



BATOKA GORGE HYDRO- ELECTRIC SCHEME (BGHES) - ZAMBEZI RIVER - ZAMBIA AND ZIMBABWE

*Environmental and Social Impact
Assessment Disclosure*

02 December 2020

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The business of sustainability

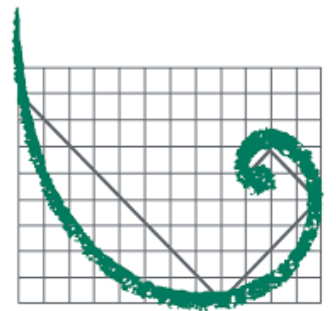
Agenda

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4. Project Description and Status
5. Key ESIA Findings and Management Measures
6. Disclosure of Livelihood Restoration Plans for Staff Townships and Access Road
7. Next Steps
8. Question and Answer Session

Webinar Etiquette

- As a participant, you will be muted for the duration of the 60 minute presentation
- During this time, you as participant can use the Q&A function (bottom tool bar of your screen) to pose questions and comments to the speaker. Please do not use it for other topics or internal discussion
- These questions and comments will be addressed during the 60 minute Q&A session, following the presentation
- To ask a question during the Q&A session please raise your hand using the function on your tool bar
- We will record the meeting and share the presentation on the Project website

Introduction



ERM



ESIA Process and Public Participation Undertaken To Date

Regulatory Framework

- Three separate draft ESIAs have been prepared for the Project to assess potential **physical, biophysical**, and **social impacts** of the Project, and propose measures to mitigate adverse impacts and enhance project benefits
 - ESIA for dam wall and impoundment, including spillway; surface power houses; Project townships in Zambia and Zimbabwe; and other ancillary infrastructure
 - ESIA for Project access roads in Zambia and Zimbabwe
 - ESIA for Project transmission lines in Zambia and Zimbabwe

Zambia

- Zambian Environmental Management Act (EM Act) (Act 12 of 2011)
- Environmental Impact Assessment (EIA) Regulations (Statutory Instrument No. 28 of 1997)
- Environmental Management (Licensing) Regulations (S.I. No. 112 of 2013)

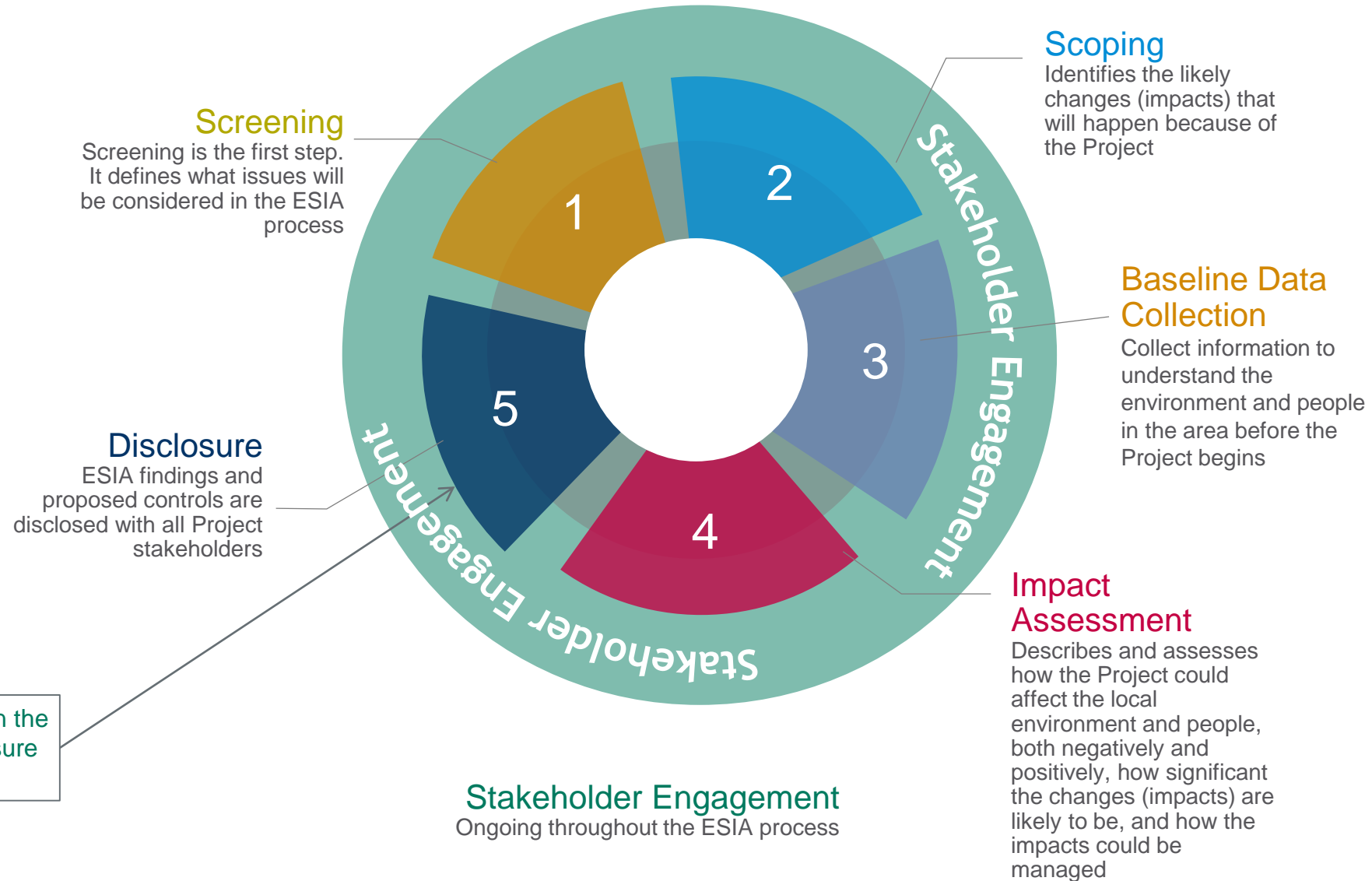
Zimbabwe

- Environmental Management Act (the Act) (Chapter 20:27), No. 13 of 2002
- Environmental Management (Environmental Impact Assessments and Ecosystems Protection) Regulations, SI 7 of 2007
- Environmental Impact Assessment Policy (1997)

Regulatory Framework Continued

- A number of international environmental and social guidelines and standards applicable to the BGHES
- The environmental and social guidelines and standards considered to guide the ESIA include:
 - World Bank Environmental and Social Safeguard Policies
 - The International Finance Corporation (IFC) Performance Standards on Environmental and Social Sustainability (2012) (the IFC Performance Standards)
 - IFC Environmental, Health and Safety (EHS) Guidelines (April 2007)
 - World Commission on Dams (WCD) Guidelines and Recommendations
 - The International Hydropower Association (IHA) Sustainability Guidelines and Sustainability Assessment Protocols
 - The Southern African Power Pool (SAPP) Environmental and Social Impact Assessment Guidelines for Hydroelectric Projects and Transmission Infrastructure in the SAPP region

The ESIA Process

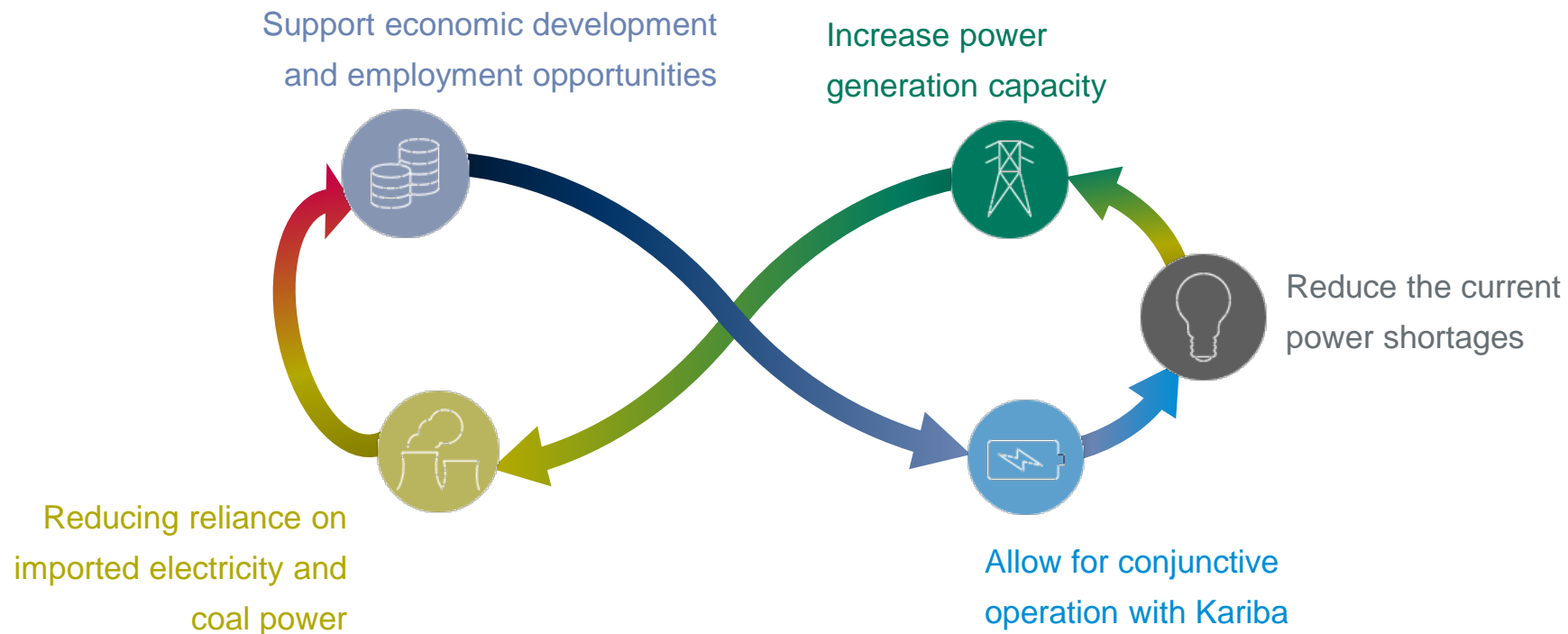


Project Description

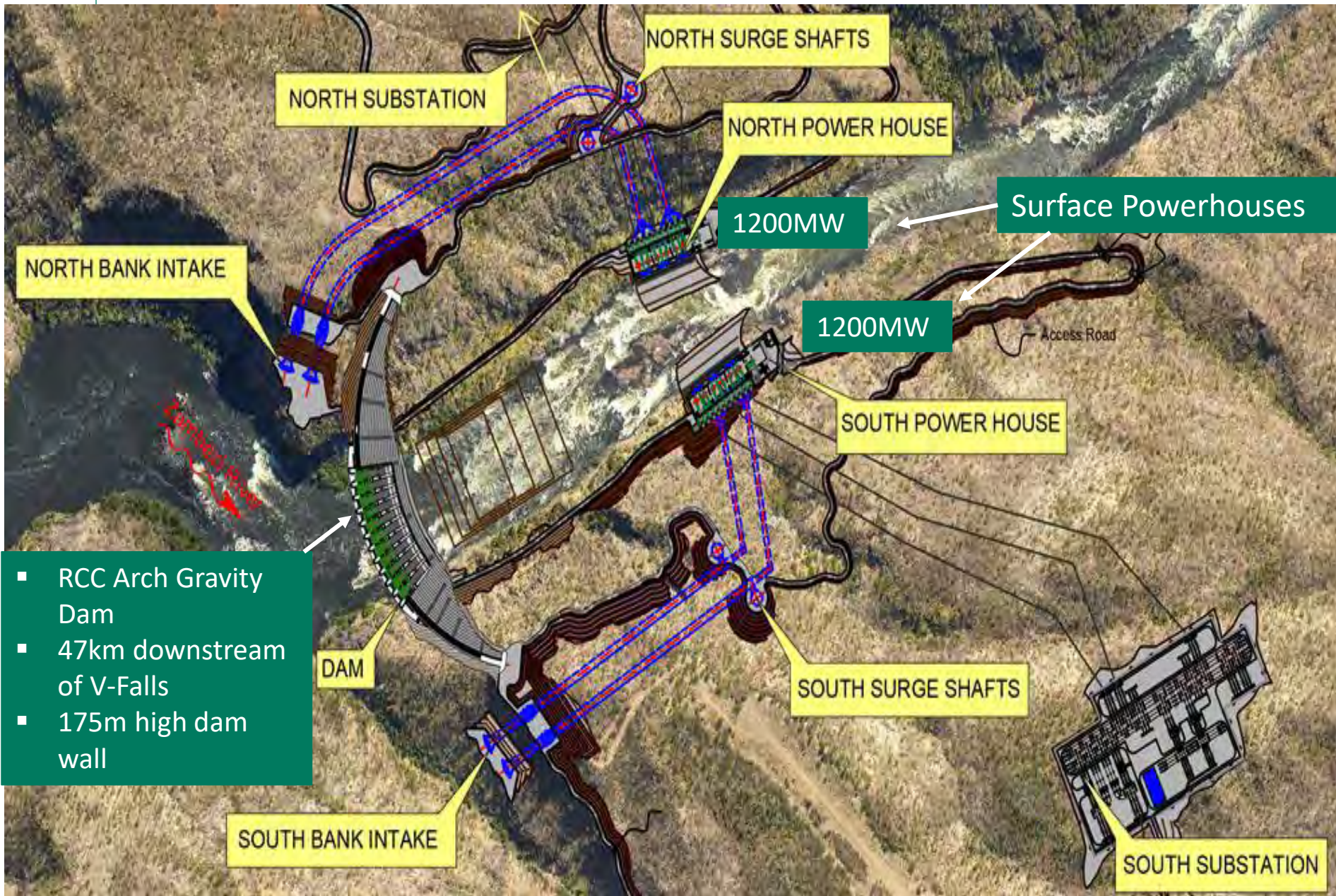
Need for the Project

The Zambezi River has a vast hydropower energy potential. Hydropower is considered the most feasible and reasonable electrification option for both countries

BGHES would contribute significantly to electricity supply of Zambia and Zimbabwe, and to distribute power to southern African countries under the Southern African Power Pool (SAPP). The Project will aim to:



BGHES Proposed Scheme Layout



Batoka Gorge Site

- Roller Compacted Concrete Arch Gravity Dam Wall and impound area (reservoir)
- Spillway
- Pressure waterways, located in the abutments
- Two surface power houses, one on each side of the river, located on the abutments and two switchyards
- Project townships (in both Zambia and Zimbabwe) and other ancillary infrastructure (such as quarries, spoils area and batching areas)
- Access roads on each side

BGHES Proposed Project Transmission Lines

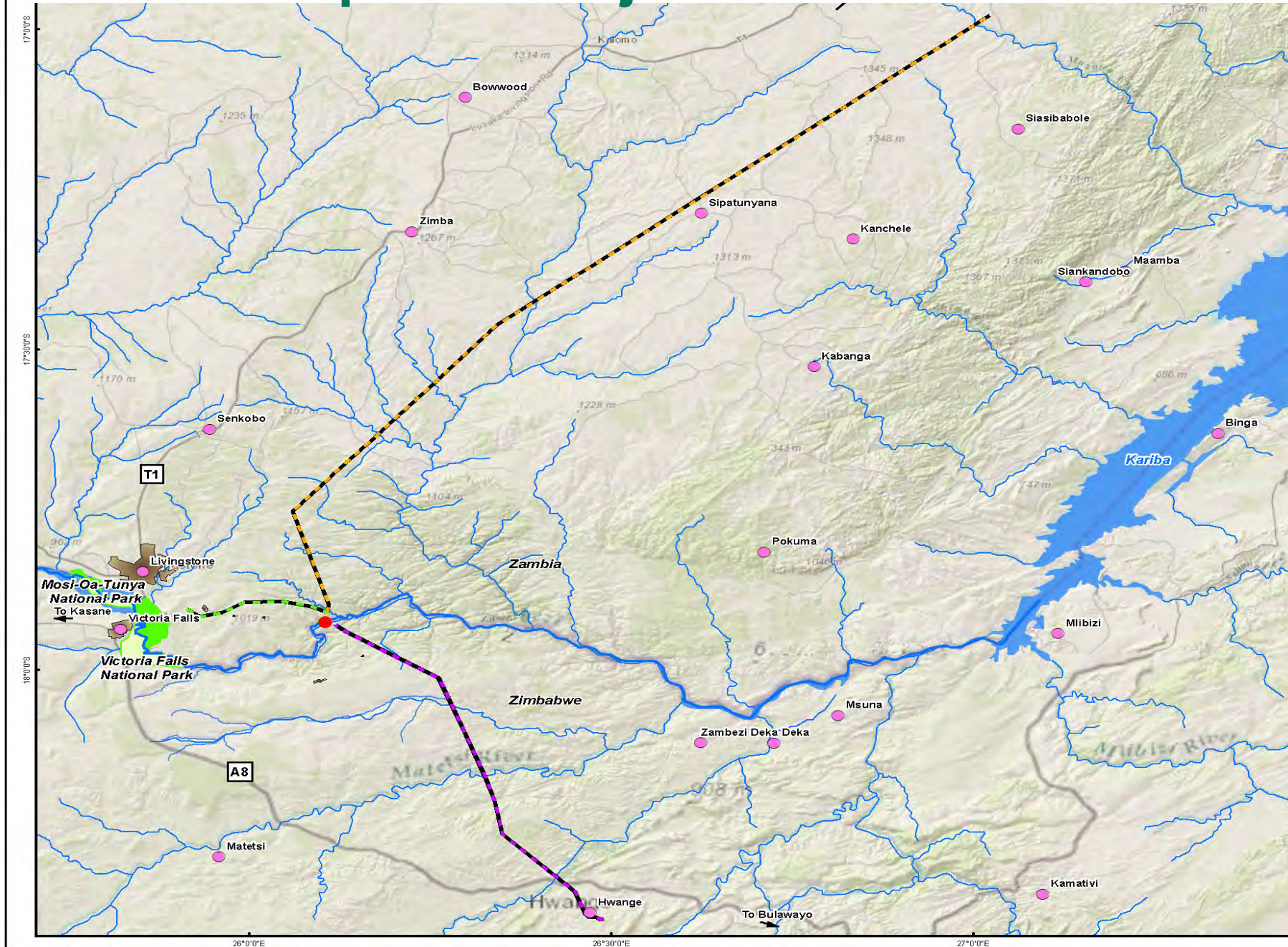
Three transmission line routes are proposed as part of the BGHES Project:

Zambia

- Mukuni 300 kV transmission line - approximately 22 km (from proposed BGHES substation on north bank to newly constructed 330 kV Mukuni ZESCO substation in Livingstone)
- Muzuma 300 kV transmission line - approximately 152 km (from proposed BGHES substation on north bank to Muzuma substation in Choma)

Zimbabwe

- Hwange 400 kV transmission line - approximately 67 km (from the proposed BGHES substation on south bank to the proposed Hwange 400/330kV substation)



BGHES Proposed Access Road & Staff Townships

Access Road

Overall access road length is 35 km on the Zambian side and 53 km on the Zimbabwe side

Staff Townships - There are two proposed Townships on the North bank and South bank

Land Acquisition Progress

Zambia (over 2558Ha allocated for the project)

- All required approvals obtained , pending is numbering of the land parcels to be followed by letters of offer and then title deeds

Zimbabwe (applied for about 3000Ha.)

- Cabinet approved the excision from communal to urban and SI gazetted
- Next steps include preparation of base maps, concept layouts and for submission to Physical planning department

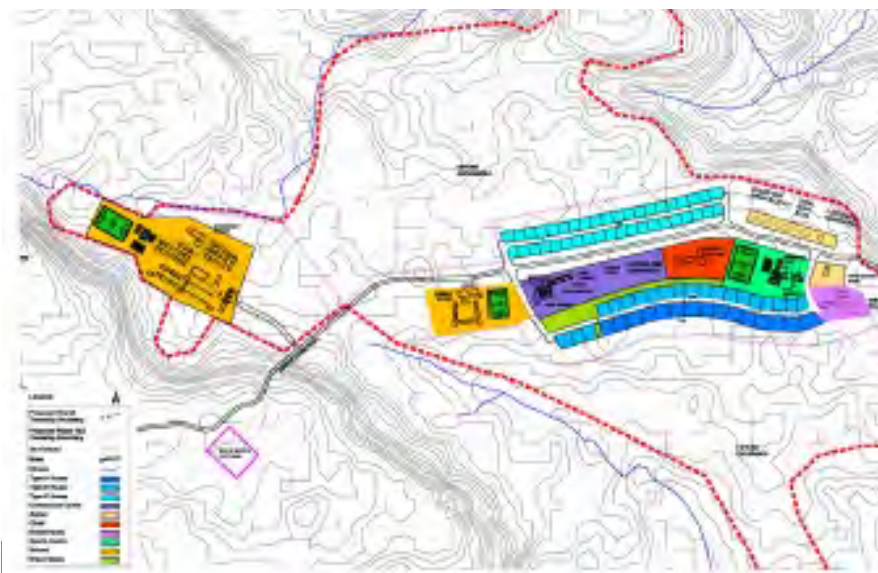


Figure 5-1: Proposed Northern Township Plan

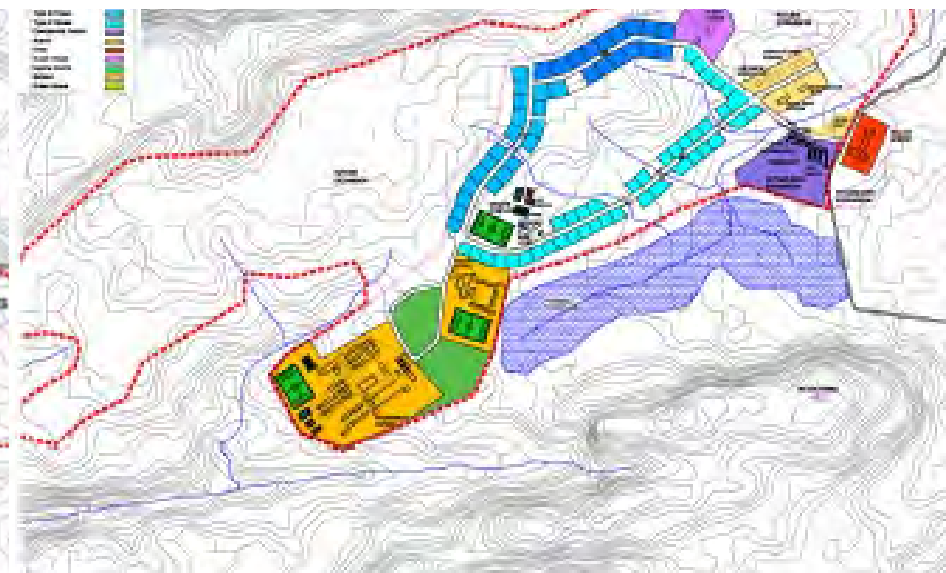
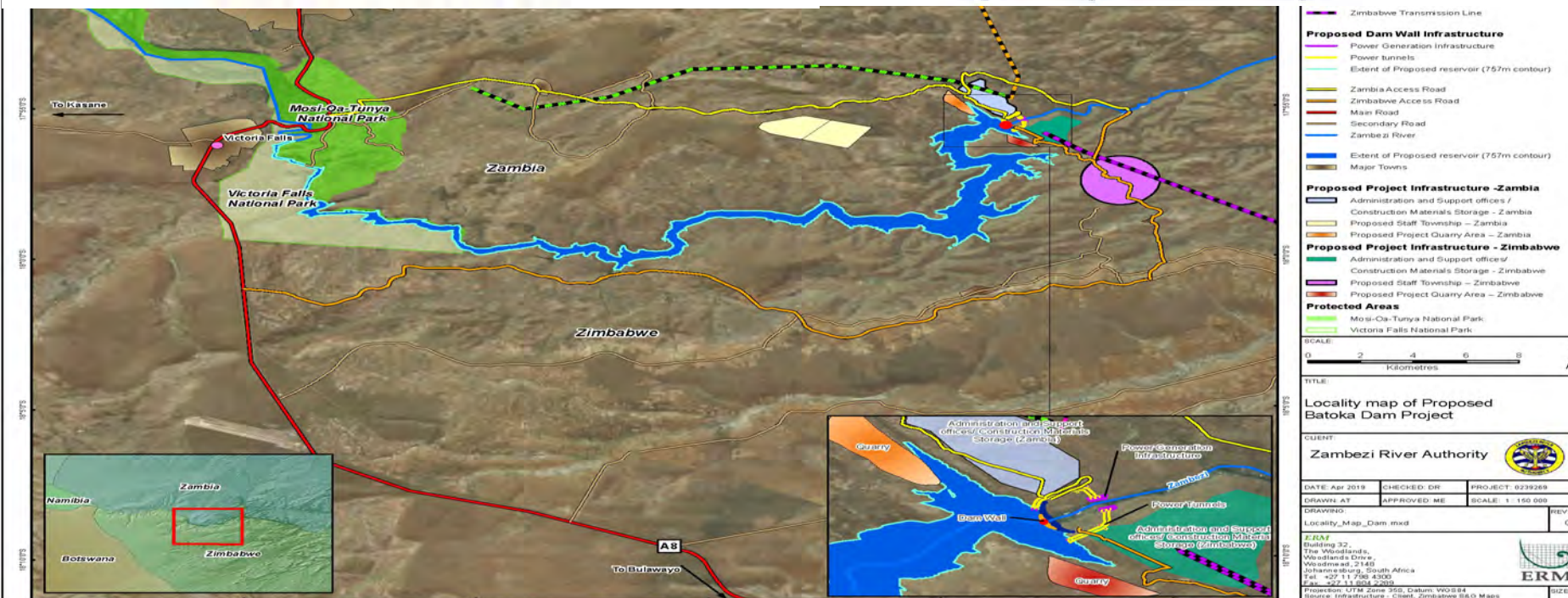


Figure 5-2: Proposed Southern Township Plan



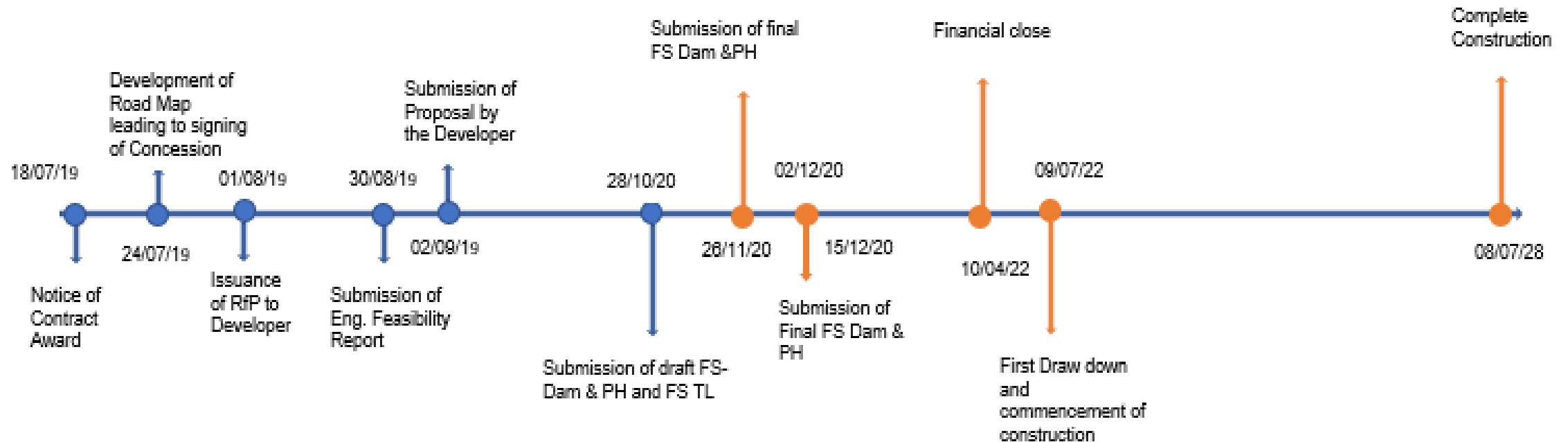
BGHES Project Status

- Engineering Feasibility Studies by Studio Pietrangeli were completed
- Draft ESIA reports completed and placed in the public domain in March 2020, currently ESIA process is at Public Disclosure phase
- The Developer is carrying out predevelopment activities including refining and optimizing the feasibility studies. Developer has since submitted proposal which is currently under Review

Current Pre-Development Activities by the Developer

- Bathymetric Surveys
- Additional Geotechnical Studies
- Aerial Topography Surveys
- Environmental and Social Impact Assessment for Additional Transmission Lines

BGHES Project Timeline

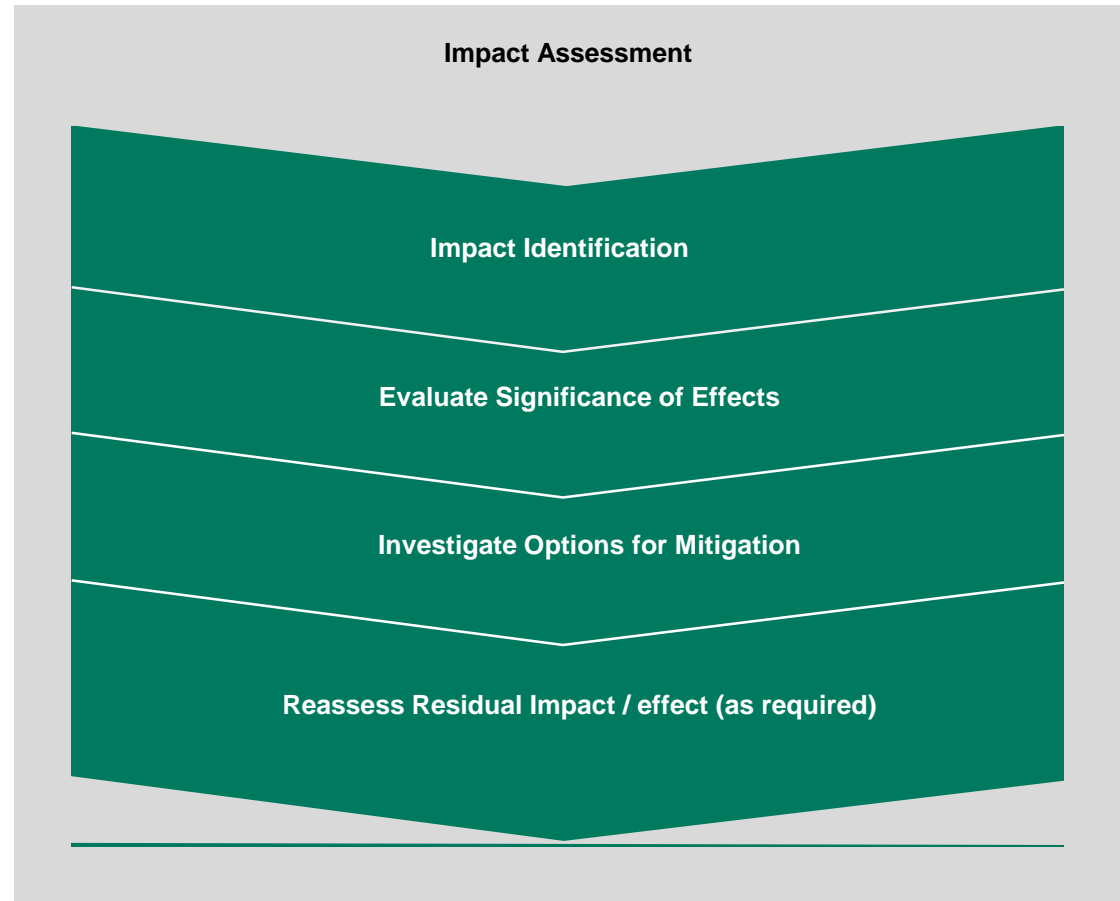


Key ESIA Findings and Management Measures

Specialist Studies Undertaken

- Biodiversity (terrestrial and aquatic) – ERM
 - Avifauna (Taita Falcons) Zimbabwe National Parks and Wildlife Management and Zambian Wildlife Authority
- Climate Change (risk review) – ERM
- Cultural Heritage and Archaeology – Mr. R. Burrett (Zimbabwe) & Mr. Richard Mbewe (Zambia)
- Economic Cost-benefit Analysis – Stratecon
- Greenhouse Gas Emissions Assessment – ERM
- Livelihood Restoration – ERM
- Socio-economic and Health Assessment - ERM
- Tourism – Anchor Environmental
- Water Resource Studies (water quality and environmental flows) – Southern Waters and ERM

Impact Assessment Methodology



Overview of Physical and Biophysical Impacts Assessed

Impact Description	Dam ESIA	Access Road ESIA	Transmission Line ESIA
Physical Environment			
Impacts associated with greenhouse gas emissions	X	X	X
Impacts on air quality	X	X	X
Impacts on noise	X	X	X
Impacts on upstream flow (water level and velocity)	X		
Impacts related to reservoir water quality during filling and operations (including potential eutrophication)	X		
Impacts on downstream flow during filling and operations	X		
Impacts related to changing upstream conditions	X		
Impacts to soils and water resources (accidental spills, sedimentation, etc.)	X	X	X
Biophysical Environment			
Loss of habitat (including critical habitat)	X	X	X
Impacts to avifaunal communities	X		X
Impacts to fauna through road and/or indiscriminate killings		X	
Alteration of fish communities and their utilisation during filling and operations	X		
Impacts to crocodiles and other fauna	X		
Habitat degradation downstream of the dam wall resulting from altered flow regimes during filling and operations	X		
Habitat degradation resulting from increased access and human influx during construction and operations		X	X
Eutrophication and associated floating aquatic weed infestation during filling and operations	X		

Overview of Social Impacts Assessed

Impact Description	Dam ESIA	Access Road ESIA	Transmission Line ESIA
Social Environment			
Economic displacement of land based livelihoods	X	X	X
Economic displacement of livelihoods related to fishing	X		
Economic displacement of downstream river users	X		
Economic displacement of river based tourism activities in Batoka Gorge during filling and operations	X		
Economic displacement of non-river based tourism activities in Batoka Gorge during filling and operations	X		
Positive economic benefits for the national economy	X		
Impact Tourism and the local economy	X		
Social benefits (employment, procurement of goods and services, opportunities for community development)	X	X	X
Community anger and resentment over unmet expectations	X	X	X
Impacts related to in-migration	X	X	X
Impacts related to increased spread of communicable diseases	X	X	X
Impacts related to increased risk of traffic accidents		X	
Impact associated with disturbance due to dust, noise and vibration		X	X
Impacts related to increased incidence of malaria and other vector borne diseases	X		
Impacts to community security	X		
Impacts related to exposure of workforce to health and safety incidents	X	X	X
Impacts associated with unexploded ordnance	X	X	X
Impacts related to destruction of physical cultural heritage during construction of the dam and associated infrastructure	X	X	X
Impacts on living cultural heritage	X	X	X

Most Significant Environmental and Social Impacts

- Impacts associated with Loss of Critical Habitat
- Impacts to Avifaunal Communities
- Impacts associated with Changes to the Downstream River Conditions
- Socio-economic Benefits
- Impacts related to Physical Displacement – Transmission line only
- Economic Impact and Displacement of River Based Tourism Activities
- Economic Impact and Displacement of Non-river Based Tourism Activities

Impacts Associated with Loss of Critical Habitat

Impacts to Avifaunal Communities

Andrew Cauldwell

Impacts to Protected Areas and Loss of Critical Habitat

Baseline

- The Mosi-oa-Tunya (Zambia) and Victoria Falls (Zimbabwe) National Parks are legally protected and recognised as a UNESCO Natural World Heritage Site.
- The whole Batoka Gorge is recognised as an Important Bird Area (IBA) and an IUCN Key Biodiversity Area.
- The Batoka Gorge is a unique ecosystem, which qualifies as a critical habitat as per IFC criteria.

Impact Statement

- Activities causing transformation and loss of habitat are construction of the dam wall, associated infrastructure and inundation of the reservoir.
- Leads to direct loss of critical habitat, legally protected areas and internationally recognised areas, including a UNESCO World Heritage Site (the BGHES reservoir extends into the World Heritage Site).

Key Management Measures

- Avoiding impacts to important areas is not feasible.
- Protecting non-impacted parts of the Batoka Gorge (rim, cliffs, scree slopes) reduces the loss of critical habitat.
- A significant residual impact remains that needs to be

- offset to align with the IFC Performance Standards.
- Offsetting residual impacts was beyond the scope of this ESIA, and no offset options have been identified.
 - Unmitigated impacts to the World Heritage Site present a potential fatal flaw (*as per guidance notes to the IFC Performance Standard 6*).

Impact Significance Rating Before Mitigation

Major Negative Impact (*potentially of Critical significance*)

Impact Significance Rating After Mitigation

Major Negative Impact

Avifauna (Bird) Impacts

Baseline

- The Batoka Gorge is an IBA (*as in previous slide*) as it supports the largest known population of Taita Falcons, and is important for other birds (Rock Pratincole, Verreaux's & Crowned Eagle, Peregrine & Lanner Falcon, Bat Hawk, Augur Buzzard).
- Parts of Batoka Gorge remain un-surveyed for Taita Falcons (surveys undertaken for upper 25 km stretch), also their ecology is not sufficiently understood to predict impacts and develop appropriate mitigation.

Impact Statement

- Primary activity that will affect important species will be loss of the Batoka Gorge habitat from inundation of the reservoir.
- Impact to birds from losses of key biodiversity features (swifts, a key prey source for Taita Falcons, may be adversely impacted by the loss of rapids, but there is insufficient evidence of this impact).

Key Management Measures Required

Key baseline gaps remain, and ZRA are committed to an action plan that outlines an approach to:

- Species specialists to thoroughly assess the entire Batoka Gorge to determine the occurrence and status of Taita Falcons;
- Workshopping with all species specialists to pool available knowledge, raise the level of confidence on potential threats and impacts, and identify if mitigation to address threats is feasible;
- Develop an appropriate Biodiversity Action Plan to address the risks.

Impact Significance Rating Before Mitigation	Impact Significance Rating After Mitigation
Major Negative Impact (<i>low confidence</i>)	Uncertain due to data deficiency

Impacts Associated with Changes to the Downstream River Conditions

Alison Joubert

Downstream Flow Impacts – Environmental Flows

Baseline

- Present ecological status of the downstream river is high (Category A/B and B – slightly modified from natural conditions) for most of the gorge
- The Zambezi River ecosystem supports extensive aquatic habitats, riparian vegetation and serves as important ecological corridor and sustains rich floral and faunal diversity and populations of large fauna including hippo and crocodile populations
- There are important water users downstream closer to Lake Kariba - predominantly informal abstractions in support of agricultural activities
- Larger, more intensive water users are associated with Lake Kariba - it was assumed that impacts will not be felt as far downstream as Kariba

Impact Statement

- Impacts relating to flow and sediment conditions in the river downstream of BGHES during dam filling and operation particularly during hydro-peaking; Potential temperature effects in the dry season.
- It was agreed that there could be no more than a 1.5 class drop in Overall Ecosystem Condition in the downstream river, i.e., from A/B to no less than a mid-C category. This represents a drop in ecological category from “near natural” to “moderately modified”, which is still considered a healthy functioning ecosystem

Impact Significance Rating Before Mitigation	Impact Significance Rating After Mitigation
Major Negative Impact	Moderate Negative Impact (if run-of-river in dry season)
	Major Negative Impact (if hydro-peaking in wet and dry seasons)

Key management measures

- Only operated as a hydro-peaking scheme during the wet season (Feb-Aug) as per operating rules established by scenario AddPM04 (dry season = Sep-Jan).
- ZRA will adopt off peak flow condition during wet season of QMin as per flow statistics in ESIA
- During hydro-peaking, rate of change of flow releases (ramping rate) will be restricted so there is a correspondingly gradual change in downstream water levels
- Gradual (smoothed) transition between wet and dry season minimum flow conditions

Socio-economic Impacts

Lindsey Bungartz and Tori Braham

Socio-economic Benefits

Baseline

- Approximately 22% and 41% of populations in Zambia and Zimbabwe have access to electricity - connectivity is lower in rural areas
- Communities are principally subsistence farmers, selling what additional crop they produce to generate small income
- Livestock rearing is common and substantial engagement in curio trade in order to generate additional income
- Other livelihood activities include trading, collection and selling of firewood, grass and forest fruits, furniture making, brickmaking, hunting, fishing, casual labour and tourism related activities

Impact Statement

- Economic benefit for national economy through increase provision of power
- Local employment opportunities
- Local Procurement of goods and services
- Opportunities for community development
- Opportunity to distribute power to southern African countries under coordination of the SAPP

Significance Rating Before Mitigation

Positive Impact

Key management measures

- Mitigation measures in ESIA Reports and ESMPs aim to enhance benefits / positive impacts – Focus on local employment, local procurement, upskilling through on the job training.
- Hiring plans and local content requirements will be applicable to all contractors.
- Estimated 8,000 jobs will be made available during construction and operation

Impacts related to Physical Displacement

Baseline

- Housing largely traditional and basic (mud walls and thatched or corrugated roofs)
- Few households have electricity and access to waste and sanitation services is poor
- Communities principally rely on subsistence farming for their livelihoods and limited formal employment opportunities exist

Impact Statement

- The transmission lines on the Zambian side is flanked by agricultural and residential land, and some of the residential structures have encroached into the proposed TL servitude and will need to be moved for safety
- Physical displacement as a result of loss of homesteads and potentially business structures, as well as other physical assets owned by households

Magnitude	Significance Rating After Mitigation
Medium Magnitude	Minor Negative Impact

Key management measures

- Project infrastructure will be designed to avoid and / or minimise resettlement as far as practicable
- Prepare RAPs (outside of ERM scope)
- Implement the grievance redress mechanism
- Where resettlement is unavoidable, the ZRA will provide required and agreed compensation for loss of physical assets, revenue, and income resulting from both temporary and permanent economic and/or physical displacement

Impact and Displacement of Tourism Activities

Gwyn Letley

Economic Displacement of River-Based Activities

Baseline

- The rafting industry has played a vital role in establishing adventure tourism
- 10 WWR operators in Project Area in 2019
- +/- 250-300 people employed. Difficult to determine exact numbers of part-time/casual staff (fluctuate with each season)
- Almost all employees are from local communities
- WWR largest contributor to tourism value downstream of Falls, US\$3.4 million in tourist expenditure annually.

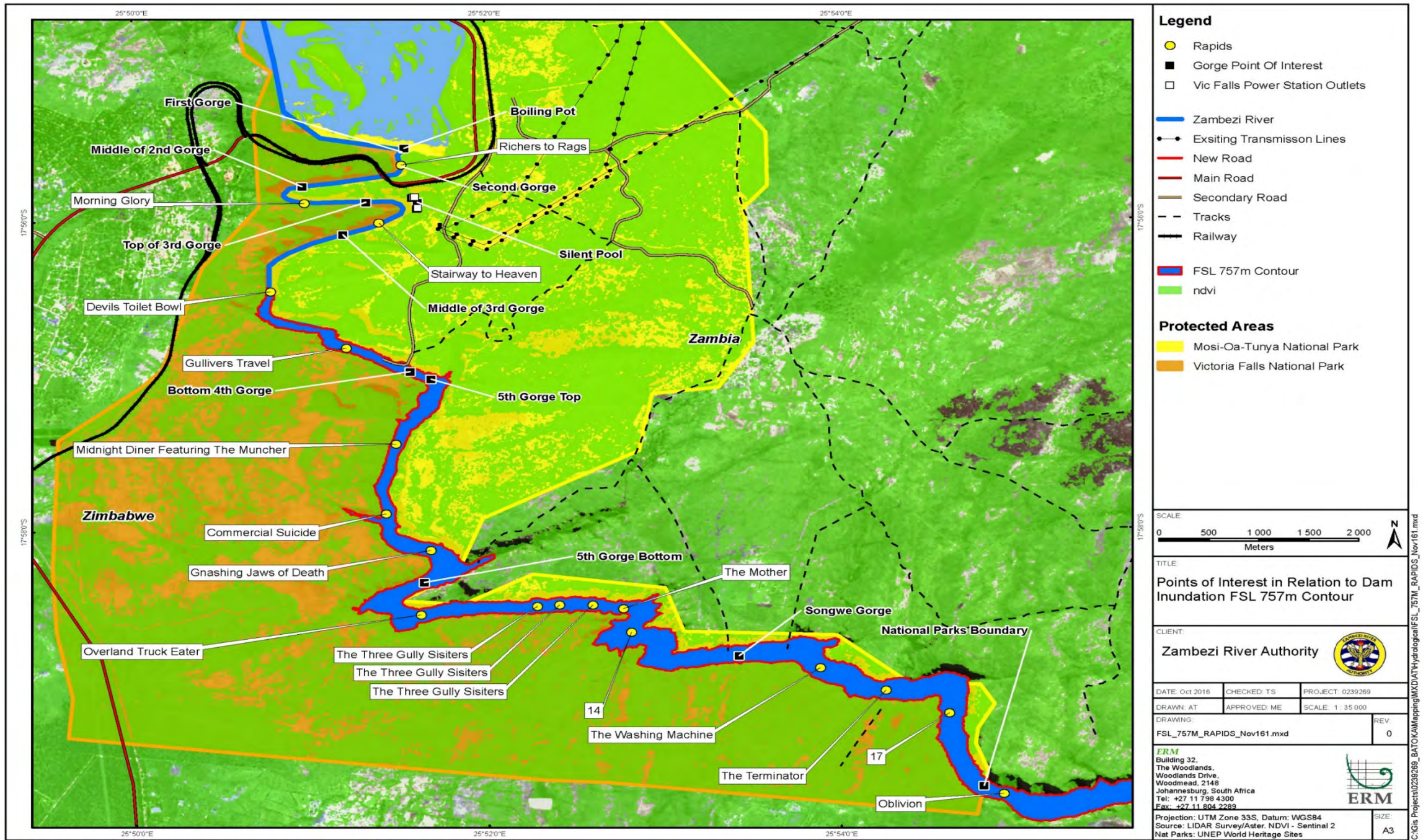
Impact Statement

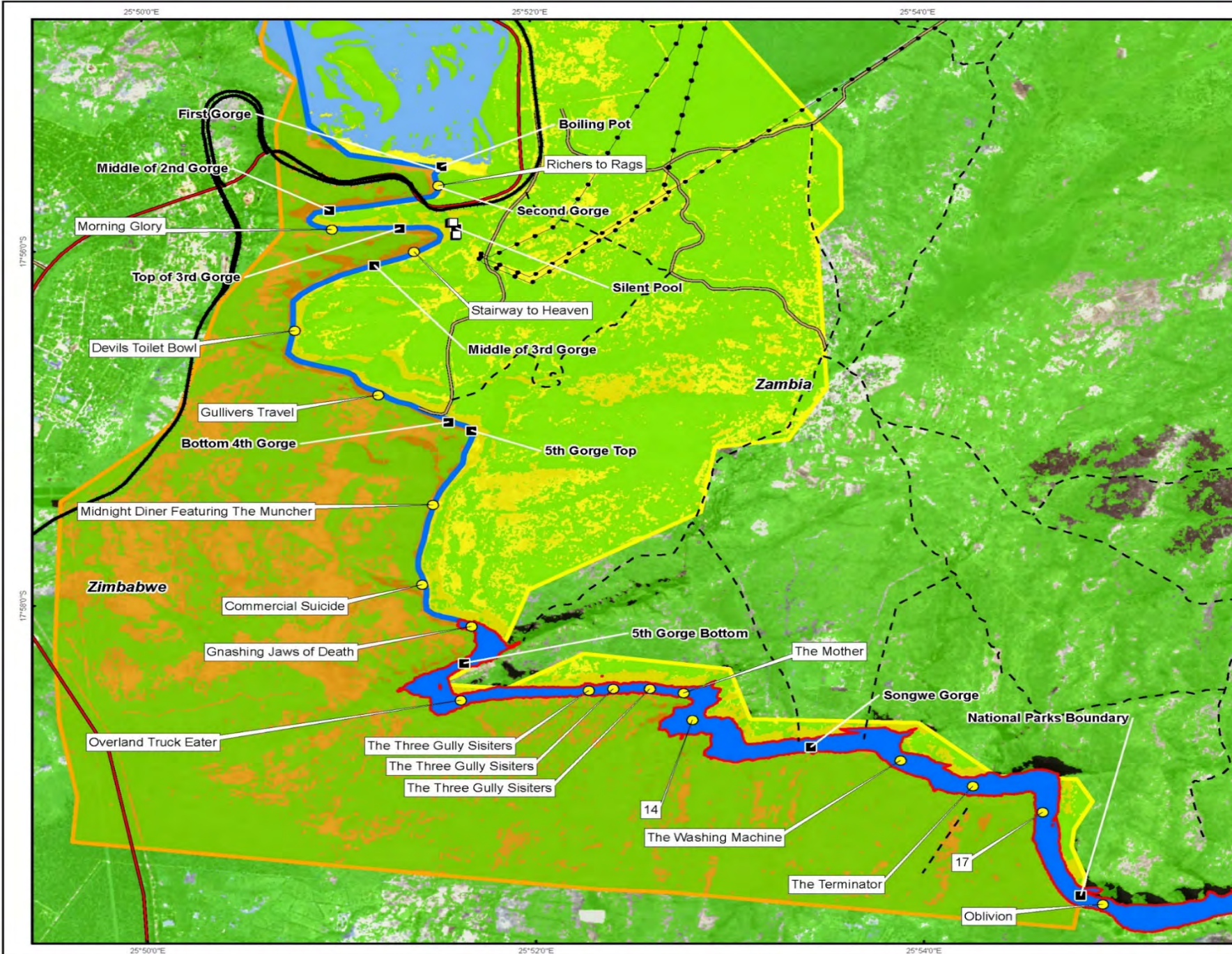
- BGHES has adopted a variable operating level approach
- Prevents rafting during high-water season (Jan-July): river reach from rapid 10 submerged by reservoir
- Rafting would only operate from rapid 1 to rapid 9/10 during low-water season (Aug-Dec)
- This has changed since 2015, when only FSL 757m ASL was being considered year-round.

Impact Significance Rating Before Mitigation	Significance Rating After Mitigation
Major Negative Impact	Moderate Negative Impact

Key management measures

- Separate RAPs and LRPs will be commissioned by ZRA for those Project components outside of ERM's current scope
- RAPs/LRPs for water users (specifically tourism operators), undertaken at a later stage (inundation proposed in 2027/2028)
- To be undertaken in accordance with the regulatory requirements of Zambia and Zimbabwe, and the requirements of IFC PS5 and WB ESS5





Legend

- Rapids
- Gorge Point Of Interest
- Vic Falls Power Station Outlets
- Zambezi River
- Exsiting Transmisson Lines
- New Road
- Main Road
- Secondary Road
- Tracks
- Railway
- FSL 730m Contour
- ndvi

Protected Areas

- Mosi-Oa-Tunya National Park
- Victoria Falls National Park

SCALE:

0 500 1 000 1 500 2 000 Meters

N

TITLE:

Points of Interest in Relation to Dam Inundation FSL 730m Contour

CLIENT:

Zambezi River Authority

DATE: Oct 2016	CHECKED: TS	PROJECT: 0239269
DRAWN: AT	APPROVED: ME	SCALE: 1 : 35 000
DRAWING:		REV:
FSL_730M_RAPIDS_Nov16.mxd		0

ERM

Building 32,
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Tel: +27 11 798 4300
Fax: +27 11 804 2289

Projection: UTM Zone 33S, Datum: WGS84
Source: LIDAR Survey/Aster, NDVI - Sentinel 2
Nat Parks: UNEP World Heritage Sites

SIZE:

A3

Economic Displacement of Non-river Based Tourism Activities

Baseline

- Other tourism activities in the gorge include birding, angling and hiking
- These activities employ fewer people than the rafting industry, but are nonetheless very popular
- Offered by activity providers as well as Lodges situated along the Gorge
- Activities contribute over US\$250 000 annually

Impact Statement

- Inundation of rapids and loss of habitat for river borne insects will reduce numbers of birds and bats in the Gorge. Increased water levels in the Gorge will also remove prime nesting habitat
- Hikers will not be able to hike along the bottom of the Gorge and overnight hiking and camping trips will not be feasible to operate as a result of increased water levels

Impact Significance Rating Before Mitigation	Significance Rating After Mitigation
Major Negative Impact	Major Negative Impact

Key management measures

- RAPs and LRPs will be commissioned by the ZRA for those Project components outside of ERM's current scope
- RAPs/LRPs for non-river users, only undertaken at a later stage, inundation of Batoka Gorge is proposed in 2027/2028
- These separate RAPs/LRPs commissioned by the ZRA will be undertaken in accordance with the regulatory requirements of Zambia and Zimbabwe, and the requirements of IFC PS5 and WB ESS5

Environmental and Social Management Plans

BGHES Management Plans

- The following E&S Management Plans (ESMPs) have been developed for the BGHES:
 - Construction ESMP for the Dam
 - Construction ESMP for Access Roads
 - Construction ESMP for Transmission Lines
 - Operational ESMP
- ESMPs detail the required mitigation measures, identifies specific people or organisations to undertake specific tasks to avoid or reduce impacts during all Project phases
- The compilation of ESMPs has been done prior to the implementation of any activities on site and thus falls within the Planning phase of the Project. Further stages of management including doing, checking and acting are required for the implementation of an effective Environmental and Social Management System (ESMS)

Disclosure of Livelihood Restoration Plans for Staff Townships and Access Road

Livelihood Restoration Plan

To manage the impacts resulting from economic displacement for the staff townships in both Zambia and Zimbabwe and the Access road in Zimbabwe, Livelihood Restoration Plans have been developed as per in country laws and International Best Practise.

Zambia Staff Township

- Land take required for Zambian Staff Township: 489 ha
- **Unpopulated, not suitable for farming**
- **No agricultural fields or residential plots affected**
- Communally held and used
- 210 households from six villages travel through the land and periodically gather timber and non-timber forest products
- Pathways to fishing locations and vegetable gardens
- Designated by Chieftdom as Chibule Grazing Lands
- No graves/cultural heritage identified

Zimbabwe Staff Township

- Land take required for Zimbabwean Staff Township: 705 ha
- **Unpopulated, no impact to agricultural fields or residential plots**
- Communal grazing and collecting natural resources
- 35 households in BH55, Sidakeni and Kasikiri Sub-Villages directly affected
- Access points and footpaths used to access the Zambezi River for fishing

As the BGHES components associated with the LRPs do not require any physical displacement and economic displacement related to agricultural land is minimal, the Project components will not result in those with pre-existing vulnerability to be disproportionately affected.

Zimbabwe Access Road

- Land take for Access Road will impact 241 agricultural fields and 7 residential plots occupied by 210 PAHs
- Average area of affected individual property 0.10 hectares, an average of 5% of entire affected field
- Construction activities along access road may temporarily cause restriction of access to agricultural land
- **No residential structures impacted other**
- Chisuma Primary School water tower, perimeter fence and portions of the nutritional garden are the only communal infrastructure impacted
- no graves/cultural heritage sites impacted

Land Acquisition Progress

Zambia

- Over 2558Ha allocated for the project
- All required approvals obtained , pending is numbering of the land parcels to be followed by letters of offer and then title deeds

Zimbabwe

- Estimated 3000Ha.
- Cabinet approved the excision from communal to urban and SI gazetted
- Next steps include preparation of base maps, concept layouts and for submission to Physical planning department

Next Steps

Next Steps: ESIA

- All comments received in this forum will be included in the ESIA Comment and Response Report
- Stakeholder can submit additional comments and questions to ERM until 25 January 2021 when the ESIA comment period will close
- All comments, together with a response from the Project team will be included in the ESIA Comments and Response Report to be submitted to the Authorities
- The final ESIAs and associated documents will be submitted to both the EMA and ZEMA for review and consideration

Next Steps: Economic and Physical Displacement

- Separate RAPs/LRPs will also be commissioned by ZRA for the following:
 - Displacement (physical and economic) of upstream / downstream water users
 - Displacement (physical and economic) of Project affected peoples in footprints associated with BGHES transmissions lines access road in Zambia quarries and other BGHES associated infrastructure
- Resettlement and livelihood restoration will be undertaken in accordance with the regulatory requirements of the Republic of Zambia and Zimbabwe, and the requirements of IFC PS5 and WB ESF5

Questions and Answer Session

Questions and Answer Session

- Use the Q&A function (bottom tool bar of your screen) to pose questions and comments to the speaker; or
- Raise your hand using the function on your tool bar



Thank you

Please feel free to reach out to ERM via email at:

batokagorgehes@erm.com