I. COVERSHEET FOR ENVIRONMENTAL MITIGATION PLAN & REPORT
(UMBRELLA EMPR: INFRASTRUCTURE)

USAID MISSION SO # and Title: _____

Title of IP Activity: _____

IP Name: __ _____

Funding Period: FY_____ - FY_____

Resource Levels (US$): _____

Report Prepared by: Name:_____ Date: _____

Date of Previous EMPR: _____ (if any)

Status of Fulfilling Mitigation Measures and Monitoring:

_____ Initial EMPR describing mitigation plan is attached (Yes or No).

_____ Annual EMPR describing status of mitigation measures is established and attached (Yes or No).

_____ Certain mitigation conditions could not be satisfied and remedial action has been provided within the EMPR (Yes or No).

USAID Mission Clearance of EMPR:

Contracting Officer's Technical Representative:_____ Date: _____

Mission Environmental Officer: _____ Date: _____
( )

Regional Environmental Advisor: _____ Date: _____
( )

List of CHF Haiti projects covered in this UEMPR (Infrastructure):

1. Background, Rationale and Outputs/Results Expected:

In response to the January 12, 2010 earthquake in Haiti, CHF International's CLEARS program focuses on creating an environment for economic, social, and political recovery through the construction of transitional shelters for 1940 households. The CLEARS program will adopt a flexible approach informed by the results of ongoing needs assessments. Providing disaster resistant transitional shelter with appropriate water and sanitation facilities is an essential initial step in the recovery of earthquake-affected populations in Haiti. With a presence in Port-au-Prince, Petit Goave, Gonaives, St. Marc and Cap Haitien, CHF is well positioned to quickly respond to changes on the ground.

CHF will use the methodologies, fine-tuned administrative and financial systems, networks and partnerships that have proved successful over three years of implementing the $104 million, USAID-funded KATA job creation and infrastructure development program. In particular, CHF's community-based approach to project identification and prioritization has created strong relationships at community and municipal government levels of Haitian society. These relationships are essential for ensuring that CLEARS program interventions are designed and implemented to maximize impact. The ongoing implementation of the KATA Program, with its focus on long-term development, also uniquely positions CHF to smoothly transition recovery activities into long-term development initiatives. Beneficiaries of the CLEARS program will also benefit from the KATA program's medium to long-term livelihoods work, especially workforce development and micro- and small enterprise development.

In post-earthquake Haiti there will be a continuing needs for improvement of roads and community and medical facilities. Another common problem in various urban centers in Haiti is the poor condition of market places, which augments the spread of disease. Without improvements to these and other critical pieces of Haiti's infrastructure, children will go without schooling, the sickly will go without medical attention and farmers will not have a viable way to reach markets to sell their produce.

CHF's USAID/KATA program is an $81 million, 4-year program that is designed to:

- Enable access to economic opportunities that provide people with dignity, income and the chance to contribute to the economic development of their country
- Enhance the government's ability to effectively respond to the needs of its constituents
- Provide improved access to capital, market linkages and investments for Haiti's micro, small and medium enterprises
- Increase access to social and productive infrastructure.

Through the infrastructure development/rehabilitation projects, CHF hopes to achieve the following goals:

1) Provide short- and long-term employment opportunities and training to vulnerable Haitians
2) Provide adequate spaces for schooling and reduce class sizes
3) Provide adequate spaces and facilities for medical treatment for Haitians in Petit Goâve, Port-au-Prince, Saint Marc, Gonaïves and Cap Haïtien.
4) Improve conditions of rural and urban roads.

CHF's CLEARS program is a $13.2 million dollar, 8 month program that is designed to:

1) Remove debris from collapsed buildings and public spaces

2) Provide healthy transitional living conditions for displaces populations

3) Include integrated on-site sanitation efforts such as latrine construction community sanitation and hygiene awareness in transitional shelter construction

5) Promote the immediate recovery of the local economy and market conditions

Through the transitional shelter projects, CHF hopes to achieve the following goals:

1) Provide vulnerable households with durable cost effective shelters that allow for households to regain a sense of normalcy and can last around two years

2) Construct 6000 transitional shelters kits to be distributed and built in five key municipalities of Port au Prince, Petit Goave, and Cabaret.

2. Activity Description:

This EMPR covers all activities directly related to the construction and/or rehabilitation of urban and rural roads, schools, community centers, health facilities, market places, micro-enterprise facilities and transitional shelters. Any other project that involves the construction and/or rehabilitation of a building or structure can also consult this EMPR for general mitigation measures that should be incorporated into project activities.

Certain activities are common throughout all different types of Infrastructure projects. The following are common activities throughout many of these infrastructure projects:\

1. Construction material sourcing,
2. Construction site excavation or levelling,
3. General construction activities and
4. Decommissioning,

However, depending on the sub-type of infrastructure project, there may be different project activities.

Activities specific to urban and rural roads projects most often include:

a) Rehabilitation and re-surfacing of roads (road rehabilitation activities rarely exceed 10KM in length)
b) Construction of sidewalks and pedestrian passes
c) Excavation/road cuts and fill
d) Dredging and reinforcing road drainage canals

e) Establishing community road maintenance committees
f) Re-vegetating road sides

Activities specific to school/community center rehabilitation projects most often include:

a) Construction/rehabilitation of classrooms and community centers
b) Resurfacing of walls and floors
c) Installation of windows
d) Roofing
e) Demolition
f) Provision of desks, school supplies, computers and printers and other materials or supplies requested
g) Addition of laboratories for chemistry or physics
h) Construction of Basketball courts
i) Painting
j) Electrical Connections
k) Designing flooding contingency plans for community members, students and teachers
l) Constructing/rehabilitating certain buildings with raised concrete bases that will allow them to withstand heavy flooding
m) Working with school staff/municipality to ensure adequate staffing to perform regular maintenance and repairs on constructed facilities

Often times, school/community center rehabilitation projects include the construction of latrines, potable water reservoirs and/or other sanitary facilities for the use of students and faculty. It is imperative for these projects to follow the suggestions in the EMPR: Potable Water and Sanitation in addition to those made in this EMPR. Rehabilitated/constructed school facilities often seek to provide space for between 250-500 students.

Activities specific to health facility rehabilitation projects most often include:

a) Construction of medical facilities and medical supply storage rooms
b) Resurfacing of walls and floors
c) Installation of windows
d) Roofing
e) Demolition
f) Provision of medical supplies
g) Painting
h) Designing safe medical waste management plans
i) Developing community educational programs on best-practice hygiene behavior.

Often times, these projects include the construction of latrines, potable water reservoirs and/or other sanitary facilities. These projects should follow the suggestions in the EMPR: Potable Water and Sanitation in addition to those made in this Infrastructure EMPR.

Activities specific to transitional shelter construction most often include:

a) Pre-cut and labeled timber frame pieces

b) Incorporating risk reduction techniques into design in preparation for likely hazards (i.e. flooding, hurricanes, aftershocks, etc.)
c) Construction of pre-fabricated shelter kits in central locations
d) Distribution of shelter kits to key municipalities in Port au Prince, Petit Goave, and Cabaret
e) Construction of soil cement floor
f) Providing technical assistance in construction process to ensure quality shelters
f) Training on best-practice hygiene and sanitation behavior

3. Environmental Baseline:

On January 12, 2010, a 7.0-magnitude earthquake struck Haiti 10 miles southwest of Port-au-Prince (PaP), home to approximately 3 million people. The earthquake pushed an already vulnerable population from a generally precarious economic status into a large-scale humanitarian crisis. An estimated 100,000 to 200,000 are presumed dead as a result of the earthquake, with up to 1 million people displaced. In total, the earthquake and its aftershocks are estimated to have affected approximately 3.5 million people – more than a third of the population of the country. Continuing aftershocks and fear of further building collapse has led much of the population to remain outdoors under whatever shelter they can find. Compounding this problem has been the near complete cessation of formal economic activities, which has left the population without the income or assets needed to resume critical livelihoods activities.

Throughout the affected areas, public and private infrastructure such as homes and roads have been damaged or destroyed, cutting supply chains, severely affecting economic systems and market networks, and leaving over 900,000 to 1.1 million households without adequate shelter. Hard-won stability and economic recovery over the last few years now hangs in the balance, and the potential is high for Haiti to fall back into instability and conflict. In consultation with OFDA, CHF will shift emphasis as needed in the CLEARS program to areas which are accessible or where beneficiaries are in most need. CHF will also shift the emphasis of interventions based on emerging needs assessments.

The USAID/KATA program, now in its third year of operation, will continue its focus on watershed management and infrastructure improvement/rehabilitation in 5 departments of Haiti, Petit Goâve, Port-au-Prince, Saint Marc, Gonaïves and Cap Haïtien. Most infrastructure projects rehabilitate old facilities, buildings or roads, however, when a project will take place on a new site, or will include an alteration of land, an EA will be carried out.

In USAID's 2007 report "Environmental Vulnerability in Haiti," Glenn Smucker and team point out that many of the environmental problems in Haiti can be attributed to, "acute poverty, rapid population growth and unplanned urbanization"(Smucker, iii). These factors have created a much higher and concentrated demand for firewood and charcoal among other natural resources and services in and around urban centers.

Not only does the indoor burning of charcoal worldwide account for the death of nearly 800,000 children and 500,000 women annually (WHO, 2006), but it is a main factor driving the

deforestation of hill and mountainsides in Haiti. According to Richard Haggerty's country study on Haiti from 1989, in 1925, 60% of original forest still covered the country. Since then, the population has cut down all but an estimated 2% of its original forest cover, and in the process has destroyed fertile farmland soils, contributing to desertification. Most important is the hillside deforestation, which has caused a slew of flooding and mudslide problems for cities and other communities located in watershed and flood plain areas.

During the hurricane seasons of both 2004 and 2008, the flooding and mudslides in Gonaives provide examples of the types of indirect problems that result from hillside deforestation and poor watershed management. According to earthobservatory.nasa.gov, "in September 2004, more than 2,500 people died when Tropical Storm Jeanne unleashed torrential rain on northeastern Haiti…The disaster was repeated in September 2008, when a string of storms—Gustav, Hanna, and Ike—drenched Haiti. Though the resulting floods were as extensive as in 2004, the death toll was not as great. As of September 15, 423 people had been reported dead, 50 were missing, and more than 100,000 were in shelters, said the United States Agency for International Development (USAID)."

The mudslides and flooding in Gonaives serve as a grim warning to the possibilities of what could be in the nation's capital, Port-Au-Prince, as both cities are located in large watersheds. Such floods and mudslides can contribute to a slew of other health, social and environmental problems ranging from road blockage, to drinking water contamination and disease spread.

The average annual rainfall is 140 to 200 centimeters, but it is unevenly distributed. Heavier rainfall occurs in the southern peninsula and in the northern plains and mountains. Rainfall decreases from east to west across the northern peninsula. The eastern central region receives a moderate amount of precipitation, while the western coast from the northern peninsula to Port-au-Prince, the capital, is relatively dry. Some regions have two rainy seasons, lasting from April to June and from August to October, whereas other regions experience rainfall from May to November. Annual variations of precipitation can cause droughts, widespread crop failures, and famine.

Temperatures are almost always high in the lowland areas, ranging from 15° C to 25° C in the winter and from 25° C to 35° C during the summer. Haiti is located on the leeward side of Hispaniola, which means that the influence of humid trade winds is not as great as in The Dominican Republic. The more humid districts are found on the northern and eastern slopes of the mountains.

Only 54% of the population in Haiti has broad definition access to potable water, while only 30% have access to sanitation coverage, according to a WHO/UNICEF report in 2006.

According to CIA world fact book, about 66% of all Haitians work in the agricultural sector, which consists mainly of subsistence farming on a small scale. Mangoes and coffee are the country's most important exports; however, agriculture only makes up 30% of the country's GDP.

In order to alleviate the pressures put upon the Haitian population due to the level of environmental degradation in the country, as well as promote long-term sustainable development as to allow for reforestation and environmental recuperation, development agencies must, "be part of an integrated approach, directly linking natural resource management with other pertinent sectors such as early warning, urban planning, reproductive health, and job creation programs" (Smucker, v).

4. Evaluation of Environmental Impact Potential of Activities (Table 2):

Soil erosion:
Construction or rehabilitation of buildings, and road rehabilitation activities require excavation and earth-moving which may increase soil erosion at construction sites.

Erosion and ecosystem damage at construction material borrow pits:
Improper sand extraction (e.g. from riverbeds or hillsides) can cause erosion, sedimentation of water bodies such as rivers, and destabilization of river beds and banks.

Degradation of rehabilitated structures during heavy rain or flooding events.
Rehabilitated buildings and roads are susceptible to damage by heavy rains or flooding if proper drainage is not installed.

Clogging of road drainage canals with sediment and trash:
Without periodic cleaning and maintenance, drainage canals fail to perform their function.

1. **Environmental Mitigation Actions (Tables 2 & 3) (this section is part of the annual EMR, but not the initial):**

CHF will implement the following strategies to mitigate the potential impacts described above:

- Ensure that road and building improvements adhere to national and international technical design standards;
- Design buildings and roads to minimize the need for excavation, earth-moving and heavy machinery use;
- Ensure sound construction practices and rehabilitation of borrow pits.
- Establish community maintenance committees for rehabilitated buildings and roads.
- Carry out Environmental Assessments for any infrastructure projects that involve new construction, are large in scale, or that are to be located in sensitive areas.
- Monitor construction projects during construction and after completion, and make adjustments to the mitigation plan when unforeseen impacts arise or when mitigation measures are insufficient to reduce impacts.

Tables 2 and 3 provide additional detail on the mitigation measures and monitoring strategy to be implemented by CHF Haiti.

III-A. Environmental Screening Form (Table 1):
*A screening form will be filled out for each individual project that falls under this UEMPR

III-B. Identification of Mitigation Plan (Table 2)

Activity/Impact/Mitigation Table (USAID/KATA) - Infrastructure			
Project Type	**Activity**	**Description of Impact**	**Prescribed mitigation measures**
A. Road Rehabilitation **See Sub-project type table for specific activities/impacts/ mitigations for rural and urban road rehabilitation projects NOTE: For further information on road rehabilitation best practice, see "Low-Volume Roads Engineering Field Guide" by Gordon Keller and James Sherar*	i. Site selection and design of road and road drainage	1. Potential damage to sensitive, valuable or private land as well as water contamination from road drainage outlets	a. In planning new routes, involve a multidisciplinary team, including (ideally) an ecologist, geo-technical and road engineer, soil scientist, hydrologist, and other relevant professionals such as an archaeologist or tourism specialist
			b. Design road so that road cuts and drainage outlets do not affect homes and sensitive ecosystems such as water bodies or wetlands
		2. Potential need to raze private property (walls, homes, etc.)	a. Design road to avoid private property. If unavoidable, coordinate with local authorities and communities to ensure clear communication of what private property needs to be torn down or changed and under what conditions (including disposal of debris, compensation)
		3. Road flooding, erosion and washout	a. Use road surface stabilization measures, like aggregate or pavements. Utilize durable materials that will not degrade to fine sediments under traffic
			b. Take problem areas involving soil and slope stability into account in design and site selection. Note seasonal and long term (50- to 100-year) flooding patterns

			c. Reinforce road cuts, sloped and potentially unstable areas with vegetation or appropriate soil stabilization structure
	ii. Sourcing of road construction materials	4. Improper construction material extraction can cause soil destabilization, erosion and/or sedimentation	a. Use materials from local road cuts first, but only if it produces a suitable, durable aggregate for embankment fill or surface stabilization material.
			b. Limit earth moving to dry seasons
			c. Locate borrow pits and earth piles away from water bodies. If this is not possible, install fencing to contain soil, or place tarps/hay bales on piles to avoid sedimentation of water body.
			d. Backfill and revegetate borrow pits when no longer needed
	iii. Excavation/road cuts and fill	5. Mountain/hillside destabilization, erosion and/or sedimentation due to excavation of site	a. Limit earth moving to dry seasons
			b. Minimize use of heavy machinery
			c. Protect new road cuts prone to erosion with hay bales or other stabilizing material during construction phase.
			d. Remove or bury all abandoned construction materials and rubble
		6. Construction site potentially poses a human health and safety hazard to workers and local residents	a. Designate a material storage zone that does not cause an obstruction to traffic and access to homes
			b. Place fencing around any excavation site
			c. Provide potable water, adequate tools and protective gear, appropriate sanitary and solid waste disposal facilities for construction workers during construction phase
	iv. Construction of	7. Unreinforced drainage canals, culverts and	a. Reinforce drainage canals with vegetation, stone or cement.

	drainage canals, culverts and outlets	outlets leading to erosion, gully formation, and potential road washout	b. Construct drainage outlets such as culvert pipes or rolling dip cross-drains. Reinforce area at outlet with rock or masonry splash apron to dissipate energy, or construct drains in areas of bedrock or dense vegetation.
	v. Road surfacing	8. Road surface below grade of surrounding road can cause soil erosion, degrade water quality, and alter hydrology	a. Raise road surface with stable fill material. Grade with inslope, outslope or cambered shape. Install sufficient cross-drains, ditches and settling ponds.
	vi. Decommissioning	9. Future clogging of roads and drainage systems due to insufficient cleaning	a. Clean drainage canals, culverts and other drainage structures before finishing project
		10. Construction site potentially poses a human health and safety hazard to workers and local residents	a. Remove or bury all abandoned construction materials and rubble
			b. Remove any temporary facilities used for construction workers (portable latrines, etc.)
	vii. Training on maintenance of road and road drainage	11. Potential erosion, flooding, road damage and ultimate long-term project failure due to insufficient maintenance of road, drainage canals and vegetation	a. Finalize maintenance agreements with local communities before beginning construction to clean drainage canals, culverts and other drainage structures. All parties must clearly understand and be committed to terms of the agreement, such as who will do what work, when, how frequently, for what compensation, and how long
			b. Protect and trim roadside vegetation (brush) adequately, but not excessively, for sight distance and traffic safety
			c. Ensure visual spot checks happen after heavy rains, looking for drainage clogging, collection of standing water and other road maintenance needs

B. Building Construction **See Sub-project type table for specific activities/impacts/ mitigation measures for construction of schools, community centers, health centers, market places.* ***NOTE:** For construction activities involving sanitary blocks (including hand washing stations, latrine systems and/or shower stations) see EMPR: Potable Water and Sanitation.*	i. Design and site selection of buildings	12. Region and site are potentially prone to flooding, which may cause damage to infrastructure, human safety concerns and/or disruption of activities	a. Ensure that no new construction will be located on hillsides, riverbanks, or otherwise unstable soils. If unfeasible, ensure soil protection through dead and live soil protection structures
			b. Incorporate typical temperature variations and events such as seasonal rains or natural disasters into the design and site selection of the facility to ensure accessibility. Also, take advantage of natural beneficial features that allow for easier drainage and shade cover.
			c. Use material appropriate to the climate (e.g. stucco instead of adobe in areas with heavy rainfall)
			d. Incorporate protective design features (drainage structures and plant vegetation on slopes)
	ii. Sourcing of construction materials	13. Improper construction material extraction can cause soil and riverbank destabilization, erosion and/or sedimentation	a. Use available local materials first, but only if they provide long term, suitable materials for building construction.
			b. Limit earth moving to dry seasons
			c. Locate borrow pits and earth piles away from water bodies. If this is not possible, install fencing to contain soil, or place tarps/hay bales on piles to avoid sedimentation of water body.
			d. Backfill and revegetate borrow pits when no longer needed
	iii. Excavation and/or site clearing and/or leveling	14. Land destabilization, erosion and/or sedimentation due to excavation of site or leveling of site	a. Limit earth moving to dry seasons
			b. Remove all excavated material from site after project completion and dispose of properly
			c. Minimize use of heavy machinery to prevent erosion, noise, and air pollution

	iv. Construction activities for buildings and rehabilitation activities	15. Health and safety hazards to construction workers	a. Provide potable water, adequate protective gear, appropriate sanitary and solid waste disposal facilities for use by construction workers
	v. Decommissioning	16. Construction site potentially poses a human health and safety hazard to workers and local residents	a. Remove or bury all abandoned construction materials and rubble
			b. Remove any temporary facilities used for construction workers (portable latrines, etc.)
	vi. Operation and maintenance of constructed buildings and facilities	17. Building deterioration can lead to the failure of the project to serve its utility, potential human health hazards and/or negative socio-economic effects	a. Finalize maintenance agreements with local communities before beginning construction to monitor upkeep of buildings and perform necessary maintenance and repairs
			b. Protect and trim any new planted vegetation
			c. User responsibilities should be clearly assigned to ensure that no tasks in the maintenance process are overlooked

Activity/Impact/Mitigation Sub-Project Type Table (USAID/KATA) - Infrastructure			
Sub-Project Type	**Activity**	**Description of Impact**	**Prescribed mitigation measures**
I. Rural road rehabilitation	i. Site selection and design of road and road drainage	18. Poor planning and design of drainage systems can cause road erosion and washout over time and/or can create flooding problems for nearby communities	a. Construct roads with grades of 12% or less, using short sections of 15% where necessary
			b. Construct roads with rolling grades to minimize concentration of water
			c. Outslope road surface 3-5% for road grades less than 10% on stable soils, using rolling dips for cross-drainage structures. In slippery soils, either inslope the road or add aggregate surfacing to the road

			d. Inslope road surface 3-5% with a ditch section for road grades in excess of 10% or in areas with steep natural slopes, erodible or slippery soils, or on sharp turns. Provide cross drainage with culvert pipes or rolling dips
			e. Design road to follow natural land contours in the area to allow drainage to run its natural course
II. Urban road rehabilitation	i. Site selection and design of road and road drainage	19. Potential safety issues for community members who live along side or often pass through area where road is rehabilitated	a. Build footpaths or sidewalks along the road for the safety of people walking along the road
			b. Use roadway surfacing and speed bumps to control dust and speed traffic
			c. Conduct training/awareness-raising campaign on detrimental effects of throwing trash into canals
			d. Develop drainage canal cleaning and maintenance plan with local authorities and community
III. Construction/ rehabilitation of school/community center buildings	i. Design of school/community center buildings	20. Region and site are potentially prone to flooding, which may cause damage to infrastructure, human safety concerns and/or disruption of school activities	a. Incorporate risk-reducing design considerations in siting and design of building (above high flood risk areas, designed to resist earthquake conditions, etc.)
			b. Work with school authorities and children to develop a flooding contingency plan, including signage for evacuation routes, protocols, and simulation exercises
	ii. Operation, maintenance of and waste disposal from school/ community center buildings	21. Daily operations of facility generate solid waste leading to potential visual and water contamination	a. Train school/community center users to develop a viable and effective clean-up and waste management plan, which includes separation of organic/inorganic wastes and composting wherever possible.

IV. Construction/ rehabilitation of health facilities	i. Site selection and design of health facility	22. Sites prone to flooding creates greater threat of accidental release of toxic, infectious or otherwise harmful material as well as water contamination	a. If site is prone to flooding, seek alternative site. If there is no other viable site in the vicinity, or if external priorities mandate activities on this particular site, design a storage area so hazardous materials are above ground or in waterproof containers with locking lids that are kept closed.
	ii. Training on maintenance of and waste disposal from health facilities	23. Risk of injury and disease transmission from medical waste to waste handlers, waste pickers and others	a. In rural areas, burn infectious waste in a single-chamber incinerator, if possible, while ensuring a low emission of potentially toxic gases.
			b. Dispose of waste in a dump or landfill, packaged to minimize exposure, placed in a hole dug below the working face of the landfill, and immediately covered with 2 m of mature landfill waste. Alternatively, it may be placed in a 2 m deep pit and covered in the same manner. Waste-picking must then be prevented
			c. If waste will be buried on site, avoid wherever possible siting the burial pit up-gradient from a drinking water source or water body. Pit must be lined with impermeable material such as clay or polyethylene
			d. Develop a waste management plan for disposal of gray water, medical wastes (including sharps), and normal solid waste as an integral part of health facility design, and away from main health facility buildings
V. Construction of transitional shelter/ housing	i. Site selection and design of transitional shelters	24. Poor site selection and/or shelter design could result in destruction of shelter, potential injury to occupants/workers and overall project failure	a. Select construction materials that minimize risk (i.e. use wood frames and plastic walls instead of cement) while ensuring structural stability
			b. Maximize ventilation to reduce risk of smoke inhalation from indoor stoves
			c. Ensure that shelter design meets SPHERE humanitarian standards (consult SPHERE handbook at http://www.sphereproject.org/index.php)
		25. Selection of materials that can't be easily re-used generates unnecessary waste and are less helpful for transition process	a. Where possible, choose construction materials that are portable and easy to re-use once shelter occupants move to permanent housing site

		26. Improper siting of shelters could lead to serious injury of occupants	a. Set shelters back from road and away from any existing hazards resulting from disaster event (i.e. badly damaged buildings, downed power lines, unstable debris and rubble)
		27. Excessive use of fuel wood as an energy source leading to deforestation and soil destabilization	a. Through community meetings, encourage preservation of vegetation among residents especially in sites prone to landslides.
	iii. Community outreach and planning	28. Negative social impacts within and around the project site can generate conflict between community members and neighbor residents	a. Ensure that clearly negotiated agreement exists for who will occupy transitional shelters
			b. If the site's location generates too much social conflict, finding an alternative site should be strongly considered
			c. Land for project must be acquired legally or with consent of land owner(s). Future occupants of shelter should be consulted in the selection of site.
	iv. Sanitation facilities	*For any transitional shelter/housing project in which sanitation facilities will be installed, see EMPR: Potable Water and Sanitation	

III-C. Environmental Monitoring and Evaluation Tracking Table (Table 3).

Environmental Monitoring and Evaluation Report (USAID/KATA) - Infrastructure									
			Monitoring Methods			Results			
Impact No.	Description of Mitigation Measure	Responsible Party	Indicators	Methods	Frequency	Dates Monitored	Problems Encountered	Mitigation Effectiveness	Recommended Adjustments
A. Road Rehabilitation									
1	a. In planning new routes, involve a multidisciplinary team, including (ideally) an ecologist, geo-technical and road engineer, soil scientist, hydrologist, and other relevant professionals such as an archaeologist or tourism specialist		Y/N signs of roadside erosion or road degradation along rehabilitated or constructed sections	Field Survey of road section	Once during rainy season and once during dry season				
	b. Design road so that road cuts and drainage outlets do not affect homes and sensitive ecosystems such as water bodies or wetlands								
2	a. Design road to avoid private property. If unavoidable, coordinate with local authorities and communities to ensure clear communication of what private property needs to be torn down or changed and under what conditions (including disposal of debris, compensation)								

3	a. Use road surface stabilization measures, like aggregate or pavements. Utilize durable materials that will not degrade to fine sediments under traffic		Y/N Road remains highly functional during wet season	Field Survey of road section	Twice during rainy season				
	b. Take problem areas involving soil and slope stability into account in design and site selection. Note seasonal and long term (50- to 100-year) flooding patterns								
	c. Reinforce road cuts, sloped and potentially unstable areas with vegetation or appropriate soil stabilization structure								
4	a. Use materials from local road cuts first, but only if it produces a suitable, durable aggregate for embankment fill or surface stabilization material.		Y/N signs of erosion around construction and/or borrow pit sites	Field Visit Report	Weekly during construction and every 3 months for 1 year after construction				
	b. Limit earth moving to dry seasons								
	c. Locate borrow pits and earth piles away from water bodies. If this is not possible, install fencing to contain soil, or place tarps/hay bales on piles to avoid sedimentation of water body.								
	d. Backfill and re-vegetate borrow pits when no longer needed								
5	a. Limit earth moving to dry seasons								

	b. Minimize use of heavy machinery								
	c. Protect new road cuts prone to erosion with hay bales or other stabilizing material during construction phase.								
	d. Remove or bury all abandoned construction materials and rubble		Y/N Construction waste present at site	Field Visit Report	Once at completion of construction				
6	a. Designate a material storage zone that does not cause an obstruction to traffic and access to homes		Y/N Reported accidents or complaints from community related to construction site	Informal survey of workers, construction supervisors and community residents	Weekly during construction phase				
	b. Place fencing around any excavation site								
	c. Provide potable water, adequate tools and protective gear, appropriate sanitary and solid waste disposal facilities for construction workers during construction phase								
7	a. Reinforce drainage canals with vegetation, stone or cement.		Y/N signs of standing water or	Field Visit Report	Once during rainy season and once				

	b. Construct drainage outlets such as culvert pipes or rolling dip cross-drains. Reinforce area at outlet with rock or masonry splash apron to dissipate energy, or construct drains in areas of bedrock or dense vegetation.		potential road washout during wet season		during dry season				
8	a. Raise road surface with stable fill material. Grade with inslope, outslope or cambered shape. Install sufficient cross-drains, ditches and settling ponds.		Y/N signs of road degradation, erosion or washout	Field Visit Report	Once during rainy season and once during dry season				
9	a. Clean drainage canals, culverts and other drainage structures before finishing project		Y/N construction site cleanup completed	Field Visit Report	Once at completion of construction				
10	a. Remove or bury all abandoned construction materials and rubble								
	b. Remove any temporary facilities used for construction workers (portable latrines, etc.)								
11	a. Finalize maintenance agreements with local communities before beginning construction to clean drainage canals, culverts and other drainage structures. All parties must clearly understand and be committed to terms of the agreement, such as who will do what work, when, how frequently, for what compensation, and how long		Y/N drainage canals clogged with sediment and trash	Field Survey of road section	Once during rainy season and once during dry season				

	b. Protect and trim roadside vegetation (brush) adequately, but not excessively, for sight distance and traffic safety								
	c. Ensure visual spot checks happen after heavy rains, looking for drainage clogging, collection of standing water and other road maintenance needs								
B. Building Construction									
12	a. Ensure that no new construction will be located on hillsides, riverbanks, or otherwise unstable soils. If unfeasible, ensure soil protection through dead and live soil protection structures		Y/N signs of soil erosion or building degradation	Y/N signs of soil erosion or building degradation					
	b. Incorporate typical temperature variations and events such as seasonal rains or natural disasters into the design and site selection of the facility to ensure accessibility. Also, take advantage of natural beneficial features that allow for easier drainage and shade cover.		Y/N At least 2 locally appropriate design considerations implemented	Field Visit Report	Once at completion of construction				
	c. Use material appropriate to the climate (e.g. stucco instead of adobe in areas with heavy rainfall)		Y/N Visual evidence of building degradation or damage	Field Visit Report	Annually				
	d. Incorporate protective design features (drainage structures and plant vegetation on slopes)								

13	a. Use available local materials first, but only if they provide long term, suitable materials for building construction.		Y/N signs of erosion around construction and/or borrow pit sites	Field Visit Report	Weekly during construction and every 3 months for 1 year after construction				
	b. Limit earth moving to dry seasons								
	c. Locate borrow pits and earth piles away from water bodies. If this is not possible, install fencing to contain soil, or place tarps/hay bales on piles to avoid sedimentation of water body								
	d. Backfill and re-vegetate borrow pits when no longer needed								
14	a. Limit earth moving to dry season								
	b. Remove all excavated material from site after project completion and dispose of properly								
	c. Minimize use of heavy machinery to prevent erosion, noise, and air pollution								
15	a. Provide potable water, adequate protective gear, appropriate sanitary and solid waste disposal facilities for use by construction workers		Y/N reported accidents or complaints from workers	Survey of workers/construction supervisors	Weekly during construction				
16	a. Remove or bury all abandoned construction materials and rubble		Y/N site cleanup completed	Field Visit Report	Once at completion of construction				
	b. Remove any temporary facilities used for construction workers (portable latrines, etc.)								

17	a. Finalize maintenance agreements with local communities before beginning construction to monitor upkeep of buildings and perform necessary maintenance and repairs		Y/N Signs of erosion or building degradation	Field Visit Report	Once during rainy season and once during dry season				
	b. Protect and trim any new planted vegetation								
	c. User responsibilities should be clearly assigned to ensure that no tasks in the maintenance process are overlooked								
Environmental Monitoring and Evaluation Report (USAID/KATA) - Sub-Project Type: Infrastructure									
I. Rural Road Rehabilitation									
18	a. Construct roads with grades of 12% or less, using short sections of 15% where necessary		Road construction complies with sound design technical checklist	Technical checklist completed at site	Once at completion of constructio n				
	b. Construct roads with rolling grades to minimize concentration of water								
	c. Outslope road surface 3-5% for road grades less than 10% on stable soils, using rolling dips for cross-drainage structures. In slippery soils, either inslope the road or add aggregate surfacing to the road								

	d. Inslope road surface 3-5% with a ditch section for road grades in excess of 10% or in areas with steep natural slopes, erodible or slippery soils, or on sharp turns. Provide cross drainage with culvert pipes or rolling dips								
	e. Design road to follow natural land contours in the area to allow drainage to run its natural course		Y/N signs of roadside erosion or road degradation along rehabilitated or constructed sections	Field survey of road section	Once during rainy season and once during dry season				
II. Urban Road Rehabilitation									
19	a. Build footpaths or sidewalks along the road for the safety of people walking along the road		Y/N Pedestrians using sidewalk	Field Survey of road section	Semi-annually				
	b. Use roadway surfacing and speed bumps to control dust and speed traffic		Y/N Complaints from roadside residents about reckless driving or dust	Survey of sample households along road section	Once per year				
	c. Conduct training/awareness-raising campaign on detrimental effects of throwing trash into canals		Y/N presence of trash in	Field survey of road section	Semi-annually				

	d. Develop drainage canal cleaning and maintenance plan with local authorities and community		drainage canals						
III. Construction/rehabilitation of school/community center buildings									
20	a. Incorporate risk-reducing design considerations in siting and design of building (above high flood risk areas, designed to resist earthquake conditions, etc.)		Y/N Building complies with risk reduction technical design standards	Risk reduction technical checklist	Once at completion of construction				
	b. Work with school authorities and children to develop a flooding contingency plan, including signage for evacuation routes, protocols, and simulation exercises		At least one simulation exercise implemented within past year	Interview with schoolteachers or children	Annually				
21	a. Train school/community center users to develop a viable and effective clean-up and waste management plan, which includes separation of organic/inorganic wastes and composting wherever possible		Y/N Presence of solid waste around facility	Field Visit Report	Annually				
IV. Construction/ rehabilitation of health facilities									

22	a. If site is prone to flooding, seek alternative site. If there is no other viable site in the vicinity, or if external priorities mandate activities on this particular site, design a storage area so hazardous materials are above ground or in waterproof containers with locking lids that are kept closed.		Y/N Any hazardous materials are adequately stored	Field Visit Report	Annually				
23	a. In rural areas, burn infectious waste in a single-chamber incinerator, if possible, while ensuring a low emission of potentially toxic gases.		Y/N Incinerator appears to be in use	Field Visit Report	Semi-annually				
	b. Dispose of waste in a dump or landfill, packaged to minimize exposure, placed in a hole dug below the working face of the landfill, and immediately covered with 2 m of mature landfill waste. Alternatively, it may be placed in a 2 m deep pit and covered in the same manner. Waste-picking must then be prevented		Y/N signs of medical or other waste near facility	Field Visit Report	Semi-annually				
	c. If waste will be buried on site, avoid wherever possible siting the burial pit up-gradient from a drinking water source or water body. Pit must be lined with impermeable material such as clay or polyethylene								

	d. Develop a waste management plan for disposal of gray water, medical wastes (including sharps), and normal solid waste as an integral part of health facility design, and away from main health facility buildings								
V. Construction/ Transitional Shelter / Housing									
24	a. Select construction materials that minimize risk (i.e. use wood frames and plastic walls instead of cement) while ensuring structural stability b. Maximize ventilation to reduce risk of smoke inhalation from indoor stoves c. Ensure that shelter design meets SPHERE humanitarian standards (consult SPHERE handbook at http://www.sphereproject.org/index.php)		Y/N Shelter design complies with SPHERE standards and implements two or more risk minimizing techniques	Field Visit Report	Once at completion of construction				
25	a. Where possible, choose construction materials that are portable and easy to re-use once shelter occupants move to permanent housing site		Y/N Shelter residents say they will reuse majority of construction materials	Informal survey of shelter residents	Once at completion of construction				

26	b. Set shelters back from road and away from any existing hazards resulting from disaster event (i.e. badly damaged buildings, downed power lines, unstable debris and rubble)		Y/N Shelters are near existing roadways, disaster related or other potential hazards	Field Visit Report	Once at completion of construction				
27	a. Encourage preservation of protective vegetation among residents especially in sites prone to landslides.		Y/N Shelter residents have preserved protective vegetation and are aware of its importance	Field Visit Report and Informal Survey of Residents	Once at completion of construction and every six months after				
28	a. Ensure that clearly negotiated agreement exists for who will occupy transitional shelters		Y/N Residents report tension or conflicts with neighboring residents or displaced persons or site land owner	Informal survey of shelter residents	Monthly				
	b. If the site's location generates too much social conflict, finding an alternative site should be strongly considered								
	c. Land for project must be acquired legally or with consent of land owner(s). Future occupants of shelter should be consulted in the selection of site.								

References for UEMPR tables:

Bickel Stephen E. (lead author with 6 others). "Environmental Guidelines for Development Activities in Latin America and the Caribbean." USAID Latin America Bureau Publication, July 2006. Find at:
http://www.usaid.gov/locations/latin_america_caribbean/environment/docs/epiq/epiq.html

The SPHERE Project. "Humanitarian Charter and Minimum Standards in Disaster Response." 2004 edition. Find at:

Keller, Gordon and James Sherar. "Low-Volume Roads Engineering: Best Management Practices Field Guide." USAID Publication, May 2003. Find at:
http://ntl.bts.gov/lib/24000/24600/24650/Index_BMP_Field_Guide.htm

Office of Sustainable Development, USAID Bureau for Africa. "Environmental Guidelines for Small-Scale Activities in Africa: Environmentally Sound Design for Planning and Implementing Development Activities. January 2007. Find at : http://www.encapafrica.org/egssaa.htm