

# Bumbuna II Hydroelectric Project

## Non-Technical Summary (NTS) of Environmental, Social & Health Impact Assessment (ESHIA)



February 2017



Client: Joule Africa

## Bumbuna II Hydroelectric Project

Non-Technical Summary (NTS) of  
Environmental, Social & Health Impact Assessment

February 2017

Reference/Project Number: 0339594

Prepared by: Eimear Gormally & Naushad Tahsildar

Reviewed by: Philippa Spence and Tunde Morakinyo

For and on behalf of  
Environmental Resources Management

Approved by: Tunde Morakinyo

Signed: 

Position: Partner

Revision Number: v8.0

Date: 01/02/2017

This report has been prepared by Environmental Resources Management the trading name of Environmental Resources Management Limited, with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.

We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.

This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at their own risk.



# Bumbuna II Hydroelectric Project ESIA

## Non-Technical Summary (NTS) of Environmental, Social & Health Impact Assessment



River Seli from the Badala Bridge

### Table of Contents

|     |  |    |
|-----|--|----|
| 1.  | Introduction & background                | 1  |
| 2.  | Economic benefits of the project         | 2  |
| 3.  | Project alternatives                     | 3  |
| 4.  | Area affected by the project             | 4  |
|     | 4a. Bumbuna extension project components | 5  |
|     | 4b. Yiben dam project components         | 6  |
| 5.  | Construction & operation                 | 7  |
| 6.  | Approach to the ESIA                     | 8  |
| 7.  | Key Impacts for decision making          | 9  |
| 8.  | Important impacts                        | 10 |
| 9.  | Cumulative impacts & ESMP                | 13 |
| 10. | Stakeholder engagement                   | 14 |
| 11. | Next steps                               | 15 |

# 1. Introduction and Background

The Bumbuna II Project builds upon Bumbuna I which consists of a 50 MW dam and power generation facility near Bumbuna town on the Upper Seli River in Sierra Leone. The Bumbuna II scheme will generate 143 MW of power and will consist of two elements.

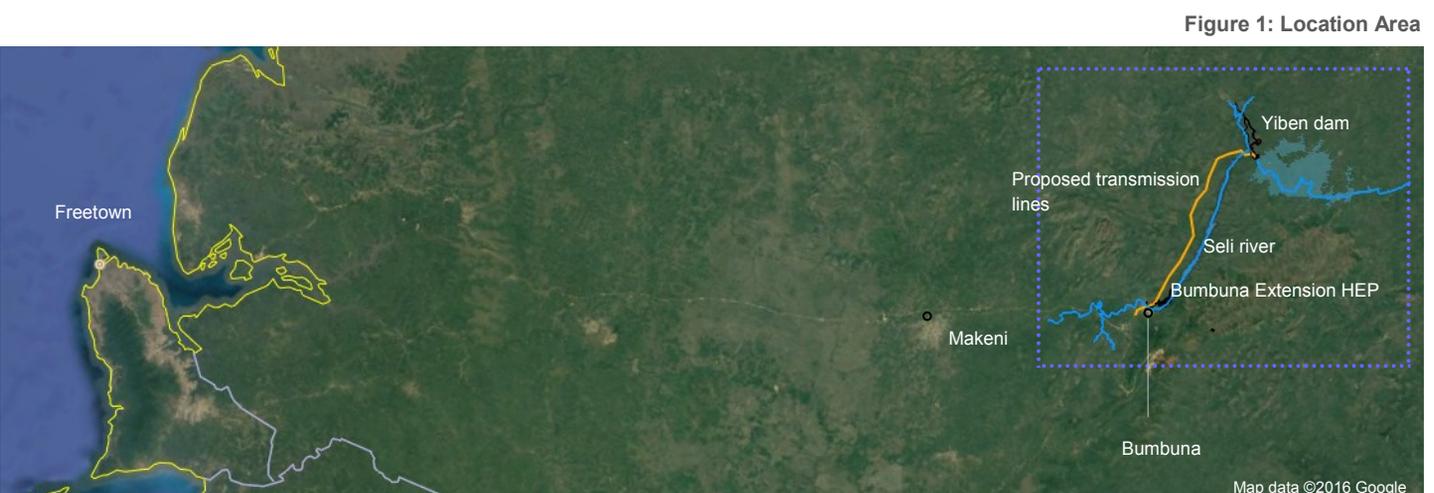
- *Bumbuna Extension* will be able to generate 88 MW of power (2 x 42 MW turbines and another smaller 4 MW turbine, known as the environmental flow powerhouse, located in the Bumbuna Phase I water outlet) and will use the same reservoir as the existing Bumbuna Phase I HEP but with separate intake, turbines and 36 km of new transmission line (to be provided by the Government of Sierra Leone).
- *Yiben* will be constructed upstream of Bumbuna Phase I and can generate 55 MW (2 x 27.7 MW turbine units) of power. The reservoir created by the dam will be approximately 115 km<sup>2</sup> in size upstream of the dam wall.

The location of Bumbuna II is shown in Figure 1. The Project is located in the Northern Province of Sierra Leone on the Upper Seli River, at the foot of the Sula Mountains, about 200 km northeast of the capital city, Freetown.

Yiben is approximately 10 km south east of the town of Fadugu and 30 km north of Bumbuna Extension, located adjacent to the existing Bumbuna I.



Existing Bumbuna I Dam



This Non-Technical Summary (NTS) is a summary of the ESHIA report in non-technical language. The full ESHIA report can be obtained and commented on as described on the last page of this document. The NTS presents the main findings and conclusions of the ESHIA completed for Bumbuna II. An ESHIA is a detailed study which assesses how the Project will change the area in which it is located, how these changes will affect people and the environment, and how the changes will be managed. The ESHIA has been prepared in accordance with:

- Sierra Leonean national legislation;
- International Finance Corporation's (IFC) Environmental and Social Performance Standards (IFC PS) (2012);
- Equator Principles III (2013);
- Africa Development Bank (AfDB) Integrated Safeguards (2013); and
- European Investment Bank (EIB) Environmental and Social Standards (2013).

The project is expected to be financed by a range of development finance institutions which may include; IFC, World Bank, AfDB, EIB, CDC, the Emerging Africa Infrastructure Fund (EAIF) and the Islamic Development Bank (IDB).

## Who are the developers ?



<http://www.jouleafrica.com/>

The Project is being developed by Joule Africa (JA) in partnership with the Government of Sierra Leone (GoSL). Joule Africa is a group of companies engaged in the development of renewable energy projects in Africa.

Through the development of renewable energy projects, Joule Africa is committed to significantly increasing access to sustainable energy for the nations in which it is needed most, a fundamental factor in any country's ability to develop.

## 2. Economic Benefits of the Project

Kabrutown Village  
Yiben Reservoir Area



Source: ERM

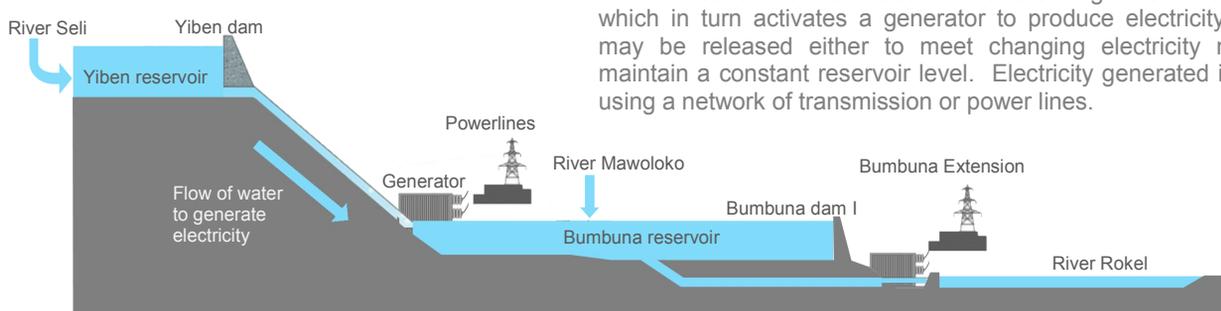
River Seli near Yiben

Sierra Leone has a population of 6.4 million, however fewer than 10% of the population have access to some form of power. Electricity access and demand are among the lowest in Africa. Installed grid connected capacity is estimated to be approximately 90 MW. Sierra Leone's power infrastructure for generation, transmission and distribution is limited to particular areas. The national distribution network primarily extends to Freetown and the surrounding Western Area (Freetown Capital Western Area), covering about 40% of their residents. In rural areas, where the bulk of the population reside, electricity access is practically non-existent.

Sierra Leone has some of the highest rainfall in Africa but to date, Bumbuna I is the only hydroelectric project in the country. The large majority of Sierra Leone's population is forced to rely on inefficient and polluting traditional fuels to meet their needs, such as kerosene for lighting and fuel-wood and charcoal for cooking, and small diesel powered auto generation. This results in negative impacts on personal health and safety as well as on the environment.

The development of the energy sector is critical to the socio-economic growth of Sierra Leone, and thus is a key element for future planning in a country at the cross roads of major industrial investments. The Government is prioritising power generation and aims to increase the proportion of households with access to electricity from the national grid from 13.5% in 2015 to 30% by 2030 as part of Goal 7 of its Sustainable Development Goals (SDGs).

### What is a Hydroelectric Project?



Source: ERM

The most common type of hydroelectric power plant is an impoundment facility. An impoundment facility, typically a large hydropower system,

Water released from the reservoir flows through a turbine, spinning it, which in turn activates a generator to produce electricity. The water may be released either to meet changing electricity needs or to maintain a constant reservoir level. Electricity generated is distributed using a network of transmission or power lines.

# 3. Project Alternatives

The ESIA reviewed the process by which the energy potential of the Bumbuna-Yiben hydropower complex was assessed and progressed and alternatives that have been considered during the design and development process.

## 'No project' scenario

The 'no project' scenario considered not developing the Project at all. The Government of Sierra Leone is seeking to increase power generation capacity to deliver electricity to the population and this project is a key pillar of the country's economic growth ambitions. In Sierra Leone's Power Sector Master Plan, various alternatives were considered. Given the high demand for increased power generation, the 'no project' scenario has not been considered further.

## Bumbuna Extension project

Three separate options were considered:

**Option A:** Extension of the existing powerhouse;

**Option B:** Development of a new powerhouse on the right bank of the dam; and

**Option C:** Development of a new powerhouse downstream of the existing dam and connected by a tunnel.

These options are illustrated on Figure 2.

Option C has been assured to be the most promising alternative from an engineering and economic perspective.

**Figure 2: Alternatives for Bumbuna**



## Yiben Dam

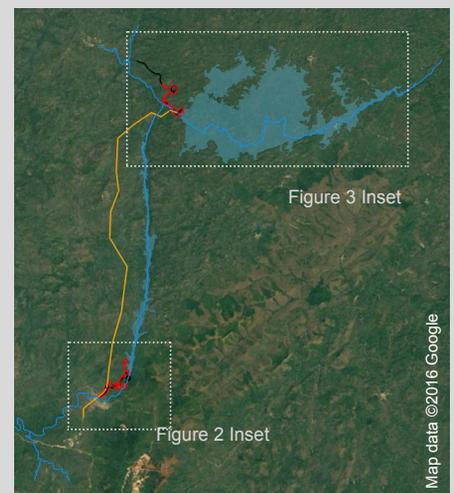
Three options were considered:

**Option A:** No development of Yiben:

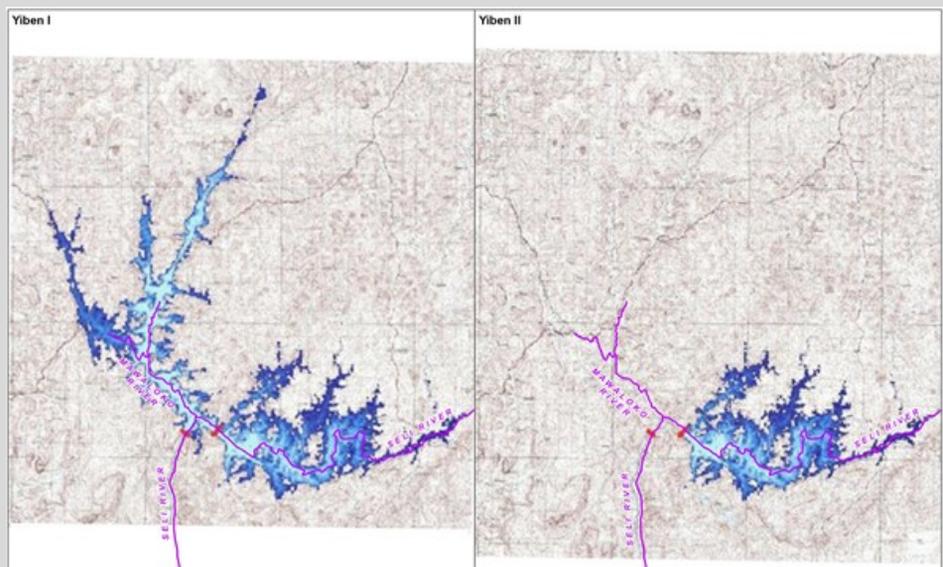
Having no dam upstream of Bumbuna Reservoir would reduce the environmental and social impacts. However, Bumbuna Extension would then effectively operate as a run-of-river plant, which would have to cope with low flows during the dry period and too much water during the wet season. This would not provide the all year round power that is needed and this would also reduce the overall scheme's annual energy generation by over 50%.

**Options B & C:** Two potential sites

for the location of the dam were assessed and are illustrated and described in Figure 3. Yiben I comprised development on the Mawoloko River and Seli Rivers and Yiben II comprised development on only the Seli River. Yiben I proved to be a more attractive option in economic terms, however due to the requirement for a much larger inundation area this option was not chosen because of the significant social impacts it would create. Thus the much smaller Yiben II alternative was selected as the preferred option since it would have a lower social impact.



**Figure 3: Alternatives for Yiben**



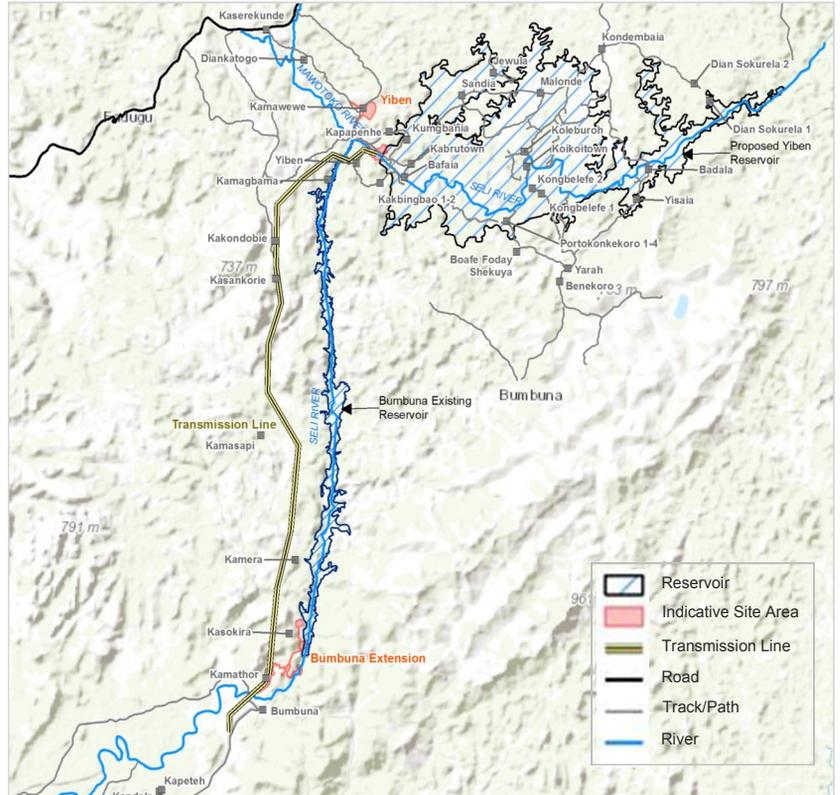
# 4. Area Affected by the Project

The area affected by the Project and the infrastructure to be built is pictured below and includes:

- Yiben inundation area, Yiben dam, power house & access road;
- Transmission line;
- Bumbuna Extension; and
- Villages directly downstream of the planned Yiben & existing Bumbuna dams.

The detail on each of these is presented in the pages that follow.

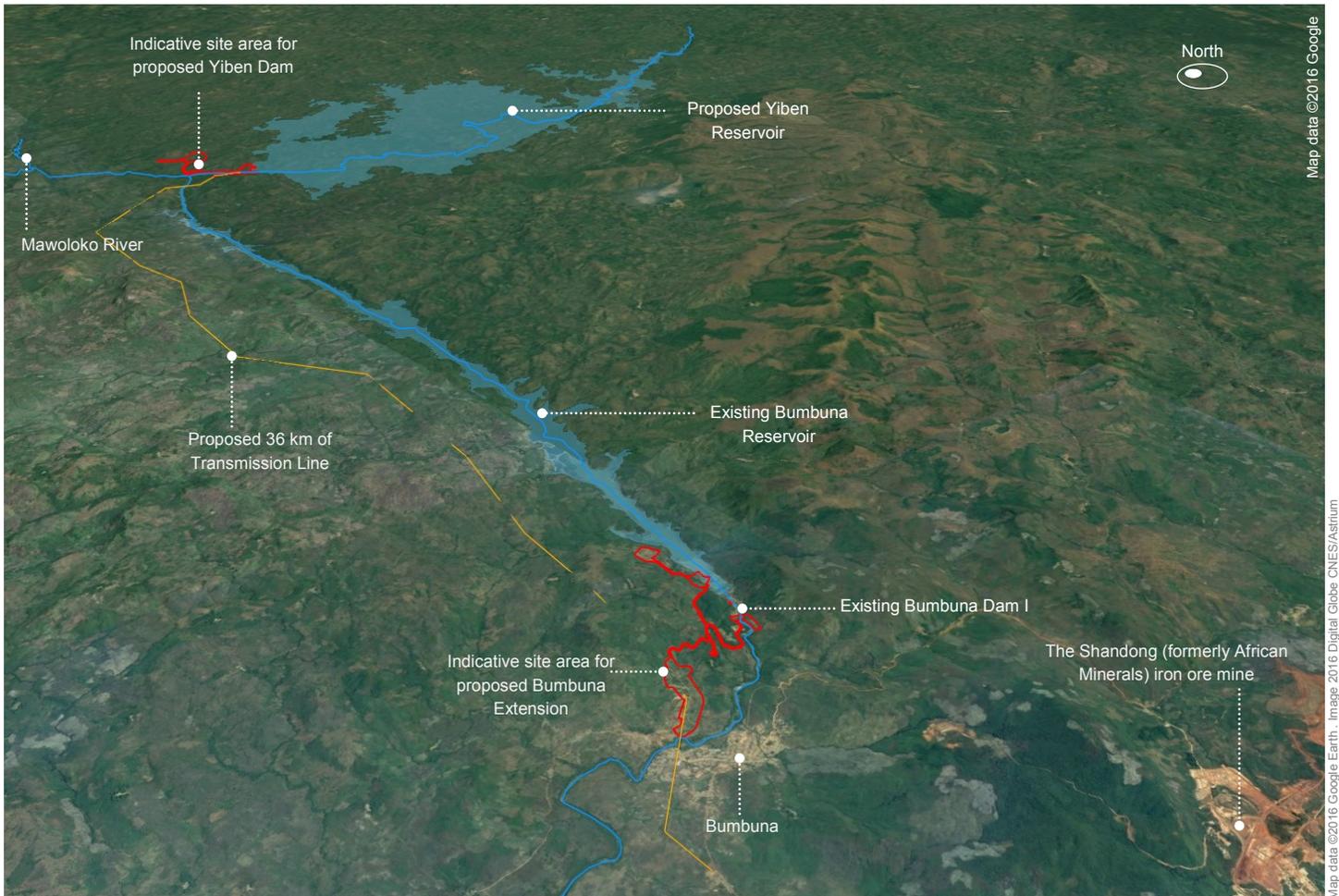
Figure 4: Project Components



Source: ERM

Women's Focus Group Discussion in Badala

Figure 5: Affected Area



# 4a. Bumbuna Extension Project Components

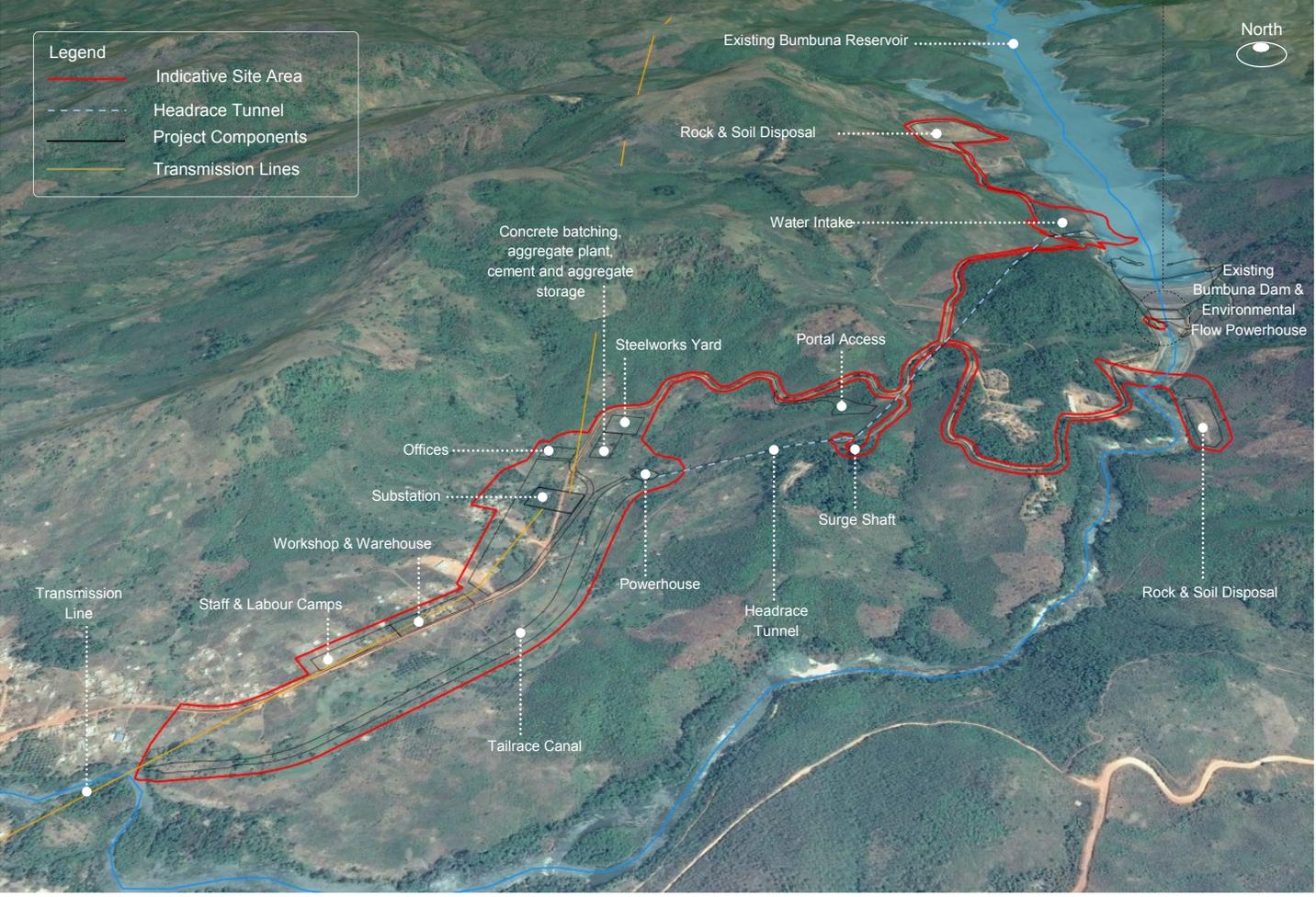
The Project components for the Bumbuna Extension include following:

- a water intake will be located on the western bank of the Bumbuna reservoir, approximately 400 m upstream of the existing dam;
- an underground tunnel with a length of approximately 1.9 km to take water from the Bumbuna Reservoir to the new turbines;
- new turbines (generating gross power of 88 MW consisting of 2 x 42 MW units and another 4 MW turbine (the environmental flow powerhouse) located in the Bumbuna I water outlet);
- a concrete tailrace channel to return the water to the river after it has been through the turbines; and
- 36km of new transmission lines between Bumbuna II and Yiben and between Bumbuna II and the proposed West Africa Power Pool (WAPP) Substation.



Source: ERM

Figure 6: Bumbuna Extension Components



Map data ©2016 Google Earth. Image 2016 Digital Globe CNES/Astrium

## 6 Villages & Communities Affected



Six settlements will be directly affected by the construction of Bumbuna Extension and the Bumbuna-Yiben transmission line:

- Bumbuna Town, Kadala, Kasokira and Kamator 1, 2 and 3 are the 4 settlements within the Kalansogoia Chiefdom of Tonkolili District that will be directly affected by the construction of the Bumbuna Extension project.
- Another 2 settlements: Kakondobie (Kasunko chiefdom, Koinadugu District) and Kasonkorie (Kalansogoia Chiefdom, Tonkolili District) lie within the path of the proposed transmission line between Bumbuna Extension and Yiben.

# 4b. Yiben Components

The Project components for Yiben include the following key elements:

- reservoir of water created by construction of the Yiben dam, approximately 115 km<sup>2</sup>;
- dam of height 83m and 730 m width;
- channel to allow large flows of water to safely bypass the dam in the event of flooding or dam maintenance;
- tunnel to take water from the dam to the turbines;
- building that will house the turbines that will generate 55 MW of gross power (2 x 27.7 MW turbines); and
- channel to return the water to the river after it has been through the turbines.

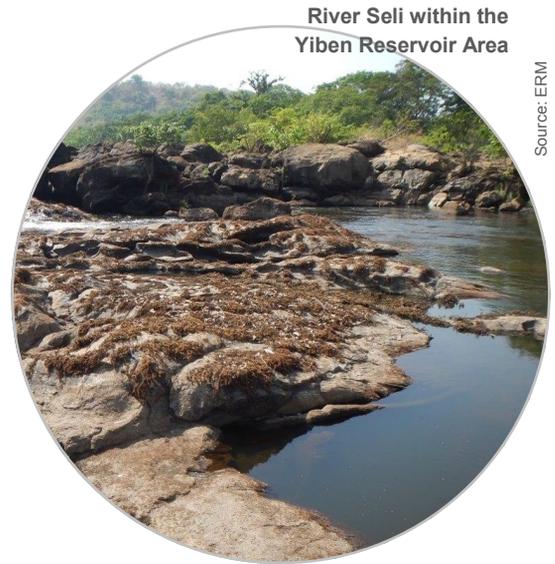
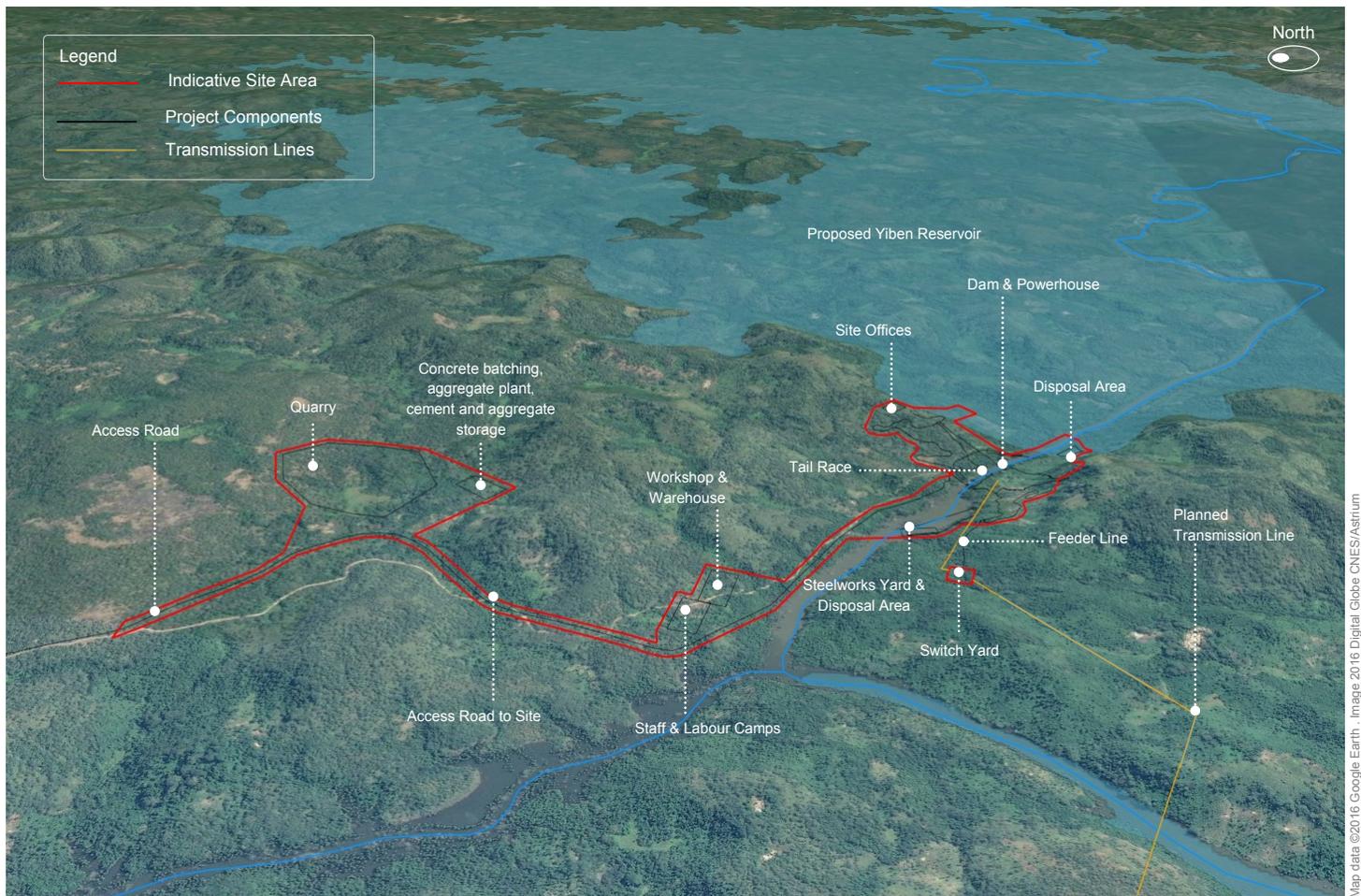


Figure 7: Yiben Dam Project Components



## 52 Villages & Communities Affected



A total of 52 villages will be affected by Yiben:

- The construction of the Yiben Dam and access road will directly affect 8 villages in Diang Chiefdom of Koinadugu District and Kaserekunde in Kasunko Chiefdom, Koinadugu District).
- The inundation of the Yiben Reservoir will necessitate the careful relocation of 44 villages, all of which lie in the Diang Chiefdom of Koinadugu District.

## 5. Construction & Operation

### Construction Activities

It is expected that construction will start by the end of 2017 and will last four years. The completion date for the entire project is scheduled for the end of 2020. During construction, activities will include:

- Land acquisition and resettlement;
- Early activities to make construction possible including upgrades of some existing roads, the construction of new roads and bridges and establishment of storage areas for equipment and materials;
- Building a new bridge further upstream along the Seli River from Badala to replace the existing bridge that will be inundated by the Yiben Reservoir;
- Establishment of construction camps within the project area as shown including workers' quarters, offices, water treatment plant, waste handling and other facilities;
- Temporary diversion of the Seli River to allow construction of Yiben Dam;
- Excavations for the dam, spillway, power houses, tailraces and other components; and
- Installation of the turbines and associated electrical and mechanical work.

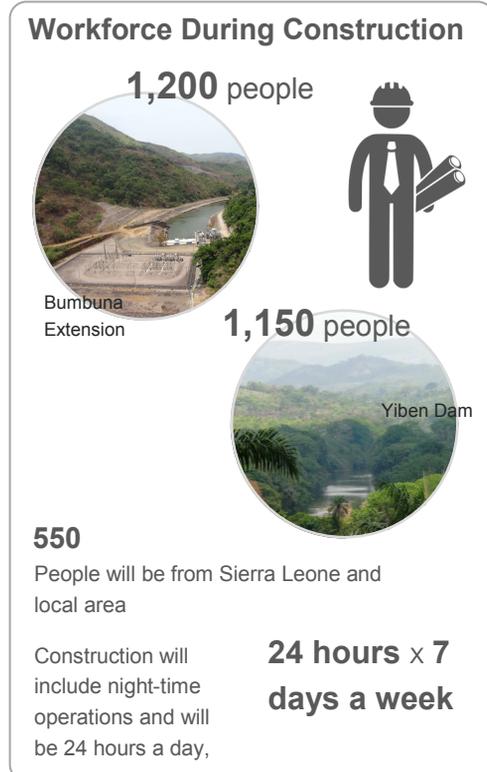
The project will require large amounts of rock, cement and steel. Rock will mostly come from a quarry 4 km north of Yiben. Steel, building stone and cement will be obtained from Freetown, while water and sand will come from the Seli River. Electricity will be provided on site by diesel generators.

### Operation Activities

After construction is complete, the new Bumbuna Extension water intake will allow for the new turbines to operate independently of the existing turbines at Bumbuna I. Water will flow through these new turbines to generate electricity. The new Bumbuna Extension will not affect the operation of the existing Bumbuna I which will still be used for energy generation. However, the existing turbines will mostly be used during the rainy season. During construction at Yiben, the new reservoir area will be flooded to create a lake with an area of about 115 km<sup>2</sup>. During the year, depending on whether it is the wet season or dry season, the level of the dam may vary by as much as 20 m. The project (inclusive of Bumbuna I, Bumbuna Extension and Yiben) is expected to produce an average of 1,062 GWh of electricity during a year.

During the operation of the two dams, efforts will be made to manage the flow of water through both dams to achieve a balance between maximising the amount of electricity generated and maintaining water habitats upstream and downstream of the dams. At times, during periods of very heavy rainfall for example, it may be necessary to release additional water downstream, however, when this occurs, the communities affected will be given warning to make sure everyone is safe.

During operation, about 110 people will work at Bumbuna Extension and Yiben. The ratio of Sierra Leone nationals compared to the international workforce is currently unknown but as many local people as possible will be employed. Water will be needed mostly for the living quarters of the staff and will come from the Seli River. Once operational, only small amounts of mostly domestic waste will be generated by the Project. Nevertheless, the project will develop a Waste and Resources Management Strategy for management of waste in line with good international industry practice.



### End of Project & Decommissioning

With careful operation and maintenance the project is thought to have a life span of upwards of 90 years. Given that the project is designed to operate for such a long period, there is no firm decommissioning plan in place at present.

When it does take place, decommissioning will involve the removal of parts of the Project such as the power houses, offices and accommodation, and turbines.

The proposed intake and tunnel will be closed and the tailrace channel backfilled. Water flows will be allowed to continue. During this phase of activity, the impacts will be similar to those during construction, although on a much smaller scale. The Project will develop a decommissioning strategy and any required environmental and social assessment that may be needed will be approved by the Government of Sierra Leone.

## 6. Approach to the ESIA

### How is the ESHIA process carried out?

The purpose of the ESHIA is to understand how people and the environment will change as a result of the development of Bumbuna II (these changes are called 'impacts'). The ESHIA also describes how these impacts should be managed to ensure that people and the environment are not harmed, and to ensure that the most is made of the benefits (or positive impacts) that the Project will bring.

This information will be used to inform decision-making by Joule Africa and the Government of Sierra Leone who are developing the project.

The ESIA study comprised the following steps:

- The potential impacts of Bumbuna II were initially identified during the Scoping Phase.
- Thereafter, studies were completed to understand how people in the area affected by the project currently live and what is important to their quality of life. Studies were also done to understand the plants and animals in the area.
- Meetings were held with local communities and other groups to share information, answer questions and understand and respond to concerns about the Project (a process called 'Stakeholder Engagement' which is described further below). People's views were considered in the ESIA study.
- Specialist experience and knowledge, coupled with modelling (eg greenhouse gas emissions and environmental flow through the scheme) in some cases, was used to understand how the area will change as a result of Project development and which impacts will cause the biggest changes.
- Ways of reducing negative changes were identified as well as ways of bringing benefits through the project.
- Several important changes were made to the Project design to reduce negative impacts wherever possible.

Figure 8: EIA Process Overview



Source: Google

West African Chimpanzee



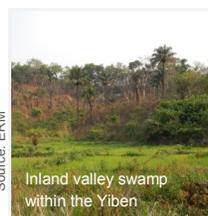
Source: ERM

A hamerkop within the Yiben Reservoir



Source: ERM

Portokonkoro Central Reservoir Area



Source: ERM

Inland valley swamp within the Yiben



Source: Shutterstock

Hooded Vulture



Source: ERM

Focus Group Discussion



Source: ERM

Patas monkey Yiben Reservoir Area

# 7. Key Impacts for Decision Making

Impacts were assessed by specialists to understand their significance or importance for those affected by the project. The significance levels used for this assessment are described in adjacent table.

The most important impacts which are discussed in detail after this section are:

### DEFINITION OF SIGNIFICANCE LEVELS

| Significance | Levels   |
|--------------|--|
| Negligible   | There will be no or very limited impact.   |
| Minor        | There will be a small impact of limited concern or interest.   |
| Moderate     | There will be a moderate change to the environment and people that will be of some concern, and efforts will need to be made to manage these to the extent possible. |
| Major        | There will be a very large change to the environment or people which will be of great concern, and which will need a great deal of effort to be managed.             |
| Positive     | There will be a positive impact.   |



## 1. Impacts on water



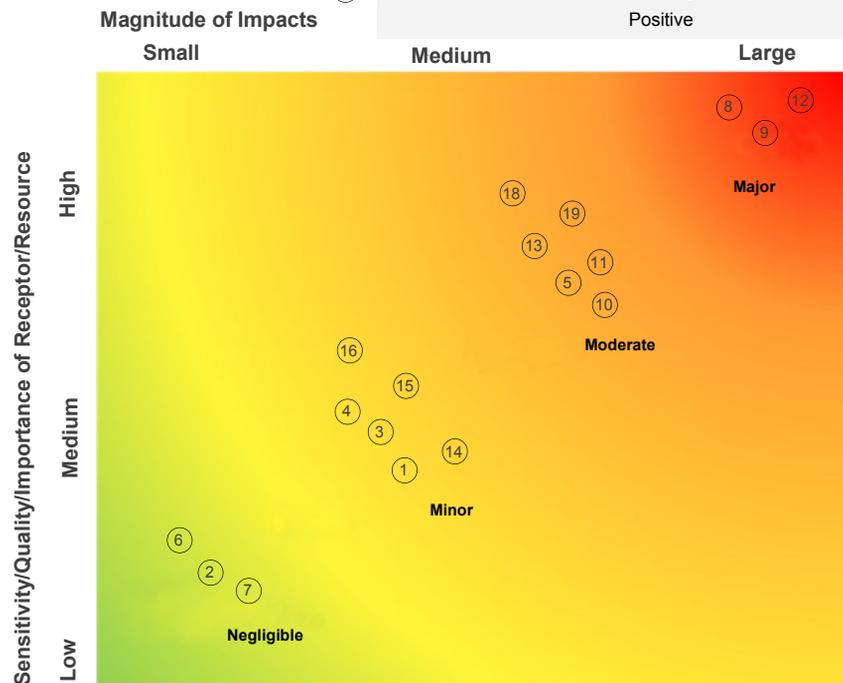
## 2. Impacts on biodiversity (plants and animals)



## 3. Impact on local people's homes and livelihoods

| Key Environmental Impacts                    |   |
|--|---|
| Construction dust                            | ① |
| Minor  |   |
| Green House Gas from construction activities | ② |
| Negligible                                   |   |
| Green House Gas emissions from reservoir     | ③ |
| Minor  |   |
| Climate change                               | ④ |
| Minor  |   |
| Noise  | ⑤ |
| Moderate                                     |   |
| Vibration                                    | ⑥ |
| Negligible                                   |   |
| Soils  | ⑦ |
| Negligible                                   |   |
| Water resources                              | ⑧ |
| Major  |   |
| Biodiversity (Plants and Animals)            | ⑨ |
| Major  |   |
| Ecosystem services                           | ⑩ |
| Moderate                                     |   |
| Traffic and transport                        | ⑪ |
| Moderate                                     |   |

| Key Social Impacts |   |
|--------------------|---|
| ⑫                  | Local people's homes and livelihoods                        |
|                    | Major   |
| ⑬                  | Poor financial management of compensation received          |
|                    | Moderate  |
| ⑭                  | Weakening of traditional governance                         |
|                    | Minor   |
| ⑮                  | Social tension related to resettlement and local employment |
|                    | Minor   |
| ⑯                  | Increased pressure on land and competition for it           |
|                    | Minor   |
| ⑰                  | Increase in land for farming downstream of Bumbuna          |
|                    | Positive  |
| ⑱                  | Loss of burial grounds                                      |
|                    | Moderate  |
| ⑲                  | Loss of sacred sites  |
|                    | Moderate  |
| ⑳                  | Access to electricity                                       |
|                    | Positive  |
| ㉑                  | Increase in local incomes                                   |
|                    | Positive  |
| ㉒                  | Increase in local development initiatives                   |
|                    | Positive  |



The effects of **Climate Change** over the lifetime of the proposed dam does not appear to be significant. The West African Monsoon system is not well understood and requires further research. If this research starts to predict large changes in the rainfall patterns of the area it could have an impact upon the Project.

# 8. Important Impacts

## Impacts on Biodiversity (plants and animals)

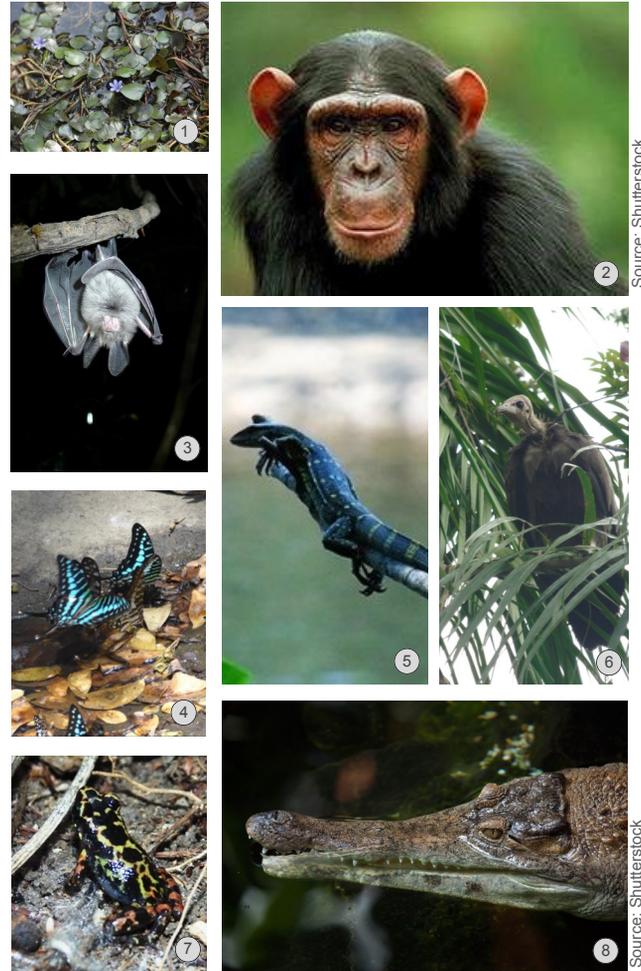
The ESIA studied the natural environment in the Project area. Studies were also carried out of the Loma Mountains National Park and the Lake Sonfon and Environs IBA (and proposed National Park) to see if they have sufficient and similar forests and grassland and populations of endangered plants and animals to replace what will be lost once the land under the Yiben Reservoir becomes flooded. The landscape in the project area consists of woodland, degraded forest and grassland with farming in lowland areas and swamps. There are also narrow strips of rainforest along river banks in the area and a variety of different plants living in the different streams and rivers. The studies found a number of important rare species which include:

- Forty-one plant species of conservation concern including one new to science species assessed as Critically Endangered river weed (*Ledermanniella sp nov*) and five species assessed as Endangered;
- Eight bat species of conservation concern including one species potentially new to science (*Neoromicia aff. Nana*) and one species, Ziama Horseshoe Bat (*Rhinolophus ziama*) assessed as Endangered;
- Eight terrestrial mammal species of conservation concern including the Endangered West African Chimpanzee (*Pan troglodytes ssp. Verus* various evidence of population presence recorded in inundation area including direct sighting of one individual) and Pygmy Hippopotamus (*Choeropsis liberiensis*);
- Thirteen amphibian species of conservation concern including the Endangered Freetown Long Fingered Frog (*Arthroleptis aureoli/ Cardioglossa aureole*);
- Four reptile species of conservation concern including the Critically Endangered Slender Snouted Crocodile (*Mecistops cataphractus*);
- Eight butterfly species of conservation concern; and
- Twenty Six freshwater fish species of conservation concern including two Endangered species (*Enteromius liberiensis* and *Marcusenius meronai*) and four likely restricted range species.

The Project has developed a range of measures to avoid, reduce and restore biodiversity impacts (for example management of construction activities to reduce potential habitat destruction and restore habitat after construction has been completed and redesign of some project infrastructure including roads and transmission lines to avoid sensitive areas). However in some places within the Project area, there will be a total loss of all existing habitats and plant species, as well as the likely loss of slow moving animals.

Despite the measures to minimize impacts on plants and animals, it must be acknowledged that the Project will have an inevitable impact on some of them. To achieve an overall positive impact on biodiversity, the Project will develop and implement a Biodiversity Action Plan (BAP). This will include an Offset Strategy to create more and better habitat than the habitat that will be lost as a way of protecting more biodiversity. The BAP will set out the approach to developing government/NGO partnerships, developing joint plans with these organisations to demarcate and protect offset areas and develop long term sustainable financing for the offset areas. The initial work to develop an offset strategy has identified three potential offset areas:

- an expansion of the existing Loma Mountains National Park;
- an expansion of the existing Lake Sonfon Protected Area; and
- creation of a new riverine habitat protected area in the Seli River catchment upstream of Yiben reservoir.



① Aquatic weed within the Yiben Reservoir Area  
 ② West African Chimpanzee  
 ③ Egyptian slit-faced bat in the Yiben Reservoir Area  
 ④ Butterflies in the Yiben Reservoir Area  
 ⑤ West African Nile Monitor Lizard  
 ⑥ Hooded Vulture in Yiben Reservoir Area  
 ⑦ Freetown Long Fingered Frog  
 ⑧ Slender Snouted Crocodile

All other photo source: ERM

## 8. Important Impacts

### Impacts on Water Resources

The Rokel River, also known as the Seli River upstream of Bumbuna reservoir, and its basin is the third largest in Sierra Leone. Since the operation of the Bumbuna dam, commenced in 1999, flows in the Seli River have been controlled through the operation of Bumbuna I. Nevertheless, the river's flows are still strongly seasonal, more than doubling during the wet season.

There has been a requirement from the Government of Sierra Leone for Bumbuna I, to maintain the lowest volume of water required to protect the habitat and community livelihoods downstream; however, it seems that there are times when this minimum flow has not always



Source: ERM

River Seli within the Yiben Reservoir

Once Bumbuna Extension and Yiben have been constructed, and commissioned, this is expected to change the water flow rates and patterns of water flow down the river overall. Upstream of Yiben dam, the river will become a wide shallow slow moving water body. This will favour different species of fish from those currently found in the river. There could also be a change in water quality due to any rotting vegetation, which has not been cleared prior to inundation, in the slow moving water. Nevertheless there will be an increase in opportunities for fishing.

In the Bumbuna Reservoir in between Bumbuna Extension and Yiben, the flow of water will become more even between the dry and wet seasons. Downstream from Bumbuna I, diversion of water into the tunnel will reduce the flow of water into the short 4 km stretch of the Rokel River before the water from the tunnel into the Bumbuna Extension re-joins the river. This will affect the habitats and farming within in this short stretch of the river. However it will also provide a river with slower flowing water which will support a number of species that are good for fishing that favour such conditions. The flow of water downstream into the Rokel River will be evened out. Less sand, leaf particles and other matter could reach downstream river habitats, reducing the fertility of the river and therefore affect farming on the river banks as well. However it will provide safer and increased access to the river banks.



Source: ERM

River Seli downstream of Bumbuna Dam

The change in the water quality in the Yiben Reservoir could affect the quality of the water further downstream although how much it will be affected is currently unknown, and additional studies will be carried out to determine this. Then it will be possible to decide what can be done to manage this issue.

Studies of the river have shown that increasing the flow of water into the river downstream from Bumbuna I could negatively affect river species that are used to living in shallow water. There are a number of options to reduce the flow in the Rokel River to manage this, but these would greatly reduce the amount of electricity that could be generated by the project and significantly increase the Project costs.

## 8. Important Impacts

### Impacts on People's Homes and Livelihoods

During construction the Project will aim to avoid displacing people's houses or affecting the ways in which they make a living as far as possible. Nevertheless the most important impact on people will be the physical resettlement of 1,065 households and 44 settlements within the new Yiben reservoir area. There are another 50 households that will also be affected by the construction of access roads and other supporting facilities.

The Project has already developed a Resettlement Framework that has identified the affected villages and sets out an approach to compensating the affected households. Initial discussions with the Paramount Chief of Diang also indicate that there is available land for relocation of the affected households. The Project is developing a detailed Resettlement Action Plan that identifies all the affected people and their assets, and will identify host sites for them to move to and the process by which they will be moved and compensated for their losses. Efforts will also be made to relocate sacred sites and graveyards if possible.



Source: ERM

Yiben Village

Despite the implementation of the RAP, it must be acknowledged that the changes to the lives of those affected by resettlement will be significant and permanent. The resettlement programme will therefore aim to provide the affected communities with new villages and ways of making a living that are an improvement on what they currently have. Support will also be given to people to enable them to re-establish themselves after they have moved to their new locations. This will include new economic opportunities that will come from increased access to energy and increased fishing in the new Yiben reservoir for example.

During construction, the Project will require an estimated 2,300 construction workers many of whom will come from the local area. This will improve the local economy and will provide people with new skills. The Project will also deliver reliable year round electricity to Sierra Leone, and this, improved access to electricity will have many benefits for individual households as well as businesses contributing to the economic development of the country.

## 9. Cumulative Impacts and ESMP

### Cumulative Impacts

There are a number planned developments located near to the Project whose impacts might combine with those listed above to have a greater combined effect (called “cumulative impacts”). These are considered in the ESIA and include iron ore mining projects and a large biofuels project in Makeni. It is possible that these projects in combination will have a greater positive impact on employment since workers might be able to move from one project to another and bring increased development to the area.

This will require regional level planning to coordinate these planned developments.

On the other the other hand there could be increased migration into the area by people seeking jobs leading to an increased pressure of public facilities such as roads, health centres and schools. There might also be greater impacts on biodiversity and air quality in the area.



Source: ERM

Mawoloko River as it approaches the River Seli downstream of the Yiben Dam

### Environmental, Social and Health Management Plan

A number of measures to manage impacts are captured in the Project Environmental, Social and Health Management Plan (ESHMP) (a plan that describes how all the impacts identified will be managed) and other specific management plans have been developed according to the requirements of Sierra Leonean law and good international industry practice.

The ESMP and other plans listed below will be implemented during construction and operation of the project. The ESHMP takes each of the impacts identified in the impact assessment of the ESHIA and sets out the management measures needed to deal with the impacts as well as describing responsibility for implementing these.

Some of the management plans will include the following.

- Access to Energy Plan;
- Stakeholder Engagement Plan;
- Occupational Health and Safety Management Plan;
- Construction Camp Management Plan;
- Construction Management Plan;
- Workforce Code of Conduct;
- Worker Grievance Mechanism;
- Air Quality Management and Monitoring Plan;
- Hazardous Material Management Plan;
- Noise and Vibration Management and Monitoring Plan;
- Waste Management Plan;
- Protection and Security Policy and Plan;
- Emergency Preparedness and Response Plan;
- Traffic Management Plan;
- Resettlement Action Plan (RAP); Community Investment Plan;
- Grievance mechanism (Land Acquisition and Involuntary Resettlement);
- Biodiversity Action Plan (BAP); and
- Archaeological Chance Finds Management Procedure.

It is important to note that the companies that are bidding to carry out the construction of the Project have been given copies of the ESHIA to take the mitigation or management actions outlined into account in their price estimates to carry out the work.

They will be responsible for carrying out some of the activities identified in the management plans listed here.

All the plans will have specific monitoring requirements to make sure that are implemented by those responsible.

# 10. Stakeholder Engagement

## Who has been engaged to date?

Many of the stakeholders in the Project area have been consulted at various times over several years starting with the engagement carried out for the development of the Bumbuna I project in the 1990s. In 2011 and 2012, as part of the draft ESIA prepared by CEMMATS for the Project, further engagement was carried out with some of the affected communities as well as with national and regional government. In 2013, further engagement was also undertaken by Joule Africa for the establishment of the Bumbuna Resource Centre for literacy training, youth club meetings and other community activities.

The Project has also established a strong partnership with the Government of Sierra Leone (GoSL) central government. There has been ongoing and regular coordination with the government during the development of the project, and the establishment of the Energy Sector Task Force to support the Project's development.

In the preparation of this ESHIA, stakeholder engagement has taken place in two rounds. A first round of engagement was conducted with stakeholders in March 2016. Another round of stakeholder engagement took place in July 2016 which included representatives from the groups/organisations listed below.

- National government; regional and district authorities;
- Traditional leaders;
- Potentially affected communities across the project area, including vulnerable groups: female headed-households; children and youth; elderly people and vulnerable groups (including the disabled and non-landowning groups such as the Fulani and Limba communities);
- Communities affected by Bumbuna I;
- Community based organisations, national and local level NGOs;
- Project employees/contractors;
- National, regional and local level labour unions and the media;
- Public services including community and government health; centres and schools, police and military;
- Businesses (mining companies) in the project area; and
- Academic institutions.

## Key Issues

At the national level, the main issues raised were related to compliance with national laws and regulations, the importance of engaging with the local communities and concerns regarding the management of resettlement and biodiversity impacts.

Among those who will be directly affected by the Project, people were most concerned about the resettlement and compensation process, in particular economic impacts related to land loss. Impacts to cultural heritage sites and community health and safety from flooding were also raised as concerns. Stakeholders also explained their expectations regarding employment, economic development and access to electricity.

In some communities issues related to the Bumbuna Phase I resettlement process were also raised, mainly in relation to unmet expectations regarding the quality of housing and replacement agricultural land provided. Communities downstream of Bumbuna I also complained about not receiving notice about water releases and thus the danger of farming or fishing in or near the Rokel River.



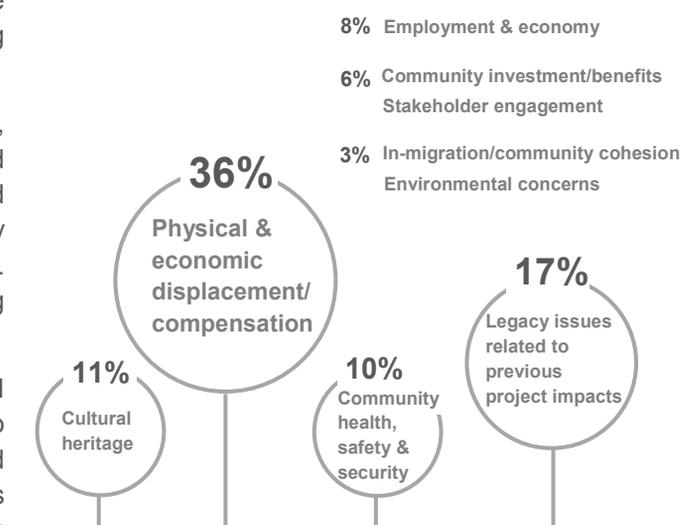
Kapampahe Focus Group Discussion



Yiben Village Women's Focus Group Discussion

During 2016 a total of **139** meetings were undertaken attended by approximately **566** participants. These included residents of all the villages within the Yiben Reservoir area. Meetings held included:

- **5** National level meetings;
- **46** Village profile meetings;
- **52** Focus group discussion meetings; and
- **36** Key informant interviews.



# 11. Next Steps

## WHAT ARE THE NEXT STEPS IN THE STAKEHOLDER ENGAGEMENT PROCESS?

Further engagement will be conducted with affected stakeholders to disclose the ESHIA and separately for the development of the Resettlement Action Plan (RAP). During construction, on-going engagement will take place through Community Liaison Officers (CLOs). This will be frequent since there will be great deal of activity that will impact people. During operations once construction is complete, engagement will become steady and routine over the years with the project-based operations teams.

This NTS will be made available for any person or organisation that is interested in or affected by the Project (Interested and Affected Parties (I&APs)) to review and provide any comment.

## GRIEVANCE MECHANISM

This is a process by which anyone with a complaint or a concern about the project can communicate this. Joule Africa will distribute information on how to communicate a grievance using telephone, email, writing a letter or an address to meet someone in person to speak face to face. Once the Project receives a complaint from an affected person, they will receive a response to confirm this information has been received and the number of days within which they can expect a reply on the matter.

It will be possible for people to submit a complaint without giving their name if they prefer. However if they do this, it will not be possible for the project to tell them how the complaint has been dealt with.

The Grievance Mechanism is an important way for the Project to make sure it deals with all the complaints, or concerns it receives as quickly as possible.

## Where can I find the full ESHIA Report?

The ESIA Report for the Project has now been made available for comment. The ESHIA Report is available in English. The public comment period is to be confirmed.

An electronic copy of the ESHIA Report can be downloaded from <http://www>. Hard copies of the ESHIA Report are available for review at the following locations:

## Contact information

Comments or queries should be sent to Joule Africa at the address, telephone/fax numbers or e-mail address shown below prior to XX.

Attention:

Tel: +

E-mail:

