Environmental and Social Impact Assessment: Batoka Gorge Hydro-electric Scheme (HES) – Stakeholder Engagement During Scoping

January 2015
Objectives of this Meeting

- Introduce the proposed Batoka HES Project
- Introduce and report on the ESIA Process
- Review issues of concern and gather more comment
- Report back on baseline data collected and on work to be done
- Clarify further stakeholder needs on:
  - Engagement
  - Information
  - Technical studies
Proposed agenda for this meeting

1. Project team and project proponent
2. The Project: Need and Description
3. The ESIA process
4. Issues of concern identified to date
5. Preliminary baseline data collection results:
   - Water
   - Biodiversity
   - Social baseline
   - Heritage
6. Discussion
7. Way forward and closure
Introductions: Zambezi River Authority

- The Zambezi River Authority (ZRA) is the project proponent.

- The ZRA was established as a body corporate in 1987 under the Zambezi River Authority Acts (Act No. 17 and 19 in Zambia and Zimbabwe respectively)

- The ZRA is jointly owned by the governments of Zambia and Zimbabwe in equal proportions.

- The ZRA are responsible for overseeing the development of the Zambezi River.
Introductions: Environmental Resources Management (ERM)

- More than 35 years of experience of working with development agencies, developers and governments
- More than 4,500 staff operating in 40 countries
- Over 20 years of experience of undertaking projects in accordance with environmental and social (including resettlement) safeguard policies for IFI/World Bank funded development programs across Africa, Europe, Asia, the Americas and the Middle East.

Project Experience Across Africa
Local Partners

**Black Crystal**
- ERM’s local partner in Zimbabwe
- Registered with the Environmental Management Agency of Zimbabwe to undertake environmental impact assessments (EIAs)

**Kaizen Consulting International**
- ERM’s local partner in Zambia
- Registered with the Zambian Environmental Management Agency (ZEMA), to undertake EIAs.
Previous work undertaken

• 1972 – site alternatives for hydropower: Batoka Gorge, Devil’s Gorge and Mupata Gorge

• Followed by three more phases of site/geological investigations 1981/82, 1983 and 1989 respectively. Results revealed that the Batoka Gorge substrate conditions represent a feasible location for such a project

• 1981 – EIA commissioned for future dams at the Batoka Gorge and Mupata Gorge sites.

• 1992 - ZRA commissioned the Batoka Joint Venture Consultants (BJVC) to carry out a feasibility study for the Batoka Gorge HES.

• Further environmental and social studies undertaken in 1998.

• In 2014, ZRA appointed Studio Pietrangeli (SP) Consulting Engineers to update the engineering feasibility study for the proposed scheme, and in parallel, has appointed ERM to carry out an ESIA of the proposed Batoka Gorge HES.
Project Motivation

- Overall economic growth of SAPP country members 4.1% (1998-2012)
- SAPP Base case scenario: power peak demand will go from 45,124MW in 2012 to 121,421MW in 2045
- Power peak demand (Zambia) 1,681MW (2012) to 10,015MW (2045)
- Power peak demand (Zimbabwe) 2,029MW (2012) to 6,071MW (2045)
- SAPP power expansion plan (alternative case expansion) up to period 2025 envisages development of hydropower potential in the Kariba, Shire River, Kafue and Tete sub-basins
- SAPP Plan offers power pooling throughout the region, with capacity balance, energy balance, system reliability balance
What is the Project?

• The ESIA will be developed in line with national legislative requirements of both Zambia and Zimbabwe and international best practice (e.g. World Bank Safeguard Policies and IFC PS)

• In-country legislation includes:
  • Statutory Instrument No. 7 of 2007 the Environmental Management (Environmental Impact Assessments and Ecosystems Protection Regulations) in Zimbabwe and
  • in Zambia, it is the Environmental Management Act, 2011 and Statutory Instrument 28 of the 1997 EIA Regulations.

• The HES will be located 47km downstream of Victoria Falls and will provide 1600MW; 800MW will be provided to Zambia and 800MW to Zimbabwe. This could increase to 3000 MW depending on the results of current engineering feasibility studies
What is the project?

The Batoka Gorge Hydro-electric Scheme (HES)

• Project infrastructure will include:
  ➢ Dam wall and impoundment - 17°55'38.57"S , 26° 6'29.18"E;
  ➢ Two outside power stations;
  ➢ A spillway;
  ➢ Transmission lines in Zambia and Zimbabwe;
  ➢ Access roads in Zambia and Zimbabwe; and
  ➢ Other ancillary infrastructure (such as quarries, spoils area, construction camps and batching areas and permanent staff housing).
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What's this layout for?

This slide forms the base of the majority of slides – a text box with bullets are included ready for you to type into.
Project infrastructure

**Dam wall and impoundment**: high gravity arch dam wall, 176m in height. The Full Supply Level (FSL) of the reservoir is tentatively set at 757 m above mean sea level. Dam area of 23 km$^2$.

**Power Houses**: two power houses on each river bank, with a total capacity of the scheme being approximately 1,600 MW. The powerhouses are likely to be located outdoor at the dam toe. Each powerhouse will accommodate four turbines. The spillway will be located in Zimbabwe, approximately 2km from the dam site.

**Transmission lines**: In Zimbabwe it is proposed that the transmission lines will comprise of 2 x 70km 330kV lines, running in parallel, and sharing a common right-of-way, to the existing Hwange 330 kV substation. In Zambia, the line will comprise of 2 x 330kV transmission lines measuring 21km running from Batoka and terminating at a new 330kV substation ZESCO will construct in Livingstone. A second line may also be developed which will run in parallel to the existing 220kV line, terminating at the Muzuma substation in Choma, a distance of approximately 160 km.

**Access Roads**: Existing roads will be upgraded and new ones will be constructed to allow access to each river bank. In Zambia, it is proposed that the road originating in Palmgrove (near Livingstone) that connects to Mukuni village will be rehabilitated and a new road, measuring 20km in length will be constructed to connect Mukuni to the dam site. In Zimbabwe, the secondary road that starts from the Bulawayo-Victoria Falls main road and connects to Jabula will be upgraded and a new road, connecting Jabula to the dam site (measuring 14km long), will be constructed. The construction of a road downstream from the dam and a bridge that connects the two countries is also proposed, in order to minimise the passage of heavy loaded trucks on the dam crest.

**Permanent camps**: To accommodate approximately 9000 people (1500 employees). Three alternatives proposed on each side of the river (labelled 1-6).
## Project programme

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<tr>
<th>Project phase</th>
<th>Duration</th>
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<tr>
<td>ESIA process</td>
<td>11 months</td>
<td>May 2014 – 2nd quarter 2015</td>
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<td>Construction: phase 1</td>
<td>1–2 years</td>
<td>2015–2017</td>
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<td>Construction: phase 2</td>
<td>6–7 years</td>
<td>2017–2024</td>
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<td>Operation phase</td>
<td>For life of dam</td>
<td>2024 onwards</td>
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The ESIA is divided into 5 stages with the primary objectives of identifying and assessing impacts and ensuring that management enhances or reduces impacts if project approved:

**Inception** or screening identifies likely key issues of concern, risks and fatal flaws. Defines the scope of work for the remainder of the ESIA.

**Scoping** identifies the likely changes (impacts) that will happen as a result of the proposed Project. Seeks to involved interested and affected parties.

**Baseline Data Gathering** will be undertaken to enhance understanding on the environment and people in the area and how the proposed Project is likely to affect them.

During **Disclosure** the ESIA report will be submitted to the Governments of Zambia and Zimbabwe who will review it and issue a decision.

**Impact Assessment** assesses how significant the impacts are likely to be, as well as identifying ways to manage them.
Stakeholder Engagement

- Currently 3 phases of engagement proposed:
  - Notification and Scoping;
  - Feedback on Scoping;
  - ESIA Disclosure
Stakeholder engagement during Scoping

- Advertisements
- The distribution of notices / flyers for community
- Background Information Document
- Fielding of telephonic and written comment;
- One-on-one discussions

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<td>Public Open Day, Harare</td>
<td>Harare Royal Golf Club</td>
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<td>Authorities Meeting, Bulawayo</td>
<td>Bulawayo Club</td>
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<td>Community meeting, Jambezi</td>
<td>Chief Shana’s homestead</td>
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<td>Hwange Rural District Council Meeting</td>
<td>Hwange Rural District Council Offices</td>
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<td>Sacred Heart Mission</td>
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<td>Victoria Falls Open Day</td>
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<td>Community meeting, Kattchecheti</td>
<td>Ndhlovu Business Centre</td>
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<td>Chisuma Primary School</td>
<td>6th Oct 2014</td>
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<td>Community meeting, Chikandukubi</td>
<td>Mashake Secondary School</td>
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<td>Livingstone Open day</td>
<td>Livingstone Municipal Offices</td>
<td>6th Oct 2014</td>
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<td>Community meeting, Matetsi</td>
<td>Matetsi Police Station</td>
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<td>Community meeting, Mbhizi</td>
<td>Milonga Clinic</td>
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<td>Lusaka Open Day</td>
<td>Long Acres Lodge</td>
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<td>Regulatory authority meeting, Lusaka</td>
<td>Long Acres Lodge</td>
<td>8th Oct 2014</td>
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<td>Community meeting, Sidinda</td>
<td>Lumbora Primary School</td>
<td>8th Oct 2014</td>
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<td>Community meeting, Mashala</td>
<td>Mashala Secondary School</td>
<td>8th Oct 2014</td>
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<td>Livingstone Council Meeting</td>
<td>Provincial Conference Room, Livingstone</td>
<td>9th Oct 2014</td>
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<td>Kazangulu District Council Meeting</td>
<td>Kazungula Council Chambers</td>
<td>10th Oct 2014</td>
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<td>Community meeting for Chief Musokatwane</td>
<td>Musokotwane Primary School</td>
<td>11th Oct 2014</td>
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<td>Community meeting for Chief Mukuni villages</td>
<td>Njando Primary School</td>
<td>13th Oct 2014</td>
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Extension of stakeholder engagement scope of work

- Further meetings in Livingstone requested:
  - Clarity regarding project description
  - Adequate notice in advance to be provided
- Scheduled meetings in Vic Falls (22\textsuperscript{nd} Jan 2015) and Livingstone (23\textsuperscript{rd} Jan 2015)
- Following notification has been provided:
  - Media notices in: The Post (Zambia) on 19th December 2014 and the Chronicle (Zimbabwe) on 22\textsuperscript{nd} December 2014
  - Also distributed via the Livingstone Weekly, Friends of Victoria Falls, the Hospitality Association of Zimbabwe and the Bejhani Trust
  - Letters of invitation posted or emailed to registered stakeholders
  - Emailed reminders to registered stakeholders
  - Telephonic reminders to registered stakeholders.
ESIA Activities – Stakeholder Participation

- **Stakeholder Meetings / Open Days**
- **Key Informant Interviews**
- **Household Surveys**
- **Focus Group Discussions**
Proposed further engagement

- Update of comments and response document following Livingstone and Vic Falls meetings: 30th Jan 2015
- Release of the Draft Scoping Report and comments and response report: mid February 2015. Comment for 30 days. This will entail the following activities:
  - Notification of all registered stakeholders of availability of the DSR
  - Availability at public places for comment
  - Circulation of comments and response report and Technical Summary in electronic format
- Feedback meetings on the results of the ESIA: currently anticipated in 2nd quarter 2015
Potential Impacts

- Physical displacement
- Tourism
- Cultural heritage
- In-migration
- Economic displacement
- Water quality and flow
- Health
- Biodiversity
Anticipated specialist studies

- Biodiversity
- Social-economics including health impact assessment and an economic cost-benefit analysis
- Resettlement
- Cultural heritage and archaeology
- Water flow and water quality monitoring
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<tr>
<td>Will the crocodiles in the Gorge be relocated?</td>
<td>Jean Whiley</td>
<td>Private</td>
<td>01-Oct-14</td>
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<td>Can you provide assurance that a search for rare and endangered species was done by properly qualified staff at the appropriate times of year for the species to be detected. In particular the &quot;Taïta Falcon&quot;.</td>
<td>Sean Edington and Sue Liell-Cock</td>
<td>Safari Par Excellence and International Rafting Federation</td>
<td>2014/10/27 and 18th Nov 2014</td>
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<td>The Taïta Falcon’s and Black Eagles nest in the area. The Falcon’s are only found in this Gorge and Wonder Gorge. They are difficult to locate and identification cannot be based on chance sightings. The African Finkfoot is also present in the area. A bird specialist needs to form part of the biodiversity team. The level of the dam will determine if they can continue nesting in the area.</td>
<td>Chanda Mwele and David Ngwenyama</td>
<td>WWF</td>
<td>06-Oct-14</td>
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<td>There is concern regarding the nesting of endangered birds in the Gorge.</td>
<td>Christopher Kaniki</td>
<td>ZESCO</td>
<td>08-Oct-14</td>
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<td>What is the potential impact of the Batoka Dam on the fresh water bio-diversity (fish, reptiles, unique vegetation etc.)?</td>
<td>David Ngwenyama</td>
<td>WWF-Zambia Country Office</td>
<td>Registration and Comment sheet</td>
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Issues identified to date through stakeholder engagement

- Impact on biodiversity including:
  - Avifauna
  - Insect life
  - Bats
  - Succulents
  - Riverine vegetation
  - Aquatic ecology
  - Mammals
  - Tree species
  - Migration corridors
  - Human-animal conflict
  - Infestation of alien species
- Climate change considerations and feasibility of dam as a result
Issues identified to date through stakeholder engagement

- Community development opportunities including:
  - Employment opportunities
  - Social investment
  - Power supply
  - Provision of water
  - Business opportunities
- Cultural heritage impact including sacred sites, graves, World Heritage site
- Impacts associated with dam failure
- Environmental flow impacts including impact on:
  - Kariba;
  - Vic Falls;
  - River downstream of dam;
  - Downstream water users;
Issues identified to date through stakeholder engagement

- Environmental flow impacts during the construction phase and periods of drought
- Physical displacement
- Economic displacement
- Economic and livelihood impacts including:
  - Impact on river rafting
  - Impact on tourism activities
  - Impact on fishing
- Impact on surrounding communities groundwater supply
- Health impacts including spread of water borne diseases, HIV, etc
- Increase in cattle theft due to improved access
- Impact of inmigration to the area
- Impact of odour
Issues identified to date through stakeholder engagement

• Motivation for the project and proposed project alternatives including solar power, turbine generated power,
• Safety on roads
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Data Requirements – WQ Analysis & Modelling

- Bathymetric data within the reservoir flooded area (including reservoir elevation-storage-area table)
- Hydropower intake elevations, plan and elevation drawings
- Historical inflow data, water temperature, TSS, DO, BOD, nutrients etc
- Hydropower release rate schedule (flows seasonally and hourly);
- Meteorological data
Data Requirements – EF Analysis

At the two critical downstream assessment locations:

- Sediment composition
- Channel characteristics and habitat distribution
- Riparian vegetation
- Macro-invertebrate community structure and habitat
- Fish community structure and habitat
- Flow data for present day and post-impoundment scenarios (baseload and peak power generation)
- Stage (water level) versus flow discharge relationship
Baseline Phase

- River delineation and bio-survey site selection - to represent diversity of river morphologies and associated habitat conditions (EF1 just d/s HES; EF2 20km u/s Lake Kariba)

- Review of existing information and compilation of initial relationships (biophysical indicators, relation to flow etc)

- Hydrology and flow scenario production (see previous slide)

- Field data collection at EF1 and EF2 (September 2014)
Assessment Phase

- Numerical modelling approach used to assess impacts on water quality in the reservoir and downstream in the Zambezi River to the upper end of Lake Kariba.

- Baseline and post construction conditions calculated using two numerical models (GEMMS for in-reservoir temperature and dissolved oxygen, and BATHTUB for eutrophication) that utilize available water quality and quantity information and engineering design information.
Assessment Phase (Continued)

- DRIFT model used to assess Environmental Flow conditions pre and post impoundment.

- Method quantifies and assesses the implications for the river ecosystem (in terms of ecological integrity and status) of the flow scenarios based on the operation of Batoka HPP.

- Environmental Flow studies conducted in 2014 provide assessment of the current ecological state of Riparian Vegetation, Aquatic macro-invertebrates and Fish communities.

- EF studies provide data on the expected responses to changes in the Zambezi River downstream of the proposed Batoka Dam Wall and possible flow release scenarios.
Assessment Phase (Continued)
Climate Change

IPCC predictions include:

- 10 to 15% decrease in rainfall across the Zambezi basin
- Increase in temperatures across the basin (0.3 to 0.6 °C) per decade until the end of the century
- Changes in the seasonal pattern of rainfall; delayed onsets as well as shorter and more intense rainfall events
- A reduction in average annual river flows

- Essential that the feasibility engineers include climate change predictions into their water budget calculations
  - Potential worse case scenario of an up to 3.5% reduction in the water budget per decade compared to the baseline climatology
  - Shortening of the peak flow season
Batoka Gorge HES ESIA
Biodiversity assessment
Biodiversity Assessments

**Terrestrial Ecology**
- Data Inputs from 1993 and 1998 studies
- Expanded habitat assessment and mapping
- Updated current status of faunal communities
- Focus on status of birds (Taita Falcons & Pratincoles)
- Sensitivity Assessment and sensitivity mapping

**Aquatic Ecology**
- Data Inputs primarily from 1998 studies (fish)
- Data Inputs Environmental Flow Assessments:
  - Riparian Vegetation
  - Aquatic Macro-invertebrates
  - Fish Ecology
Terrestrial Habitat Assessment & Mapping

- Developed an Ecological Area of Influence (AoI)
- Vegetation was already mapped for Zimbabwean side, descriptions were developed and expanded to fit the entire AoI.
- Field studies were conducted to verify vegetation units and map vegetation on the Zambian side in a manner that matched assessments on Zimbabwean side.
Assessment of Faunal Communities

- Emphasis placed on updating the current state of following faunal groups:
  - Large Mammals
  - Birds
  - Reptiles and Amphibians

- Assessment of the presence of Threatened and Protected Species

- Data inputs received from Wildlife Authorities in Zambia and Zimbabwe, local museums, CAMPFIRE, Local Safari Hunters and Crocodile Farming Associations and local NGOs.
Focus on Status of Birds

- Zimbabwe Falcon Club (ZFC) were approached to provide insights into the status of Taita Falcons based on their recent surveys and existing knowledge.
  - Taita Falcons populations have declined in the Batoka Gorge as a result of tourism (helicopter) activity and an increase in Lanner Falcon populations.

- ZFC provided data inputs on the ecology and status of Rock Pratincole and Black Storks within the Batoka Gorge.
Sensitivity Assessment

- Habitat Sensitivity conducted based on the recognition of following:
  - Modified Habitats (low sensitivity)
  - Natural habitats, widespread and with low sensitivity
  - Natural habitats, restricted and with high sensitivity
  - Critical Habitats - The Batoka Gorge is considered to be a Critical Habitat based on the importance to a range restricted species (Taita Falcon) and as a highly unique ecosystem.
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Aquatic Ecology

- Past data from the 1998 ESIA studies used. Provides a deep insight into the expected responses on the fish communities to the development of the Batoka Reservoir.
- Majority of the riverine fish will disappear and there will be a vacant niche for pelagic fish. Introduction of Kapenta is recommended.
- If Kapenta populations establish, and eutrophication can be controlled (emphasis on Livingstone and Victoria Falls waste water treatments), then Tiger Fish populations should thrive.
Batoka Gorge HES ESIA

Socio-economic impact assessment
Methodology

- Downstream impacts activities involved identification, not primary data collection of these communities as impacts not fully understood
- Also exclusion of transmission line in Zambia – uncertainty regarding alignment
- Economic impact assessment and assessment of tourism loss still to be undertaken
- Resettlement action plan still to commence
- Primary data was obtained from:
  - focus group discussions with males and females;
  - key informant interviews;
  - household surveys; and
  - site observations
Methodology

- Tools for data collection developed
- Household surveys of 30% on average per village size

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Key findings

The affected project area is:

- Zambia: Southern Province, Kazungula and Livingstone Districts, Mukuni Ward with traditional authority of Chief Mukuni

- Zimbabwe: Matebeleland North Province, Hwange Rural District, Matetsi, Chidobe, Katchecheti, Nemanhanga, Mbizha, Jambezi, Sidinda, Mashala and Chinkandukubi Wards, traditional authorities: chief Shana, Bishop Matata Sibanda (who is Acting Chief for Mvutu, who has recently deceased) and Chief Hwange
The world's leading sustainability consultancy

What's this layout for?

This slide forms the base of the majority of slides – a text box with bullets are included ready for you to type into.
Key findings

- Livelihoods in the project area - Zambia:

- Farmer: 58%
- Artisans – curios: 16%
- Fishing: 1%
- Trader / Market-seller: 13%
- Tourism Industry – rafting: 4%
- Tourism industry - other: 4%
- Maricho / casual labour: 4%
Key findings

- Livelihoods in the project area - Zimbabwe:
Key findings

- Education:
  - Few schools and inadequate facilities. Long distances to access. Poor access to tertiary education

- Health:
  - Poor facilities in the area for medical care
  - Reported rates for HIV of between 14 and 30%.
  - 67-78% of households stated that they suffer from food shortages
  - Common ailments are respiratory diseases, diarrhea, malaria

- Services:
  - Transport: gravel roads, poor public transport options, extreme minority having access to own means of transportation
  - Water: wells/boreholes with hand pumps, majority reported to be of good quality, shortages reported at times
  - Power: majority reliant on firewood, torches and candles, none of households surveyed having electricity. Paraffin common in Zim
  - Sanitation: only 10% have access to latrines in Zambia, 50% in Zim
  - Waste: majority dumped
  - Telecommunications: cell phones, but reception problems
Key findings

- **Vulnerable groups**
  - In the social study area in Zambia, 5% of people are aged 60 years and older and 11.1% in Zimbabwe;
  - Female headed households account for 28.3% of households in the Zambian social study areas and 41.4% in Zimbabwe
  - Approximately 8% of households in the Zambian study area have a household member who suffers from a physical or mental disability and 6.4% in Zimbabwe
Batoka Gorge HES ESIA
Heritage impact assessment

The world's leading sustainability consultancy
Key findings

- Most of sites are no longer intact and their original contextual associations have been destroyed.

- This topography may have been deemed unsuitable for habitation

- The vast majority of sites recorded date from the Stone Age, in particular Middle Stone Age (MSA).

- No diagnostic Early Stone Age (ESA) artefacts have been recorded on the Zimbabwe side although they are known in Zambia

- Historical sites are found across the proposed Project Area, reflecting the increased population and scattered landuse that has emerged with the advent of colonisation

- Chemapato Hill, contrary to the conclusions of the 1998 Report, is an important site with living and intangible heritage associations for the local Toka-Leya community
Methodology

- Further work required for:
  - Transmission lines once refined
  - Zambia
  - Batoka Gorge itself – due to access – caves present where may be rock art, Stone Age deposit, burial sites and those of intangible importance
  - Cave-like features in tributary gorges
  - Chimamba Rapids and Moemba Falls as well as other pools and scattered islands
  - Area north and west of Kasikiri – landmines
What's this layout for?

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Batoka Gorge HES ESIA
Advise provided to the project engineers
E&S inputs into the Engineering Study

- Need to look at alternative dam heights – 757 m and 740 m FSL’s under consideration
- Water quality /limnological modelling provides advice on the heights of offtake structures
- Environmental Flow analysis – further refinement of DRIFT model during ongoing feasibility study
- Advice on the placement of permanent villages
- Advice on the location of new roads
- Advice on the provisional routing of Transmission lines
- Climate change scenarios to be incorporated into dam design
Summary of recommendations

For transmission lines:

- Suggestion for diversion to east to avoid Manuna and Jambezi in Zimbabwe and heritage resources at Matetsi River
- Preference for alternative routing to Hwange – avoid Kasibo
- Zambia: rerouting to avoid N’gandu, Munwana and Chibule

With regard to access roads:

- Against the construction of the Jabula - Batoka Airport Trunk A and B. Use of Sizinda road as an alternative (Zimbabwe) – safety and displacement
- Zambia – avoidance of heritage sites
Thank you

If you would like to enquire further about the ESIA process and proposed Project please contact us on the following:

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<thead>
<tr>
<th>Zimbabwe</th>
<th>Zambia</th>
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<tr>
<td>Black Crystal</td>
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<td><a href="mailto:queries@blackcrystal.co.zw">queries@blackcrystal.co.zw</a></td>
<td><a href="mailto:Kaizen0601@gmail.com">Kaizen0601@gmail.com</a></td>
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Or on the Batoka Gorge email address at: batokagorgehes@erm.com