



THE REPUBLIC OF UGANDA



THE NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

PUBLIC NOTICE

THE PUBLIC IS HEREBY NOTIFIED that the National Environment Management Authority (NEMA) has received an Environmental and Social Impact Statement (ESIS) for the proposed Karuma Hydro-power Project submitted by the Ministry of Energy and Mineral Development, which is now available for public scrutiny and comment.

Karuma HPP will be a run-off the river project with intake 1.5km on the Kyoga Nile east of the Kampala – Gulu Highway. The Project area covering 465.5 Ha is to be located in Kiryandongo and Oyam Districts, and the Karuma Wildlife Reserve. A Resettlement Action Plan for the project area affected persons has since been approved by the CGV, and a total of 192.75 Ha will be acquired from private owners.

Key project components and features are summarised below:

- A concrete dam of maximum height 20m, length of 311.53m;
- Power intake structure, pressure shafts and Underground powerhouse with six vertical Francis Turbines of 100MW each, and total installed capacity of 600MW;
- Tailrace system, including an 8.3 km tunnel, with a head of upto 70m;
- Reservoir area of 237.35 Ha at Full Reservoir Level, and Gross reservoir volume of 80MCM;
- Flood discharge of 4700m³/s, design discharge of 1178m³/s and minimum environment flow of 100m³/s;
- A river section of 14km with reduced flow;
- A fish ladder to allow for immigration of aquatic species;
- Camps, roads and associated infrastructure for the construction phase and future operations including magazines, workshops, warehouses, muck disposal area, power and water supply, telecommunication and waste water treatment;

Some aspects of the proposed development were found likely to result in impacts on communities and the environment. The proponent of the Project intends to minimize those impacts by implementing appropriate mitigation measures as specified in the ESIS. It is also indicated that the Project could lead to positive gains to the Uganda economy.

Summary Of Positive Impacts

- Increased electricity generation, reducing electricity rationing and the associated costs of alternative thermal generation;
- Create conditions to attract direct foreign investments to Uganda;
- Increase productivity and lower costs for government, education, health, business and industry;
- Direct employment of Ugandans during construction and operation of the project;
- Indirect employment and trade, in industries and commercial activities, which become established as a result of the greater availability of electricity;
- Facilitate rural electrification;
- Minimize cost of electricity for consumers;

SUMMARY OF KEY IMPACTS AND MITIGATION MEASURES

Affected Environment	Impacts/Benefits	Proposed Mitigation/Enhancement Measure
CONSTRUCTION PHASE		
1. SOIL AND LAND REQUIREMENTS	<ul style="list-style-type: none"> • Increase in soil erosion due vegetation clearance and soil instability from construction activity. • Mining for the construction material is likely to be sourced from the vicinity of the project area which if carried out inappropriately, scars the land reducing its aesthetic quality, causes erosion and contributes to tree resource depletion. • Pressure on available land in the area due to increased settlement and cultivation and can easily lead to land degradation if conducted in an unsustainable manner. 	<ul style="list-style-type: none"> • Re-vegetation on slopes and installation of sediment runoff control devices to control soil erosion. • Procurement of all raw materials and construction inputs from approved sources. In such a case as it may be deemed necessary to open up a new source of material for the project (e.g. for sand), Uganda's environmental legislation requires that a separate environmental project brief be elaborated for each separate material extraction site and the Contractor is required to obtain permits from NEMA for the operation of borrow pits. • Tree planting to compensate for the loss of trees and to prevent soil erosion; • Restoration at material source points, including sand, murram
2. FLORA	<ul style="list-style-type: none"> • Permanent loss of vegetation due to clearance of tree cover and shrubs. Further surrounding vegetation will experience changes in species composition towards more riparian species. Proliferation of invasive alien species including <i>Lantana camara</i> and <i>Senna</i> 	<ul style="list-style-type: none"> • Conservation of Mvule (<i>Milicia excelsa</i>), an IUCN red listed species adopting appropriate in-situ conservation measures. • Planting with wildlings of the characteristic species from the nearby areas in the disturbed sites susceptible to erosion. • Promoting of tree planting and energy saving stoves among project host

	<p><i>spectabilis</i> that were recorded in the project area affecting native or endemic vegetation.</p>	<p>communities as part of community development activities</p> <ul style="list-style-type: none"> • Spread of invasive species should be checked as much as possible through uprooting, burning and prevention of growth to reproductive stage.
<p>3. TERRESTRIAL FAUNA</p>	<ul style="list-style-type: none"> • Disturbance to wildlife due to temporary increase in noise and vibration during the construction time; • Increased human access to the Karuma Wildlife Reserve could lead to illegal activities, such as poaching; 	<ul style="list-style-type: none"> • Only the necessary roads/buildings should be constructed and the EPC Contractor should avoid opening up unnecessary roads/open spaces, and as much as possible restrict developments to approved layout/design; • Ensure compliance with all regulations relevant to minimizing noise and vibrations generated from construction; • Compliance with UWA guidelines for developments in the park including waste management, noise emissions, speed limits
<p>4. AQUATIC ECOSYSTEMS</p>	<ul style="list-style-type: none"> • Aquatic ecosystem and biodiversity will be negatively affected due to accidental or deliberate dumping of soil and rock, unprofessional storage and handling of the large quantities of oil and oil products and indiscriminate unsafe disposal of human waste. • Increased fish demand due to rise in labour population could lead to use of illegal fishing methods as a coping strategy 	<ul style="list-style-type: none"> • Strict adoption and enforcement of environmental friendly management strategy and practices for soil and rock waste translocation and disposal. • Ensure approval of all oil storage and dispensing facilities and their regular inspection; • Safe procedures for storage and handling of oil and oil products. • Infrastructure in place for disposal and treatment of faecal waste; • Sensitization on community hygiene not only for the work force but also for the local community. • Strict enforcement of management strategies that emphasize use of recommended fishing methods and level of fishing pressure.
<p>5. AIR QUALITY</p>	<ul style="list-style-type: none"> • Generation of airborne dust as well as gaseous pollutant as NO_x, SO_x are likely to increase due to construction activity, increased vehicular movement. 	<ul style="list-style-type: none"> • Use of modern drilling and blasting techniques • Secondary crushers will be equipped with dust suppression equipment comprising of water sprays. • A maximum speed limit of 40 km/h will be imposed on all internal access roads and features to reduce speed erected including speed bumps and appropriate road signage. • Main access roads in the project area, such as the road from the Kampala–Gulu Highway to the dam and further to the power station will be paved.
<p>6. NOISE AND VIBRATIONS</p>	<ul style="list-style-type: none"> • Increase in Noise levels in the construction area from machinery and vehicular 	<ul style="list-style-type: none"> • Equipment used, for example, should meet minimum safe guards for natural environments and could have silencers

<p>LEVELS</p>	<p>movement which will have potential impact on construction workers who are working in the close vicinity.</p> <ul style="list-style-type: none"> • Increase in vibration level may have negative impact on the land structures like roads, bridge, houses or dam and other components, and cause disruption to wildlife 	<p>and cause minimum ground vibrations during construction period.</p> <ul style="list-style-type: none"> • Blasting activity should be limited or restricted during night time and shall be conducted in a controlled manner in accordance with Ugandan explosives regulations. • Standard occupational health and safety practices such as ear protection and enforcement of exposure duration restrictions should be undertaken.
<p>7. IMPACTS ON WATER QUALITY</p>	<ul style="list-style-type: none"> • Siltation of downstream water courses and drainage systems due to increased water runoff and erosion from various work sites. • Water pollution due to oil and fuel spillages and leakages from transport, storage, dispensing of petroleum products. • Water pollution from disposal of human faecal waste 	<ul style="list-style-type: none"> • Sedimentation control and attenuation facilities such as sand traps, temporary attenuation ponds will be used. • Stockpile areas for materials and overburden dumps should be located away from water courses. • Construction of diversion tunnel/coffer dam will be carried out in dry season • Liquid fuel storage and dispensing on site shall also be provided with relevant standards • Concrete batching plant/mixing area will be surrounded by a retention bund and excess water will be retained in a sedimentation reservoir. • Approved sites for disposal of construction material and hazardous waste. • Adequate water borne facilities for collection and treatment of faecal waste
<p>8. GEOTECHNICAL SAFETY</p>	<ul style="list-style-type: none"> • No major fault / fault zone was located hence the earthquake hazard is not very high for this site. • Tailrace outfall area overburden of concern to tunnel and workers' safety 	<ul style="list-style-type: none"> • The geological condition at the tailrace outfall area is not suitable to drive the tunnels up to the river, so a trapezoidal channel of 100.0 m base width with 1:1 side slope has been proposed at 8.3km downstream of surge chamber. • Upto 4 adits to be used to access underground work sites; • Establishment of a seismicity monitoring station.
<p>9. OCCUPATIONAL HEALTH AND SAFETY</p>	<ul style="list-style-type: none"> • Potential high risk levels to the occupational health and safety of workers and personnel during deep excavations work, tunnelling and handling of heavy plant and machinery. • Risk of fire due to negligence 	<ul style="list-style-type: none"> • EPC Contractor shall be obliged to comply with the National Health and Safety Regulations, specifically the Occupational Health and Safety Act of 2006, and international best practices. • Provision of Fire prevention systems.
<p>10. PUBLIC HEALTH AND SAFETY</p>	<ul style="list-style-type: none"> • Reduced road safety on the Kampala–Gulu Highway road around Karuma due to construction traffic. • Increased risk of transmission 	<ul style="list-style-type: none"> • Speed limit signs, traffic and safety barriers and other relevant warning signs will be established in and around construction sites and access routes. • Awareness campaigns on traffic safety

	<p>of HIV and communicable diseases due to social interactions amongst the construction workers and local communities.</p>	<p>will be organized.</p> <ul style="list-style-type: none"> • An intensive HIV/AIDS awareness programme should be organized in association with the Kiryandongo Hospital, District Aids Coordinators, Uganda AIDS Commission, and as part of Community Development Projects • Redevelopment of the Karuma area highway section to dual carriage way
<p>11. IMPACTS ON SOCIAL ENVIRONMENT</p>	<ul style="list-style-type: none"> • Population increase due to immigration of labour population. • Change in settlement pattern in the Karuma area as some villages in the dam site will have to be relocated from the intake area and along the Tail race 	<ul style="list-style-type: none"> • Strict control to in-migration should be instituted to ensure only relevant staff move to the construction site area. • Involvement of local authorities in the regulation and control of any influx of people into the area. • A Resettlement Action Plan (RAP) has been developed; this also will include a Community Development Plan (CDAP) which has been developed taking into account the ongoing local government programmes and interventions in the project area and its immediate environs.
<p>12. CULTURE AND HERITAGE RESOURCES</p>	<ul style="list-style-type: none"> • Total distraction of the archaeology and other cultural resources found in the soils like burials due to construction work. • Vibration from construction vehicles poses threat to the physical fabric of the pottery, iron slag, furnaces, tuyeres and the bone remains 	<ul style="list-style-type: none"> • Chance finds procedure to be developed by EPC in liaison with department of Museums and Monuments to guide handling of all archaeological finds during construction. • Relocate the burial sites, shrines and ritual sites in accordance with laws and local traditional norms.
<p>13. COMMUNITY/ NATIONAL BENEFITS</p>	<ul style="list-style-type: none"> • Boost to the Local Economy due to increase in market demand of food and other necessities. • Employment opportunities will be created for both skilled and non skilled labours. • Capacity building will be provided (organised and un-organised) through the transfer of new technologies and new skills to (un-skilled) labour. 	<ul style="list-style-type: none"> • Market opportunities / infrastructure for the sales of local produce to the workforce will be provided. • Programmes and technical training courses as well as on the job training will be provided in specific skills areas for suitable candidates.
<p>OPERATION PHASE</p>		
<p>1. SOIL AND LAND REQUIREMENTS</p>	<ul style="list-style-type: none"> • No major soil erosion impacts are envisaged during the operation phase since the construction phase mitigation measures e.g site restoration will spread into the operation 	<ul style="list-style-type: none"> • Appropriate reservoir rim treatment measures comprising of engineering/biological measures. • EPC contractor will ensure the shifting of Atura ferry crossing. All private land

	<p>phase</p> <ul style="list-style-type: none"> • A continuous strain on the natural resources is envisaged in the operational phase due to increased population in the project area • Submergence is likely to remain confined to river beds only owing to the topography therefore will not have any major impact. However, Atura ferry crossing is also likely to be submerged by the proposed project. • Up to 192 Ha of private to be land affected • Up to 238.6 Ha of Karuma Wildlife reserve land to be affected 	<p>affected and properties to be compensated as per approved Resettlement Action Plan.</p> <ul style="list-style-type: none"> • Clearance in the Karuma Wildlife Area to be restricted to access roads and adits, and for surveyor line of vision. All affected sites to be restored, except the main access road and access to adits.
2. FLORA	<ul style="list-style-type: none"> • Some plants especially epiphytes including <i>Cyrtorchis chailluana</i>, and <i>Aerangis jkoschiana</i> on the south bank will be affected due to change in the microclimatic condition due to submergence and reduced amount of spray created by the Karuma Fall. • Proliferation of invasive weeds at restored sites 	<ul style="list-style-type: none"> • No unique plant communities in the upstream and downstream river stretches were identified as being entirely dependent on the microclimate characteristics for their survival. • Spread of invasive species should be checked as much as possible through uprooting, burning and prevention of growth to reproductive stage.
3. TERRESTRIAL FAUNA	<ul style="list-style-type: none"> • Increased human interferences due to improved accessibility could lead to increase in illegal activity, such as poaching • The loss of terrestrial wildlife to drowning during reservoir filling. • Positive impact on reptilian fauna by providing more rock outcrops and sun basking surfaces for crocodiles and monitor lizards due to the reduced water. The water reservoir upstream the weir will also provide a large feeding ground surface for crocodiles. 	<ul style="list-style-type: none"> • Periodical monitoring of the Nile Monitor and Nile Crocodile species. • Wildlife rescue efforts shall be taken up, wild animals rescued or captured shall be relocated to suitable habitat.

<p>4. AQUATIC ECOSYSTEMS</p>	<ul style="list-style-type: none"> • The proposed project will lead to drastic drawdown of water level which will cause desiccation of macro-habitats for macro-benthos and young fish; loss of habitats where fish spawn, feed and the very young nursery. • A large number of hippos will lose suitable diurnal residence/refuge in the existing shallow enclaves of the river. • Construction of the Karuma Dam will pose restriction to the movement of the migratory fishes reported from the study area. 	<ul style="list-style-type: none"> • Provision of fish ladder apart from the measures taken for the multiplication of the migratory fishes. • Maintenance of Ecological flow in the downstream to maintain the aquatic diversity to a minimum of 100m³/s
<p>5. AIR QUALITY</p>	<ul style="list-style-type: none"> • Emission of greenhouse gases (GHGs) due to decomposition of vegetation submerged by the flooding of the reservoir. • Modification to the local micro climate due to creation of reservoir which results in a local increase in humidity and a cooling effect. This effect will be intermittent and is not necessarily a negative impact. 	<ul style="list-style-type: none"> • All woody species will be harvested and cleared from the area to be inundated.
<p>6. NOISE AND VIBRATION LEVELS</p>	<ul style="list-style-type: none"> • During operation, noise will mainly be generated in the power station, generating units and the transformers. 	<p>Equipment to have noise reduction facilities to limit noise generated.</p>
<p>7. WATER QUALITY</p>	<ul style="list-style-type: none"> • Possibilities of eutrophication due to decomposition of vegetative matter resulting in a nutrient rich environment. • Growth of aquatic weeds such as water hyacinth, a common problem in other water bodies in Uganda (e.g. Lake Victoria). 	<ul style="list-style-type: none"> • All woody vegetation should be cleared before inundation • Weed harvesting to be carried out by the HPP operator.

8. GEOTECHNICAL SAFETY	<ul style="list-style-type: none"> Studies conducted by NORSAR (Norway), for NORPAK in 1999, revealed that earthquake hazard is not very high for this site. But it is still not negligible, and will depend on project characteristics. Further information regarding the seismic risk assessment is given in the Engineering report. 	<ul style="list-style-type: none"> Establishment of a seismicity monitoring station. An inspection regime will be in place for key civil structures, including the dam and tunnel
9. OCCUPATIONAL HEALTH AND SAFETY	<ul style="list-style-type: none"> Accident and injury can result during operation of high voltage equipment / risk of electric shock, operation of mechanical moving equipment (turbines and generators) and fire/heat hazards (apply to every aspect of the plant and in particular electrical systems and handling of fuels). 	<ul style="list-style-type: none"> All occupational health, safety and environment management measures to be documented; All employees should be trained and inducted in the company's safety rules and regulations such as use of personal protective equipment (PPE), Fire procedures and assembly points etc.
10. PUBLIC HEALTH AND SAFETY	<ul style="list-style-type: none"> Increased risk of waterborne diseases due to the formation of reservoir which will provide breeding ground for malaria and bilharzias. Risk of drowning due to formation of reservoir and at the event of dam break/failure 	<ul style="list-style-type: none"> Health campaigns regarding diseases such as malaria and bilharzia will be conducted. Distribution of treated mosquito nets to all residents surrounding the dam area will be promoted.
11. SOCIAL ENVIRONMENT	<ul style="list-style-type: none"> Physical displacement and loss of fixed family assets in the four affected villages. 	<ul style="list-style-type: none"> Resettlement Action Plan (RAP) approved by CGV to be implemented, including a Community Development Action Plan. Local Area Development plan should be developed by Government within the framework of decentralized district planning, in collaboration with relevant stakeholders.
12. VISUAL IMPACTS	<ul style="list-style-type: none"> Scenery of the Karuma Falls will be impacted on due to the reduced water flow over the falls. This impact will be long term. 	<ul style="list-style-type: none"> Environmental Flow Releases (EFRs) from the dam intake will to some extent serve to maintain natural flow variations in the river.
13. COMMUNITY/ NATIONAL BENEFITS	<ul style="list-style-type: none"> Increase in revenue and taxes for both the central and local authorities Increased installed capacity for electricity generation Improved local infrastructure/facilities due to upgrading of the access roads Implementation of this project 	<ul style="list-style-type: none"> Establishment and or improvement of local social infrastructure such as schools, health facilities and water points will be established under the RAP process (See RAP Report Vol IV). EPC contractor in association with the UWA will do the monitoring in order to avoid any negative impact on the KWR.

	<p>will have a positive impact in a number of ways, including improved infrastructure such as the access roads and improved security in the area, it is likely to affect tourism activities especially the fishing concession given to Chobe Lodge.</p> <ul style="list-style-type: none"> • Positive impact on Agriculture due to more reliable water supply from the reservoir. 	
<ul style="list-style-type: none"> • Downstream sediment impacts and change in aquatic ecology • River channel instability and hydrological alterations • Air pollution due to emissions of dust and other Green House Gases GHGs • Temporary increase in noise and vibration due to blasting • Socio-Economic impacts due to removal of dam structure being in term of alternative energy source or due to damage of land use. 	<ul style="list-style-type: none"> • Complete or partial removal of sediment behind the dam, combined with stabilizing the sediment by engineered measures or vegetation covers. • Decommissioning should be undertaken in accordance with the legislation prevailing at that time, in liaison with the relevant regulatory authorities and adhere to the dam safety guidelines. • Safe disposal of concrete and similar non-recyclable construction materials, restoration of all disturbed sites to pre-construction conditions through bio-engineering measures. 	

Copies of the EIS Reports, can be found or accessed from the following places:

1. NEMA Library, NEMA-House, Jinja Road;
2. Public Libraries of Uganda, Buganda Road;
3. Makerere University, Main Library;
4. Gulu University, Main Library;
5. Kiryandongo District Headquarters;
6. Oyam District Headquarters;
7. Makerere University Institute of Environment and Natural Resources Library;
8. Kyambogo University Library;
9. Mukono Christian University Library;
10. Uganda Wildlife Society, Kamwokya;
11. Kampala Capital City Authority Library, City Hall;
12. Soft copy on NEMA website, visit: www.nemaug.org
13. Ministry of Energy and Mineral Resources Resource Centre
14. Uganda Electricity Generation Company Ltd Head Office, Jinja
15. Uganda Electricity Transmission Company Ltd, Projects Implementation Unit, Kampala

THE PUBLIC IS FURTHER NOTIFIED that the outcome of the public review will contribute to the making of a final decision of either to approve or otherwise deal with the mitigation measures proposed in the ESIS.

Comments and views should reach the undersigned on or before the 9th December, 2011.

Views or enquiries should be addressed or hand-delivered to:

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