



Seli Hydropower Ltd

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# Seli Hydropower Environmental and Social Update

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October 2020

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# AGENDA

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1. Introduction
2. Environmental and Social Plans
3. Resettlement
4. Biodiversity
5. Downstream Flows

## Location



- About 200 km northeast of Freetown, approximately 6 - 7 hours distance by road
- On the Seli River, a tributary of the Rokel River (on which Bumbuna I is located); the Rokel basin is the third largest in Sierra Leone

# Project Configuration



- ▶ Seli HP is the Phase II expansion of the existing 50 MW Bumbuna HEP, which will remain state owned

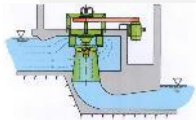
## The 143 MW Seli Hydropower Project comprises of three main elements;



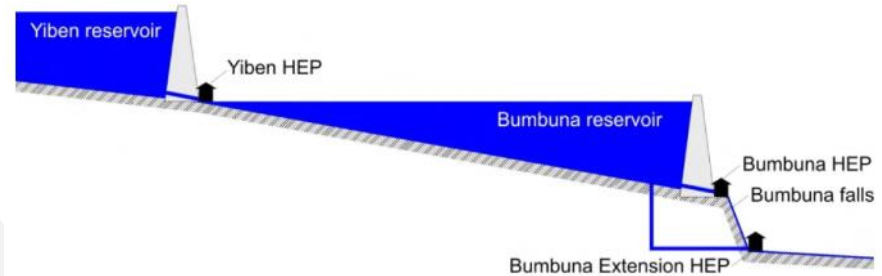
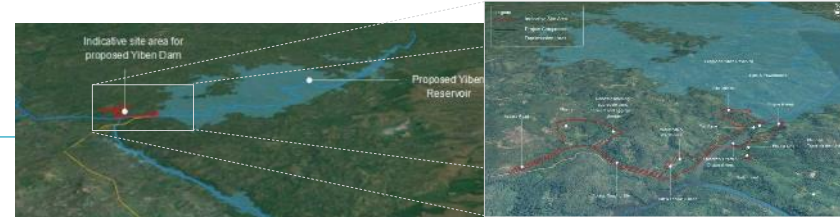
- ▶ Yiben Dam
  - New 86 m high, 728 m wide dam, 32 km upstream to regulate Bumbuna reservoir
  - 55 MW of new generation



- ▶ Bumbuna Extension
  - 2 km headrace tunnel leading from existing Bumbuna reservoir, dropping 40 m to a new powerhouse.
  - 84 MW of new generation capacity



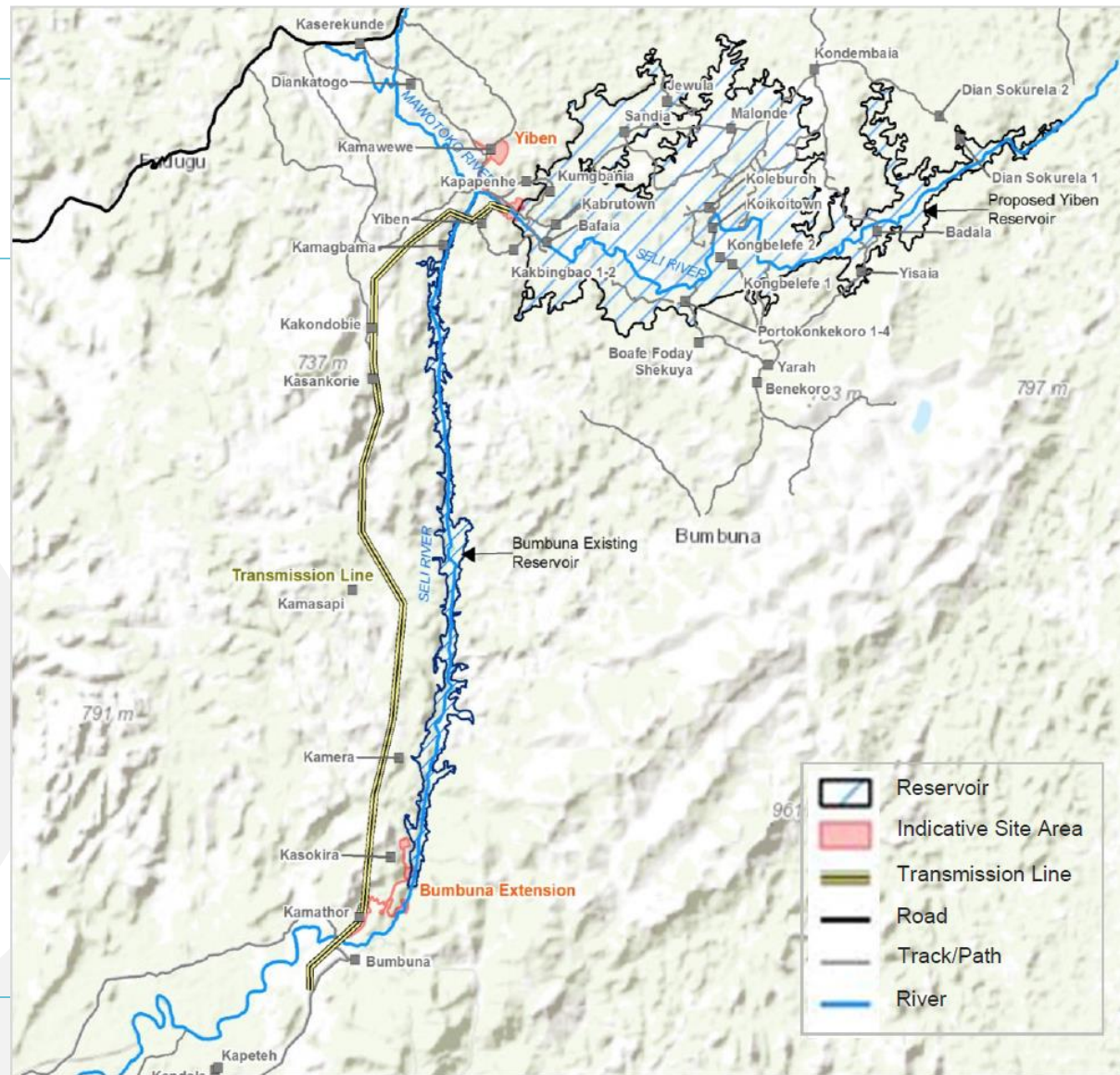
- ▶ Environmental Flow
  - Additional 4 MW powerhouse installed at the foot of the existing Bumbuna I plant





## 1. Introduction

# Bumbuna II layout



# Key facts

### Bumbuna Extension

- 88 MW capacity (2 X 42 MW)
- 1.9 km headrace tunnel
- Concrete tailrace channel

### Yiben

- 55 MW capacity (2 X 27.7 MW)
- 32km upstream of Bumbuna I
- Dam height 83 m, crest length 730 m
- 86 km<sup>2</sup> reservoir (115 km<sup>2</sup> including islands / isolated areas)

### Total 143 MW

- 36 km of new transmission lines between the Bumbuna Extension and Yiben, and between Bumbuna Extension and WAPP-connected CLSG line
- 200-250 km India Exim Transmission Line
- A new access road from Kaserekunde (near Fadugu) to the Yiben Dam
- Construction workforce will peak at 2500, including 600 Chinese and others local and national
- Operation stage workforce estimated at 110
- 3400-3700 people to be physically displaced
- 10% of reservoir area is critical habitat
- Environmental flow will be provided by addition of 4 MW ecological powerhouse to Bumbuna I

# Environmental and social priorities

### A. Resettlement



#### Physical and economic displacement:

- ▶ Stage 1/ RAP 1 Early Works: Six settlements impacted by the construction of the Bumbuna I early works (46 households with 407 people requiring physical resettlement)
- ▶ Stage 2/ RAP 2 Yiben Reservoir: c.600 households physically-displaced

### B. Biodiversity



#### Management of biodiversity impacts, and offsetting:

- ▶ Western Chimpanzee, *Ledermaniella yiben* (an aquatic plant) and *Enteromius cf. aff. Trispilos* (a fish)
- ▶ Critical Habitats - freshwater habitats, gallery forest, and hill slope forest

### C. Downstream impacts



#### Downstream impacts:

- ▶ Priority fish species have already been impacted downstream of Bumbuna I
- ▶ Further Social and E Flow Studies have been carried out
- ▶ Downstream, the overall Ecostatus is predicted to remain the same

# Firm power is essential for social and economic development in Sierra Leone



- ▶ Since Sierra Leone's independence in 1961, the country's economic development has been hampered by a brutal civil war, ending in 2002, and the deadly Ebola outbreak from 2014-16
- ▶ In Sierra Leone, 23% of the population has access to electricity (8<sup>th</sup> lowest in the world), well below the average of 45% for the population of Sub-Saharan Africa and 89% for the world
- ▶ When excluding off-grid electricity, this percentage drops to just 13%
- ▶ Seli HP will double the available electricity, providing 143 MW of new installed capacity
- ▶ Including a guaranteed minimum 80 MW – firm power, all-year round
- ▶ Seli HP is a core component of the Sierra Leone National Energy Strategy, which aims to ensure 30% of population have access to electricity by 2030, and is a strategic electricity generating asset for the region

**Republic of Sierra Leone** Capital: Freetown

**Population** 7.6 million

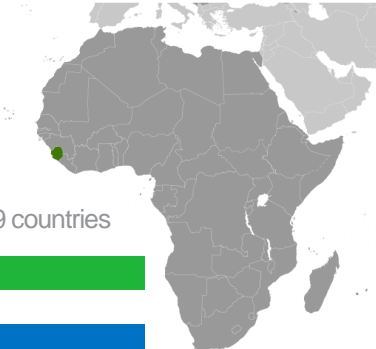
**Major Languages** English, Krio

**Life expectancy** 53 yrs (men), 55 yrs (women)

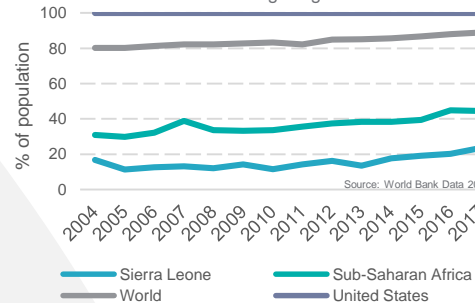
**Human Development Index<sup>(1)</sup>** 184 out of 189 countries

**Main export** Minerals (52%), Precious metals (13%), Foodstuff (10%), Other (25%)

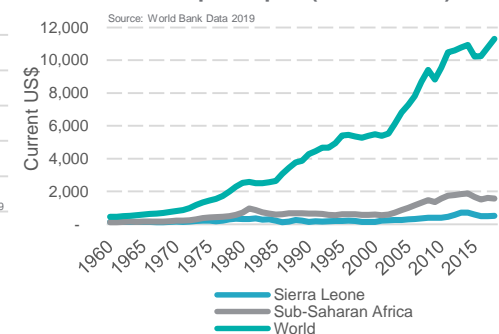
Source: UN, World Bank



**Access to electricity (% of population) including off-grid**



**GDP per capita (current US\$)**



Note: (1) The Human Development Index is a statistic composite index of life expectancy, education, and per capita income indicators, which are used to rank countries into four tiers of human development.





# Sierra Leone's long term energy mix requires hydro for base load

Unlikely to be significant in the SL energy mix:

- **Gas:** no indigenous gas resource
- **Coal:** no coal sources in the region and significant GHG and air quality impacts
- **Diesel:** not practical for more than a few small MW units at most; generally not suited to baseload generation
- **Wind:** resource is too low to make wind power commercially viable; too intermittent to contribute in the short- to medium-term

Potentially significant in the SL energy mix:

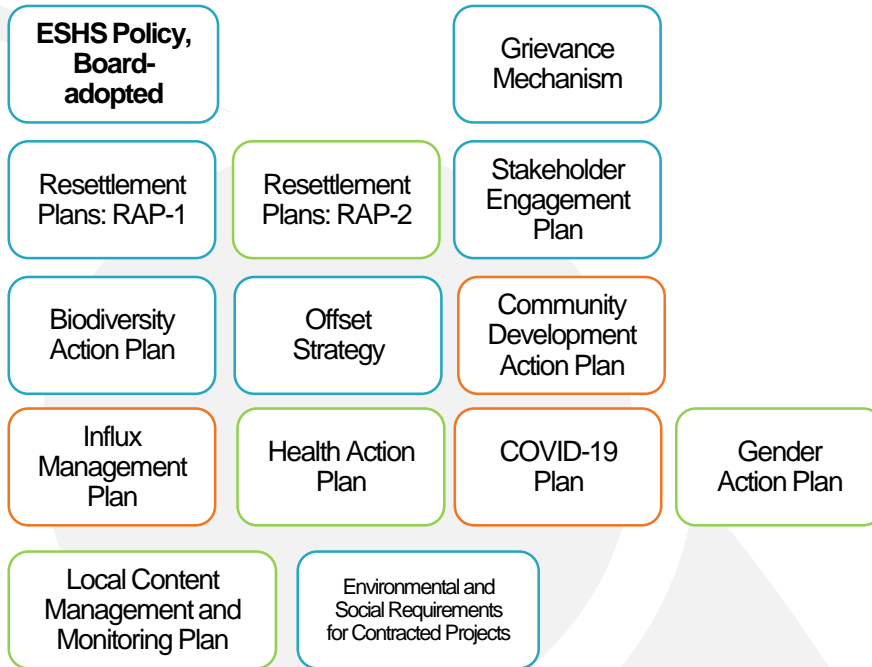
- **HFO-fired units:** viable short-term solution and potentially part of a realistic energy mix for Sierra Leone; high cost compared to hydro, and oil price volatility
- **Solar:** in Sierra Leone, until large mining and industrial loads are connected, peak will remain in the early evening; solar can't contribute to peak; grid-connected hybrid solar-battery projects not proven in Africa, expensive and still early-stage technology
- **Hydro:** low cost; with storage, can meet base load and peaking demand

# Well-developed environmental and social capacity

- ▶ A comprehensive Environmental, Social and Health Impact Assessment (“ESHIA”) was completed according to international performance standards and principles.
- ▶ A competitive engineering, procurement, and construction (“EPC”) public procurement process has been run. Highly detailed contractual schedule on ESHS management.
- ▶ Range of specialist international advisers, on resettlement, biodiversity, downstream flow issues.
- ▶ Strong E&S team with significant capacity (more than is usual for this stage of project development).
- ▶ Led by an E&S Manager, including a RAP Coordinator, Grievance Redress Officer, Database Officer, and Health and Safety Officer, plus 5 - 6 CLAs.
- ▶ Plans to recruit a further three officers – an international Biodiversity Manager, Biodiversity Coordinator, and Biodiversity Specialist;
- ▶ Additional capacity will be necessary as the project approaches construction, especially in: strategic environmental oversight (not only biodiversity); site-focused EHS management; and human resources management;
- ▶ Two site offices for community liaison.

# SHPL ESHS Management System

Now described in an ESHS MS overview document/manual



- Health and Safety Management System:
- SHPL Worksite Health and Safety Management
  - Health and Safety Risk Assessment Process
  - Health and Safety Incident or Near-Miss Reporting and Post-Event Investigation
  - General Worksite Safety Rules
  - Personal Protective Equipment (PPE)
  - First Aid Policy
  - Fire Prevention Policy
  - Drug, Alcohol, Tobacco and Firearms Policy
  - Vehicle Safety Policy
  - Visitor Safety Policy
  - Visitors Handbook
  - Health and Safety Incentive and Recognition Programme
  - Health and Safety Monitoring Plan
  - Emergency Response Plan



# EPC Contractor Schedule 15 – ESHS Conditions of Contract

- Air Quality Management and Monitoring Plan
- Biodiversity Management Plan for Construction
- Camp Management Plan
- Chance Finds Procedures
- Emergency Prevention and Response Plan
- Erosion and Stormwater Control
- Hazardous Materials Management Plan
- Health and Safety Management Plan
- Human Resources Management
- Influx Management Plan
- Noise Management Plan
- Security Management Plan
- Site Clearance and Rehabilitation
- Site-specific EHS Management Plans
- Spill Management Plan
- Spoil and Tunnel Spoil Management
- Supply Chain Management
- Surface Waters Management Plan
- Traffic Management Plan
- Water, Sanitation and Hygiene Plan
- Waste Management Plan

Schedule 15 is comprehensive, including:

- Adoption of ESHS Management System
- Organisational Capacity and Personnel
- SHPL approval of all Designs, Plans, Procedures and Practices
- Monitoring, Supervision and Reporting
- Incentives and Penalties

# Key sources of expertise

Resettlement Action Plan	<ul style="list-style-type: none"><li>• SRK Consulting (team led by Cathryn MacCallum) – RAP-1 preparation; RAP-2 preparation ongoing over 9 months</li></ul>
Biodiversity Action Plan	<ul style="list-style-type: none"><li>• The Biodiversity Consultancy (Emma Tatum-Hume and John Pilgrim) – will continue to update biodiversity plans</li><li>• Royal Botanic Gardens Kew (Dr Martin Cheek) – ongoing work on river plant translocation</li></ul>
Downstream flows analysis	<ul style="list-style-type: none"><li>• Ecotone (Michiel Jonker) for ecological analysis</li><li>• SRK for social analysis</li></ul>
ESHIA	<ul style="list-style-type: none"><li>• ERM (completed in 2017)</li></ul>
Due diligence, and Climate Change Risk Assessment	<ul style="list-style-type: none"><li>• Mott MacDonald</li></ul>
GHG assessment	<ul style="list-style-type: none"><li>• Justin Guest (CDM specialist)</li></ul>
Feasibility	<ul style="list-style-type: none"><li>• Lahmeyer International (renamed Tractebel from January 2019)</li></ul>





# Resettlement Numbers

	Both physically and economically displaced		Only economically displaced	
	HHs	PP	HH	PP
Northern and Southern Early Works (Actual)	46	407	33	191
Reservoir area (Estimates)	520 to 633*	2964 to 3288*	611 to 787	3483 to 4486**
TOTAL (approx.)	566 to 679	3371 to 3695	644 to 820	3674 to 4677

\* Range due to inclusion/exclusion of settlements on reservoir edge

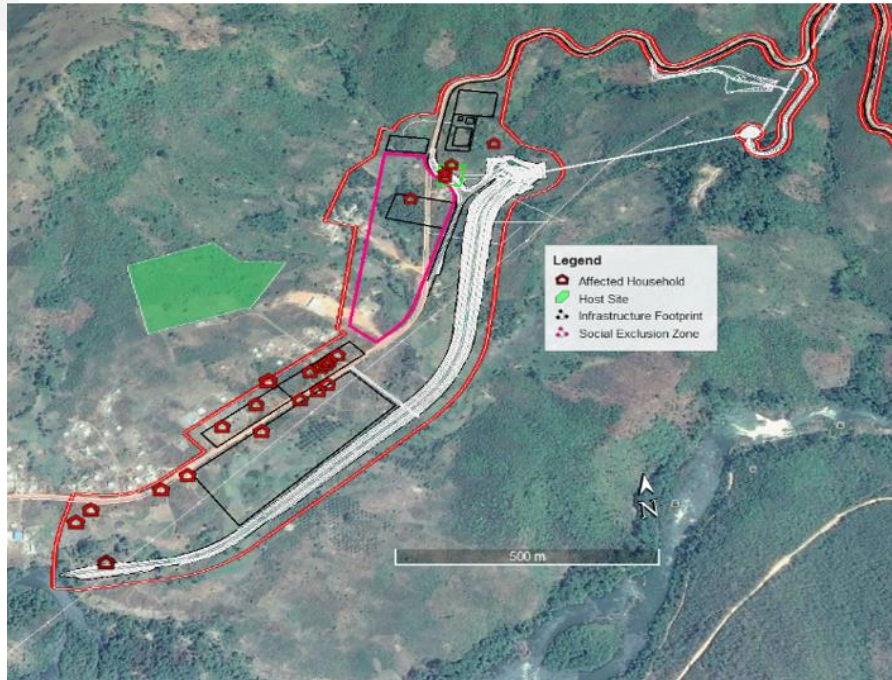
\*\* Assuming upper level estimate of 5.7 persons per household found during EHSIA surveys.

Key areas of uncertainty are:

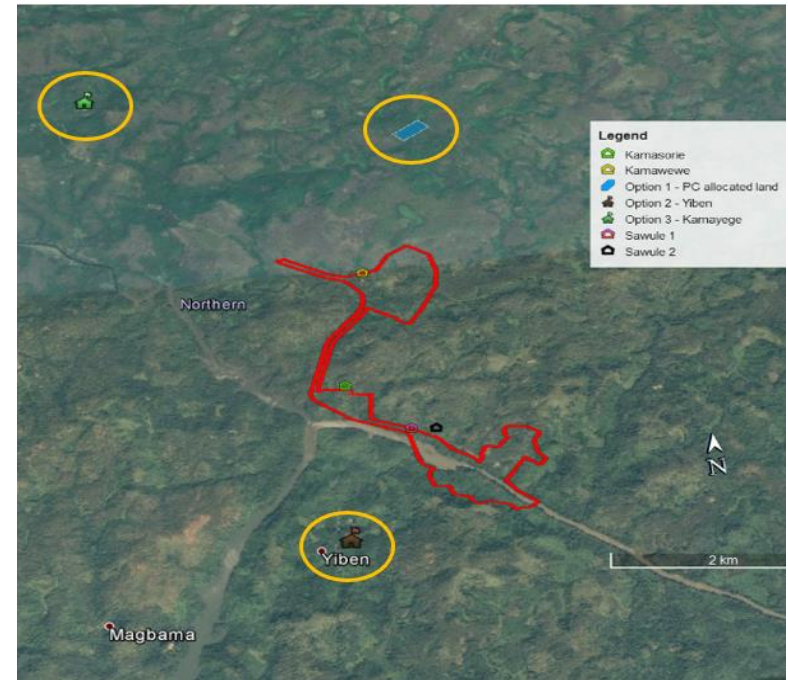
- Inclusion / exclusion of households on the reservoir edge from physical displacement;
- Hydrological and topographical uncertainty
- The adoption of a buffer zone or exclusion zone around the reservoir
- Numbers of people who are economically-displaced only.

### 3. Resettlement

## Southern EWA:

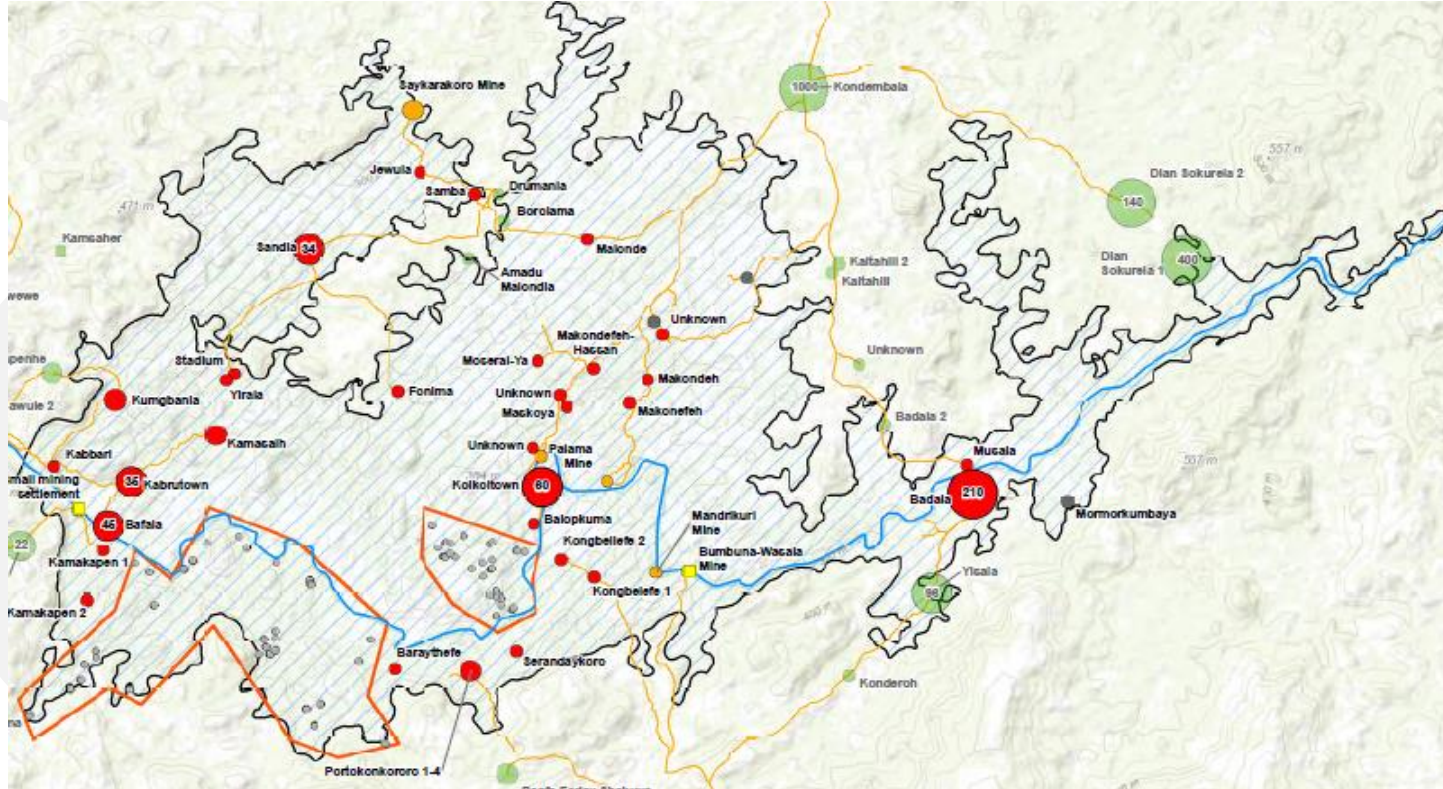


## Northern EWA:



### 3. Resettlement

# RAP-2: Estimated 633 households physically-displaced and 600+ economically-displaced





# Resettlement status update

## RAP1 (early works / construction site areas)

- ▶ RAP1 preparation completed
- ▶ Seli Hydropower (SHPL) is preparing to implement RAP1:
  - Temporary access bridge completed
  - Housing design completed
  - SHPL building out presence with RAP field offices
- ▶ Northern EWA to be relocated pre-FC (pictured right); Southern EWA relocation post-FC.

## Land Acquisition (early works)

- ▶ Land transfer ceremony held in Aug 2018 to symbolically hand over the land required for the project to SHPL.
- ▶ SHPL working with Freetown based legal counsel to document land acquisition agreements, in consultation with Ministry of Lands and Attorney General.

## RAP2 (inundation area)

- ▶ Scoping Report completed
- ▶ SHPL initial census report completed
- ▶ Household and asset surveys will start in late 2020



## 4. Biodiversity

# Net gain planned for Critical terrestrial and aquatic habitat



### Aquatic Offset

<b>Target biodiversity</b>	<ul style="list-style-type: none"> <li>• 1 Critical Habitat (freshwater)</li> <li>• <i>Enteromius</i> sp. aff. <i>trispilos</i> (fish)</li> </ul>	<ul style="list-style-type: none"> <li>• <i>Ledermanniella yiben</i> (plant)</li> </ul>
<b>Approach</b>	Targeted sustainable development activities	Species-specific activities to translocate and protect locations

### Aquatic Net Gain approach:

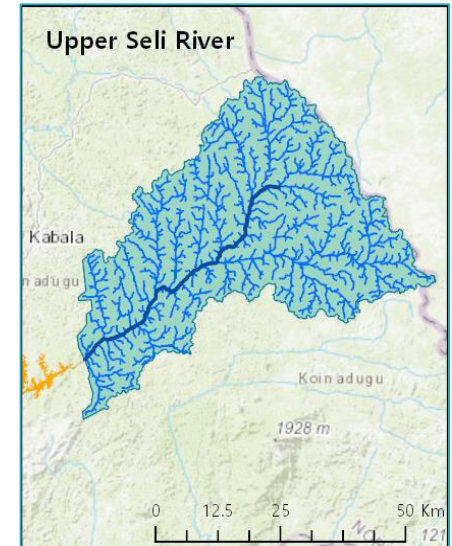
- ▶ Activities with artisanal miners to restore and maintain freshwater quality.
- ▶ Establish new populations of the river weed through translocation.

### Terrestrial Net Gain approach:

- ▶ Conservation management activities to avert loss of forest habitat and species and restore degraded habitat.

### Terrestrial Offset

<b>Target biodiversity</b>	<ul style="list-style-type: none"> <li>• 2 Critical Habitats (gallery forest, hillslope forest)</li> <li>• 1 Natural Habitat (wooded savannah)</li> <li>• Western Chimpanzee</li> </ul>	
<b>Approach</b>	Site-based conservation management	Community-based conservation management





# Separate strategy for *Ledermanniella yiben* (an aquatic plant)



Plan A

Look for new populations  
(Action 1)

Plan B

Establish:  
1. Ex-situ populations  
2. New wild populations

# Biodiversity planning

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### ▶ Key plans:

- Species Prioritisation Report;
- Critical Habitat Assessment;
- Biodiversity Action Plan;
- Offsetting Strategy.

### ▶ 2017 Critical Habitat Assessment – due diligence concluded it was of high quality

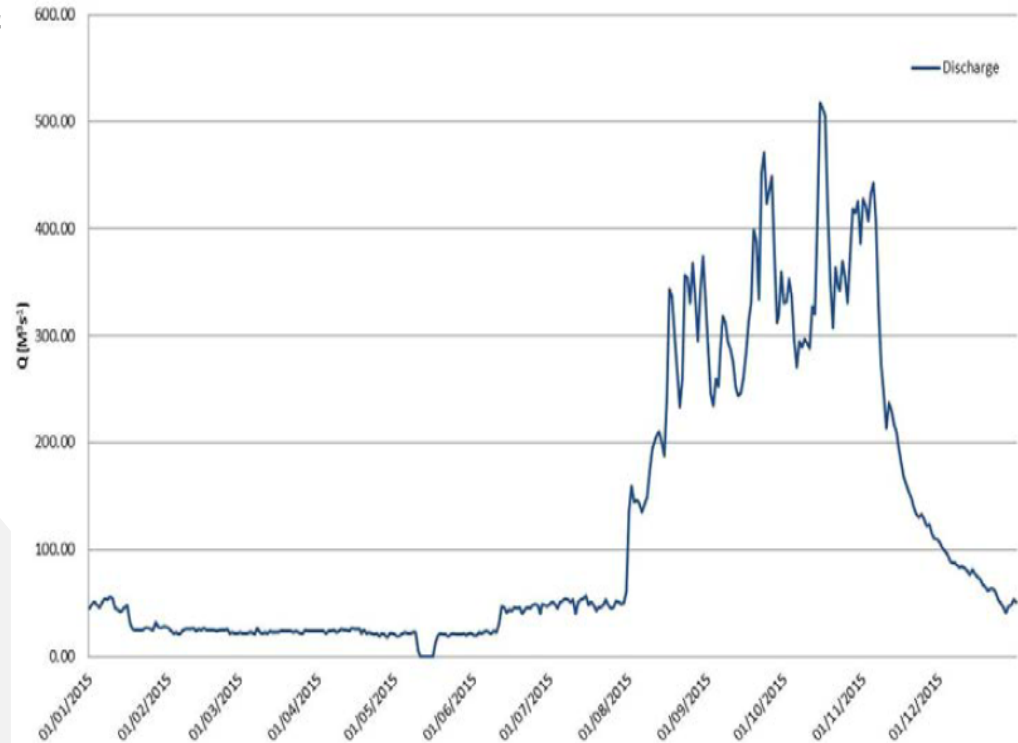
### ▶ Forthcoming:

- BMEP (Biodiversity Monitoring and Evaluation Plan)
- Biodiversity Offset Plan, with clear and implementable actions, timescale, responsibilities, funding mechanisms, long-term governance / management, agreements in principle with third parties etc

# Highly seasonal flow

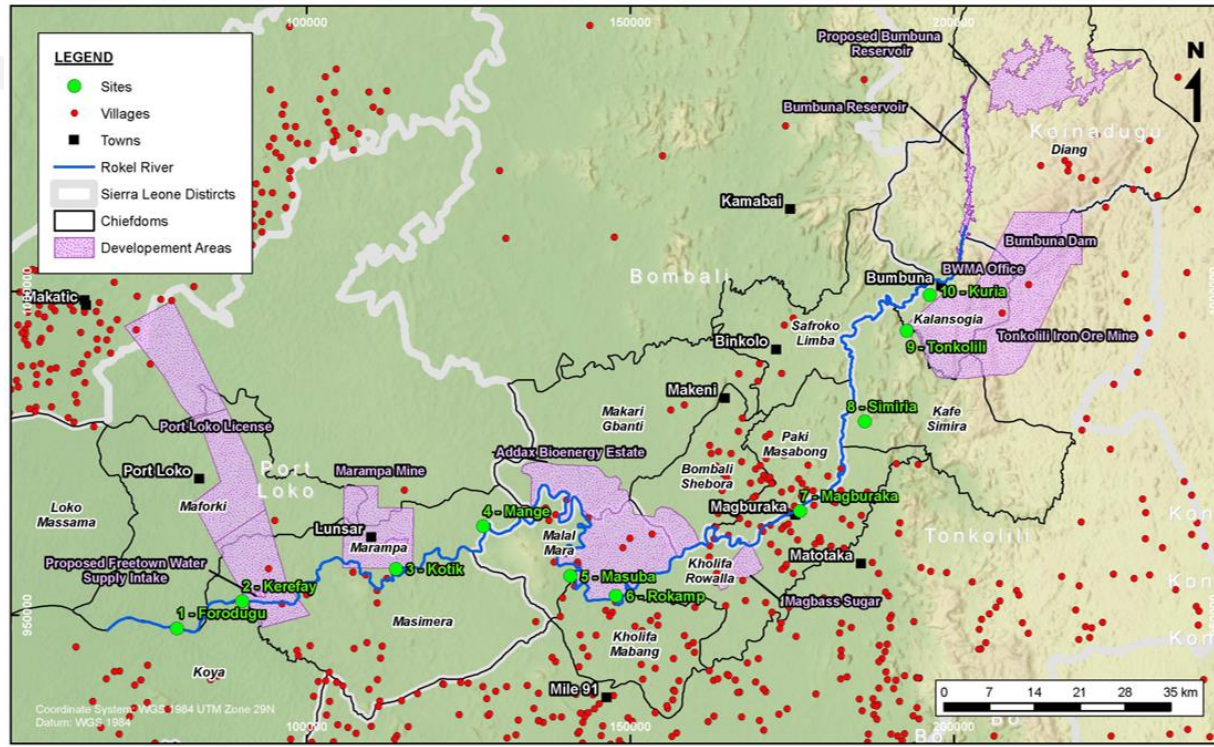
### Seli River flow downstream of Bumbuna I in 2015:

- ▶ Downstream social impact analysis (SRK)
- ▶ Ecotone 2018 Ecological Flow Assessment:
  - Flow reduction within the 'dry reach' within a portion of Upper foothills habitat (between the existing Bumbuna Reservoir and the Extension HEP tailrace (SL5))
  - An increase in dry season baseflows extending over the length of the downstream river and a delay in the onset of the wet season functional flows (SL6-SL10)
  - Recommended varying the proposed minimum e-flows seasonally



## 5. Downstream flow

# Social downstream impact study covered livelihoods at various locations downstream in the Rokel River Basin



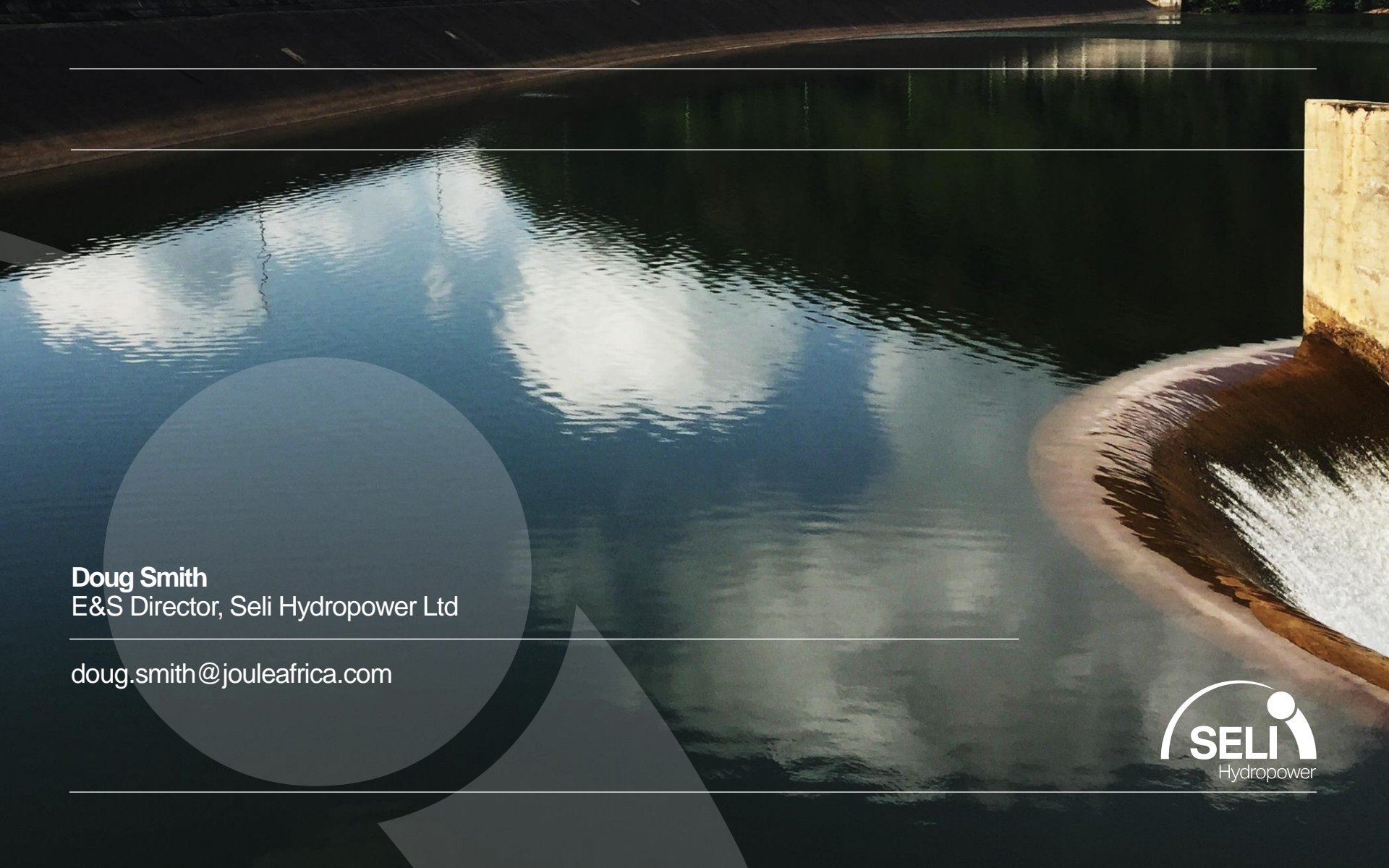
- ▶ Remote sensing and ground truthing of existing natural resource use along the basin was carried out using multispectral and visual data along the entire Rokel River basin
- ▶ This information was “ground-truthed” during a site visit.
- ▶ SRK concluded that Bumbuna II will have an overall positive social downstream impact, largely due to higher dry season flows

JULY 2018

U7419

ROKEL RIVER LIVELIHOOD ASSESSMENT





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