Ministry of Transport, Roads & Bridges (MTRB)

Upgrading of the

NADAPAL-JUBA ROAD

from Gravel to Paved (Bitumen) Standards

CONTRACT No: ……

ICB No: ……

FINAL ENVIRONMENTAL AND SOCIAL IMPACT REPORT

Issued on:**…….**

EMPLOYER:

Ministry of Transport, Roads and Bridges, Government of Republic of South Sudan.

CONSULTANT:

SMEC INTERNATIONAL PTY LIMITED, AUSTRALIA
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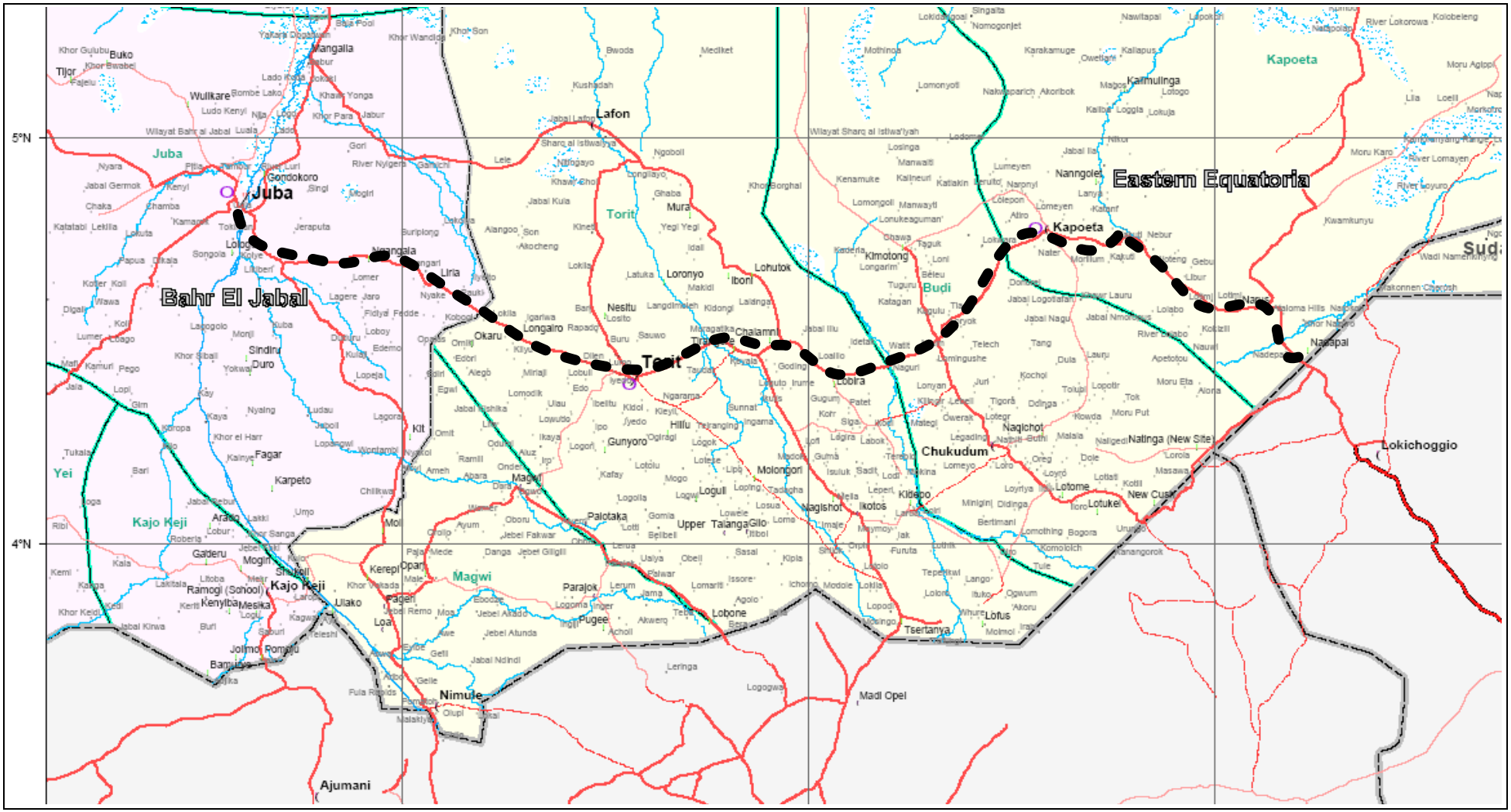

Nadapal Juba Road Location Map

EXECUTIVE SUMMARY

Introduction

The historic Comprehensive Peace Agreement (CPA) signed between the Government of Sudan (GOS) and Sudan People's Liberation Movement/Army (SPLM/SPLA) on January 9, 2005 marked the end of a 21 year civil war and signifies a new era of peace, reconstruction and development for South Sudan. To facilitate the financing of the consensus emerging from the JAM process, some donors have made pledges of assistance. Some of these donors have agreed to pool their assistance and these have been used to create separate Multi Donor Trust Funds (MDTF), one each for the North and the South. Subsequent to the JAM process, the SPLM/Government of South Sudan (GOSS), with the assistance of the World Bank, has prepared a Sudan Emergency Transport and Infrastructure Development Program (SETIDP) for implementation in three parallel phases over a period of about five years. The project development objective of SETIDP is to rehabilitate and develop critical national and rural roads and transport infrastructure, and improve critical urban infrastructure in the major towns that form the national and state capitals of South Sudan.The GoRSS intends to apply part of the proceeds of this first phase project for consultant services towards the upgrading of Nadapal-Juba gravel surfaced road to paved (bitumen) standard, which construction is planned to be carried out in follow up operations.

Although the project was initiated to be constructed under MDTF program and the ESIA prepared in 2010, recently the Government has agreed on the upgrading of the proposed Nadapal-Juba road with the World Bank and other fund organizations. By virtue of this, the draft ESIA prepared in 2010 has been updated considering the existing situation of the whole stretch of Nadapal_Juba road.

The proposed Program Development Objective (PDO) of the South Sudan – East Africa Regional Transport, Trade and Development Facilitation Program is to enhance regional connectivity and integration of South Sudan with its Eastern Africa neighbouring countries. This would be achieved through increasing transport efficiency, facilitating trade and development, connecting Juba with fiber optics, and linking South Sudan to alternative sea ports. The proposed program helps eastern part of South Sudan and north western part of Kenya to boost export oriented agricultural development by facilitating increased agricultural production along the Juba-Eldoret corridor, endowed with abundant natural resources, through improved access and development of export processing zones. The proposed program contributes to the overarching goal of integrating the economies of the countries in the sub-region and helps them compete in the free market zone of Eastern and Southern Africa, and the global market. The program will also contribute to the reduction of transport cost that will help lower the cost of economic development, services delivery to the poor, and doing business, in the sub-region.

The principal factors for focusing on the Juba–Nadapal-Eldoret corridor, include: (a) the corridor opens the massive agricultural, animal and mineral resources rich area in eastern South Sudan, the closest to the regional and global market, and the less developed Turkana region of Kenya; (b) the corridor crosses only one transit regime and will be the cost effective and shortest connection to Mombasa, in terms of truck turnaround time; (c) the project crosses flatter terrain, which will reduce vehicle operating cost and safer for driving; (d) the corridor opens access to an alternative sea port – Djibouti; ; and (e) the corridor offers the quickest route to the offshore submarine cables off the East African coast, with the fewest transit countries.

SMEC International PTY Limited of Australia has been contracted to undertake a detailed design of Nadapal-Juba Road which includes Environmental and Social Impact Assessment presented in this draft report.

Purpose of Environmental and Social Assessment

Following the World Bank Operational Policies (OPs) and National Environmental and Social Screening and Assessment Framework (NESSAF), this Environmental and Social Impact Assessment was prepared to ensure that the up-grading of Nadapal-Juba Road is environmentally sound, socially accepted and sustainable by recognizing environmental consequences and identifying ways to prevent, avoid, minimize or mitigate adverse effects as well as enhance the positive impacts.

The first purpose of the ESIA is to determine the characteristics of the existing social and bio-physical environments that may be impacted by this project. The second purpose was to provide the basis for the Environmental and Social Management Plan (ESMP), designed to prevent or mitigate potential negative impacts that may be caused by the project and enhance the positive one.

Methodology for ESIA

The methodology adopted involved gathering of the information on Bio-Physical and Social environment and ground trotting. The study focused mainly on the key (sensitive) sites, cover selected sections and reflecting the entire project area. The study involved a survey of Bio - Physical Environment, survey of Flora and Fauna (Ecological Study) and socio-Economic and Public Awareness Survey. Extensive public consultation was conducted also to understand and address the concerns from the directly affected public.

Institution, Policy and Legal Requirements

The constitution of South Sudan spells out in Section 2, that every person shall have the right to have the environment protected for the benefit of present and future generations, through reasonable legislative action and other measures that prevent pollution and ecological degradation; promote conservation; secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect the bio-diversity. It is on this basis that the ESIA was conducted. Various laws that are in place in the GoRSS have been evaluated during the study (see below table).

It is now accepted that development projects should be economically viable, socially acceptable, and environmentally sound. Being a young Government, GoRSS is still in the process of enacting various legislations, and among the pieces of legislation that are yet to be developed is a comprehensive Environmental Act/Regulation. For this reason, only pieces of legislation that are relevant to the environment and enacted have been reviewed in this report. These include the Constitution of Southern Sudan, the Wildlife Conservation and National Parks Act, Land Act 2009, Water Policy, The Forest Commission Act, Mines and Quarries Act of 1972 and the Traffic Act. On the other hand other guidelines of international in nature have been considered which include International Conventions and Treaties such as Biological Diversity Convention, Desertification Convention, United Nations Framework on Climate Change, Bamako Convention on Transboundary Movement of Hazardous Waste, Vienna Convention (ozone layer depletion), Montreal Protocol, Ramsar (wetlands) Convention and Kyoto Protocol.

The Ministry of Environment (MoE) has developed the National environment policy for the GoRSS which will include a national mandate for Environmental Impact Assessment and from the policy the procedures will be established. Currently the World Bank Operational policies, procedures and guidelines and the National Environmental and Social Screening and Assessment Framework (ESSAF) are followed in implementation of projects that are likely to have an impact to the environment and the communities. Given the scale and nature, this particular project is falls under category "B"of the World Bank Environmental Assessment classification. This classification determines the extent and depth of carrying out EIA.

The overall purpose of the National ESSAF is to provide pragmatic operational guidelines and procedures to the GoRSS to eliminate, reduce and/or mitigate the environmental and social risks associated with Bank-financed operations implemented under the ISN period.

The national ESSAF has been prepared in line with Bank operational policies and procedures for investment operations and the guidance note for crises and emergency operations for application of Bank safeguard and disclosure policies. The ESSAF was prepared to provide the basis for simplifying the application of Bank safeguard policies and related provisions of the Bank's disclosure policy to all Bank-finance operations in South Sudan during the ISN period. The Framework has been developed within the context of draft National environmental policy and the Interim Constitution and covers all phases of the project cycle. Specifically, they complement existing Environmental and Social Impact Assessment (ESIA) procedures and are to be used in undertaking EIAs for the sectors covered. Support and facilitate preparation of safeguards instruments (ESIA, ESMP, RPF, RAP) by providing relevant information on the standard content and structure of each type of instrument. This ESIA study was undertaken in accordance with the World Bank (WB) Environmental Guidelines.

The government of Republic of South Sudan has various ministries that deal directly with utilization, management and conservation of natural resources i.e. Ministry of Environment, Ministry of Interior and Wildlife Conservation (MIWC), Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR), Ministry of Agriculture, Forestry, Tourism, Animal Resource, Cooperative and Fisheries (MAFTACF), Ministry of Land, Housing and Physical Planning (MLHPP). The Ministry of Environment works hand in hand with the MTRB to ensure that environmental standards are achieved when implementing the road projects. The institutions at National and State Levels are responsible for the implementation and monitoring compliance to both national and international environmental policies and standards. There is a need to strength institutions in South Sudan to enable that to take the part in environmental conservation at all levels of development.

Summary on the applicaple policies and legal frameworks		
Policy and legal framework	**Key points**	**Compliance to the policy and legal framework**
The Interim Constitution of Southern Sudan (2005)	The constitution spells out that every person or community shall have the right to a clean and healthy environment and the environment protected for the benefit of present and future generations. All levels of government in Southern Sudan shall promote energy policies that will ensure that the basic needs of the people are met while protecting and preserving the environment. In addition, under article 49, duties of the Citizen section (h) indicated that, every citizen in Southern Sudan shall in particular protect the environment and conserve natural resources.	This ESIA prepared in line with the constitution to avoid/minimize any potential negative impacts from the proposed Juba-Nadapal Road. The mitigation measures under this ESIA will take care of the statutes of this constitution to enhance the proposed development projects to be environmental friendly.
Environment Policy (2010),	The policy provides a wide range of guidance in response to emerging environmental management challenges to enable decision makers and resource users make development choices that are economically efficient, socially equitable and environmentally friendly to ensure realization of sustainable development. The goal of the South Sudan National Environment Policy is to ensure protection and conservation of the environment and sustainable management of renewable natural resources in order to meet the needs of its present population and future generations.	This policy was important to the Juba-Nadapal upgrading road project, as it provides general guidelines and principles to be followed in environmental management during the constructionand oprations. The draft ESIA report prepared on the basis of the requirnment of the national environmentsl policy.
Environment Protection Bill (2010),	The purpose of the Draft Environment Bill (2010) covers all matters concerned with the Environment in South Sudan and to promote the prudent use, development, conservation and recuperation of its Natural and Environmental Resources, ecosystem services and biological diversity; to integrate Environmental considerations into development policies, plans, programs, and projects at the community, government and private sector levels; to promote effective, widespread, public participation in the consideration and the incorporation of Environmental considerations into development activities and to contribute to the resolution and management of conflicts related to the use of natural resources and the Environment. The Bill stipulates also the need to undertake an Environmental Impact Assessment where and when the Lead Agency deems the project may have varies levels of an impact on the Environment.	This ESIA study is designed and prepared in accordance and requirement of the Draft National SS-Environmental protection bill.

SS-Environmental and Social screening and Assessment framework	The overall purpose of the National ESSAF is to provide pragmatic operational guidelines and procedures to the GoRSS to eliminate, reduce and/or mitigate the environmental and social risks associated with Bank-financed operations implemented under the ISN period of FY13-15; and to develop procedures for the effective environmental planning and management of selected development projects and their operation. The ESSAF was prepared to provide the basis for simplifying the application of Bank safeguard policies and related provisions of the Bank's disclosure policy to all Bank-finance operations in South Sudan during the ISN period.	The draft ESIA prepared Nadapal in line with the National ESSAF and all the measure indicated under this ESIA would comply and follow the guidline and procedures indicated in the NESSAF
Southern Sudan Land Act 2009,	According to the Land Act 2009 Chapter 2 Section 7 all land in South Sudan is owned by the people of South Sudan and its usage shall be regulated by the government. This land may be acquired, held and transacted through customary, freehold and leasehold by the people of South Sudan. Section 73 (Reasons for Expropriation of Land for Public Interests) stated that (1) The Government of Southern Sudan, State Governments and any other Public Authority may expropriate land for public purposes subject to compensation and upon agreement as prescribed by this Act or any other law. Section 70 makes provisions for (1) Any allocation of land for investment purposes shall be subject to a social, economic and environmental impact assessment to ensure that the social, economic and environmental implications of the activities on the land are taken into account before any decision is made thereon. (2) The process shall involve an analysis of the possible effects on the environment, biodiversities, people and assets. (3) A social, economic and environmental impact assessment shall be undertaken by both public and private sectors prior to any activities that may have impact on the environment and the people as determined by law, this Act or any other law or regulations.	The draft ESIA was complied with the legislation under the national land act. All measure stated under the ESIA refelected and resonded the requirnment of the Land act 2009.
Wildlife Conservation and National Parks Act,	Section 14, this act refers the interest of the proper management and development of the national park, no person shall within any national park:- a) Cut, clear burn or otherwise damage or remove any tree, bush, plant or other vegetation or any part thereof; b) Occupy, cultivate or plant any land or otherwise grow or harvest any crop;	ESIA identified that No National parks are found along the proposed road. Only the management to minimize the cutting of trees are indicated in accordance with this act

	c) Construct or occupy any house, hut, shelter or, any other structures; d) Notwithstanding the provisions of any other law, mine, quarry, drill for or remove any minerals, stones, gravel, earth or other substances, or prospect for such substances; e) Use a national park as a disposition ground for any kind of waste, etc..	and other national Environmental policies and guidelines.
Wildlife Conservation and Protected Areas Bill, 2010,	Currently, the MIWC is developing Wildlife and Protected Area Policy, from which a new set of legislation will be developed to replace The purpose of this Bill, is to cover all issues regarding with wildlife conservation, the establishment and management of Protected Areas and controlled areas and to preserve Southern Sudan's natural heritage including its unique wildlife. The Bill contains principles that introduce new concepts of: public participation, community-based conservation; participation of local and traditional leaders, cultural and social benefits for conserving wildlife resources; recognition of indigenous knowledge Wildlife Conservation and mitigation of human-wildlife conflicts wherever they occur.	The draft ESIA accounts issues considered uinder this Bill to avoid/minimize any impacts to the wildlife and protected areas due to the implementation of the proposed road.
Draft Forestry Policy	The first draft of the new forestry policy was produced in June 2006 and has been under discussion since then. The policy is in line with best practice in sustainable forest management and is based on guiding principles that include sustainable development, poverty eradication, equity, and community involvement.	The report indicated that No National forest priority areas along the proposed Juba –Nadapal road project. Measures to minimize cutting of trees and proper compensation and planting trees are indicated in the draft ESIA report.
The Mines and Quarries Act 1972	The GOSS is yet to develop a Mines and Quarries Act however currently the Mines and Quarries Act 1972 is operational and adopted by the government of South Sudan. In the Act ownership of mineral resources and quarried material as lying in, upon or under land or under territorial waters or upon the continental shelf of the Republic of Sudan, is vested in the Government which shall have the exclusive right of prospecting for and getting such minerals. The Acts through the Mines and Quarries Board provides for issuing of Quarrying licence authorising the holder to get quarried materials from a quarry as provided for in the licence and to sell them in accordance with the provisions of this Act or any other Act.	This particular project will involve extraction of gravel and other materials from quarries and borrow pits. The report indicated that clearance in the form of mining licences or leases from the GOSS - Ministry of Petroleum, Mining and Industry and MoE shall be issued to contractor.
World Bank Policies: Environmental	The policy required a detail screening should be conducted for all bank financed projects early in the identification stage and determine the project	The EA confirmed that appropriate levels of environmental and social

Assessment (OP 4.01)	boundaries and classify projects into the appropriate safeguards category. The policy describes an environmental assessment (EA) process for the proposed project. The breadth, depth, and type of analysis of the EA process depend on the nature, scale, and potential environmental impact of the proposed project. The policy favors preventive measures over mitigatory or compensatory measures, whenever feasible.	screening were carried out as part of project design and identifies also the environmental assessment category to be Category B projects. Most of the requirements of this safeguard policy have been responded to in this report, by evaluating the impact of the project, its alternatives, existing legislative framework and, conducting public consultations and by proposing mitigation measures for the potential impacts identified.
Involuntary Resettlement (OP 4.12)	The objective of this policy is to avoid where feasible, or minimize, exploring all viable alternative project designs, to avoid resettlement. The Bank's Policy on Involuntary Resettlement is intended to assist displaced people arising from development projects, in order not to impoverish any affected people within the area of influence of project. An action plan that at least restores their standard of living must be instituted, in cases where resettlement is inevitable or loss of assets and impacts on livelihood occurs.	The ESIA study identified the proposed project generates an impact on the properties and structures along the road. In line with this policy, the draft ESIA specifies the possible measure (including the preparation of RAP) to minimize and compensate impacts in relation to comply with this policy.
Physical Cultural Resources (OP 4.11)	This policy guides in preserving physical cultural resources and helps to reduce chances of their destruction or damage. The policy is premised on the need to investigate and take inventory of cultural resources likely to be affected. Mitigations are provided for in cases of adverse impacts on physical resources. The Bank does not support development actions likely to significantly damage non-replicable cultural property, and does assist only those projects sited or designed to prevent such damage.	To minimize and /or avoid the potential impacts on the PCR, the Chance find procedures and other mitigation measures are stated in the draft ESIA in accordance with the Bank's policy.
Indigenous People (OP 4.10)	The objectives of this policy is dedicated to ensure that the development process fully respects the dignity, human rights, economies and cultures of Indigenous Peoples; ensure that adverse effects during the development process are avoided, or if not feasible ensure that these are minimized, mitigated or compensated; and ensure that indigenous peoples receive culturally appropriate and gender and intergenerationally inclusive social and economic benefits.	The policy OP/BP 4.10 is triggered. As stated in the national ESSAF, the community consultation were conducted to hear the views and perception of the people in and around the project area and issues raised have been taken in to account in the draft ESIA report.

	In South Sudan, based on initial technical work inside and outside the Bank, it appears that the overwhelming majority of citizens are likely to meet the policy's criteria. When Indigenous Peoples are the sole or the overwhelming majority of direct project beneficiaries, the elements of an Indigenous Peoples Plan (IPP) should be included in the overall project design, and a separate IPP is not required.	
Bank's Policy on Disclosure	World Bank consultation and disclosure requirements will be met based on the operating environment within which the project and/or subproject is prepared. All projects and subprojects will aim to include open and transparent consultations with local communities, project beneficiaries, project affected persons and other local and interested stakeholders with a specific view to solicit feedback from both genders to the extent possible based on prevailing conditions at the local level. The safeguard instruments for all projects will be disclosed at the InfoShop and in-country in English and the most appropriate local language to the extent possible based on local conditions	As per the Bank's Disclosure policy the draft ESIA is planned to be disclosed and made available at various offices and levels in Country and infoshop before appraisal of the project at the end of September, 2013.

Project Baseline Site Conditions

The Nadapal - Juba Road is an interstate road that links The Central Equatoria and Eastern Equatoria states. The entire road covers approximately 341.2 km traversing undulating terrain. The road passes through major townships and trading centres i.e. Nadapal, Narus, Kapoeta, Lobira, Torit, Liriya, Ngangal and Nesitu Junction which marks the end point. Along the road there are numerous villages alongside the road and with a varying population.

- **State organization and population**

South Sudan is located in Africa with Juba as its capital city. South Sudan borders Ethiopia to the east, Kenya, Uganda, and the Democratic Republic of the Congo to the south, and the Central African Republic to the west. South Sudan consists of the ten states which formerly composed the provinces of Equatoria (Central Equatoria, Eastern Equatoria, and Western Equatoria), Bahr el Ghazal (Northern Bahr el Ghazal, Western Bahr el Ghazal, Lakes, and Warrap), and Upper Nile (Jonglei, Unity, and Upper Nile). It is estimated that the population of South Sudan is around 12 million, but given the lack of a census in several decades, this estimate may be severely compromised. The economy is predominantly rural and subsistence farming.

- **National Topography and Soils**

South Sudan is bisected roughly by the Nile River which is surrounded by a gently sloping to flat basin into which the highlands of the surrounding countries drain. It has a "substantial areas of relatively high soil suitability ratings for rain-fed agriculture" (relatively flat topography, productive albeit occasionally heavy soils, and low intensity of cropland use). Crop production is scattered, and the soils, where cultivated, lose fertility relatively quickly; even the richer soils are usually returned to bush fallow within five years.

Livestock rearing is this area's major activity, but a significant amount of crop cultivation, mainly of millet, also occurs. The qoz sands are the principal area from which G*um arabic* is obtained through tapping of *Acacia Senegal* (known locally as hashab). This tree grows readily in the region, and cultivators occasionally plant hashab trees when land is returned to fallow.

- **Geology**

The geology of the South Sudan is extremely diverse with a variety of metamorphic, igneous and sedimentary rocks. The intensity of deformation and metamorphism varies from place to place. Extensive studies carried out by several workers in Sudan proved that the central Sudan and Nile Valley metamorphic belt include relic structures of ancient basement which date back to Lower Proterozoic or even Archaean. The project will traverse different section with diverse geologic characteristics this will determine the intensity and magnitude of ground exaction works that will be carried out.

- **Rainfall and Temperature**

Rainfall is seasonal across most of the south, with a pronounced dry season lasting from January to April, coinciding with the hot season. This causes large scale migration of many of the pastoral people to wetlands along the river and elsewhere in pursuit of water and fodder for their herds. Rainfall in the south western extremes and highland areas of Equatoria ranges from 1200 to 2200 mm. The most arid portions of South Sudan occur in the extreme southeast along the border with Kenya where rainfall may not exceed 200 mm. The tropical climate in South Sudan defined in the desert zones, where winter temperatures as low as 4.4°C (about 40°F) is common, particularly after sunset. Summer temperatures often exceed 43.3°C (about 110 F) in the desert zones and rainfall is negligible.

- **Agro-Ecological Zonation within South Sudan**

Descriptions of the ecology and environment of South Sudan had to be cobbled together from older documentation, much of it citing earlier works which might no longer be entirely valid or which contained unverified data and information. It is predicated on the notion that planning and development interventions need to take account of both the physical environment and how people use it to derive their livelihoods.

- **Drainage Pattern and Surface Water**

There are numerous wetlands ecosystems in South Sudan. Wetlands are a common feature of the flat plain areas west and east of the Nile and the existing road system traverses them on countless occasions, often over causeways or raised roadbeds that were also expensive to build and which have disrupted the wetland ecosystem. The predominance of wetlands is vitally important as part of the land-use strategy among the agro-pastoralist society which retreats to them during the long dry season to sustain their cattle with fresh fodder and water. Wetlands also serve an important ecological function as well, absorbing the run-off from occasionally torrential rain storms, storing it and releasing it slowly later in the season regulating the flow of many streams and watercourses. There are several rivers crossing the road at different points.

- **Soil Erosion**

Large proportions of the population live in rural areas (90 per cent out of the total population), making them subject to rapid economic development such as logging and agricultural development. There are positive impacts of any rural development, but also there are negative impacts such as deforestation, soil erosion, and flooding. Soil erosion reduces the productivity of the crops, range, and forest and as a result of that endangers food security, causes displacement of local people and degrades the quality of human life in the affected areas. There is a relationship between food security/insecurity and environmental degradation, this result from

inappropriate cultivation practices, overgrazing, excessive fuel wood, cutting, burning, and overstocking of animals and deforestation. This process of soil erosion has resulted to high poverty.

- **Flora and Fauna in South Sudan**

South Sudan endowed with a wide range of ecosystems and species diversity (flora and Fauna). South Sudan is considerate to biologically richest as compared to the neighbour country (Sudan). The ecological zones extend over a wide range from the desert in the extreme north to the rain forests deep in the southern parts. Conservation of biodiversity is vital in a country like South Sudan, where ecosystems are fragile and the renewable natural resources are endangered through over-exploitation.

There is evidence that many aquatic and terrestrial species have either disappeared or are subject to severe threats resulting from the destruction of their habitats. Limitation of legislation and law enforcement efforts which call for protection of biodiversity have led to improper utilization and misuse of natural resources and adversely affected the biota both at sea and land. Lack of clear policy and strategy for the conservation and management of resources has led to unsustainable use of resources and irreversible loss of biota.

- **Biological Resources and Ecological Analysis**

The vegetation is diverse but mostly of the lowland woodland, bush land, shrub land and grassland. These undulating plains are crossed by several perennial rivers namely: Kidepo, Thingaita, Koss Idou and Kudo which forms a unique ecosystem. A total of 19 (nineteen) plots were laid out between Nadapal and Nimule Junction. Emphasis was made on species diversity survival and coping mechanisms of the local population. South Sudan is not a highly urbanized region, with low population density, apart from the major towns and located along the road. Most of the structures are temporary to semi-permanent in nature. These are centres of population concentration, which are included as towns because of their administration and commercial importance.

On the other hand South Sudan is much better watered and more fertile than the arid north but it is still a land where the imperatives of fragile soils, erratic rainfall regimes and under-developed land-use technologies mean that local people are persistently vulnerable to food insecurity. Most of the social infrastructures such as electricity, feeder roads, and health are poorly developed the high insecurity cases along Nadapal - juba road has made development along this road to lag behind. Therefore, with upgrading of this road the general security situation of the region will be improved and consequently development project to improve the general wellbeing of the communities will be achieved.

Detailed Description of the Project

The Nadapal-Juba road is located in Central and Eastern Equatoria States. The Nadapal-Juba road has been identified by the GoRSS since 2003 as one of the priority roads for investment to speed up post-war reconstruction, add support to development and reduce the cost of transit transport goods into the country coming from Kenya. The total length of road is approximately 363.2km of unpaved road which provides transport connectivity between Juba and the district headquarters, towns and villages of Juba, Torit, Budi and Kapoeta Counties in Central and Eastern Equatoria states. The road is also an international corridor linking the hinterland of South Sudan with markets in Kenya and international markets through the port of Mombasa.

The topography of the project area can be described as undulating at Nadapal and the hills surrounding Mineral Springs. The next section is mainly flat plain. From Longario, there are high volcanic outcrops up to Liriya and Luluba. From Torit to Ngalagala, the road crosses numerous streams and rivers and follows a gently sloping ridge through the subsequent section to Juba.

The altitudes vary from an elevation of 741 m at the border with Kenya to 800 m at Mineral Springs, 620 m at Torit and with gentle variations in slope down to an elevation of 460 m near Juba.

Activities Associated with the Project

Some of the main activities that will be associated with road construction are outlined below

- Establishment of construction camps
- Construction of temporary/permanent accommodation
- Provision of sewage disposal facilities
- Water abstraction
- Construction of workshops
- Transportation of construction materials and equipment
- Recruitment of the labour force
- Earthworks
- Construction of detours and access routes
- Borrow pits and materials extraction
- Crushing and screening of materials
- Operation of Asphaltic Plant
- Screening, mixing, and stockpiling of aggregates
- Transportation of hot mix asphalt
- Construction of drainage structures, e.g. culverts, bridges
- Excavation of side drains, mitre drains, and cut-off drains
- Pavement Construction
- Construction of erosion protection works
- Asphaltic concrete binder and wearing courses

These activities will have various degrees of impact on both the biophysical and human environment. This Environmental and Social Impact Assessment report includes a Management Plan that is intended to act as a guide in avoiding negative impacts, and mitigating those, which are not avoidable. The project will involve utilization of different material in different quantities and quality. Material that will be used during construction of this road will include:

- Granular Subbase
- Hard rock
- Sand
- Water
- Bitumen

Proposed Road Upgrading Project

In line with the South Sudan road design standards the proposed road upgrading shall consist of the following:

(i) Design Speed - Varies at different sections

(ii) Lane Width - 3. 5m (each lane)

(iii) Shoulder Width - 1.5m (to edge of drain, unless there is restriction)
(iv) Type of carriageway pavement –Asphaltic Concrete surfacing
(v) Shoulder Surface –Asphaltic Concrete
(vii) Design Life - 20 years

The proposed project upgrading works will comprise the following:

- Improvement of the alignment at the poor sections;
- Realignment of road to by-pass Torit Town;
- Widening the road to a width of 10.0m (including the shoulders);
- Reconstruction of the base material and pavement of the entire road length;
- Reconstruction or upgrade of 22 crossings/bridges;
- Reconstruction or Construction of about 200 box culverts;
- Provision of lay-bys/bus bays at appropriate locations;
- Installation of road signs and markings; and
- Installation of necessary traffic and pedestrian control devices

Public Participation

The public consultation shows that the local people are very supportive of the Project and want the Project to be completed as soon as possible.
The people surveyed understood the Project contents well and had most concerns related to the noise and traffic safety. Concerns raised by the affected public have been recorded by ESIA team, and together with the design team responsive mitigation measures have been developed and included in the report. Following are the major public concerns and responses:

1. Land acquisition and resettlement
2. Employment of local labour force
3. Siting of borrow pits and quarries
4. Noise and safety impact
5. Traffic blocking
6. Soil erosion
7. Bitumen emission
8. Cultural heritage
9. Security of the workers and materials

One of the major concerns from the communities during public participation was regarding the construction of workers camps. A request was put forward to the contractor(s) to put up permanent structures for the workers so that after completion of the project the structures will be donated to the community to be converted to a may be a school, hospital, Government offices. It is therefore important for the GoRSS to consider this request and forward it to the contractors who will be constructing the road.

Project Alternatives

The alternative to the current alignment is to build a new road which will result in much higher and more significant environmental/social impacts; land acquisition, rural residents relocation

and resettlement, damage to plants, more earth work and higher soil erosion. Furthermore, as the residential centres are settled along the existing road, they will receive no improved benefits on access to service and market if an alternative road is constructed.Although demining activities are on-going along the road corridor, there is a danger posed by the unexploded landminesthat are planted adjacent to the main road which may still exist.

It is obvious that upgrading of the existing road will have the least negative environmental impacts than the alternative, a completely new road. Therefore the upgrading of the existing road is considered the optimal and no other alternative is designed for comparison. The ESIA team is convinced from the above studies and analysis the project would have effective protection both from engineering and environmental aspects.

Environmental and Social Impacts and Mitigation Measures

The upgrading of this road and subsequent construction of various structures along the road will not only improve the transport but also open up the entire region for development. In view of the activities involved it is anticipated that the project will have both positive and negative impacts during and after construction. These impacts can be direct and indirect and over the length of the roads involved here in South Sudan and lead to unacceptable cumulative impacts on both the bio-physical environment and on the human environment. These must be avoided or mitigated if the roads program is to be fully effective and efficient

The ESIA team is convinced from this study and analysis of the impacts the project would have effective protection both from engineering and environmental aspects. With appropriate measures during construction, the potential adverse impacts to the environment can be minimized and the environmental benefits of upgrading of the existing road are obvious.

The road upgrading project is expected to have positive impacts in the long term as it will facilitate economic development thereby promoting improvement in the living standards of the persons living along the road corridor and South Sudan in general. Despite this long term positive impacts, the project may have some negative impacts in the short term mainly during its implementation. These include (a) loss of land; (b) loss of homes; (c) loss of income; (d) loss of access to property resources; (e) joblessness; (f) food insecurity: (g) increased morbidity; (h) community displacement; and (i) spread of HIV/AIDS. Overall, land acquisition and resettlement impacts of the project are modest with minimal risks associated with losses to lands and homes.

The project requires the acquisition of about 375 hectares spread linearly along the entire 341km stretch. The total number of project affected household is 180 and they will lose only a small linear portion of the total land holdings they own and/or cultivate. The estimated number of people who live in the affected families is 1218. A total of 154 small businesses along the road project will be adversely affected and they accounted for more than 30% of household incomes. The income loses that will be directly attributable to loss of land especially on business plot is expected to be high and consequently adequate mitigation measures have been provided for.

The land acquisition will be based upon a legal framework consistent with the international best practices, laws and regulations of Southern Sudan, as well as international standards outlined in the World Bank Group Operational Policy (OP) 4.12. All affected immovable assets have been inventoried. Accordingly, about 517 land segments with different land use characteristics (predominantly farm lands) will be partially affected.

This RAP has been prepared for the unavoidable adverse impacts and prescribes the means and cost of mitigating these negative impacts. The ultimate objective of resettlement and restoration

is to ensure a reinstatement of life and production of the impacted individuals, enterprises and institutions in a short period of time and to maintain or raise the living standards and productivity as quickly as possible. The resettlement program will be implemented under the leadership of the local County governments.

The road project will only affect a few houses and farm land in the Bomas and will not have significant impact on their original production and living system. Majority of the PAPs whose houses and properties are lying within the road corridor requested that they be resettled within their original community, so that their way of production, living and social relationship can be maintained. Since land is communally owned, communities have agreed to reallocate an equivalent land for free to the PAPs to be resettled. The project was only asked to compensate in cash or in kind the relocation and reconstruction costs.

Simple ground leveling will be carried out by the project on the relocation sites as most housing structures to be relocated are temporary structures. In most cases, the ground will be leveled by a way of minimal excavation by the local labour. The ground leveling fee will be included in the reconstruction costs.

No social services such as schools, churches, mosques, and health centers shall be affected and demolished by the proposed road Project. The design of the road has taken into consideration distance location of social services and no such facilities shall be affected.

The vulnerable groups identified along the road project include unemployed youth, squatters, landless, wounded soldiers, poor households, households with disabled members, households headed by the women, and the households consisting of the aged. The unemployed youth will be given first priority when it comes to skilled and unskilled labour for the construction of road. The rest of the vulnerable groups that will be affected by the project have been included in the RAP and appropriate relocation site has been identified by these households themselves.

The public utilities which were originally documented for demolishing in Torit town will no longer be affected as a result of the redesign of the road to include the Torit by-pass. The proposed by-pass which is about 15km long lies within a virgin land with no communities and by passes the Torit town completely. Although the Torit town roads shall be rehabilitated as part of the road upgrading it shall follow the existing alignment and right-of-way (ROW). Therefore, no property or facilities to be affected in Torit town.

Summary of impact on structure and other properties

Type of Impacts	**Amount**
Affected Land Segments	517
Area Lost due to the Project (ha)	375
Affected Fruit Trees	28
Tukuls/Residential Houses	
• Permanent	3
• Semi-permanent	30
• Temporary	138
• Animal Sheds	5
• Toilets	
• Cooking Shed	42
Affected Business Structures	

• Permanent	13
• Semi-Permanent	67
• Temporary	65

Summary of Analysis of Potential Impacts

Potential Impact	Nature of Impact			
	Construction Phase		Operation Phase	
		Mitigation		Mitigation
Impacts on Local Hydrology	-, Irr,t	Y	+	Y
Soil Erosion and Degradation	--, L,Sp	Y	-	Y
Impacts on Tropical Forests and Protected Areas	-, P, Irr	Y	0	
Increased Access to Natural Resources and the Potential for Land-Use Changes and the Rate of Habitat Loss	-,Irr,P,	Y	0	Y
Water and Soil Contamination	--,Sh	Y	0	
Water Sources for Construction Work	-, Sp	Y		
Loss of Vegetation	-, R	Y		
Environmental Health, Safety and Aesthetics of Borrow Pits and Drainage Features	-,P,R	Y	-,P,R	Y
Construction Camp Impacts	--,L,R,Y	Y	0,-	Y
Environmental Health and Safety Hazards of High Dust Conditions	--,T,R	Y	--,T,R	Y
Traffic Safety on Improved Roads	T,Sp,R	Y	-	Y
Material Storage and Handling	-	Y	0,NC	0, NC
Diversion routes	+,T	Y	0	0
Waste Management	--,R, Sp	Y	-	
Spread of Disease along Roads	--,P,Sp,R	Y	--,P,Sp,R	Y
Roads and Internally Displaced Peoples	+		++	
Demographic Changes	++, Sp	Y	++, W	Y
Cultural Resource Impacts	-	Y	-	Y
Human Settlement impacts	-,T	Y	+,-, P	Y
Noise Level	-, Sp, T	Y	-, Sp, T	Y
Conflict Impact	+,Sp,	Y	-	Y
National / Regional Economy	++,P,W		++,P,W	Y
Increased Occupation / Economic Activities	++,Sp	Y	++,W	Y

Impacts Analysis Key

Key	Type of Impact	Key	Type of Impact
++	Major Positive Impact	+	Minor Positive Impact
--	Major Negative Impact	-	Minor Positive Impact
0	Negligible Impact	NC	No Change

Sp	Specific/Localized	W	Wide Spread
R	Reversible	Irr	Irreversible
Sh	Short term	L	Long Term
T	Temporary	P	Permanent
Y	Mitigation of Negative Impact/Enhancement of Positive Impact is Possible	N	Mitigation of Negative Impacts/Enhancement of Positive one is Not Possible

Environmental Monitoring and Management Plan

Monitoring is a long-term process, which should begin at the start of construction and continue throughout the life of the road project. Its purpose is to establish benchmarks so that the nature and magnitude of anticipated environmental and social impacts can be continually assessed. So monitoring involves the continuous or periodic review of construction and maintenance activities to determine the effectiveness of recommended mitigation measures.

The responsibility for the incorporation of mitigation measures for the rehabilitation of the roads lies with the Supervising Engineer, who must ensure that the Contractor implements all specified mitigation measures. The MTRB through the supervising engineer and the Environment officer will have to oversee the supervision of the road during construction to ensure that the contactor conforms to the mitigation measures.Environmental monitoring should adopt a cross-sectoral approach to ensure that mitigation measures are well implemented.

Simple monitoring systems should be set up during construction by the Supervising Engineer and Contractor and during operation by the MTRB, so that potentially environmentally problematic areas can be detected well in advance and the appropriate remedial action taken. Many of the potentially significant negative impacts identified in the ESIA relate to the construction and operation phase of the project. Mitigative and support measures are therefore, best achieved through the incorporation of suitable clauses in the contractual documents, which are enforced by the Supervising Engineer.

Environmental and Social Management and Monitoring Plan

Environmental/ Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Impacts on Local hydrology	Install drainage structures properly Efficiency of drainage structures	Design Engineer, Supervising Engineer and Contractor	Ministry of Transport, Roads and Bridges (MTRB), Ministry of Electricity, Dams, Irrigation and water Resources (MEDIWR).	Inspection Routine maintenance and road condition survey	During construction and on completion of each structure Once per year
Soil erosion and degradation	Control earth works Install erosion control measures Grouted stone pitching and rock fill gabion works to protect culverts inlets and outlets Landscape embankments and re-vegetate gravel sites with indigenous grass For drainage ditches along the road scour checks will be necessary in steep section. Management of excavation activities On section with high filling and deep cutting, slopes should be covered by stone walls and planted with grass. If existing drainage are damaged or removed they should be replaced or rehabilitated with better ones. Impact on soil erosion on road and off road, embankment, riverbanks. Efficiency of erosion control measures	Supervising Engineer and the Contractor. MTRB	MTRB, Ministry Environment (MoE), Ministry of Interior and wildlife Conservation (MIWC), Ministry of Electricity, Dams, Irrigation and water Resources (MEDIWR).	Inspection Routine maintenance and road condition survey	Daily: during construction and on completion Once in 6 Months to account seasonal variations if any

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Environmental/ Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Vegetation loss	Control clearing Avoid clearing using herbicides Replanting where vegetation is unnecessarily removed Landscaping and planting all disturbed areas (Pits, deviations, embankments, campsites) Planting trees at main towns along the road. Planting and grassing should be done just before the rains or otherwise watered Care for trees planted	Supervising Engineer and the Contractor	MTRB, MoE, MAFTACF	Inspection Observation	Daily during construction and completion Weekly Randomly
Access to protected areas	Control clearing of vegetation Planting trees/shrubs to provide new habitat where vegetation has been destroyed Prohibit hunting/poaching of wild animals by project staff Install warning signs Enforce speed limits Monitor wildlife kills	Supervising Engineer and the contractor during construction phase	MTRB, MoE, MIWC, MAFTACF	Inspection Routine maintenance Observation Reports	Daily Once in six months
Public health and occupational safety	Sensitization campaigns on HIV/AIDS and STDs in the communities along the project site Monitor solid waste disposal and collection Monitor waste water management Provide clean water to the project worker	Contractor Supervising Engineer, MTRB, MoE	MOH, MoE, MTRB	Observation during construction Observation/reports during operation	Once a year during operation

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Environmental/ Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Water and soil contamination	Incorporate erosion control measures Works on culverts to be done in dry season Proper disposal of construction debris and solid wastes from impending water bodies and drainage systems Proper handling, storage and disposal of oil wastes. Proper disposal of wastewater sewage at contractors' workmen camps Construct parking bays at terminal towns for heavy vehicles with oil interceptors drains Maintain plant and equipment. Maintenance of construction vehicles should be carried out in the contractors' camps	Supervising Engineer, Contractor and Design Engineer. MTRB and MoE	MTRB, MIWC, MoE	Inspection/tests Routine Maintenance	Daily during construction Once in six months after completion and
Noise pollution	Sensitise workforce Supervise construction traffic Sensitise driver of construction vehicles Regular maintenance of plants and equipment Workers in the vicinity of high level noise to wear protective gear Impose speed limits of all vehicles especially at the towns and villages Sensitize road users	Supervising Engineer and Contractor MTRB and MoE	Contractor Traffic Police	Inspection/Observation during construction and operation	Daily/Random during construction and operation

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Environmental/ Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Air pollution (Dust)	Control speed of construction vehicle Prohibit idling of vehicle Sensitize workforce Residential houses should be 500M downward wind of Bitumen mixing site Water should be sprayed on deviations, temporary roads leading to quarry site, barrow pits and Bitumen mixing site. In filling sub grade water spraying is needed to solidify materials and assist in compaction Plant trees around settlement areas to act as barriers to dust Regular maintenance of plant and equipment Impose speed limits for all vehicle especially at towns and villages Sensitize road uses	Design Engineer Supervising Engineer Contractor MTRB and MoE	MTRB, MOH, MoE and Traffic Police	Inspection Observation	Randomly during operation
Construction camps	Sufficient measure will be taken in the construction camps like provision of dust bins and sanitation facilities, If septic tanks are to be installed waste will be cleared periodically Special attention will be given to sanitary condition at the campsite Garbage will be disposed off periodically	Contractor and Supervising Engineer MTRB and MoE	MTRB, MoE and MOH	Regular inspection during construction	Daily during construction

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Environmental /Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Water sources/abstraction	Management of water usage Plan for harvesting and storage of water during rains for use later Plan works schedule according to water availability Abstraction not to be done during low flow	Supervising Engineer and the contractor	MEDIWR	Meetings Inspection Check plans and schedule	During rains During abstraction and at random
Barrow pits and gravel sites	Inform people living at/near the site that the pit have been selected for exploitation Arable land should not be used as barrow pit whenever possible. For new barrow pits the top soil should be kept and refilled later after construction is over to minimize impacts on the ecosystem and agriculture Plan access to gravel site Control and restrict access to gravel site by fencing Control earth works Proper management of excavation activities Rehabilitate, landscape, terrace if necessary and grass sites Replace trees that were removed during excavation Discourage pans being made into water pans after construction Rehabilitate old unused gravel pits Compensate land owners as required Progress of rehabilitated gravel sites	Supervising Engineer and Contractor Design Engineer MTRB and MoE	MTRB, MoE	Meeting during construction Inspection during Construction Payment records/compensation records during construction Inspection during operation Preparation of Re-instatement plan by the contractor and supervised by the Engineer	Once/daily immediately after section of the site during construction phase Once before excavation begins Once in Six months during operation

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Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Deviations routes	Plan deviations Adhere to road reserve if possible Obtain permission from inhabitants if deviation goes beyond ROW Reinstate deviations to its original state on completion of the road. Management of traffic along deviations Pay compensation for crops/property removed/destroyed by deviations on inhabited land Monitor rehabilitation of the deviations	Supervising Engineer and the contractor Design Engineer	MLHPP and South Sudan Lands Commission , MTRB	Check plans and inspection during construction Payment and compensation records during operation	Daily when deviation are in use Once before construction of deviation Once in six months during operation
Traffic safety on the road	Install warning signs on approach to trade centres and busy junction as well as black spots Enforce speed limits Monitor road accidents	Supervising Engineer and the Contractor Design Engineer Roads Engineer	MTRB, Traffic Police, MLHPP	Inspection during construction Routine maintenance and observation during operation	When erecting during construction Once a month during operation
Waste Management	Designate a specific place as dumping site Where possible recycle the waste materials. Encourage the worker to be responsible enough and avoid deliberate dumping of waste materials such as plastic bottles.	Supervising Engineer and the Contractor Environmental Specialist	MTRB, MOE, MoH	Inspection during construction Routine maintenance and observation during operation	Daily Once in six months During operation
Material storage and handling	Ensure that safety procedures are followed, wearing of personal protective equipment, having fire prevention plan and fire equipment, raining workers handling them and maintenance of construction vehicles	Supervising Engineer and the Contractor	MTRB, MOE	Inspection during construction	Daily Once in six months during operation

Socio Economic Impacts

Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Land Acquisition Impact: Loss of land predominantly under agriculture by owners of acquired land	Minimize land acquisition; Adequate compensation; Demined areas identified as farm sites to enable residents move their farm away from the road project.	GORSS	MTRB GOSS	Household farm size	Annually
Impact: Loss of numerous housing structures as over 80% linearly exist within 5 meters on either side of the proposed road centre.	Adequate compensation Demined areas identified as resettlement sites to enable residents build their structures way from the road project	GORSS	Project GOSS	New settlement sites	Annually
Impact: Loss of shade for community meetings and income as a result of felling of numerous tress dominated by mango trees on road side	Planting of shade and fruit trees in the resettlement sites; Minimise unnecessary felling of fruit trees	Communities	Project Project	Number of new trees planted	Annually

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Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Traffic and Safety Impact: Loss of lives and livestock due speeding vehicles during and after construction	Provide facilities for pedestrians and non motorized traffic. Erect and maintain all traffic safety measures	Contractor	Project Project	Traffic records on number and nature of accidents	Monthly
Influx of Project workers Impact: Overstretching of few social infrastructures available in the area (house rent rise, water shortage and sanitation problem)	Use of temporary camp sites to accommodate workers Provision of good and sufficient water supply, sanitation and waste disposal facilities in camp sites.	Contractor	Project Project	Percentage increase in house rents Number of persons per toilets,	Monthly
Impact: Increased STDs including HIV/AIDs infections due to increased number of commercial sex workers from Juba, Kenya and Uganda	STDs sensitization campaigns. Training and distribution of awareness materials for information, education and communication on HIV/AIDs Distribution of condoms, and encouraging status testing.	GOSS – MOH	Project Project Project	Number of sensitization programs Number of residents visiting Voluntary Counselling and Testing Centres	Monthly

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Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Labour requirements Impact: Increased employment opportunities and skills acquisition	Priority to be given to local indigenous people in all vacancies Skills improvement and on job training programs to locals	GOSS & Contractor	Project Project	Employment rate	Annually
Security of project workers	Open door policy to facilitate information flow to and from host communities to enhance cordial relationship Each Country Commissioner to be responsible for security on sections of the road within their Counties	GOSS	Project County	Acceptance level Number of reported cases of insecurity	Monthly Weekly
Operation stage Impact: Large scale clearing of land and intensified demand for forest products for building materials and fuel by returnees	Improved governance. Control and management of land and forest products Encourage use of non forest products construction materials Promote and support plantation of indegeneous plant spp. Promote other fuel sources	GOSS & Contractor	State State State County relevant offices (MTRB, MOE)	Settlement patterns Percentage change in forest cover	Annually
Impact: Reduced transportation cost and availability of high class transportation facilities	Provide road signage	Contractor	State	Percentage change in transport cost	Monthly
Impact: Rapid economic growth of East Equatoria State	Improve security Promote private property rights	GOSS	State State	Economic growth rate	Annually

Conclusion and Recommendations

The primary objective of the study on the Nadapal – Juba road was to identify the most appropriate economically justified up grading and periodic maintenance or strengthening solutions for this road in South Sudan. It is anticipated that in the long term there will be considerable economic benefit accruing to the areas of influence of the project roads due to stimulated economic and social activities and improved traffic flow.

At this detailed design stage, no adverse environmental and social impacts of significant magnitude are foreseen that would hinder the proposed upgrading of the road to Bitumen standards. The road project will not harm any sites that are historically or environmentally sensitive. The most important negative impact will result from soil erosion during earth works and construction of structures along the road especially in the road section between Nadapal – Kapoeta.

The study found that there was no available information concerning the conservation status of plant species in South Sudan. It was therefore impossible to determine the species endemism, threats or the vulnerability. The Wildlife Conservation and National Park Act, 2003 for South Sudan which is available does not expand on the conservation status of the avifauna and flora

The findings of the Socio Economic Impact assessment conclude that the impact of upgrading of the Nadapal – Juba road will have a positive impact on the socio-economic environment of the entire South Sudan. The social management measures proposed are generally straight forward. The majority of the measures relate directly to sound operating practices both during the construction phase and subsequently over the operational life of the road. Provided that the road is upgraded with due attention to the mitigation and management measures outlined, the project will have a positive impact on the socio-economic environment of the project area. The upgrading of this road to a paved (bitumen) standard will improve the socio-economic conditions South Sudan and more specifically the Eastern Equatoria States.

This study concludes that there will be no major ecological impact that will negatively affect the up-grading of the Nadapal-Juba road. In support of the huge acceptability shown by our survey, it is recommended that this project proceeds and that the proposed mitigation and monitoring measures are enforced in full. The project has no serious negative environmental and social impacts and we recommend implementation as proposed, while ensuring implementation of the proposed Environmental and Social Management and Monitoring Plan.

Recommendations

To successfully implement the environmental and social safeguards in a manner consistent to WB and National Policies the team recommends that:

1. The mitigation measures identified in this report are incorporated as far as is practically possible, within the design details, specification and contract documents, to be drawn up for the project road.

2. The local people must be informed of the details and progress of the project, particularly those who will be affected by the proposed realignment and extension of the road so that they can plan for the future accordingly.

3. A Resettlement Action Plan has been prepared by the GOSS to address issues such as amount of payment, methods of payment to the project affected people.

4. Diligence on the part of the contractor and proper supervision by the Supervising Engineer during construction and the initial operation period is crucial for mitigating impacts. However all mitigation measures need to be specified in tender and contract documents, and must be included in the Engineering Drawings, Specifications and Bills of Quantities.

5. During operation, maintenance of the road is a key factor in protecting the environment. For example, if the project roads are always in motorable condition, vehicles would not have to drive off-road, thereby destroying vegetation, road structures, and posing a danger to pedestrians, cyclists and livestock.

6. It is strongly recommended that the mitigation measures proposed in this report be incorporated, as they are reasonable and implementable. It is further recommended that a result based monitoring and evaluation program should be drawn and documented as an integral component of the Environmental Management Plan.

7. The list provided on Annex 21 represents the list of peoples, structures/properties that will be affected during road construction.

8. Environmental monitoring allows measures to be implemented in order to prevent or avert negative impacts. The MTRB and Ministry of Environment must ensure that monitoring does take place and oversee environmental compliance in all road related activities.

LIST OF ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BEPs	Best Engineering Practices
C.B.O	Community Based Organization
CE	Central Equatoria
CPA	Comprehensive Peace Agreement
EES	Eastern Equatoria State
EIA	Environmental Impact Assessment
ESSAF	Environmental and Social Screening and Assessment Framework
GOSS	Government of Southern Sudan
GoRSS	Government of Republic of South Sudan
GWA	General Weighted Attitude
H.E	His Excellency
HIV	Human Immune Virus
IDPs	Internally Displaced Peoples
JAM	Joint Assessment Mission
LHS	Left Hand Side
MAFTACF	Ministry of Agriculture, Forestry, Tourism, Animal Resource, Cooperative and Fisheries
MCYS	Ministry of Culture, Youth and Sports
MDTF	Multi Donor Trust Funds
MEDIWR	Ministry of Electricity, Dams, Irrigation and water Resources
MFCEP	Ministry of Finance, Commerce and Economic Planning
MGCSW	Ministry of Gender, Child and Social Welfare
MIB	Ministry of Information and Broadcasting
MIWC	Ministry of Interior and Wildlife Conservation
MLHPP	Ministry of Land, Housing, Physical Planning
MOH	Ministry of Health
MoE	Ministry of Environment
MPMI	Ministry of Petroleum, Mining and Industry
MTRB	Ministry of Transport, Roads and Bridges
NGO	Non- Governmental Organization
NMT	Non-Motorized Traffic
PAs	Protected Areas
RHS	Right Hand Side
ROW	Right of Way
SDP	Sudanese Pounds
SETIDP	Sudan Emergency Transport and Infrastructure Development Program
SPLA	Sudanese People Liberation Army
SPLM	Sudan People's Liberation Movement
SSLC	South Sudan Land Commission
STD	Sexually Transmitted Diseases
TES	Threatened and Endangered Species
UNJLC	United Nations Joint Logistics Centre
USD	United States Dollars
WB	World Bank
WHO	World Health Organization

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CHAPTER 1: INTRODUCTION

1.1 Background Information

South Sudan is one of the countries in Africa that has experienced a civil war of over 21 years. However in January 9, 2005 marked the end of a 21 year civil war and signified a new era of peace, reconstruction and development for South Sudan. This was followed by a signing of historic Comprehensive Peace Agreement (CPA) signed between the Government of Sudan (GOS) and Sudan People's Liberation Movement/Army (SPLM/A). The signed CPA called for a 6-year interim period for a Government of National Unity at the end of which a referendum will be held on the political autonomy of South Sudan. During the interim period, the parties to the CPA had agreed on a reconstruction and development program elaborated through the Joint Assessment Mission (JAM), which was comprised of the UN, the World Bank, the GoRSS and the SPLM/A.

To facilitate the financing of the consensus emerging from the JAM process, some donors have made pledges of assistance. Some of these donors have agreed to pool their assistance and these have been used to create separate Multi Donor Trust Funds (MDTF), one each for the North and the South. The Government of Sudan and the SPLM/A have asked the World Bank to be the Administrator of these two MDTF funds applying appropriate World Bank rules and procedures. Subsequent to the JAM process, the Government of South Sudan (GOSS), with the assistance of the World Bank, has prepared a Sudan Emergency Transport and Infrastructure Development Program (SETIDP) for implementation in three parallel phases over a period of about five years.

The project development objective of SETIDP is to rehabilitate and develop critical national and rural roads and transport infrastructure, and improve critical urban infrastructure in the major towns that form the national and state capitals of South Sudan. It is also aimed at building capacity for planning, construction and sustainable operation, maintenance and management of the infrastructure in South Sudan. The Project is estimated to cost US $777 million. The GOSS has signed a Grant Agreement with the International Development Association, as administrator of grant funds provided by the MDTF, for the joint financing of the first phase of the SETIDP of a total amount of US$150 million.

The GOSS intends to apply part of the proceeds of this first phase project for consultant services towards the upgrading of Nadapal -Juba gravel surfaced road to paved (bitumen) standard, which construction is planned to be carried out in follow up operations.

Although the project was initiated to be constructed under MDTF program and the ESIA prepared in 2010, recently the Government has agreed on the upgrading of the proposed Nadapal-Juba road with the World Bank and other fund organizations. By virtue of this, the draft ESIA prepared in 2010 has been updated considering the existing situation of the whole stretch of Nadapal_Juba road.

The proposed upgrading program under the current arrangement, development Objective (PDO) of the South Sudan – East Africa Regional Transport, Trade and Development Facilitation Program is to enhance regional connectivity and integration of South Sudan with its Eastern Africa neighbouring countries. This would be achieved through increasing transport efficiency, facilitating trade and development, connecting Juba with fibre optics, and linking South Sudan to alternative sea ports.

The proposed program will help the eastern part of South Sudan and north western part of Kenya to boost export oriented agricultural development by facilitating increased agricultural production along the Juba-Eldoret corridor, endowed with abundant natural resources, through improved access and development of export processing zones. The proposed program contributes to the overarching goal of integrating the economies of the countries in the sub-region and helps them compete in the free market zone of Eastern and Southern Africa, and the global market. The program will also contribute to the reduction of transport cost that will help lower the cost of economic development, services delivery to the poor, and doing business, in the sub-region.

The principal factors for focusing on the Juba–Nadapal-Eldoret corridor, include: (a) the corridor opens the massive agricultural, animal and mineral resources rich area in eastern South Sudan, the closest to the regional and global market, and the less developed Turkana region of Kenya; (b) the corridor crosses only one transit regime and will be the cost effective and shortest connection to Mombasa, in terms of truck turnaround time; (c) the project crosses flatter terrain, which will reduce vehicle operating cost and safer for driving; (d) the corridor opens access to an alternative sea port – Djibouti; ; and (e) the corridor offers the quickest route to the offshore submarine cables off the East African coast, with the fewest transit countries.

SMEC International PTY Limited of Australia has been contracted to undertake a detailed design of Nadapal-Juba Road which includes Environmental and Social Impact Assessment presented in this draft report.

1.2 Description of the Project

The Nadapal-Juba road has been identified by the GoRSS since 2003 as one of the priority roads for investment to speed up post-war reconstruction, add support to development and reduce the cost of transit transport goods into the country coming from Kenya. The Nadapal-Juba road is located in Central and Eastern Equatoria States. The total length of road is approximately 341.2 Km of unpaved road which provides transport connectivity between Juba and the district headquarters, towns and villages of Juba, Torit, Budi and Kapoeta Counties in Central and Eastern Equatoria states. The road is also an international corridor linking the hinterland of South Sudan with markets in Kenya and international markets through the port of Mombasa.

The project road starts at Nadapal in Eastern Equatoria State on the side of Kenya/Sudan border. The Customs and Excise Department and Immigration Department of South Sudan are located on this point. The fence and gate defining the border point is the exact starting point of the project. After leaving Nadapal, the road traverses through numerous towns and villages. The road is passing in two states, i.e. Eastern and Central Equatoria States. The towns and villages which the project road traverses are Narus, Kapoeta, Loriyok, Torit, Liriya and ends at Nesitu (Nimule Junction) Figure 1 and Plate 1. The project road joins with Nimule to Juba road at Nesitu. The junction of road going to Bor is at Gumbo.

At Torit, the road proposed upgrading will by-pass the community just after the Military Barracks from Kapeota and end after the Magwi Junction on the Torit – Juba road. This is to reduce the number of PAPs and also preserve the Prisons, health facility and other structures in the Community as well as improve safety from pedestrian –vehicular conflicts.

The topography of the project area can be described as undulating at Nadapal and the hills surrounding Mineral Springs. The next section is mainly flat plain. From Longario, there are high

volcanic outcrops up to Liria and Luluba. From Torit to Ngalagala, the road crosses numerous streams and rivers and follows a gently sloping ridge through the subsequent section to Juba. The altitudes vary from an elevation of 741 m at the border with Kenya to 800 m at Mineral Springs, 620 m at Torit and with gentle variations in slope down to an elevation of 460 m near Juba.

The climate in the project area is characterized by high temperatures, generally above 20°C, and the precipitation is low compared to the evaporation. The average annual rainfall increases from 700 mm in Lokichogio, about 25 km south of Nadapal to 1,000 mm at Boya Hills and all the way to Juba. The main rivers crossed by the road are the Kidepo, Thingaita, Koss, Idou and Kudo Rivers.

Plate 1: Beginning (0 + 000) and End Point (Nimule Junction)

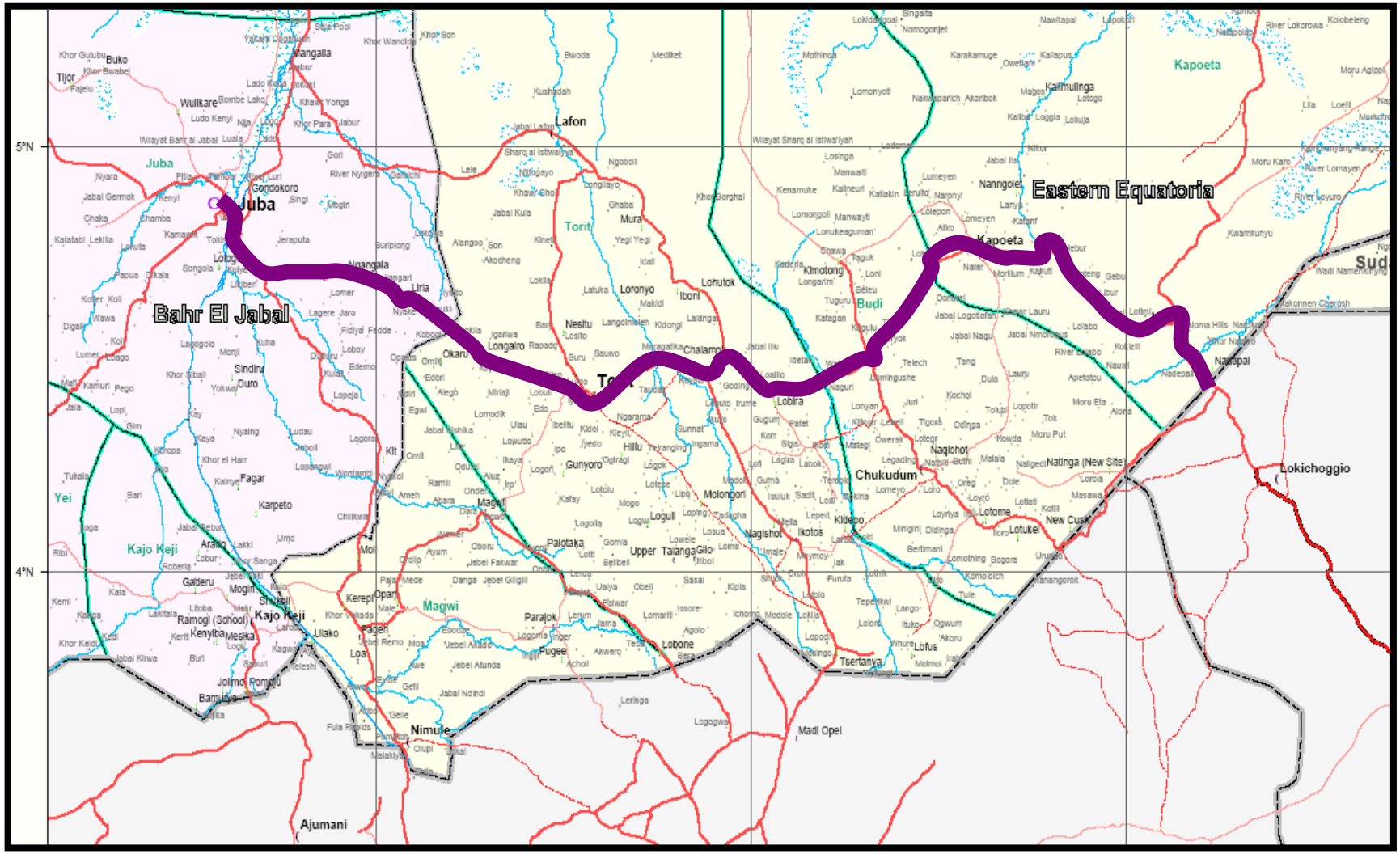


Figure 1: Map of the Proposed Road Project

1.3 Importance of the Project

The importance of the upgrade of the Nadapal–Juba road to the donors, the Sudan Peoples Liberation Movement/Army (SPLM/A) and Government of Republic South Sudan (GoRSS) is to improve access to and from South Sudan. The overall South Sudan – East Africa Regional Transport, Trade and Development Facilitation Program (SS-EARTTDFP) Development objective is to enhance regional connectivity and integration of South Sudan with its Eastern Africa neighbouring countries. This would be achieved through increasing transport efficiency, facilitating trade and development, connecting Juba with fibre optics, and linking South Sudan to alternative sea ports. Specifically the project aims to:

- Improve road access, reduce the cost of access to food and food production itself;
- Stimulate commercial activity and self-sufficiency;
- Facilitate the movement of Internally Displaced Peoples (IDPs) and other returnees;
- Show the dividends of Peace;
- Reduce the transport cost of the massive amounts of humanitarian operations and assistance flowing into the country;
- Open up GoRSS for rapid economic development;
- helps eastern part of South Sudan and north western part of Kenya to boost export oriented agricultural development by facilitating increased agricultural production along the Juba-Eldoret corridor, endowed with abundant natural resources, through improved access and development of export processing zones;
- Contributes to the overarching goal of integrating the economies of the countries in the sub-region and helps them compete in the free market zone of Eastern and Southern Africa, and the global market; and
- Contribute to the reduction of transport cost that will help lower the cost of economic development, services delivery to the poor, and doing business, in the sub-region.

The principal factors for focusing on the Juba–Nadapal-Eldoret corridor, include: (a) the corridor opens the massive agricultural, animal and mineral resources rich area in eastern South Sudan, the closest to the regional and global market, and the less developed Turkana region of Kenya; (b) the corridor crosses only one transit regime and will be the cost effective and shortest connection to Mombasa, in terms of truck turnaround time; (c) the project crosses flatter terrain, which will reduce vehicle operating cost and safer for driving; (d) the corridor opens access to an alternative sea port – Djibouti; ; and (e) the corridor offers the quickest route to the offshore submarine cables off the East African coast, with the fewest transit countries.

1.4 Requirement for an Environmental and Social Impact Assessment (ESIA)

The Nadapal - Juba road is a donor funded project to the GoRSS which applies appropriate World Bank rules and procedures in implementing projects of such magnitude. The World Bank's Operational Policies (OP) is meant to ensure that operations of the Bank do not lead to adverse impacts or cause any harm to persons or groups. The following four policies which are triggered by the proposed upgrading road work are considered under the ESIA study. These are:

- Environmental Assessment (OP 4.01): The Bank requires environmental assessment (EA) of projects proposed for Bank financing to help ensure that they are environmentally sound and sustainable, and thus to improve decision making.
- Involuntary Resettlement (OP4.12): This policy covers direct economic and social impacts that both result from Bank-assisted investment projects, and are caused by (a) the involuntary taking of land resulting in (i) relocation or loss of shelter; (ii) lost of assets or access to assets; or (iii) loss of income sources or means of livelihood, whether or not the affected persons must move to another location; or (b) the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons.
- Indigeneous People (OP 4.10): (This policy contributes to the Bank's mission of poverty reduction and sustainable development by ensuring that the development process fully respects the dignity, human rights, economies, and cultures of Indigenous Peoples.); and
- Forestry (OP4.36): This policy applies to the following types of Bank-financed investment projects:(a) projects that have or may have impacts on the health and quality of forests;(b) projects that affect the rights and welfare[3] of people and their level of dependence upon or interaction with forests; and (c) projects that aim to bring about changes in the management, protection, or utilization of natural forests or plantations, whether they are publicly, privately, or communally owned.
- Physical Cultural Resources (OP 4. 11): This policy addresses physical cultural resources, which are defined as movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Physical cultural resources may be located in urban or rural settings, and may be above or below ground, or under water. Their cultural interest may be at the local, provincial or national level, or within the international community. The Bankassists countries to avoid or mitigate adverse impacts on physical cultural resources from development projects that it finances.

It is on this basis that an Environmental and Social Impact Assessment (ESIA) is required to consider environmental and social impacts of the WB funded road improvement project between Nadapal and Juba in South Sudan. The ESIA should help identify more environmentally sustainable strategies for achieving the project goals; identify the potentially adverse environmental impacts of project interventions; ensure that adequate mitigating measures are included to minimize adverse impacts; ensure that environmental monitoring activities are included in the project plan, including objectively verifiable indicators and means of verification; and finally, focus on the spectrum of most likely environmental impacts in order to facilitate their future management and help the project become a rational component of future development for the region and the entire South Sudan.

1.5 Objectives of Environmental and Social Impact Assessment

The fundamental objective of this environmental and social impact assessment is to ensure that the construction of the proposed road upgrading project is environmentally sound and contributes to the development of environmental assets. It is also expected to provide a means whereby the overall environmental performance of this project can be enhanced through:

- identification and evaluation of the potential impacts associated with project implementation and subsequent operation, and
- the adoption of measures and mechanisms for their incorporation in the project to enhance beneficial impacts and to avoid, minimize or offset adverse impacts.

In this context, it should be noted that the term "environment" and its derivatives havebeen used in a wider sense, which covers not only physical and biological aspects, butalso the human dimension.

1.6 Environmental Impact Assessment Methodology

Road projects will create a range of direct and indirect impacts on physical, biological andhuman environment. Understanding the environmental settings and issues andconstraints along the proposed upgrading road is essential for the design of road projects.The methodology adopted for the environmental studies is illustrated schematically inFigure 3, and is summarized below. The methodology follows the conventional patternfor road project EIA's and meets the requirements of International Environmental ImpactAssessment guideline and procedure.

The ESIA applies as its principle for the methodology of focusing on key (sensitive) sites, cover selected sections and reflecting the entire project area. Site investigation and collected data analysis are the primary methods for the assessment of social and economic impacts, as well as ecosystem impacts assessment. Analogy analysis method is applied for assessing acoustic environment and ambient air impacts. Extensive public consultation was conducted to understand and address the concerns from the directly affected public. The general Methodologies are discussed below:

Scoping: A scoping exercise has been carried out to identify and highlight the key issues and impacts likely to occur during the construction and operation and maintenance phases of the project under consideration. The effort has focused on the most important aspects of impact identification.

Collection of Available Information: The consultant collected and reviewed published regulations, guidelines, national policy papers, reports and documents (see references). Information on existing environmental conditions, necessary to provide the basic background for impact identification and assessment, has been obtained from these published sources. The national legislative and institutional framework, policies, procedures, guidelines etc. has also been reviewed.

Field Visits: Detailed site visit was carried out between in 2009 in order to gain first-hand knowledge of existing environmental conditions and also to put the proposed road designs and construction works into context. The field visits were also been carried out to supplement the available information with emphasis on those areas identified as being of environmental interest during the scoping process. During the trip, information on physical resources, ecological resources, economic development activities, socio-economic aspects, health, cultural and other values in the project area has been collected.

Public Consultation: The field visits also included consultation with various stakeholdersalong all sections of the proposed road. The purpose was to obtain supplementary information on social, socio-economic and socio-cultural conditions, and views on various aspects of the project. The consultation was also to obtain background informationrelevant to impact assessment and

environmental management and, in particular, toidentify any areas of specific concern which needed to be addressed. Individuals consulted are listed in Annex 3 and minutes of consultation meetings a represented in Annex 4.

Characteristics of the project: A review of the project designs and other relevant issueshas been carried out with particular reference to establishing the form and scope of theworks, probable construction methods and materials, and operational characteristics of the completed road, in order to identify potential sources of impact of the project on theenvironment.The characteristics of the project have been considered having regarded, in particular, to:the size of the project,the use of natural resources,the production of waste,pollution and nuisances, andthe risk of accidents.

Description of the Existing Environment: baseline data on the physical, biological andsocio-economic environment of the project area has been collected and evaluated. Direct information was also obtained by visiting the project area. The Project Area comprises the area which will be under direct influence (i.e., where the environmental impacts of the construction activity can be felt) of the project and includes the road section and its influence area, quarry and borrow areas, etc.

Identification of Environmental Impacts: Key potentially beneficial as well as adverse impacts on physical, biological and socio-economic environment associated with theproject construction, and operation and maintenance phases of the project have been identified.

Environmental Mitigation Plan: Feasible and cost effective mitigation measures thatmay reduce potentially significant adverse environmental impacts to acceptable levels and enhance beneficial impacts are recommended.

Environmental Management and Monitoring Plan: An environmental management and monitoring plan has been developed to be fully integrated with the overall project management effort. A programme for monitoring environmental impacts during and afterconstruction has been prepared.

Preparation of ESIA report: the final step is the preparation of Environmental and Social Impact Statement which addresses items called for in the National concerned institutions and other international financing institutions guidelines and the local communities and their leaders.

1.6.1 Description of the Project Area

The ESIA study was conducted in Government of Republic of South Sudan. The Nadapal - Juba Road is an interstate road that links The Central Equatoria and Eastern Equatoria states. The entire road covers approximately 341.2 km traversing undulating terrain. The road passes through major towns i.e. Nadapal, Narus, Kapoeta, Lobira, Torit, Liriya, Ngangal and Nesitu Junction which marks the end point. In Torit, the road by-passes the town after the Military barracks and joins the road again just after the Magwi junction. This is in line with the States development Plan. This plan has been developed by the State. Along the road there are numerous villages with a varying population. The towns and villages were used for the social-economic studies/Assessment.

Arrangement for the field work took place concurrently during this time the people of the locality was also informed about the ESIA team's work plan and the timing for the necessary

meetingsand/or consultations. The field team walked and drove through the proposed alignment, alternative alignments referring to the latest land use map and carrying out bio-physical assessments. The suitability of the alignment from all the survey angles was discussed among the team members. Soil and rock types, floral and faunal findings were discussed and noted.

1.6.2 Survey of Bio- Physical Environment

Descriptions were obtained from MTRB headquarters in Juba during field reconnaissance. The information on Bio-Physical environment was gathered by the EIA team. During field visits data and information gathering was to a great extent authenticated. Description of topography, geology, soil types, Climatic conditions, Agro Ecological Zones, of the area was done using the topographical maps that were obtained from UNJLC offices in Juba. This was supplement by the information that was collected from the MTRB headquarters.

Collection and review of secondary information pertaining to the project and information, which included: review relevant environmental guidelines both national, international and financing agency and existing literatures on Government of Republic of South SudanProject document.

During bio-physical analysis a checklist was used to list and analyse the impacts. Checklists are study instruments that aid in assessing possible environmental impacts during both construction and operational phases of a project. In this study, checklists were utilized to:

- Facilitate identification of potential environmental impacts;
- Provide a means of comparing the predicted environmental impacts;
- Indicate the magnitude of both positive and negative environmental impacts;
- Indicate possible adverse environmental impacts that are potentially significant but about which sufficient information can be obtained to make a reliable prediction;
- Indicate negative potential environmental impacts in the project area, which merit mitigation measures and monitoring during project implementation.

The field survey adopted various techniques of baseline data collection on the existing environmental conditions, namely:

- Field observations and recordings including photography along theproposed route and its vicinity.
- Use of checklists for determining potential environmental impacts of the proposed project. Annex 7, 8 and 9
- Discussions with key informants along the road and its vicinity.

Formulation of an environmental management and monitoring plan based on proposals for preventive, compensatory and mitigative measures during project implementation and during the lifespan of the road was done.

1.6.3 Survey Flora and Fauna (Ecological Study)

The method used in the vegetation characterization is that of line transect. The core road area was used as the central transect line and the plots were laid out using the core road area alignment from Nimule junction (Nesitu) to Nadapal. The size of the plots were 1km long by 16m wide where 6m were the core road area and 5m on each side of the core road area. The plots were laid out at an interval of 20km Figure 2. (Note: Sampling Points not drawn to Scale)

All the plots were geo-referenced using UTM, GPS co-ordinates Annex 17. In each plot the specimens were sampled at random and recorded. Nearly 95% of the species sampled were site records and 5% which were unknown were identified at the East African Herbarium Nairobi. The avi-fauna occurrence was recorded all along the whole stretch of the road. Mammals, birds, domestic animals and reptiles seen were recorded on site.

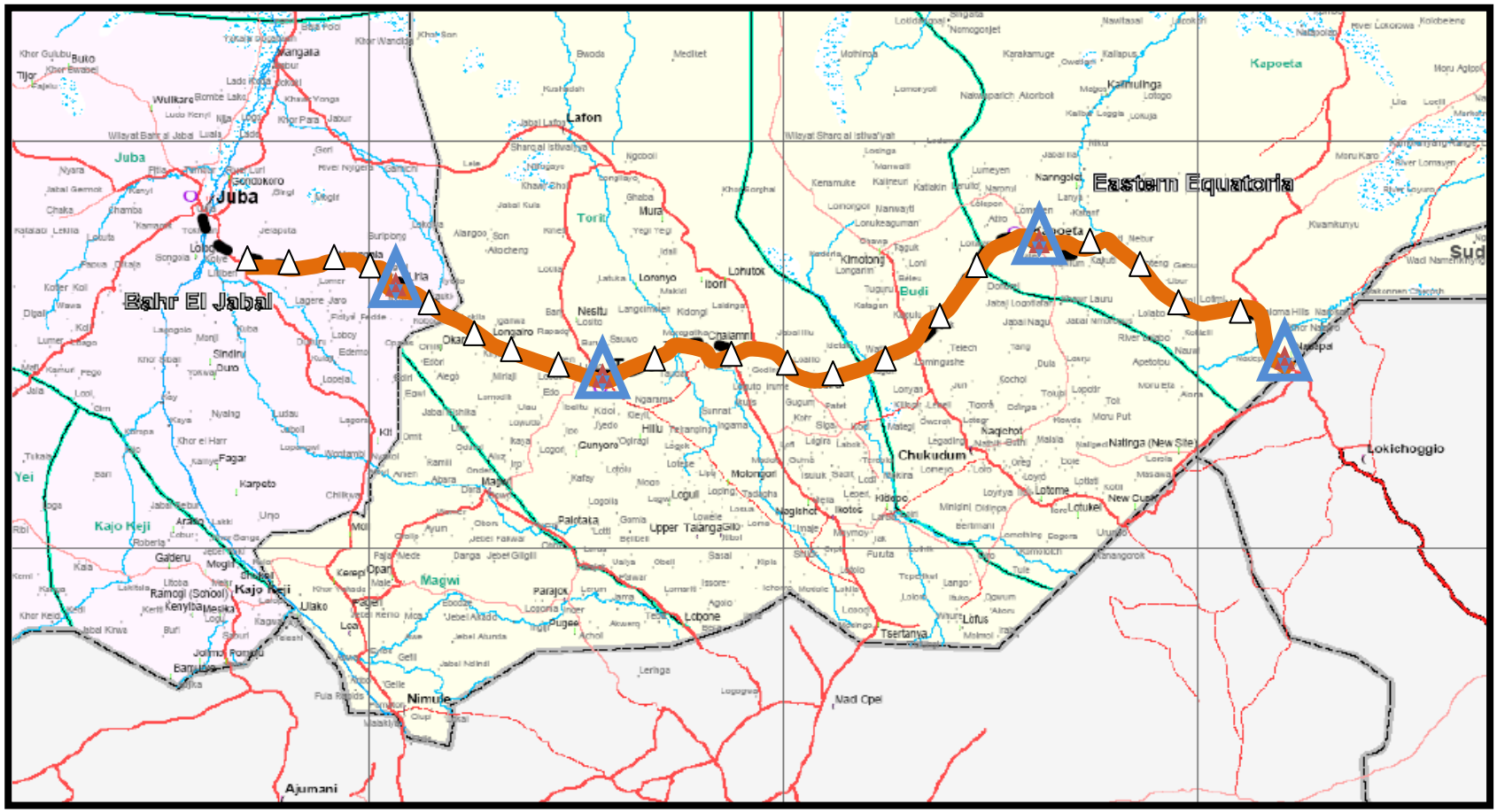


Figure 2: Sampling Plots along Nadapal Juba Road

1.6.4 Socio-Economic and Public Awareness Survey

1.6.4.1 Sample Design and Selection

A multi stage sampling procedure was used in selecting a sample size of 96 households along Nadapal -Juba road. First stage involved listing all the Bomas/Payams dotted along the proposed road project. They were sixteen (16) in total. In each of the sixteen (16) Payams/Bomas, six (6) households were randomly selected. This generated a sample size of 96 households.

1.6.4.2 Field Administration of Questionnaires

The socioeconomic data was gathered using a structured questionnaire. The data gathered comprises demographic characteristics of sampled households, occupational and income distribution, land tenure and land use patterns, HIV/AIDS, health and social infrastructure, Due to low level of literacy levels and language problem among the communities living along the project road, direct interview method was used with interviewers interpreting and filling out the questionnaires during the survey.

1.6.4.3 Key Informants Interviews

This involved meetings and oral interviews with community opinion leaders. In each of the Payams/Bomas, the ESIA team conducted key informant interview with Payam administrators, Sultans (Boma leaders), youth leaders, women leaders, rainmakers, landlords and business persons Plates 2.


Plate 2: A Focus Group Discussion at Obule and Kudo Payam Respectively

1.6.4.4 Public Hearings and Consultative Meetings

It is recognized that conducting consultative meetings with community members and other stakeholders is an important process in ESIA studies and is specifically to ensure community involvement and to create a sense of responsibility and commitment towards implementation of the project. Consultative meetings were held in relatively larger Bomas along the project road with a major one being held in Torit town. Stakeholders' consultative meeting in Torit was a special case because it was chaired by the County Commissioner, His Excellency Colonel Allam. It attracted most of the major stakeholders (Annex 3 and Plates 3 and 4 since the project road passes through the town and is likely to create a big socioeconomic impact.

Plate 3: Public Hearing at Lyangary Payam

Plate 4: Stakeholders Consultative Meeting at Torit County Hall

It is recognized that CPP is an important process in ESIA studies and is specifically to ensure community involvement and to create a sense of responsibility and commitment towards implementation of the project. This component was handled by the sociologist as a separate activity.

The methodology followed in carrying out this ESIA has been summarized (Figure 3). Write-up of the ESIA proposal based on the TOR and presented the proposal. An ESIA team was also formed during this period. This also meant team mobilization for the field work.

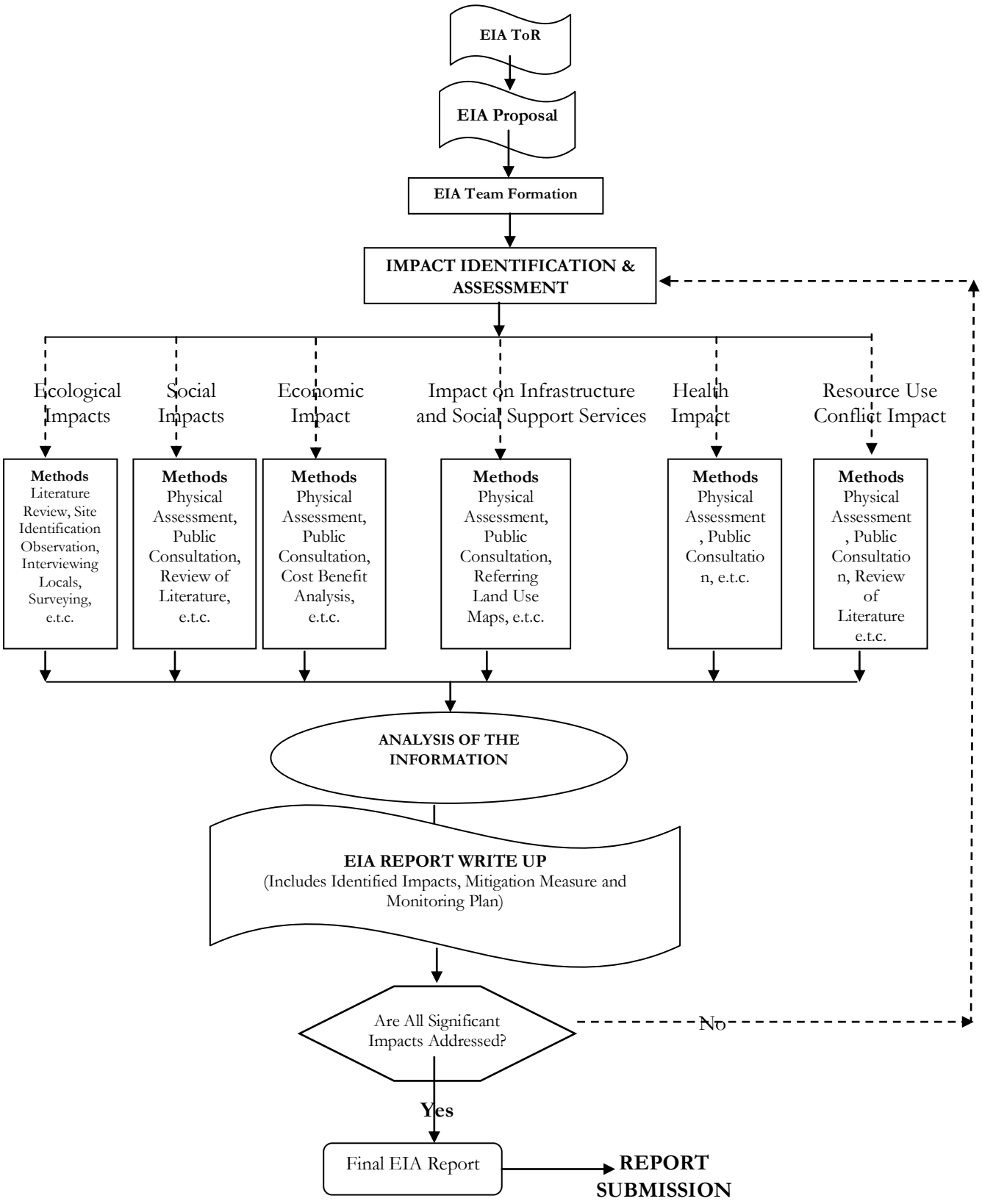


Figure 3: Summary Methodology Followed to Carryout EIA Study

CHAPTER 2: INSTITUTION, POLICY AND LEGAL REQUIREMENTS

2.1 Regulatory Framework for Environmental Management

2.1.1 The constitution of Southern Sudan

The interim constitution of Southern Sudan spells out in Section 2, that every person shall have the right to have the environment protected for the benefit of present and future generations, through reasonable legislative action and other measures that prevent pollution and ecological degradation; (b) promote conservation; (c) secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect the bio-diversity. The Constitution therefore acknowledges that social and economic developments may impact on the environment but emphasizes the need to minimize such impacts.

It is now accepted that development projects should be economically viable, socially acceptable, and environmentally sound. Being a young Government, GoRSS is still in the process of enacting various legislations, and among the pieces of legislation that are yet to be developed is a comprehensive Environmental Act. For this reason, only pieces of legislation that are relevant to the environment have been enacted and reviewed in this report. Among others include: the Constitution of Southern Sudan, The Interim National Constitution of Southern Sudan (ICSS), The Comprehensive Peace Agreement (CPA), The Transitional Constitution of the Republic of South Sudan, 2011 (TCRSS), Environment Policy (2010), Draft Environment Protection Bill (2010), Southern Sudan Land Act 2009, the Wildlife Conservation and National Parks Act, the Forest Commission Act and the Traffic Act, The Wildlife Forces Act, 2003, Wildlife Conservation and Protected Areas Bill 2010, Draft Forestry Policy, and the Forestry Commission Act of 2003.

The Government of the Republic of South Sudan has 10 States exercise powers on: lands, natural resources, animal wealth, wildlife, non - Nilotic waters and electric power. There are concurrent powers where both Federal (National) and State authorities exercise power over education, health, environment, tourism, industry and meteorology. The localities exercise powers within the locality boundaries through local orders to be approved by the locality legislative organ.

The Interim Constitution of the GoSS provides for the creation of Commissions particularly, on land to assume among other things planning and allocation of lands and forests between Federal and State authorities. The Interim Constitution of Southern Sudan (2005) states in Section 44 (1-4) that "every person or community shall have the right to a clean and healthy environment". To have the environment protected for the benefit of present and future generations, through reasonable legislative action and measures that: prevent pollution and ecological degradation; promote conservation; and, secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect genetic stability and biodiversity of Southern Sudan (Part II, Fundamental Objectives and Guiding Principles, Chapter I Objectives and Principles (Guiding Objectives and Principles).

2.1.2 The Interim National Constitution of Southern Sudan (ICSS)

The ICSS is the supreme law of Southern Sudan which stipulates the legal aspects for the protection and management of the environment and natural resources. **Part three, article 44 of the Interim Constitution of Southern Sudan (The Environment)** has guaranteed every person or community the right to have a clean and healthy environment. The Constitution further commits all levels of government in Southern Sudan to sustainable development in order to ensure that the environment is protected for the benefit of present and future generations, through reasonable legislative action and other measures that prevent pollution and ecological

degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect genetic stability and bio-diversity of Southern Sudan. And also all levels of government in Southern Sudan shall promote energy policies that will ensure that the basic needs of the people are met while protecting and preserving the environment.

The Interim Constitution also specifies land issues that are under National powers (Federal level) and those under the control of states as well as joint powers (concurrent powers) shared by the Federal and States institutions. The states manage issues related to State lands that are not under National control. These include: management, lease and utilization of lands belonging to States, town and rural planning and agricultural lands within the state boundaries. The concurrent powers include matters related to urban development, planning and housing, electricity generation, waste management, consumersafety and protection, water resources other than inter – state waters and regulation of land tenure and the rights on land.

Articles of the Constitution are of direct relevance to this project are the right to expropriate land and compensation to the owners, protection of cultural heritage and religious sites, as well as issues related to the safety and protection of the inhabitants, beside penalties incurred for environmental damage and pollution as well as respect of the International Environmental Agreements, ratified by the Government of the Republic of South Sudan.

2.1.3 The Comprehensive Peace Agreement (CPA)

The CPA provides the general framework and implementation modalities for addressing the management of the environment and natural resources as well as the regulation of land tenure and protection of national heritage and areas of Cultural and social significance.

2.1.4 The Transitional Constitution of the Republic of South Sudan, 2011 (TCRSS)

The TCRSS specifies that every person or community shall have the right to a clean and healthy environment. (2) Every person shall have the obligation to protect the environment for the benefit of present and future generations. (3) Every person shall have the right to have the environment protected for the benefit of present and future generations, through appropriate legislative action and other measures that: considering to (a) prevent pollution and ecological degradation; (b) promote conservation; and (c) secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect genetic stability and bio-diversity. (4) All levels of government shall promote energy policies that will ensure that the basic needs of the people are met while protecting and preserving the environment.

2.1.5 Environment Policy (2010)

The Republic of South Sudan has been in conflicts that led to the civil wars, causing millions of loss of lives and serious damage to the natural environment. South Sudan is endowed with abundant natural resources which include vast land and water resources, oil, and rich biological diversity due to varying climatic patterns, undulating topography, diversified ecosystems and habitats. Among others, the Sudd wetland which has been designated as a Ramsar site of international importance and is essential to be protected that the country to have a benefit from this resource.

Following the achievement of the CPA in 2005, there has been increasing growth of population in the major towns and rural areas of South Sudan. Additionally, the upcoming investments in the oil sector and infrastructural development in terms of housing projects, road construction, and others all have adverse impacts on the environment, especially if undertaken without due consultation of such impacts.

South Sudan has experiences a wide range of environmental problems, including, soil degradation due to widespread deforestation with consequent loss of biodiversity and wildlife habitats, pollution of rivers and the environment due to oil drilling in the wetlands, over-exploitation of fisheries, conflicts over diminishing resources such as rangelands and water points for livestock, increase and prevalence of environment-related diseases such as malaria, typhoid, and watery diarrhoeal diseases due to widespread water contamination by urban surface runoff and poor environmental sanitation as a result of disposal of both solid and liquid wastes on open grounds.

Having all these environmental problems and considering the various on-going and upcoming development activities in South Sudan have a contribution to put more pressure on the environment. Despite the lack capacity to enforce the existing sectoral legislations and regulations pertaining to environmental and natural resources management, to avoid or minimize these potential impacts and to make EIA process legally binding, developing and enforcing environmental policy and legislations is inevitable.

The Ministry of the Environment is in the process of submitting a draft Environment Protection Policy that enables to guide the management of environment and natural resources along with the development activities to the RoSS Council of ministers through the Ministry of legal Affairs.

The main purpose of this draft policy document is to provide guidance and direction to all stakeholders, which include, the sector government agencies, the private sector, NGOs, CBOs and the general public regarding sustainable management of the environment and mitigating the adverse impacts of their development activities as such. Due to lack of environmental information at hand the content of the document in terms of the background information, environmental issues to be addressed and the policy guidance prescribed are extremely general in the sense that they do not tackle the concerns in a specific manner as it should be.

The formulation of this policy is a step forward in promoting sustainable environmental management across all sectors in Southern Sudan. The effectiveness of this Environmental Policy will be continuously monitored besides being periodically reviewed to ensure that it remains pertinent and relevant.

The Government of Republic of South Sudan (RSS) has the mandate and responsibility for protection, preservation of natural heritages, and conservation of the environment and sustainable utilization of natural resources. The Draft Environmental Policy stated that the policy provides a framework with conformity to legislative requirements and having the following objective:

(1) Improve livelihoods of South Sudanese through sustainable management of the environment and utilization of natural resources;
(2) Build capacity of the government at all levels of governance and other stakeholders for better management of the environment;
(3) Integrate environmental considerations into the development policies, plans, and programs at the community, government and private sector levels; and

(4) Promote effective, widespread, and public participation in the conservation and management of the environment.

The implementation of the Environment Policy will require clear responsibilities of the Ministry of line ministries, and decentralization at least to State level, with trained and equipped staff.

2.1.6 Draft Environment Protection Bill (2010)

The Draft Bill stipulates the need to undertake an Environmental Impact Assessment where and when the Lead Agency deems the project may have varies levels of an impact on the Environment. The Bill recommends the EIA should be conducted by an expert retained by the Project Proponent whose name and qualifications are approved by the Ministry.

2.1.7 National Environmental and Social Screening and Assessment Framework (ESSAF)

Currently the World Bank developed a national Environmental and Social Screening and Assessment Framework (ESSAF) for South Sudan as a guideline for all World Bank financed development projects during the ISN period including the proposed Nadapal-Juba road upgrading project. Given the proposed road traverses along the existing alignment and the expected impact is minimal, this particular project falls under category B of the World Bank Environmental assessment category classification. This determines also the extent and depth of carrying out ESIA. ESIAs can help integrate environmental management decisions at the planning stage to ensure that potential environmental and social impacts are avoided or develop environmental protection measures to mitigate any adverse impacts, resolve conflicts and enhance positive impacts. Available alternatives may be compared (siting and design) and the optimum mix of environmental/social costs and benefits determined.

The overall purpose of the National ESSAF is to provide pragmatic operational guidelines and procedures to the GoRSS to eliminate, reduce and/or mitigate the environmental and social risks associated with Bank-financed operations implemented under the ISN period; and to develop procedures for the effective environmental planning and management of selected development projects and their operation. The national ESSAF has been prepared in line with Bank operational policies and procedures for investment operations and the guidance note for crises and emergency operations for application of Bank safeguard and disclosure policies.

The ESSAF was prepared to provide the basis for simplifying the application of Bank safeguard policies and related provisions of the Bank's disclosure policy to all Bank-finance operations in South Sudan during the ISN period.The Framework has been developed within the context of National environmental policy and draft legislation and regulations and the Interim Constitution and covers all phases of the project cycle. Specifically, they complement existing Environmental and Social Impact Assessment (ESIA) procedures and are to be used in undertaking EIAs for the sectors covered and also to support and facilitate preparation of safeguards instruments (ESIA, ESMP, ESMF, RPF, RAP) by providing relevant information on the standard content and structure of each type of instrument.

Under section 4.3 Environmental Impact Assessment of the RSS environmental policy discussed that following the achievement of comprehensive peace in the Country and the upcoming development activities and investment coupled with other more intensive land use practices, the environment in South Sudan is likely going to be adversely affected. The Government of South Sudan will require a systematic environmental impact assessment, audits, monitoring and evaluation to mitigate adverse impacts and enhance environmental benefits. Therefore, the policy Guidance indicated: a) Make the EIA process legally binding to all proposed projects; b) Develop

capacity to monitor the state of the environment in Southern Sudan; c) Ensure that EIA guidelines for all sectors are developed; and d) Ensure stakeholder participation during the EIA process right from the initial planning stages of the project.

2.1.8 Land Act 2009

According to the Land Act 2009 Chapter 2 Section 7 all land in South Sudan is owned by the people of South Sudan and its usage shall be regulated by the government. This land may be acquired, held and transactedthrough customary, freehold and leasehold by the people of South Sudan. Section 8 of this Act further states that everyperson in South Sudan have the right to acquire or own property as regulated bylaws and stipulated in Article 31(1) of the constitution.

Chapter 3 classifies land in South Sudan as public, community or private. Section 10 further classifies public land as land owned collectively by all people of South Sudan and held in trust by the appropriate level of government. The above land regulations help organize land tenure. However, most of Sudan's lands are organized by customary and traditional rules and regulations. Therefore land administration and management in South Sudan is based on the principle of decentralization, participation and transparency for the benefit of the people of South Sudan.

The Section 42 of Land Act empowers the GOSS and State Government in management of the land on South Sudan through:

- Intervention in rural and urban planning
- Solving disputes arising from use of land
- Resettlement, rehabilitation and reconstruction
- Management and protect historical sites of common interest for South Sudan
- Control and restoration of environment

Chapter Eleven Section 69 of Land Act 2009 provides for the protection of land by individuals, communities and organizations in order to keep it in a productive condition in which problems such as land degradation will be adequately managed with the provisions of Article 44 of the constitution.

Section 70 makes provisions for any development activity to be undertaken in South Sudan be subjected to Environmental, Social, EconomicImpact Assessment to ensure that the social, Economic and Environmental implicationsof the activities on the land are taken into consideration be any decisions is made thereon. The acts states that Social, Economic and Environmental Assessment be undertaken by both private and public sectors prior to any activity that may impact on the environment and people as determined by law.

The acts provides for restoration of any degraded environment in due toeconomicactivities. Because any misuse of the resources endangers the population or nature. The authority concerned may requisite of occupancy of people living in the area after consultation and subject to relocation and or compensation as mention in Section 75 of the Land Act 2009.The GOSS, The State Government or Private Company shall proceed with resettlement plan for the communities affected by the project.

The GoRSS, State Government and any other public Authority may expropriate land for public interest/use subject to compensation and upon agreement with people affected as prescribed by the Act. For the purpose of this project GoRSS, State Government and any other public Authority may expropriate land for road construction this is done according to Chapter 12,13 14 and 15 of Land Act.

The GoRSS has assigned responsibility for state and county decision making at the state, and locality levels. The state and local and traditional authorities play important roles in land administration and management. These local institutions also play important roles in consultation and mobilization of local communities, conflict resolution and providing direct links to the locality for any issues related to village affairs. Table 3 summarizes institutional arrangements and their mandates. Depending on the type and size of the projects to be implemented and according to the National and State legislation requirements, a number of approvals and permits may be required from various governmental agencies (Table 1).

Table 1: Permit Procedures in Government of Republic of South Sudan

Institution	Mandate
National Level ▪ South Sudan Land Commission	▪ Entertain claims, arbitration and mediation, enforcement of law, accept references and assess compensation
State Level ▪ State Land Commission ▪ State Land Administration	▪ Entertain claims, arbitration and mediation, enforcement of law, accept references and assess compensation ▪ Land allocation & mapping. Land measurement and quality evaluation. Land classification. Design land use & approval. Land record & statistics & registration. Land valuation. Assign land use right. Issue land Title deeds. Regulate land transfer and land lease. Control and protect land use. Protect customary land rights; regulate withdrawal or requisition.
Local Level ▪ County Land Authority	▪ Hold and allocate public lands with approval of State Ministry Physical Infrastructure and Planning. Make recommendation to the Concerned Ministry on gazetted land planning; advise concerned ministry on resettlement of persons in the County; facilitate the registration and transfer of interest in land; advise the local community on issues related to land tenure, usage, and exercise over land rights; protect community lands; chair the consultation process between community and State Government if required; and liaise with South Sudan Land Commission.

2.1.9 Wildlife Conservation and National Parks Act, 2003

According to this Act, access and use of resources are not forbidden, but rather the powers to permit anybody to exploit the inherent resources in such protected areas are vested in the Director General of the Secretariat. However, there are specific animal species whose capture is prohibited and these are listed in Schedules 1 and 2 of the Act (Annex 19). Section 27 provides that no person shall hunt with firearms or birds of prey or capture any animal listed in Schedule II, except under a valid ordinary hunting licence or a special permit issued. This section exempts the species listed in Schedule 3 from such restrictions.

Whereas the Land Planning Act has not been concluded, The Wildlife Conservation Act provides that the establishment or extension of any national park, game reserve, forest reserve or controlled area, shall be within the framework of any national land use planning in force and shall be deemed to be for public interest. The Director General, after relevant consultations, may make regulations generally for the development, preservation, protection and management of wildlife and environmental resources and may make regulations concerning, inter alia,

- The proper administration, management and development of national parks, game reserves, forest reserves, controlled areas and other protected areas;
- The terms and conditions of any concessions to be granted under sections and the procedures to be followed in applying for and granting any such concessions;

The administration and execution of the policy shall be vested in the Secretariat of Wildlife Conservation Environment Protection and Tourism. The objective and functions of the Secretariat shall include:

- The conservation, management and administration of parks, controlled areas and other protected game reserves.
- The development, in cooperation with other competent authorities, of Tourism based on wildlife in the New Sudan and the development of other forms of rational utilization of the wildlife and environment resources;
- The promotion of Education and the dissemination of information about wildlife resources in the New Sudan, in cooperation with the competent authorities;
- The development and carrying out of research on wildlife and environmental resources with a view of their optimum preservation, conservation, management and protection
- The administration and enforcement of the provision of this Act and the attainment of its objectives.

2.1.10 The Forestry Commission Act, 2003

The Forest Commission Act establishes the Forestry Commission here in after referred to as "the Commission". The Commission shall be responsible for the regulation, management and utilisation of forests and forestry resources of The New Sudan and the co-ordination of policies in relation to them. The Commission shall, among others:

- Advise on national policy and practices related to forests, forestry resources and associated economic activities;
- Makecomprehensive database information on national forests and forestry resources for decision making by the relevant authorities.
- Recommend research and training priorities consistent with the national forestry policy;
- Collate, analyse and disseminate information of forests, forestry resources and associated resources;
- Publish journals and periodicals on research findings in the forestry sector;
- Educate the public on the effective and efficient utilisation of forests, forestry resources and matters concerning forests generally;
- Receive, assess and advise on the approval and implementation of investment proposals and projects involving forests and associated resources;
- Monitor and co-ordinate the operations of agencies charged with the implementation of the New Sudan policies on the management and utilisation of forests and forestry resources;
- Mo-operate and liaise with the national, regional and international organizations and agencies on matters of forests, conservation, utilization and environmental issues generally;
- Advise on land use and development affecting forests, forestry and associated resources;
- Advise the commissioner on matters concerning forests, forestry and associated resources; and
- Perform such other functions as are incidental to the specified functions.

According to this Act the Commissioner may in consultation with the appropriate authorities make rules and regulations on:

- Investment projects related to forestry and forest resources;
- The management, development and utilization of forestry resources;
- Forest conservation; and
- Any other matters as may be necessary to carry the provisions of this Act into effect.

The Ministry of Agriculture, Forestry, Tourism, Animal Resource, Cooperative and Fisheries (MAFTACF) has developed a forest policy framework in which management of forests and forest resources has been well stipulated. The Directorate of Forestry in the MAFTACF takes responsibility for effective management of National Forest Resourcesin a formalized partnership with state Government and Local Communities. Thus the forest plantation and Reserves are protected and Managed as common by GOSS – MAFTARF as National Resources and Heritage.

2.1.11 The Wildlife Forces Act, 2003

The Act describes the duties and responsibilities of military forces deployed to protect wildlife and protected areas. The essence of this law is being implemented with the deployment of former game guards and ex-combatants as Wildlife Forces.

2.1.12 Wildlife Conservation and Protected Areas Bill, 2010

Currently, the MIWC is developing a Wildlife and Protected Area Policy, from which a new set of legislation will be developed to replace The Wildlife Conservation and National ParksAct, 2003. The purpose of this Bill is to cover all matters concerned with wildlife conservation, the establishment and management of Protected Areas and controlled areas and to preserve Southern Sudan's natural heritage including its unique wildlife. The Bill contains principles that introduces new concepts of: public participation, community-based conservation; participation of local and traditional leaders, cultural and social benefits for conserving wildlife resources; recognition of indigenous knowledge Wildlife Conservation and mitigation of human-wildlife conflicts wherever they occur

2.1.13 Draft Forestry Policy

The first draft of the new forestry policy was produced in June 2006 and has been under discussion since then. The policy is in line with best practice in sustainable forest management and is based on guiding principles that include sustainable development, poverty eradication, equity, and community involvement.

2.1.14 The Forestry Commission Act of 2003

This Actis among the Acts that were produced in 2003 with USAID support, yet stakeholders were not involved in the production, and it was not implemented. The *Forests Act of 1989* is the law that still governs the management and conservation of forests in Sudan. This law was produced by the north, and is not in line with the new policy in the south. A new Forestry Act will be required to implement Southern Sudan's new forestry policy.

2.1.15 The Mines and Quarries Act 1972

The GOSS is yet to develop a Mines and Quarries Act however currently the Mines and Quarries Act 1972 is operational and adopted by the government of South Sudan. According to this Act quarried material': means rock, stone (including limestone), gravel, sand and clay. 'Quarry': means any land, in, upon or under which operations are undertaken (whether bysurface or opencast working or otherwise) for the getting of quarried material.

In the Act ownership of mineral resources and quarried material as lying in, upon or under land or under territorial waters or upon the continental shelf of the Republic of Sudan, is vested in the Government which shall have the exclusive right of prospecting for and getting such minerals. The Acts through the Mines and Quarries Board provides for issuing of Quarrying licence authorising the holder to get quarried materials from a quarry asprovided for in the licence and to sell them in accordance with the provisions of this Act orany other Act.

This particular project will involve extraction of gravel materials from quarries and borrow pits. A result clearance in the form of mining licences or leases from the GOSS - Ministry of Petroleum, Mining and Industry shall be issued to contractor.

2.1.16 Traffic Act

There are several provisions of the Act that are of direct relevance to all phases of the project, namely design, construction and operational phases. The following paragraphs summarize some relevant provisions

- No person shall drive or being the owner or the person in charge of vehicle, cause or permit any other person to drive a vehicle on a road at a speed higher than such speed as may be prescribed as the maximum speed for that class of vehicles.
- On a vehicle subject to a speed restriction under subsection (1), expect a vehicle registered as a motor car or motor cycle, or a private hire vehicle there shall be painted or affixed to the rear as close as possible to the rear number plate and so as to be clearly legible, to a person within ten meters of the rear vehicle, a mark in the prescribed form indicating its maximum permitted speed in kilometres per hour.
- No person shall drive or being the owner or person in charge of the vehicle cause or permit any other person to drive any vehicle at a speed exceeding fifty kilometres per hour on any road within the boundaries of any village, town or city. Highway authority shall erect and maintain traffic signs to indicate to drivers entering or leaving such roads or areas where the fifty kilometres per hour speed limit restrictions begin and end.
- Notwithstanding the provisions of subsections (1) and (3) the Commissioner may:-
  - Impose on any road such lower speed limit as he considers necessary by reason of repairs, reconstruction or damage to the road or the condition of the road, for public safety or prevent damage to the road. Such lower speed limit shall be imposed only for such period as is necessary to carry out repairs or construction or until the condition of the road is satisfactory.
  - Impose on any road or area permanently or provisionally as he considers appropriate, such lower limit of speed as may be necessary to prevent damage to the road or for the safety of the public, having regard to any permanent or temporary hazards such as the alignment or characteristics of the road, the width of street, nature of traffic or general development of the area.

Section 57 of the Traffic Act highlights the Limitation of Loads that vehicles are to carry along the road. No vehicle shall be used on a road with a load higher than the load specified by the manufacturer of the chassis of the vehicle or the load capacity determined by the inspector under this Act.No vehicle shall be used on a road if it is loaded in such a manner as to make it a danger to other persons using the road, a person travelling on the vehicle, and should any load or part of it fall from any vehicle on to a road, that shall be prima facie evidence that the vehicle was loaded in a dangerous manner, until the contrary is proved to the satisfaction of the Court.For the purposes of this Section a person travelling on a vehicle shall be deemed to be part of the load.
Section 74 of the Traffic Act highlights the procedures for the Closure of Roads. It states that the highway authority or its authorized representative may for public interest, close the whole or part of such a road to all vehicles or any particular type of vehicles at anytime for any period it thinks fit. No driver, or person in charge of any vehicle shall drive or haul the vehicle or cause it to be

driven or hauled over a bridge or any portion of a road which is closed to traffic and where a conspicuous notice is displayed to the effect that the road is closed, unless he has a written permission from the highway authority.

Section 75 of the Traffic Act highlights the procedures to follow in case there is an Injury to Bridges and Roads. The Act states that if any injury is caused to a bridge or road due to any contravention of this Act, the highway authority shall repair the road or bridge and recover the cost from the owner of the vehicle and the certificate of the highway authority, of the cost of repair, shall be conclusive evidence of the amount payable by such owner.

2.1.17 World Bank Safeguards Policies Triggered by the Project

World Bank as a major donor to many development projects with direct environmental implications, the World Bank has formulated several policies that ought to be strictly adhered to by any beneficiary. This section captures the relevant World Bank safeguards policies that apply for this project.

- **Environmental Assessment (OP 4.01)**

The OP 4.01 requires among others that screening for potential impacts is carried out early, in order to determine the level of EA and propose measures to mitigate potential adverse impacts. The Bank's project screening criteria group projects into four categories:

- **Category A** –Full Environmental Impact Assessment; A proposed project is classified as Category A if it is likely to have significant adverse environmental impacts that are sensitive, diverse, or unprecedented.
- **Category B** – Partial Environmental Assessment; A proposed project is classified as Category B if its potential adverse environmental impacts on human populations or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats—are less adverse than those of Category A projects.
- **Category C** – A proposed project is classified as Category C if it is likely to have minimal or no adverse environmental impacts. Beyond screening, no further EA action is required for a Category C project. ; and
- **Category FI**- A proposed project is classified as Category FI if it involves investment of Bank funds through a financial intermediary, in subprojects that may result in adverse environmental impacts.

The EA ensures that appropriate levels of environmental and social assessment are carried out as part of project design, including public consultation process, especially for Category A and B projects. The OP 4.01 is applicable to the upgrading of the Nadapal – Juba road.

- **Natural Habitats (OP 4.04)**
    - **This policy is triggered as the proposed road will pass through a potential wildlife corridor near Kidepo in South Sudan - a seasonal**

migratory route where animal crosses to find food and water depending on the yearly season. The project is expected to create a temporary impediment on existing seasonal wildlife movements. There is also a risk of introduction of invasive alien species along the road corridor. This section of the road requires appropriate design measures and interventions to be implemented together with robust monitoring program both during project construction and operation phases. Such monitoring program will be designed, based on the consultations with relevant stakeholders, including South Sudan Ministry of Interior and Wildlife. It was confirmed that the project will not have significant conversion or degradation of critical natural habitats, as the project activities entail existing road rehabilitation, with identified material sites away from any critical natural habitats. Involuntary Resettlement (OP 4.12)

The Bank's Policy on Involuntary Resettlement is intended to assist displaced people arising from development projects, in order not to impoverish any affected people within the area of influence of project. An action plan that at least restores their standard of living must be instituted, in cases where resettlement is inevitable or loss of assets and impacts on livelihood occurs. Public consultation of "re-settlers" as well as with the host communities is significant for the successful resettlement process and implementation of the action plan, in order to incorporate appropriate choices. This project triggers OP 4.12 which has resulted in the preparation of a Resettlement Action Plan.

- **Physical Cultural Resources (OP 4.11)**

The policy is premised on the need to investigate and take inventory of cultural resources likely to be affected. Mitigations are provided for in cases of adverse impacts on physical resources. Mitigation measures should be undertaken in conjunction with the appropriate authorities, organizations and institution that are also required to be consulted and involved in the management of cultural property. The Bank does not support development actions likely to significantly damage non-replicable cultural property, and does assist only those projects sited or designed to prevent such damage. This ESIA contains chance-finds procedures, which

- **Indigenous People (OP 4.10)**

The objectives of this policy is dedicated to ensure that the development process fully respects the dignity, human rights, economies and cultures of Indigenous Peoples; ensure that adverse effects during the development process are avoided, or if not feasible ensure that these are minimized, mitigated or compensated; and ensure that indigenous peoples receive culturally appropriate and gender and intergenerationally inclusive social and economic benefits.

The policy is triggered when the project affects the Indigenous Peoples in the project area. However, according to the National Environmental and Social Screening and Assessment Framework (NESSAF) and Interim Strategy Note (ISN) – FY13-15 all people in South Sudan are

considered indigenous and Indigenous Peoples OP/BP 4.10 is triggered, but a separate Indigenous Peoples Plan is not required. A separate Social Assessment is being carried out by GOSS and the findings and mitigation measures should be issued separately from this ESIA. The social assessment is used to obtain the broad support of project affected communities through free and prior informed consultations. The consultations would also help to identify mitigation measures, how these communities could participate in the project development, identify complaint redressing mechanisms.

- **Bank's Policy on Access to Information**

The Bank's policy on Access to Information requires that all the people residing in the given areas of a project have the right to be informed of the proposed development project in the respective areas. In this regard therefore, the summary of the study of the development action with other relevant information shall be disclosed to the public prior to project appraisal of the Bank. The disclosure shall be carried out in-country through the Ministry of Transport, Roads and Bridges and the Ministry of Environmentat National, States and Counties within the project area, in the manner accessible to all project stakeholders. It shall also be made available at the World Bank Info-shop.

2.2 International Conventions and Treaties

In carrying out an EIA, there are other important sectoral laws that must be considered in identifying environmental impacts and their mitigation. The Environmental Health and the Public Health Acts of 1975 provide regulations and restrictions for industries regarding the control of water and air pollution (standards). According to these Acts, protection obligations extend to cover animal and plant life. Specifically, the Acts cover the collection, treatment and disposal of waste and prohibit water pollution by addition of any solid or liquid wastes, chemicals, sewage and remains of animals to water bodies such as rivers, hafirs, and wetlands. The Electricity Act (2001) provides regulations covering environmental protection standards. Article 9 of the Act requires that any developer (investor) must comply with existing laws regarding roads, watercourses, communication network, environmental issues and archaeological sites. Article 13 notes that environmental standards must be taken into consideration when establishing power plants. Article 17 requires compensation to any damage that the project may cause to life and property.

In addition to national environmental legislations, the regional and international conventions and protocols on environmentthat might be applicable to be party include:

- **Biological Diversity Convention.**
  - The Convention on Biological Diversity has three goals. These are: the conservation of biodiversity; the sustainable use of the components of biodiversity; and the fair and equitable sharing of the benefits arising from the use of genetic resources.

- **The United Nations Convention to Combat Desertification (CCD)**
  - The objective of the Convention is to combat desertification and mitigate the effects of droughts in countries experiencing serious drought and/or desertification, particularly in Africa.

- **United Nations Framework on Climate Change.**
  - This convention takes into account the fact that climate change has transboundary impacts. The basic objective of this convention is to provide for agreed limits on

the release of greenhouse gases into the atmosphere so as to prevent the occurrence of climate change. It also aims to prepare countries to minimize the impact of climate change should it occur.

- **Bamako Convention on Transboundary Movement of Hazardous Waste.**
  - The Bamako Convention of 1991 plays a similar role at the level of the African continent.

- **Vienna Convention (ozone layer depletion).**
  - The basic objective of the Convention is to combat the negative impact on the environment and human beings resulting from ozone depleting substances by reducing the amounts released and eventually banning their commercial use through internationally agreed measures. The Montreal Protocol entered into force in 1989 to facilitate the implementation of the Convention.

- **The Basel Convention**
  - The objective of the Basel Convention is to control and regulate the transboundary movement of hazardous wastes.

- **The Stockholm Convention**
  - The Stockholm Convention on Persistent Organic Pollutants by proclamation No. 279/2002 designed to ban the use of Persistent Organic Pollutants (POP).

- **The Rotterdam Convention**
  - This Rotterdam Convention on Prior Informed Concert (PLC) relates to prior informed consent in the context of international trade in specific hazardous chemicals and pesticides

- **Montreal Protocol.**
- **Ramsar (wetlands) Convention.**
- **Kyoto Protocol.**

2.3 Institutional Arrangements

The government of South Sudan has five ministries that deal directly with utilization, management and conservation of natural resources i.e. Ministry of Environment (MoE), Ministry of Petroleum, Mining, and Industry (MPMI), Ministry of Agriculture, Forestry, Tourism, Animal Resources, Cooperative and Fisheries (MAFTACF), Ministry of Interior and Wildlife Conservation (MIWC), and Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR). The MoE is the key ministry regarding EIA and works hand in hand with MTRB to ensure that environmental standards are achieved when implementing the road projects.

The institutions at National and State Levels responsible for the implementation and monitoring compliance to both national and international agreements include:

- Council of Ministers;
- County Land Authority;
- Local government at the County level.
- Ministry of Interior and Wildlife Conservation (MIWC);
- Ministry of Petroleum, Mining and Industry
- National and State Land Commissions;
- Payam Land Council.

- State Land Administration and Authority;
- State Ministries of Health, Industry and Agriculture; and,
- Directorate of Environment.

The environmental acts and laws provide standards to be applied in assessing the probable environmental impacts of the project. State Organs and Local laws deal with issues at State or Local levels, while the Federal Acts are more concerned with general directives and set limits and standards for environmental protection without going into details at the local level. Based on the provisions of these legal requirements and sectoral laws as well as policies of different departments, the impacts of the proposed projects are to be assessed and appropriate mitigation measures recommended.

EIA is a requirement for the most projects in South Sudan. Currently, EIAs are being undertaken for most projects, especially those funded by international organizations and agencies. In most cases, EIA is being conducted by prominent local and international consulting firms and submitted to the ME for approval. At the ministerial level, only the Ministry of Transport, Roads and Bridges has established an Environmental Unit with guidelines for environmental protection.

Beside the government institutions responsible for environmental management, there are also local institutions that play important roles in environmental management at local level. In the environmental field, such local institutions can play important roles in sanitation and garbage collection beside taking part in mobilization of local communities and providing direct links to the locality for any issues related to village affairs.

Table 2: Institutional Arrangements in Environmental Decision Making

Institutions	Mandate
National Level Directorate of Environment	• Environmental Policies / Plans • Guidelines • Approves EIAs • Sign International Conventions • Monitoring
At State Level State Ministries- Ministry of Health Responsible for Public Health	• Implement State Policies • Implement Sectoral Laws (National or State Laws) • Approval of development activities
At Local Level Counties and payams Popular Committees, CBOs and NGOs Ministry of Health Responsible for Public Health	• Implement local orders on Public Health • Implement local orders on locality natural resources • Implement State Laws • Approval of projects at Locality Level • Implement local orders • Mobilize local communities • Submit requests for development activities

CHAPTER 3: BASELINE PROJECT SITE CONDITIONS

This section sets out to provide sufficient background on the different agro-ecological zones as well as some of the particular environmental features of the country in order to highlight the environmental sensibilities as they may be affected by the road rehabilitation and reconstruction activities. This description is hampered by the lack of good and up-to-date data and information as a result of more than 20 years of civil war.

3.1 Physical Setting

3.1.1 Location

The Republic of South Sudan is located in Africa with Juba as its capital city. Under the terms of the deal with Republic of Sudan, the south has been given a large degree of autonomy and the chance to vote for full independence in 2011 after six years of home rule. The conflict between Sudan's Muslim north and mainly Christian south was, until it officially ended in January 2005, Africa's longest running civil war.

South Sudan borders Ethiopia to the east, Kenya, Uganda, and the Democratic Republic of the Congo to the south, and the Central African Republic to the west. To the north lies the predominantly Arab and Muslim region directly under the control of the central government, with its capital at Khartoum. It includes the vast swamp region of the Sudd formed by the White Nile, here called the Bahr el Jebel.South Sudan, also known as New Sudan, has nearly all of its administrative offices in Juba, the capital, and the city with the largest population.

South Sudan consists of the ten states which formerly composed the provinces of Equatoria (Central Equatoria, Eastern Equatoria, and Western Equatoria), Bahr el Ghazal (Northern Bahr el Ghazal, Western Bahr el Ghazal, Lakes, and Warrap), and Upper Nile (Jonglei, Unity, and Upper Nile). It is estimated that the Southern region has a population of around 12 million, but given the lack of a census in several decades, this estimate may be severely compromised. The economy is predominantly rural and subsistence farming. This region has been negatively affected by the First and Second Sudanese Civil Wars for all but 10 years since Sudanese independence in 1956, resulting in serious neglect, lack of infrastructure development, and major destruction and displacement. More than 2 million people have died, and more than 4 million are internally displaced or have become refugees as a result of the civil war and war-related impacts. The region has been struck by occasional famine. A 1998 famine killed hundreds of thousands, and a food emergency was declared in mid-2005.

The Nadapal - Juba Road is an interstate road that links The Central Equatoria and Eastern Equatoria states. The entire road covers approximately 341.2 km traversing undulating terrain. The road passes through major townships and trading centres i.e. Nadapal, Narus, Kapoeta, Lobira, Torit, Liriya, Ngangal and Nesitu Junction which marks the end point. Along the road there are numerous villages alongside the road and with a varying population.

3.1.2 Topography and Soils

South Sudan is bisected roughly by the Nile River which is surrounded by a gently sloping to flat basin into which the highlands of the surrounding countries drain. This gentle drainage pattern typical across much of the country, with exceptions for hills and mountains in the extreme south and more broken topography in the southwest (Western Equatoria and Bahr el Jebel), is of course directly related to the soil types. Seen from the agro-ecological perspective, much of South Sudan has "substantial areas of relatively high soil suitability ratings for rain-fed agriculture" (relatively flat topography, productive albeit occasionally heavy soils, and low intensity of cropland use)

This potential improves generally on a gradient from north to south. The combination of the natural resources normally offer a wide range of crop producing opportunities with a growing season ranging from 150 days in the northern plains to 240 days in the Green Belt in the southern zone where double cropping is routinely practiced. One might characterize South Sudan as an agricultural frontier which has yet to benefit from more modern agricultural technologies and inputs because of the disruptions of the past decades of Civil War. Despite past tendencies toward food insecurity as a result of a certain measure of drought prone conditions, knowledgeable persons agree that the growing conditions hold great potential.

Livestock rearing is this area's major activity, but a significant amount of crop cultivation, mainly of millet, also occurs in parts of Central Equatoria and Eastern Equatoria States where land is fertile. Peanuts and sesame are grown as cash crops. The qoz sands are the principal area from which *Gum arabic* is obtained through tapping of *Acacia senegal* (known locally as hashab). This tree grows readily in the region, and cultivators occasionally plant hashab trees when land is returned to fallow. Around Kapoeta South County and Torit County mangoes and Bananas respectively grow well along the river banks. They are used as the major sources of livelihood for the communities living in this region. They underlie the extensive moist woodlands found in these provinces. Crop production is scattered, and the soils, where cultivated, lose fertility relatively quickly; even the richer soils are usually returned to bush fallow within five yearsAnnex 16.

3.1.3 Geology

The geology of the South Sudan is extremely diverse with a variety of metamorphic, igneous and sedimentary rocks. The intensity of deformation and metamorphism varies from place to place. Extensive studies carried out by several workers in Sudan proved that the central Sudan and Nile Valley metamorphic belt include relic structures of ancient basement which date back to Lower Proterozoic or even Archaean. The gravity, seismic and drilling data acquired in interior Mesozoic basins in the central and South Sudan indicated that more than 30, 000 feet of clastic sediments occur within the deepest central trough of the three major rift basins. The project will traverse different section with diverse geologic characteristics this will determine the intensity and magnitude of ground exaction works that will be carried out Plate 5.

Plate 5: Rock Types along Nadapal Juba Road

3.1.4 Rainfall and Temperature

Total precipitation and periodicity are key components of the agro-ecologicalequation and nowhere in South Sudan can crop productivity be taken for granted. Rainfall is seasonalacross most of the south, with a pronounced dry season lasting from January to April, coinciding with the hotseason. This causes large scale migration of many of the pastoral people to wetlands along the river andelsewhere in pursuit of water and fodder for their herds. When the rains return (reportedly later in recentyears), up until June, people return to the upland agricultural areas to

graze their animals and raise some basicfood crops. This seasonality is much less pronounced in the extreme south and in the hilly areas of Equatoriawhere better rainfall and good soils promote a more sedentary crop-based lifestyle and where the higherhumidity is conducive to tsetse that limits livestock husbandry.

Rainfall in the south western extremes and highland areas of Equatoria ranges from 1200 to 2200 mm. As onemoves north along the Nile, the lowland areas of Eastern Equatoria, Jonglei, Upper Nile, Bahr el Ghazalreceive anywhere from 700 to 1300 mm of rainfall per year. The most arid portions of South Sudan occur in the extreme southeast along the border with Kenya where rainfall may not exceed 200 mm Figure 4.

The tropical climate in South Sudan defined in the desert zones, where winter temperatures as low as 4.4°C (about 40°F) is common, particularly after sunset. Summer temperatures often exceed 43.3°C (about 110 F) in the desert zones and rainfall is negligible. Dust storms, called haboobs, frequently occur. High temperatures also prevail to the south throughout the central plains region, but the humidity is generally low. In the vicinity of Khartoum the average annual temperature is about 26.7°C (about 80°F); and annual rainfall, most of which occurs between mid-June and September, is about 254 mm (about 10 in). Equatoria climatic conditions prevail in South Sudan. In this region the average annual temperature is about 29.4°C (about 85°F), annual rainfall is more than 1015 mm (more than 40 in), and the humidity is excessive.

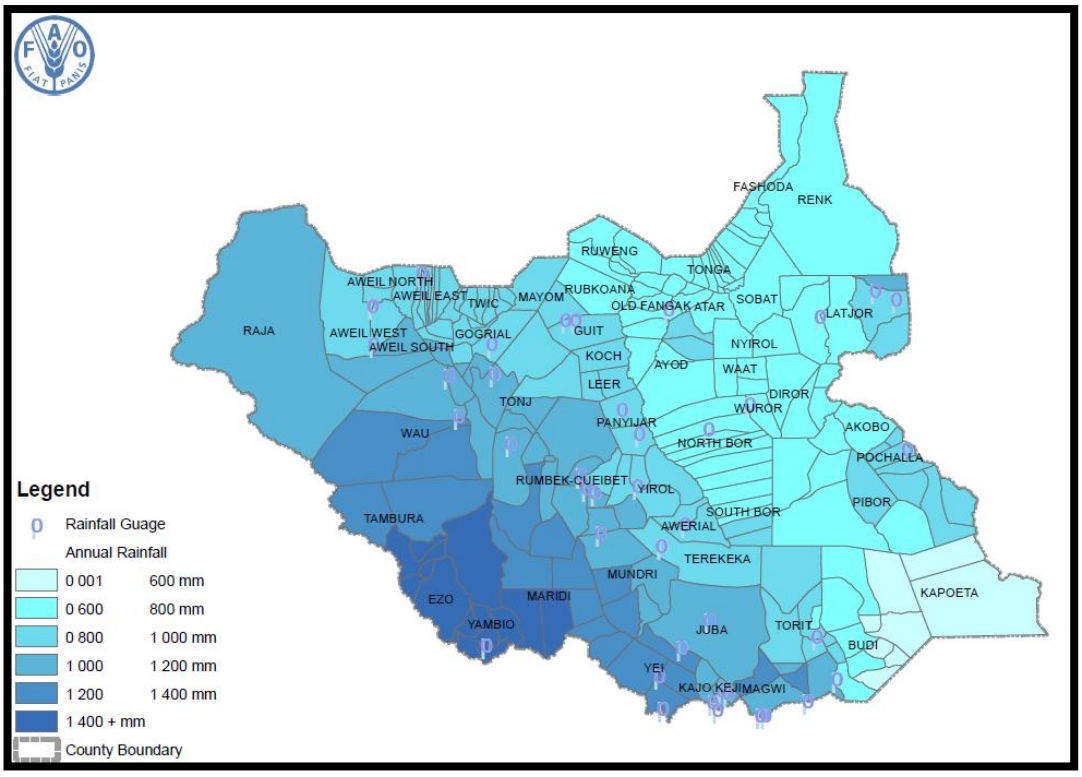


Figure 4: Rainfall Distribution in South Sudan

3.1.5 Agro-Ecological Zonation within South Sudan

Up until quite recently, descriptions of the ecology and environment of South Sudan had to be cobbled together from older documentation, much of it citing earlier works which might no longer be entirely valid or which contained unverified data and information. The "livelihood" paradigm is also well suited to this type of environmental analysis.It is predicated on thenotion that planning and development interventions need to take account of both the physical

environment and how people use it to derive their livelihoods. It thus mirrors the environmental assessment technique of considering both direct impacts on the physical environment as well as the indirect socio-environmental impacts of a given activity. The livelihoods paradigm is also useful in that an understanding of it can serve to highlight how adverse impacts from the activities being assessed can affect how people cope with hardships inherent to where they live or how they survive from year to year. Conversely, it is the livelihoods approach that also aids in an understanding of how the intervention being considered in this case of up grading Nadapal – Juba road actually benefits local people.

According to this report, South Sudan may be divided up into seven broad "Livelihood Zones"shown in Annex 16 and Table 3.

Table 3: Rural Livelihood Zones of South Sudan

In summary, these "Livelihood Zones" are described as follows:

Zone	Description
Greenbelt Zone	Households in the wetter south-western areas of the Greenbelt Zone rely almost exclusively on agriculture to meet their food needs. Here, surplus production is common and households cope with dry years by increasing their dependence on root crops and exchange.
Arid Zone	In the Arid Zone, which occupies the south-eastern tip of the country, households practice a nearly pure form of pastoralism and there is almost exclusive reliance on livestock and livestock trade for food. Seasonal migrations in search of both water and pasture provide opportunities for substantial trade and exchange with neighbouring communities.
Hills and Mountains Zone	The Hills and Mountains Zone falls somewhere between these two extremes (agriculture and pastoralism) with reliance on cattle, trade and root crops increased in difficult years.
Western and Eastern Flood Plain Zones	In the Western Flood Plain Zone, livestock and agriculture, supplemented by fish and wild foods, are the main food sources. Similar food sources are available in the Eastern Flood Plains Zone, but with an additional option of game hunting.
Ironstone Plateau	Households in the Ironstone Plateau Zone are heavily dependent on crop production and are well placed to access surpluses in the neighbouring Greenbelt.
Nile and Sobat Rivers Zone	Apart from crops and livestock, wild foods and fish contribute significantly in the Nile and Sobat Rivers Zone. Fish and wild foods are collected in varying quantities depending on the season and the location

Source: SSCCSE 2006.

Forests and Forestry development in Eastern Equatoria State is vital in modification of the climate within this region since it acts as a water catchment into River Nile. The state has woodland dominated by Acacia Senegal with substantial Gum Africa production potential. The state comprise of eight counties Budi, Ikotos, Kapoeta East, Kapoeta South, Kapoeta North, Lopa , Magwi and Torit in which the project is located. Natural forests and plantations in this

3.1.6 Drainage Pattern and Surface Water

3.1.6.1 Wetlands

South Sudan has numerous wetlands ecosystems. Wetlands are a common feature of the flat plain areas west and east of the Nile and the existing road system traverses them on countless occasions, often over causeways or raised roadbeds that were also expensive to build and which have disrupted the wetland ecosystem. The predominance of wetlands is vitally important as part of the land-use strategy among the agro-pastoralist society which retreats to them during the long dry season to sustain their cattle with fresh fodder and water.

Wetlands also serve an important ecological function as well, absorbing the run-off from occasionally torrential rain storms, storing it and releasing it slowly later in the season regulating the flow of many streams and watercourses. In effect, wetlands act as natural sponges and serve as an edaphic buffer mitigating the erratic rainfall patterns typical of much of South Sudan. The wetlands, of course, also serve as habitat and refuge for many wildlife species in South Sudan including all of the main "threatened and endangered species" except the chimpanzee. Inherently environmentally sensitive as ecosystems, the difficulty of building or reconstructing roads through the wetlands is exacerbated by the lack of good data on their hydrological characteristics. In many cases, wetlands are rivers waiting to happen wherein upstream run-off in some years will come together to form a previously unknown stream or river.

3.1.6.2 Groundwater

South Sudan possesses large areas of land underlain by rich aquifers. These water bearing formations are recharged by seasonal rainfall and river flooding and in some case it extends across international boundaries. Within the project site are there is high potential of ground water some of which has been exploited through sinking of bore holes along the road. These boreholes serve as source water for domestic purposes and animal as shown in the Plate6.

Plate 6: Water for Animal and Domestic Use

3.1.6.3 Rivers

The longest river in the world, the Nile flows for 6,737 kilometres from its farthest headwaters in central Africa to the Mediterranean. There are seasonal rivers and streams that originate and flow inside South Sudan namely the drainage of Eastern Equatoria plateau which comprise of R. Kineti, R. Kidepo, R. Thingaita, R. Koss, R. Idou, R. Kudo, R. Loma Yen, and R. Malen. Some of these rivers may from time to time dry during dry season Annex 15.
The road passes through several River Beds. This is very common along Torit - Kapoeta section.

3.1.7 Soil Erosion

In South Sudan, like any other developing countries, population growth has led to an increasing demand of basic needs such as food, employment, and cash income. Furthermore, in South Sudan, a large proportion of the population live in rural areas (90 per cent out of the total population), making them subject to rapid economic development such as logging and agricultural development, but also there are negative impacts such as deforestation, soil erosion, and flooding.

Soil erosion reduces the productivity of the crops, range, and forest and as a result of that endangers food security, causes displacement of local people and degrades the quality of human life in the affected areas. There is a relationship between food security/insecurity and environmental degradation, this result from inappropriate cultivation practices, overgrazing, excessive fuel wood, cutting, burning, and overstocking of animals and deforestation. This process of soil erosion has resulted to high poverty.

3.2 Historic and Cultural Resources

It has become commonly accepted that all the cultures of South Sudanese are basically alike, and it is true that there are basic elements of culture common to many of the societies in the region. But it is also true there are many divergences among these people. Culture is usually regarded as "consisting of patterns, explicit and implicit of and for behaviour acquired and transmitted by symbols, constituting the distinctive achievement of human groups, including heir embodiments in are facts.

The people of South Sudan have been classified and re-classified by scholars depending on a number of criteria. The most common criterion used by the majority of scholars has been cultural and linguistic features. According to cultural and linguistic similarities, there are three broad groups of people in south Sudan:

- The Nilotics; the main groups include the Dinka, Nuer, Shilluk, Luo of Bahr el Ghazal, the Acholi, Lango, and the Pari of Lafon, (and probably parts of the Mundari).
- The Nilo-Hamites; the main groups include the Bari-speaking, the Lotuko, Anuak-Murle-Didinga-Toposa groups,
- The Sudanic, the main groups include the Zande, Muru-Madi, Baka, Mundu, Avokaya, Makraka, Bongo-Baka-Bagirmi-Balanda

Most scholars until about mid-1950s used this classification, when a new classification of the above groups was adopted, which was:

- The Central Southerners; (in place of Nilotics)
- The Eastern Southerners, (in place of the Nilo-Hamites);
- Western Southerners, (in place of the Sudanic groups).

A new classification was adopted for the two groups, which were Nilotics and Para-Nilotics, suggesting that the groups of South Sudan were closely related, especially with regards to language and some cultural characteristics. But scholars have suggested, we still commonly know the divisions of the people of the South according to the first classification.

There are about over 200 tribal groups in South Sudan. The distribution of these groups corresponds very closely with the physical geographical classification shown above. The Nilotics groups are generally found in the Central and Flood zones of the Nile, while the Nilo-Hamites and the Sudanic groups are concentrated in the Equatoria zone.

The term Nilotics or Nilotes is sometimes used indiscriminately to describe all the people south of the Arabs and living near the Nile or its tributaries. But the term is now used more precisely to cover a group of people who display certain similarities of cultures, means of livelihood, physical

type, and in particular language. They are now found widely distributed in South Sudan, Uganda, Kenya and Tanzania. The Nilotics and Nilo-Hamites groups have other common characteristics, and one of the most important is animal husbandry. Moreover, some of the words are very common to the majority of the people in these groups.

3.3 Biological Resources and Ecological Analysis

The proposed up-grading of the Nadapal to Nimule- Nadapal junction stretches for a distance of 341.2km. It starts from Nadapal and passes through small townships namely Nadapal, Narus, Kapoeta, Torit, and Liriya.The road extends along gently undulating terrain passing between high mountain ranges from Nadapal through Kapoeta, Boaya hills and Torit ending at Juba, on the banks of the White Nile. The vegetation is diverse but mostly of the lowland woodland, bush land, shrub land and grassland. These undulating plains are crossed by several perennial rivers namely: Kidepo, Thingaita, Koss Idou and Kudo which forms a unique ecosystem. A total of 19(nineteen) plots were laid out between Nadapal and Nimule Junction. Emphasis was made on species diversity and distribution especially within the plots, townships, small settlements along the road, the vegetation occurring in the luggas at the bridge crossing points and the expected ball pits. These areas are more prone to species destruction during the road upgrade. The avifauna diversity is also diverse. Animals, birds, insects, amphibians and reptiles encountered along the road were recorded on site.

The proposed Nadapal-Juba road passes through a seasonal migratory route where animal crosses to find food and water depending on the yearly season. The wildlife crossing area along the proposed road section particularly around Kidepo valley is a seasonal wild animal crossings corridor (from Kenya, Ethiopia and Uganda to Nimule National Park, Kidepo and Tigely National Parks) and needs a special intervention to avoid and/or minimize impacts on the wlidlife. The road design will include provisions to minimize disruptions to wildlife movement during construction and operational phases of the project. Such road design provisions will be done in consultations with relevant stakeholders. A separate budget will be allocated for monitoring and relevant activities during scheduled road maintenance.

3.3.1 Vegetation Description

The observation shows that there are four distinctive vegetation types along the whole stretch of the road. These are within the GPS points between:

- Nimule Junction (Juba) - Nadapal junction to Kiyala; this is a purely closed woodland.
- Kiyala to Kapoeta including luggas; a more open wooded grassland.
- Kapoeta to Nadapal; Acacia-*Balanites-Dobera-Diospyros* open shrub land.
- Within townships and small settlements along the road; mostly exotic species.

The first type is a more closed woodland dominated by tall trees which include: *Sclerocarya birrea, Tamarindus indica, Lannea schweinfurthii, Balanites pedicillaris, Sterculia rhynchocarpa, Ziziphus abyssinica, Combretum collinum, Mangifera indica, Piliostigma thonningii, Azadirachta indica, Acacia polyacantha, Ficus lutea, Kigelia africana, Celtis wightii, Hyphaene coriacea. Vitallaria paradoxum, Ekebergia capensis, Milicia excelsa, Khaya grandifoliata, Entendrophragma angolense and Erythrophleum suaveolens.*
The resurgence of this vegetation type is as a result of the influence of forest species which marks the transitional zone between the high altitude species and the lowland woodland.

The second vegetation type is more of open lowland wooded grassland dominated by scattered trees and shrubs. It is well described as *Acacia-Terminalia- Balamites* open wooded grassland. Thedominant species includes: *Terminalia brownii, Terminalia spinosa, Acacia polyacantha, Acacia tortilis, Dichrostachys cinerea, Dalbergia melanoxylon, Harissonia abyssinica, Tamarindus indica, Sclerocarya birrea, Berchemia discolor, Ficus glumosa, Kigelia africana, Acacia eliotior and Ximenia caffra.*

Kapoeta-Nadapal; Acacia-Balanites-Dobera-Diospyros open shrub land; this vegetation is described as open *Acacia-Balanites-Dobera-Diospyros* shrub land with scattered patches of grass. The dominant species are *Acacia reficiens, Acacia mellifera, Acacia poalii, Acacia nilotica, Acacia tortilis, Lannea triphylla, Balanites aegyptiaca, Dobera glabra, Diospyros scabra, Dichrostachys cinerea, Salvadora persica, Ximenia caffra, Boscia angustifolia, Cordia sinensis and Terminalia spinosa. Aloesecundifolia, Sansevieria robusta, Sarcostemma viminale and Adenium obesum* are also common.There are several luggas that cross the road within this vegetation. The dominant species in the luggas at the bridge crossing point includes; *Terminalia brownii, Berchemia discolor, Meyna tetraphylla, Diospyros scabra, Ficus sur, Cordia millenii, Tamarindus indica and Acacia eliotior.*

Species found within Townships and small settlements along the road. Most of the plant species found within townships and the small settlements along the road are exotics. These include *Azedirachta indica, Jatropha curcas, Tectonia grandis, Senna siamea, Ricinus communis, Parkinsonia anacantha, Ceiba pentandra, Prosopis chirensis, Carica papaya, Musa paradisiacal, Hibiscus rosa-chinensis and Mangifera indica.* The indigenous species include *Acacia nilotica, Salvadora persica, Acacia tortilis, Balanites aegyptiaca, Cordia sinensis, Kigelia africana and Hyphaene coriacea*.

Plate 7: *Khaya grandifoliata*

Plate 8: *Vitteraria paradoxum* (Leaves and Fruits)

Plate 9: *Adenium obesum* (Leaves and Fruits)

Table 4: List of Birds Recorded Along Nadapal-Juba Road

Common Name	Scientific Name
Cattle Egret	*Bubulous ibis*
Black Egret	*Egretta ardesiaca*
Grey Heron	*Ardea cinerea*
Egyptian Goose	*Alopochen aegyptiaca*
Egyptian Vulture	*Neophron percnopterus*
Black-chested-snake-Eagle	*Circaetus spilogaster*
Pygmy Falcon	*Polihierax semitorquatus*
African Hawk Eagle	*Hieraaetus spilogaster*
Grey Hornbill	*Tockus nasutus*
Green-backed Heron	*Buteroides striatus*
African Spoonbill	*Platalea alba*
White-backed Vulture	*Gyps africanus*
Fish Eagle	*Haliaetus vocifer*
Red-Necked Falcon	*Falco chicquera*
Crested Francolin	*Francolinusleucoscepus*
Vulturine Guinea fowl	*Acrylliumvulturium*
Somali bee eater	*Meropsrevoilii*
Red-billed Hornbill	*Tockus erythrorhynchus*
Crested Helmet shrike	*Prionopsplumata*
Grey-headed sparrow	*Passer griseus*
Wire-tailed swallow	*Hirundosmithii*
Paradise Flycatcher	*Terpsiphoneviridis*
White-headed buffalo Weaver	*Dinemelliadinemellia*
Grey-headed Sparrow	*Passer griseus*
Golden-breasted starling	*Cosmopsoriusregius*

Chicken were seen within townships and small settlement along the road.

Plate 10: Quillea Birds (On the Background)

The insects seen belong to the follows groups;

Table 5: Insects Recorded

Common Name	Scientific Name
Coleoptera	*Hymenotera (ants)*
Hemiptera	*Thysanura*
Lepidoptera	*Coleoptera*

There were a lot of house flies seen especially within the settlements

Table 6: Reptiles and Amphibians Recorded

Common Name	Scientific Name
Red headed Agama	*Agama agama*
Gekko	*Lygodactylus picturatus*
Nile Monitor Lizard	*Veranus niloticus*
Savannah Monitor Lizard	*Veranus exanthemetics*
Rock python	*Python sebae*
Brown backed snake	*Rhamphioplus oryrhynchus*

Plate 11: *Python sabea*

Table 7: Mammals Recorded

Common Name	Scientific Name
Kirk's Dikdik	*Rhynchotragus kirki*
Egyptian mongoose	*Herpestes ichneumon*
Olive baboon	*Papio Anubis*
Velvet monkey	*Cercopithecus aethiops*
Bush squirrel	*Parazerus ochraceus*
Thomson's Gazelle	Eudorcas thomsonii

Plate 12: Thomson's Gazelle

The domestic animals seen along the road and within townships and villages are cats, cattle, donkeys, dogs and goats.

3.3.2 Results

A total of 600 plants were recorded from the 19 plots which represent 46 families and 175 species. The species that were found in most of the plots include: *Acacia nilotica, Acacia Senegal, Albizia amara, Balanites pedicellaris, Calotropis procera, Combretum collinum, Dalbergia melonoxylon, Dichrostachys cinerea, Flueggea virosa, Grewia villosa, Harissonia abyssinica, Kigelia Africana, Maytenus senegalensis, Piliostgma thonningii, Sclerocarya birrea, Solanum incanum, Tamarindus indica, Tribulus terrestris, Ximenia caffra andZiziphus abyssinica.*The most dominant species with a wide distribution all along the road include: *Sclerocarya birrea, Tamarindus indica, Kigelia Africana, Harissonia abyssinica, Flueggea virosa, Dichrostachys cinerea, Combretum collinum, Balanites pedicillaris, Piliostigma thonningii, Grewia villosa and Ziziphus abyssinica.*

The species that are of any economic value include*: Millicia excelsa and Khayagrandifoliata* which produce good timber, *Vitteraria paradoxum*, called shea butter and whose seed oil is used commercially and *Mangifera indica* (Mango) whose fruits are source of food for the local community. A number of species were reported to have been exploited for food by the local communities especially during the drought periods. However, these are common herbaceous or shrubby plants with a wider distribution throughout the study area. A complete list of plant species sampled along the road is shown in Annex 18.

3.3.3 Conclusion

Nearly all the plant species recorded are common with a wide distribution within the study area. Except for *Millicia excelsa* and *Khaya grandifoliata* which are forest species and are widely distributed in the adjacent hills and mountains including Imatong; *Vitteraria paradoxum* which is commonly distributed in the lowland habitats and the *Mangifera indica* which has been planted mostly in settlements areas, most of the others are herbaceous or perennial species which occur in the dry lowland habitats.

There was no available information concerning the conservation status of plant species in South Sudan. It was therefore impossible to determine the species endemism, threats or the vulnerability. This information is normally given in the IUCN Red Data List and in the CITES. The Wildlife Conservation and National Park Act, 2003 for South Sudan which is available does not expand on the conservation status of the avifauna and flora.This study concludes that there will be no major ecological impact that will negatively affect the up-grading of the Nadapal-Juba road.

3.4 Socio Economic Baseline Results and Discussions

3.4.1 Social Environment

The project road crosses six counties (Juba, Torit, Kapoeta North, Kapoeta South, Budi and Ikotos) with a total population 838,555. There are over sixteen dotted settlements known as Payams or Bomas situated linearly along the project road. The road project is principally within one state, Eastern Equatorial State. The Counties are inhabited by Toposa, Buya, Langi, Lotuka, Lukoya and Bari communities. The area is largely dominated by the pastoral communities– Toposa, Buya and Lotuka with few small scale subsistence farmers growing mainly sorghum. Table 8 below shows the population composition of affected Counties.

3.4.1.1 Religion

The inhabitants of the project region practices three religions. The religions include Christianity, Islam and African Traditional Religion. Nearly 30% of the households from Juba to Torit are Christian, over 50% are tradionalists and very few are Muslims. Form Torit to Nadapal, over 80% of the household are Christians with very few the pockets of Muslims and Tradionalists. Of the Christians, over 70% were Catholics.

3.4.1.2 Population and Demographic Characteristics

The 2008 South Sudan census figures have not yet been released and hence the census figures for the study area cannot be estimated. From the sampled households, there are on the average 5 persons per household Table 9. Lyangari Boma had the highest fertility rate with an average household size of 6.7 with Town having the least average household size of 1.5. The household size is low in Torit town because most residents are business persons whom majority were still youth and single.

Although gender composition of the sampled households is on average balanced, Torit town and Lopiri Boma had very skewed gender distribution with males recording 79.59% and 33.33% respectively. Most residents of Torit town are business persons and government workers who are either single or had their wives and children staying in the rural areas. Lopiri Boma had the reverse experience of Torit town. Most of the male members of the households had migrated to the nearby towns and trading centres for wage employment or businesses living behind women in the villages to work on farms and graze livestock. Amazingly, the project area is male dominated with 80% of the households being headed by men. Even where a respondent was single mothers, she still indicated that either her elder son or a close male relative was the household head. The culture and traditions followed by most households in the project area does not allow women to be the head of household. Khiyala and New Kenya were exceptional and 50% of households were headed by women.

Table 8: Population of Project Area

County	Male	Female	Total
Juba	205,674 (55%)	166,739 (45%)	372,413
Torit	50,644 (51%)	49,096 (49%)	99,740
Kapoeta North	53,269 (52%)	49,815 (48%)	103,084
Kapoeta South	42,402 (53%)	37,068 (47%)	79,470
Budi	50,103 (51%)	49,096 (49%)	99,199
Ikotos	42,106 (50%)	42,543 (50%)	84,649
Total	**444,198 (53%)**	**394,357 (47%)**	**838,555**

Source: Census Report 2008

Table 9: Summary Statistics of Demographic Characteristics of the Sampled Household

Boma	Average household size	Gender Composition of Households		Male Headed Households	Average Years of formal education
		Male	Female		
Ebalanyi	4.5	51%	49%	67%	2.5
Gikokwe	4.6	54.17%	45.83%	70%	2.8
Khiyala	5.7	50.42%	49.58%	50%	0.6
Korjip	6.3	47.93%	52.07%	68%	2.8
Kudo	6.3	43.39%	56.61%	84%	1.9
Liria	2.7	64.92%	35.08%	100%	1.5
Lobira	6	45.46%	54.54%	80%	1.2
Lopiri	4.3	33.33%	66.67%	66%	4.6
Lyangari	6.7	42.76%	57.24%	66%	4.2
Napotpot	3.7	65.28%	34.72	100%	2.1
Narus	5.7	55.65%	44.35%	100%	3.6
New Kenya	5.5	52.93%	47.08%	50%	3.5
Nhuelere	6	51.36%	48.64%	100%	2.5
Obule	5.3	50.56%	49.44%	100%	0.6
Olere	6.3	53.57%	46.43%	80%	3.2
Toirt town	1.5	79.59%	20..41%	90%	1.4

Source: Field Data

3.4.1.3. Demographic Profile and of Population Distribution PAPs

The project affected households survey registered and counted the households within the proposed project road corridor. The demographic variables that were considered included:Population distribution by sex; Household Size; Education status of the household head; Primary occupation of the household head; Household expenditure patterns; and Household sources of income. The census of PAPs revealed that a total of 180 households with a total population of 1218 will be adversely affected by the project. Of the affected population, 50.5% were male and 95.5 % female. The average household size was found to be 6.76 persons. The population composition of affected household is presented Table 10 below.

Table 10: Population Distribution of Project Affected Household

Payam	Total HH	Male	Female	Total	Average HH Size
Ngony	49	181 (56%)	144 (44%)	325	6.7
Loriyok	81	250 (48%)	274(52%)	524	6.4
Liria	8	26(59%)	18(41%)	44	6.2
Narus	33	123(46%)	144 (53%)	267	8.1
Kiyala	9	35(60%)	23 (40%)	58	6.4
Total	**180**	**615 (50.5%)**	**603 (49.5%)**	**1218**	**6.76**

Source: Field Study, 2010

3.4.1.4 Social Infrastructure

Most of the Payams dotted along the project road lack basic social infrastructures such as accessible roads, electricity public and private hospitals, dispensaries hotels and gas station. The

entire project area further lacks a dedicated transport system of it take residents using public transport to travel for more than two days to cover distances more than 100 kilometres.

3.4.1.5 Education

There is very limited number of schools in the project area and this explains why over 70% of the respondents had no education with the rest having very few years of formal schooling. As shown in the Table 9 above, Lopiri Boma households had the highest average schooling years of 4.6 years which by even the East and Central African Standard is very low. Obule and Khiyala Boma had most of its residents having no education at all. The low figures of years of schooling in the project area is due to the over twenty years of war which adversely affected education. The few who had primary and secondary education revealed that they got their education from Uganda, Kenya and Khartoum. It was only Kudo and Torit town that had new permanent buildings for primary schools with the rest having temporary structures or children being taught under trees. The project area has only one secondary school situated in Torit town.

The average schooling years for the PAPs is 1.64 years. Among the PAPs, 86 percent have no education while only 10 percent have secondary education. The literacy status of female PAPs is worse as their average schooling years is 1.3 years. The low literacy levels are as a result of the project area being a "war zone" during the 20 years civil war and were exposed to frequent displacements with majority of the school going ages joining the army. The low literacy rate means that approximately 86 percent of the PAPs cannot read and write thus will likely affected the understanding of issues pertaining to land acquisition impacts. Table 11 provided the education status of the PAPs.

Table 11: Education Status of PAPs

Payam	Total PAPs	Average Schooling Years	Average Female PAPs Schooling Years
Ngony	325	2.76	2.4
Loriyok	524	0.99	0.45
Liria	267	2.48	0
Narus	58	1.52	0.51
Kiyala	44	0.95	0
Total	**1218**	**1.64**	**1.3**

3.4.1.6 Water

Most of respondents depend on boreholes for water supply. Communal boreholes were constructed by NGOs operating along the project road and are being maintained by the communities benefiting from them. Most respondents however complained that borehole water was not enough for both domestic and livestock need.

3.4.1.7 Electricity

Individually owned diesel generators provide most of the electricity requirements to businesses along the project area. It is only in Torit town when the county government supply residents with electricity and it limited to between 6.00 PM to Midnight. Most of the households use lantern lamps and candles for lighting their houses.

3.4.1.8 Roads

Before the improvement of Nadapal - Juba road to all season's road, most of the areas in the Eastern Equatoria were highly in accessible. There are virtually no goods roads feeding into the

proposed road project. Over 90 percent of the respondents cited poor roads as a big obstacle development and therefore the upgrading of this road to bitumen standard will be a big boost to economic development in the entire South Sudan.

3.4.1.9 Transportation

The transport system within the project area is very chaotic with majority of passengers relying on trucks from Kenya, few ill suited 14 sitter small cars, motorcycles (Senkes) Plate 13 and bicycles. Most of the respondents indicated that most of the time they are unable to travel to other areas served by the road either due to lack of public transport or it being extremely expensive. The upgrading of the road is expected by many respondents to transform the transport system within the region into a modern transport industry which is expected to grow rapidly, improving comfort for travellers, and reducing travel time and costs.

Plate 13: A Man Using Motorcycle Transport (Senke)

3.4.2 Economic Environment

3.4.2.1 Occupational Distribution of the Respondents

The primary occupations of the residents within the project area are farming, trading and grazing. As shown in Table 12 farming activities on average account for 63 .54% of the recorded economic activities. Trading which included shop keeping, hotel business, and charcoal burning for sale, selling of grass, alcohol brewing for sale, and hunting game meat for sale account for only 16.67% of economic activities with the project area. Grazing as an economic activity accounted for only 3.13% as Khiyala and Napotpot were the only Bomas with large livestock along the project road. Government employees accounted for 7.29% and were mainly Payam administrators. Torit town and Narus towns being administrative centres had largest concentration of Public servants which accounted for 33.33% of the occupational activities.

Farming activities in the project area is small scale and in most cases is below the subsistence level as most household lacked enough food stock to last them up to the next harvest period. Most of the youth in the project region are engaged in raiding and stealing of livestock from other neighbouring communities as well as hunting and selling game meat as their major income generating activities. Most respondents cited that lack of gainful employment opportunities for the youth is the major cause of insecurity along the project road

Table 12: Occupation Structure of Respondents

Boma	Farming	Grazing	Trading	Public servant
Ebalanyi	50.00%	33.33%	16.67%	0.00%
Gikokwe	83.33%	16.67%	0.00%	0.00%
Khiyala	16.67%	50%	33.33%	0.00%
Korjip	50.00%	0.00%	33.33%	0.00%
Kudo	33.33%	0.00%	16.67%	50.00%
Liria	66.67%	0.00%	16.67%	16.67%
Lobira	66.67%	0.00%	16.67%	16.67%
Lopiri	83.33%	0.00%	0.00%	16.67%
Lyangari	66.67%	0.00%	33.33%	0.00%
Napotpot	33.33%	50.00%	16.67%	0.00%
Narus	16.67%	0.00%	50.00%	33.33%
New Kenya	50.00%	0.00%	50.00%	0.00%
Nhuelere	100.00%	0.00%	0.00%	0.00%
Obule	100.00%	0.00%	0.00%	0.00%
Olere	83.33%	0.00%	0.00%	16.67%
Torit	0.00%	0.00%	66.67%	33.33%
Project Area	63.54%	3.13%	16.67%	7.29%

Source: Field Data

3.4.2.2 Income Distribution of the Respondents

The minimum income among most respondents was below 1000 Sudanese Pounds. Table 13 below should be taken cautiously as the project area had several economic activities such as farming, hunting and livestock keeping which are always treated as non-cash items and as such could have led to an underestimation of incomes in the project area. On the overall, the income distribution among the sampled households reflect high levels of poverty with over 35% of the respondents reporting incomes below 1000 Sudanese Pounds a year. Lopiri and Olere households are the most poor with over 66% of the households living in chronic poverty. High levels of income were reported in Torit and Liria towns. This could be explained by the fact the two towns are the major business centres along the proposed road project.

Table 13: Estimated Annual Income Distribution of Respondents

Income (SDP) / Boma	Below 1000	1001 - 2000	2001 – 3000	3001 - 4000	4001 - 5000	5001 – 6000	6001 – 7000	8000 - 10,000	10,000 - 15,000	above 15,000
Ebalanyi	33.33%	16.67%	16.67%	0.00%	0.00%	16.67%	0.00%	16.67%	0.00%	0.00%
Gikokwe	33.33%	0.00%	16.67%	16.67%	0.00%	16.67%	0.00%	16.67%	0.00%	0.00%
Khiyala	33.33%	33.33%	16.67%	0.00%	0.00%	0.00%	16.67%	0.00%	0.00%	0.00%
Korjip	33.33%	16.67%	0.00%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%	16.67%
Kudo	16.67%	33.33%	16.67%	16.67%	0.00%	16.67%	0.00%	0.00%	0.00%	0.00%
Liria	16.67%	16.67%	0.00%	0.00%	0.00%	0.00%	16.67%	0.00%	16.67%	33.33%
Lobira	16.67%	16.67%	16.67%	0.00%	0.00%	33.33%	0.00%	0.00%	16.67%	0.00%
Lopiri	66.67%	16.67%	0.00%	0.00%	0.00%	16.67%	0.00%	0.00%	0.00%	0.00%
Lyangari	50.00%	16.67%	33.33%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Napotpot	33.33%	0.00%	16.67%	16.67%	0.00%	0.00%	0.00%	0.00%	16.67%	16.67%
Narus	50.00%	0.00%	0.00%	16.67%	0.00%	0.00%	16.67%	0.00%	0.00%	16.67%
New Kenya	16.67%	0.00%	33.33%	16.67%	0.00%	0.00%	0.00%	0.00%	16.67%	16.67%
Nhuelere	50.00%	0.00%	16.67%	0.00%	0.00%	16.67%	0.00%	0.00%	16.67%	0.00%
Obule	50.00%	16.67%	0.00%	0.00%	16.67%	0.00%	0.00%	0.00%	0.00%	16.67%
Olere	66.67%	0.00%	16.67%	0.00%	0.00%	0.00%	0.00%	16.67%	0.00%	0.00%
Torit	0.00%	0.00%	0.00%	0.00%	0.00%	16.67%	16.67%	16.67%	33.33%	16.67%
Project Area	35.42%	11.46%	12.50%	7.29%	1.04%	8.33%	4.17%	4.17%	7.29%	8.33%

Source: Field Data

3.4.2.3 Land Use and Agricultural System

The economic land use in the project area is farming during the rainy season and grazing. The settlements are dotted and crowded together with a small and large Boma consisting of 20 and over 50 households respectively. Some of the large settlements were provided by primary schools dispensaries sponsored by UNICEF. The main sources of water for domestic use are boreholes. These boreholes are constructed by NGOs operating in these settlements and provide clean and suitable water for the community. The project area covering up to Torit from Juba had several Mango trees linearly dotted barely five meters along the project road. These mango trees are countless and are, surprisingly a very important source of livelihood of the local communities.

They are harvested and sold within the local markets and also to outside markets within the region. The mango trees were not planted by the current residence in these communities and the ownership arrangement is communal with all the members having the harvesting rights. An estimated 80% of the mango trees are within 20 m of the present road centerline and are thus targets for felling during construction.

Plate 14: Trees along a Section of the Proposed Project Road in Torit Town

Farming System

The farming system in the project area is farm rotation with multiple crops which includes sorghum, maize, cassava, groundnuts, peas, simsim and beans. The long spell of war in South Sudan was concentrated in the region covered by the proposed road project and this greatly affected agricultural production. The landmines and explosives planted during the war have forced local households to maintain a minimum subsistence level of agricultural production in this vast area with extremely high production potential Plate 15.

Plate 15: Farm at Gikokwe with Several Ammunitions Buried Underground alongthe Proposed Road

Although the current road condition makes it difficult for the farm produce access markets, the upgrading project road to asphaltic concretestandard has compelled to the GoRSS with the assistance of the UN agency currently carrying out demining exercise in the country to demine within 26m of the ROW of the existing road from Juba to Nadapal.

Most of farm labor is communal in nature and Boma member's draws work schedules on all the farms owned by households. The household whose farm is worked on has to provide food and drinks as compensation to the workers. The Plate 16 below gives a picture on communal labor system.

Plate 16: Communal Work on a Farm in New Kenya alongthe Road Project

The farms are relatively small and over 60 percent of the sampled households owned average farm size below 0.25 ha as shown in Table 14. The smallest farms are found in Obule, Narus and Napopot. These Bomas consists of households that are mainly pastoralists. Medium farms are relatively few and were found in Gikokwe and Olere. The residents who originally feared that most landmines are still buried on the ground and hence cannot risk by expending their farms away from the existing road have been sensitized by the MTRB, Torit State and UN demining agencies of such fears.The UN is currently undertaking demining exercises in South Sudan and has declared the Juba – Nadapal road and its environs free of any mines. The sensitization of communities on the demining is still on-going.

Table 14: Household Farm Size

Boma	Below 0.25 Ha	0.25 - 1 Ha	1.1 – 2.0 Ha	Over 2.0 Ha
Ebalanyi	50.00%	50.00%	0.00%	0.00%
Gikokwe	33.33%	16.67%	16.67%	33.33%
Khiyala	66.67%	16.67%	0.00%	16.67%
Korjip	66.67%	16.67%	16.67%	0.00%
Kudo	50.00%	33.33%	16.67%	0.00%
Liria	33.33%	16.67%	33.33%	16.67%
Lobira	83.33%	16.67%	0.00%	0.00%
Lopiri	50.00%	16.67%	16.67%	16.67%
Lyangari	16.67%	50.00%	16.67%	16.67%
Napotpot	83.33%	0.00%	16.67%	0.00%
Narus	83.33%	0.00%	0.00%	16.67%
New Kenya	66.67%	33.33%	0.00%	0.00%
Nhuelere	66.67%	33.33%	0.00%	0.00%
Obule	100.00%	0.00%	0.00%	0.00%
Olere	33.33%	33.33%	0.00%	33.33%
Torit	0.0%	0.00%	0.00%	0.00%
Project Area	60.42%	21.88%	8.33%	9.38%

Source: Field Data

Livestock

Table 15 below shows the distribution of livestock ownership along the project road. Most of the livestock along the project road included cows, goats and sheep. Most households had at least a combination of the two livestock type with only 15% having all of them. 19% of the sampled households had cows, 44% had goats and 24% had sheep. The intensity of livestock ownership and type is not uniform along the road project and is tribe dependent. Most of the Bari speaking

tribe owned only goats and sheep while the Latuka and Toposa speaking tribes owned most of the cows and the goats. From the table below, it is evidenced that most of the cows and goats along the road will be found in Khiyala and Napotpot.

Table 15: Livestock Ownership by Respondents

Boma	Cows	Goats	Sheep
Ebalanyi	0.00	3.33	26.00
Gikokwe	0.00	26.17	42.67
Khiyala	50	83.83	1.67
Korjip	5.83	37.33	6.00
Kudo	1.00	5.00	2.50
Liria	5.00	3.00	1.67
Lobira	1.50	6.67	2.50
Lopiri	4.83	13.83	7.33
Lyangari	1.67	1.83	3.33
Napotpot	157.33	250.00	3.00
Narus	0.00	7.83	0.00
New Kenya	0.00	7.83	0.00
Nhuelere	34.67	1.50	3.17
Obule	10	83.30	0.00
Olere	3.33	1.87	3.00
Torit	0.00	0.00	0.00

Source: Field Data

In these most of these Bomas, livestock movement is quite extensive with several goats having the habit of always lying along the project road. Accidents between vehicles and livestock are expected and mitigation must include the installation of warning signs erected at intervals along the road and the construction of underpasses to be used by goats and cattle crossing the road. The plate below shows a large number of goats lying in the all over the road during day time Plate 17.

Plate 17: Livestock Lying On the Proposed Road Project

3.4.3 Community Health Status

3.4.3.1 Housing

The settlement dotted along the project road is unplanned and houses are built indiscriminately without giving any consideration for proper drainage. Over 80% of the housing units are either semi-permanent or temporary in nature and are built using grass, mud and sticks Plates 18 and 19) Table 16. Houses built with concrete and corrugated sheets along the project road were found in only in Torit town, Kapoeta and Nadapal.

Table 16: Housing Types of the Sampled Households

Boma	Permanent	Semi-Permanent	Temporary
Ebalanyi	0.00%	16.67%	83.33%
Gikokwe	0.00%	33.33%	66.67%
Khiyala	16.67%	33.33%	50%
Korjip	0.00%	80.00%	20.00%
Kudo	0.00%	60.00%	40.00%
Liria	0.00%	50.00%	50.00%
Lobira	16.67%	33.33%	50.00%
Lopiri	0.00%	50.00%	50.00%
Lyangari	0.00%	33.33%	66.67%
Napotpot	0.00%	16.67%	83.33%
Narus	0.00%	50.00%	50.00%
New Kenya	0.00%	50.00%	50.00%
Nhuelere	0.00%	0.00%	100.00%
Obule	0.00%	33.33%	66.67%
Olere	0.00%	33.33%	66.67%
Torit	83.33%	0.00%	16.67%
Project Area	7.45%	36.17%	56.38%

Source: Field Data

Plate 18: A Semi Permanent Housing Unit along the Proposed Road Project

Plate 19: Home Stead with Temporary Housing Units along the Proposed Road Project

3.4.3.2 Water and Sanitation

Boreholes serve as the only source of clean water to communities along the project area. Most respondents indicated that this water source is grossly inadequate Plate 20. Sanitary conditions are pathetic with over 80 % of the respondents having no toilets at all and defecate directly in the surrounding bushes. The health implication of such a practice is the frequent serious outbreak of cholera and other communicable diseases during rainy seasons.

Plate 20: A Man Using Donkey Transport to Ferry Water in Torit Town

3.4.3.3 Knowledge and Attitude on HIV/AIDS

The ESIA team investigated the knowledge and attitude of the communities living along the project road on HIV/AIDS. 73% of the respondents indicated that they had heard about the disease and answered correctly how the disease is spread and ways to be protected from getting infected. 27% of the respondents revealed total ignorance about HIV/AIDS. Table 17 below shows the distribution on respondents' the knowledge by their respective Bomas.

Table 17: Knowledge on HIV/AIDS by Respondents

Boma	Significant Knowledge	Total Lack of Knowledge
Ebalanyi	33.33%	66.67%
Gikokwe	100.00%	0.00%
Khiyala	100.00%	0.00%
Korjip	50.00%	50.00%
Kudo	50.00%	50.00%

Liria	100.00%	0.00%
Lobira	100.00%	0.00%
Lopiri	83.33%	16.67%
Lyangari	50.00%	50.00%
Napotpot	66.67%	33.33%
Narus	100.00%	0.00%
New Kenya	66.67%	33.33%
Nhuelere	33.33%	66.67%
Obule	66.67%	33.33%
Olere	66.67%	33.33%
Torit	100.00%	0.00%
Total	72.92%	27.08%

Source: Field Data

The Table 17 above depicts that all respondent from six Bomas (Gikokwe, Khiyala, Liria, Lobira, Narus and Torit) had perfect information on issues relating to HIV/AIDS. A further interview with those who had perfect knowledge revealed that most of the households in these Bomas were returnees from Kenya and Uganda. The Bomas recording lack of knowledge by majority of its households consisted of those who migrated and settled on the mountains along the road project during the war and hence could not easily access any education and information.

Table 18 below reveals a very worrying scenario along the road project as over 47% of the female respondents claimed total lack of information about HIV/AIDS and how it is spread. Most male respondents revealed significant knowledge HIV/AIDS and discussed the subject freely with the interviewers.

Table 18: Knowledge onHIV/AIDS by the Gender of Respondents

Gender	Significant Knowledge	Total Lack of Knowledge
Male	86.30%	13.70%
Female	52.63%	47.37%
Total	72.92%	27.08%

Source: Field Data

The major sources of information on HIV/AIDS revealed by respondents was radio and friends, with 46.15% and 53.85% of the respondents indicating that they regularly get informed about the disease by radio and friends respectively. Table 19 gives a detailed summary of the percentages of respondents from sampled Bomas by the information source. The Bomas with strong ties and good social capital easily accessed information about HIV/AIDS from friends. In most of the trading centres, majority of the respondents had radios and hence could easily access information through the media as opposed to most Bomas away from the trading centres with few radios.

Most of these respondents who had some knowledge on HIV/AIDS were not popular with the condom use as a way of protection against contraction the disease. They all advocated for serious sensitization programs on the need for total abstinence among the youth who are unmarried. 100% of these respondents believed that social interaction with project employees, most of whom are likely to come from Juba, Kenya and Uganda, with the residents considering the influence of money, is a potential avenue for transmission of HIV/AIDS and other social infections.

HIV/AIDS control should therefore be a major undertaking under the project that should particularly focus on the small trading centres and Torit town in addition to areas which will be of social and economic concentration within the project corridor. Among the activities in this regard should be geared towards advocacy (awareness creation), training and preventive measures. It would be recommended as follows;

- Review the activities of the road construction to integrate with HIV/AIDS campaigns.
- Develop appropriate training and awareness materials for information, education and communication on HIV/AIDS,
- Identify and partner other players on HIV/AIDS for enhanced collaboration
- Develop an intervention strategy compatible with the road construction programme to address success of the HIV/AIDS prevention and provide peer educators for sustainability in collaboration with stakeholders,
- Integrate monitoring of HIV/AIDS preventive activities as part of the road construction supervision. Basic knowledge, attitude and practice are among the parameters to be monitored, and particularly on provision of condoms, status testing and use of ARVs.

Table 19: Information Sources on HIV/AIDS along theProject Road

Boma	Radio	Friends
Ebalanyi	40.00%	60.00%
Gikokwe	16.67%	83.33%
Khiyala	83.33%	16.67%
Korjip	100.00%	0.00%
Kudo	40.00%	60.00%
Liria	66.67%	33.33%
Lobira	83.33%	16.67%
Lopiri	0.00%	100.00%
Lyangari	0.00%	100.00%
Napotpot	0.00%	100.00%
Narus	50.00%	50.00%
New Kenya	100.00%	0.00%
Nhuelere	25.00%	75.00%
Obule	33.33%	66.67%
Olere	25.00%	75.00%
Torit	60.00%	40.00%
Total	46.15%	53.85%

Source: Field Data

3.4.4 General Conclusion and Recommendations

The findings of the Socio Economic Impact assessment conclude that the impact of upgrading of the Nadapal – Juba road with a by-pass in Torit, will have a positive impact on the socio-economic environment of the entire South Sudan. The social management measures proposed are generally straight forward. The majority of the measures relate directly to sound operating practices both during the construction phase and subsequently over the operational life of the road. Provided that the road is upgraded with due attention to the mitigation and management measures outlined, the project will have a positive impact on the socio-economic environment of the project area.

Considering the urgent need for socio-economic development in South Sudan, it is important to emphasize that this study recommends that the proposed road project should proceed. The upgrading of this road to a paved (bitumen) standard will improve the socio-economic conditions South Sudan and more specifically the Eastern Equatoria States. In summary, the potential positive impacts of the proposed project road by far outweigh the potential negative impacts. It is strongly recommended that the mitigation measures proposed in this report be incorporated, as they are reasonable and implementable. It is further recommended that a result based monitoring and evaluation program should be drawn and documented as an integral component of the Environmental and Social Management Plan (ESMP).

3.5 Detailed Description of the Project

Since the signing of the Comprehensive Peace Agreement (CPA) between the Government of Sudan (GOS) and the Sudan People's Liberation Movement/Army (SPLM/A) on 9 January 2005, the Nadapal – Juba road has assumed a vital role in the supply of food and goods to the entire South Sudan. The road forms part of the 'northern corridor' route from Mombasa, through Kenya and Uganda to South Sudan. It is a vital arterial road to South Sudan's Western and Eastern Equatoria region and serves several state capitals to the west of White Nile River. The

section between Liriya, Torit and Kapoeta also serves as the main transport corridor for many other towns, within Eastern Equatoria State

The recent increase in heavy goods traffic, and the lack of any control to limit axle loads of vehicles, has resulted in severe overloading of axles with consequential detrimental effects on the road. These effects include severe tracking and deformation of the carriageway and large deep potholes, in many road sections.

The different design aspects of the road are described in detail in the various engineering design reports. The width of the bitumen surfaced carriageway will be 7 m, with shoulders generally of 2 m width, but possibly reducing to 1.5 m in some places. The project road will follow the existing alignment as closely as possible, compatible with design standard requirements. However, some minimal realignment is foreseen, particularly in hilly, drifts and mountainous sections. There shall be a by-pass at Torit town to avoid the impact on institutional and commercial properties as well as to reduce vehicular-pedestrian conflict. New drainage structures including bridges will be constructed or rehabilitated, while junctions and accesses will be improved in line with the specifications for safety and capacity requirements.

3.5.1 Existing Road Alignment and Condition

Overloading of axles from heavy goods vehicles plying the project road had had detrimental effects along the project road. These effects include severe tracking and deformation of the carriageway and large deep potholes/mud holes along the greater part of the road length. Further, relatively high rainfall episodes are experienced along the road, especially between Nadapal and Juba exacerbates the effects of overloaded axles. This makes the road impassable during wet seasons for goods vehicles.

3.5.1.1 Nadapal to Kapoeta

The road is in fairly good condition. Nadapal form the point where the road upgrade will begin (0+000). There are various government offices which include Immigration offices, Police Station and Customs Offices. Just like any other Nadapal has various business activities taking place within the town. This road section passes through various trading centres and villages such as Kordip, Napotpot, Lolim, Loyoro, Narus, Nakodok and Kapoeta. Kapoeta town is the administrative headquarter for Kapoeta County with various government offices.

Soils along this road section are black cotton soils in nature although there are some points which have sandy soils with brown murram. The rocks are granites in nature which appears in various shades as shown in Plate21. In terms of vegetation the most dominant plan is the acacia species. This section has five borrow pits and two quarries which may be used as source of construction material. This road section has over 42 drifts that are mostly impassable during the rainy season.

Plate 21: Variety of Rock Types along the Road

3.5.1.2 Kapoeta to Torit

The road is in fair condition although some sections are impassable during rainy seasons. There is diverse range of vegetation on both sides of the road. This section of the road has much rock out crops which are potential sources of road construction materials. In terms of settlements there are nine settlements along the road some of which are located on the road reserve and hence will be demolished to pave way for construction. These settlements include Labalwa (Army Barracks), New Kenya, Hiyala, Chalaming, Ilieu, Tahabak, Lobira, Loryork (Camp 15) and Torit town. Ground water and surface water are common along this section of the road. There are seasonal rivers along this section of the road such as Kidepo Plate 22.

Plate 22: Drifts along the Road

3.5.1.3 Torit to Liriya

This section of the road is in a fair condition in terms of traffic movement. Both sides of the road are coved by bush land which is a remnant of the forest.This section traversesseveral villages on either side of the road. The villages include Liria town, Debel Cotton, Kudo (Kor), Longario, Kordolep (Army Barracks), Korlabeta and Torit Town. On this section there are two major trading centres i.e. Torit town and Liriya. Torit town form the administrative headquarter of Eastern Equatoria State with the Governor and commissioner's offices being located within the town.There islittle cultivation on both sides of the road. This section has several culverts crossing the road. There are seasonal and perennial rivers crossing this road section. Kudo River forms part of the perennial rivers in this section. Poor waste management in the town has led toopen dumping of the waste in an abandoned Borrow Pit. A bus park has been proposed for construction within the town Plate 23.


Plate 23: A Section of Bus Park at Torit.

3.5.1.4 Liria to Nemule Junction (End Point)

Nemule Junction forms the endpoint of Nadapal Juba Road project. At this junction there is an Army Barracks. The section of the road is in fairly good condition. It has several sharp corners that may be black spot from time to time. In terms of settlements along the road there are three major settlements that are located along this road section. These include Koralangerek, Ngangal, Ngulere and an Army Barracks at Nemule junction Plate 24. There are several rock outcrops located at various sections of the road.

Plate 24: Mangoes Trees along the Road at Ngangal

3.5.2 Activities Associated With the Project

Some of the main activities that will be associated with road construction are outlined below:

- Establishment of construction camps
- Construction of temporary/permanent accommodation
- Provision of sewage disposal facilities
- Water abstraction
- Construction of workshops
- Transportation of construction materials and equipment
- Recruitment of the labour force
- Earthworks
- Construction of detours and access routes
- Borrow pits and materials extraction
- Crushing and screening of materials
- Asphalt Plant Operation
- Screening, mixing, and stockpiling of aggregates
- Transportation of hot mix asphalt

- Construction of drainage structures, e.g. culverts, bridges
- Excavation of side drains, mitre drains, and cut-off drains
- Pavement Construction
- Construction of erosion protection works
- Asphaltic Concrete binder and wearing courses

These activities will have various degrees of impact on both the biophysical and human environment. This Environmental Impact Assessment report includes a Management Plan that is intended to act as a guide in avoiding negative impacts, and mitigating those, which are not avoidable.

3.5.3 Construction Materials

3.5.3.1 Granular Subbase

A number of exploited borrow/quarries areas have been observed on both sides of the project road (Annex 5). The materials are mainly of lateritic type. The consultant may need to adapt the Specifications for the particular lateritic materials occurring along the project road, by introducing new requirements (plasticity modulus for example).The use of materials of too high plasticity index leads to poor road conditions. This situation is particularly common where the road crosses marshy areas, with road surface elevations at the same level as the natural level.

3.5.3.2 Hard rock

As described in the geological section, the hard rock's may be encountered all along the project road, occurring as outcrops as illustrated in the Plate25and Table 20. However, from observation of the eroded and rounded shape of the rocks, it will be of major importance to check their strength in order that sites comprising of weathered materials may be discarded.

Plate 25: Rock Outcrops at Ngangal

Table 20: RockOutcrop along Nadapal Juba Road

Chainage (Km)	Description/Location
23 +600 RHS	Outcrop 60M Off Road
68 +400 LHS	Outcrop 50 M Off Road
126 + 200 RHS	Outcrop 100M Off Road
132 + 340 LHS	Outcrop 1Km Off Road. Potential Quarry Site
176 + 200	Outcrop 50m Off Road Large and Wide Potential Quarry Site
187 + 246	Outcrop 60 m Off Road Large and Wide Potential Quarry Site

268 + 800 LHS	Outcrop but Land Mines Danger
284 + 900 RHS	Outcrop Large and Wide Potential Quarry Site
304 + 300	Outcrop but Land Mines Danger

3.5.3.3 Sand

Sand is needed in cement concrete for all bridges and culverts. Borrow pits areas will be searched for in the beds of water courses crossing the road or in the sections mentioned in the Table 21 below in the geological section, mapped as quaternary formations. Otherwise, silty sand could be washed, or crushed sand could be used. Potential sand pits location are shown in the Plate26 below.

Table 21: Proposed Sandpits along Nadapal Juba Road

Chainage (Km)	Description/Location
11 + 400 RHS/LHS	Nakodok
18 + 100 RHS/LHS	Narus
37 + 500 RHS/LHS	Loyoro
51 + 500 RHS/LHS	NapotPot
69 + 800 RHS/LHS	
90 + 200 RHS/LHS	
135 + 700 RHS/LHS	Lariok
152 + 246 RHS/LHS	Kidepo Bridge
242 + 700 RHS/LHS	Sand Pit
248 + 396 RHS/LHS	Bridge
307 + 600 RHS/LHS	Sand Pit

Source: Field Data

Plate 26: Potential Source Sand pit at Kidepo Bridge

3.5.3.4 Water

Depending on the time of year of construction, water may be obtained from a few rivers provided it does not interfere with or disturb the supply of locals, for agriculture and animals. A few ponds are encountered along the road, but the water from them would normally be used for cattle, and this priority should remain. Otherwise, as in many villages, water could be drawn from bored wells. Alternatively, where the water is very close to the ground surface, holes could be dug by mechanical shovels or excavator in order to extract the water Table 22.

Table 22: Proposed Water Points along Nadapal Juba Road

Chainage (Km)	Description/Location
0 + 000 RHS	Nadapal Settlement
0 + 200 RHS	Off Road Nadapal
10 + 600 RHS	Water Pan at 121M Off the Road
29 + 000 RHS	Bore hole 100M Off Road
37 + 500	Stream Crossing the Road
51 + 000 RHS	Bore hole at 100 M off the Road
98 + 200 LHS	Borehole at 35 M off Road
135 + 700	Stream crossing
135 + 900	Bore hole
152 + 246	Water Available
188 + 700	Bore hole 10 M off the Road
191 + 600	Bore hole 10 M Off the Road
236 + 870	Kinate River (Torit Bridge)
256 + 800	Bore hole in a Settlement
264 + 600	Bore hole 50 M Off the Road
307 + 700	Bore hole 50 M Off the Road

Source: Field Data

3.5.3.5 Bitumen

Bitumen is a black, oily, viscous material that is a naturally-occurring organic by-product of decomposed organic materials. Also known as Bitumen or tar, bitumen was mixed with other materials throughout prehistory and throughout the world for use as adhesive in road construction. Nadapal –Juba road will be up graded to bitumen standard. Therefore, transportation, storage and handling will be an issue. It is expected that this material will be stored at work site in ready for final road surfacing.

3.6 Clearance for the Project

At present no environmental clearance is required to be undertaken for the proposed road up grading project. However, permission for the tree cutting will be taken by the MTRB from the forest department wherever required. Other permission that is required includes:

- Permission for water abstraction both surface and ground water
- Permission for employing local labour
- Permission for opening new quarries for aggregate if any
- Permission for setting up labour camp
- Permission for establishment of the crusher

3.7 Project Components

In accordance with South Sudan road design standards and the existing roadconditions, the following key elements shall be incorporated into the final design

(i) Design Speed - Varies at different sections

(ii) Lane Width - 3.5m (each lane)

(iii) Shoulder Width - 1.5m (to edge of drain, unless there is restriction)

(iv) Type of carriageway pavement –Asphaltic Concrete surfacing

(v) Shoulder Surface –Asphaltic Concrete

(vi) Design Life - 20 years

The proposed project upgrading works will comprise the following:

- Improvement of the alignment at the poor sections;
- Widening the road to a width of 10.0m (including the shoulders);
- Reconstruction of the base material and pavement of the entire road length;
- Reconstruction or Upgrade of 22 crossing/bridges;
- Reconstruction or Construction of about 200 box culverts;
- Provision of lay-bys/bus bays at appropriate locations;
- Installation of road signs and markings;
- Installation of necessary traffic and pedestrian control devices; and
- Speed break/bumps at sensitive area like small towns, villages and wildlife crossing corridors.

CHAPTER 4: PUBLIC PARTICIPATION

4.1 Public Consultations

The EIA team has carried out a public consultation program between April 27, 2009 and May 16th 2009 to understand the opinions and concerns of the public in the proposed road section from Nadapal to Juba. Additional fieldtrips were made in April 2013 to update the 2009 information, finalize the consultation on the Torit by-pass and sensitize PAPs about the completion of the demining exercise in the area. The public consultation has been carried out at various sampled points along the proposed road project. The consultation focused on the affected people and entities, including schools, residential areas, village committees, township and government agencies.

Public consultation was conducted in major Payams/Bomas with an objective of seeking various information about the socio-economic implications of the proposed road upgrading to paved (bitumen) standards. The payams/Bomas included Obule, Lopwiro Lopiri, Gikokwe, Olere, Lyangri, Jikokwe, Nhuelere, Kudo, Ebalanyi, Lobira, Korjip, Narus and Nadapal. This was done through use of questionnaires, interviews and public meetings/hearing at the commissioner's office. Annex 2, 3 and 4 and Plates 27 and 28.

MTRB with the support from the TA, has made a consultation in 2013 around Torit and nearby area to clarify and confirm the extent of impacts due to the Torit By-pass and to hear the perception of the community along the Road. As per the observation and consultation with the community and relevant stakeholder, The 2013 consultation has also confirmed that no public facilities and/or utilities, which were originally documented for demolishing in Torit town will no longer be affected as a result of the redesign of the road to include the Torit by-pass. The public facilities originally identified in Torit town and were earmarked for demolition shall no longer be affected due the approval for a Torit by-pass. These facilities which included the prisons, health post, office of the Census Statistics, office of legal administration and a borehole shall not be affected and no longer earmarked for demolition.The Torit by-pass begins just after the Military barracks from New Kenya (towards Torit) and ends just after the Torit – Magwi junction on the Torit – Juba road. The proposed by-pass which is about 15km long lays within a virgin land with no communities and by passes the Torit town completely.

The ESIA team first briefed public members the project information, such as works description, alignment, possible benefits to people and negative impacts. The focus was placed on the collection of concerns from the roadside residents and organizations.

4.2 Objectives of Public Consultation

The overall objective of Public consultation was to disseminate information to interested parties, solicit their views and consult on sensitive issues. Specific objectives included:

- To identify community needs and ensure that those needs are documented before project commences.
- To avoid conflicts by addressing issues promptly
- To ensure that any suspicions or uneasiness about the Nadapal-Juba road project are fully addressed.
- To avoid misunderstanding about the Nadapal-Juba road project before and during its implementation.
- To inform community about and discuss the nature and scale of adverse impacts of the project on their livelihoods in a more transparent and direct manner and seek their participation in the project cycle.

- To identify and discuss mitigations of the impacts that may arise from the proposed road upgrading project.
- To give PAPs affected communities a chance to have a say and express their views in the planning and implementation of the project that affect them directly.
- To obtain qualitative as well as quantitative information on viable income generation and livelihood interventions which PAPs could engage themselves in order to restore their income and livelihoods in a self-sustaining manner.
- To check and confirm the level of impacts due to the Torit By-pass and hear the community and relevant stakeholders views and perception
- To inform local authorities of the impacts, agree on a cut-off date, solicit their views on the project and discuss their share of the responsibility for the smooth functioning of the overall project operations.

4.3 The Stakeholders

- **Primary Stakeholders**

These included all the Bomas/Payams and businesses enterprises dotted along the Nadapal-Juba road that will be directly affected by the impacts created by the upgrading of the road.

- **Secondary Stakeholders**

These included all the county government agencies in the Equatorial State and NGOs operating along the Nadapal-Juba road.

The principal actors and stakeholders could include all of the following depending on how the road segment rehabilitation is contracted:

1. Ministry of Transport, Roads and Bridges: Directorate of Roads and Bridges, representing the Government of South Sudan (GOSS) as the executing agency in charge of sector policy and plans to expand the road network in the country.
2. Ministry of Environment: The regulatory agency tasked with protecting the environment and avoiding adverse environmental impacts on behalf of society.
3. The Contracting Agency: this could be World Bank or Implementers with the association of the Ministry of Transport, Roads and Bridges, as the agency responsible for the finance and administration of the road rehabilitation and construction.
4. The Consulting Engineers: Contracted to do the assessment of a chosen road segment scheduled for rehabilitation and to produce the basic design documents and Bill of Quantity.
5. The Construction Company: Being the successful bidders who will carry out the road rehabilitation activities on the road segment in question.
6. The Supervising Engineers: Working at the behest of the contracting agency, this entity monitors the construction efforts and is responsible for quality control and insuring compliance with standards and specifications. They are also responsible for preparation of regular progress report (usually monthly), which will include the degree to which environmental management expectations and goals have been achieved which are shared with the Ministry of Environment.

In addition to these principal actors, the environmental guidelines and oversight system takes into account the need and interests of other stakeholders, including the following:

1. Representatives of local government at the State, County and Payam level, who have a role in representing the local people living in communities affected by the road rehabilitation activities and who should be the vehicle for transmitting messages related to health and safety along newly constructed roads.
2. The Ministry of Health, whose monitoring services are critical to detecting the spread of infectious diseases, in particular, HIV/AIDS and who could take an institutional role in HIV/AIDS Awareness and Prevention along the road system.
3. The communities: they are the direct and indirect users who benefit from the services of the improved road network and whose views are generally sought to ratify the social acceptability of the road rehabilitation activities.

Plate 27: High Level Consultations with Stakeholders at Torit

Plate 28: Consultation with Community Members

4.4 Public Participation Process

The surroundings of Nadapal-Juba road belong to the communities living along this road and their participation is useful for gathering data, understanding the likely impacts, determining community and individual preferences, selecting project alternatives and designing viable and sustainable mitigation and compensation if any. Public participation conducted along the Nadapal – Juba road included all communities living along the proposed road project. Prior to any consultation process, the ESIA team made an advance visit to Bomas and made arrangements with the Sultan (head of the Boma) and Boma members to ensure that all the relevant parties were well informed in advance of the purpose of the visit and the background information on the road upgrading process.

In all the public participation meetings, the ESIA team got a cordial welcome from the communities as well as their leaders. Most of the consultations were very impressive and cut across the different strata of the communities. The participation by the public included door to door personal interviews, focus group discussions, and stakeholder's consultation sessions.
In all the public meetings, the following groups were represented:

- Payam administrators;
- Opinion leaders;
- Traditional leaders (e.g. landlords, rain makers);
- Youth representatives;
- Women representatives;
- Traders along the project road;
- Community members;
- Schools along the project road; and
- Public Transport operators

Public participation was highly influenced by cultures, educational levels and political consciousness. During all the public meetings, a number of individuals were interviewed to ascertain their responses to specific questions concerning possible socio-economic impacts of the project road during construction and operation. Special attention was drawn to their knowledge of ensuring healthy socio-economic benefits of the project road. The communities identified their needs on the proposed road upgrading project and these included:

- The need for government to compel the construction company to consider the locals especially the youth for employment during the project execution;
- The need to preserve the mango trees as they are a very important source of livelihood of the local communities
- The need for the government to give those with structures in the road reserves enough time to relocate their structures;
- The need for the government to compensate those whose properties will be affected by the road upgrading;
- The need for the project not to interfere with sacred trees, shrines and ancestral graves unless accompanies with the required rituals;
- The need for more boreholes as the construction work will make water more scarce;

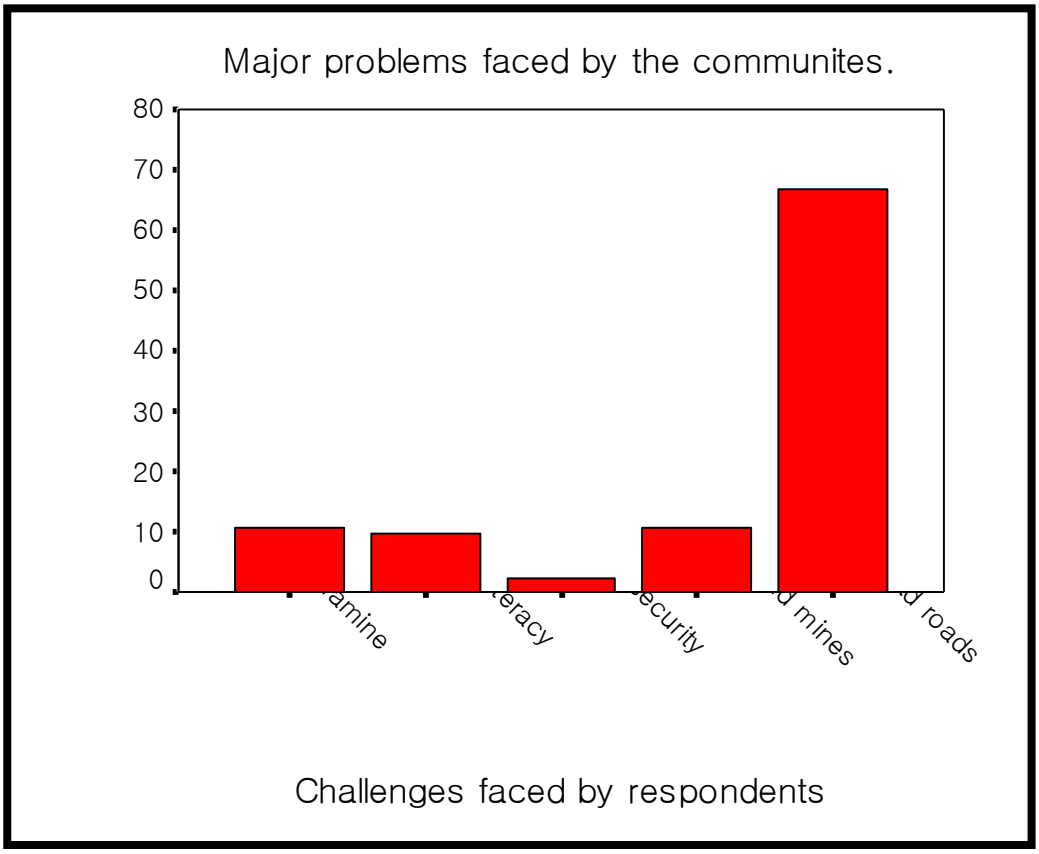
During the consultative meetings, the communities along the road were very enthusiastic about the road upgrading to bitumen standard. Most of the community members revealed that this is a rare opportunity that will give them a good road for first time in history. They indicated that as a result of the impassable roads during the war period and bad roads during this peace time: they had lost lives due famine and lack of access to Medicare; they had been discouraged from large scale farming due to inadequate market and the presence landmines. They are however being sensitized to go back into large scale farming after the completion of the demining exercise by the UN. This may take some time but it is expected that theproductive youths who migrated to Juba due rural urban migrationwill return once the road is upgrading is completed.

4.5 Attitudinal Attributes of the Population along the Proposed Road

There are generally conflicting attitudes regarding any project development. 66.7 percent of the respondents (Figure 5) identified poor roads as their major problem and viewed the proposed road project as a vital step towards the opening up of the area to development and thus a source of economic growth to the marginalized South Sudan. During all the public consultative meetings, this project was unanimously seen by the communities along the road project as the immediate source of employment for the idle local youths and stronger members of the community (as

construction workers). Based on the above Figure 5, it is therefore evidenced that this proposed road project will be a valuable asset to the local communities along the road as a whole.

Figure 5: Ranking of General Problems Identified by The Communities along the Proposed Road.



Source: Field Data

4.6 Weighted Rating for Attitudes towards the Project;

To capture people's attitudes towards the project, a semantic scale is used. This scale is chosen because it easily reflects people's attitudes towards any developmental project. The responses to the perception questions during the consultative meetings are weighted using the scale that ranges from 1 (strongly agree with the project) to 5 (strongly opposed). The social acceptance of this road project depends on general attitudes. The following weighting formula was used to assess the respondent's attitudes towards the project;

$$A = \left(\frac{f_i(1,2,.....,5}{n} \right) = \frac{1(s_1) + 2(s_2) + ... + 5(s_5)}{n}$$

Where;

- Ais the mean response for the i^{th} question by the respondents;
- f_i is the frequencies of respondents per attribute;
- n is the sample size (number of respondents)
- 1, 2, ……,5 are the degree of responses
- S_1….S_5 are the number of respondents score or rating

Based on the above formula and the semantic scale below, judgments on public attitudes towards the proposed road project are made Table 23 and 24.

Table 23: Summary of Weighting Used

Average Rating	Respondent's Responses
1.0 – 1.5	Strongly Agree
1.6 – 2.5	Agree
2.6 – 3.5	Undecided/Indifferent
3.6 – 4.5	Disagree
4.6 – 5.0	Strongly disagree

Source: Field Data

Table 24: Results of the Mean Responses;

Main Attribute Related to Project	Strongly Agree	Agree	Indifferent	Don't agree	Strongly Disagree	Score
The project will contribute positively to agricultural activities	90.0	10.0	0.0	0.0	0.0	1.06
The project will open South Sudan to more business opportunities	60.0	40.0	0.0	0.0	0.0	1.54
Project will lead to the creation of more employment opportunities	90.0	10.0	0.0	0.0	0.0	1.06
The project will greatly improve the availability and range of basic consumers goods and services	96.0	4.0	0.0	0.0	0.0	1.03
Project will lead to an improved incomes and life quality of households	95.0	4.0	1.0	0.0	0.0	1.04
Project to be a source of rapid economic growth to South Sudan	70.0	22.0	8.0	0.0	0.0	1.26
The project will facilitate and attract the returning of the displaced people	45.0	35.0	20.0	0.0	0.0	1.53
The project will lead to more cases of HIV/AIDS	90.0	10.0	0.0	0.0	0.0	1.06
The project will lead to more accidents and deaths to livestock	30.0	20.0	0.0	10.0	40.0	1.83
Project is likely to interfere with safety of communities along the project road	15.0	30.0	10.0	35.0	10.0	2.61

Source: Field Data

The General Weighted Attitude (GWA) towards the project was 1.40 which is an indication that the communities dotted along the project road generally and strongly supported the project. The highest anticipation (1.03) was that the project will greatly improve the availability and widen the range of basic consumers' goods and services. However the most communities (2.61) felt that the road will make their communities more accessible to cattle raiders which will interfere with their safety and security.

4.7 Response to Public Concerns

The public consultation shows that the local people are very supportive of the Project and want the Project to be completed as soon as possible. The people surveyed understood the Project contents well and had most concerns related to the noise and traffic safety. Concerns raised by the affected public have been recorded by EIA team, and together with the design team responsive mitigation measures have been developed and included in the report. Following are the major public concerns and responses:

1. **Land Acquisition and Resettlement**

Land acquisition is inevitable to any road projects. The roadside residents understand the necessity of land acquisition particularly to those living within and/or on road reserve. If some structures need to be demolished, the compensated house should be of higher quality than the old one and should be provided within the village. A resettlement team need to be constituted to prepare a project RAP. The team must comprise of relevant government officials and affected communities.

There is need to safeguard the public interest based on the national laws and applicable World Bank policies. The effort will be made that the compensation will be distributed to the affected public in the most efficient way possible.

2. **Compensation**

Since land is communally owned, the compensation for acquired land either for the road or quarries should be two fold. Individual members' compensation should be limited to the private structures and crops at the market replacement cost. The communities should be compensated for land in the form of construction of schools, hospitals, boreholes and other social infrastructures to be agreed in the RAP.

3. **Employment of Local Labour Force**

The public and government wanted the project to employ the local labour so that they could have more income opportunities from the Project construction and operation. The ESIA team has transferred the requirements by the public to the government/construction company to give full considerations of employing labour from local sources. The locals can be used as hard labour and after trainingfor jobs requiring more skills.

4. **Siting Of Borrow Pits and Quarries**

The quarries borrow pits should not be selected on farmland/grazing land. The sites of deposit and borrow pits will be carefully selected during the advanced design phase to avoid occupying farmland/grazing land. The soil conservation and restoration will be carried out immediately after the construction by contractor according to contractual provisions after the soil borrowing operation is completed. Landscaping of these sites was proposed from the consultation. It was suggested that the quarry/borrow site may be filled up with top sols or be carefully converted to watering point for animals/water pans.

5. **Noise and Safety Impact**

The public is concerned that construction activities near schools, hospitals and villages could cause noise disturbance. Increased traffic on the upgraded road during the construction and operation could be a safety concern particularly to school children. Therefore local Counties will carry out an environmental monitoring program during the construction and operation phases. Noisy equipment will not be operated in school time or night time without the consent from the affected people and local governments. The ESIA team has worked with the design team to develop mitigation measures against noise. Warning signs will be erected on construction sites.

6. **Traffic Blocking**

The public is concerned that construction activities could close the roads and impede the traffic. As a result of this, diversion routes will be opened in areas where construction activities will be carried. On the other hand Warning signs like "construction ahead, reduce speed, deviation ahead among others " will be installed by contractors on their road section, a staff will be designated by the contractor to guide traffic when necessary.

7. **Soil Erosion**

The public is concerned on the increased soil erosion due to construction activities. Soil conservation ability will be improved when drainage structure facilities are completed. The road slopes will be protected through landscaping and mortar-brick embankment will be built on the water saturated road base.

8. Bitumen Emission

The public is concerned with Bitumen mixing station emission. Three Bitumen stations will be sited in areas, at least 300m leeward from residential housing. These stations will be fully enclosed. Small and uncontrolled Bitumen stations will be banned.

9. General Security

Since the area covering the project is prone to insecurity, the local administrations at both County and Payam level should be directly involved in security issues concerning the sections of the road project within their local boundaries. The ESMP will provide specific recommendations to protect the health and safety of the communities along the road, the health and safety clause will be part of the civil works contract.

10. Movement of Site Workers

The movement of site workers and their interaction with local communities, to be restricted by the contractor in order to avoid insecurity and to control and minimize AIDS transmission during the construction period.

11. Cultural Heritage

The cultural heritages of the people need to be considered and preserved where possible. Concerns were raised where the road may pass through a graveyard on a settlement. The affected people must be consulted on the way forward and where necessary be allowed to perform some cleansing rituals as per the beliefs.

12. Security of the Workers And Materials

Concerns were raised on general security from the beginning to the completion of the project. It was noted with a lot of concern that the general security along the Nadapal - Juba road is poor. Therefore security of the workers needs to be provided from the beginning to the end of the project. If possible a full time security personnel need to be attached to the project.

4.8 Information Disclosure

This Environmental and Social Impact Assessment and the Environment and Social Management Plan reports will be disclosed to the public once completed. In view of the difficulties in distribution of information in such region between Nadapal and Juba, the ESIA team carefully proposes the means for information disclosure. The team proposes that once finalized and approved the report be distributed to the relevant government offices that are located within the project site; at the Commissioners' offices in different counties for public review and reference.

CHAPTER 5: PROJECT ALTERNATIVES

5.1 Road Reserve Area (RRA) and Resettlement Approach

The Ministry Transport, Roads and Bridges in the GoRSS provides for the establishment of road reserves and for the maintenance of roads and future expansion. According to the Ministry of Transport, Roads and Bridges a Road Reserve Area is an area bound by imaginary lines parallel to and not more than 50 feet from the centre line of any road and no person shall, save with written permission of the road authority, erect any building or plant any tree or permanent crops within a road reserve. However the road reserves have neither been surveyed nor formally gazetted since their establishment by the Ministry and for this reason there has been encroachment upon them with time either knowingly or unknowingly especially in dense populated areas and near urban centres along Nadapal Juba Road Plate29

Plate 29: Agricultural Use of Residual Land within the Road Reserve Area

Demolition of buildings is limited to the buildings encroaching on the road structures including maintenance beams or severely compromising road safety; all other existing buildings not encroaching with the road will be allowed to remain in place and after gazetting of the road reserve the construction of new buildings will be prohibited. Crops and trees cutting is limited to crops and trees encroaching on the road structure including maintenance beams, trees cutting is also admitted to the ones located beyond the above mentioned area when they severely compromise road safety.

Land acquisition will be limited to the area needed by the widening of the existing road structure. The engineering design for the Feasibility Study has considered realignment of the existing road in order to comply with requirements of the Road Design Manual and Environmental Guidelines for the Directorate of Roads and Bridges in the Ministry of Transport & Roads in the GoSS or to improve the alignment for safety reasons, and different road type options for capacity/economic reasons. This difference is of little significance in terms of environmental impacts when assessed as outlined above.

5.2 Realignment Options

The engineering design for the Feasibility Study has considered realignment of the existing road in order to comply with requirements of the Road Design Manual and Environmental Guidelines for the Directorate of Roads and Bridges in the Ministry of Transport & Roads in the GoSS or to improve the alignment for safety reasons, and different road type options for capacity/economic reasons. The realignment includes a by-pass in Torit.This difference is of little significance in terms of environmental and social impacts when assessed.
Alignment options have been studied during feasibility and design study. Alignment options that aims at:

- Correcting the lay-outof existing road with minimum impacts to the environmentand replacing the existing dilapidated bridges culverts and drifts. The Design team has considered building of new bridges and culverts adjacent to the existing so as to have more stable bridges and culverts. Plates 30


Plate 30: Sections of the Road and a Bridge

- Correction of road curves, which currently have radii below the minimum value as established by the Road Design Manual and Environmental Guidelines for the Directorate of Roads and Bridges in the Ministry of Transport & Roads in the GoRSS Plate 31.


Plate 31a: Some of the Road Curves that need to be reduced

- Creating a by-pass in Torit to improve safety and also reduce the social impact of public facilities such as the Prisons and the local health facility.
- Elimination of unnecessary kinks will make the road safer vehicle movement. These minor realignments will also require the expropriation of land and some resettlement of homesteads and crop cutting.

On the other hand realignment of the existing road may be limited due to danger of unexploded land mines that are planted on the ground. This will limit the extent to which the road may be aligned. Plate 32 below shows unexploded land mine observed along the Nadapal-Juba road near Torit townduring the field work in 2009.

However, the MTRB has indicated that demining has already taken place along the corridor and hence the design would be aligned according to design standards.

Plate 32: Unexploded Mines Planted on the Ground

5.3 Proximity to the Quarry Site

In the design execution and approach of the project various alternatives with regard to quarry sites were considered. The quarry sites will be considered on the basis of proximity to the road, consent of acquisition, accessibility and minimal negative impact to the surrounding environment. Nine possible sources of gravel and two possible sources of rock for construction were found in the vicinity of the road. Likewise the establishment of the camp site has to consider the availability of land, water and sanitation, and ease of access to a pool of labour force. Since the project road follows the existing alignment only, minimal disturbance of existing ecosystem/vegetation is anticipated. Availability of space and public acceptance of this project was also considered. The equipment to be used in the entire project was carefully selected for compliance with hygiene regulations especially in terms of air and noise pollution.

5.4 Construction of a New Road

Construction of a completely new row road and abandoning the current alignment is another option to consider. However this option would result to high impacts to the environment. The impact would be significant in terms of damage to the environment and the overall project cost which is an implication to the budget. Therefore the cost of construction would be high. This is because of the high vegetation clearing and earthworks along the road.

For instance if a new road of span 10 Metres is constructed it implies that the total area of vegetation in Hectares to be cleared will be 342Ha from Nadapal to Nesitu/Nimule Junction assuming that vegetation covers the entire road. On the other hand given that the current road span of approximately 7Metres, the road width will be increased by 3 Metres. Therefore vegetation loss will be 102.3Hectares. In this case vegetation to be cleared will be very little as compared to the earlier scenario where a new road is constructed. The impacts will be minimal, the earthworks will be little and the overall cost of the project will be reduced significantly.

5.5 Conclusion

The alternative to the current alignment is to build a new road which will result in much higher and more significant environmental impacts including more land acquisition, relocation and resettlement, damage to plants, more earth work and higher soil erosion. Furthermore, as theresidential centres are settled along the existing road, they will receive no improved benefitson access to service and market if an alternative road is constructed. The ROW of the existing road which was constructed along the valley plain in a high mountainous terrain (sections between Nadapal, Kapoeta and Torit). Hence the upgradingworks will not involve significant mountain/valley cutting which would result in serious impact on thearea ecosystem.

It is obvious that upgrading of the existing road (including the Torit by-pass) will have the least negative environmentaland social impacts than the alternativeof constructing a completely new road. The ESIA team is convinced from the above studies and analysisthatthe upgrading of the Nadapal –Juba road seems more viable and sustainable. With the effective implementation of the environmental and social management plans, the potential adverse impacts canbe minimized and the economic, environmental and social benefits of upgrading of the existing road are realised.

CHAPTER 6: ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

6.0 Introduction

The proposed 341.2 km upgrading road project from Nadapal to Juba traverses through various villages and town and connects many people and towns/urban centres in the South Sudan. The villages including scattered human settlements along the project road depend on various activities such as agriculture, livestock, tree (mango and other fruit tree) and firewood for their livelihood. Traditional markets are usually located at the centres of these villages and rural towns.

Therefore, up grading of this road and subsequent construction of various structures along the road will not only improve the transport but also open up the entire region for development.In view of the activities involved it is anticipated that the project will have both positive and negative impacts during and after construction. It is anticipated that most of the adverse effects, associated with the construction will be reversible in nature. These impacts can be direct and indirect and over the length of the roads involved here in South Sudan and lead to unacceptable cumulative impacts on both the bio-physical environment and on the human environment.

Most of the impacts may stem from ground disturbance, operation of equipment, and labour force housing, workshops, openand sheltered storage, parking, borrow pits and other ancillary activities. It is anticipated therefore, very few impacts will lead to significant negative permanent change. The single mostimportant direct impact of the project will be the requirement for land needed for theworks. The permanent works will include the carriageway, shoulders, embankments, cuttings, side drains, bridge and culverts, and any associated river training and erosioncontrol works.These impacts must be avoided or mitigated if the roads program is to be fully effective and efficient. The impacts discussed below are the explicit findings of the Environmental and Social Impact Assessment Team after assessing the experience with road rehabilitation in South Sudan.

In this section potential impact before and after the construction and operation period of the proposed road realignment for various elements of the bio-physical and social environment have been identified and quantified where possible mitigation measures that should be adopted to avoid or minimize potential adverse impacts are recommended. Of which, some involve good engineering practices while others viewed from socio-economic as well ashumanitarian angle.

Before analysis of potential adverse environmental impacts, it is useful to establish the nature and the extent of the road up grading and reconstruction activities that will be carried out in the Nadapal – Juba Road project South Sudan. The project will involve all phases; from design to project completion the following types of activities:

- The assessment process which includes identifying the nature and extent of the road rehabilitation work involved, including drainage structures, the need for re-alignment if any and surveying the current road configuration and any recommended road engineering design changes, identification and sources of road building materials (alignment soils, base/sub-base materials and quarry materials, as necessary), all culminating in the Bill of Quantities for the road segment being assessed;
- Clearing land and building construction camps to house staff and store equipment and supplies;
- Clearing brush and removing some trees to reclaim road width and drains;
- Excavating borrow pits, and where appropriate, re-grading and "closing" them;
- Roadbed preparation to improve the sub-grade;

- Excavating potholes and occasionally areas of black cotton soils or other unsuitable substrate and replacement with suitable sub-base:
- Excavating side and mitre drains, and placing culverts to retain/improve drainage;
- Reconstructing bridges or constructing drifts;
- Filling and compacting to eliminate road surface deformation and the many large potholes;
- Providing required signage to ensure traffic safety and directional indications, and constructing speed bumps, where appropriate; and
- Closing the construction camp when the road segment is completed.

6.1 Bio-Physical Impacts

6.1.1 Impacts on Local Hydrology

During construction of Nadapal Juba Road, temporary, direct impacts to stream flow and drainage may occur. In some cases, wetlands may have to be filled to build causeways across them for the road thus requiring culverts to allow water to pass through them in an unobstructed manner. Road construction crossing watercourses and wetlands can alter the stream flow and drainage patterns with both ecological and socio-environmental effectsin South Sudan.

Although construction is supposed to take place in the dry season, when it occurs in thewet season or when wetlands or watercourses are still holding water, hydrological conditions could bedisrupted, affecting flow downstream and wetland functions. Heavy machinery operations at crossing pointswill leave soil and substrate prone to washing by renewed stream flow leading to sediment transport andalterations of stream hydrology.

Unimpeded drainage through a road causeway or under a similar road structure in a wetland is critical to boththe durability of the road and to mitigating impacts of construction. Inadequate culvert or bridge size (or cloggedculverts because of the lack of maintenance Plates33 and 34 can lead to a build-up of surface water on the upstream sidewhich penetrates and softens the road base. The traditionally heavily overloaded trucks which ply the Nadapal Juba Road of South Sudan sink into these soft spots causing yet anotherpothole and points of weakness on the road. On the other hand inadequate culvert size may be clogged due to lack of maintenance leading to surface water on the upstream side which penetrates and softens the road base.

Plate 33: Unmaintained Culvert and Bridge

Plate 34: Kidepo Bridge Blocked by Sand and Debris

Drainage may also need to be spread rather than concentrated to maintain the former hydrologicalcharacteristics of a wetland. Although an individual wetland site sacrificed for the purposes of transportationinfrastructure may seem insignificant, the cumulative impacts of many such sites, given the frequency ofwetlands and swamps in South Sudan could lead to significant and unacceptable adverse socio-environmentalimpacts. In many along the project site, the loss of wetlands would mean the loss of dry seasongrazing areas (the "toic") and thus additional conflict among pastoralists dependent on these areas. South Sudan's wetlands along the Nadapal Juba Road are also part of a regional system that supports the rich biodiversity of aquatic ecosystems in which hydrological disruptions at one point may have unpredictable and unintended consequencesdownstream.

6.1.2 Soil Erosion and Degradation

Site clearance involving removal of vegetation and top soil is needed before construction of the proposed road upgrading works and other ancillary activities commences. The soils in the project area are erodible and, coupled with the rainstorms during the wet season earthworks are likely to be eroded. Soil erosion has adverse effects on the water quality (in terms of increases suspended solid loading) in the watercourses to which the drainage water is discharged. Concerns regarding the introduction of sediment to water courses also include potentially negative impacts to aquatic habitat and fishery resources.

In some areas (especially the sections between Torit and Kapoeta), soil erosion and gullying is evident and many more mayoccur, particularly those with more rugged, sloping topography, resulting in loss of topsoil, diminished soil fertility, and ultimately, siltation of waterways and wetlands. Although the general plan is to carry out road construction activities in the dry season, this is not always possible and feasible. During construction, with the earth movement and disturbed soil that occurs to rehabilitate roads, there may be potential for increased soil erosion. This will especially be a problem on steeper slopes and when constructing/rehabilitating along water courses. Similarly, in draining the cambered surface of the road, water channelled off into and along the roadside ditches can gain force and cause erosion in-situ or lead to adverse off-site consequences on neighbouring lands Plate 35. Material excavated and stockpiled temporarily during placement of culverts, bridges, and drifts could erode and result in siltation of wetlands and/or water courses.

These consequences could be significant if homes are adjacent to the road or if the land is used to grow crops. Discharging culverts or cross drains on to fill-based slopes without protection will quickly erode the side hill. Even in the flatter areas, loose or disturbed soil can be washed into the road ditches or drainage ways, adding to the need for maintenance of these structures.

To avoid/minimize the potential soil erosion and degradation problem in and around the project area, the following measures shall be considered during construction and operation phase:

- as much as possible earthworks should be concentrated in the dry season to reduce environmental damage and sediment loading to streams;

- stabilize slopes at cut faces and maintain by "benching" and installing erosion protection devices during construction;
- the drainage works shall direct site runoff to established watercourses. They shall be inspected regularly for damage caused by scouring, sediment deposition, channel obstruction, and loss of vegetation cover; along the proposed roads provision will be made for suitable and adequate permanent drainage facilities;
- stockpiles and spoil disposal areas shall not be located on drainage lines or in floodway zones or other areas important for the conveyance of floodwaters during major floods;
- stability of spoils will be ensured to minimize erosion both during and after completion of placement by implementing erosion protection measures and temporary and permanent drainage works where these are necessary;
- excavated materials, waste soils and rocks shouldn't not be dumped on stream banks to avoid adverse effects on channel morphology and increased sediments load;
- to avoid the death of down-slope vegetation and the stimulation of erosion, as much as possible excavated materials will not be side-tipped on steeply sloping and erodible soils; and if excess sediment is occurring, immediately cease the activity causing sedimentation and re-establish sediment control measures to reduce the contribution to the environment.

In general, with the use of Best Engineering Practices (BEPs) which serve to control the velocity, flow and amount of water run-off, soil erosion could be kept to a minimum. However, some of the types of BEPs (hay bales, silt curtains, and in some cases, even rock with which to build protective structures or facings) to control soil erosion will not be feasible in South Sudan and therefore soil erosion during construction remains an issue.

Plate 35: Erosion Gullies along the Road

6.1.3 Impacts on Tropical Forests and Protected Areas

Road construction and rehabilitation activities will improve access to tropical forest and/or protected areas. This could result in unsustainable/uncontrolled resource extraction, land use/forest conversion, and a decrease in biodiversity richness. As a result too, Threatened or Endangered Species (TES) which previously were difficult to access could be put at risk.There are no significant wildlife habitats reported to exist in the Project Area and noendangered animal species have also been identified that will be affected by constructionactivities.No wildlife sanctuaries or protected habitats have been identified in the study corridor.

Proposed construction of Nadapal Juba Road will take place along existing gravel roads, with minor modifications in some areas where safety or engineering concerns warrant limited road realignments. As can be seen by comparing the map of present road projects at the beginning of this report (Figure 1) with the map of known conservation areas (Figure6) there are certain segments where the road will pass adjacent to protected areas including national parks, forest reserves, and game reserves.

Consultation with the Ministry of Interior and Wildlife Conservation (MIWC) (Former MWCT) and Ministry of Agriculture, Forestry, Tourism, Animal Resources, Cooperative and Fisheries (MAFTACF) indicates that the Nadapal-Juba road does not lie in the game or forest reserves but falls within migratory route. A correspondence for the Ministry is attached in Annex 25.

Although minor, the project road construction will be a temporary impediment to existing seasonal wildlife movements. The road crosses the migratory route (corridor) around kidipo valley for wild animals especially elephants from Kenya, Ethiopia and Uganda to Nimule National Park, Kidipo and Tigely National Parks in search for food and water.

Therefore, to minimize and/or avoid the possible impacts due to this seasonal impediment of wildlife, the project will provide a special intervention before the commencement of the construction work. These include: speed/traffic calming structures (bumps/humps, traffic signs, reduced speed limit, posted speed limit, post advisory speed limit and Wildlife Warning Signs, etc); regular consultation with adjacent communities and other project stakeholders to raise awareness of the road safety; record keeping of any incidents on wildlife, wildlife crossing time and nature of wildlife; and development and enforcement traffic safety plan.

Figure 6: Conservation Areas of South Sudan

6.1.4 Increased Access to Natural Resources and the Potential for Land-Use Changes and the Rate of Habitat Loss

Up grading of Nadapal Juba Road will occur across a range of ecosystem types, urban and peri-urban, towns, villages/small settlements, areas with sparse populations; through landscapes for livestock grazing, agriculture; dry/ tropical forest, wetlands, and degraded landscapes, burned for agriculture or previously settled but abandoned. Concerns have been expressed that this will lead to large-scale degradation of the natural environment as people exploit these resources without controls. This is because it will improve physical access to natural resources across the landscape in along the project site.

During the construction phase, improved access to natural resources is a potential significant issue because road crews would gain access to these resources, with no regulatory authority to oversee sustainable use. During the operations phase, it is also a potentially significant issue since traffic will increase on these roads, improving access to resources by a growing number of people. Uncontrolled hunting, fishing, and mining of other natural resources, including wood for charcoal, poles for use in construction and for brick making, and harvesting of non-timber forest products are among the concernsPlates36.

Plate 36: Exploitation of Forests to Produce Poles and Charcoal

Habitat loss as a direct result of road rehabilitation is unlikely since Nadapal Juba road is an existing road. However, it may occur indirectly due to increased traffic, settlements, and new enterprises, habitat may be lost. Land-use conversion (from agricultural land to settlements, from grazing land to agricultural land.) may occur. Roads may serve as firebreaks, controlling the fires that are set to burn agricultural fields and thus indirectly benefit the natural environment. Villages would be expected to grow, and enterprises and other ancillary services will increase to provide for the growing wealth and numbers of people. Therefore, indirectly, road rehabilitation may result in habitat loss and land use conversion. However, improved roads will also help to guide development and town/village planning so that growth may occur in a more organized fashion, and thereby may decrease the impact on natural habitat. Regulatory authorities would gain improved access to the resources they are charged with managing, and be able to access local communities, to work with local people and promote sustainable use, while discouraging resource mining; and to enforce regulations. This regulatory authority though, is currently lacking.

There is limited capacity at Ministry levels and less at local levels to regulate the use and management of resources. Markets for goods will follow the improved roads increased traffic will bring consumers, and income generated from the employment opportunities (from road works and from new enterprises) will create a demand for forest and other natural resources products, such as timber, charcoal, lulu, and bush meat. This trade in natural resources products will need to be regulated, and improved infrastructure will pave the way for regulating it. However, capacity needs to be built in the natural resources professions to implement sustainable management schemes; and communities need to be encouraged to put in place conditions to ensure sustainability. Without these pieces in place, natural resources could be mined, with no forethought of future benefit.

6.1.5 Water and Soil Contamination

During construction phase there will be deterioration in the water quality of the surrounding area, mainly as a result of the spread of soil particulate matter and sedimentation particularly in the three rivers that the alignment cross. The impact will be more significant and negative during either of the two rainy seasons and is likely to be compounded by human activities, especially agricultural activities. If the construction camps are sited near water courses or close to the forested areas, pollution from waste oil or chemical spills would be more significant than if the sites are located away from water courses. Over the life of the road, there is the possibility that there will be a number of pollution incidents, such as an oil or chemical spill. In places the existing paved road has scour channels on either side of the road, which have been caused by incidents of intense tropical rainfall. The effect will be similar for a reconstructed road, if it is not properly maintained. The potential impact is considered to be moderate and negative.

Considering the potential impacts to the available water resources, it is recommended to:

- require the contractor to make specific and adequate provision for the disposal of sanitary and other wastes in such a way as will not result in any form of pollution or hazard to human or animal health;
- the contractor to take all reasonable precautions to prevent spillages and leakage of materials with the potential to pollute water resources;
- the measures should be maintained in an effective condition throughout the life of the base camp and other work areas;
- prohibit washing of vehicles and plant in or adjacent to any water sources. All washing to be carried out at designated areas away from water sources; and
- the contractor should be responsible for cleaning up any pollution caused by his activities.

6.1.6 Water Sources for Construction Work

Road construction involves use of large volumes of water. This water may be obtained from rivers and boreholes. Due to the fact that most rivers along Juba Nadapal road are seasonal in nature and the perennial river have very little volumes. It is likely that some communities would with the contractor in the use of water for construction works. The Contractor shall consider sinking of bores at different locations along the road. It is important that the borehole to supply construction water should not be located close to the existing ones. This is because it will involve abstraction of large volumes which may lead to drying up of the community boreholesand be a potential source of conflict. Impacts could also result from over abstraction of water from rivers during low volumes and this may jeopardize water supply to the local community.

In addition, the water requirements at the base camps will be relatively high depending on the number of workers, although these will be much lower than those needed in connection with construction. During the dry season, most watercourses which the road crosses have no flow (see photo below) and where there is, it will be very low and any scale withdrawals by contractor could reduce water availability to existing users and may bring collision with the local community.

Therefore, to minimize/avoid the anticipated impacts related to the shortage of water sources during construction, the contractor shall be responsible for making his own arrangements for water supply for construction and other purposes without affecting the quality or availability of groundwater or surface water resources to existing users and to provide an alternative supply if interference does occur. In the event of there being any valid dispute regarding the effect the contractor's arrangement has had on the water supply of others, the contractor shall be responsible, at his own expense, for providing an alternative supply to those affected, which is not inferior in quantity or quality to that previously enjoyed.

6.1.7 Loss of Vegetation

One of the major unavoidable impacts of road works is the effect on the terrestrial vegetation in the vicinity of the construction works. The impacts on natural vegetation is associated with the construction of carriageway width, bridge and other drainage structures, operation of quarry and borrow areas, and the construction access to quarry and borrow sites, etc. Although, there no significant areas of natural or semi-natural forest, and no designated or protected areas of terrestrial ecological interest that will be affected by the proposed construction activities, due to the proposed upgrading works the impact of this project to vegetation cover is thus very specific to the site of the activities. Given that the current road width is approximately 7m average (Upper Limit). The proposed road width is 10 Metres. Therefore there will be an increase in width by three metres. This shows that 102.6 Hectare of vegetationwill be cleared to pave way for construction of the new road assuming that the vegetation along the road covers 342 Kilometres of on both sides of the road.

To avoid and/or minimize excessive destruction of vegetation and further disturbance of the existing vegetation, it is recommended that:

- avoid excessive destruction of trees and other vegetation and follow only the proposed ROW;
- consider the location of mature trees during route selection for the construction of access road to the borrow areas and quarry sites and land clearing for quarry and borrow sites;
- compensate the loss of privately-owned mature trees and Mango and replant natural vegetation as appropriate;and
- prohibit quarrying, borrowing, spoil disposal and camping within the boundaries of existing dense vegetation site and productive farmland.

6.2 Human and Social Impact

6.2.1 Environmental Health, Safety and Aesthetics of Borrow Pits and Drainage Features

The construction of borrow pits and drainage features may create habitat for water borne disease vectors; and pose a safety issue for people and livestock. Also, there are matters of aesthetic or visual impact, loss of natural habitat, run-off and erosion, loss of productive lands, including grazing lands along the road corridors as a result of over-zealous borrow pit construction Plate 37 and 38.

Construction of Nadapal Juba Road will create borrow pits along the roadway to mine road constructionmaterial. In some locations, borrow pits may be spaced close to each other to reducematerial haulage costs.During construction of a specific road segment, the borrow pit will remain open and operational, and duringrainy seasons, it will collect water. The borrow pit may then become a breeding ground for mosquitoes and other water-borne disease vectors. Also, if water is collected in the borrow pit, people and livestock maydrown in them or mired in mud, unable to climb up the side of the borrow pit due to the steep slope, and drowning. On the other hand if these pits hold stagnant water for lengthy periods, they can become breeding grounds for vectors. Close to towns borrow pits may create additional concern since a greater number of people may have access to them and because disease vectors are more of an issue.

Forms designed to ensure that borrow pits are acquired legally and reinstated at the satisfaction of both land owners and PMT attached as Annex 26. In addition, to offset anticipated impacts resulted from borrow pits, the contractor is required to prepare detailed Site Environmental Plans (SEPs), prior to commencement of any site development, and to execute all works at the site in accordance with the plans. The SEPs should address all matters relevant to environmental protection and minimization of impacts. Information provided in the SEPs should include, but not be limited to the following:

- a site plan showing the location and proposed extent of the quarry and borrow sites, access road and any other facilities which may be installed;
- details of all landholdings, vegetation and land use;
- distance from the site to the nearest habitation;
- proper reclamation plan for quarry and borrow areas;
- proper transferring procedures and safety precaution measures for borrow pit left unreclaim with preference of the nearby communities;
- measures which will be taken to minimize erosion caused by access road construction and drainage system operation and any other measures which will be taken to minimize environmental impacts; and
- measures to be taken to make borrow and quarry sites safe on completion of exploitation and to rehabilitate any land which has been affected by access road construction.

	
Plate 37: Abandoned Borrow Pits Used as an Open Dump Site near Torit Town	**Plate 38: Abandoned Borrow Pit with Stagnant Water**

6.2.2 Construction Camp Impacts

Creation of construction camps may result in environmentalpollution from waste material, including human waste and garbage, and from fuel, oil, and lubricants fromassociated machinery. Road camps will be constructed along Nadapal Juba Road segment to house the road crew and theequipment and supplies to rehabilitate the road. The construction camp becomes a small villagehousingmany people, usually in temporary accommodation, with latrines, and food preparation areas and commoneating areas. Often, motorized equipment is kept, fuelled and serviced at the camp.

When clearing land for a construction camp, there will be direct impacts on the environment at the camp site.In most cases, a camp can be easily sited to minimize direct effects of camp construction and operation. Inarid areas alongNadapal Juba Road demand for water for camp use and for wet compacting of road layers or for concrete work can compete with local human needs causing hardships and/or conflict.

During operation of the road camp, measures are needed to minimize the potential for pollution from human waste, solid waste and from fuel, oil, and lubricant spills to ensure adverse effects do not occur. This is particularly important in South Sudan mainly along Nadapal-Juba Road local people turn to the camp and its borehole for potable water supplies. Every effort must be made to avoid activities which could contaminate the water supply, especially if, as is recommended, these boreholes are left in an operational status to avail more water supplies needed by local communities.

With proper management during operation and with proper closure and decommissioning of theconstruction camp site, there will be no long-term environmental effects. Moreover, all the contractor's sites and facilities should be formally decommissioned to an approved condition. Therefore, prior completion, check that all requirements regarding clean-up and reinstatement have been met. To assist for this activity, the contractor shall be required to prepare a plan for the approval of the Engineer/PMT, prior to abandonment of base camps, which indicates what facilities are to remain at the request of MTRB and the local authorities, and what activities are to be carried out to clean up the site. These activities should include removal and disposal of all wastes, demolition and removal of unwanted structures, removal and safe disposal of any earth which has been contaminated by the spillage of diesel, or any other polluting material, and to restore the site, as far as possible, to its initial state.

6.2.3 Environmental Health and Safety Hazards of High Dust Conditions

Dust is generated by vehicles driving on the road, resulting in human health concerns, affecting livelihoods and vegetation (crops and natural vegetation) adjacent to the roadway. During construction of Nadapal Juba Road, construction equipment plying the road, churning up an enormousamount of dusts Plates 39. Vehicles using the road while it is still under construction are doing likewise.

During operation, the increased traffic on the road combined with the likelihood of increased average speeds will likewise, increase the amount of dust. This is particularly true on the laterite road surfaces which are more easily subject to pulverization of the wearing course than the stone-based gravel wearing courses.


Plate 39: Dusty Condition on the Road

According WHO respiratory diseases are already common in parts of South Sudan and continuous exposure to fine dust from the road surfaces will exacerbate the environmental health hazards for local people. There will also be occasions where the dust will affect their crop yield on agricultural fields adjacent to roads. Business activities along Nadapal - Juba Road such as shops, bars and restaurants along the road may close down because of the dust. High amounts of dust also create a major traffic safety issue, blind passing through dust clouds. Faster vehicles attempting to pass a slower moving truck raising a lot of dust will not be able to see on-coming traffic nor pedestrians or Non-Motorized Traffic (NMT) in the road ahead.

6.2.4 Traffic Safety on Improved Roads

With improved roadway conditions encouraging more vehicular traffic and higher average speeds, will result to increased possibility for accidents between vehicles, and with non-motorized transport (such as cyclists), pedestrians and animals. Generally improved road surfaces will allow vehicles to travel at faster speeds. Although the up graded road will be wider in certain areas, straightening of dangerous curves will make it safer to travel at higher speeds, there are still likely to be more collisions between vehicles and with vehicles and bicycles, pedestrians and livestock (wildlife) Annex13.

Local people in South Sudan along Nadapal-Juba Road have lived so long without good roads that there is a lack of awareness of the dangers of the roadways and fast moving vehicles. People, animals, NMTs, and particularly children are unaware of the danger of a fast approaching vehicle and may cross the road in front of it. Livestock wandering semi-attended by herd boys is a very common feature of much of the country and these animals too often wind up in the road Plate 40 Stopping a vehicle on these gravel faced roads takes time and space, as there is a possibility of skidding.

During day time hours when traffic is heavier and when drivers are able to move faster, wildlife is scarce in most of the areas where roads will be rehabilitated. Because, of insecurity and the road conditions, there is currently little traffic from sunset to sunrise, the most active time for most wildlife. However, as security and road conditions improve, there will be increased chances for vehicle-wildlife collisions.

Plate 40: Livestock Wandering Along the Road

6.2.5 Material Storage and Handling

Materials for construction will be obtained from borrow pits, sand pits and quarries which are located at different points along the road (Annex 5 and Plates 41). The excavation method will entail open mining using bulldozers, excavators, trucks, track shovels and excavators. The Ministry of Transport, Roads and Bridges are the owners of the area to be exploited. Construction material will be obtained by either purchasing or by acquiring land for exploiting material for use. Any materials obtained from the Ministry's material sites will be free although the required authorizations in form of permits have to be provided and approved. Tippers, trucks and Lorries will be used to transport materials to the site. With regard to storage and handling of the construction material, stockpiling at the material site and dumping on the road during construction will be done. During construction safety measures will be considered and this will include ensuring that the workforce is provided with helmets and also posting warning signs indicating the construction exercise.

Plate 41: Potential Sites for Gravel and Borrow Materials

6.2.6 Diversion Routes

It is envisaged that diversion routes will be limited to the existing road during the upgrading phase or alternative alignments will be used. As a result some vegetation clearance and material stabilisation may be necessary to widen the road. The diversion must be well maintained throughout the construction period. The potential impacts of poor diversion routes are significant and negative.However due to the limitation of unexploded land mines diversion routes are going

to minimal. In cases where new bridges will be constructed the existing bridges will be used as the diversion. Some of these bridges are in very bad state Plate 42. Therefore the contract will need to reinforce them to make the more strong to withstand the weight of the traffic crossing over them

Plate 42: A Section of Dilapidated Bridge

6.2.7 Waste Management

In construction of any road there is potential of generation wide variety of waste materials. Thus may include domestic and human waste, debris, timber, stones, rocks, metals, plastics, papers among others. The quantity of waste can be substantial and can be a health hazard as well as visual intrusion. This may even result to further contamination water courses as a result of improper disposal of liquid and solid wastes from construction activities. Disposal of containers that contain toxicsubstances may result to death of human being and/or animals particularly in the areas where there are settlement. Extreme care must be taken during disposal of any kind of waste generated from road construction Plate 43.

Plate 43: Plastic Bottles Dumped by the Road Side

6.2.8 Spread of Disease along Roads

Increased traffic on the roads, and construction crews who work on the roads could introduce diseases, especially HIV/AIDS into the area. Given the proximity and close ties to Kenya, Uganda there will be a renewal of the flow of commerce and trade by truck deep into South Sudan on these Nadapal Juba Road. It is well-known that truck drivers have played a significant role in the spread of HIV/AIDS in East Africa and thus the improved roads could pose a significant threat to health in the region. Similarly, during the construction phase, road crews, often strangers to the area in which they are working, may bring contagious diseases to local populations, perhaps not previously affected by some of the diseases.

The improved roads will also serve to improve health services to these outlying areas, previously underserved by health clinics and health workers. However, the significance of contagious disease spread and the prevalence of HIV/AIDS in the region overwhelm any additional health care that may be provided to these areas.

ARC International, an NGO funded by ERRP, is implementing an HIV/AIDS Awareness and Prevention Program targeting the current road construction projects, and is working with construction companies and their road crews to educate them about AIDS prevention. HIV/AIDS awareness and prevention programs also work in local communities along the road network. These programs can serve as models for awareness raising programs that should be part of any road rehabilitation activity.

6.2.9 Roads and Internally Displaced Peoples

Internally Displaced Peoples (IDPs) are expected to be returning to areas in the South in large numbers and clearly the improved road system will facilitate and may even induce such returnees. Many people are concerned that the improved roads will concentrate the potential adverse impacts of this repopulation process along these corridors or in the urban areas they serve.

One of the scenarios under the Comprehensive Peace Agreement is the return of IDPs to theirhome areas and to urban areas in the South. Large numbers of people returning to their former homelands will mean large-scale clearing for agriculture and intensified demands for round wood products with which to reconstruct the family homestead. The size of the towns in South Sudan could easily increase significantly causing heightened demands for land on which to build a home, as well as for building materials and domestic energy in the form of fuel wood or charcoal. There will be a great strain on the already limited water and sanitation services available inurbanized areas.

This scenario will take place regardless of the existence of improved roads. With improved roads, the goods and services, improved governance, urban-town planning, and control and management of natural resource use is more likelyi.e., the structures and institutions needed to plan for and manage urban and village areasrely on having the basic infrastructure in place. Return of IDPs will happen regardless of the state of the road network, and mitigation to minimize the effects of such a population shift is beyond the control and capacity of this program.

Controlling and managing where migrant populations settle is complex and is, in part, a natural process and in part controlled by government (through an urban-town planning process), private sector (provision of services) and history (returning to previously settled areas). Contracts to implement road rehabilitation activities have no control over or capacity to manage IDP returnees and the additional infrastructure that will be needed to provide for them.

6.2.10 Loss of land

Land acquisition survey documented the present condition of land use and was restricted to the lands to be acquired by the project. The registered lands included cultivated lands, housing plots, business plots and public utility plots. It has been noted that an extra 375 hectare land will be acquired by the project. Table 25 below provides a summary of land use to be acquired in each of the County. The road upgrading work shall affect a total of 517 land segments with a total area of 375 Ha.

Table 25: Land Use within Identified Land Parcels to be acquired by the Project

	Farm land	**Grassing land**	**Residential Structures**	**Business Structures**	**Public Utility Plots**	Total
Number of Affected Land Segments	162	0	192	159	4	517
Total Area Lost to the Project (HA)	272	0	57	45	1	375

Source: Field Study, 2010

6.2.11 Loss of Trees

The road will affect very few commercial trees during road upgrading works. The total affected trees are mainly Mango and Pawpaw trees. Table 26 gives a summary of trees lying within the corridor of impact and hence must to be removed during the road construction phase.

Table 26: Affected Trees

Payam	**Timber**	**Fruit trees**	**Others**	**Total**
Nyong	0	10	0	10
Loriyok	0	0	0	0
Liria	0	18	0	18
Narus	0	0	0	
Kiyala	0	0	0	0
Total	**0**	**28**	**0**	**28**

Source: Field Study, 2010

6.2.12 Loss of Structures

Household Structures

Household structures affected by the road project include 171 residential structures, 5 animal shed, and 42 cooking sheds. Table 27 provides a summary of the household structures that must be demolished by the project as they are situated within the ROW.

Table 27: Affected Private Structures

Payam	Tukuls/Residential Houses			Animal Sheds	Toilets	Cooking Shed
	Permanent	Semi Permanent	Temporary			
Ngony	2	3	23	0	0	10
Loriyok	0	2	76	5	0	20
Liria	0	4	4	0	0	0
Narus	1	20	29	0	0	12
Kiyala	0	0	0	0	0	0
Total	**3**	**30**	**138**	**5**	**0**	**42**

Source: Field Study, 2010

Loss of Business Structures

Most of the business structures affected by the road project were found to be temporary and semi-permanent in nature. It should however be noted that there is no clear cut definition of what is considered temporary and semi-permanent in the project area. The permanent business structures were found only in Torit County and Nyong Payam. The business structures to be demolished by the project include 13 permanent structures, 67 semi temporary structures and 65 temporary structures. Table 28 below provides a summary of the business structures affected by the project.

Table 28: Affected Business Structures

Payam	Business Structures		
	Permanent	Semi-Permanent	Temporary
Ngony	13	15	1
Loriyok	0	0	0
Liria	0	27	6
Narus	0	15	40
Kiyala	0	0	18
Total	**13**	**67**	**65**

Source: Field Study, 2010

6.2.13 Loss of Public Facilities

No public facility shall be affected by the proposed road upgrading project. The public facilities originally identified in Torit town and were earmarked for demolition shall no longer be affected due the approval for a Torit by-pass. These facilities which included the prisons, office of the Census Statistics, office of legal administration and a borehole shall not be affected and no longer earmarked for demolition.

6.2.14 Demographic Changes

Currently the population of South Sudan is 7.5 million. People in South Sudan especially along the Nadapal juba road experience transportation problem due to the poor state of the road. It is anticipated that the project will help solve this problem by directly facilitating transportation. It will also help to bring in. other social services to the region especially along the road. It is anticipated that further the rural population would increase by a significant proportion. This will lead to pressure on the limited resources that are in South Sudan.

6.2.15 Cultural Resource Impacts

On the whole, the project does not hold major adverse implications for much of the archaeological, historical and cultural artefacts, structures and environmental features that are of religious or ritual significance. The language, social organization, social relationship, religious beliefs and rituals in the region is still largely intact. As the project implementation begins, it could create differences in the level of earnings that, in turn, could create imbalances in the currently harmonious social structure. If mass labourers for the project are imported from foreign countries, there is also a danger that their religious beliefs and rituals may clash with local practices, causing tensions.

6.2.16 Human Settlement impacts

The impacts on human settlement can be discussed under two categories; that aredamage to dwellings/houses and agricultural land damage. As the project implementation begin houses/structures constructed on the road reserve will be demolished to pave way for the construction on the road. On the other hand in creation of diversion route for the road several houses/dwellings will be destroyed or relocated to create the temporary routes for the traffic. At the same time agricultural lands will be affected in the same manner.

6.2.17 Conflict Impact

Resource use conflict: As the road creeps in it is likely that the accessibility to the resources are enhanced, this would create a situation of resource use competition. The case is more prominent with stone quarrying. The project might reduce the abundance of the local resources. Stone quarrying by locals for their construction on any stretch of road (as usually happens along the existing road) may pose create nuisance for the project. Such excessive stone quarrying by locals may also result in landslides. This could happen both during the implementation of the project as well as the post project period.

Cultural conflict: Since grazing and agricultural fields are situated both above and below the road, people might leave traditional fashion they have been accustomed to. Similarly, for those paddy fields below road there is also a danger that slides might: occur because of irrigation being casually drawn along any stretch of road.

6.2.18 Noise Levels

During the field study noise levels were not collected as part of this project. However there are no considerable sources of noise generating operation within the Nadapal Juba road. The impacts from increased noise level will be likely to occur during construction and operation phase on the nearby settlements. The impacts of noise are going to be felt strongly in areas where there are settlements. It is therefore important to limit the working hours and using equipments that have release low noise levels Annex 14.

During construction it will be responsibility of the contractor to provide personal protective equipments whenever the workers are subject to equipment with high noise level Annex 12. The public will be advised to construct vegetative noise barriers and construct houses and other settlements at least 100 Metres away from the road. The public awareness related to health issue due to exposure of noise will be addresses through the local media, newspapers and other media available during the operation stage.

6.3 Economic Impacts

6.3.1 National /Regional Economy Growth

The Nadapal Juba Road forms part of the Trans African Highway providing access from in Kenyan port of Mombasa to Sudan. Road transport is the dominant form of transport in South Sudan. According to WFP road transport accounts for approximately 60 -75 % of the countries passenger and freight movements (excluding pedestrian transport) and provides the only access to

most communities. The project road passes through important agricultural and forestry zones. Rehabilitating the road will reduce people's transport costs considerably and there will be important time savings. This is a significant positive impact and will be particularly valuable to the Trans African traffic.

6.3.2 Increased Occupation/Economic Activities

During the re-construction phase there will be some employment opportunities for both skilled and unskilled labour related directly to the road. Indirect opportunities could also arise from increased prospects for trading and the supply of food and water to the construction team. Over the design life of the road, the improved accessibility to and through the area is likely to impact positively on employment opportunities. The overall impact is considered to be significant and positive.

6.4 Analysis of the Potential Impacts

In general, environmental issues likely to be of concern during the construction and periodic maintenance/rehabilitation of Nadapal Juba road can be grouped into five categories:

- Ecological damage resulting from route deviations and clearance.
- Limited nuisance from noise and air (dust) pollution.
- Ecological damage from the clearance of areas for construction camps, storage of materials (fuel, lubricants and machinery), diversion and road widening.
- Water supply for the upgrading works.
- Social disturbance caused by the teams undertaking the periodic maintenance, rehabilitation and reconstruction.

Impacts can be positive or negative, direct or indirect. The magnitude of each impact isdescribed in terms of being significant, minor or negligible, temporary or permanent, long-termor short-term, specific (localised) or widespread, reversible or irreversible. The impacts due to oraffecting certain elements during construction and operation are presented below in tabular formfor ease of reference. These qualities are indicated in the assessment Table 29 and 30 below:

Table 29: Impacts Analysis Key

Key	Type of Impact	Key	Type of Impact
++	Major Positive Impact	+	Minor Positive Impact
--	Major Negative Impact	-	Minor Positive Impact
0	Negligible Impact	NC	No Change
Sp	Specific/Localized	W	Wide Spread
R	Reversible	Irr	Irreversible
Sh	Short term	L	Long Term
T	Temporary	P	Permanent
Y	Mitigation of Negative Impact/Enhancement of Positive Impact is Possible	N	Mitigation of Negative Impacts/Enhancement of Positive one is Not Possible

Table 30: Summary of Analysis of Potential Impacts

Potential Impact	Nature of Impact			
	Construction Phase		Operation Phase	
		Mitigation		Mitigation
Impacts on Local Hydrology	-, Irr,t	Y	+	Y
Soil Erosion and Degradation	--, L,Sp	Y	-	Y
Impacts on Tropical Forests and Protected Areas	-, P, Irr	Y	0	
Increased Access to Natural Resources and the Potential for Land-Use Changes and the Rate of Habitat Loss	-,Irr,P,	Y	0	Y
Water and Soil Contamination	--,Sh	Y	0	
Water Sources for Construction Work	-, Sp	Y		
Loss of Vegetation	-, R	Y		
Environmental Health, Safety and Aesthetics of Borrow Pits and Drainage Features	-,P,R	Y	-,P,R	Y
Construction Camp Impacts	--,L,R,Y	Y	0,-	Y
Environmental Health and Safety Hazards of High Dust Conditions	--,T,R	Y	--,T,R	Y
Traffic Safety on Improved Roads	T,Sp,R	Y	-	Y
Material Storage and Handling	-	Y	0,NC	0, NC
Diversion routes	+,T	Y	0	0
Waste Management	--,R, Sp	Y	-	
Spread of Disease along Roads	--,P,Sp,R	Y	--,P,Sp,R	Y
Roads and Internally Displaced Peoples	+		++	
Demographic Changes	++, Sp	Y	++, W	Y
Cultural Resource Impacts	-	Y	-	Y
Human Settlement impacts	-,T	Y	+,-, P	Y
Noise Level	-, Sp, T	Y	-, Sp, T	Y
Conflict Impact	+,Sp,	Y	-	Y
National / Regional Economy	++,P,W		++,P,W	Y
Increased Occupation / Economic Activities	++,Sp	Y	++,W	Y

6.5 Proposed Mitigation Measures

A basic consideration of ESIA is to ensure that good road engineering and sound environmental management go hand-in-hand to benefits all the parties concerned. The ESIA study limits its recommendations to the mitigation measures which address the impacts seen or confirmed on the ground as likely outcomes of up grading of Nadapal Juba road and assumes a reasonable degree of due diligence on the part of the contractors and consulting engineers who supervise them in South Sudan. Another important recommendation related to mitigation is the importance of considering environmental and social impact early in the road up grading and reconstruction process, during the project planning phase, during the road segment assessment and as part of the process of choosing and contracting a road construction company Table 31 and 32.

6.5.1 Planning and Design Phase

Table 31: Potential Impacts and Proposed Mitigation Measures

Issue	Potential Impacts	Mitigation Measures
Design and assessment of priority road segments by the road engineering design consultants	At this early stage, environmentally sound design may not be considered along the target road segment; in preparing the design documents and the Bill of Quantities (BOQ), mitigation measures are not identified and budgeted.	Ensure good collaboration among ministries so that activities can be coordinated an understanding of the areas of ecological sensitivity. Road up grading Environmental Design Checklist is used by those assessing construction needs for chosen road segments. Costs of environmental management becomes an explicit part of the BOQ Those in charge of pre-tender site visits identify potential environmental issues for prospective bidders.

6.5.2 Construction Phase

Issue	Potential Impacts	Mitigation Measures
Soil disturbance from road building and associated excavation.	Soil erosion leading to soil displacement, slope failures, gullying, clogging of drainage ways and sedimentation in watercourses or water bodies.	Preference for dry season construction Avoid building roads in very steep terrain (>60% slope) Spreading and/or compaction of disturbed soils incorporated into BOQ Install sufficient number of water bars and/or culverts along the roadside ditches to minimize the amount of water that accumulates; more if the area is steep On steeper slopes, line roadside ditches with riprap or sow grass or other cover crops to anchor the soil Add splash aprons or energy dissipaters at the outlet of culverts Add a requirement for the use of silt curtains or mulching for particularly important drainage areas Ensure adequate maintenance of such drainage ways to prevent blockages and failure.

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Issue	Potential Impacts	Mitigation Measures
Road construction crossing watercourses or wetlands.	Impeded stream flow or drainage patterns affecting human/livestock access to water or dry season grazing and/or effects on the stability and functions of aquatic ecosystems.	Preference for dry season construction Identify suitable crossing points and re-align the road if needed Establish national riparian zone management policy and apply it Ensure adequate size (diameter no less than 60 cms) & number of culverts passing watercourses or wetlands. Avoid cut & fill road construction adjacent to torrential or flashy streams that could wash away the toe slope and sink the road platform Avoid constricting water flow with bridges or drifts Suitably sized bridges, both volume and spread to accommodate natural flows
Construction and operation of borrow pits.	Additional habitat for water borne disease vectors; safety issues for people and livestock (drowning in deep/steep pits); and blight on the aesthetic views cape along road. Can be source of water borne related diseases.	Minimize the number of borrow pits by increasing free haul distance in BOQ Establish conditions for borrow pit construction Require contractor to establish and implement a borrow pit management plan Engage local community authorities to take responsibility for long-term borrow pits in their areas
Establishment, operation and decommissioning of construction crew camps	Pollution from human wastes, garbage or fuel, oil and lubricants from motorized equipment and possible competition with local communities for water supply, particularly in arid areas of the country.	Proper siting with a preference for flat sites and standardized layout with adequate and clearly specified pollution safeguards Careful attention to water supply issues so as not to disadvantage local communities with whom these are shared during construction Consider leaving operational borehole for local community use after departure of the road crew Consider putting up a permanent structure that can used/donated to the community for other uses. Full clean up and decommissioning costs incorporated into BOQ
Storage and handling of materials	Spills and emissions are likely to occur in the process of handling building materials this may result to having impacts on human health, may cause accidental fires. And failure to comply with legal aspects of handling.	Ensure that safety procedures are followed, wearing of personal protective equipment, having fire prevention plan and fire equipment, raining workers handling them and maintenance of construction vehicles

Issue	Potential Impacts	Mitigation Measures
Water and soil contamination	During construction phase it is envisage that there will be movement of heavy vehicles on the ground. This will loosen the soil particles to a great extent resulting to transportation of soil particles to water bodies causing sedimentation	Restrict movement of vehicles to one route only wherever possible. Sprinkle water to allow particulate to settle. Encourage growth of vegetation cover.
Water sources for construction work	Construction of road involves use of large volumes of water. This water may be obtained from rivers and boreholes.As a result competition for water may arise leading to conflicts	Avoid sinking bore hole very close to the existing ones. Maintain the minimum distance from one borehole to another to minimize the chances of borehole drying up. Avoid abstraction of water from rivers especially during dry season when the water volumes are low.
Loss of vegetation cover	Construction of Nadapal juba road will involve clearing of vegetation along the road so as to increase the road carriage way. Approximately 102.6 Ha of vegetation will be cleared from the start point to end point of the road. This will lead to massive reduction of vegetation cover along the road	Encourage replanting of vegetation to increase the vegetation cover. Avoid use of herbicide to clear vegetation
Waste management	Construction of road will involve generation of waste material both biodegradable and non-bio degradable.	Designate a specific place as dumping site Where possible recycle the waste materials. Encourage the worker to be responsible enough and avoid deliberate dumping of waste materials such as plastic bottles.
Noise Level	Construction and Operation of the road will involve generation of noise. This noise is a health hazard if it has high pitched.	Limit Working hours in areas where there is settlement. Use personal protective equipment in ears when working with equipment with high noise. Encourage and sensitize communities to plant vegetation which will act as sound absorbers. Regular maintenance of equipment and plants Impose speed limits. Follow the stipulated noise level standards (Annex 14)

6.5.3 Operation Phase

Issue	Potential Impacts	Mitigation Measures
Increased vehicular traffic during the dry season.	High dust conditions affect human health and quality of life, and also create traffic safety issues associated with passing on a dusty road	Need for sealed roads within urbanized areas Speed bumps to slow traffic and enforcement of speed limits Construct wider shoulder widths or improved condition to allow for pedestrian use Road signage alerting drivers to the dangers of passing on a dusty road plus "no passing zones"
More traffic and higher average speeds.	Potentially higher frequency of accidents, among vehicles and with other users of the road	Community education, particularly in primary schools, to make people aware of the dangers of fast moving vehicles Speed bumps to slow traffic and rigorous enforcement of speed limits Road signage for drivers and pedestrians alike Bypass roads to avoid bringing bulk of traffic through the most densely populated areas
Increased traffic and travellers using the improved road system.	The spread of sexually transmitted diseases (STDs) and HIV/AIDS along the road axis.	HIV/AIDS awareness and prevention campaign working with road crews and adjacent communities Health clinics along the roads get high priority, with special attention to danger of HIV/AIDS
Access to tropical forest and protected areas enhanced because of improved road network	Relatively undegraded natural tropical forests and/or protected areas are degraded through illegal or unsustainable use or increased hunting pressure affects threatened and endangered species	Collaboration among GOSS ministries targets such areas for early redeployment of protection staff Boundary re-establishment and demarcation of such areas is given priority Signage along the roadside makes users aware of special status and regulations near protected areas For each road segment, a site-specific investigation will be necessary, ideally by comparing the planned road alignment with a map of existing areas of undegraded forest or protected areas. Initiate community-based natural resources management programs and co-management programs established in buffer zones around the Protected Areas.

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Issue	Potential Impacts	Mitigation Measures
Increased access to natural resources leading to their destruction	Unsustainable use of natural resources, degradation of habitat and inappropriate land-use conversion.	Cross-sectoral planning should link communities where this is a concern with programs for sustainable economic growth activities that will relieve pressure on the natural resource base and that can help devise sustainable use plans. Intensify the present efforts at land-use and urban planning and eventually regulation
IDPs return in large-numbers and destroy the environment to meet their basic needs	Unplanned and unguided development particularly in an urbanized area leads to large-scale environmental degradation.	Promote a sense of the importance of environmental considerations in IDP assistance programs. Ensure a balance in development programs that provide social services in both urban and rural areas to take pressures off the growing urbanized areas. Avoid schemes that displace returning peoples from their ancestral lands forcing them to carry out agriculture on more marginal lands.
Air Quality	During construction of highways there are a number of potential impacts to air quality and noise especially during, site preparation, material and workers transportation.	Vehicles transporting soil and/or crushed rock should be: Doused with water -the water shall come from a water body that is not considered to be ecologically sensitive and be covered with tent. Employ the use of a water truck to spray earthworks; Locate batching sites and construction yards at least away from a sensitive receptor (school, residential areas, towns, hospitals etc); Fit the tipping point of soil and aggregate with a permanent water spray to allow for dampening of materials.
Diversion Routes	It is anticipated that diversion routes will lead to increased dusty conditions if there will be more traffic flowing. Diversion will also lead to destruction of vegetation in the area.	Ensure that the diversion route is well watered to settle the dust. Where there is alternative route avoid clearing vegetation clearing.

The SIA focuses not only on the impacts assessment associated with the design and the construction phases of the road project but also long term impacts of the road upgrading. The identification of potential and associated impacts of the proposed road upgrading was based on:

4. Expert group discussions and meetings;
5. Field investigation results;
6. The understanding of the socio-economic and health baseline conditions;
7. The knowledge of potential impacts of similar road upgrading projects;
8. The knowledge of the proposed project activities.

The table below listed various socio-economic and health components that are likely to be impacted on by the proposed road. This impact assessment is based on the assumption that these components will register changes as a result of the proposed project activities.

Table 32: Potential Social Impacts and Proposed Mitigation Measures

Socio Aspect and Impact	**Proposed mitigation and Aspect for Monitoring**
Land Acquisition Impact: Loss of land predominantly under agriculture by owners of acquired land	Minimize land acquisition; Adequate compensation; Demining exercise underway
Impact: Loss of housing structures as over 80% linearly exist within 10 meters wide of the proposed road.	Adequate compensation Demining exercise underway
Impact: Loss of shade for community meetings and income as a result of felling of numerous tress dominated by mango trees on road side	Planting of shade and fruit trees in the resettlement sites; Minimise unnecessary felling of fruit trees
Traffic and Safety Impact: Loss of lives and livestock due speeding vehicles during and after construction	Provide facilities for pedestrians and non-motorized traffic. Erect and maintain all traffic safety measures

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Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring
Labour requirements Impact: Increased employment opportunities and skills acquisition	Priority to be given to local indigenous people in all vacancies Skills improvement and on job training programs to locals
Security of project workers	Open door policy to facilitate information flow to and from host communities to enhance cordial relationship Each Country Commissioner to be responsible for security on sections of the road within their Counties
Impact: Clearing of land and intensified demand for forest products for building materials and fuel by returnees	Improved governance. Control and management of land and forest products Encourage use of non forest products construction materials
Impact: Reduced transportation cost and availability of high class transportation facilities	
Impact: Rapid economic growth of East Equatoria State	Improve security Promote private property rights
Impact: Increased STDs including HIV/AIDs infections due to increased number of commercial sex workers from Juba, Kenya and Uganda	STDs sensitization campaigns. Training and distribution of awareness materials for information, education and communication on HIV/AIDs Distribution of condoms, and encouraging status testing.
Influx of Project workers Impact: Overstretching of few social infrastructures available in the area (house rent rise, water shortage and sanitation problem)	Use of temporary camp sites to accommodate workers Provision of good and sufficient water supply, sanitation and waste disposal facilities in camp sites.

6.5.4 Decommissioning Phase

The project does not envisage any decommission at all. However construction works camps, bitumen mixing plant will be dismantled after completion of the project. On the other hand the contract will consider donating the premises that will be used as office and workmen houses for other uses such as putting up a health centre/hospital to benefit the locals.

CHAPTER 7: ENVIRONMENTAL MONITORING AND MANAGEMENT PLAN

7.1 Introduction

A principal Project goal is to achieve an appropriate balance in the environmentalprotection of the Nadapal – Juba road upgrading works and its immediate surroundings. It is achieved through avoidance or mitigation of potential impacts associated with the Project, and enhancement of Project benefits. Towards this goal, an environmental monitoring and managementis recommended. Monitoring is a long-term process, which should begin at the start of construction and continue throughout the life of the road project. Its purpose is to establish benchmarks so that the nature and magnitude of anticipated environmental and social impacts can be continually assessed. So monitoring involves the continuous or periodic review of construction and maintenance activities to determine the effectiveness of recommended mitigation measures. Consequently, trends in environmental degradation or improvement can be established, and previously unforeseen impacts can be identified or pre-empted. Environmental audits are carried out one year after completion of the project. These audits assess therelevance, efficiency and impact of any mitigation measures that have been employed.

7.2 Management and Monitoring Plan

In order to be effective, environmental management must be fully integrated with overall project management effort at all levels, which itself should be aimed at providing a highlevel of quality control, leading to a project which has been properly designed andconstructed and functions efficiently throughout its life.The responsibility for the incorporation of mitigation measures for the rehabilitation of the roads lieswith the Supervising Engineer, who must ensure that the Contractor implements all specifiedmitigation measures. In order for the Contractor to carry out environmental management activitiesduring construction he should draw up an environmental management plan of his own to show how he will address the mitigation measures during the construction period. The Supervising Engineer is responsible for assessing the Contractor's environmental management plan Table 33 and 34.

The MTRB through the Supervising Engineer and the Environment Officer will have to oversee the supervision of the road during construction to ensure that the contactor conforms to the mitigation measures. Environmental monitoring allows measures to be implemented in order to prevent or avert negative impacts. Simple monitoring systems should be set up during construction by the SupervisingEngineer and Contractor and during operation by the MTRB, so thatpotentially environmentally problematic areas can be detected well in advance and the appropriateremedial action taken.Many of the potentially significant negative impacts identified in the ESIA relate to the constructionand operation phase of the project. Mitigative andsupport measures are therefore best achieved through the incorporation of suitable clauses inthe contractual documents, which are enforced by the Supervising Engineer.

Some of management and monitoring issues indicated below are sectoralin nature, requiring outside participation of other Government authorities.Management will very largely be concerned with controlling impacts which may result fromthe actions of the Contractor, through enforcement of the construction contract clausesrelated to protection of the environment as a whole and of the components within it. In thisrespect, it is important to recognize that successful mitigation of construction impacts canonly be achieved if the environmental protection measures, as set out in the constructioncontract, are properly enforced.

Table 33: Environmental Management and Monitoring Plan

Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Impacts on Local hydrology	Install drainage structures properly Efficiency of drainage structures	Design Engineer, Supervising Engineer and Contractor	Ministry of Transport Roads and Bridges (MTRB), MEDIWR	Inspection Routine maintenance and road condition survey	During construction and on completion of each structure Once per year
Soil erosion and degradation	Control earth works Install erosion control measures Grouted stone pitching and rock fill gabion works to protect culverts inlets and outlets Landscape embankments and re-vegetate gravel sites with indigenous grass For drainage ditches along the road scour checks will be necessary in steep section. Management of excavation activities On section with high filling and deep cutting, slopes should be covered by stone walls and planted with grass. If existing drainage are damaged or removed they should be replaced or rehabilitated with better ones. Impact on soil erosion on road and off road, embankment, riverbanks. Efficiency of erosion control measures	Supervising Engineer and the Contractor	MTRB, MPMI, MIWC, MoE, MEDIWR	Inspection Routine maintenance and road condition survey	Daily during construction and on completion Once in 6 Months to account seasonal variations if any

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Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Vegetation loss	Control clearing Avoid clearing using herbicides Replanting where vegetation is unnecessarily removed Landscaping and planting all disturbed areas (Pits, deviations, embankments, campsites) Planting trees at main towns along the road. Planting and grassing should be done just before the rains or otherwise watered Care for trees planted	Supervising Engineer and the Contractor	MTRB, MPMI, MoE, MEDIWR, MAFTARF, MIWC	Inspection Observation	Daily during construction and completion Weekly Randomly
Access to protected areas	Control clearing of vegetation Planting trees/shrubs to provide new habitat where vegetation has been destroyed Prohibit hunting/poaching of wild animals by project staff Install warning signs Enforce speed limits Monitor wildlife kills	Supervising Engineer and the contractor during construction phase	MTRB, MPMI, MoE ,MIWC, MAFTARF	Inspection Routine maintenance Observation Reports	Daily Once in six months
Public health and occupational safety	Sensitization campaigns on HIV/AIDS and STDs in the communities along the project site Monitor solid waste disposal and collection Monitor waste water management Provide clean water to the project worker	Contractor Supervising Engineer	MOH, MPMI, MoE	Observation during construction Observation/reports during operation	Once a year during operation

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Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Water and soil contamination	Incorporate erosion control measures Works on culverts to be done in dry season Proper disposal of construction debris and solid wastes from impending water bodies and drainage systems Proper handling, storage and disposal of oil wastes. Proper disposal of wastewater sewage at contractors'workmen camps Construct parking bays at terminal towns for heavy vehicles with oil interceptors drains Maintain plant and equipment. Maintenance of construction vehicles should be carried out in the contractors' camps	Supervising Engineer, Contractor and Design Engineer	MTRB, MPMI, MoE	Inspection/tests Routine Maintenance	Daily during construction Once in six months after completion and
Noise pollution	Sensitise workforce Supervise construction traffic Sensitise driver of construction vehicles Regular maintenance of plants and equipment Workers in the vicinity of high level noise to wear protective gear Impose speed limits of all vehicles especially at the towns and villages Sensitize road users	Supervising Engineer and Contractor	Contractor Traffic Police	Inspection/Observation during construction and operation	Daily/Random during construction and operation

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Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Air pollution (Dust)	Control speed of construction vehicle Prohibit idling of vehicle Sensitize workforce Residential houses should be 500M downward wind of Bitumen mixing site Water should be sprayed on deviations, temporary roads leading to quarry site, barrow pits and Bitumen mixing site. In filling sub grade water spraying is needed to solidify materials and assist in compaction Plant trees around settlement areas to act as barriers to dust Regular maintenance of plant and equipment Impose speed limits for all vehicle especially at towns and villages Sensitize road uses	Design Engineer Supervising Engineer Contractor	MTRB, MOH, MPMI, MoE and Traffic Police	Inspection Observation	Randomly during operation
Construction camps	Sufficient measure will be taken in the construction camps like provision of dust bins and sanitation facilities, If septic tanks are to be installed waste will be cleared periodically Special attention will be given to sanitary condition at the campsite Garbage will be disposed off periodically	Contractor and Supervising Engineer	MTRB, MPME and MOH	Regular inspection during construction	Daily during construction

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Environmental /Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Water sources/abstraction	Management of water usage Plan for harvesting and storage of water during rains for use later Plan works schedule according to water availability Abstraction not to be done during low flow	Supervising Engineer and the contractor	MEDWRI, MoE	Meetings Inspection Check plans and schedule	During rains During abstraction and at random
Barrow pits and gravel sites	Inform people living at/near the site that the pit have been selected for exploitation Arable land should not be used as barrow pit whenever possible. For new barrow pits the top soil should be kept and refilled later after construction is over to minimize impacts on the ecosystem and agriculture Plan access to gravel site Control and restrict access to gravel site by fencing Control earth works Proper management of excavation activities Rehabilitate, landscape, terrace if necessary and grass sites Replace trees that were removed during excavation Discourage pans being made into water pans after construction Rehabilitate old unused gravel pits Compensate land owners as required Progress of rehabilitated gravel sites	Supervising Engineer and Contractor Design Engineer	MTRB MoE	Meeting during construction Inspection during Construction Payment records/compensation records during construction Inspection during operation Preparation of Re-instatement Management Plan by the Contractor	Once/daily immediately after section of the site during construction phase Once before excavation begins Once in Six months during operation

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Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Deviations routes	Plan deviations Adhere to road reserve if possible Obtain permission from inhabitants if deviation goes beyond ROW Reinstate deviations to its original state on completion of the road. Management of traffic along deviations Pay compensation for crops/property removed/destroyed by deviations on inhabited land Monitor rehabilitation of the deviations	Supervising Engineer and the contractor Design Engineer	MoE, SSLC, MTRB, MLHPP	Check plans and inspection during construction Payment and compensation records during operation	Daily when deviation are in use Once before construction of deviation Once in six months during operation
Traffic safety on the road	Install warning signs on approach to trade centres and busy junction as well as black spots Enforce speed limits Monitor road accidents	Supervising Engineer and the Contractor Design Engineer Roads Engineer	MTRB Traffic Police	Inspection during construction Routine maintenance and observation during operation	When erecting during construction Once a month during operation
Waste Management	Designate a specific place as dumping site Where possible recycle the waste materials. Encourage the worker to be responsible enough and avoid deliberate dumping of waste materials such as plastic bottles.	Supervising Engineer and the Contractor Environmental Specialist	MTRB, MoE, MoH, Public Health	Inspection during construction Routine maintenance and observation during operation	Daily Once in six months during operation

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Environmental/Social Aspect	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Material storage and handling	Ensure that safety procedures are followed, wearing of personal protective equipment, having fire prevention plan and fire equipment, raining workers handling them and maintenance of construction vehicles	Supervising Engineer and the Contractor	MTRB, MPMI, MoE	Inspection during construction	Daily Once in six months during operation
Conflict over resources	Sensitize the communities on the importance of peaceful co-existence	GoSS, Commissioners, Chiefs	GoSS	Barazas, Before and After the Project	Once in Every Six Months
Demographic/Population Changes	It is therefore important to increase the facilities that will be used by the anticipated population changes. Such as water supply system, sewerage system, communication system, electricity among others.	Supervising Engineer and the Contractor	SSCBS	Census	Once in Every 10 Years
Human Settlement impacts	Ensure that human settlements are fully controlled to reduce growth of shanties in urban centres. Increase the distribution of public services to meet the increasing demand. Planning for the settlements/structures	Supervising Engineer and the Contractor	MPMI, MoE	Inspection After Completion	Once Every Six Months

Table 34: Environmental Management and Monitoring Plan for the Social Impacts

Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Land Acquisition	Minimize land acquisition;	GOSS	Project		
Loss of land predominantly under agriculture by owners of acquired land	Adequate compensation; Demining underway.		Project GOSS	Household farm size	Annually
Loss of numerous housing structures as over 80% linearly exist within 20 meters on either side of the proposed road centre.	Adequate compensation Demining underway	GOSS	Project GOSS	New settlement sites	Annually
Loss of shade for community meetings and income as a result of felling of numerous tress dominated by mango trees on road side	Planting of shade and fruit trees in the resettlement sites; Minimise unnecessary felling of fruit trees	GOSS	Project Project	Number of new trees planted	Annually

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Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Traffic and Safety		GOSS			
Loss of lives and livestock due speeding vehicles during and after construction	Provide facilities for pedestrians and non motorized traffic. Erect and maintain all traffic safety measures		Project Project	Traffic records on number and nature of accidents	Monthly
Influx of Project workers		GOSS			
Overstretching of few social infrastructures available in the area (house rent rise, water shortage and sanitation problem)	Use of temporary camp sites to accommodate workers Provision of good and sufficient water supply, sanitation and waste disposal facilities in camp sites.		Project Project	Percentage increase in house rents Number of persons per toilets,	Monthly
Increased STDs including HIV/AIDs infections due to increased number of commercial sex workers from Juba, Kenya and Uganda	STDs sensitization campaigns. Training and distribution of awareness materials for information, education and communication on HIV/AIDs Distribution of condoms, and encouraging status testing.	GOSS – MOH,	Project Project Project	Number of sensitization programs Number of residents visiting Voluntary Counselling and Testing Centres	Monthly

Socio Aspect and Impact	Proposed mitigation and Aspect for Monitoring	Responsibility for intervention and Monitoring During Design, Construction and operation Period	Responsibility for Mitigation, Monitoring and/or Maintenance During operation	Monitoring Means	Recommended Frequency of Monitoring
Labour requirements Impact: Increased employment opportunities and skills acquisition	Priority to be given to local indigenous people in all vacancies Skills improvement and on job training programs to locals	GOSS & Contractor	Project Project	Employment rate	Annually
Security of project workers	Open door policy to facilitate information flow to and from host communities to enhance cordial relationship		Project	Acceptance level	Monthly
	Each Country Commissioner to be responsible for security on sections of the road within their Counties		County	Number of reported cases of insecurity	Weekly
Operation stage Large scale clearing of land and intensified demand for forest products for building materials and fuel by returnees	Improved governance. Control and management of land and forest products Encourage use of non forest products construction materials	GOSS	State State State	Settlement patterns Percentage change in forest cover	Annually
Reduced transportation cost and availability of high class transportation facilities			State	Percentage change in transport cost	Monthly
Rapid economic growth of East Equatoria State	Improve security Promote private property rights	GOSS	State State	Economic growth rate	Annually

7.3 Environmental /Social Impacts Mitigation and Monitoring Costs

Costs of certain items associated with environmental management and monitoring will be an integral part of specific items incorporated in overall project budgets, and no separate budget is necessary to cover these aspects. Such items comprise:

- Costs which will be incurred by Government of Republic of South Sudan in connection with management duties related to the expropriation process, the payment of compensation and implementation of the resettlement plan; it is assumed that MTRB project budgets will cover these costs.
- Marginal costs of the contractor incurred in complying with environmental protection clauses in the construction contract are incorporated in unit rates and bill items and will thus include in construction costs. It should be noted that no significant increase in construction costs is expected in connection with requiring compliance with environmental protection clauses, since these merely require the contractor to behave in a responsible manner in relation to the environment, in accordance with good construction practice.
- Environmental monitoring carried out by the construction supervision consultant's staff including inputs by the Environmental Specialist from ESMU/PMT is an integral part of general supervision duties and will be covered by normal construction supervision cost estimates and ESMU's/PMT's operation cost.

Table 35: Environmental/Social Impact Mitigation and Monitoring Costs

Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Cost of Mitigation and Monitoring in USD
Impacts on Local hydrology	Install drainage structures properly Efficiency of drainage structures	16,000 p.a
Soil erosion and degradation	Control earth works Install erosion control measures Grouted stone pitching and rock fill gabion works to protect culverts inlets and outlets Landscape embankments and re-vegetate gravel sites with indigenous grass For drainage ditches along the road scour checks will be necessary in steep section. Management of excavation activities On section with high filling and deep cutting, slopes should be covered by stone walls and planted with grass. If existing drainage are damaged or removed they should be replaced or rehabilitated with better ones. Impact on soil erosion on road and off road, embankment, riverbanks. Efficiency of erosion control measures	18,000 p.a
Vegetation loss	Control clearing Avoid clearing using herbicides Replanting where vegetation is unnecessarily removed Landscaping and planting all disturbed areas (Pits, deviations, embankments, campsites) Planting trees at main towns along the road. Planting and grassing should be done just before the rains or otherwise watered Care for trees planted	16,000 p.a

Access to protected areas	Control clearing of vegetation Planting trees/shrubs to provide new habitat where vegetation has been destroyed Prohibit hunting/poaching of wild animals by project staff Install warning signs Enforce speed limits Monitor wildlife kills	16,000 p.a
Public health and occupational safety	Sensitization campaigns on HIV/AIDS and STDs in the communities along the project site Monitor solid waste disposal and collection Monitor waste water management Provide clean water to the project worker	12,000 p.a

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Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Cost of Mitigation and Monitoring in USD
Water and soil contamination	Incorporate erosion control measures Works on culverts to be done in dry season Proper disposal of construction debris and solid wastes from impending water bodies and drainage systems Proper handling, storage and disposal of oil wastes. Proper disposal of wastewater sewage at contractors' workmen camps Construct parking bays at terminal towns for heavy vehicles with oil interceptors drains Maintain plant and equipment. Maintenance of construction vehicles should be carried out in the contractors' camps	15,000 p.a
Noise pollution	Sensitise workforce Supervise construction traffic Sensitise driver of construction vehicles Regular maintenance of plants and equipment Workers in the vicinity of high level noise to wear protective gear Impose speed limits of all vehicles especially at the towns and villages Sensitize road users Limit working hours in settlement areas	7,000 p.a
Construction camps	Sufficient measure will be taken in the construction camps like provision of dust bins and sanitation facilities, If septic tanks are to be installed waste will be cleared periodically Special attention will be given to sanitary condition at the campsite Cabbage will be disposed off periodically	BOQ
Air pollution (Dust)	Control speed of construction vehicle Prohibit idling of vehicle Sensitize workforce Residential houses should be 500M downward wind of Bitumen mixing site Water should be sprayed on deviations, temporary roads leading to quarry site, barrow pits and Bitumen mixing site. In filling sub grade water spraying is needed to solidify materials and assist in compaction Plant trees around settlement areas to act as barriers to dust Regular maintenance of plant and equipment Impose speed limits for all vehicle especially at towns and villages Sensitize road uses	7,000 p.a

Cont…

Environmental/Social Aspect	Proposed Mitigation and Aspect for Monitoring	Cost of Mitigation and Monitoring in USD
Water sources/abstraction	Management of water usage Plan for harvesting and storage of water during rains for use later Plan works schedule according to water availability Abstraction not to be done during low flow	BOQ
Barrow pits and gravel sites	Inform people living at/near the site that the pit have been selected for exploitation Arable land should not be used as barrow pit whenever possible. For new barrow pits the top soil should be kept and refilled later after construction is over to minimize impacts on the ecosystem and agriculture Plan access to gravel site Control and restrict access to gravel site by fencing Control earth works Proper management of excavation activities Rehabilitate, landscape, terrace if necessary and grass sites Replace trees that were removed during excavation Discourage pans being made into water pans after construction Rehabilitate old unused gravel pits Compensate land owners as required Follow the site management plan	7,000
Deviations routes	Plan deviations Adhere to road reserve if possible Obtain permission from inhabitants if deviation goes beyond ROW Reinstate deviations to its original state on completion of the road. Management of traffic along deviations Pay compensation for crops/property removed/destroyed by deviations on inhabited land Monitor rehabilitation of the deviations	BOQ
Traffic safety on the road	Install warning signs on approach to trade centres and busy junction as well as black spots Enforce speed limits Monitor road accidents	5,000
Conflict over resources	Educate/sensitize communities on the best methods of solving conflicts.	4,000 p.a
Demographic/Population Changes	It is therefore important to increase the facilities that will be used by the anticipated population changes. Such as water supply system, sewerage system, communication system, electricity among others.	-
Human Settlement impacts	Ensure that human settlements are fully controlled to reduce growth of shanties in urban centres. Increase the distribution of public services to meet the increasing demand. Planning for the settlements/structures	3,000 p.a

Cont...

Environmental /Social Aspect	Proposed Mitigation and Aspect for Monitoring	Cost of Mitigation and Monitoring in USD
Storage and handling of materials	Ensure that safety procedures are followed, wearing of personal protective equipment, having fire prevention plan and fire equipment, raining workers handling them and maintenance of construction vehicles	3,000 p.a
Waste Management	Designate a specific place as dumping site Where possible recycle the waste materials. Encourage the worker to be responsible enough and avoid deliberate dumping of waste materials such as plastic bottles.	2,000 p.a

7.4 Institutional Responsibilities

Institutional responsibilities for incorporating mitigation measures and for monitoring various Environmental and socio-economic aspects have been indicated in Tables 31, 32, 33, and 34 above. During the defects liability period the contractor must make sure that the road is completely serviceable, which entails ensuring optimal performance of all structures.

During construction, the Supervising Engineer and Contractor will be responsible for implementing all the proposed mitigation measures. However, the overall task of ensuringthat mitigation is in fact implemented lies with the MTRB in the GoSS. After thedefect liability period, responsibility for the maintenance of the project road will lie with the MTRB. Therefore certainparameters, such as efficiency of drainage structures and borrow pit rehabilitation can bemonitored by the respective government authorities within the counties which they occur during routine or periodic maintenance, or whencarrying out annual maintenance needs assessments.

7.5 Capacity Building

The effective implementation of the Environmental Management Plan of this project will require capacity and awareness building. While the GoRSS through the MTRB must ensure that capacity and awareness building, mitigation measures and monitoring concerns are implemented, actual training activities will be the responsibility of the Supervising Engineer, who may have to commission external consultants to carry out the training component. The objectives of training will be:

a) To develop awareness of the need to consider environmental issues during construction, operation and maintenance of roads.
b) To create awareness and understanding of the environmental legal framework pertainingto roads.
c) To develop skills for:
    - Identification and assessment of environmental impacts of road projects.
    - Incorporation of mitigation measures at all stages of road development.
    - Reviewing ESIA reports and incorporating measures into the decision making process.

This can be achieved by targeting specific groups for the necessary training. These target groups can be divided into five:

i. Group A Road Workers:
This group consists of Engineers (Resident, County/State and Project) Contractors, Supervisors, Site Agents, Site Managers and the MTRB. These are the top management staff concerned with road construction and maintenance.

ii. Group B Road Workers:
Foremen, headmen, skilled and unskilled labourers.

iii. Group C Road Users:
Transport Associations Examples include the Truck Drivers Association, and Public Service Vehicles Drivers Association. For this group of people the road is their livelihood.

iv. Group D Road Users:
Pedestrians and Non-Motorised Traffic

v. Group E Project Affected People (PAP):
Business people including farmers. These people have businesses (kiosks, offices, schools among others) that can potentially be affected by the road, or they live by the road.

7.6 Chance finds procedures

These procedures should be incorporated into each sub-project ESMP and civil works contracts. The following wording is proposed:

> If the Contractor discovers archeological sites, historical sites, remains and objects, including graveyards and/or individual graves during excavation or construction, the Contractor shall:
>
> - Stop the construction activities in the area of the chance find;
> - Delineate the discovered site or area;
> - Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities or the [Relevant Ministry] take over;
> - Notify the supervisory Project Environmental Officer and Project Engineer who in turn will notify the responsible local authorities and the [Relevant Ministry] immediately (within 24 hours or less);
>
> Responsible local authorities and the [Relevant Ministry] would then be in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by the archaeologists of the [Relevant Ministry]. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage, namely the aesthetic, historic, scientific or research, social and economic values.

Decisions on how to handle the finding shall be taken by the responsible authorities and the [Relevant Ministry]. This could include changes in the layout (such as when finding irremovable remains of cultural or archeological importance) conservation, preservation, restoration and salvage.

Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities.

-Construction work may resume only after permission is given from the responsible local authorities or the [Relevant Ministry] concerning safeguard of the heritage

7.7 Reporting

Progress Reports should be prepared which summarize the results of all monitoring. The reports will give monitoring data in a standard format. Reports should emphasize any significant violations of contract provisions by the contractor or any failure to implement requirements of the ESMP. Any significant incidents of environmental contamination should be summarized, along with actions taken to mitigate these and to prevent reoccurrence. Progress Reports should be submitted to MOE, MTRB/PMT/ESMU.

CHAPTER 8: CONCLUSION AND RECOMMENDATIONS

8.1 Conclusions

The primary objective of the study on the Nadapal – Juba road was to identify the most appropriate economically justified up grading and periodic maintenance or strengthening solutions for this road in South Sudan. It is anticipated that in the long term there will be considerableeconomic benefit accruing to the areas of influence of the project roads due to stimulated economic and social activities and improved traffic flow. In this project the environment along the road have been considerably altered during the wars in South Sudan. This resulted to complete neglect and deterioration of the structures along the Nadapal – Juba Road. Additional disturbances due to construction will therefore be relatively minor.

The proposed Nadapal–Juba Road upgrading work will lead to avariety of changes in the local and wider environment. Many of the effects will bebeneficial, particularly the impact at a state and local level of increasing the reliability ofroad transport and the potential to develop the local economy through improvedinfrastructure and employment opportunities. The potential beneficial impacts associatedwith project implementation are also expected to lead to much improved quality of life,particularly for those communities who live on or close to the road.

At this detailed design stage, no adverse environmental impacts of significant magnitude areforeseen that would hinder the proposed upgrading of the road to Bitumen standards. The road project will not harm any sites that are historically or environmentally sensitive.The most important negative impact will result from soil erosion during earth works andconstruction of structures along the road especially in the road section between Nadapal - Kapoeta

Soil erosion is also likely to occur, particularly as a result of excavation of gravel pits; but this can be mitigated. Pollution due to air, dust, noise, and sediments will occur during construction and continue duringoperation.Workmen's camps should preferably be located at the major centres along the roads. In addition, the camps must not stress local natural resources (fuel wood and water supplies) at the expense ofthe local population. The project roads are to be designed for higher speeds, which pose a danger to non-motorised traffic. The provision of shoulders and installation of road signs will help to mitigate these impacts.

The study found that there was no available information concerning the conservation status of plant species in South Sudan. It was therefore impossible to determine the species endemism, threats or the vulnerability. The Wildlife Conservation and National Park Act, 2003 for South Sudan which is available does not expand on the conservation status of the avifauna and flora.

The findings of the Socio Economic Impact assessment conclude that the impact of upgrading of the Nadapal – Juba road will have a positive impact on the socio-economic environment of the entire South Sudan. The social management measures proposed are generally straight forward. The majority of the measures relate directly to sound operating practices both during the construction phase and subsequently over the operational life of the road. Provided that the road is upgraded with due attention to the mitigation and management measures outlined, the project will have a positive impact on the socio-economic environment of the project area. In summary, the potential positive impacts of the proposed project road by far outweigh the potential negative impacts.

This study concludes that there will be no major ecological impact that will negatively affect the up-grading of the Nadapal-Juba road.In support of the huge acceptability shown by our survey, it

is recommended that this project proceeds and that the proposed mitigation and monitoring measures are enforced in full. The project has no serious negative environmental impacts and we recommend implementation as proposed, while ensuring implementation of the proposed Environmental Management and Monitoring Plan.

8.2 Recommendations

Successful implementation of environmental safeguards in a manner consistent to World Bank and Nationalpolicies and guidelines the team recommends that:

1. The mitigation measures identified in this report be incorporated, as far as is practically possible, within the design details, specification, and contract documents, to be drawn up for the project road.

2. The local people must be informed of the details and progress of the project, particularlythose who will be affected by the proposed realignment and extension of the road so that they can plan for the future accordingly.

3. A Resettlement / Compensation Action Plan needs to be prepared by the GoRSS to address issues such as amount of payment, methods of payment to genuine cases of the affected people.

4. Diligence on the part of the contractor and proper supervision by the Supervising Engineer during construction and the initial operation period is crucial for mitigating impacts. However all mitigation measures need to be specified in tender and contract documents, and must be included in the Engineering Drawings, Specifications and Bills of Quantities.

5. During operation, maintenance of the road is a key factor in protecting the environment. For example, if the project roads are always in motorable condition, vehicles would not have to drive off-road, thereby destroying vegetation, road structures, and posing a danger to pedestrians, cyclists and livestock.

6. It is strongly recommended that the mitigation measures proposed in this report be incorporated, as they are reasonable and implementable.

7. It is further recommended that a result based monitoring and evaluation program should be drawn and documented as an integral component of the Environmental Management Plan.

8. Environmental monitoring allows measures to be implemented in order to prevent or avert negative impacts. The MTRB and Directorate of Environment must ensure that monitoring does take place and oversee environmental compliance in all road related activities.

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