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SITE-SPECIFIC ENVIRONMENTAL COMPLIANCE PLAN

for ONI Streets Rehabilitation

Implemented under: Municipal Infrastructure and
IDP Housing Rehabilitation Project, Component 1
DCN: 2010-GEO-033

Prepared by: TetraTech

SITE-SPECIFIC ENVIRONMENTAL COMPLIANCE PLAN
ONI STREETS REHABILITATION SITE

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A. PROJECT AND SITE DATA:

Project Name:	USAID/Caucasus – Municipal Infrastructure and IDP Housing Rehabilitation Project
Country:	Georgia
DCN of Triggering IEE:	2010-GEO-033
Component Name:	Component 1
Type of Activity:	Rehabilitation of Municipal Infrastructure
Site Name:	ONI Streets Rehabilitation
Name of Reviewer	James Gallup, Team Leader and Environmental Specialist Mamuka Gvilava, Environmental Specialist
Date of Review:	04 September 2011

B. SITE DESCRIPTION:

USAID is providing assistance to the Government of Georgia (GoG) under the Georgia Municipal Infrastructure and IDP Housing Rehabilitation Project (GMIP). The project implementation period is 2011-2013. GMIP includes three components, Component 1, Municipal Infrastructure, Component 2, Rehabilitation of Irrigation Infrastructure and Component 3, IDP (Internally Displaced Persons) Durable Housing. The Municipal Development Fund (MDF) will be responsible for procurement of the works, goods and services required.

As a result of the consultations with the population, the local council of Oni Municipality has applied for USAID support selecting rehabilitation of internal roads in Oni sub-project with hopes that rehabilitated street infrastructure will contribute to the economic growth of the municipality and improve the social conditions of the population.

This Site-Specific Environmental Compliance Plan (SS ECP) is prepared for the GMIP municipal component, in particular, the improvement of internal roads in Oni through the sub-project entitled Oni Streets Rehabilitation.

1. Location

Oni settlement and municipality is located in north-east part of Racha-Lechkhumi and Kvemo Svaneti region of Georgia. The territory of the municipality covers 1,356 km². Population of Oni proper is 3,400 inhabitants (with 133 IDPs). Terrain of the settlement is flat (the absolute levels above the sea range between 785-800), surrounded by mountains. The climate is moderately humid. The average annual humidity is 60 %. The region is characterized by cold winter and warm summer seasons. Average annual air temperature is 14.50 C. Geographic coordinates of Oni are N 42°34'52"; E 43°26'03".

The asphalt-concrete pavements of the streets of Oni are in need of repair and replacement (see photos). Most of the streets do not have drainage system and during precipitation the water flows on the carriageway and outwashes the asphalt-concrete layer to the level of sand and gravel and ground layers. Drainage pipes are all past their expected service life where present. The width of street carriageways ranges from 6-9 m and sidewalks from 1.5-2.0 m. The inclinations of the streets are slight. Municipal authorities hope that rehabilitated streets will improve amenities for the population and visiting tourists.

2. Beneficiaries

The total population of Oni Municipality is 8500, while the number of the settlement inhabitants (3400 as mentioned above) doubles as the touristic season is approaching. The unemployment level is 72%. Low socioeconomic development promotes migration that complicates the social conditions.

Despite its small size, Oni is an important settlement of Georgia thanks to its heritage. Its attractiveness is reinforced by the possibilities of hosting mountaineer tourism and alpinism. Other natural resources for Oni Municipality are mineral waters and climate that promotes growing the number of tourists and holidaymakers. Improved infrastructure would create pleasant environment for inhabitants and guests of the settlement.

3. Benefits

The economic development of the city is dependent on the improvement of transport infrastructure and amenities in the city. This may contribute into development of tourism sector and improvement of the social life. Besides, the rehabilitation of the streets will improve the traffic movement, reduce the risk of accidents, improve ecological condition and it is hoped that will promote the development of tourism sector and would diversify employment opportunities for the local population.

4. Detailed Description of Site Activities

The following are the assumptions, plans and parameters (see Table 1 below) for the rehabilitation work:

- two types of road arrangement are envisaged: (i) Type II, milling of the asphalt-concrete pavement (6-7 cm), mixing the milled materials with fractional macadam (0-40 mm) and battering; (ii) Type IV, pit-hole repairing of asphalt-concrete (processing of the pits with breaker hammer and bitumen);
- arrangement of sidewalks on streets with necessary width and replacement of existing ones;
- rehabilitation of drainage channels (0.5 x 0.5 m);
- the cross profile, road bed and plan of the streets will remain unchanged.

Table 1. Names and parameters of planned rehabilitation streets in Oni

Streets	Length	Carriageway			Sidewalk			Drainage
		width , m	Type II, m ²	Type IV m ²	Kerb, m	Sidewalk, m ²	Lane, m ²	Length, m
Tsereteli	160,0	9,0	–	1440,0	550,0	714	714	320,0
Demetre II	330,0	9,0	–	2970,0	640,0	640,0	640,0	
Mindeli	117,0	8,0	936,0	–	110,0	175,0	–	117,0
Stalin	484,0	7,0	3388,0	–	950,0	1956,0	–	–
Gvantsa Dedopali	200,0	8,5	–	1700,0	–	–	–	–
Rustaveli	245,0	6,5	1592,5	–	960,0	490,0	490,0	
Saakadze	607,0	8,0	4856,0	–	600,0	1210,0	–	–
Arno Oneli	456,0	8,0	3648	–	900,0	910,0	–	–
Total	2599,0		14420,5	6110,0	4710,0	6095,0	1844,0	437,0

The following range of equipment will be used in the construction: grader, excavator, drum roller, vibrating roller, pneumatic roller, asphalt paver, crane, bulldozer, loader, concrete plant, dumpers (6), compressors (2), and breaking hammers (4).

5. Site-specific Timeframe and Schedule

Design & bidding documentation preparation is estimated to last for 2 months upon initiation (plus 1 month for design contract tendering and signing). Works bidding and contracting will take at least 3 months. Works could be initiated as early as spring of 2012. Works can be implemented in the period of spring-fall 2012. By the time of bidding for works EMMPs should be finalized. By the time of contractor mobilization all permits & clearances should be in place.

The following is the schedule of works proposed in the feasibility study:

Time schedule for rehabilitation works	01	02	03	04	05	06	07	08	09	10	11	12	01	02	03	04	05	06	07	08	09	10	11	12
Oni Streets Rehabilitation			■	■	■	■	■	■	■	■														

Estimated cost of construction is USD 825,000 excluding VAT.

Operational and maintenance period of completed works is expected to be 20 years (till 2030).

6. Photos of Site

ONI Street Photos:



Photo 1. Typical condition of asphalt-concrete pavement at the streets of Oni (fragments of asphalt-concrete layer; sand and gravel layer has remained).

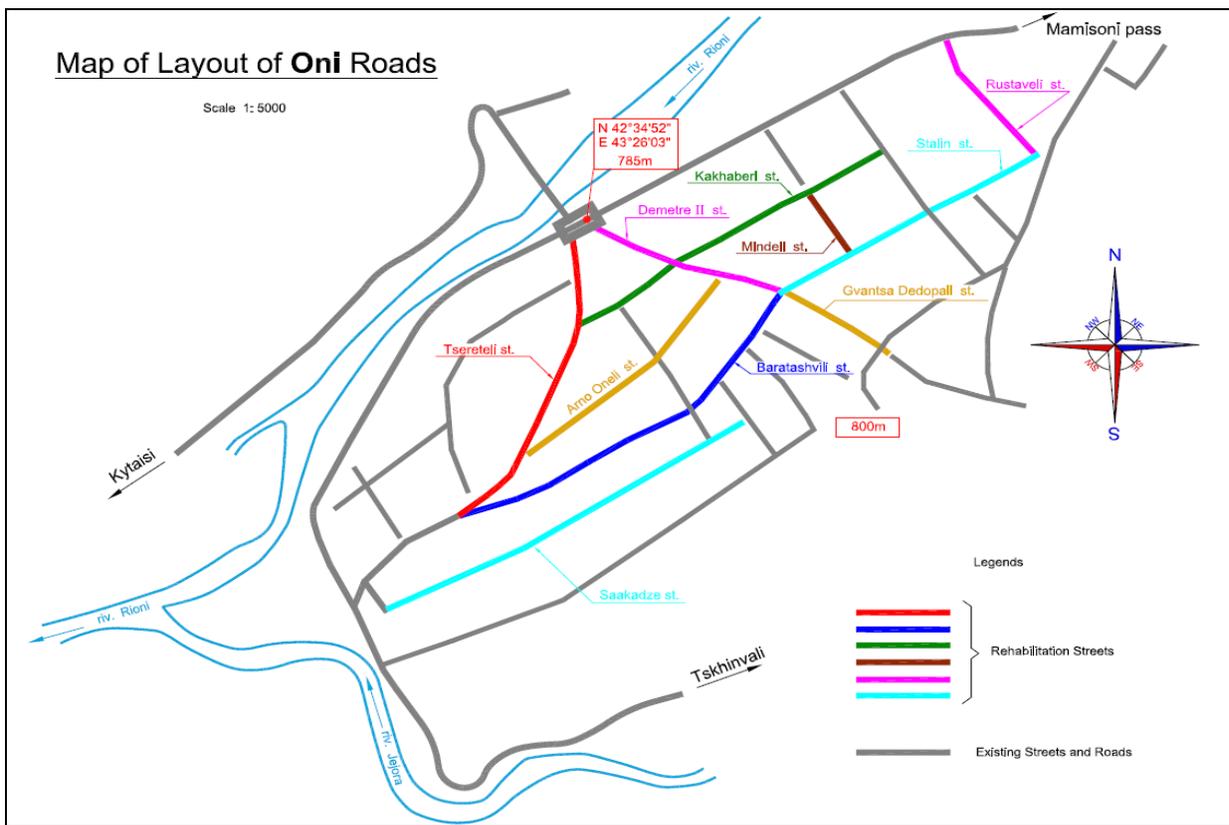


Photo 2. Residence cottages for IDPs at the end of the Tsereteli street in Oni.

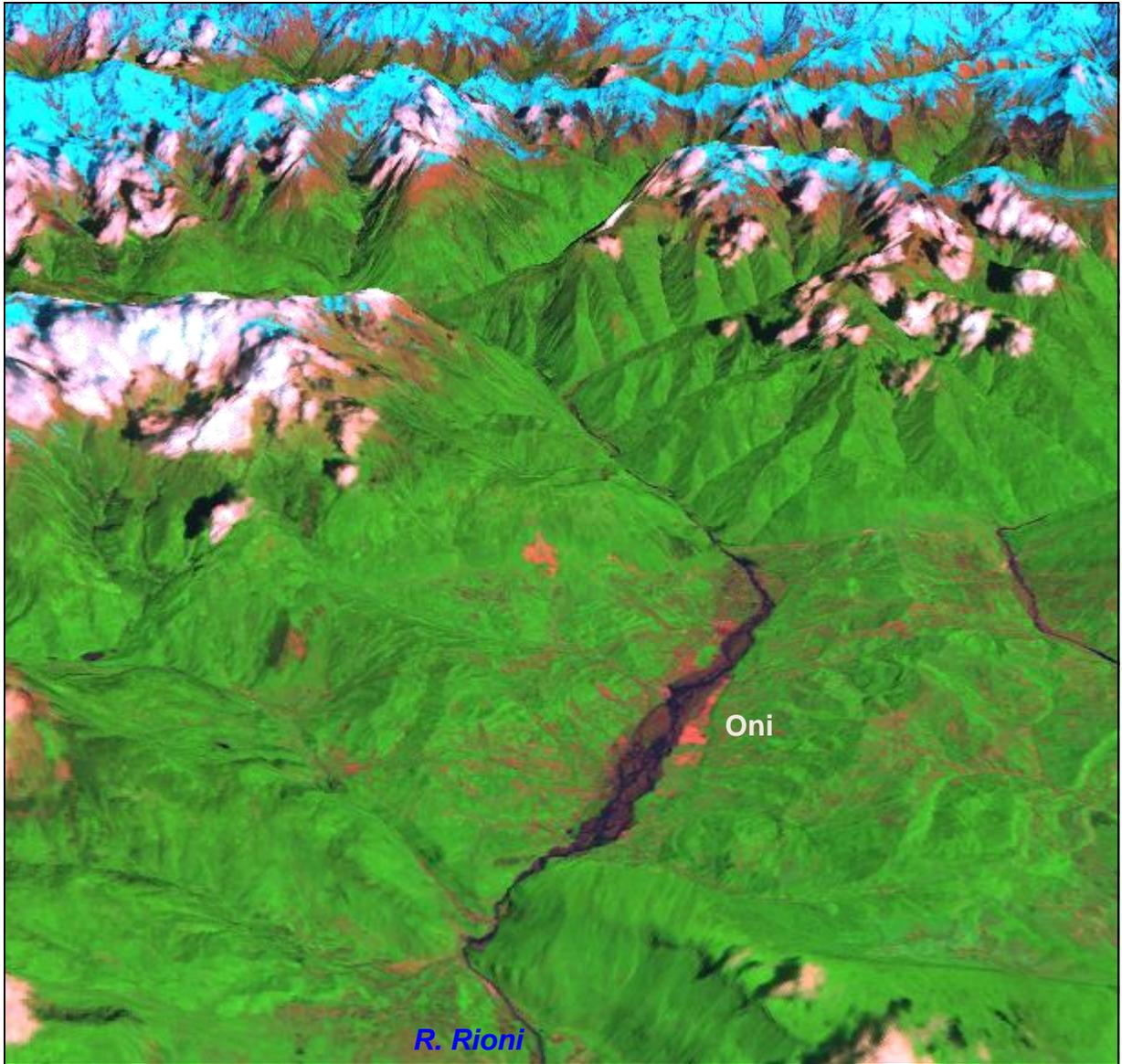
7. Site Map



Map 1. Location of Oni Streets Rehabilitation site (source: Kavgioprotransi-MG Ltd Feasibility Study, July 2011)



Map 2. Oni streets rehabilitation scheme (source: Kavgioprotransi-MG Ltd Feasibility Study, July 2011)



Map 3. Satellite image of Oni (source: Landsat 5 TM, June 08, 2011)

C. SITE-SPECIFIC BASELINE ENVIRONMENTAL CONDITIONS:

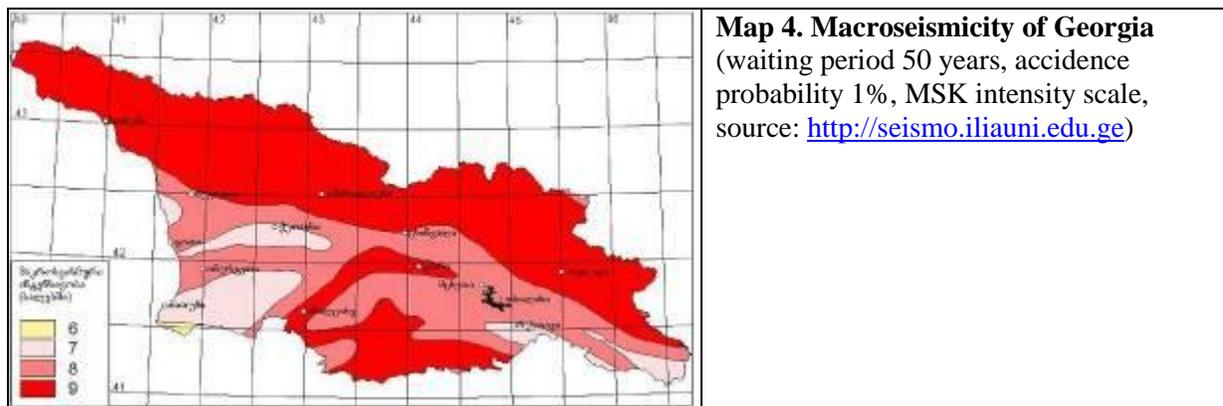
1. Geography / Geology

Geography. Oni municipality is located in north-east part of Racha-Lechkhumi and Kvemo Svaneti region, along the border of the Republic of Georgia. It is bordered by Russian Federation on the north, Java municipality (Tskhinvali region) – on the east, Ambrolauri and Lentekhi municipalities – on the west and Sachkhere municipality (Imereti region) – on the south. Oni settlement proper is laid out on both sides of riv. Rioni.

Topography. Oni area is sectioned by deep and narrow tributaries and ravines. Box-shaped valley is mainly covered by terraces with width between 250-300 m (near vv. Tevresho, Gebi, Chiora); 300-350 m (near c. Oni), 100-300 m (near vv. Nigvznari, Sori and Seva); 300-600 m (near Kvishari). The length of terraces ranges between 0.3-2.0 km. The biggest terrace is on the right bank between vv. Kvatskhuta and Bostana: length – 5 km, width – 0.5-0.8 km. Other terraces are smaller with the length 100-200 m and the width 50-100 m, whilst the height of the terraces varies between 2-3 m to 3-6 m.

Geology. The relief of Oni municipality is mountainous covered with plains; river terraces are located from place to place. The area is mainly covered with plains developed from Quaternary age alluvial sands, loamy sand and limestone. Tectonically the territory is a part of Caucasus mountain system.

Seismicity. The rehabilitation site is situated in high 9-magnitude seismicity (MSK 64 scale) zone, as can be seen from the Map 3 below, depicting the macroseismic zoning of Georgia.



2. Natural and Cultural Resources

Protected Areas & Cultural Heritage. The feasibility and scoping study reports that rehabilitation works are not carried out within or in proximity to protected areas, and that there are no natural, cultural and/or archeological monuments within the works area. Considering the fact that the project envisages rehabilitation of existing system, the chances to discover, or risks of impacting archeological monuments are considered as low. At the same time site activities should proceed with full respect of cultural nature of the city and should take care in the vicinity of local landmark buildings.

Soils. There are various types of soils spread in this region: weak gray forest and brown earth soils are found on the slopes of the mountains, whilst the crowns of the mountains are covered by greensward and greensward-peaty mountain-meadow soils. Transitional Black soils are spread in the plains.

Flora. The humid subtropical climate of Oni municipality, mountainous relief, variable climate and soil conditions predetermine rich diversity of plant species, with vertical zoning in the range of 300-600 m ASL. All Caucasian coniferous species, such silver and green fir-tree, pine-tree, juniper can be found

here. The vertical variability in the forest plant species establishes the original character of the area. The most dense forest massifs are located above 1000 m ASL and stretching till subalpine zones.

Fauna in Oni municipality is represented by species distributed in mountainous areas, with mixture of lowland fauna. Species notable in Oni area are aurochs (which is endemics of the Caucasus), chamois, roe, bear, wolf, jackal, fox, marten, Caucasian squirrel and rabbit. The area is rich in birds, such as hawk, sparrow-hawk, kite, and falcon. Mountain Eagle is present in the subalpine zone. There are approximately 50 species of birds registered.

3. Current Land Use

The project does not envisage construction works outside the borders of the existing streets. The project does not envisage land acquisition, resettlement or losses of income or property. Only temporary inconveniences will be created for land and property owners next to the streets subject to rehabilitation.

4. Population Characteristics and Proximity to Public Facilities

As mentioned above, Oni is considered as touristic destination by the GoG and road rehabilitation works should be respectful of future touristic ambitions of this small settlement. There are few cultural heritage landmarks, such as famous Oni Synagogue as well as the Church (located on Baratashvili Street) and Theatre (Rustaveli Street). Main public buildings like local administration and police headquarter are also located on the rehabilitation streets.

5. Current Environmental Conditions in the Area of the Site

5.1 Environmental Setting

Climate. The climate of Oni area is transitional towards the humid subtropical and is characterized by long warm summer, cold winter and two minimums of precipitation. The average annual temperature in the plain is 9.6-9.7 C°. The annual average temperature of January is -1.4 C° and of July 20-20.5 C°. The absolute minimum temperature is -29 C°, whilst the absolute maximum is 37 C°. The annual amount of precipitation is about 700 mm. The maximum amount of precipitation comes in spring and at the beginning of summer. Easterly as well as westerly winds blow during the year.

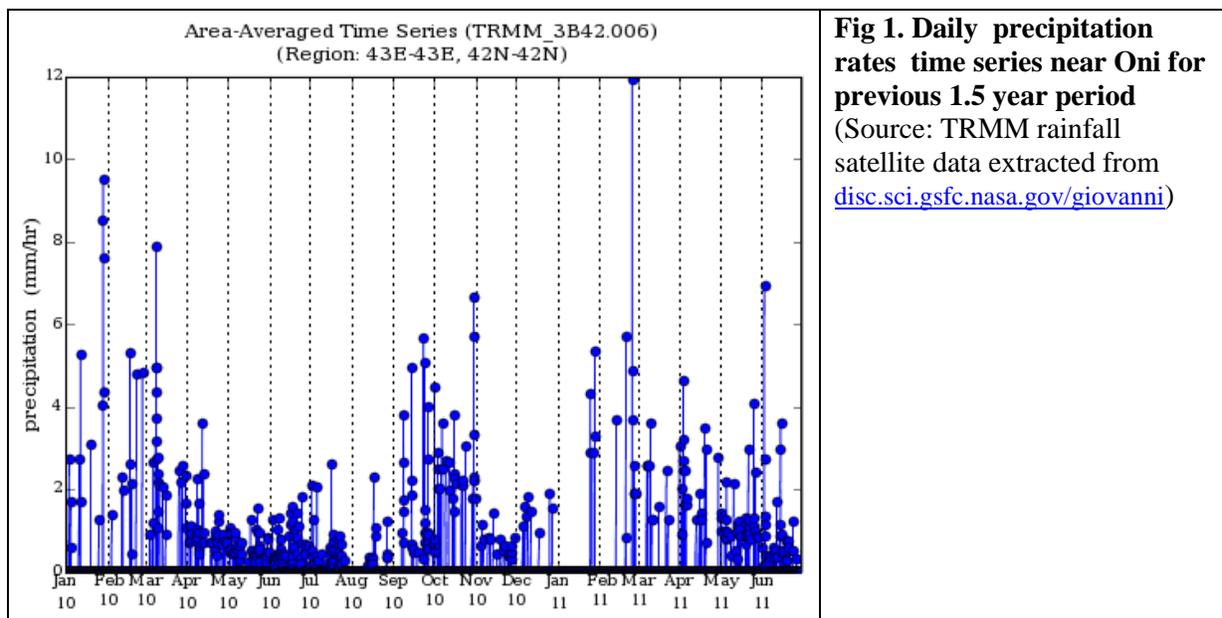


Fig 1. Daily precipitation rates time series near Oni for previous 1.5 year period (Source: TRMM rainfall satellite data extracted from disc.sci.gsfc.nasa.gov/giovanni)

Hydrology. Riv. Rioni crosses the Oni region in east-west direction. Rioni is the biggest river in west Georgia. The source of the river is located on the southern part of the Caucasus Mountain Ridge. The river flows in the Black Sea near Poti. The length of river is approx. 327 km, catchment area – 13,400 km² (almost half of the west Georgia).

5.2 Site Drainage and Ecology

The project envisages rehabilitation of sections of municipal streets/roads; therefore impact on vegetation is indeed minimal. Due to urban environment encountering of wild animals is also negligible. In terms of drainage and sedimentation, strong torrential rains may outwash road pavement discharging particulate matter into the river. Road sections under rehabilitation do not cross surface water objects. Due to damaged asphalt cover dusts from traffic create nuisance for the locals.

6. Conclusions on Baseline Conditions

Based on the findings of the baseline analysis, (i) there are no significant environmental concerns for the rehabilitation activities and these seem to be mitigable with adequate environmental management and monitoring; (ii) some improvement of environmental condition is expected during operation phase.

D. LEGAL, REGULATORY AND PERMITTING REQUIREMENTS

1. *Please describe the national environmental impact assessment requirements for this site*

Requirements of Georgian Legislation. The project does not require the Environmental Impact Permit (EIP) and/or State Ecological Expertise (SEE) under the Georgian legislation, since in accordance with the Article 4 of the Law of Georgia on Environmental Impact Permits, local urban road rehabilitation is not listed as the type of project subjected to EIP or SEE. Likewise, setting Norms for Maximum Permissible Level of air and water emissions are not required either.

According to current legislation, water and air emissions during rehabilitation and operation of the project facilities should comply with the Norms established by the Technical Regulations of the Environmental Protection.

2. *Please list the local permits that must be obtained for this site, process for obtaining them and the schedule for obtaining them:*

Permit Type	Schedule
Zoning	To be addressed by the engineering design company and the works contract client (MDF).
Building/Construction	To be addressed by the engineering design company and the works contract client (MDF).
Source Material Extraction	To be addressed by the engineering design company and the works contract client (MDF). Materials should be from licensed sources (alternatively contractor should obtain such license).
Waste Disposal	Non-hazardous waste: clearance with local authorities. Hazardous waste: only to be disposed at approved hazardous waste disposal facilities.
Wastewater	Clearance with local authorities (camps and staging areas, other discharge points).
Air	Compliance with air emission standards.
Water Use	Clearance with local authorities.

Historical or Cultural Preservation	In case of chance finds immediate stop work order and acting in clearance with Ministry of Culture and Monuments of Georgia.
Wetlands or Waterbodies	-
Threatened or Endangered Spp.	-
Other	Asphalt plants are subject to EIA per Georgian legislation. Contractor should be required to clear EIA if intends to install new plant, rather than use existing plant with proper permit.

3. *Please list additional host government environmental laws or environmental standards that the site must comply with?*
- a. *Air emission standards*
 - b. *Water discharge standards*
 - c. *Solid waste disposal or storage regulations*
 - d. *Hazardous waste storage and disposal*
 - e. *Historical or Cultural Preservation*
 - f. *Other*

The laws that are considered to be directly or indirectly related to this project could be listed as follows:

Environmental protection:

- Law on Environmental Protection (1997, amended in 2000, 2003, 2007)
- Law on Environmental Impact Permits (2007)
- Law on Ecological Expertise (2007)
- Law on Environmental Protection Service (2008)

Conservation of natural resources:

- Law on Soil Protection (1994, amend. 1997, 2002)
- Law on Natural Resources (1996)
- Law on Water (1997, amend. 2003, 2004, 2005, 2006)
- Law on Regulation of Forest Use (1998)
- Law on Protection of Ambient Air (1999, amend. 2000, 2007)
- Law on Minerals (1996)

Conservation of nature and biodiversity:

- Law on Wildlife (1997, amend. 2001, 2003, 2004)
- Law on Red List and Red Book of Georgia(2003, amend. 2006)

Environmental security:

- Law on Hazardous Chemicals Substances (1998, amended in 2006, 2007)
- Law on Compensation of Damage from Hazardous Substances (1999, amended in 2002, 2003)
- Law on Resorts and Sanitary Protection of the Resort Zones
- Law on Pesticides and Agrochemicals (1998)
- Transit and Import of Hazardous Waste within and into the Territory of Georgia

Land use:

- Law on Land Registration (1996)
- Law on Procedure for Expropriation of Property for Necessary Public Needs (1999)

Various:

- Law on Tourism and Recreation (1997)
- Law on Licensing Design-Construction Activities (1999)

- Law on Cultural Heritage (1999, amend. 2007)
- Law on Licenses and Permitting (2005)

Environmental standards in Georgia establish requirements towards the environmental quality and are determining Maximal Permissible Concentrations (MPC) in water, air and soil for substances harmful to human health and environment. These environmental quality standards and norms are set in accordance with the Law on Public Health, in concordance with the Law on Environmental Protection and the Law on Water.

As prescribed by the listed legislation, the Order No. 297/N dated 16.08.2001 issued by the Minister of Labor, Health and Social Affairs of Georgia established a set of environmental quality and sanitary norms and rules in various domains, dealing with surface water supply systems; surface water pollution; sanitary protection zones; air pollution norms; sanitary norms and rules for soils with regard to wastewater, application of fertilizers and irrigation; groundwater pollution; noise and vibrations; electromagnetic radiation.

Maximal Permissible Concentrations. Limits for emissions/discharges of harmful substances (in water, air, soil environments) determine maximal permissible levels for emissions/discharges. The lists of substances are given in the Order of the Minister of Environment Protection and Natural Resources of Georgia No. 139 dated 25.11.1999 On Approval of Hazard Coefficient for Harmful Substances Emitted from Stationary Sources. Maximal Permissible Concentrations (MPCs) for concentrations of harmful substances in water objects are established by the Law on Water. MPCs are determined on an individual basis for each particular facility.

International agreements. Georgia is party to number of important international conventions and agreements (see all references on the webpage <http://aarhus.ge/index.php?page=153&lang=eng>).

4. Please describe U.S. or other international standards that the Site must comply with.

International standards. It is proposed that together with Georgian legislative requirements for environmental quality the project to comply with relevant standards of international financing institutions, such as those listed in the IFC's Pollution Prevention and Abatement Handbook (see at http://www.ifc.org/ifcext/sustainability.nsf/Content/Publications_Handbook_PPAH) as well as the IFC's Environmental, Health, and Safety General Guidelines, which is available at <http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines>.

E. ENGINEERING SAFETY AND INTEGRITY

1. *Have engineering designs and plans been developed by a qualified engineering?*
Not yet, they will be.
2. *Do designs and plans effectively and comprehensively address management of storm water runoff and its effects?*
Not yet, they will be.
3. *Do designs and plans effectively and comprehensively address reuse, recycling, and disposal of construction debris and by-products?*
See EMMP.
4. *Do designs and plans incorporate pollution prevention measures, wherever appropriate?*
See EMMP.
5. *Do designs and plans effectively and comprehensively address environmental management of mobilization and de-mobilization?*

See EMMP.

6. *Are there known geological hazards such as faults, landslides and unstable soil structure that affect the site? If so, how will you ensure engineering integrity of any structures?*
Geohazards are not anticipated. Engineering will be part of construction contract.
7. *Will the site require grading, trenching, or excavation? Will the site activity generate borrow pits? If so, how will these be managed during implementation and closure?*
Aggregate materials would be required from nearby extraction sites. Materials should be imported from licensed sources, or contractor should obtain license.
8. *Will the site activity cause interference with the current drainage system?*
Construction contract will cover.
9. *Will the site activity interfere with utility transmission such as above and below-ground cables; water, sewer and gas lines; etc.?*
It is anticipated that some limited interference with municipal infrastructure would take place. The design team and construction contractor would address these issues through detailed road rehabilitation design, clearances with local utility service and pre-construction survey.
10. *Is an emergency plan included in the engineering plans and designs?*
Response to small spills and minor incidents would be addressed with EMMP.
11. *Does the site activity increase risk of fire, explosion, or hazardous chemical releases?*
No.
12. *Does the site activity require disposal or retrofitting of PCB-containing equipment (e.g., transformers, florescent light ballasts, etc.)?*
No.
13. *Is the site activity associated with occupational safety and health hazards? If so, has a health and safety action plan been developed?*
See EMMP.

Feasibility and environmental scoping studies were conducted by Georgian engineering companies, contracted by MDF. Design assignment is to be also commissioned by MDF as soon as practicable. Task of the engineering design team should include due consideration of the provisions of this SS ECP, including addressing all above listed sound engineering issues.

F. ENVIRONMENTAL CONSEQUENCES

General checklist for environmental consequences is provided in Attachment F.1, while below more detailed treatment is given for various environmental and social issues.

1. Potential Impacts to Public Health and Well-being

- a. *Will the site activities require resettlement of any portion of the surrounding community?*

Resettlement is unlikely; although some issues may arise in case of adjacent temporary land take during construction works.
- b. *Will area residents and/or workers be exposed to pesticides, fertilizer, or other toxic substances as a result of farming or manufacturing?*

No.

- *If so, how will you ensure that these chemicals do not penetrate into ground water or flow into surface water?*
- *If so, how will you ensure that workers wear protection clothing to prevent exposure?*
- *If so, what measures will be taken to control releases of these substances to air, water, and land?*
- *If so, how will the site be restricted to remove the potential for human exposure?*

- c. *Will the site activity generate wastes from pesticides, chemicals or industrial wastes that will contaminate ground and surface water supplies used for bathing and drinking water?*

No.

- d. *Will the site activity result in odor or noise from livestock facilities that may disturb local communities or contaminate surface or groundwater?*

No.

- e. *Will the site activity generate wastes including construction debris, dry or wet cell batteries, florescent tubes, aerosol cans, paint, solvents, etc.? If so, how will this waste be disposed of?*

The project will generate construction debris, wet batteries as well as non-hazardous waste, but impacts will be controlled through waste minimization and disposal at appropriate approved sites.

- f. *Do site activities require the removal of asbestos-containing building materials or include the use of building materials that may contain asbestos, formaldehyde, or other toxic materials? Can you certify that building materials are non-toxic? If so, how will these wastes be disposed of?*

The project activities will not use asbestos and is not expected to generate asbestos-containing waste. Any hazardous waste generated in some activities will be disposed of safely at permitted hazardous waste disposal facility.

- g. *Does the site activity provide a new source of drinking water for a community? If so, how will you monitor the new drinking water source to ensure that it is free of contaminants that may harm human health?*

The project will not provide drinking water sources for communities.

- h. *Will construction or refurbishment activities associated with demolition or blasting result in increases in noise, air and light pollution due to increased traffic, construction operations and increase in light that will be disturbing to the surrounding community?*

Rehabilitation works will result in noise and air pollution, but impacts will be local and temporary and can be minimized through mitigation measures. Light pollution will not be an important issue.

- i. *Does the site activity generate sewerage wastes? If so, how will this be controlled?*

Workers camps and staging areas will generate some wastewater. The camps will as a minimum be provided with the temporary sanitation on site, such as septic tanks and/or mobile toilets of sufficient capacity, collecting and discharging wastewater in compliance with the requirements of the regulations.

- j. *Will the site activity involve burning of wood or biomass for cooking? If so, please describe the ventilation system?*

No.

2. Land Use Changes and Impacts

- a. *Will the site activity convert fallow land to agricultural land?*

The site activities will not convert fallow land into agriculture land.

- b. *Will the site activity convert forest land to agricultural land?*

The site activities will not convert forest land into agriculture land.

- c. *Will the site activity convert agricultural land to urbanized area?*

The site activities will not convert agriculture land into urbanized area.

- d. *Will chemical containers be stored at the site?*

Chemical containers will not be stored at the site.

- e. *Will the site activity generate solid wastes that will be deposited to land resources?*

The site activities will not generate solid wastes that will be deposited to land resources.

- f. *Will the site activity generate solid or hazardous wastes such as construction debris, dry or wet cell batteries, florescent tubes, aerosol cans, paint, solvents, etc.?*

The project will generate some construction debris, wet batteries as well as non-hazardous waste, but impacts will be controlled through waste minimization and disposal at appropriate approved sites.

- g. *Does the site activity generate medical wastes? If so, how will it be handled onsite and disposed of offsite?*

The site activities will generate very limited amount of medical waste (worker's healthcare) which can be easily controlled through waste management plan.

- h. Will the site activity require onsite storage of liquid fuels or hazardous materials in bulk quantities?*

The site activities will require onsite storage of liquid fuels or hazardous materials in limited quantities, but these will be controlled through pollution prevention and control arrangements, see EMMP.

- i. Will the site activity result in mineral extraction such as granite, limestone, coal, lignite, oil, gas?*

The site activities will not result in mineral extraction.

- j. Will the site activity alter the view shed of the area community or residents?*

The site activities will not alter viewsheds of the communities or residents. Rehabilitated roads will have positive impact on urban viewscape.

3. Water Use Changes and Impacts

- a. How far is the site located to the nearest river, stream or lake?*

Oni is located along Rioni River, but site activities will not have impact on its water resources.

- b. What is the depth to groundwater at the site?*

This is not important issue for site activities.

- c. Will the site activity result in an increase in groundwater extraction? If so, what is the volume?*

The site activities will not result in the increase of groundwater extraction.

- d. Will the site activity result in an increase in surface water withdrawals? If so, what is the volume?*

Watering road before compacting may increase demand on water use but it is not likely to require substantial increase in water withdrawals. Whenever possible, compaction activities will be delayed until the beginning of the wet season or when water becomes more available.

- e. Does the site activity result in increased storm water run-off?*

There will be some operational increase in storm water quantities due to increase in impermeable pavements, but these will be taken care through road drainage design.

- f. Will the site activity result in the runoff of pesticides, fertilizers or toxic chemicals into surface water?*

The site activities will not result in the runoff of pesticides, fertilizers or toxic chemicals into surface water.

- g. Will the site activity result in fertilizer, pesticide and toxic chemical contamination of groundwater?*

The site activities will not result in fertilizer, pesticide and toxic chemical contamination of groundwater.

- h. Will the site activity result in discharge of livestock wastes such as manure or blood into surface water?*

The site activities will not result in discharge of livestock wastes such as manure or blood into surface water.

- i. Does the site require excavation, placing of fill, or substrate removal (e.g., gravel) from a river, stream or lake?*

The sites activities may require excavations, placing of fill, and some substrate removal (gravel) from river. Respective mitigation and monitoring measures are specified, including the use of only licensed sources of material extraction.

- j. Is there potential for discharges of waste water or potentially contaminated (including suspended solids) storm water from the site?*

Some potential exists for discharges of waste water (camp sites) or contamination (suspended solid run-offs from work areas), therefore respective mitigation and monitoring measures are specified.

- k. Will the site activity disturb wetland, lacustrine, or riparian areas?*

The site activities will not disturb natural wetland and lacustrine areas.

4. Impacts to Forestry, Biodiversity, Protected Areas and Endangered Species

- a. Is the site located in an endangered or threatened species habitat? Is there a plan for identifying endangered or threatened species during site activity implementation? If such species are identified during implementation, describe the process for notifying authorities?*

Baseline studies did not report the presence of endangered or threatened species.

- b. Is the site located in a migratory bird flight path?*

Baseline studies did not report the issues with migratory bird flight paths.

- c. Is the site located adjacent to a protected area, national park or wildlife refuge?*

There are no protected areas within the site activities area. Baseline studies did not reveal any impact on protected/conservation areas elsewhere.

- d. Will the site activity generate an increase in carbon emissions?*

CO₂ emissions will be associated with heavy equipment works during the rehabilitation phase. Improved road cover may result in decreased CO₂ emissions compared to current emissions.

- e. *Will the site activity involve decommissioning of systems that contain ozone depleting substances?*

The site activities do not involve decommissioning of systems that contain ozone depleting substances.

- f. *Will the site activity alter the area's microclimate?*

The site activities will not alter the area's microclimate.

- g. *Will the site activity involve harvesting of non-timber forest products such as mushrooms, medicinal and aromatic plants (MAPs), herbs, and/or woody debris?*

The site activities are not concerned with harvesting of non-timber forest products such as mushrooms, medicinal and aromatic plants (MAPs), herbs, and/or woody debris.

- h. *Will the site activity involve tree removal or logging? If so, please describe.*

The site activities do not involve tree removal or logging.

5. Historic or Cultural Resources

- a. *Are there cultural or historic sites located at or near the site? If so, what is the distance from these? What is the plan for avoiding disturbance or notifying authorities?*

Baseline studies report that there are no natural, cultural and/or archeological monuments within the works right of way area. Considering the fact that the project envisages rehabilitation of existing system, the chances to discover, or risks of impacting archeological monuments are considered as low. EMMPs specify that in an unlikely event that such resources are detected, measures will be taken in accordance with the provisions of the Georgian legislation and the best international practice.

- b. *Are there unique ethnic or traditional cultures or values present in the site? If so, what is the preservation plan addressing these?*

In the area of site activities (rehabilitation streets in Oni settlement) there are few cultural heritage landmarks, such as famous Oni Synagogue, local Church (located on Baratashvili Street) and Theatre (Rustaveli Street). Main public buildings like local administration and police headquarter are also located in the vicinity of rehabilitation streets. Site activities should be conducted in a respectful manner near these locations.

G. SITE CLOSURE AND HAND OVER

1. *If this site activity involves construction or renovation, what phases are involved (mobilization, site preparation and staging; implementation; waste disposal; site restoration; closure; handover; etc.)?*

All indicated phases are involved for rehabilitation works, plus operation phase.

2. *Please briefly describe the environmental impacts that must be addressed during each of the phases?*

Impacts are described in more detail in attachments I.1 and I.2, but herewith are provided indicative impact themes attributed to each phase listed:

Mobilization: impact on road traffic and pedestrians; noise and air emissions (dust, exhausts)...

Site preparation and staging: compacting soil, contamination of waters and spread of water diseases; introduction of transmittable diseases...

Implementation: contamination of surface and ground water (sediments, spills, construction waste); noise and dust and air emissions; erosion; siltation; increased demand for water needed for compaction; various impacts from borrow pits; spread of transmittable and water born diseases; road works hazards and related health and safety risks...

Waste and wastewater collection and disposal: contamination of land water and groundwater resources; spread of pathogens and disease vectors...

Site restoration: erosion; siltation; site clean-up...

Closure and handover: decommissioning of camp and staging areas...

Operations: change to local culture and society due to increased visitations; operational noise and air emissions; traffic hazards; impacts of maintenance activities; soil erosion and sediments; changes in hydrology/drainage patterns; safety hazard and landscape degradation due to used borrow pits (including impacts on tourism from degraded scenic qualities)...

3. *Will the host country recipient organization have the capacity to sustain the environmental management aspects of the site activity after closure and handover?*

Local authorities would be able to maintain the rehabilitated street network and implement related environmental monitoring and management measures.

H. RECOMMENDED ACTION

Environmental planning and feasibility studies for the project (GMIP) to help define potential interventions are being finalized. Tetra Tech has conducted an analyses based on the results of these studies and their own site investigations. Based on the results of this analysis presented in the form of an Checklist for Environmental Consequences and Leopold Matrix (see attachments F.1 and I.1 compiled in the format specified in the approved IEE [DCN: 2010-GEO-033]) and preparation of a draft EMMP it has been revealed that the proposed road rehabilitation for Oni can be classified as small-scale intervention as measured by the generally simple construction interventions planned under GMIP. These include paving existing streets to requested specification, arrangement of sidewalks and rehabilitating street drainage channels. There will be no changes introduced into the existing cross profiles, road bed and the layout/plan of the streets.

The GMIP Municipal IEE provides for ER Checklists under a Negative Determination with Conditions in the event that analyses determine that small-scale elements of the program do not require individual Environmental Assessment (EA). An EA would allow more attention to alternatives, but there are no environmentally sensitive alternatives with regard to already existing street plans (except "no action", or perhaps specifying alternative road cover, such as stone pavement).

It is proposed in this regard that an environmental plan for completing all environmental requirements prior to startup of construction be prepared. The focus of the environmental plan will be to identify any

potential significant environmental impacts, designing mitigations to reduce or eliminate these possible impacts and adopting monitoring measures to insure mitigations work effectively. Mitigations will cover mobilization, construction, cleanup, and advising local authorities with mode of operations after construction. GMIP therefore proposes to prepare this Site Specific Environmental Compliance Plan in response to requirements stipulated in approved IEE [DCN: 2010-GEO-033]).

Site Specific Environmental Compliance Plan describes project activities, baseline environmental conditions and environmental consequences. This information is used to identify significant environmental impacts during the rehabilitation and operation phases and appropriate mitigation measures for each program step and monitoring measures to insure mitigations are implemented in project design and implementation contracts.

The Site Specific Environmental Compliance Plan pays additional attention to engineering safety and integrity, public health, water use, site closure and handover. The Environmental Mitigation and Monitoring Plan (EMMP) is tailored to site-specific needs with improved links between activities, impacts, mitigations, monitoring indicators, monitoring/reporting frequency and identifying responsible parties for each measure. There is an associated Record of Compliance with Site-Specific EMMPs that covers mobilization and site preparation, implementation, site closure and activity handover.

As such it is therefore recommended that the project does not carry out an in-depth environmental assessment and the Negative Determination with Conditions would apply and a detailed Mitigation and Monitoring Plan be developed (see highlighted option 2 below):

1. The project has no potential for substantial adverse environmental effects. No further environmental review is required.*
2. **The project has potential for adverse environmental concerns (baselines section and water quality issues) and/or environmental impacts; however the recommended mitigation measures will be developed and incorporated in to the project design phase. The recommended mitigation measures will be approved by the MEO in consultation with the BEO. Monitoring of mitigation done will be documented in a monitoring report and sent to the BEO at AID/W.***
3. The project has substantial but mitigatable adverse environmental effects and requires measures to mitigate environmental effects. Environmental Mitigation and Monitoring Plan (EMMP) must be developed and approved by the BEO and/or REO prior to implementation. EMMP is to be attached to the Scope of Work.*
4. The project has potentially substantial adverse environmental effects, but requires more analysis to form a conclusion. A Scoping Statement must be prepared and be submitted to the BEO for approval. Following BEO approval an Environmental Assessment (EA) will be conducted. Project may not be implemented until the BEO approves the final EA. For activities related to the procurement, use, or training related to Pesticides a PERUSAP will be prepared for BEO approval.
5. The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required.
6. The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.

***Note regarding applicability related to Pesticides (216.2(e)):** The exemptions of §216.2(b)(1) and the categorical exclusions of §216.2(c)(2) *such as technical assistance, education, and training* are not applicable to assistance for the procurement or use of pesticides.

I. SITE-SPECIFIC ENVIRONMENTAL IMPACTS, MITIGATION & MONITORING PLANS

Potential impacts from site-specific project activities on various environmental components (physical, biological and social) were analyzed using checklist for environmental consequences (see Part F and Attachment F.1) and Leopold Matrix tool (see table in Attachment I.1) in order to identify significant environmental impact areas. Project related significant impact areas are then presented in Attachment I.2, grouped into *rehabilitation* and *operation* phases.

Respectively, Site-specific Environmental Mitigation and Monitoring Plan (EMMP) was developed both for site *rehabilitation* and *operation* phases, to address these impacts.

1. Site-specific Environmental Mitigation Plan

Environmental mitigation plan for Oni Streets rehabilitation is presented in Attachments J.1.1 (*Rehabilitation*) and J.2.1 (*Operation*).

2. Site-specific Monitoring Plan

Environmental monitoring plan for Oni Streets operation is presented, respectively, in Attachments J.1.2 (*Rehabilitation*) and J.2.2 (*Operation*).

3. Standard Conditions

In addition to and in conjunction with these Site-specific Environmental Mitigation and Monitoring Plans, project activates should be in compliance with USAID Standard Conditions – Road Rehabilitation and Maintenance Projects (attachment K) and MDF Guidelines for Road Rehabilitation and Maintenance Projects (attachment L), which are considered as integral part of this SS ECP and are applied in the same level of implementation priority as Site-specific Environmental Mitigation and Monitoring Plans.

4. Implementation Arrangements

Site-specific Environmental Compliance Plan (SS ECP) is subject to review and approval by the BEO and/or REO prior to implementation. Approved SS ECP (including EMMP) must be attached to the Scope of Work, thus making it obligatory for implementation by the Contractor with the same priority of contractual treatment as Technical Specifications. Necessary quantifiable items should be identified and included in the Bill of Quantities for construction contracts. Bidding document should define financial penalties for poor performance, such as withholding set percentage of payments invoiced by Contractor if environmental requirements of the contract are not satisfactorily met and/or if preventive and corrective action requests issued by the construction works Project Manager are not duly and timely acted upon by the Contractor. Environmental performance and staffing requirements should also be defined for bidding and contract documents.

Special considerations apply to operation phase as well. All necessary plans, systems and manuals should be developed and approved prior to operation phase. Primary responsibility for street maintenance and proper operation rests with the local authority (Oni municipality). Environmental mitigation plan (as well as health and safety arrangements) developed for these rehabilitation activities apply to all rehabilitation activities during operation and maintenance phase as well, to be undertaken by the local authorities and/or its contractor(s).

J. CERTIFICATION OF NO SIGNIFICANT EFFECTS ON THE ENVIRONMENT

The undersigned certifies that all foreseeable significant adverse effects on the environment have been adequately and effectively eliminated or mitigated by this Site-Specific Environmental Compliance Plan. If new adverse effects, and/or the need for new or improved mitigation measures, are identified, I will notify the USAID activity manager/COTR/AOTR and the Mission Environmental Officer to ensure that the environmental report or environmental assessment is amended to reflect new findings to ensure that environmental safeguards are incorporated into project level EMMP & this site specific compliance plan.

Implementer Project Director/COP:

Date

APPROVAL: (Approval requirement specified in the IEE)

USAID/Project COTR/AOTR:

Date

Mission Environmental Officer

Date

Bureau Environmental Officer

Date

Copy Provided to (Check Box):

MEO

BEO

ATTACHMENT F.1

A. Summary Checklist for Environmental Consequences

(Note: appropriate columns are checked below as Yes (Y), Maybe (M), No (N) or Beneficial (B). Y, M and B checks are briefly explained in the next Section, "Explanations". A "Y" response does not necessarily indicate a significant effect, but rather an issue that requires focused consideration.)

- | | |
|-----------------------------------------------------------------------------------------|-----|
| 1. Earth Resources | |
| a. grading, trenching, or excavation in cubic meters or hectare | _Y_ |
| b. geologic hazards (faults, landslides, liquefaction, un-engineered fill, etc.) | _N_ |
| c. contaminated soils or ground water on the site | _M_ |
| d. offsite overburden/waste disposal or borrow pits required in cubic meters or tons | _M_ |
| e. loss of high-quality farmlands in hectares | _N_ |
| 2. Agricultural and Agrochemical | |
| a. impacts of inputs such as seeds and fertilizers | _N_ |
| b. impact of production process on human health and environment | _N_ |
| c. other adverse impacts | _N_ |
| 3. Industries | |
| a. impacts of run-off and run-on water | _N_ |
| b. impact of farming such as intensification or extensification | _N_ |
| c. impact of other factors | _N_ |
| 4. Air Quality | |
| a. substantial increase in onsite air pollutant emissions (construction/operation) | _Y_ |
| b. violation of applicable air pollutant emissions or ambient concentration standards | _N_ |
| c. substantial increase in vehicle traffic during construction or operation | _M_ |
| d. demolition or blasting for construction | _N_ |
| e. substantial increase in odor during construction or operation | _M_ |
| f. substantial alteration of microclimate | _N_ |
| 5. Water Resources and Quality | |
| a. river, stream or lake onsite or within 30 meters of construction | _N_ |
| b. withdrawals from or discharges to surface or ground water | _M_ |
| c. excavation or placing of fill, removing gravel from, a river, stream or lake | _M_ |
| d. onsite storage of liquid fuels or hazardous materials in bulk quantities | _M_ |
| 6. Cultural Resources | |
| a. prehistoric, historic, or paleontological resources within 30 meters of construction | _N_ |
| b. site/facility with unique cultural or ethnic values | _N_ |
| 7. Biological Resources | |
| a. vegetation removal or construction in wetlands or riparian areas in hectare | _N_ |
| b. use of pesticides/rodenticides, insecticides, or herbicides in hectare | _N_ |
| c. Construction in or adjacent to a designated wildlife refuge | _N_ |
| 8. Planning and Land Use | |
| a. potential conflict with adjacent land uses | _N_ |
| b. non-compliance with existing codes, plans, permits or design factors | _N_ |
| c. construction in national park or designated recreational area | _N_ |
| d. create substantially annoying source of light or glare | _N_ |
| e. relocation of >10 individuals for +6 months | _N_ |
| f. interrupt necessary utility or municipal service > 10 individuals for +6 months | _M_ |
| g. substantial loss of inefficient use of mineral or non-renewable resources | _N_ |
| h. increase existing noise levels >5 decibels for +3 months | _M_ |
| 9. Traffic, Transportation and Circulation | |
| a. increase vehicle trips >20% or cause substantial congestion | _M_ |
| b. design features cause or contribute to safety hazards | _M_ |
| c. inadequate access or emergency access for anticipated volume of people or traffic | _M_ |
| 10. Hazards | |
| a. substantially increase risk of fire, explosion, or hazardous chemical release | _N_ |
| b. bulk quantities of hazardous materials or fuels stored on site +3 months | _N_ |
| c. create or substantially contribute to human health hazard | _M_ |
| 11. Other Issues | |
| a. workforce and community health and safety concerns | _Y_ |

B. Explanation of Environmental Consequences:

(Note: this section briefly explains Y, M and B responses given in the previous section.)

- 1. Earth Resources**
 - a. filling and grading is envisaged all along the Type II rehabilitation streets _Y_
 - c. accidental spills of equipment operations is expected to have pollution impact on soils or surface and ground water _M_
 - d. Aggregates such as gravel will be required, which may create off-site impacts if not sourced from adequately managed borrow pits _M_

- 4. Air Quality**
 - a. construction would substantially increase urban air pollution (and noise) if not mitigated _Y_
 - c. vehicle and equipment traffic during construction would increase compared to baseline _M_
 - e. construction equipment and asphalt fumes would be temporary source of unpleasant odors _M_

- 5. Water Resources and Quality**
 - b. site run-offs if not managed adequately may reach Rioni _M_
 - c. if gravel from unauthorized or poorly managed source _M_
 - d. bitumen or other hazardous materials need adequate storage _M_

- 8. Planning and Land Use**
 - f. traffic will be seriously interrupted if construction is not well planned and phased _M_
 - h. noise levels will be significant when and where construction equipment operates _M_

- 9. Traffic, Transportation and Circulation**
 - a. vehicle and equipment traffic during construction would increase compared to baseline _M_
 - b. roads for repairs are in urban setting _M_
 - c. risks will be significant if works site safety and signage is not well planned and enforced _M_

- 10. Hazards**
 - c. hazards will be significant if works site signage is not well planned and enforced _M_

- 11. Other Issues**
 - a. workforce and community health and safety issues are important due to lack of skills and weak enforcement mechanisms _Y_

ATTACHMENT I.1

Leopold Matrix (Significance of Potential Impacts) – Rehabilitation and Operation of Roads

Project Component \ Environmental Component		PHYSICAL ENVIRONMENT									BIOLOGICAL ENVIRONMENT									SOCIAL ENVIRONMENT												
		Agricultural Land	Soil Erosion	Slope Stability	Energy / Mineral Resources	Surface Water Quantity	Surface Water Quality	Ground Water Quantity	Ground Water Quality	Air Quality	Noise	Aquatic Ecosystems	Wetland Ecosystems	Terrestrial Ecosystems	Endangered Species	Migratory Species	Beneficial Plants	Beneficial Animals	Pest Plants	Pest Animals	Disease Vectors	Public Health	Resource / Land Use	Distribution Systems	Employment	At Risk Population	Migrant Population	Community Stability	Cultural / Religious Values	Tourism / Recreation	Nutrition	
REHABILITATION	Vegetation clearing		■						■		■		■										■	○						■		
	Construction camp	■	■				■		■	■			■							■	■	■	■	○	■					■		
	Quarry management		■	■			■	■	■	■	■		■							■	■	■	■	○	■				■	■		
	Trucking gravel and spoil		■						■	■													■		■					■		
	Cutting & filling		■	■		■	■	■	■	■	■																			■		
	Construction material use		■		■	■			■	■	■												■			■						
	Management of spoil		■			■	■			■	■		■																			
	Storage of diesel/oils						■		■		■	■	■								■	■	■	■		■						
	Waste management						■		■	■	■	■	■					■		■	■	■	■	■		■				■		
	Water use		○			■	■	■	■	○	○	■	■	○				■					■	■						■	■	
	Vehicle traffic movement		■			■	■	■	■	■	■										■		■	○	■					■		
	Road maintenance		■			■	■	■		■	■												■		○						○	
	Maintenance of machinery						■		■		■		■								■	■										
	Tourist activities					■	■				■		■	■	■						■	■	■	■	○	■	■	■	■	○	○	
	Waste management						■		■	■	■	■	■							■	■	■	■		■					■		

KEY: Adverse: ■ High ■ Medium ■ Low
 Beneficial: ○ High ○ Medium ○ Low

ATTACHMENT I.2

Identified Significant Environmental Impacts**I. REHABILITATION Phase**

The following below are the typical impacts associated with the proposed rehabilitation activities. Site-specific protection and mitigation measures are respectively developed for inclusion in the construction contracts, subject to monitoring during construction. Contractors are required to submit environmental protection plan addressing specific potential impacts for approval before construction activities are allowed to begin.

Soil erosion. Soil erosion is often caused by failing to keep water off road surfaces. Roads that collect water and do not have enough side drainage to handle heavy precipitation or abnormal flooding are susceptible to erosion. Barren areas associated with roads can contribute to soil erosion, including building material sources, work areas, temporary routes, turnout or parking areas.

Degradation of water quality. Water quality may be damaged by soil erosion and the siltation of nearby rivers, streams, lakes and wetlands. Siltation also occurs as a secondary effect of soil erosion resulting from road improvements. Adverse impacts on water quality may also be associated with poor management of fuel and lubricants at road camps, vehicle maintenance depots and fueling areas. The Technical Specifications of the Construction Contracts will have to include restrictions on activities that may be harmful to water quality and environment in general.

Adverse effects on water quantity. Large quantities of water are needed to help prepare and compact the road surface during road construction and maintenance. Although this demand for water is temporary, it may affect local water supplies.

Borrow pits associated with road construction and maintenance fill with water during rains, creating safety hazards and pools that attract mosquitoes and other disease vectors. Pollution from sediment discharges as well as from depreciated equipment operating at the borrow pits could be significant either.

Declines in scenic quality. The cumulative effects of poorly located and poorly managed quarries and borrow pits supplying building materials for road projects may cause significant loss in scenic values. Under some circumstances, such damage can lower tourism revenues.

Altered site hydrology. Roads crossing areas with high water tables may act like dams to block surface and sub-surface water flows. Poorly installed culverts may concentrate water and then form gullies upslope and/or downslope of the road.

Adverse impacts on human health and safety. Potential concerns include:

Dust and noise. Depending on local conditions and the vicinity of houses and communities, dust and noise may damage human health during construction and, especially, once the road is in use. The health of road construction and maintenance staff may also be adversely affected by noise and dust produced from construction, road rehabilitation and maintenance.

Spread of communicable diseases. Road improvements increase communication among rural and urban populations. This in turn increases the potential for exposure to sexually transmitted diseases (including HIV/AIDS) and other communicable diseases such as tuberculosis. Road construction crews are often the first sources of such infections in an area.

Spread of water-borne diseases. Where poor road design and maintenance result in poor drainage and areas of standing water, the risk of water-borne disease. The same is true for standing water found in open quarries and borrow pits.

Road works hazards. The operation of road works machinery often endangers both operators and laborers during construction and road maintenance. Poorly planned borrow pits and quarries for road works can also pose threats, ranging from falls from quarry faces to drowning in quarry pits that have become standing water reservoirs.

Disposal of waste. In construction phase waste would consist of construction waste, plastic containers/bags, hydrocarbons (lubricants, fuel, etc) due to use of heavy equipment and other types of non-hazardous and hazardous materials. The Technical Specifications of the construction contracts will have to require handling and disposal of construction waste in an approved manner to be monitored by the Client.

Health and Safety. All construction activities have inherent safety risks to workers and the local communities. Georgian companies do not typically follow proper site safety precautions and need to be closely monitored. The Technical Specifications of the construction Contracts will have to require submittal of a Health & Safety Plan for approval by the Client prior to start of the construction. Compliance with approved Health & Safety Plan should continuously be monitored during the works.

II. OPERATION Phase

Project design and future programming by USAID and GoG should also consider the following impacts (indicated in Attachment I.1) expected from the operation of the irrigation scheme. Key concerns from the operation of the irrigation scheme include the following:

Change local culture and society. The development of new roads, or rehabilitation of existing ones, often improves personal livelihoods. Access to educational opportunities and to social services, including health care, is often a key rationale for road improvements. However, socio-cultural values may also be altered and the stability of communities adversely affected by exposure to rapid social change or tourism.

Adverse impacts on human health and safety. Potential concerns at operations include:

Noise and air emissions. Noise and air pollution from exhaust gases of poorly maintained heavy vehicles may damage human health once the road is in use. The health of road construction and maintenance staff may also be adversely affected by noise and dust produced from construction, road rehabilitation and maintenance.

Traffic hazards. Road improvements, especially those that allow increased vehicular speed, can lead to significant increases in accident rates for both human and animal populations.

Impacts of operation and maintenance activities. Many of the impacts described during the rehabilitation phase are relevant for operation and maintenance activities as well, such as impacts of construction camp or from heavy equipment use.

ATTACHMENT J.1.1

Site-specific Environmental Mitigation Plan – REHABILITATION of Roads

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
Construction crews and camps	<ul style="list-style-type: none"> • Damage local habitat, compact soil and create erosion via building and occupation of construction camps 	<ul style="list-style-type: none"> • Explore off-site accommodation for crew (P&D) (C) • Keep camp size to a minimum. Require that crew preserve as much vegetation as possible, e.g., by creating defined footpaths (P&D) (C) • Restore site through revegetation and similar measures after camp is broken down (C) 	<ul style="list-style-type: none"> • Design documentation • Camp & staging area inspection at mobilization & continuously
	<ul style="list-style-type: none"> • Contaminate surface water and spread disease via solid waste and feces generated by camps 	<ul style="list-style-type: none"> • Provide temporary sanitation on site, e.g., pit latrine (assuming the water table is low enough, with soil and geology of appropriate composition) (P&D) (C) • Collect all solid waste (metal, glass, and burnable materials) from all work and living areas. Dispose of waste in local dump or landfill. If this is not possible, sell recyclables for reuse/recycling, place organic wastes in well-screened waste pits, covering with soil weekly, bury the remainder (excluding toxic materials). Implement Non-Hazardous and Hazardous Waste Management Plan at the camp (P&D) (C) 	<ul style="list-style-type: none"> • Camp & staging area inspection at mobilization & continuously
	<ul style="list-style-type: none"> • Spread communicable diseases including malaria, tuberculosis, and HIV/AIDS via construction crews who come from outside the region • Introduce alcohol or other socially destructive substances via construction crews 	<ul style="list-style-type: none"> • Use local or regional labor, if possible. Screen potential crew members for HIV/AIDS and tuberculosis. Provide education and strict guidelines regarding contact with local residents, and enforce guidelines (P&D) (C) 	<ul style="list-style-type: none"> • Health screening of workforce • Continuous monitoring • Toolbox training • HS Plan
	<ul style="list-style-type: none"> • Deplete local fauna and flora (especially game and fuelwood) via poaching and collection by construction crews 	<ul style="list-style-type: none"> • Set guidelines prohibiting poaching and collection of plants/wood with meaningful consequences for violation such as termination of employment (C) • Provide adequate quantities of food and cooking fuel; both should be of good quality (C) • Stop any use of unauthorized areas and harassment of wildlife in area (C) 	<ul style="list-style-type: none"> • Monitoring during construction • Detecting signs of killed flora and fauna at work sites • Toolbox training

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
Use of heavy equipment	<ul style="list-style-type: none"> • Cause erosion due to machinery tracks, damage to roads, stream banks, etc. • Compact soil, changing surface and groundwater flows and damaging future use for agriculture 	<ul style="list-style-type: none"> • Minimize use of heavy machinery (P&D) (C) • Test grade drivers' ability to follow grade, slope, and contour design standards. Train if necessary (P&D) (C) • Test the ability of bulldozer drivers and other equipment operators to properly maintain drainage structures. Train if necessary (P&D) (C) • Test road crew's ability to keep roads clear of vegetation with least adverse environmental impacts. Train if necessary (P&D) (C) 	<ul style="list-style-type: none"> • Design documentation • Inspection on mobilization • Continuous inspection
	<ul style="list-style-type: none"> • Contaminate ground or surface water whenever (1) machinery repairs result in spill or dumping of hydraulic oil, motor oil or other harmful mechanical fluids; and (2) hazardous construction materials are spilled or dumped 	<ul style="list-style-type: none"> • Set protocols for vehicle maintenance, such as requiring that repairs and fueling occur elsewhere or over an impervious surface such as plastic sheeting. Prevent dumping of hazardous materials. Capture leaks or spills with drop cloths or wood shavings. Burn waste oil if it is not reusable/readily recyclable, does not contain heavy metals and is flammable. Prohibit use of waste oil as cooking fuel (P&D) (C) • Provide a maintenance area that is adequate distance (at least 50 meters) from waterways and any sensitive terrestrial habitat, and require that all equipment maintenance take place there (C) • Install concrete pads, drains and oil/water separators in areas where vehicle and equipment maintenance and fueling will occur regularly (C) • Keep emergency response equipment on work sites to deal with hazardous or other spills (C) 	<ul style="list-style-type: none"> • Design documentation • Inspection on mobilization • Continuous inspection • HS plan
	<ul style="list-style-type: none"> • Heavy equipment that is not well-maintained and stored properly could degrade water quality 	<ul style="list-style-type: none"> • Prevent fuel tank leaks by (a) monitoring and cross-checking fuel levels deliveries and use, (b) checking pipes and joints for leaks, (c) tightening generator fuel lines, and (d) preventing over-filling of main storage and vehicle tanks (C) 	<ul style="list-style-type: none"> • Inspection on mobilization • Continuous inspection
	<ul style="list-style-type: none"> • Traffic impairment by various construction activities 	<ul style="list-style-type: none"> • Submit a traffic management plan to local traffic authorities prior to mobilization (P&D) (C) • Provide information to the public about the scope and schedule of construction and expected disruptions and access restrictions (C) • Allow for adequate traffic flow around construction areas (C) • Provide appropriate signalization, lighting, well-designed traffic safety signs, barriers and flag persons for traffic control (P&D) (C) 	<ul style="list-style-type: none"> • Traffic management plan • Public information • Signage and barriers
	<ul style="list-style-type: none"> • Workers using heavy equipment exposed to health and safety risks at camps and at work sites 	<ul style="list-style-type: none"> • Provide workers with appropriate safety equipment, e.g., earplugs or headgear to mute noise from very loud equipment; masks for workers exposed to large amounts of dust; safety glasses for workers doing jobs that may generate sharp projectiles (C) 	<ul style="list-style-type: none"> • Continuous monitoring • Daily toolbox training

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
Materials extraction: quarrying, logging	<ul style="list-style-type: none"> • Damage aquatic ecosystems through erosion and siltation 	<ul style="list-style-type: none"> • Identify the most environmentally sound source of materials that is within budget (P&D) (O&M) • Use material from local road cuts first, but only if it produces a fairly suitable, durable aggregate for either embankment fill or surface stabilization material. Local borrow material can be very cost-effective. Upon removal of material, the area should be restored and receive erosion control measures (P&D) (C) • Monitor adherence to plans and impacts of extraction practices. Modify as necessary (C) (O&M) 	<ul style="list-style-type: none"> • Borrow sites identification at design stage • Material only from licensed sources • Monitoring borrow site documentation • Clearance of borrow sites • Spoil & rock method statement
	<ul style="list-style-type: none"> • Harm terrestrial ecosystems via harvesting of timber or other natural products 	<ul style="list-style-type: none"> • Develop logging, quarrying and borrowing plans that take into account cumulative effects (P&D) 	<ul style="list-style-type: none"> • Approving borrowing plans
	<ul style="list-style-type: none"> • Spread vector-borne diseases when stagnant water accumulates in active or abandoned quarries or borrow pits and breeds insect vectors • The quarry may become a safety hazard 	<ul style="list-style-type: none"> • Control runoff into pit (C) • Fill in quarries and pits before abandoning. • Decommission/restore area so it is suitable for sustainable use after extraction is completed. (C) • Install drainage structures to direct water away from pit (C) (O&M) • Implement safety protocols to minimize risks from falling rock or debris, collapsing quarry walls, or accidental falls from cliffs (P&D) (C) (O&M) • Discuss with local community the option of retaining quarry pits as water collection ponds for watering cattle, irrigating crops or similar uses. Highlight issues of disease transmission and the need to prohibit its use for drinking, bathing, and clothes washing (P&D) (C) (O&M) • Monitor adherence to plans and impacts of extraction practices. Modify as necessary (C) (O&M) 	<ul style="list-style-type: none"> • Borrow site environmental management plan • Initial and final inspections of source sites • HS Plan
	<ul style="list-style-type: none"> • Take land out of other useful production 	<ul style="list-style-type: none"> • Take photos of site before initiating excavation, so that restoration can match original site characteristics as much as possible (C) (O&M) • Site quarries and gravel pits so that they are not visible to travelers on the roads (P&D) (C) (O&M) • Develop specific procedures for storing topsoil, as well as for phased closure, reshaping and restoration when extraction has been completed. Include plans for segregating gravel and quarry materials by quality and grade for possible future uses. Where appropriate, include reseedling or revegetation to reduce soil erosion, prevent gulleying and minimize visual impacts (P&D) (C) (O&M) 	<ul style="list-style-type: none"> • Borrow site identification at design stage • Material only from licensed sources • Borrow site environmental management plan • Initial and final inspections of source sites

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
Use of hazardous materials	<ul style="list-style-type: none"> Contaminate ground or surface water when hazardous construction materials are spilled or dumped 	<ul style="list-style-type: none"> Prevent dumping of hazardous materials. Burn waste materials that are not reusable/readily recyclable, do not contain heavy metals and are flammable (P&D) (C) Develop, clear with the client and implement Waste Management Plan (P&D) (C) 	<ul style="list-style-type: none"> Approved waste management plan Approved hazardous waste collection and disposal arrangements Hazardous waste transfer notes
	<ul style="list-style-type: none"> Put workers at risk from exposure to hazardous materials 	<ul style="list-style-type: none"> Investigate and use less toxic alternative products (P&D) (C) 	<ul style="list-style-type: none"> Incident reports HS Plan
Storing materials	<ul style="list-style-type: none"> Deplete water resources Damage valuable ecosystems and habitats 	<ul style="list-style-type: none"> Pre-wet gravel when water is more available (i.e., not during dry season) and store gravel in a way that will keep it wet, e.g., covered with plastic sheeting (P&D) (C) When siting storage areas, avoid using sensitive areas or sites that drain directly into a sensitive area (P&D) (C) 	<ul style="list-style-type: none"> Continuous inspections Spoil & rock method statement
Demolition of existing structures	<ul style="list-style-type: none"> Contaminate soil, groundwater or surface water from demolition waste containing residual amounts of toxic materials (e.g., leaded paint) Bother or endanger neighbors via noise, dust, and debris from demolition 	<ul style="list-style-type: none"> Recover all reusable material (P&D) (C) Determine whether toxic materials are present. If possible, dispose of waste in lined landfill. Otherwise, explore options for reuse in areas where potential for contamination of surface and groundwater are small (e.g., consider the feasibility of use as roadbed material, if non-hazardous.) (P&D) (C) Develop, clear with the Client and implement Waste Management Plan (P&D) (C) 	<ul style="list-style-type: none"> Approved waste management plan Approved waste collection and disposal arrangements Waste transfer notes
Site clearing and/or leveling	<ul style="list-style-type: none"> Damage or destroy sensitive terrestrial ecosystems in the course of site clearing/preparation 	<ul style="list-style-type: none"> Design infrastructure so that it creates least impact (P&D) Minimize disturbance of native flora (vegetation) during construction. Minimize the amount of clearing. Clear small areas for active work one at a time. Provide fencing and signage where required (P&D) (C) Move earth and remove vegetation only during dry periods. Store topsoil for respreading. If vegetation must be removed during wet periods, disturb ground only just before actual construction (P&D) (C) Remove, without destroying, large plants and ground cover where possible (P&D) (C) Avoid use of herbicides. Any use should follow health and safety procedures to protect people and the environment. At a minimum, herbicides should be used according to manufacturer’s specifications (C) 	<ul style="list-style-type: none"> Design documentation Continuous inspection HS Plan

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
	<ul style="list-style-type: none"> Produce areas of bare soil which cause erosion, siltation, changes in natural water flow, and/or damage to aquatic ecosystems 	<ul style="list-style-type: none"> Install temporary erosion control features when permanent ones will be delayed. Use erosion control measures such as hay bales, berms, straw or fabric barriers (or other appropriate and obtainable material) (C) Revegetate with recovered plants and other appropriate local flora immediately after equipment is removed from a section of the site (C) 	<ul style="list-style-type: none"> Design documentation Continuous inspection Final inspection
Excavation	<ul style="list-style-type: none"> Cause erosion, siltation, changes in natural water flow, and/or damage to aquatic ecosystems when excavated soil is piled inappropriately 	<ul style="list-style-type: none"> Cover pile with plastic sheeting, prevent runoff with hay bales, or similar measures (P&D) (C) 	<ul style="list-style-type: none"> Reviewing method statements Continuous and final inspections HS Plan
	<ul style="list-style-type: none"> Expose inhabitants and crew to risk of falls and injuries in excavation pits 	<ul style="list-style-type: none"> Place fence around excavation (P&D) (C) 	<ul style="list-style-type: none"> Incident reports Continuous inspection HS Plan
	<ul style="list-style-type: none"> Deprive down-gradient populations and ecosystems of water if higher regions of aquifer are blocked 	<ul style="list-style-type: none"> Investigate alternatives allowing shallower or no excavation (P&D) Ensure that excavation is accompanied by well-engineered drainage (P&D) (C) 	<ul style="list-style-type: none"> Reviewing method statements
	<ul style="list-style-type: none"> Impact on ground covered heritage such as archaeology chance finds 	<ul style="list-style-type: none"> Have construction crews and supervisors be alert for buried historic, religious and cultural objects and provide them with procedures to follow if such objects are discovered. Provide incentives for recovery of objects and disincentives for their destruction or theft.(P&D) (C) 	<ul style="list-style-type: none"> Toolbox talks Chance find procedure
Filling	<ul style="list-style-type: none"> Block water courses when fill is inappropriately placed 	<ul style="list-style-type: none"> Do not fill the flow line of a watershed. A culvert may not supply adequate capacity for rare high-volume events (P&D) 	<ul style="list-style-type: none"> Incident reports Continuous inspection
	<ul style="list-style-type: none"> Destroy valuable ecosystems when fill is inappropriately placed 	<ul style="list-style-type: none"> Design so that filling will not be necessary. Transplant as much vegetation and groundcover as possible (SS) (P&D) (C) 	<ul style="list-style-type: none"> Reviewing designs Continuous inspection
	<ul style="list-style-type: none"> Result in land subsidence or landslides later if fill is inappropriately placed, causing injuries or damage 	<ul style="list-style-type: none"> Use good engineering practices (e.g., do not use soil alone. First lay a bed of rock and gravel) (P&D) (C) Balance the cuts and fills (to minimize earthwork movement) whenever possible (P&D) (C) 	<ul style="list-style-type: none"> Reviewing designs
Compacting to improve road materials performance	<ul style="list-style-type: none"> Deplete freshwater resources 	<ul style="list-style-type: none"> Water the road immediately before compacting it to strengthen the road surface. (Otherwise, traffic will soon beat back the road surface to pre-bladed condition) (P&D) (C) When possible, delay compaction activities until the beginning of the wet season or when water becomes more available (P&D) (C) 	<ul style="list-style-type: none"> Continuous inspection of compacting Inspection of water source used for compacting

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
Blasting	<ul style="list-style-type: none"> • Cause soil erosion, degrade water quality, alter hydrology, damage valuable ecosystems and habitats 	<ul style="list-style-type: none"> • Minimize blasting (P&D) (C) • Take safety precautions to protect workers and others from being injured by flying or falling rock and avalanches (P&D) (C) 	<ul style="list-style-type: none"> • Blasting method statement • HS Plan
Hazardous abandoned structures	<ul style="list-style-type: none"> • Open latrines or septic systems 	<ul style="list-style-type: none"> • Fill in and close all latrines and septic systems (C) 	<ul style="list-style-type: none"> • Pre- and post-construction inspection of sites • HS Plan
	<ul style="list-style-type: none"> • If construction camps and other ancillary features are not dismantled or if other provisions are not made for them, they will degrade over time, and could impact water quality, degrade soils, and create a public hazard 	<ul style="list-style-type: none"> • Unless other provisions are made, staff construction camps and other ancillary features shall be removed once construction is complete. Removal shall include disposal of solid waste, buildings, etc. (P&D) (C) 	<ul style="list-style-type: none"> • Pre- and post-construction inspection of sites • Final inspection
Eroded soils in the vicinity of abandoned infrastructure	<ul style="list-style-type: none"> • Gulleying and siltation. Damage to aesthetics 	<ul style="list-style-type: none"> • Restore the site through replanting, reseeding and use of soil erosion control measures (hay bales, etc.) 	<ul style="list-style-type: none"> • Recontouring and restoration before work site demobilization • Final inspection
Design verification and Quality control	<ul style="list-style-type: none"> • Environmental impacts due to wrong design and low quality of performance 	<ul style="list-style-type: none"> • Conduct independent inspections of work periodically to see that it conforms to original plan and design specifications. Provide incentives and disincentives to ensure conformance (C) • Drive roads after moderate rains to identify areas that collect or gully water. Mark and redesign/rehabilitate as necessary (C) 	<ul style="list-style-type: none"> • QA/QC plan • Inspection after rain as well as heavy storm events
EHS in planning, design and construction	<ul style="list-style-type: none"> • Adverse environmental impacts and poor performance could result if tender documents and construction contracts do not include mitigation and monitoring measures and a budget to implement them 	<ul style="list-style-type: none"> • Include SS ECP in the engineering and works tender and contract as part of the technical specification (P&D) (C) • Provide in the bidding document environmental criteria for contractor staffing and earlier company experience (P&D) • Include quantifiable items from SS ECP into the Bill of Quantities (P&D) (C) • Provide means to supervise and monitor performance of engineering design and constructing contracts (P&D) (C) • Provide mechanism of penalties for EHS misperformance (P&D) (C) 	<ul style="list-style-type: none"> • Providing provisions for Environment, Health & Safety (EHS) in • Design & Technical Specifications • Bidding documentation • Contract documentation

ATTACHMENT J.1.2

Site-specific Environmental Monitoring Plan – REHABILITATION of Roads

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	Records Generated <i>Note: design/construction company (DC/CC), MDF (MDF), TetraTech (TT)</i>
Design documentation and plans on construction crews and camp facilities	<ul style="list-style-type: none"> Review and approval of technical specifications 	<ul style="list-style-type: none"> Design company (I) MDF (R) (M) TetraTech (M) 	<ul style="list-style-type: none"> Included in drawings and tech. specifications (DC) Included in bidding documentation (MDF) Review and clearance (TT)
Environmental compliance at camps & staging areas	<ul style="list-style-type: none"> Inspected on mobilization and continuously throughout the project 	<ul style="list-style-type: none"> Construction contractor (I) (R) MDF (M) (R) TetraTech (M) 	<ul style="list-style-type: none"> Weekly reports (CC) Monitoring using camp and staging area checklists, reporting violations (MDF) Review of reports (TT)
Health screening of workforce and monitoring local population	<ul style="list-style-type: none"> On hiring and random screening of suspected personnel and workforce Continuous monitoring Weekly toolbox talks 	<ul style="list-style-type: none"> Construction contractor (I) (R) MDF (M) (R) TetraTech (M) 	<ul style="list-style-type: none"> Medical screening records (CC) Toolbox talk records (CC) Monitoring records (MDF) Interviews with locals (TT)
Detecting signs of killed flora and fauna at work sites	<ul style="list-style-type: none"> Continuous monitoring on sites and immediately reporting all violations 	<ul style="list-style-type: none"> Construction contractor (I) (R) (M) MDF (M) (R) TetraTech (M) 	<ul style="list-style-type: none"> Immediately reporting violations (CC) Reporting any signs of killed wildlife or damage to vegetation off-site (MDF) Interviews with workforce and locals (TT)
Minimizing use and impacts from heavy equipment (erosion, compaction, pollution, etc.) through <ul style="list-style-type: none"> Design documentation review Inspection on mobilization Continuous on site inspections 	<ul style="list-style-type: none"> Review and approval of technical specifications Inspection of heavy equipment before and on mobilization Continuous monitoring throughout the project Initial and biannual review of equipment and vehicle maintenance protocols and records 	<ul style="list-style-type: none"> Design company (R) Construction contractor (I) (R) (M) MDF (M) (R) TetraTech (M) 	<ul style="list-style-type: none"> Included in drawings, technical specifications and bid list of equipment (DC) Included in bidding documentation (MDF) Review and clearance of bidding documentation (TT) Equipment maintenance protocols and records (CC) Weekly reports (CC) Monitoring using heavy equipment inspection checklist and refueling equipment inspection checklist, reporting all violations (MDF) Reporting on maintenance protocol records and contractor performance (MDF) Review and monitoring of reports, field checks (TT)

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	Records Generated <i>Note: design/construction company (DC/CC), MDF (MDF), TetraTech (TT)</i>
<p>Sourcing of building and logging materials, aggregates through</p> <ul style="list-style-type: none"> • Borrow sites identification at design stage • Import only from licensed extraction sites • Reviewing borrow site documentation • Clearing site selection • Approval of logging , quarrying and borrowing plans • Approval of borrow site environmental management plan 	<ul style="list-style-type: none"> • Suggested list of sources included in the design and specifications • Monitoring source document prior to extraction and delivery to the construction site • Prior approval of borrow sites proposed by contractor • Prior approval of borrow site environmental management plan • Initial and final inspection of borrow sites and quarries 	<ul style="list-style-type: none"> • Design company (R) • Construction contractor (I) (M) • Operator of borrow sites (I) (M) • MDF (R) (M) • TetraTech (M) 	<ul style="list-style-type: none"> • Borrow sites identification at design stage (DC) • Material only from licensed sources (CC) • Monitoring borrow site documentation (MDF) • Initial inspection of each source of material (MDF) • Clearance of selected borrow sites, field checks (MDF, TT) • Final inspection of borrow sites, observing run-offs and stagnant waters (MDF)
<p>Minimizing use of hazardous and non-hazardous materials through</p> <ul style="list-style-type: none"> • Review of contractor’s waste management plan • Waste disposal monitoring throughout the project • Checking waste transfer notes • Incident reports 	<ul style="list-style-type: none"> • Initial review and approval of contractor’s waste management plan (including anticipated non-hazardous and hazardous waste inventory) prior to site mobilization • Continuous monitoring throughout the project • Contractor keeping all waste transfer notes and the periodic external checking of records 	<ul style="list-style-type: none"> • Design company (R) • Construction contractor (I) (R) (M) • MDF (M) (R) • TetraTech (M) 	<ul style="list-style-type: none"> • Including non- and hazardous waste management provisions in the technical specifications and in the bill of quantities (DC, MDF) • Review and clearance of bidding document (TT) • Review and clearance of contractor’s waste management plan (MDF & TT) • Hazardous and non-hazardous waste transfer and disposal records (CC) • Weekly reports (CC) • Incident reports (CC) • Monitoring using camp and staging area checklists; hazardous and non-hazardous waste collection inspection checklists, reporting all violations (MDF) • Reporting on waste transfer records and contractor performance (MDF) • Approval of hazardous waste disposal site selection by contractor (TT) • Review and monitoring of reports, field checks (TT) • Corrective and preventive actions requests (MDF, TT)

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	Records Generated <i>Note: design/construction company (DC/CC), MDF (MDF), TetraTech (TT)</i>
<p>Monitoring and minimizing site clearance, leveling, excavations, filling, applying erosion control and site restoration though</p> <ul style="list-style-type: none"> • Design documentation review • Review and approval of method statements • Site inspections 	<ul style="list-style-type: none"> • Initial review and approval of technical specifications • Approval of contractor's method statements before proceed order • Continuous field monitoring • Final inspections 	<ul style="list-style-type: none"> • Design company (R) • Construction contractor (I) (M) • MDF (R) (M) • TetraTech (M) 	<ul style="list-style-type: none"> • Erosion control and site restoration plans included in technical specifications and bidding documents (DC and MDF) • Erosion control and restoration method statements (CC) • On site monitoring (priority after heavy rain events) and final inspection (MDF) • Review and clearance of erosion control and site restoration plans and method statements, field checks (TT)
<ul style="list-style-type: none"> • Health and Safety Plan (HS Plan) • Emergency Response Plan 	<ul style="list-style-type: none"> • Clearance prior to mobilization • Continuous on site monitoring • Incident reporting 	<ul style="list-style-type: none"> • Design company (R) • Construction contractor (I) (M) • MDF (R) (M) • TetraTech (M) 	<ul style="list-style-type: none"> • HS requirements (DC) • Design features for emergencies in case of systems failure (DC) • HS Plan and submit for approval (CC) • Incident reports (CC) • Continuous inspection reports (MDF) • Review and approval of plans, performance monitoring and periodic field checks (TT)
<p>Traffic control for construction phase</p>	<ul style="list-style-type: none"> • Traffic control plan and signage clearance prior to mobilization • Continuous monitoring and incident reporting during construction • Dust and emissions control plan 	<ul style="list-style-type: none"> • Design company (R) • Construction contractor (I) (M) • MDF (R) (M) • TetraTech (M) • MRDI, and Traffic Police (approvals, deployment) 	<ul style="list-style-type: none"> • Traffic control plan for construction phase (DC) • Construction planning and phasing, proper signage (CC) • MRDI (approval) • Deployment of proper traffic controls (Traffic Police)
<p>Providing EHS provisions in</p> <ul style="list-style-type: none"> • Design & Technical Specifications • Bidding documentation • Contract documentation 	<p>Prepare, review and approve</p> <ul style="list-style-type: none"> • Design & Technical Specifications • Bidding documentation • Contract documentation 	<ul style="list-style-type: none"> • Design company (R) • Construction contractor (I) (M) • MDF (R) (M) • TetraTech (M) 	<p>EHS provisions included in</p> <ul style="list-style-type: none"> • ToR, Design & Technical Specifications (DC, MDF) • Bidding documentation (MDF) • Contracts (MDF) • Weekly reports (CC) • Inspection at mobilization and continuously (MDF) • Review, approval and performance monitoring at all stages (TT)

ATTACHMENT J.2.1

Site-specific Environmental Mitigation Plan – *OPERATION of Roads*

Activity	Identified Environmental Impacts	Mitigation Measure(s) <i>Note: Mitigations apply to specified project phase: Site Selection (SS); Planning and Design (P&D), Construction (C), or Operation and Maintenance (O&M)</i>	Monitoring Indicator(s)
Road maintenance to remove ruts, potholes, washboarding, standing water and materials blocking road	<ul style="list-style-type: none"> • Create gulleys and standing pools 	<ul style="list-style-type: none"> • Monitor and maintain drainage structures and ditches, including culverts. Clean out culverts and side channels/runout (leadoff ditches) when they begin to fill with sediment and lose their effectiveness (O&M) 	<ul style="list-style-type: none"> • Periodic inspection and maintenance of all culverts and channels/runouts
	<ul style="list-style-type: none"> • Create mud holes, potholes 	<ul style="list-style-type: none"> • Fill mud holes and potholes with good quality gravel; remove downed trees and limbs obscuring roadways (O&M) 	<ul style="list-style-type: none"> • Periodic inspection and maintenance of all mud hole and potholes, blockages
	<ul style="list-style-type: none"> • Breed disease vectors in settling basins and retention ponds 	<ul style="list-style-type: none"> • Use water from settling basins and retention ponds for road maintenance (O&M) 	<ul style="list-style-type: none"> • Water quality in settling basins and retention ponds
Increase traffic hazards during operation	<ul style="list-style-type: none"> • Uncontrolled traffic may cause elevated levels of gaseous and noise emissions • Road improvements may increase vehicular speed and can lead to increases in accident rates 	<ul style="list-style-type: none"> • Integrate in the engineering design safety features such as speed control signs, proper road markings, streetlights, pedestrian crossing, livestock crossing and other visual means (P&D) (C) (O&M) • Plan for, procure and equip rehabilitated roads with adequate traffic control signs and equipment (P&D) (C) (O&M) 	<ul style="list-style-type: none"> • Traffic control plan, specification, supply and installation
Construction camp and crew	(See environmental monitoring plan provisions for “Construction camp and crew“, rehabilitation phase)		
Use and maintenance of equipment	(See environmental monitoring plan provisions for “Use of heavy equipment and hazardous materials“, rehabilitation phase)		

ATTACHMENT J.2.2

Site-specific Environmental Monitoring Plan – OPERATION of Roads

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	Records Generated <i>Note: Local Authority (LA), Ministry of Regional Development and Infrastructure (MRDI), MDF(MDF),TetraTech (TT)</i>
Periodic inspection and maintenance of all culverts and channels/runouts	<ul style="list-style-type: none"> Seasonal 	<ul style="list-style-type: none"> Municipality (I) (R) MRDI (M) TetraTech (drafting O&M manual) 	<ul style="list-style-type: none"> Inventory and maintenance schedules (LA) O&M manual (TT)
Periodic inspection and maintenance of all mud hole and potholes, blockages	<ul style="list-style-type: none"> Seasonal 	<ul style="list-style-type: none"> Municipality (I) (R) MRDI (M) TetraTech (drafting O&M manual) 	<ul style="list-style-type: none"> Inventory and maintenance schedules (LA) O&M manual (TT)
Water quality in settling basins and retention ponds	<ul style="list-style-type: none"> Seasonal and as required 	<ul style="list-style-type: none"> Municipality (I) (R) MRDI and Ministry of Environment (M) TetraTech (drafting O&M manual) 	<ul style="list-style-type: none"> Periodic visual inspections (LA) Testing water quality as required O&M manual (TT)
Water quality in settling basins and retention ponds	<ul style="list-style-type: none"> Seasonal and as required 	<ul style="list-style-type: none"> Municipality (I) (R) MRDI and Ministry of Environment (M) TetraTech (drafting O&M manual) 	<ul style="list-style-type: none"> Periodic visual inspections (LA) Testing water quality as required O&M manual (TT)
(See environmental monitoring plan provisions for “Construction camp and crew“, rehabilitation phase)			
(See environmental monitoring plan provisions for “Use of heavy equipment and hazardous materials“, rehabilitation phase)			
Traffic control plan, specification, supply and installation	<ul style="list-style-type: none"> Traffic control plan and signage clearance prior to operations Continuous monitoring and incident reporting 	<ul style="list-style-type: none"> Design company (R) Construction contractor (I) (M) MDF (R) (M) TetraTech (M) MRDI and Traffic Police (approvals) 	<ul style="list-style-type: none"> Traffic control plan (DC) Supply and installation of signs and equipment (CC) MRDI and Traffic Police (approvals) Maintenance of traffic signs and equipment (LA)
Providing EHS provisions in operation and maintenance plans and procedures	<ul style="list-style-type: none"> Prepare, review and approve operation and maintenance manual with proper EHS provisions 	<ul style="list-style-type: none"> Local authorities (I) (R) MRDI (M) and Ministry of Environment (Approval) TetraTech (Drafting) 	<ul style="list-style-type: none"> EHS system provisions included in O&M plans and approved/implemented (OC) O&M manual with due consideration of EHS prepared (TT)

ATTACHMENT K

USAID Standard Conditions – Road Rehabilitation and Maintenance Projects**Noise, Traffic Disruption and Dust**

- Establish and adhere to construction timetables that minimize disruption to the normal activities of the construction area. Post construction timetables and traffic diversion schedules at the project site, as appropriate.
- Coordinate truck and other construction activity to minimize noise, traffic disruption and dust.

Human Health and Worker Safety

- Develop and implement appropriate human health and worker safety measures during construction.
- Provide workers with appropriate safety equipment.
- Take safety precautions to protect workers and others from injury by flying or falling rock, slope failures and avalanche.
- Explore off-site accommodation for crew.
- Keep camp size to a minimum.
- Provide temporary sanitation on construction sites.

Ecological and Historical Considerations

- Identify and avoid areas in the project impact zone that may contain important ecological, archeological, paleontological, historic, religious or cultural resources, including forests, wetlands and areas of high biological diversity or threatened species habitat.
- Have construction crews and supervisors be alert for buried historic, religious, and cultural objects, and provide them with procedures to follow if such objects are discovered. Provide incentives for recovery of objects and disincentives for their destruction.
- If impact to sensitive areas cannot be avoided during road reconstruction, involve ecologists, archeologists and engineers in evaluating alternatives and minimizing impacts.
- Where significant environmental impacts may occur, document and photograph preconstruction and post-construction conditions.

Project Design

- Use established design standards for each facet of construction and related activities (e.g., roadbed, road surface, drainage, erosion control, re-vegetation, stream crossing, sensitive areas, steep slopes, material extraction, transport and storage, construction camps, decommissioning, etc.).
- Minimize use of vertical road cuts even though they are easier to construct, and require less space than flatter slopes. The majority of road cuts should have no more than a $\frac{3}{4}$:1 to 1:1 slope to promote plant growth. Vertical cuts are acceptable in rocky material and in well-cemented soils, if such cuts are stable according to established slope stability criteria.
- Water the road prior to compaction to strengthen the road surface.
- When possible, delay compaction activities until the beginning of the wet season or when more water is available.
- Use water from settling basins and retention ponds for road maintenance.
- Drive roads after moderate rains to identify areas that collect or gully water. Mark and redesign / rehabilitate as necessary.
- Reshape eroded or culled surfaces so that water will no longer follow the course of the roadway.
- Conduct periodic independent inspection of work to see that it conforms to original plan and design specifications. Provide incentives and disincentives to ensure conformance.

Excavation / Borrow Pits

- Use material from local road cuts first, since it produces a fairly durable aggregate for both surface stabilization and erosion control and is very cost effective.
- Place fence around borrow pit excavations as necessary.
- Ensure excavation is accompanied by well-engineered drainage to control runoff into the pit.
- Develop specific procedures for storing topsoil and for phased closure and reshaping and restoration of the pit when extraction has been completed. Include plans for segregating gravel and quarry materials by quality and grade for possible future uses. Where appropriate, include re-seeding or re-vegetation to reduce soil erosion, prevent gulleying and minimize visual impacts.
- Discuss with local communities the option of retaining quarry pits as water collection ponds to water cattle, irrigate crops or for similar uses. Issues of disease transmission, and prohibiting the use of pit water for human consumption, bathing, and clothes washing, should be highlighted.
- Decommission / restore area so it is suitable for sustainable use after extraction is completed.
- Backfill and / or restore borrow areas and quarries before abandonment if alternative uses for those sites are not planned.

Vegetation Clearing and Re-vegetation

- Carry out earth moving and removal of vegetation only during dry periods.
- If vegetation must be removed during wet periods, wait until just before actual construction.
- Store topsoil and preserve removed plants for later use.
- Re-vegetate with recovered plants and other appropriate local flora immediately after equipment is removed from a section of the site.

Material Storage

- Identify sites for temporary / permanent storage of excavated material and construction materials.
- Avoid pollution of waterways with stockpiled construction materials.
- Cover stockpiled construction materials, as practicable.

Fill and Grade

- Minimize the volume of fill required.
- Raise road surfaces with stable and durable fill material. Grade with inslope, outslope or cambered shape. Install sufficient cross-drains, ditches and settling ponds.
- Use appropriate road surface materials (e.g., asphalt, concrete, gravel) following fill placement, or excavation to design grade.
- Do not fill the flow-line of natural creeks and drainages. Especially in arid areas, design culverts to handle rare high rainfall events.
- Minimize cuts and fills in wetlands.

Drainage and Erosion Control

- Install drainage structures during instead of after construction. Most erosion associated with roads occurs in the first year after construction. Delaying installation of the drainage features greatly increases the extent of erosion and damage during that time.
- Use outside ditches to control surface water when necessary, but avoid general use as they concentrate water flow and require the road to be at least a meter wider. Install frequent structures, berms or trenches, to divert water upslope of roads into stream channels.
- Install frequent diversion structures, such as water bars, to move water off the road and minimize concentration of water.
- Install drainage crossings to pass water from the uphill to the downhill side of the road. If using culvert pipes, follow accepted sizing and design standards. Where flows are difficult to determine, use structures such as fords, rolling dips, and overflow dips that can accommodate any flow volume and are not susceptible to plugging.

- Stabilize outlet ditches (inside and outside) with small-stone riprap, and / or vegetative barriers placed on contour to dissipate energy and to prevent the creation or enlargement of gullies.
- Install drainage turnouts at frequent intervals, and extend turnout drains far enough to allow water to dissipate evenly into the ground.
- Install drainage ditches or berms on up-hill slopes to divert water away from the road.
- Visually spot check for drainage problems, including accumulation of water on road surfaces, especially after the first heavy rains following rehabilitation and at the end of the rainy season.
- Monitor and maintain drainage structures and ditches including culverts. Clean out culverts and side channels / runouts when they begin to fill with sediment.
- Install temporary erosion control features when permanent ones will be delayed. Use erosion control measures such as hay bales, berms, straw or fabric barriers.
- Stabilize slopes by planting vegetation. Work with agronomists to identify native species with the best erosion control properties, root strength, site adaptability, and other socially useful properties. Set up nurseries in project areas to supply necessary plants. Do not use non-native plants.

Material Disposal

- Break up old road surface material. Remove and dispose of surface material (e.g. asphalt) if necessary, and loosen soil of previous track to accelerate regeneration of vegetation.
- Segregate waste that can be salvaged, re-used or recycled.
- Take waste materials to appropriate, designated local disposal areas.
- Minimize burning of waste materials.
- If waste will be buried on site, avoid siting burial pits up-gradient of drinking water sources such as wells. Pits should be lined with impermeable material (e.g., clay or polyethylene).
- If waste will be buried on site, avoid siting waste pits where water tables are high or underlying geology makes contamination of groundwater likely. If no alternative site is available, ensure that pits are lined with impermeable material.

Hazardous Materials

- Do not use asbestos materials on USAID-funded projects.
- Do not use herbicides on USAID-funded projects without prior written approval.
- Place solvents, lubricants, oils, and other semi-hazardous and hazardous liquids over a lined area with appropriate secondary containment in order to contain spillage. Test the integrity of bulk storage tanks and drums, and secure valves on oil and fuel supplies.
- Build appropriate containment structures around bulk storage tanks and materials stores to prevent spillage entering watercourses.
- Handle, store, use and process branded materials in accordance with manufacturer's instructions and recommendations.
- Set protocols for vehicle maintenance such as requiring that repairs and fueling occur elsewhere or over impervious surface such as plastic sheeting. Prevent dumping of hazardous materials. Capture leaks or spills with drop cloths or wood shavings. Burn waste oil that is not reusable / readily recyclable, that does not contain heavy metals, and that is flammable.
- Take special precautions to prevent release / dumping of debris, oil, fuel, sand cement, and similar harmful materials.
- Install concrete pads, drains and oil / water separators in areas where vehicle and equipment maintenance and fueling will occur regularly.
- Prevent fuel tank leaks by monitoring and crosschecking fuel levels, deliveries and use; checking pipes and joints for leaks; tightening generator fuel lines; and preventing overfilling of main storage and vehicle tanks.

ATTACHMENT L

MDF Standard Conditions – *Guidelines for Road Rehabilitation and Maintenance Projects*



**LOCAL AND MUNICIPAL ROAD DESIGN AND
CONSTRUCTION SUPERVISION ADVISOR**

PROJECT NO. RMIDPII/C/IC/01

DESIGN MANUAL REPORT

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