CHAPTER 9
ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

9.1 ENVIRONMENTAL MANAGEMENT AND FOLLOW-UP PROGRAMS

Environment Management Planning includes the identification of mitigation and compensation measures for all the identified significant impacts for ensuring the maintenance of the existing environmental quality. The EMMP converse all aspects of planning, construction and operation of the project, which are relevant to environment. It is essential to implement the EMMP right from the planning stage and then continuing it throughout the construction and operation stages. It also involves the physical planning, including work programme, time schedule and allocations for putting mitigation and compensation systems in place, identifying implementing agency, delineation of financial plan for implementing the mitigation measures in the form of budgetary estimates and demonstration of its inclusion in the project budget estimates.

The objectives of the Environmental Monitoring Management Plan are:

i. To bring the project into compliance with applicable national environmental and social legal requirements and the international legislation
ii. To outline the mitigating/enhancing, management, consultative and institutional measures required to prevent, minimise, mitigate or compensate for adverse environmental and social impacts and;
iii. To address capacity building requirements to strengthen the funder's environmental and social capacities if necessary.

The proposed project may have minimal adverse environmental effects, provided that recommendations and mitigation measures identified in Chapter 8 are incorporated into all the contracts and followed by both the developer and the contractor.

Accordingly, the management plans with specific mitigation measures to be implemented during construction and operation phase of the proposed Karuma HPP are prepared and are summarized in the **Table 9.1**.

The project's compliance with Ugandan and international lender legislation and guidelines for environmental and social performance will be the key responsibility of the project sponsor (MEMD). However, day-to-day responsibility for implementing environmental and social mitigation, compensation and monitoring actions will be of the Engineer, Procure, Construct (EPC) Contractor or the other governmental agencies. The governmental agencies are assigned responsibilities for implementation of the proposed mitigation measures to be implemented under the physical environment, biological environment, socio-economic environment and Cultural & Archaeological Environment during the design, construction and operational phases of the project.

The main stakeholder responsible for implementing the plan will be the EPC Contractor while, the developer i.e., The Ministry of Energy and Mineral Development MEMD will co-ordinate and monitor all the work done by EPC Contractor. Uganda Wildlife Authority (UWA), National Environment Management Authority (NEMA), Directorate of Water Resources Management (DWRM), Uganda National Museums (UNM), Chief Government Valuer (CGV), Districts (Kiryandongo and Oyam) and the Local Authorities will be the other stakeholders responsible for implementation and monitoring of the management plans.

Monitoring is recommended in the context of ensuring that ecosystem function is maintained at a level equal to or better than pre-construction conditions. The Hydropower Development Unit in MEMD, and where required, external consultants and other Government Agencies, will undertake to monitor various components of the project. All environmental monitoring programmes shall be undertaken under the supervision of the National Environment Management Authority (NEMA), Uganda Wildlife Authority (UWA) and the respective Districts. This will ensure compliance to the environmental mitigation plans during construction, operation and maintenance of the hydro power infrastructure. The scope and responsibility of the main stakeholder responsible for implementing the plan i.e., The Ministry of Energy and Mineral Development MEMD and EPC Contractor are discussed as follows:

9.1.1 Role of EPC Contractor

a. Review the approved ESIA document, particularly the required mitigation measures and the environmental management and monitoring plans, and the owners environmental and social management framework;

b. Review approval conditions provided by NEMA (approval certificate), and permits from lead agencies including DWRM (Water Abstraction Permit), DWD (Construction Permit), Department of Occupational Health and Safety, Department of Petroleum Supplies (Construction permit, operating license for storage and dispensing facilities of petroleum products), Ministry of Internal Affairs (handling of explosives), Ministry of Water and Environment (River Dredging permit); NEMA (River Bank Use Permit, Waiver for blasting in the river bed);

c. The Contractor should then prepare a Contractor's Environmental, Social, Health and Safety Action Plans to comply with the above requirements. This should include an implementation framework, including staffing and budget.

d. The EPC Contractor will also consult general public and disclose information in relation to construction scheduling, traffic management, public health and safety, and the results of Environmental monitoring.

e. All expenditure and costs related to complying with Environmental safeguards as applicable to construction and development of Karuma HPP would be met by the EPC Contractor.

9.1.2 Role of Developer (MEMD)

a. The Developer will monitor compliance of the Contractor through its implementation agency, and a stakeholder wide monitoring group comprising technical staff from government institutions (NEMA, MEMD, UEGCL, UETCL, ERA, MWE, DWRM, DWD, MoWT, MoGLSD, UWA, MTTI, Ministry of Lands, Housing and Urban Development etc) and Civil Society.

Table 9.1: Proposed Environmental Management Plan for the Karuma HPP

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
1	General		• The EPC Contractor in collaboration with the Project Management Team and the relevant authorities shall be responsible for the following: • Supervision of all employees and sub-contractors • Enhance environmental protection through training of employees in good professional and environmental practices. • Sharing of information on bio-physical and socio-economic aspects of the environment to prevent misunderstanding. • Thorough acquaintance with the environmental protection requirements. • Awareness of archaeological artifacts. • Awareness of any other environmental matters which are deemed necessary by the Project Management Team (e.g. appropriate behaviour or community relations.	EPC Contractor MEMD, UWA	2011	Continuous
Muck management Plan						
2	Land environment	Disposal and rehabilitation of the muck	Substantial amount of muck shall be utilized in construction material. The excess muck shall be dumped at the pre-identified muck disposal sites. These muck disposable sites shall be stabilized by using various engineering and biological measures **Engineering measures:** Retaining wall is proposed to hold the disposed muck. **Biological measures:** Vegetation cover controls the hydrological and mechanical effects on soil and slopes. Therefore, biological measures are proposed to stabilize the loose slopes which includes plantation with plant species. The selection of the plant species should be based on the climatic, soil and drainage condition of site.			
Landscaping & Restoration Plan						
3	Land Environment	Sediment load into the river as a result of	• Reservoir rim treatment work should be carried out by providing the treatment to the drains directly	EPC Contractor MEMD	2011	Continuous

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
		various excavation activities in the project area	draining into the reservoir with the series of gabion check dams, retaining walls coupled with vegetative measures of sufficient dimensions. • Construction of sediment traps structures on tributary stream and slope stabilization • For restoration of quarry areas and slope Environmentally friendly stabilization shall be undertaken using suitable engineering and biological structures			
4	Geology and Soils	Prevent soil erosion	All earthworks for site preparation and leveling shall be carried out during the dry season of each implementation phase and the permanent storm water, road and site drainage system will be in place before the onset of the following rains.	EPC Contractor, MEMD	2011	On-going
5	Land Environment	Land degradation and soil erosion	Restoration of the quarry sites and other vulnerable areas should be done using suitable bio-engineering measures.	EPC Contractor, MEMD	2011	
6	Land Environment	Illegal encroachment of land for setup of labour camps, for quarry or for project component	Mainly the workers should be recruited from the locals residing in the area based on their skills during the Pre Construction Phase. Land for quarry area and other project component establishment is already identified hence no encroachment is foreseen.	EPC Contractor, MEMD	2011	
7	Geology and Land	Prevent land degradation	All raw materials and construction inputs shall be procured from approved sources and NEMA authorized quarries and existing approved gravel pits. In such a case as it may be deemed necessary to open up an alternative source of material (e.g. for gravel or laterite), a separate environmental project brief shall be elaborated for each separate material extraction site for consideration and approval by NEMA in accordance with the Ugandan Environmental Legislation.	EPC Contractor, MEMD, NEMA	-	Ongoing
			Solid waste management and sanitation			
8	Land Environment & Public Health and safety	Prevent contamination of land and, surface and ground water To ensure healthy	Adequate facilities for collection, segregation and transportation of waste and refuse such as rejected off-cuts and packaging, workers garbage, waste from workers canteen etc to the approved disposal sites on a	EPC Contractor, MEMD, NEMA,	2011	Continuous

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
		environment in project site	regular basis shall be provided.	DWRM		
9	Water Quality	Prevent contamination of surface and ground water	• Adequate sanitary facilities shall be provided for workers in the form of portable community toilets • On establishment of the project camps and hostels, water supply and sewage system, permanent ablution/sanitation facilities connecting into this system shall be constructed and provided for construction workers. • All hazardous wastes, material soiled with hazardous wastes and empty containers of hazardous materials shall be stored on site in an approved manner, and be removed at regular intervals to offsite waste disposal facilities designed to handle such hazardous waste as required by law. • Sewerage water shall be treated before its disposal in the river stream	EPC Contractor, MEMD, NEMA, DWRM	2011	-
10	Water flow	Minimise disruption to surface drainage	Temporary drains should be constructed and directed in such a manner as to reduce the risk of water logging or erosion and siltation of downstream drainage system	EPC Contractor, MEMD, DWRM, NEMA	2011	Every year
11	Fisheries/Aquatic Resources	Prevent chemical contamination of water which lead to the poisoning of biota and loss of aesthetic appeal	• Safe procedures for storage/handling oil and oil products • To depute contingency measures for accidental spills.	EPC Contractor, MEMD, NEMA, UWA	2011	Ongoing
Pollution Control						
12	Air Quality	Minimize air pollution	The burning of any kinds of waste or construction materials shall not be permitted	EPC Contractor, MEMD, NEMA	-	Ongoing
13	Air Quality	Minimise dust nuisance	All work areas and access roads on site shall be regularly watered by water sprinkler in order to reduce dust levels.	EPC Contractor, MEMD, NEMA	-	Daily
14	Air Quality	Minimise exhaust	Equipment engine, fuel and emission systems of	EPC	-	Ongoing

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
		pollution	construction machinery and vehicles shall be well maintained and calibrated in accordance with manufacturers' recommendation to minimise exhaust smoke, fuel and oil leaks.	Contractor, MEMD, NEMA		
15	Noise and vibration Level	Minimise noise and vibration nuisance from construction activity.	• The Contractor shall restrict any of the operations, which result in undue noise disturbance to nearby communities, dwellings, animals (e.g. blasting activities and operation of heavy machinery and construction traffic) between 18:00 to 06:00 hours. • Standard of nuisance as per country rules and acts shall be maintained all the times at construction sites. • To minimize the noise silencers shall be used and buffer shall be created under green belt development. • Blasting shall be carried out safely as indicated in requirements for public health and safety.	EPC Contractor, MEMD, NEMA	-	Daily
16	Atmospheric environment	Mitigate release of green house gases as a result of decomposition of plant material in the reservoir.	Vegetation from the submergence area will be cleared and it will not be allowed to decompose in the reservoir	EPC Contractor, MEMD, DWRM	-	Continuous
17	Water Quality	Prevent contamination of surface and ground water	Immediate soil remediation will be carried out for any major oil or fuel spillages that may occur by mopping up with an appropriate material and disposal off site by a registered contractor in an approved manner.	EPC Contractor, MEMD, NEMA, DWRM	-	As required
18	Water Quality	Prevent contamination of surface and ground water	Drip pans will be available on hand for the capture of any substance leaking from machinery.	EPC Contractor, MEMD, NEMA, DWRM	2011	Ongoing
19	Water Quality	Prevent contamination of surface and ground water	Liquid fuel storage and dispensing on site shall be provided in accordance with relevant standards set by the energy regulations and NEMA	EPC Contractor, MEMD, NEMA, DWRM	2011	-
20	Water Quality	Prevent contamination of surface and ground water	All bunds of the fuel storage facility will have a drainage sump with a piped drain to a common oil	EPC Contractor,	2011	-

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
			interceptor (shared with the workshop / maintenance area)	MEMD, NEMA, DWRM		
21	Water Quality	Prevent contamination of surface and ground water	The oil interceptor shall be cleaned/emptied as per regulations	EPC Contractor, MEMD, NEMA, DWRM	-	As required
22	Water Quality	Prevent contamination of surface and ground water	Used oil and lubricants will be stored in approved containers on a concrete hard standing surface with retention bund as per standards and disposed of in accordance with NEMA regulations.	EPC Contractor, MEMD, NEMA, DWRM	2011	Ongoing
23	Water Quality	Prevent contamination of surface and ground water	All routine maintenance of construction machinery and vehicles, if carried out on site, shall be carried out in a designated workshop / maintenance area with concrete hard standing surface and drainage to an oil interceptor.	EPC Contractor, MEMD, NEMA, DWRM	2011	Ongoing
24	Water Quality	Prevent contamination of surface and ground water	The concrete batching plant / mixing area will be surrounded by a retention bund and all excess and wash water will be retained and recycled.	EPC Contractor, MEMD, NEMA, DWRM	2011	-
Dam safety and Emergency Response Plan						
25	Human environment	To reduce the ill impact resulting from the disasters caused due to dam failure and to reduce risk of drowning	• Putting restriction to restrain the locals from unguarded contact with the reservoir and by installing warning signs near dam reservoir. • An effective dam safety surveillance, monitoring and observation along with periodic inspection, safety reviews and evaluation must be installed. • Emergency Action Plan shall be prepared and include all the potential indicators of likely failures of the dam, since the primary concern is for timely and reliable identification and evaluation of potential emergency. • The plan should presented warning and notification procedure to be followed in case of potential failure	MEMD, EPC Contractor,		

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
			of the dam. The purpose of the plan is to provide timely warning to nearby residents and alert key personnel responsibility for taking actions in case of an emergency. • A Dam Safety review panel will be formed to address safety issues. The Panel will consist of up to three technical experts who will provide advice through final design, construction, and initial filling and start-up phases of the dam. Safety risks will be addressed as part of the Panel's terms of reference. • An efficient communication system and a downstream warning system are absolutely essential for the success of an emergency plan especially in the present case because of inadequacy of time.			
Wildlife and Biodiversity Management plan						
26	Wildlife	To promote conservation of biodiversity Control the likely increase in poaching and habitat destruction. Minimise/Reduce disturbance to the wild animals near construction sites To reduce disturbance to the wildlife due to noise pollution Minimise noise nuisance due to construction activities	• Awareness programs about the continued survival and the importance of wildlife. These programs should be co-ordinated through local NGOs. • Replanting of characteristic indigenous species of conservation significance and economic importance shall be undertaken. • Awareness campaigns to be carried out for all construction workers to protect and avoid killing such animals unnecessarily. • The Contractor shall restrict any of his operations, which result in undue noise disturbance to nearby communities, dwellings, animals (e.g. blasting activities and operation of heavy machinery and construction traffic) between hours of 18:00 and 06:00. • Standard of nuisance as per country rules and acts will be maintained at construction sites. • Excessive nighttime lighting be avoided by utilizing low-glare lighting fixtures with light beams directed downward to work sites rather than skyward.	EPC Contractor, MEMD, NEMA, UWA	2011	Ongoing

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
			• Creation of veterinary facilities and rescue camps for healthcare of wild animals and for controlling diseases.			
27	Protected area	Minimise the Influx of project vehicles, equipment transportation and construction dam site that could alter the normal visual impressions in MFNP and KWR	• Only agreed number of vehicles should be allowed into the construction sites that fall within the wildlife reserve. A vehicle quota should be kept for in-coming and out-going vehicles. • The Project falls in the Karuma wildlife reserve area and is rich in floral and faunal diversity. Therefore, the wildlife management plan should be proposed with respect to the conservation and should emphasize on the following measures in the protected areas: ➢ All conservation aspects for both physical and biological environment shall be enhanced and habitat restoration shall be enhanced ➢ Awareness, education and sensitizing of fringe population ➢ Recruitment of field staff ➢ Anti-poaching and hunting operational measures ➢ Rehabilitation of a small wildlife health cum ex-situ conservation centre. ➢ Infrastructure development ➢ Enforcement of law ➢ Proper regulation of movement of floating population and settlement of camps near wildlife habitat	EPC Contractor, MEMD, NEMA, UWA		
Forest Protection Plan						
28	Forest	To protect forest	• N o other tree felling other than required for the project should be ensured and where ever possible tree plantation should be taken up • Necessary facilities would be provided to the forest/wildlife officials for the improvement of vigilance. • Organizing public awareness programmes, conducting training camps, hoardings etc.	EPC Contractor, MEMD, NEMA, UWA	2011	Ongoing

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
Fisheries Management Plan						
29	Fisheries	Contamination of river water with suspended solids, sewage disposal and chemical from the equipments which leads to ➢ Destruction of fish breeding and feeding sites ➢ Enhance light attenuation and degrade primary and secondary productivity as well as fish production ➢ Clogging of breathing organs of the fishes	• Strict adoption and enforcement of environmental friendly management strategy and practice of waste disposal • Safe procedures for storage/handling oil and oil products; standby contingency measures for accidental spills. • Treatment of water before disposing into main river	EPC Contractor, MEMD, NEMA, UWA	2011	Ongoing
30	Aquatic ecology	Reduced flow along river stretch from dam to tailrace outlet will affect the aquatic biodiversity and other aquatic animals	Maintenance of proposed 100 cumecs environmental flow all the time into the river for the sustenance of fisheries and other aquatic life.	EPC Contractor, MEMD, DWRM	2011	Continuous
31	Fishes	At operation stage dam will lead to interruption in fish migration.	To explore provision of fish ladder or fish pass to allow continuous upstream and downstream movement of fish during the operation phase.	EPC Contractor, MEMD, NEMA, UWA	2011	
Greenbelt development Plan						
32	Land environment, Air environment	Check soil erosion around the reservoir, Check landslides and slips around the reservoir, Develop the habitat for wildlife particularly birds	Plantation along the road side, Crusher Plant, along reservoir rim, along settlement areas. Species selected for the plantation should be fast growing.	EPC Contractor, MEMD		

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
		and butterflies, Reduce dust pollution Reduce noise pollution to the neighboring household population				
Health and safety management plan						
33	Occupational health and Safety	Ensure occupational health and safety on the construction site	• The EPC Contractor will design an occupational health and safety programme (OHSP), which addresses all aspects of worker health and safety relevant to the operation of the hydro facilities. • This plan shall comply with the Health and Safety Regulations of MEMD as well as with all applicable Ugandan construction Health and Safety Standards as required by the Occupational Safety and Health Act of 2006 with specific reference to part VIII that relates to Health and Welfare at the workplace. • The Contractor shall ensure that all employees are made aware of and comply with safety rules and measures that will apply on site. • Personal Protective Equipment (e.g. hard hats, gloves, overalls, boots, respiratory protection, hearing and eye protection, high visibility waist coats, fall protection harnesses) shall be issued as required to the various categories of the workforce and replaced when necessary. • The Contractor will install temporary lighting for roads, pathways and work areas according to applicable local standards.	EPC Contractor, MEMD, Local Leadership, MoL, Districts	2011	Ongoing
34	Occupational health and Safety	Hazardous materials handling and storage: fire prevention systems	• Fire prevention systems and secondary containment should be provided for storage facilities, where necessary or required by regulations, to prevent fires or the release of hazardous materials to the environment. • A fire prevention and fire safety programme should be implemented and include regular drills. • Fire alarm should be installed in the project construction area.	EPC Contractor, MEMD	2011	Ongoing

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
35	Occupational health and Safety	Safety – General: prevention of electrocution by electrical equipment	• Electrical equipment should be grounded, well insulated and conform to applicable codes. • Electrical installations must be designed, constructed and maintained to eliminate fire or explosion hazards and risks to employees	EPC Contractor, MEMD	2011	Ongoing
36	Public Health and safety	Reduce risk of HIV and communicable disease transmission	• Where practicable, and without prejudice to the Contractor's other contractual obligations, preferential employment shall be given to members of local communities to reduce the risk of communicable diseases associated with migrant labour. • The Contractor shall conduct HIV/AIDS awareness and prevention campaigns amongst all members of the workforce in conjunction with the local Health Centre under which the project area falls. Also, HIV/AIDS, STIs centre shall be established in collaboration with Kiryandongo Hospital	EPC Contractor, MEMD, Local Leadership, MoH, District Administration	2011	Bi-annually
37	Public health	To provide health care facilities at construction site	**Primary health Centers/First Aid Post** **First Aid facilities** • Key personnel shall receive training in basic First Aid • The Contractor shall provide atleast 4-5 first aid kits First Aid which should have all the necessary items for providing medical help at the construction site. • The Contractor shall provide a First Aid post on site, which should be appropriately equipped and staffed by fully trained First Aid personnel. • Contractor shall formulate a plan to deal with serious injuries on site, e.g. accidents with the heavy machinery prior to possession of the site.	EPC Contractor, MEMD, District Administration		
38	Public Health and safety	Reduce risk of malarial infection	The Contractor shall ensure adequate drainage of site as indicated in Landscaping and Restoration Plan to prevent stagnant water that can provide a breeding habitat for mosquitoes.	Contractor MEMD, Local Leadership, MoH, District Administration	2011	Ongoing
39	Vehicle Traffic	Avoid/reduce risk of accident due to increased	• Upto 2km stretch of the highway through Karuma town near Karuma trading centre should will be re-	EPC Contractor,		

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
		traffic and over speeding traffic	designed to avoid accident due to increase traffic. Re- designing should involve creation of a separation between the traffic flow in the opposite directions to ensure that no vehicles are crossing lanes at junctions and there is minimsed likelihood of head on collisions. • The re-designing of the road should also cater or include the creation of pedestrian walk ways and pavements on the road sides especially on the residential side (right side of the highway). • **Speed limit humps:** Speed limit humps will be installed at the entrance into Karuma town from either Direction	MEMD, Local Leadership, MoW/UNRA, District Administration		
Labour Force Management Plan						
40	Population	To manage the influx in population during construction	Awareness campaigns shall be undertaken for both the current residents and the new construction workers.	EPC Contractor, MEMD, UWA	2011	Ongoing
41	Population	To resolve labour disputes	• Strict screening for construction workers shall be undertaken to ensure exclusion of social misfits and security shall be enhanced to ensure social order. • Labour disputes will be resolved according to the Labour Disputes (Arbitration and Settlement) Act 2006.	EPC Contractor, MEMD, and Local Administration	2011	Ongoing
42	Forest	To reduce pressure on the forest resources for fuel wood	Free fuel or subsidy on other energy resources shall be provided to reduce pressure on the existing forest resources	EPC Contractor, MEMD,		
Management Plan for Resettlement						
43	Human environment	To ensure implementation of the Resettlement Action Plan (RAP)	Assistance should be provided to various agencies for the successful implementation and monitoring of the RAP Compensation would be paid for the loss of land, houses and all other immovable properties for which a comprehensive resettlement action plan should be prepared for directly affected people and the host community. The rehabilitation grant has already being	EPC Contractor, MEMD, CGV Local, authority officials	2011	-

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
			calculated and evaluated by Chief Govt. Valuer (CGV) and is presented in Volume III Resettlement Action Plan (RAP) of ESIA.			
44	Human environment	Community development plan	Assistance should be given to affected families in regaining their economic status in the initial stages in such a way they can sustain on their own and do not have to depend on the project authorities for long.	EPC Contractor, MEMD, Local, authority officials	2011	-
			Management Plan for human issues			
45	Human environment	Strengthening education facilities	• Existing education facilities in the project area should be strengthened and if needed new schools shall be opened up in consultation with the education department. The Project authority should provide all the infrastructure, salaries and maintenance grant for the school for at least five years • Scholarship and other skill development opportunities for the eligible persons of the affected population should be provided.	EPC Contractor, MEMD		
46	Human environment	Employment opportunities	The project authorities directly as well as through their contractors shall. • Ensure jobs for local population. • Training in vocational skill for unskilled youth of the project affected area. • Income generation schemes	EPC Contractor, MEMD		
47	Human environment	Strengthening of health services Properly manage the increasing population and the likely public health issues such as STIs that are likely to come along with such interaction.	• The project authority shall establish healthcare facilities in terms of health care centers at a few affected villages. These centers shall also extend their services to the local people. • Mobile vans for emergency services shall be provided and HIV/AIDS, centre shall be established in collaboration with Kiryandongo Hospital (Health and safety management plan).	EPC Contractor, MEMD		
48	Human environment	Properly manage the increasing population; during construction	Social amenities shall be expanded to allow for increased population.	EPC Contractor, MEMD and Local	2011	Ongoing

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
				Administration		
49	Public Infrastructure	Avoid or compensate damage to public access roads due to heavy traffic	Damage arising to public access roads which is directly attributable to construction activities or to the Contractors negligence, the Contractor shall be liable for its repair to the original specifications or the cost of repair.	EPC Contractor, MEMD, Local Leadership, CGV, District Administration	2011	As required
50	Public Infrastructure	Three Masts located in the project area	The function of these masts falling in the project area is not going to be affected and can stay in the project area, no relocation required.	EPC Contractor, NEMA and MEMD		As required
51	Public Infrastructure	Atura river crossing point is going to be submerged by the project	• Shifting of the Atura river crossing point may be considered. • Exploring other route and plan for shifting the structure with calculating the cost for the purpose at the time of construction.	EPC Contractor, NEMA and MEMD		As required
52	Human Environment	Electricity Supply	Free electricity or electricity on subsidized rates to the project affected population is proposed.	MEMD	2011	
53	Land / Public Infrastructure	Damage to the roads, houses and infrastructure due to vibration and noise generated from blasting	Photographs of the project area including structures have been taken into records during socio-economic survey. Therefore, in case of damage reported to any structure compensation will be paid after through verification.	EPC Contractor, MEMD, Local Leadership, CGV, District Administration		
Best Management Practices in agriculture						
54	Agriculture	To increase agriculture production and self sustainability in the project affected area	• Financial Grant shall be made for providing high yielding variety of seed, fertilizers and equipments to the project affected families and for improving the veterinary health services • Agricultural Centre should be open which should impart training to the farmed. • Training programmes should be organized for the farmers on best practices of agriculture. They should be made aware about the new techniques, instruments and etc.	EPC Contractor District and Local Authorities.		
55	Weed	Removal of invasive	A suitable biological and physical method shall be	Project and	2011	As

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
		weed to enhance the agricultural production.	implemented.	local Authorities		required
Management Plan for Cultural Heritage						
56	Archaeological Sites	Protection of the important historical sites that were found out but close to the project site (e.g. Kabalege's Fort).	At construction/operational stage, the identified sites shall be enhanced and preserved.	EPC Contractor, MEMD, Uganda National Museums, UWA	2011	As required
57	Cultural Resources	Properly handle the sensitive issue of likelihood that dead bodies have to be exhumed or run over during construction phase	The burial sites' owners/ clans should be consulted on the way forward	EPC Contractor, MEMD, Uganda National Museums, UWA	2011	At the on set of the project
58	Cultural Resources	Properly handle the issue of cultural sites like Manana shrine which will be interfered with	The shrine owners/ clans should be consulted on the way forward	EPC Contractor, MEMD, Uganda National Museums, UWA	2011	Ongoing
59	Archaeological Resources	Proper management of any archaeological artifacts and sites that might be discovered during construction	The Uganda National Museum should be informed of such discoveries.	EPC Contractor, MEMD, Uganda National Museums, UWA	2011	As required
Management plan for Tourism						

Ref. No.	Affected Environment	Objective to Address Impact	Measures to be taken	Responsibility	Due Date	Frequency
60	Tourism	To enhance the tourism industries	• Project proponent in collaboration with UWA should explore and promote the potential tourism activities in the project area • Dam construction creates panoramic sceneries which attract the tourism. This option should also be explored. • Cultural programs can also be organized for tourism enhancement.	MEMD, Local Authorities, District Administration	2011	As required

9.2 SOCIAL & ENVIRONMENTAL MANAGEMENT PLAN FOR KARUMA HPP

The Social & Environmental Action Plan (SEAP) describes the principles, objectives and approach to be followed in minimizing and mitigation the adverse environmental and social impacts caused as a result of the implementation of the Proposed Karuma HPP. The plan is comprised of several components that are to be integrated and implemented by project developer and the EPC Contractor with regard to the Project. All the relevant policies, regulations, procedures arising from government agencies, lender policies and international treaties etc as outlined in the Chapter 2 of this ESIA report form the basis of this plan. These relevant policies and guidelines will have to be observed during the construction and operation of the project to reduce environmental (including social and economic) impacts of the project. The Management Framework will include a Change Management process, whereby proposed changes to social and environmental management procedures are reviewed and assessed prior to being implemented, and a comprehensive register of such changes is kept.

The SEAP components are shown in **Figure 9.1**; whereas the UEGCL implementation team structure and proposed EPC contractor's environmental team structure is presented in **Figure 9.2 and 9.3** respectively.

9.2.1 Change Management

During the implementation of the project, change may be required to address unforeseen or unexpected conditions or situations. A change management process significant changes to project procedures, processes, design or activities. Both project proponent and the EPC Contractor will be responsible for managing changes within their respective areas of responsibility. MEMD and the EPC Contractor will incorporate into their Action Plan a change management process similar to the following:

- Identification of item/situation potentially requiring change;
- Preparation of a Change Request Document that;
    a. Outlines the nature of the item/situation requiring change;
    b. Outlines impacts of the change (e.g., cost, schedule, safety, operability); and,
    c. Identifies potential biophysical, socio-economic, or health concerns.
- Review of the Change Request for compatibility with MEMD's or the EPC Contractor's Action Plan, as applicable;
    a. At the task manager level for minor changes;
    b. By the Social and Environmental Review Panel for significant changes; and,

c. Review by NEMA and international lenders for significant changes, to confirm it will not compromise ongoing compliance with Ugandan regulations, nor with lender policies and performance standards.

- Documentation of the approval or rejection of the change request;
- Application for, and receipt of, any approvals required to effect the change under Ugandan Law;
- Implementation of the approved change, including communication to appropriate parties concerning the nature, scope, and timing of the change; and,
- Summary of project changes and status to be included in quarterly reports to the Social and Environmental Review Panel, NEMA and lenders.

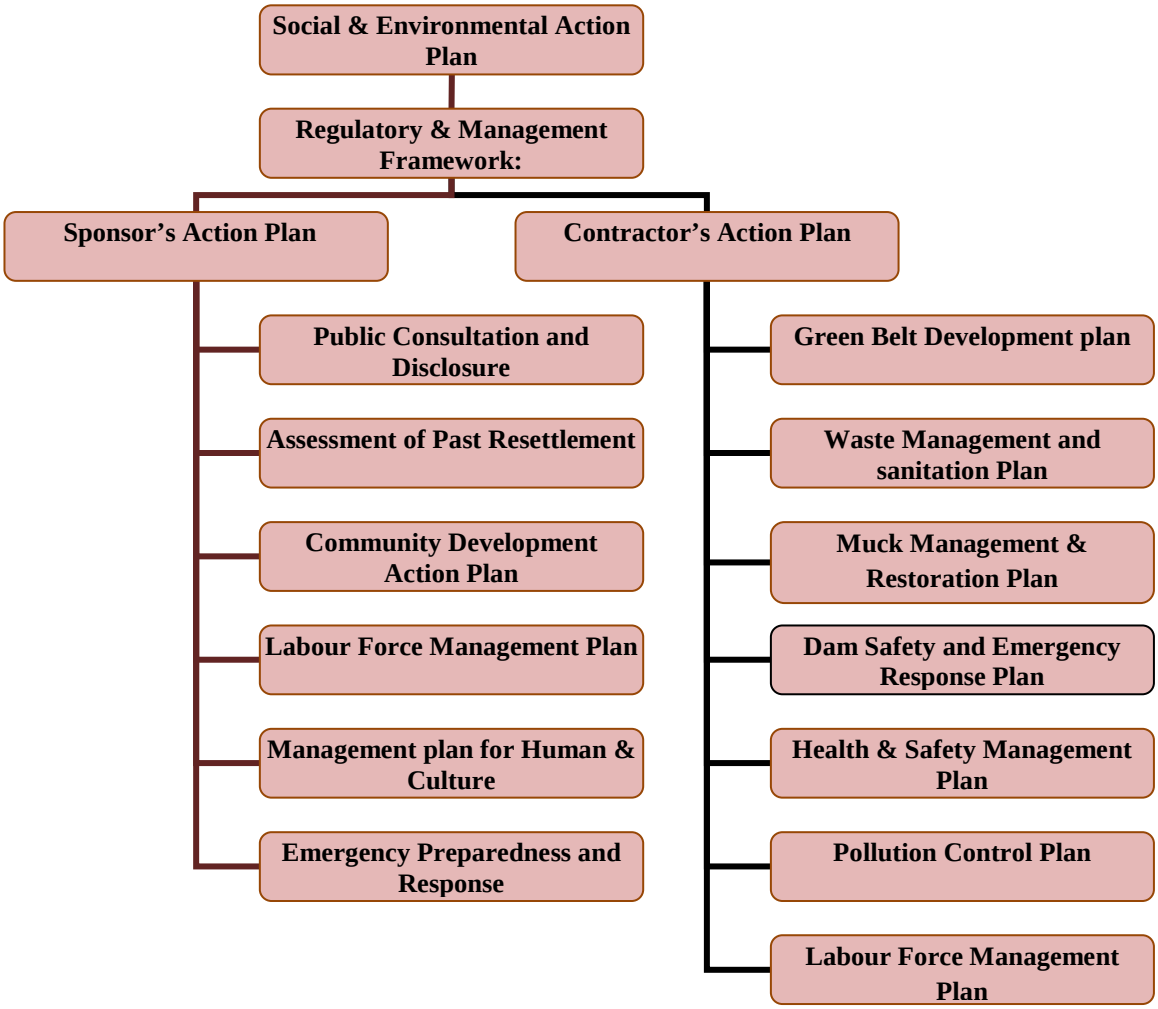

Figure 9.1 : Social & Environmental Action Plan (SEAP) Components

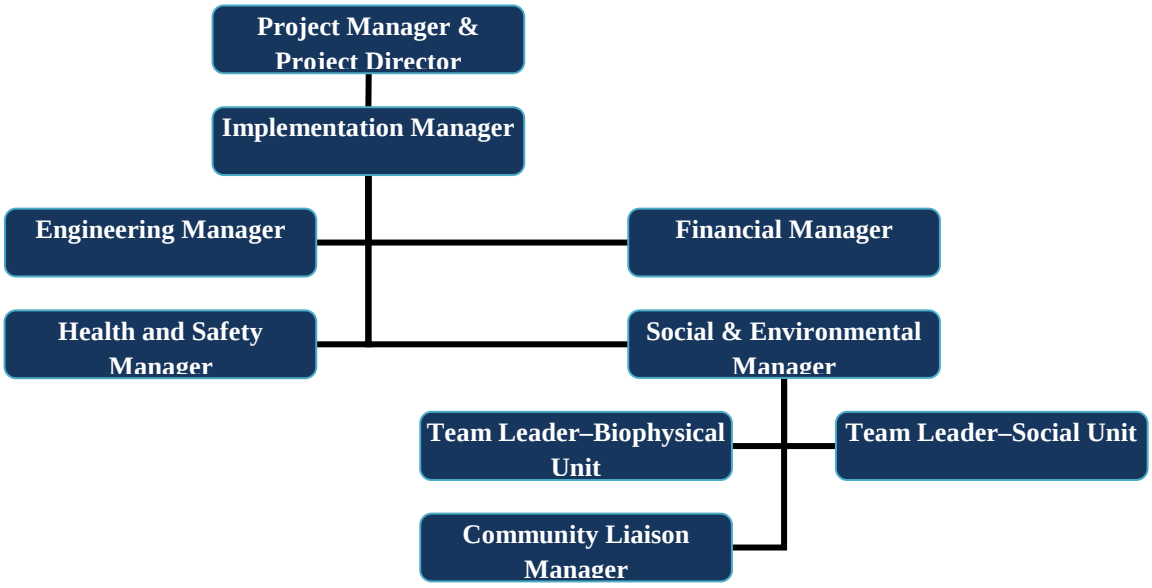

Figure 9.2: UEGCL implementation team structure (indicative)

Figure 9.3: Proposed EPC contractor's environmental team structure

9.3 ENVIRONMENTAL MONITORING & AUDITING

During project implementation, a framework in the form of a plan is proposed to ensure efficient and effective undertaking of the mitigation measures. Environmental monitoring is used as a tool in relation to environmental management as it provides the basis for rational management decisions regarding impact control. By using the information collected through monitoring, environmental mitigation and benefit enhancement measures can be improved and the works or operation will be modified or halted when necessary. Therefore, the objectives of this environmental monitoring programme include:

- To monitor changes in the environmental conditions as a result of implementing the Karuma Hydropower Project;
- To check on whether mitigation and benefit enhancement measures have actually been adopted, and are proving effective in practice;
- To provide a means whereby any impacts which were not clearly defined/identified/evaluated or unforeseen at the time of preparation of this ESIA can be identified, and to provide a basis for developing appropriate and additional impact mitigation measures to take into account those newly evaluated impacts;
- To provide information on the actual nature and extent of key impacts and the effectiveness of mitigation and benefit enhancement measures which, through a feedback mechanism, can improve the planning and execution of other similar hydropower projects.
- To ensure that personnel exercise due diligence in carrying out activities

The proposed environmental monitoring programmes shall include:

a) Compliance monitoring

An environmental compliance monitoring programme will ensure that pre-construction commitments made to regulatory agencies, and other stakeholders are implemented. Compliance monitoring will ensure that preventive and environmental measures are in place throughout the project area.

Compliance monitoring is undertaken for a project to ensure that appropriate regulations and company specifications are implemented during project development. Activities relevant to all phases of the project (i.e., construction, operation and decommissioning) are subject to the provisions of relevant regulations and guidelines.

Compliance monitoring will be performed by MEMD personnel that are familiar with the applicable regulations and will ensure that activities be planned and conducted with the knowledge and understanding of standard specifications. Monitoring will ensure that any planned activity during project development is not in contravention of the regulations or MEMD specifications. In the event of non compliance, MEMD personnel overseeing compliance monitoring will immediately report the activity to MEMD, and implement measures to achieve compliance. Monitoring during operations will be conducted during normal working hours. Compliance monitoring will follow the stipulations in the Standing Operations Procedures for the Power Station. General environmental conditions in the project area and surrounding areas will be monitored. New developments or activities near Power Station facilities will also be monitored to assess any encroachment onto the MFNP and KWR.

b) Baseline monitoring

Pre-construction (i.e. baseline) monitoring will be conducted to characterize a variety of parameters associated with environmental components, and facilitate finalization of the envisaged Power Station and conservation area. Baseline monitoring provides a basis by which changes in parameters associated with environmental components can be determined by comparing with the results obtained from the compliance and environmental effects monitoring program.

c) Environmental effects monitoring

Environmental effects will be monitored in order to assess the accuracy of any predictions made in the EIA concerning potential impacts. After project implementation, potential environmental effects of construction will be monitored. Site visual examinations of the environmental features along the Nile River and protected area (MFNP and KWR) will be conducted to identify potential problem areas. This will facilitate the assessment of recovery trends and zones that may require additional restoration activities. Soil and water sampling programmes in the project area will be developed to monitor site conditions in order to establish site specific rehabilitation programmes where need will arise. Monitoring may include documentation on the following:

i. Aquatic habitat,
ii. Species at risk (Fish, Wildlife and Forestry)
iii. The effect of vibrations associated with blasting and or drilling activities on the aquatic environment (especially on wild animals and fish) and surrounding areas
iv. The quality of selected surface waters draining potentially disturbed areas

Environmental monitoring ensures that the impacts have been accurately predicted and that appropriate mitigation measures are being implemented as planned and that they have the expected effects. Identification of potential environmental impacts associated with the construction of the project indicates a need to design and implement a specific environmental monitoring plan. The monitoring process begins with supervision of implementation. The bulk of the activities may take place during the implementation stage. The environmental objectives of these activities are to ensure mitigation measures outlined in the contracts are being properly implemented, that environmental contractual measures are being respected, construction is going in accordance with the agreed design standards and that no unforeseen negative impacts are occurring as a result of project execution.

The comprehensive environmental monitoring programme has been proposed for KHPP which is given in **Table 9.2**. This monitoring plan identifies monitoring activities that will take place, when and by whom and identifies the indicators and data collection methods, allocates the budget and institutions and persons to implement the plan. As indicated in the monitoring schedule below, monitoring will be done by MEMD, EPC Contractor, DWRM, UWA, Uganda National Museum and local authorities among others.

Table 9.2: The proposed Environmental Monitoring Plan for Karuma HPP

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
Physical Indicators						
Nile River	Downstream Water Flow	Ensure planned environmental flow and artificial flood	Along set transects after every 2Km downstream	Gauging Boards/Water Level Meters(Online Monitors)	Daily	EPC Contractor, DWRM, MEMD
	Sediment Load	Control the inflow of sediments from the construction site into the river	At the streams flowing into the river where traps would have been installed	Collect triplicate bottom sediment samples for benthic macro-invertebrates using a ponar grab	Weekly	EPC Contractor, DWRM, MEMD
Geology	Geological formation and structure	Detect any changes in the geological formation within the project area	Along the Tunnel/power channel, and tailrace channel	Seismicity monitoring station be established	Continuous	EPC Contractor, DWRM, MEMD
Land environment	Roads, houses and other infrastructures	Damage to the structures due to vibrations generated from the blasting and construction activites	Entire project area	Visual inspection	Periodical inspections throughout the construction period	EPC Contractor, MEMD, District Administration

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
Topography	Landscape and Aesthetics	Landscape alterations are reduced to a minimum	Entire project site	Visual inspection of earth works to ensure that excessive excavation other than those agreed upon are not carried out, particularly at borrow pit sites, access roads and around the contractor's camp.	Weekly inspections throughout the Construction Phase	MEMD, UWA
Soils	Soil erosion/degradation and compaction	Ensure minimal soil disturbance and the related erosion impacts	Along access roads, construction sites and steep slopes of the river bank	Slope stabilization in susceptible areas will be undertaken	Weekly	EPC Contractor, DWRM, MEMD
	Solid and liquid wastes	Ensure that sites for storage of materials, oil and fuels have sealed surfaces	Sites for storage of materials, oil and fuels	Site Engineer to inspect storage tanks and ensure they have bund walls around them high enough to contain any spillage	Periodical inspections throughout the construction and operation Phase	EPC Contractor, DWRM, MEMD, UWA, NEMA
Hydrology	Fisheries resources	Monitor the fisheries in the immediate upstream of the weir	At set transects upstream the weir	Visual survey and Chemical and Bacteriological analysis	Monthly	EPC Contractor, DWRM, MEMD

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
Water Quality	Baseline Water Quality (pH, TSS, BOD, DO, Total Nitrogen, Total Phosphorus, faecal coliforms	Establishment of Baseline Data and successive trends	Same sampling points from where data was collected for EIA study	Chemical and Bacteriological analysis	Monthly	EPC Contractor, DWRM, MEMD
	Hazardous liquids storage	To inspect and satisfy that areas where hazardous liquids are stored, water from concrete batching plants is treated, silt traps are put along drainage systems	Storage areas for the materials of concern	Inspect areas where hazardous liquids are stored	Periodical inspections through out the Construction Phase.	EPC Contractor, DWRM, NEMA, MEMD
Water Resources Demand	Environmental flows	Maintain the planned ecological flow	At in-take upstream and downstream of the project	Gauging Boards/Water Level Meters (Online Monitors)	Daily	EPC Contractor, DWRM, MEMD
Noise	Noise levels	Baseline data and trends to ensure compliance with the noise limits and protect public health	Key areas as outlined in section 5.1.3 in this report	Field noise meters installed	Monthly, and during specific activities such as blasting	EPC Contractor, MEMD, UWA
	Sleep disturbance	To check and ensure that working hours are limited to day light only	Construction sites	Visual inspection	Weekly inspections through out the Construction	EPC Contractor, MEMD, UWA

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
					Phase	
Air Quality	Dust deposition on the immediate surroundings such as grasses, shrubs, trees	To observe the level of dust generated during construction and watering down should be done if dust levels are unacceptable.	Entire project site especially access roads and construction sites	Field air quality meters installed	Regular inspections through out the Construction Phase.	EPC Contractor, MEMD, UWA
	Exhaust fume emissions are controlled	To check and ensure that construction vehicles and equipment are maintained in order to reduce emission of exhaust fumes	Construction vehicles and equipment	Routine Maintenance and servicing of vehicles and equipment	Regular inspections through out the Construction Phase.	EPC Contractor, MEMD
	Clean toilet environment free from unpleasant odours	To inspect and ensure that toilets are cleaned and maintained to avoid unpleasant odours	Toilets and their surroundings	Visual inspection	Regular inspections through out the Construction Phase.	EPC Contractor, MEMD
	Waste disposal method	To inspect and ensure waste is carefully managed and disposed of in designated places to prevent unpleasant odours.	Approved waste disposal site	Visual inspection	Regular inspections through out the Construction Phase.	EPC Contractor, MEMD
Biological Environment						
Mammals	Habitat distruction, Poaching and Noise	Baseline Data and Trends	Strip 30 km wide along the river	General walk through the project area observing mammals presence, signs, tracks and faecal	Monthly	MEMD, UWA

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
	disturbance			material and wallow areas/Range Based Monitoring		
Reptiles and amphibian	Habitat distruction, Poaching and Noise disturbance	Baseline Data and Trends	Riverine and riparian environments	Visual encounter surveys by wildlife ecologist	Monthly	MEMD, UWA
Birds	Habitat distruction	Baseline Data and Trends	Riverine and riparian environments	Counts lasting 30 minutes at intervals placed 1 km apart along the access routes and the general project area.	Monthly	MEMD, UWA
Fisheries/Aquatic Resources	Smothering macro-habitats for invertebrates, fish breeding and feeding; Contamination of water; light attenuation	Baseline Data and Trends	Riverine and riparian environments	Phytoplankton and Zooplankton assessments; Chemical and Bacteriological analysis	Monthly	EPC Contractor, DWRM, MEMD
Terrestrial Vegetation & Forest cover	Rare and endemic species, cutting of trees and undercover vegetation	Sensitive habitats to be maintained and also ensure that excessive clearance of vegetation is avoided and should be confined to the project site	Riverine and riparian environments especially at dam, access routes, camp sites	Belt-transects, Visual inspection by botanist, transects	Each time clearance of vegetation is being done through out Construction	EPC Contractor, DWRM, MEMD

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
					Phase	
Aquatic Weed	accumulation of weed and Algae production	Avoid a barrier for aquatic weed accumulation	At spill way gate, upstream of weir	Visual inspection by Aquatic specialist and transects	Monthly	EPC Contractor, DWRM, MEMD
Wildlife	Wildlife Habitats	To carry out inspections and report evidence of wildlife intrusion onto the project site and to check that wildlife access corridors are maintained	Entire project site especially MFNP	Visual inspections	Periodical inspections through out Construction and Operation Phase	EPC Contractor, UWA, MEMD
Social-Economic Environment						
Population	Poaching and Settlement patterns. Encochement in foret areas.	Influx of project vehicles, equipment transportation, alteration of normal visual impressions in MFNP and KWR	Entire project site especially camp areas	Visual survey/ Range Based Monitoring	Periodically during construction period	EPC Contractor, MEMD, UWA
	Work Accidents	To monitor and ensure that the procedures on Safety, Health and Environment for construction workers are being followed during the Construction Phase	Entire Project area	Operational Manual on Safety, Health and Environment for construction workers be developed and available on site	Periodical inspections through out the Construction Phase; however daily records are to be maintained by EPC	EPC Contractor, MEMD

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
					contractor.	
Social and cultural set-up	Immigration of people	It is likely to destabilize the social set-up of the area	Project area and its surroundings	Maintenance of record of project area residence and labour recruitment in the project Periodic Meeting with locals to check the records of immigration	Quarterly	EPC Contractor, MEMD, UWA
	STDs and HIV/AIDS communication	Contractor shall conduct awareness camps and ensure that education is given to both the construction workers and local community on STDs and HIV/AIDS	Near by villages and worker camps	Communication aids such as video shows, pamphlets, talks, medical camps etc	Periodic check- ups during the Construction Phase	EPC Contractor, MEMD
Water supply and sanitation	Demand on domestic water supply and proper sanitation facility	Avoid exceeding planned water abstraction rate for construction work and domestic use	Water abstraction points	Routine check-up by DWRM	Weekly	EPC Contractor, DWRM, MEMD
Transport	Road traffic	Heavy traffic moments and accidents	Along Kampala – Gulu Highway at project site	Road signs such as speed limit and warning signs	Monthly	EPC Contractor, MEMD

Environmental Aspect	Parameter to be Monitored	Objective/Reason for Monitoring	Monitoring Location	Monitoring Method	Monitoring Frequency	Responsibility
Cultural / Archaeological Environment						
Archaeological Sites	Heritage sites	Disturbance and encroachment to the heritage sites	Project area and its surroundings	Ethno-archaeological study and Visual survey In case of new findings intimating associated govt. authorities	Quarterly During specific activities such as road construction	Uganda National Museum, EPC Contractor, MEMD

Note:

- *The summary budget for the implementation of both the Environmental Management Plan and the Monitoring Plan is given in a separate table below.*
- *The NGOs/Civil Society have not been indicated in the responsibilities, but they are key stakeholders in implementation of both the management and monitoring plans and they continuously be engaged for the smooth implementation of the proposed mitigation measures.*

9.4 INSTITUTIONAL STRENGTHENING

Several governmental agencies at both the local and national levels will be responsible for ongoing monitoring of construction and operational conditions and activities. This section outlines the framework that MEMD will make ensure that the monitoring institutions which are assigned responsibility as per the ESIA report have the capacity to discharge their responsibilities. In general, MEMD will consult with the applicable agencies to establish the extent of each agency's 'in house' capability for managing such activities, and identify any shortfalls. Wherever appropriate, institutional strengthening should be integrated with existing programmes being planned or implemented by the institutions themselves, or by national or international organisations such as NGOs.

The general process to be followed to establish institutional strengthening needs is as follows:

- Discuss the mandate and monitoring responsibilities of each agency, and develop a monitoring plan that will include details of procedures, equipment requirements and staff requirements;
- Establish the Agency's 'in house' capability for managing such activities, and identify any shortfalls;
- Develop, in consultation with the Agency, a plan for meeting these shortfalls;
- Assist the Agency to implement a specific capacity building plan, taking into account other capacity building programmes being planned or implemented by government or international organisations; and,
- Monitor the effectiveness of institutional strengthening measures, and carry out any further measures as required.

The following agencies are responsible for the monitoring of construction and operational conditions and activities of Karuma HEP.

- UWA
- EPC Contractor
- DWRM
- NEMA
- District Health Offices
- UEGCL
- MoW/UNRA,
- District administration

9.4.1 Permits and approval conditions

The environmental monitoring reports will be provided timely by the responsible agencies. These reports allow in identifying if any mitigation measure is not being effective and will enable corrective action to be taken. These documents may be inspected and/or audited by NEMA and other stakeholders and project lenders from time to time, in accordance with the above statute. This will provide an opportunity for them to comment both on the impacts of the project itself and the efficacy of the ESIA. A limited number of hard copies of the quarterly reports will be made available to local stakeholders at the project developer's offices. All monitoring and reporting documents will be kept on file for the life of the project, and will not be disposed of without permission from NEMA.

9.5 ENVIRONMENTAL MITIGATION BUDGET

The provision under this section covers the cost for biodiversity conservation & management, catchment area management, fishery conservation & management, public health delivery system, solid waste and sewage management, fuel and energy conservation measures, muck disposal, landscaping and restoration of construction areas & quarry sites, creation of green belt , resettlement and rehabilitation, disaster and hazard management, environmental monitoring programme, compensatory afforestation, reservoir rim treatment, local area development etc. The total environmentally related costs on the proposed project are estimated at USD 20.52 Million. The budget related to the socio-economic issues is provided for in the Resettlement Action Plan (RAP). The various budgeted provisions for mitigation activities and related costs are outlined in **Table 9.3** below. These budget estimates have been made with adequate provisions for contingencies and is an integral part of the financial requirement of the project.

Table 9.3: Summary of costs in implementing the EMMP

S. No.	Mitigation measures	Tentative Cost, USD (USD)
1	**EMP at Construction Site**	**8,200,000**
a	Muck Management Plan	2,500,000
b	Landscaping & Restoration Plan	800,000
c	Erosion & sediment control	3,000,000
d	Solid waste management and sanitation	1,000,000
e	Pollution control	100,000
f	Dam Safety and Emergency Response Plan	800,000

2	**EMP for Biological Resources**	**3,000,000**
a	Wildlife and Biodiversity Management plan including plan for National Park	1,300,000
b	Fisheries Management Plan	700,000
c	Greenbelt development Plan	1,000,000
3	**Management Plan for Human Issues**	**5,000,000**
a	Electricity Supply	1,000,000
b	Strengthening of health services	1,000,000
c	Improvement of Educational Facilities	1,500,000
d	Employment opportunities	1,500,000
4	**Health and safety management plan**	**100,000**
5	**Labour Force Management Plan**	**400,000**
6	**Management Plan for Resettlement**	**1,000,000**
7	**Best Management Practices in agriculture**	**420,000**
a	Improved inputs for seeds, fertilizers and equipments	50,000
b	Improvement of veterinary health services	20,000
c	Agricultural Centre	300,000
d	Training to the farmers for best practices	50,000
8	**Management Plan for Cultural Heritage**	**800,000**
9	**Institutional Strengthening**	**800,000**
10	**Environmental Monitoring Programme**	**800,000**
11	**Tourism**	**1,20,000**
Grand Total		**20,520,000**

Note: The cost of the resettlement and compensation as evaluated by Chief Government Valuer is provided separately in Volume III Resettlement Action Plan (RAP) of ESIA. However, the above cost estimated for Management and Monitoring may consider as tentative which may revise in future as per need.