Hydropower Sustainability Standard

Assessment Report

Project Name: Ngonye Falls HPP

Installed Capacity: 180 MW

Country: Zambia

Western Power

Project Sponsor: Western Power Co.

Report Author: Joerg Hartmann, Antonio Fonseca dos Santos, Prabhakar Kale

Report Date: May 30, 2024

Hydropower Sustainability Standard

GOLD

Project: **Ngonye Falls HPP**
Stage: **Preparation**
Date: **December 2024**

Preparation

Cover page photo: View of right bank channels of the Ngonye Falls in upstream direction

Published by:

Hydropower Sustainability Alliance
Edifício LACS
Rocha Conde d'Óbidos
1350-352 Lisboa, Portugal
Email: info@hs-alliance.org

Reporting template first published in September 2021.
This edition published October 2023.

The findings in this report are based on an independent assessment conducted in compliance with the processes set out in the Hydropower Sustainability Assurance System.

Hydropower Sustainability Standard

About the HSS	The Hydropower Sustainability (HS) Standard is the normative document that sets out the performance requirements of the Hydropower Sustainability Certification System, a global labelling and certification scheme outlining the expectations for hydropower projects around the world. The HS Standard recognises hydropower projects for their environmental, social and governance (ESG) performance by setting minimum and advanced performance requirements for the sector and acknowledging projects for meeting these requirements. The HSS is aligned with the safeguards of key lenders (e.g. IFC and World Bank) and can be used to attract climate-aligned finance through green bonds certified by the Climate Bonds Initiative and support electricity sales to RE100 companies. The HS Standard is managed by the Hydropower Sustainability Alliance. The HS Alliance was established in October 2023 to act as the independent and multistakeholder standard-setting body that oversees the Hydropower Sustainability Certification System.
Intended users and uses	The HS Standard includes three separate stages: Preparation, Implementation and Operation. These reflect the different stages of hydropower development and have been designed to be used as standalone documents. Each reporting template provides an action plan to help project teams address any gaps against minimum (good practice) and advanced requirements (best practice). Official HS Standard assessments are carried out by Accredited Assessors, who take an evidence-based approach based on data triangulation. All findings are supported by objective evidence, which is factual, reproducible, objective and verifiable. The HS Standard is most effective when operators and developers commit to implement the recommendations provided and resolve identified significant gaps. Hydropower development and operation may involve public entities, private companies or combined partnerships, and responsibilities may change as the project progresses through its life cycle. It is intended that the organisation with the primary responsibility for a project at its particular life-cycle stage will have a central role in any HS Standard assessment.
Structure of the reporting template	The HS Standard comprises 12 sections that cover the environmental, social, governance and climate change impacts, both negative and positive, that arise from hydropower development and operation. Summary sections at the beginning of the report include: (A) Assessment Overview, (B) Project Details, (C) Performance against Minimum Requirements, (D) Performance against Advanced Requirements, (E) Environmental and Social Action Plan and (F) Abbreviations and Acronyms. The summary sections are followed by the 12 ESG sections where requirements for good and best practices are presented and project findings are provided. The report finishes with three appendixes that list the types of evidence used in the assessment.
Supporting resources	Additional guidance on the structure, content and history of the HS Standard can be found online at: www.hs-alliance.org
Version date	October 2023

A. Assessment Overview

Assessor(s)	Joerg Hartmann (Sustainable Water & Energy LLC), Antonio Fonseca dos Santos (Kelowna Consultoria Ambiental e Sustentabilidade Ltda), Prabhakar Kale (Tata Power)
Assessment objective	• To identify the most significant sustainability issues and risks for the project in comparison with international benchmarks • To prioritise actions to address sustainability issues and risks, and integrate these actions into project plans • To strengthen preparedness for lender and investor appraisals, and enhance the availability of financing
Assessment dates	On-site assessment March 18-23, 2024
Assessment report date	May 30, 2024
Summary of key findings	The project siting and design represents an appropriate balance between very significant economic and social benefits, and moderate environmental and social impacts. Environmental assessments and management plans are being prepared to meet both Zambian regulatory and international financing requirements, using appropriate expertise. WPC and their consultants are on track to deliver a full set of assessment and planning documents by the start of construction. Some advanced requirements related to a human rights focus in the E&S assessment, external verification of E&S management systems, options analysis, and comprehensive compensation of impacts are not met at this time. WPC has basic HR and safety policies and processes in place, appropriate for the preparation stage. An assessment of human resource, labour management and OH&S issues including risks and opportunities was included in the ESIA, and initial management plans in the ESMMP. Detailed plans and processes for WPC are under preparation and will be required from the EPC contractor, for recruitment, local employment, labour conditions, accommodations, OH&S, emergencies and other labour-related issues. No inconsistencies between labour management policies, plans and practices and internationally recognized labour rights have been identified. Water quality, sedimentation and erosion issues are expected to be relatively minor, given the large size of the river, small size of the reservoir, and good baseline conditions with high water quality and low sediment load and erosion. The project will use standard good construction practices to limit impacts on quality, erosion and sediments. There is some uncertainty over sediment transport. Assessment and management of community impacts including community health and safety are generally comprehensive and adequate. Project benefits are very substantial. A number of plans, in particular regarding public safety still have to be developed in more detail, and there are currently no plans to address pre-existing safety issues. Also there are some uncertainties regarding the robustness of long-term livelihood improvements, and compensation of lost business incomes. The number of physically displaced households (119) is relatively small compared to the size of the scheme, and most of them will remain in the area and will experience significant gains in terms of living standards and livelihoods. Resettlement plans have been

	developed in consultation with affected people, and almost all of them have accepted compensation arrangements. The implementation of the RAP is scheduled to start immediately after ZEMA approval and financial closure. The project region is generally rich in biodiversity, and the Upper Zambezi River and Ngonye Falls in particular still provide some undisturbed aquatic habitats. Biodiversity impacts of the hydro project are comprehensively assessed and mitigated, although some residual impacts will remain. There are still some uncertainties regarding the transmission line, potential critical habitat impacts and resulting additional mitigation/compensation requirements, and opportunities for biodiversity enhancement. The Ngonye Falls are an area of historic significance with several sites, which have been assessed in cooperation with the Zambian authorities. Impacts have been avoided and minimized to the extent possible, and there are plans to mitigate and compensate some remaining impacts. While the external governance context in Zambia can be challenging, to date WPC and its shareholders have managed these risks well, and have established well-functioning corporate governance policies, plans and processes that show a high awareness of sustainable business practices. Engagement with stakeholders has been proactive, transparent and successful in that there is general support from local communities and other stakeholders. There are some limited opportunities for improvement, principally regarding engagement of tourism operators and regarding plans for ongoing reporting on project progress and sustainability performance. Historic hydrology is well understood and efforts are underway to better understand future hydrology. The scheme has been designed with a small headpond and as a pure run-of-river scheme, with no active regulation. The flows over the falls between the headworks and the tailrace will be reduced, with impacts on biodiversity, fishing, and visual attraction. These objectives have been comprehensively and systematically assessed, and plans designed for operations and delivery of environmental flows that balance all objectives. The project will cause minimal GHG emissions and will make a significant positive contribution to climate change mitigation, by avoiding fossil fuel-based power generation in the Southern African Power Pool, and by supporting the expansion of variable renewables. The resilience against future flow variability or flow reductions has been and is being further assessed and considered in the project design. With a run-of-river design, the project has limited ability to support adaptation to climate change, except by diversifying and strengthening the regional economy.
Limitations of the assessment	There were no significant limitations. While a small number of interviews were not able to be scheduled, the perspectives of these stakeholders were known from a pre-assessment of the project with the HESG Gap Analysis Tool in 2018, or otherwise documented, and stakeholders will have an opportunity to comment on the findings during the public consultation period.

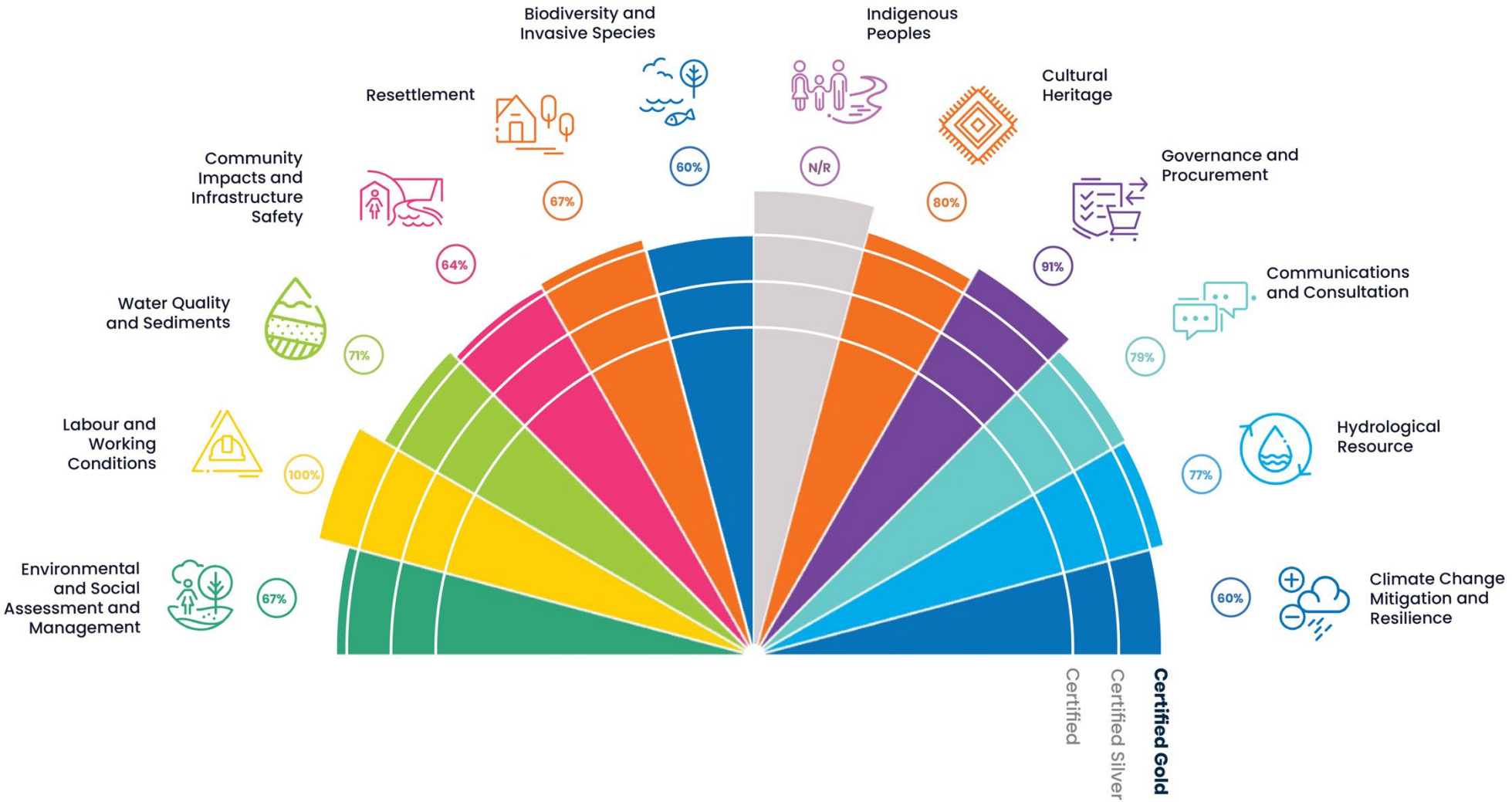

Figure 1 – Hydropower Sustainability Standard (HSS) Results Diagram

B. Project Details

Project name	Ngonye Falls HPP
Country	Zambia
Location	Upper Zambezi River, Sioma and Senanga Districts, Western Province
Purpose	Power generation
Developer / Owner	Western Power Company (WPC) Ltd, Figtree House, 17 Warthog Road, Kabulonga, PO Box 320181, Woodlands, Lusaka, Zambia
Financer(s)	TBD. Planned project finance arrangement with the majority of the debt likely to be provided by Development Finance Institutions (DFIs)
Installed capacity (MW)	180 MW
Construction start date (planned or actual)	June 2025
Commercial operations date (planned or actual)	June 2028
Annual average generation (GWh / year)	887 GWh
Associated infrastructure: road(s) (length)	5.5 km construction and permanent roads from the Sesheke-Senanga highway
Transmission lines and sub-stations (names, lengths and capacities)	New 220/330 kV line from Ngonye sub-station 110 km to Sesheke sub-station. The existing 66 kV line to Mongu will be connected to the Ngonye sub-station. A new 220/330 kV line to Mongu is under preparation but not part of the project, except for support with preparatory studies.
Total cost (USD m)	USD 715 m (including interest during construction)
Annual operating costs (USD m)	n.a.
Specific investment cost (USD m / MW)	USD 4 m / MW
Levelised energy cost (USD / kWh)	The tariff in the PPA with ZESCO will be between 8.65 and 9.68 UScents/kWh, to be adjusted for inflation by 3% annually.
Dam type	Concrete weir with pneumatically controlled steel flap gates, a concrete gated barrage, and embankment dams across islands, on the left bank above canal intake, and around the forebay
Dam height (m)	3 m for the weir, 8.5 m for the barrage, and up to 21.5 m for the embankment dams
Dam length at crest (m)	Weir 3,500 m; barrage 54 m; overtoppable embankment dams (1,920 m); and non-overtoppable embankment dams (400 m)
Units (number, type, MW)	4 horizontal bulb (Kaplan) turbines of 45 MW each
Reservoir area at Full Supply Level (FSL) (km^2)	Approximately 2 km^2 additional area permanently inundated
Average net head at FSL (m)	21.7 m
Average flow (m^3 / s)	1,080 m^3/s (based on short-term local records as well as long-term records at Victoria Falls)

Design flow (m^3 / s)	1,100 m^3/s (maximum generation flow)
Load factor	52%
Number of physically displaced households	119 by the hydro project; to be determined for the transmission line
Power density (W / m^2)	89
Emissions intensity (gCO_2e / kWh)	1.25
Contacts / website	https://www.westernpower.org/

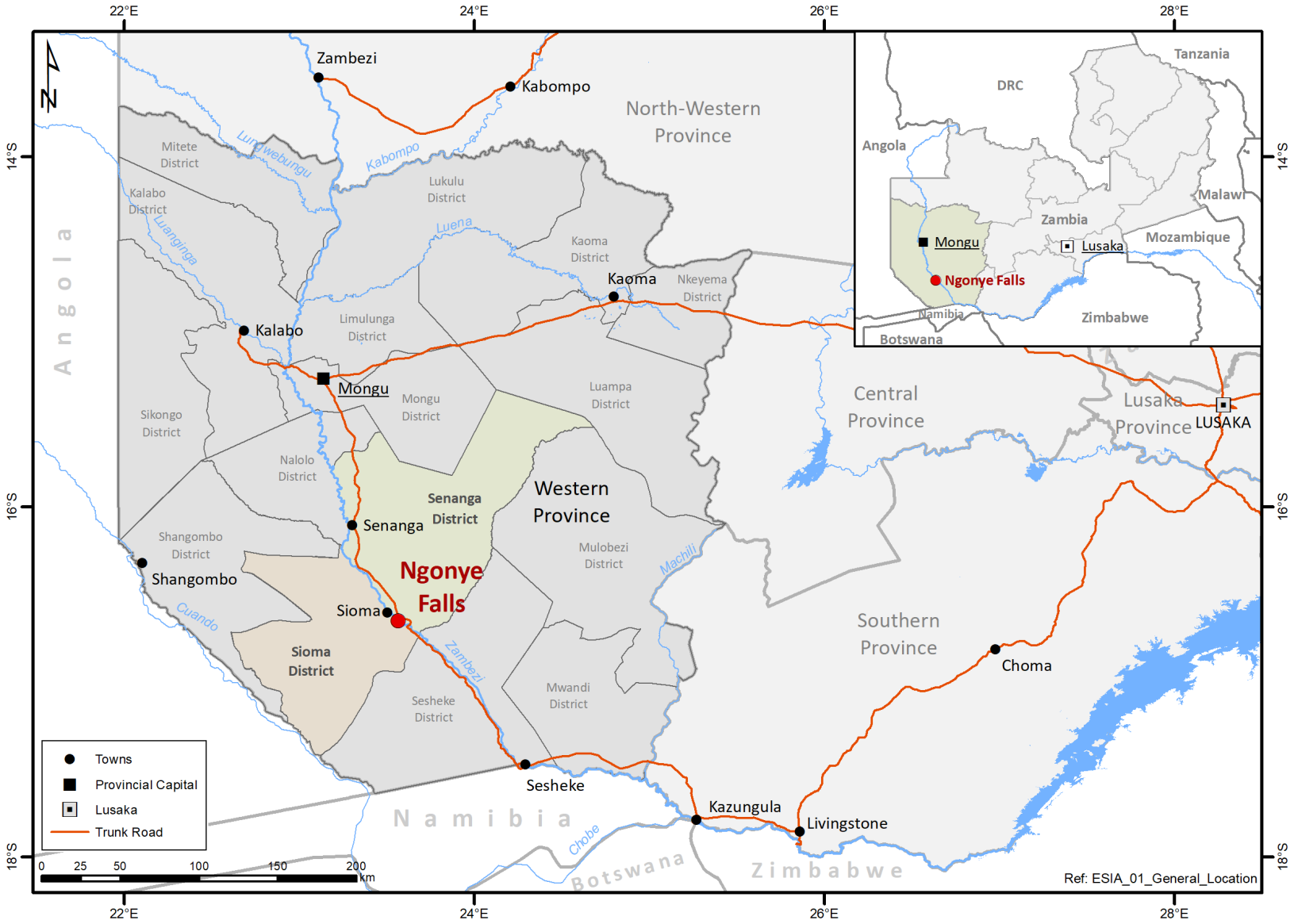

Figure 1 – General Location

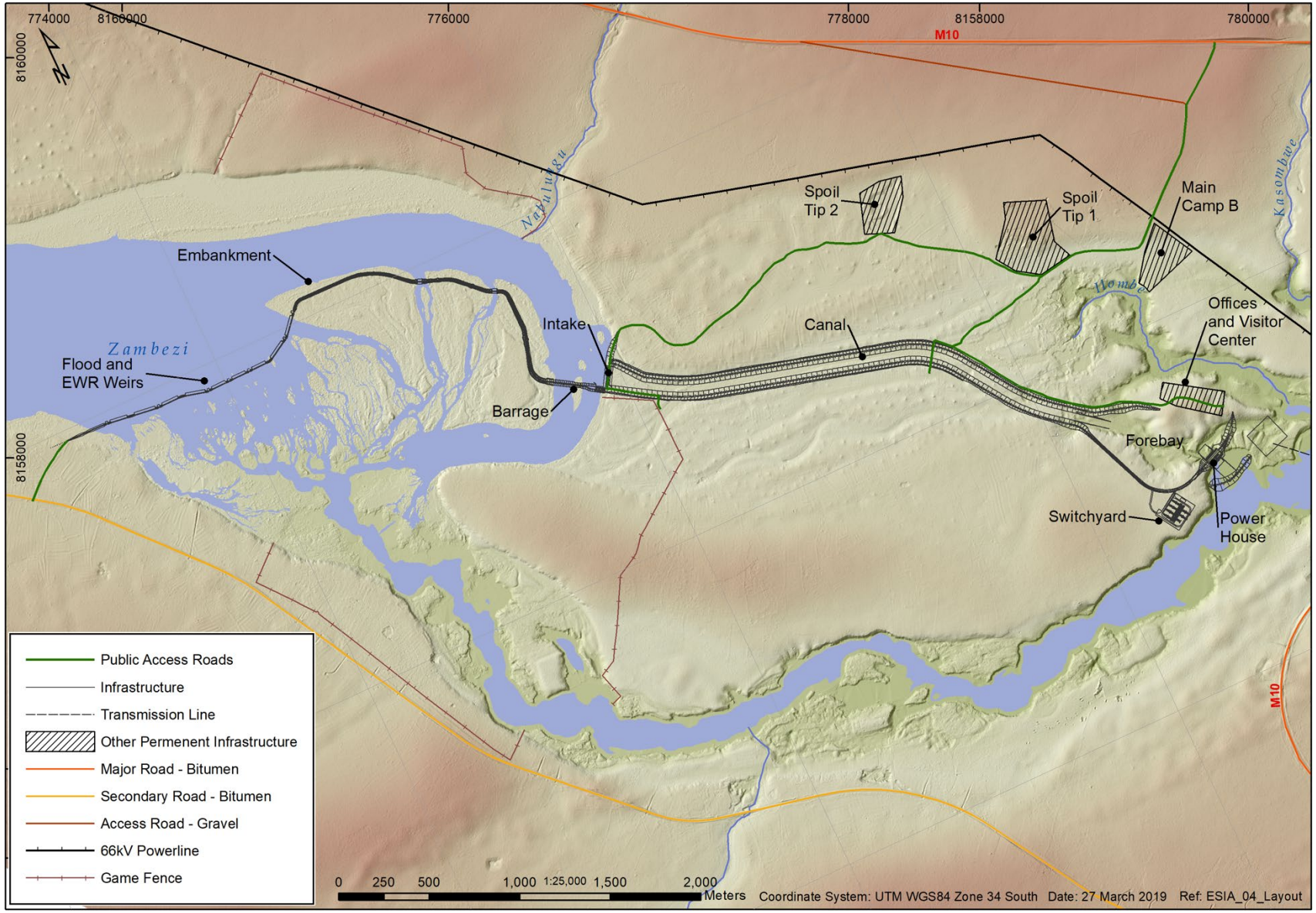

Figure 2 – Project Layout

C. Performance against Minimum Requirements

This section is not used since all Minimum Requirements are met.

D. Performance against Advanced Requirements

	Sections											
	1. Environmental and Social Assessment and Management	2. Labour and Working Conditions	3. Water Quality and Sediments	4. Community Impacts and Infrastructure Safety	5. Resettlement	6. Biodiversity and Invasive Species	7. Indigenous Peoples	8. Cultural Heritage	9. Governance and Procurement	10. Communications and Consultation	11. Hydrological Resource	12. Climate Change Mitigation and Resilience
TOTAL NUMBER OF REQUIREMENTS	12	3	7	14	3	5	5	5	11	14	13	10
NUMBER OF REQUIREMENTS MET	8	3	5	9	2	3	Not relevant	4	10	11	10	6
PERCENTAGE OF REQUIREMENTS MET	67%	100%	71%	64%	67%	60%	Not relevant	80%	91%	79%	77%	60%

Note:

- A project must meet all Minimum Requirements on all relevant sections to achieve HS Certified label.
- To receive the HS Silver label, a project must meet all Minimum Requirements on all relevant sections AND meet at least 30% of the Advanced Requirements on each relevant section.
- To receive the HS Gold label, a project must meet all Minimum Requirements on all relevant sections AND meet at least 60% of the Advanced Requirements on each relevant section.

E. Environmental and Social Action Plan (ESAP)

This section is not used. WPC is planning to take the results of the assessment into account during the remainder of the preparation process.

F. Abbreviations and Acronyms

BRE	Barotse Royal Establishment
CPA	Community Participation Agreement
DNPW	Department of National Parks and Wildlife
EPC	Engineering Procurement Construction
ESIA	Environmental and Social Impact Assessment
ESMMP	Environmental and Social Management and Monitoring Plan
E&S	Environmental & Social
GIIP	Good International Industry Practice
HR	Human Resources
IFC PS	International Finance Corporation Performance Standard
IRP	Integrated Resource Plan
KAZA-TFCA	Kavango-Zambezi Trans-frontier Conservation Area
NFCPP	Ngonye Falls Community Partnership Park
NHCC	National Heritage and Conservation Commission
OH&S	Occupational Health & Safety
PPA	Power Purchase Agreement
PAH	Project-Affected Household
SIA	Social Impact Assessment
SEP	Stakeholder Engagement Plan
RAP	Resettlement Action Plan
RPF	Resettlement Policy Framework
TL	Transmission Line
WARMA	Water Resources Management Authority
WPC	Western Power Company
ZEMA	Zambian Environmental Management Agency

1 Environmental and Social Assessment and Management

Scope and principle
This section addresses the assessment and planning processes for environmental and social impacts associated with project implementation and operation throughout the area of impact of the project, the contribution of the project in meeting demonstrated needs for water and energy services, and the evaluation and determination of project siting and design options. The principle is that environmental and social impacts are identified and assessed, and that avoidance, minimisation and mitigation measures are designed and implemented.

Background	
Identify the main environmental and social issues during implementation	Land acquisition and displacement; loss of heritage, fishing and grazing sites; compensation and livelihood restoration/improvement for people with customary titles and resource rights; workforce-community interactions and construction site environmental, health and safety issues; changes in habitat for a variety of fauna and flora species; benefits primarily through local employment and procurement.
Identify the main environmental and social issues during operation	Reduction in flows over the Ngonye Falls system, with biological, visual and social impacts (fishing, tourism); creation of a headpond, and a slight increase in the frequency and duration of floodplain inundation during floods; barrier effects of linear infrastructure such as the weir, power canal and transmission lines; benefit sharing primarily through payments into community trust funds. Over the longer term, the project area will experience a number of changes (demography, economic growth, infrastructure development, land use, climate, river flows) which will interact with the project to generate cumulative social and environmental impacts.
Identify the environmental regulator	Zambian Environmental Management Agency (ZEMA)
Identify other regulators (e.g. on land, water use, Indigenous Peoples)	Water Resources Management Authority (WARMA) – water regulator; Department of National Parks and Wildlife (DNPW) – wildlife and protected areas; National Heritage and Conservation Commission (NHCC) – cultural heritage; Energy Regulation Board (ERB) – energy regulator; Ministry of Tourism and Arts – tourism
Summarise the ESIA regulatory requirements	For hydropower projects in Zambia, ZEMA (in consultation with other government agencies) has to approve the ESIA as well as the RAP.
List the key license conditions/ voluntary commitments	ZEMA's approval of the hydropower ESIA in 2021 came with 50 conditions and requirements to follow general environmental regulations, none of which required significant changes to the project. The ESIA and ESMMP already went beyond standard Zambian practices and requirements in many ways. Examples for major voluntary commitments are the benefit sharing arrangements (see section 4). The transmission line (TL) ESIA and RAP still have to be finalized and approved.
Total environmental and social costs in project development, including resettlement costs	USD 1.2 m in development costs, USD 8 million for implementation of the ESMMP, USD 3 million for implementation of the RAP, payments under the Community Participation Agreement (CPA) of USD 0.5 m at financial close, USD 0.5 m/a fixed, and variable dividends, estimated to increase from USD 0.26 in year 1 of operations to USD 1.55 m in year 10

Description of the non-physical cultural heritage in the project area	The population largely belongs to the Lozi people which live in Barotseland, administratively the Western Province of Zambia. The Barotse traditional authorities led by the king (Litunga) of the Barotse Royal Establishment (BRE) co-exist with modern government. The Lozi have their own language and follow some of their own cultural traditions, such as ceremonies.
Other relevant information	The project is located in an agriculturally-dominated section of the Western Province of Zambia, on the upper Zambezi River, between the Barotse floodplains upstream and Victoria Falls downstream. The Western Province is one of the poorest in Zambia, with a large majority of the population under the poverty line, especially in rural areas.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Assessments of project environmental and social impacts	✓	The ESIA for the original design with 45 MW was drafted in 2016. A comprehensive range of specialist studies, encompassing biodiversity, heritage, health, social, visual impacts etc has been prepared, and where necessary, updated for the new design of 180 MW. The full ESIA was submitted in 2020 and approved by ZEMA in April 2021, with a validity period of 3 years (an extension is being issued). ZEMA considers the project location to be sensitive, related to resettlement impacts and the natural and cultural heritage value of the area. Additional studies are still being undertaken to update and complement the ESIA findings.	The assessment takes broad considerations into account, and both risks and opportunities	✓	The E&S assessment is comprehensive, with some additional considerations identified in this sustainability assessment. Baseline data have included, for example, detailed analyses of ecosystem services, heritage and fisheries sites, a wide range of water quality parameters, and vulnerable groups. It takes a number of risks and opportunities into account, however with more emphasis on 'doing no harm' (mitigating and compensating potential negative effects) than on potential positive impacts.
Assessments address:					
• project implementation	✓	All specialist studies and the ESIA have addressed both implementation and operation.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• project operation	✓	See above			
• associated facilities	✓	A short TL from the powerhouse on the left bank to a sub-station on the right bank, and local roads to connect the site are included in the 2020 ESIA. ZESCO and WPC are preparing an ESIA for the 110km 220/330kV TL south to ZESCO's Sesheke sub-station. This line is required for the Ngonye Falls project, is included in the EPC tender, and will partially follow the alignment of ZESCO's existing 66kV line. WPC will also connect the existing 66kV line to the power station, to improve quality of supply particularly in the north around Mongu, and will support the preparation of an ESIA for the future extension of the 220/330kV line to the north and west.	The social impact assessment incorporates assessment of human rights	✘	There is no explicit assessment of human rights, which is a **significant gap** given risk factors such as the pre-existing levels of poverty and vulnerability, the duality of modern and customary law, and the ethnic minority status of the Lozi people. Some related issues (such as gender discrimination in customary land management and decision-making) are mentioned in the assessment documents, or reflected in E&S management processes (for example, the procurement of the EPC contractor mentions human rights violation in the prequalification questionnaire, and related issues are reflected in the specifications for the Human Resources and Local Employment Plan of the contractor). However, there is no systematic and comprehensive review of potential human rights impacts and mitigation or enhancement options.
• cumulative impacts	✓	The 2020 hydro ESIA and a more detailed assessment currently underway address potential cumulative impacts from e.g. tourism development at Ngonye Falls, the recently finished M10 road and bridge, transmission lines, and other ongoing changes (e.g. logging, commercial farming, climate change).			
• role and capacity of third parties	✓	The Government of Zambia and institutions such as ZEMA have significant experience with hydropower. The hydro ESIA and			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		related studies and plans include identification of relevant legislation, institutions and their roles. The capacity for E&S assessment and management is adequate given the involvement of international expertise (consultants, lenders etc.) and the fact that most management activities will be undertaken by WPC and the EPC contractor directly. Capacity-building will be critical to the success of the benefit-sharing mechanism, but this is addressed below (section 4).			
• impacts associated with primary suppliers	✓	Supply chain impacts will be identified and managed by the EPC contractor through a Supply Chain Management System. For rock quarries that are still to be determined, the EPC contractor will undertake a separate assessment and obtain a permit.			
Assessments have been prepared using appropriate expertise	✓	Highly appropriate combination of expertise, including national EIA and RAP consultants, regional experts on biodiversity and livelihood restoration, national institutions on heritage, regional and national social development experts; plus several layers of independent review and due diligence, both for the hydro and the TL ESIAs.			
A baseline has been established and well-	✓	The ESIA and RAP summarize detailed baseline studies for physical			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
documented for the pre-project condition against which post-project changes can be compared		environmental quality, biodiversity, and social issues. Further baseline studies are ongoing for the TL and for biodiversity, and the management plans include plans for continued assessments and monitoring.			
Assessment of needs for water and energy services	✓	The ESIA includes identification of policies that promote renewable energy and hydropower. There are no doubts about the suppressed power demand in Zambia and neighbouring countries. The Western Province currently has no significant power generation and the 66 kV TL from Sesheke can only supply a maximum of about 10 MW for the entire province. In addition to its own generation, the project will significantly reduce transmission losses and improve power quality.	The assessment shows a strong emphasis on social and environmental needs, policies and plans, including the need for sustainable development of the river basin and integrated water resource management	✓	The project ESIAs and subsequent studies show a high level of awareness and ambition with regards to E&S issues. There is no detailed assessment of development needs or plans for the region, sustainable river basin development, or integrated water resource management. This gap is not significant as development needs are obvious, there is very limited other water infrastructure and few other large-scale water users on the upper Zambezi, the project will not affect these, and potential impacts from upstream water abstraction have been considered.
Assessment of options to meet water and energy needs	✓	The ESIA compares power supply alternatives for the province, including a smaller hydro scheme at Ngonye Falls (45 MW), which would supply more expensive power. At a larger scale, the recent Integrated Resource Plan for Zambia envisages some further expansion of hydropower, accompanied by a diversification of renewable power sources. ZESCO have included the			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		project in their power generation projections.			
Assessment of national and regional policies and plans relevant to those needs	✓	Assessment of policies and plans on energy and water is included in the ESIA.	The assessment is based on dialogue with government planners, policy makers and key stakeholder groups	✓	The 2020 ESIA may become outdated with regards to the assessment of the power and water system context. WPC and their consultants have maintained a dialogue with stakeholders largely on project development and permitting, less on the policy context. However, there is now a process in place to update the assessment of the context, taking into account recent government plans such as the Integrated Resource Plan (IRP) for the power sector which would greatly expand variable renewables, as well as plans for rapid expansion of irrigated agriculture.
Social and environmental considerations, including regulatory considerations, have been analysed at an early stage in preliminary project designs and options	✓	The scheme as currently designed is significantly larger than the previous design and has a number of additional impacts. However, the requirement to minimise displacement, biodiversity impacts (especially freshwater), and impacts on heritage have been an integral part of the design process. Examples: selection of the weir and headpond level in relation to upstream displacement; inclusion of Obermeyer weirs to ensure stable headpond level; detailed assessment of flow splits between the Ngonye	Options take into consideration sustainable river basin design and integrated water resources management	✓	Although the project is located on the mainstream of a major river, it implements principles of sustainable river basin design such as maintaining connectivity and not affecting downstream flows. Integrated water resources management is taken into consideration in the water permitting process, where the compatibility with other water uses is checked. There are no options for storage and multi-purpose schemes at or near the site on the upper Zambezi.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		Falls and power canal to maintain freshwater biodiversity, fisheries, and visual amenity; alignment of power canal.			
MANAGEMENT					
Environmental and social management plans and processes have been developed	✓	The ESMMP (Environmental and Social Management and Monitoring Plan, part of the ESIA) and RAP summarise most management plans, with cost, responsibilities etc. Additional management plans are under preparation for the TL and for specific areas such as environmental flows and biodiversity. Some plans such as the RAP are being complemented by detailed implementation plans. The EPC contractor will be required to develop fully detailed plans primarily for OH&S and construction E&S management.	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	A number of emerging risks and opportunities are already considered in the project documentation. Processes include the ESMMP and RAP and the provisions for monitoring and adaptive management therein, with a wide range of indicators, the EPC contractor's management systems, and the system of supervision, inspections, and reporting by WPC and the owner's engineer (OE). The quarterly report format has been designed to anticipate, identify and determine responses to emerging risks and opportunities. Communication with stakeholders includes the grievance mechanism (see section 10).
Plans address project implementation	✓	The ESMMP is divided into WPC and EPC contractor requirements as well as into preparation, construction, and operation stage requirements.			
Plans address project operation	✓	See above			
Plans have been prepared using appropriate expertise (internal and external)	✓	Highly appropriate combination of expertise, including national EIA and RAP consultants, regional experts on biodiversity and livelihood restoration, national institutions on	Plans are embedded within an internationally recognised environmental management system which is third party verified, such as ISO 14001	✘	WPC has or is on track to have many elements of an HSES (health safety environment and social) management system), designed to meet IFC PS-1 requirements, and approaches E&S

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		heritage, regional and national social development experts; plus several layers of independent review and due diligence, both for the hydro and the TL ESIAs.			management in a systematic manner. For example, the regularly updated 'HSES planner' document lays out tasks for the upcoming year in a very systematic way. There is also a requirement for the EPC contractor to be certified against ISO 9001, 14001, and 45001. However, there is no intention for WPC's own HSES management systems to be third party verified, which is a **significant gap**.
Plans address all key social and environmental issues	✓	All key issues are addressed.			
Plans address construction-related waste, noise, air quality, land disturbance and rehabilitation	✓	The construction stage ESMMP includes sub-plans for each of these issues, and they will be developed in more detail by the EPC contractor, as a contractual requirement. As yet it has not been determined whether the project will need its own landfill, whether its capacity will be sufficient for the operation stage and for municipal waste, and whether it will be operated jointly or handed over to local authorities, but these issues are covered at a general level in the construction stage ESMMP.	Independent review mechanisms are utilised	✓	WPC has a small permanent staff and regularly use independent advisers and reviewers. An initial sustainability assessment in 2018 was followed by this certification assessment in 2024. The project is also reviewed by regulators and lenders.
Environmental and social impact assessment and key associated management plans are publicly disclosed	✓	Public disclosure is required by ZEMA and the hydro ESIA (including management plans and non-technical summaries in English and Lozi languages, maps and other explanatory materials) is also already			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		placed on the website of the developer, and will be available through equity partners and financing institutions. The RAP and the TL ESIA will follow a similar process.			
An optimisation process has been undertaken to assess the project siting and design options	✓	The Ngonye Falls scheme including associated facilities has undergone a long process of siting and design optimisation. A key decision was taken in 2017 to move from a design where most channels would flow freely and only the left channel would be diverted resulting in an installed capacity of 45MW, to a design with weirs and embankments across all channels, able to divert a portion of all channels and resulting in an installed capacity of 180 MW, close to the estimated suppressed demand in the Western Province. The larger scheme results in lower tariffs and larger community benefits. The project is designed as a pure run-of-river scheme.			
OUTCOMES					
Environmental and social plans avoid, minimise and mitigate negative impacts	✓	The ESMMP in conjunction with other plans under development addresses negative impacts with no significant gaps.	Environmental and social plans avoid, minimise, mitigate and compensate negative project impacts	✘	Whether all project impacts will be compensated cannot be confirmed at this stage, as not all impact assessments and management plans are designed and approved yet (e.g. those for the TL and those resulting from the update of the critical

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					habitats assessment) and there is no clear mechanism or commitment for identifying and determining compensation measures for residual impacts This is a **significant gap**.
The strategic fit of the project with needs for water and energy services, and relevant policies and plans can be demonstrated	✓	The project fits with the needs for expanded, stable and renewable power supply in the isolated and underdeveloped Western Province, across Zambia, and across the interconnected southern African region.	Plans provide for enhancements to preproject environmental or social conditions or contribute to addressing issues beyond those impacts caused by the project	✓	The project will enhance living conditions and economic development in the Western Province in a very significant way, primarily through improved power supply, the community benefit sharing arrangements, and local employment. There may also be opportunities for enhancing other E&S conditions, but these are not fully finalized, as described under different sections below.
The final project siting and design has responded to environmental and social considerations	✓	A number of environmental and social considerations are reflected in the siting and design.	The project is one of the priority options to address demonstrated needs	✘	The project is mentioned and generally fits into the Zambia IRP 2023, and is one of the few large scale renewable power projects in the country, and only one in the Western Province, with a realistic prospect of implementation in the near future. There is some uncertainty, however, how run-of-river schemes such as Ngonye Falls HPP with no active regulation can support the planned massive expansion of variable renewables. There is very limited discussion of this issue either in the

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					IRP or in the project documentation, which is a **significant gap**.
The project can pay for social and environmental plans and commitments	✓	The costs of E&S management including benefit sharing are included in the overall project costs, which are the basis for negotiating the offtaker agreement (PPA) with ZESCO that was signed in 2023, as well as raising equity and debt finance. Revenue projections are done through a financial model which is being used for sensitivity analyses, for example to consider the effects of reduced flows under climate change.	The final project siting and design is optimal with respect to sustainability considerations for siting and design	✓	Trade-offs between the project's impacts and benefits have been considered. The incremental footprint from expanding the project from 45MW to 180MW is relatively small compared to the incremental social and economic benefits.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	8

Summary of findings and other notable issues
The project siting and design represents an appropriate balance between very significant economic and social benefits, and moderate environmental and social impacts. Environmental assessments and management plans are being prepared to meet both Zambian regulatory and international financing requirements, using appropriate expertise. WPC and their consultants are on track to deliver a full set of assessment and planning documents by the start of construction. Some advanced requirements related to a human rights focus in the E&S assessment, external verification of E&S management systems, options analysis, and comprehensive compensation of impacts are not met at this time.

Relevant evidence	
Interview	3-6, 8, 9, 31, 32
Document	2-6, 40-48, 65-69, 75-76, 93-96, 108, 109, 123-132, 150, 153-152
Photo	1-60

2 Labour and Working Conditions

Scope and Principle
This section addresses labour and working conditions, including employee and contractor opportunity, equity, diversity, health and safety. The principle is that workers are treated fairly and protected.

Background	
Labour requirements during implementation (full-time equivalent)	The project will create a peak of 3,100 jobs for approximately 24 of the 36-month construction period, according to the ESIA.
Labour requirements during operation (full-time equivalent)	Approximately 60-100 permanent personnel will be required. This will comprise a plant operating team of approximately 30-45 with the remainder support staff including security, drivers, cleaners and catering (according to ESIA).
Applicable key human resources regulations	Employment Code, Act No. 3 of 2019
Applicable key occupational health and safety (OH&S) regulations	Occupational Health and Safety Act No. 36 of 2010 Factories Act, Cap 441 Workers Compensation Act
Identify the regulator for labour law and OH&S	Ministry of Labour and Social Security Factories Inspectorate (under the Ministry of Labour and Social Security)

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
ASSESSMENT					
Assessment of human resource and labour management requirements	✓	The Feasibility Study and ESIA includes construction and operation phase labour force requirements, with mention of promotion of labour from local communities. Few skilled workers for large-scale infrastructure projects are available in the Western Province.	The assessment takes broad considerations into account, and both risks and opportunities	✓	The ESIA provided baseline information on local employment and economic activities, and identified some risks and opportunities, including the need of training local people for job opportunities, and issues regarding equal opportunities. The specification of the contents of

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
The assessment includes project occupational health and safety issues, risks, and management measures	✓	An assessment of preparation stage occupational health and safety (OH&S) issues has been undertaken by a specialized consultant. No major accidents or other major work-related OH&S issues have been reported during the preparation stage. The ESMMP includes an assessment of human resource (HR) and OH&S requirements for implementation, and a requirement for the EPC contractor to prepare detailed emergency and OH&S plans aligned with the requirements of ISO 45001 or its equivalent, Good International Industry Practice (GIIP), and IFC PS 2.			the EPC contractor's local employment, workers' accommodation, OH&S and other labour-related plans also includes both risks and opportunities.
MANAGEMENT					
Human resource and labour management policies, plans and processes have been developed for project implementation	✓	WPC has basic human resource processes appropriate for a small start-up organization, and has contracted consultants to develop an HR strategy, manual, code of conduct, local employment and equal opportunities policies, and manage recruitment and employee lifecycle management. The company has also developed a Health and Safety Policy for their own staff. Health and safety issues are registered and are a standing item at Monthly Development Team meetings and Quarterly Board meetings. WPC is hiring an ESG Director who will	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	Labour plans presented in the ESMMP are comprehensive and include clear responsibilities and guidance for WPC, the EPC contractor, and other contractors and sub-contractors. The OH&S plan is defined as a living document which the EPC Contractor has to update periodically as the works progress, incorporating lessons learned. There are plans for local employment, worker accommodation, emergencies, and other labour related issues. Monitoring is planned for local employment and OH&S, and a grievance mechanism will be available for all workers.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		oversee OH&S. Staff have been trained in OH&S issues such as defensive driving and operational safety. The ESMMP presents a very detailed and comprehensive scope for the OH&S plan to be developed by the EPC contract, and these requirements are included in the tender documents. Vocational training for local community members began last year, and has continued this year, with Mongu and Kalabo Trades Training Institutes. WPC has so far supported the training for 97 young adults. Courses included, brick laying, general agricultural, mechanics, electrical, food production and auto-mechanics.			
Human resource and labour management policies, plans and processes have been developed for project operation	✓	At this stage there is only an HR framework described in the ESMMP, but this is not an issue given the length of time until commissioning and the fact that consultants have been contracted to prepare WPC's HR system (see above).			
These plans cover all labour management planning components, including those of contractors, subcontractors and intermediaries	✓	The ESMMP and the specifications in the tender documents for the EPC contract and subcontractors cover all major labour management planning components. All companies associated with the project have to be aligned with WPC's labour provisions in the Sustainability and Health and Safety policies. The EPC contractor			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		specifications require employee recognition and rewards, including a system of recognizing exemplary employee and team/unit performance in HSES matters (awards and certifications, bonus payments).			
OUTCOMES					
There are no identified inconsistencies of labour management policies, plans and practices with internationally recognised labour rights	✓	Zambia has ratified all ILO core labour rights conventions. There are no indications of any inconsistencies with rights including equal opportunities, fair treatment, non-discrimination, rights of employees, and equal remuneration. Labour and working conditions during the preparation stage, both for the small team of the developer and for contractors (mainly consultants and geotechnical investigation companies), have been satisfactory.	Labour management policies, plans and practices are demonstrated to be consistent with internationally recognised labour rights	✓	The ESMMP and tender documents for the EPC contractor include clear references to international labour rights, which will be further detailed in the HR policies and processes under development. The HR consultants and EPC contractor are required to prepare plans aligned with IFC PS 2, GIIP, and ISO 45001 or its equivalent.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	3

Summary of findings and other notable issues
WPC has basic HR and safety policies and processes in place, appropriate for the preparation stage. An assessment of human resource, labour management and OH&S issues including risks and opportunities was included in the ESIA, and initial management plans in the ESMMP. Detailed plans and processes for WPC are under preparation and will be required from the EPC contractor, for recruitment, local employment, labour conditions, accommodations, OH&S, emergencies and other labour-related issues. No inconsistencies between labour management policies, plans and practices and internationally recognized labour rights have been identified.

Relevant evidence

Ngonye Falls HPP, 180 MW, Zambia

Interview	1, 2, 4-7, 10, 20-22, 27-29, 34, 35
Document	1, 2, 21-24, 40-48, 53-63, 68, 69, 79, 86, 110-122, 140, 141
Photo	54

3 Water Quality and Sediments

Scope and Principle
This section addresses the management of water quality, erosion and sedimentation issues associated with the project. The principle is that water quality in the vicinity of the project is not adversely impacted by project activities, and that erosion and sedimentation caused by the project are managed responsibly and do not present problems with respect to other social, environmental and economic objectives.

Background	
Water Quality	
Description of water quality	Despite the large catchment and lack of wastewater treatment upstream, the nutrient load of the river is low, and the water is classified as oligotrophic. All chemical constituents measured are well below detection limits or benchmark criteria for sustaining freshwater life, and there is little solid waste pollution.
Key water quality issues	Total coliforms and faecal coliforms are high at some sampling sites (including boreholes) possibly due to contamination from settlements and livestock. Local authorities report that some boreholes show high salinity.
Main influences on water quality	There is low population density, limited agricultural activities and use of agricultural chemicals, and almost no industries upstream of Ngonye Falls.
Sedimentology	
Key sediment issues	Extensive floodplains and swamps, the Barotse Floodplain and Luena Flats approximately 70-200 km upstream, capture sediments from the upper catchment. Banks of fine aeolian sand, present in bays along the river course, are moved and redeposited during flood events. Total dissolved and suspended solids and turbidity are higher during higher flows as increasing runoff scours sediment deposited during the dry season.
Sediment load (tonnes/year)	Not available (neither the technical nor the E&S studies provide an estimate of sediment load)
Catchment area at the dam	315,000 km^2

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Water quality issues assessment	✓	Multiple surface and groundwater quality samples have been taken between 2014 and 2020. These covered different seasons, locations	The assessment takes broad considerations into account, and both risks and opportunities	×	Water quality is considered sensitive because of the good baseline quality and the dependence of communities and ecosystems on this good quality.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		and parameters, including biological indicators. The ESIA identified potential water quality impacts primarily from construction (increased turbidity and nutrient levels from site run-off and instream works, accidental spillages and leaks of hazardous materials, releases of sanitary wastes due to worker/population influx).			Impacts from slightly longer retention of water in headpond and reduced flows in the bypass reach (leading to changes in dilution, water temperatures and dissolved oxygen content) are assessed to be minor. There may be some visual impacts on the falls of increased sediment load during construction, but this would be barely noticeable. The total sediment load in the river and the dependence of sandbanks on sediment transport has not been assessed. Sandbank locations and sizes may be affected by delayed sediment transport (temporary retention in the headpond and flushing during floods). Given that the sandbanks are a major landscape feature and part of the visual attraction of the Ngonye Falls area, this is a **significant gap.** Mitigating factors are that 1) baseline information on the sandbanks is available from current and historic aerial and satellite pictures; 2) further detailed hydraulic modelling (CFD) will also be undertaken of the intake area during the detailed design, to provide additional assurance that sediment will continue to move downstream, and 3) the photo-monitoring sites
Erosion and sedimentation issues assessment	✓	Erosion from local runoff or riverbanks is not a major issue in this reach of the river. Assessment has largely consisted of sampling and analysis of sediment grain sizes and modelling of shear stresses under different flow conditions, in order to understand the continued ability of the river to move sediment through the affected reach.			
Identification of erosion and sedimentation impacts that may be caused by the project	✓	There is only a brief discussion of potential sediment retention, but this is not a significant gap at the level of Minimum Requirements as (1) the overall sediment load is limited, (2) the volumes temporarily deposited upstream of the headworks are expected to be minor, and (3) the sediment transport capacity of the river is not significantly affected as most sediment moves during major floods which are maintained. Increased sediment input during construction would cause minor			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		temporary increases in turbidity due to dilution.			agreed with tourism stakeholders include downstream sandbanks.
Identification of erosion and sedimentation issues that may impact on the project	✓	The likelihood of deposition of significant volumes of sediment accumulating upstream of the headworks, in the intake canal or forebay is considered low. Powerhouse other equipment should not be affected by abrasive sand.			
An understanding of the sediment load and dynamics for the affected river system	✓	2-D hydraulic modelling of the affected river reach confirmed the remobilization of sediment retained in headpond at moderate flood levels.			
MANAGEMENT					
Plans and processes to address identified water quality issues have been developed for project implementation	✓	The EPC contractor plans will provide more details, but the Feasibility Study and ESMMP already foresee appropriate measures such as materials handling, solid waste and spoil disposal, and raw water and sewage treatment plants for the construction camp.	Processes are in place to anticipate and respond to emerging risks and opportunities for water quality	✓	Regarding risks, the EPC contractor will be responsible for frequent quality compliance monitoring upstream and downstream of the works. There will be reporting, inspections, audits and other supervision by WPC, as well as processes for complaints and grievances from stakeholders and regulators. WPC will conduct their own periodic monitoring during pre-construction, construction, and operation. During the first dry season in the operations stage, WPC will also verify whether temperature and dissolved oxygen levels in the bypass reach are affected.
Plans and processes to address identified water quality issues have been developed for project operation	✓	No significant water quality issues are predicted during operation, if standard precautions are taken at the power station (for example, regarding the handling of oils and lubricants). The project is designed in a way that prevents other water quality changes.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					There are no specific processes for opportunities, but it is likely that some improvements will result, in particular for local residents, through resettlement villages with improved water supply and sanitation (septic tanks) and through CSR activities and investments by the community support funds, which include public health as a funding priority. These funds and the RAP have their own processes for identifying opportunities.
Plans and processes to address identified erosion and sedimentation issues have been developed for project implementation	✓	The EPC contractor plans will provide more details, but the current documentation already includes appropriate measures under sub-plans such an Instream Works Management Plan, Erosion and Sediment Control Plan, and Water Resource Management Plan.	Processes are in place to anticipate and respond to emerging risks and opportunities for erosion and sedimentation	✓	See above regarding the process for monitoring EPC contractor compliance. As also described above, there is a general process for monitoring and adaptive management including monitoring for a variety of sediment-related issues, such as aesthetic quality of the landscape. There is no separate plan for monitoring of sediment retention or bathymetry in the headpond or sediment movement through the bypass reach, however sediment deposits will be tracked by photo-monitoring at tourism lodges, and significant erosion or deposition will be obvious to operators and river users. There are no specific processes for opportunities regarding erosion and
Plans and processes to address identified erosion and sedimentation issues have been developed for project operation	✓	Regular headpond flushing will occur naturally during flood events.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					sedimentation. The project plans replacement of lost vegetation as well as some planting of tree crops for relocated households, not a wider reforestation effort. The revegetation may have some local soil stabilization benefits.
OUTCOMES					
Plans avoid, minimise and mitigate negative water quality impacts arising from project activities	✓	The design of the project without significant storage, the operations with environmental flow releases, and the mitigation measures to limit contamination during construction and operation address all potentially significant impacts.	Plans avoid, minimise, mitigate and compensate negative water quality impacts	✓	There will be some residual water quality impacts after mitigation. The influx of people and increased economic activity in the area will lead to additional liquid and solid waste, not all of which will be within the control of the project and adequately disposed of, and thus will impact river or groundwater quality. There are no specific plans to compensate these residual negative impacts (for example, by improving solid waste management or water supply in Sioma town). However, the enhancements mentioned below will compensate negative impacts to some extent.
			Plans provide for enhancements to pre-project water quality conditions or contribute to addressing water quality issues beyond those impacts caused by the project	✓	The resettlement and benefit sharing programs will lead to enhanced water supply and sanitation for many affected people/beneficiaries, with positive impacts on water quality. WPC has already improved the water supply to Mbuyu Community school

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					and surrounding residents through its CSR program.
Plans avoid, minimise and mitigate erosion and sedimentation issues arising from project activities	✓	Standard good construction practices will limit erosion and sedimentation issues. Trees will be retained where possible, and vegetation rehabilitated. No significant issues are expected during operations, at the level of Minimum Requirements.	Plans avoid, minimise, mitigate and compensate erosion and sedimentation issues arising from project activities	✗	Similar to water quality, there will be some increased erosion and sediment supply to the river, due to residual impacts from construction and the influx of people, leading to loss of vegetation. Some but not all of this will be compensated by revegetation. Locations or sizes of sandbanks – a major landscape feature – may also change. There are no specific plans to compensate these residual negative impacts, which is a **significant gap**. There could be opportunities to increase vegetation cover by contributing to conservation efforts (section 6) or increasing the scale of revegetation efforts.
Plans avoid, minimise and mitigate erosion and sedimentation issues that may impact on the project	✓	Temporary deposition of sediments upstream of project infrastructure should not be an issue for operations.	Plans provide for enhancements to pre-project erosion and sedimentation conditions or contribute to addressing erosion and sedimentation issues beyond those impacts caused by the project	✓	There are no significant pre-project erosion or sedimentation issues that would justify enhancement measures. This requirement is deemed not applicable, and therefore met.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	5

Ngonye Falls HPP, 180 MW, Zambia

Summary of findings and other notable issues
Water quality, sedimentation and erosion issues are expected to be relatively minor, given the large size of the river, small size of the reservoir, and good baseline conditions with high water quality and low sediment load and erosion. The project will use standard good construction practices to limit impacts on quality, erosion and sediments. There is some uncertainty over sediment transport.

Relevant evidence	
Interview	3-6, 8, 11-14, 28, 31-35
Document	11, 35-48, 93-96, 137, 140-143
Photo	5, 6, 9, 18-20, 43-48, 50-55

4 Community Impacts and Infrastructure Safety

Scope and Principle
This section addresses impacts of the project on project-affected communities, including economic displacement, impacts on livelihoods and living standards, public health impacts, and impacts to rights, risks and opportunities of those affected by the project. This section also addresses project benefits and infrastructure safety during project preparation, implementation and operation. The principle is that livelihoods and living standards impacted by the project are improved relative to pre-project conditions for project-affected communities, and that life, property and community assets and resources are protected from the consequences of dam failure and other infrastructure safety risks. This section does not address requirements that relate to physical displacement or to Indigenous Peoples, which are addressed in Section 5 and 7. Other interested parties and groups are addressed in Section 10.

Background	
Community Impacts and Benefits	
Description of project-affected communities and how they are affected (distinguish between physically displaced (addressed in Section 5), economically displaced and other project-affected communities and include estimated number of people and households)	The hydropower project affects primarily rural communities in the Sioma and Senanga districts, most of which live in scattered rural homesteads practicing dryland and flood recession agriculture. Almost all of them belong to the Lozi ethnicity. They are affected and included in the Resettlement Action Plan (RAP) in the following ways: - 119 households lose structures (165 primary structures and 244 secondary structures) - 398 households will lose land (141 active land permanently, 234 inactive land permanently, 23 temporarily) - 239 fishers will lose traditional Maungwe and Limbelo fishing sites. Some of the land is community and some is private land. Some is acquired by the project (approximately 78 ha of land for temporary project components, and 407 hectares of land for permanent project components), and some is included in the RAP because the probability of inundation increases upstream of the headpond. Additionally, there will be some loss of grazing land and other common property resources, cultural heritage resources (section 8), and community infrastructure. Economic displacement is discussed in this section 4, while physical displacement (resettlement) is discussed in section 5. 71 of the households who lose structures are physically displaced. Impacts from the TL are still being assessed; the draft ESIA states that there should be no impacts on land tenure and minimal impacts on land use (utilization of the land within the wayleave for other purposes will be restricted, but farming may continue). The attractiveness of the falls and gorge will change which will in turn impact tourism. A range of small enterprises including tourist lodges operate in the area. The 224 ha Ngonye Falls Community Partnership Park (NFCPP), initiated by the Peace Parks Foundation and jointly managed by the traditional leadership, the local community and DNPW, will be

	partially affected. There are potential risks from human-animal conflicts (e.g. people, farm animals, and gardens affected by changes in numbers and locations of crocodiles, hippos and elephants). Other communities in the region may be affected by construction traffic, and as a source of labour and supplies. The closest town is Sioma (district capital) on the left bank of the Zambezi, a short distance upstream of the weir. The construction activities as well as the permanent installation of project infrastructure including headworks, canal, forebay powerplant, switchyard etc. will provide economic opportunities and improve power supply, but will also affect social structures, due to displacement of households, changes to mobility, community-workforce interactions, community benefit investments, and other changes. The traditional authorities in the area under the Barotse King (Litunga) and BRE are important stakeholders, and in fact an equity shareholder. The BRE is the executive structure that the Litunga uses to administer Barotseland. There is a network of local chiefs (Indunas) under the kingdom.
Agencies relevant to land acquisition	Conversion of Customary Land to State Land for acquisition (by way of a state lease) is administered by the local Council Secretary, and the Commissioner of Lands approves the application. For land in excess of 250 hectares, the Commissioner of Lands is required to seek clearance from the Minister of Lands before approval. There is also a Department of Resettlement in the Vice President's Office. The local chiefs (Indunas) administer community land and are involved in identifying replacement land.
Agencies relevant to livelihood restoration and project benefits	BRE and Government of Zambia, including Ministry of Local Government and Housing, Ministry of Agriculture and Livestock, Ministry of Lands and Natural Resources, Ministry of Green Economy and Environment, ZEMA, Ministry of Community Development and Social Welfare, Department of Resettlement and Disaster Management and Mitigation Unit; and local District Departments may play a role, for example in agricultural extension services.
Infrastructure Safety and Public Health	
Type of dam	Concrete weir with pneumatically controlled steel flap gates, and a concrete gated barrage; embankment dams upstream of intake and around forebay.
Dam height (m)	3 m for weir; 8.5 m for the concrete gated barrage; maximum height of embankment dams is 21.5 m
Probable maximum flood (m^3/s)	22,000
Design flood (expressed as estimated flood with return period)	14,800 with return period of 10,000 years
Spillway capacity (m^3/s)	Obermeyer gates on weir with capacity to pass Inflow Design Flood (IDF) of 9,860 m^3/s; weir can be overtopped; barrage spillway: 1,241 m^3/s.
Spillway crest elevation (masl)	991.5
Headrace length (m)	3 km
Headrace width (m)	118 m land requirement including embankments
Headrace capacity (m^3/s)	1,100 m^3/s
Seismicity	There are few recorded seismic events in the area. The closest faulting mechanism is ca. 1,000 km from the site and too distant to be considered a risk.

Geology	Alluvial and aeolian deposits overlying approximately 30-40 m of Kalahari Sandstone, which is in turn underlain by dolerites and basalts of the Karoo Group. The sandstones in the area are characterized by the presence of a thin 'cap' of cemented material (silcrete, ferricrete and calcrete) formed due to movement of groundwater.
Dam safety regulatory authorities	WARMA is responsible for supervising dam safety, but relies on design and completion certificates issued by qualified engineers. The Water Resources Management Act No. 21 of 2011 covers dam safety.
Local presence/capacity of emergency services	Minimal. Sioma is a new district with limited capacities but has a Disaster Management and Mitigation Unit (DMMU), a District Disaster Management Committee (DDMC) and a District Disaster Preparedness Plan for 2024-2025 in place.
Potential safety risks in this context	Public safety risks due to site access (construction will be spread over a significant area that cannot be completely controlled), safety on or near water (headpond, downstream of the barrage and weir, canal and forebay, tailrace), human-animal conflict, road and electrical safety. Drowning and animal encounters are currently significant risks for local people.
Degree of risk of dam failure and in what way	While the embankment dams around the forebay are large dams due to their height, according to Zambian and ICOLD definitions, and therefore require special attention, the volume of water stored behind them is relatively small.
Population at risk of dam break (locations, numbers)	Homes are not located directly on riverbanks, but individuals downstream of the headworks may be exposed to a flood wave. There are tourist lodges in the bypass reach of the Zambezi River and downstream of the tailrace.
Dam safety standards followed	ICOLD, Zambia WRM Act No. 21 of 2011 (Part XII – Water Works and Part XIV – Emergency Situations)
Agencies relevant to dam safety	WARMA
Other infrastructure safety issues	See above
Description of key public health issues	Sioma district and other affected districts in the Western Province have a high burden of disease mainly characterised by high prevalence and impact of communicable diseases, particularly malaria, sexually transmitted infections (STIs), HIV/AIDs, tuberculosis (TB) and high maternal, neonatal and child morbidities and mortalities. The area is also faced with a rising burden on non-communicable diseases including cardio-vascular diseases, muscular-skeletal and trauma. Health education is generally poor, especially among the scattered rural populations, and there are limited health facilities.
Agencies relevant to public health	Ministry of Health, Centre for Disease Control

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Community Impacts and Benefits					
An assessment of issues relating to project-affected communities	✓	Several specialized studies were conducted before and fed into the hydropower project ESIA, including social, health and tourism assessments. These studies as well as the ESIA, ESMMP and RAP contain	The assessment takes broad considerations into account, and both risks and opportunities relating to project-affected communities and project benefits	×	The assessments take broad considerations into account, and some risks and opportunities. A number of local support initiatives have been started (e.g. school infrastructure, training) or agreed

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		detailed information on project-affected communities. The TL ESIA is expected to include a similar level of detail.			(e.g. the benefit sharing trust funds), or are under discussion (e.g. improved access to the NFCPP). The trusts and their governance structures will identify opportunities based on community demand. The headpond may increase fishing potential. Multiple risks for communities have been considered. For example, to address some risks of increased human-animal conflicts, a survey of elephant movement was undertaken to determine areas to avoid for replacement housing and farmland. However, there is dissatisfaction and/or distrust among some tourist operators regarding impacts on the falls and gorge. Related to this, the scope of the landscape and visual impact assessment and the tourism impact assessment did not cover changes in visitation and revenue that may be caused by changes in the visual attractiveness of the gorge, in particular due to erosion/ sedimentation dynamics, which is a **significant gap.** It is possible that tourism operators will actually experience net benefits, due to increased visitors to the area (at least during construction), and to the planned tourism enhancement
This assessment utilised local knowledge	✓	Household surveys and other methods such as focus groups with local people were employed to acquire local knowledge. Social impact assessment has involved extensive consultations, including with local chiefs, households, and a Resettlement Liaison Committee that is still operational.			
An assessment of opportunities to increase the development contribution of the project through additional benefits and/or benefit sharing strategies	✓	Opportunities to increase the development contribution of the project through additional benefits and/or benefit sharing strategies were assessed from an early stage, resulting in the 2013 MoU and the 2017 CPA with the BRE. This is the primary topic of interest to the affected population, in addition to the benefits expected from job creation and power supply.			
The pre-project baseline against which delivery of benefits can be evaluated post-project is well-documented	✓	The Social Impact Assessment (SIA), ESIA, and RAP summarize detailed baseline studies for social issues. Further baseline studies are ongoing for the TL. The management plans include provisions for continued monitoring and evaluation. Through the trust fund arrangements, benefits will be delivered on an ongoing basis, not just at a local but also at the			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		provincial level. The baseline at the provincial level is also documented through official statistics, such as regular living conditions and poverty surveys. The trusts may choose to invest in particular initiatives for which baseline data are poorly documented. The development of monitoring and evaluation mechanisms is part of the 'roadmap' to develop the trusts, to ensure that their impacts are well understood and can guide the use of the trust fund resources.			measures (walkways, marketing, visitor centre etc.)
Infrastructure Safety and Public Health					
An assessment of dam and other infrastructure safety risks during project preparation, construction, and operation	✓	WPC with Mott Macdonald as the engineering consultants have incorporated a number of safety considerations into the feasibility studies and conceptual designs, including flood estimates as well as geological, geotechnical and seismic characteristics, hydraulic modelling (including for freeboard calculations, load rejection situations) and other considerations relevant for safe design, construction and operation.	The assessment takes broad considerations into account, and both risks and opportunities relating to infrastructure safety	×	Public safety risks during project preparation were not assessed. Dam safety risks have also not been assessed specifically at this stage. The detailed design of the dam including instrumentation, warning systems, safety inspection etc. will be under the responsibility of the EPC contractor. Nevertheless, the current conceptual design could have been informed by a preliminary second opinion or independent assessment. The assumption that, in case of a flood-induced dam failure, the water level upstream and downstream of the project's infrastructure would be comparable and hence, the safety implications of a failure would be
This assessment was conducted using appropriate expertise	✓	The consulting engineers as well as the developer have sufficient expertise for a project of this size and complexity; additionally, safety considerations will be reviewed by			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		investors, lenders, insurers and regulators.			small, could have been verified through a hydraulic model and flood inundation mapping. The ESIA covers the most relevant community safety issues, but the assessment of the risk of human-animal conflict focuses on the headpond only and does not assess in any detail possible habitat changes that may change numbers and locations of crocodiles, hippos and elephants; possible changes in areas used by humans; and hence the risk that encounters may increase. These limitations constitute a **significant gap** at the level of Advanced Requirements.
Public health issues assessment	✓	The original health impact assessment in 2015/16 was updated in 2018 with new data, and results included in the ESIA (although there is no section on community health and safety impacts in the ESIA, a number of potential impacts are addressed in separate sections and linked to management measures).	The assessment takes broad considerations into account, and both risks and opportunities relating to public health	✓	The assessment takes broad considerations into account and addresses a number of risks and opportunities related to public health. Psychological and mental health risks from social disruption are not discussed, but this gap is not considered significant since most people will remain in their communities.
This assessment includes public health system capacities and access to health services	✓	The health impact assessment identified all facilities in the Sioma and Senanga Districts, and the risk of population influx on limited capacities.			
This assessment has considered health needs,	✓	The health impact assessment considered health needs of specific			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
issues and risks for different community groups		groups such as women, people with HIV, specific age groups, etc.			
MANAGEMENT					
Community Impacts and Benefits					
Management plans and processes for issues that affect project-affected communities have been developed	✓	The ESMMP and other project documentation includes a range of design measures (to reduce land requirements and impacts on livelihoods such as fisheries) and mitigation measures, with multiple plans under the responsibility of WPC (such as the RAP), under the EPC contractor (such as construction traffic), or jointly (such as local employment, and community health and safety). The development of EPC contractor plans is a contractual responsibility.	Processes are in place to anticipate and respond to emerging risks and opportunities relating to project-affected communities and project benefits.	✘	Livelihood restoration is particularly significant in the context of current levels of poverty in the region (among the poorest parts of Zambia) which means that people are especially vulnerable to impoverishment if livelihoods restoration is not effective. The RAP does not include quantitative targets for improving livelihoods, which makes tracking of the success of measures and adaptive management more difficult, and is a **significant gap**. There is also a lack of a clear response mechanism in case the RAP monitoring shows that any affected households are not achieving self-sufficient, improved livelihoods (i.e. an explicit commitment to and a mechanism for additional support), which is a **significant gap**. Entitlements or provisions for loss of business income cover several types of impacts such as physically displaced businesses and construction disturbances for tourism businesses, but there is no mechanism for compensation in the event of unanticipated impacts. This may
These plans and processes include monitoring procedures, utilising local expertise when available	✓	The ESMMP and RAP include plans for monitoring by WPC, the EPC contractor and in some cases, by specialist consultants for multiple social indicators and grievances. There are 38 social indicators in the RAP alone, and more in the ESMMP, as well as multiple indicators to track changes that may cause social impacts (such as visual changes in the gorge through photomonitoring).			
If there are formal agreements with project-affected communities, these are publicly disclosed	✓	The CPA is publicly disclosed, and simplified draft or final versions of the ESIA, Resettlement Policy Framework (RPF) and RAP were presented in			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		public meetings and distributed amongst local communities.			become an issue if businesses such as tourism operators or commercial farmers are affected in unanticipated ways or mitigation measures are not as effective as hoped. They could go through the grievance mechanism but it is not clear how their cases would be processed (how would impacts be attributed to the project, and how would compensation be determined). This limitation is another **significant gap.** Risks associated with the benefit sharing mechanism through the BRE trusts (such as effectiveness and accountability of spending) are recognized and a management plan is under preparation.
Project benefit plans and processes have been developed for project implementation that incorporate additional benefit or benefit sharing commitments	✓	WPC and BRE have concluded a CPA, which is an equity sharing arrangement (for at least 6% of equity) with one-time payments, fixed annual payments during operation, and dividends. The resources will be managed by two trusts, the Sioma Community Benefit Trust for the local area (SCBT) and the BRE Development Trust (BREDT; for the province). Payments will start from financial closure. Some framework plans related to benefits are included in the ESMMP, and a more detailed benefit sharing plan is under development. Important benefits will result from improved power supply to the region. (Local distribution is a matter for ZESCO and plans have not been finalized, but the trust funds might also decide to invest in this). Policies and procedures for preferential treatment of local workers and businesses will be developed jointly with the EPC contractor. Some CSR measures have already been implemented and will continue to be implemented, for example for workforce training, cultural ceremonies and social services.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Project benefit plans and processes have been developed for project operation that incorporate additional benefit or benefit sharing commitments	✓	See above. Annual payments will be USD 500,000 during operations for the 25-year term of the CPA and PPA. Dividend payments may amount to ca. USD 2 million per year from 2025 onwards. These are very significant amounts in the context of the limited resources currently available to the official administrations and traditional authorities in the area.			
Commitments to project benefits are publicly disclosed	✓	See above. The CPA concerning benefit-sharing between WPC and BRE has been publicly disclosed, a 'sensitization tour' by the BRE was undertaken, and communications activities are part of the implementation of the CPA.			
Infrastructure Safety and Public Health					
Dam and other infrastructure safety management plans and processes have been developed for project implementation	✓	The ESMMP covers a number of public safety measures during implementation, under a Construction Traffic Management Plan, Community Health, Safety and Security Plan, and an Emergency Preparedness and Response Plan, to be developed in detail. While the conceptual design prepared by the consulting engineers is aimed at a safe project, specific plans and processes for dam safety, including construction supervision and quality assurance, have not yet been developed. The tender documents	Processes are in place to anticipate and respond to emerging infrastructure safety risks and opportunities	✘	Some processes are in place or on track to be developed to manage safety issues. For example, 1) some safety-related management and monitoring measures under the responsibility of WPC and the EPC contractor are included in the ESMMP, 2) the grievance mechanism will cover safety-related complaints and suggestions, 3) while no dam safety processes are established yet, the EPC Contractor will develop and implement these as per the specifications in the tender

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		specify that the EPC contractor will need to comply fully with the requirements of Zambia's Water Resources Management Act No. 21 including the requirements related to dam safety, and with all relevant ICOLD bulletins. They will have to undertake all analyses required to demonstrate the safety of the structures, including dam break analysis and emergency plans.			documents, and 4) they will be independently reviewed. However, there are no indications how these processes will deal with emerging risks and opportunities, which is a **significant gap**.
Dam and other infrastructure safety management plans and processes have been developed for project operation	✓	See above. No such plans and processes have been developed yet, but a general operational strategy is defined, there is sufficient time until start of operations, and the EPC contractor will have a clear scope of work to prepare for safe operations.			
These plans have been developed in conjunction with relevant regulatory and local authorities	✓	See above. Coordination with public authorities is only mentioned regarding one of the safety-relevant plans (the Flood Resilience Management Plan) but it is assumed that dam designs and emergency plans will be shared, approved, and/or developed jointly with competent authorities.	Plans provide for public safety measures to be widely communicated in a timely and accessible manner	✘	The EPC contractor is contractually required to have a process for communication of major incidents. However, there are no indications at this point (such as requirements for the EPC contractor, or components of the SEP) regarding wide, timely and accessible communication of safety measures, which is a **significant gap**.
Plans provide for communication of public safety measures	✓	Basic communication measures such as signage and advance warning of blasting and inundation (in the ESMMP) and community liaison meetings on traffic safety (in the Stakeholder Engagement Plan) are			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		briefly mentioned in the project documentation.			
Emergency response plans include awareness and training programmes and emergency response simulations	✓	There is currently only an Emergency Response Plan for the small WPC team, which defines emergency response procedures and critical information for the headquarter in Lusaka and for field activities. The EPC contractor's emergency response plan will include preparedness activities.	Emergency response plans are independently reviewed	✓	The emergency preparedness and response plans have to be independently reviewed as per the specifications in the tender documents.
Dam safety is independently reviewed	✓	According to the ESIA, an independent review will be undertaken for the concept design presented in the Feasibility Study and an independent panel will be established in time to review and sign off on the detailed design from the EPC contractor. The review approach will be agreed with lenders and may include their technical advisors.			
Plans and processes to address identified public health issues have been developed for project implementation	✓	The ESMMP lists a number of public health mitigation measures. Plans for construction and workers camps; influx management, community health, safety and security, and community-contractor relations will be developed in detail to avoid, for example, the introduction of communicable diseases, and community-worker conflicts.	Processes are in place to anticipate and respond to emerging public health risks and opportunities	✓	Health risks such as potentially increased prevalence of STIs, malaria and bilharzia will be monitored, to enable adaptive management. Emerging public health opportunities may be managed through the benefit sharing mechanisms, where health is one of the priority areas.
Plans and processes to address identified public health issues have been	✓	The ESMMP lists a number of health mitigation measures that extend into the operation phase. There is some			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
developed for project operation		uncertainty regarding the impact of the headpond on vector-borne diseases (malaria, bilharzia), with monitoring and adaptive management planned.			
OUTCOMES					
Community Impacts and Benefits					
Plans provide for livelihoods and living standards impacted by the project to be improved	✓	It is likely that the combination of plans outlined in the ESMMP and RAP, together with short-term economic opportunities during construction and long-term funding through the trust funds will improve livelihoods and living standards for most affected people.	Plans provide for livelihoods and living standards that are impacted by the project to be improved with the aim of self-sufficiency in the long-term	✓	There are multiple plans with a long-term perspective, such as the Sustainable Fisheries Program with a focus on increasing yields from the headpond. A number of risks to sustainable livelihoods are recognized and addressed. The risks of 1) affected people not using cash compensation effectively, or 2) leaving the area and not being able to be tracked, have been largely overcome by steering almost all affected households towards accepting compensation in kind rather than in cash, and providing counselling and other measures for those who will opt for cash. Financial, technical and other support will be provided during the transition. There is also a general commitment through the Sustainability Policy to protect people from impacts, compensate fairly, and provide additional support to vulnerable people, and it is WPC's intent to operationalize this. This may

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					be complemented by general humanitarian or 'safety net' measures, depending on the specific situation. The combination of these commitments provides assurance that no individual households are likely to be impoverished as a consequence of the project.
Plans provide for economic displacement to be fairly compensated, preferably through provision of comparable goods, property or services	✓	Livelihood assets that may be affected, including structures, land (including formal and customarily held land, flood recession agricultural plots), and inherited fishing grounds, are identified and will be compensated either by in-kind replacement or cash compensation, at replacement value. This will cover a large majority of livelihood impacts.	The project contributes to addressing issues for project-affected communities beyond impacts caused by the project itself	✓	The project is addressing multiple pre-existing issues for local communities, such as the poor quality of health and education services. The Flood Resilience Management Plan will improve the resilience of households around the headpond to the existing, as well as the future increased risk of floodplain inundation. WPC has also volunteered to address legacy issues related to the sub-station in Sesheke, where the community claims that ZESCO did not fulfill commitments from the time of construction.
Plans deliver benefits for communities affected by the project	✓	The financial resources available through the CPA, both for the Sioma area and for the wider Western Province, in combination with improved power supply and local employment and procurement, have the potential to transform economic conditions in the project area.	Plans deliver significant and sustained benefits for communities affected by the project	✓	Substantial annual payments are scheduled from financial closure through the 25 years of the CPA/PPA, and power supplies will provide a lasting economic boost.
Infrastructure Safety and Public Health					
Plans avoid, minimise and mitigate safety risks	✓	For a project with moderate safety implications such as Ngonye Falls HPP,	Plans contribute to addressing safety issues	✓	The project will address some pre-existing safety issues related to

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		the current conceptual plans related to infrastructure design, emergencies and other project-related safety issues are adequate for this stage of project preparation, and there is a clear roadmap for developing more detailed plans before construction starts.	beyond those risks caused by the project itself		drowning and animal encounters, through the provision of safe washing areas, safe boat launch sites, water taxis, and elephant-proof fencing to be provided for blocks of replacement farmland.
Plans avoid, minimise and mitigate negative public health impacts arising from project activities	✓	The project will manage health impacts with the application of the health-related plans set out in the ESMMP and RAP. The assessments predict minor negative residual health impacts from community-workforce interactions after mitigation and uncertain changes from vector-borne diseases.	Plans avoid, minimise, mitigate and compensate negative public health impacts	✓	The project will manage health impacts with the application of the health-related plans set out in the ESMMP and RAP. Monitoring and adaptive management is planned to correct negative trends and emerging risks. Health will be one of the priority areas for project benefits.
			Plans provide for enhancements to pre-project public health conditions or contribute to addressing public health issues beyond those impacts caused by the project	✓	See above. Also, the EPC contractor clinic and ambulance will be made available to the local community.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	9

Summary of findings and other notable issues
Assessment and management of community impacts including community health and safety are generally comprehensive and adequate. Project benefits are very substantial. A number of plans, in particular regarding public safety still have to be developed in more detail. Also there are some uncertainties regarding the robustness of long-term livelihood improvements, and compensation of lost business incomes.

Ngonye Falls HPP, 180 MW, Zambia

Relevant evidence	
Interview	3-6, 9, 12, 16, 17, 20-29, 31-35
Document	1-14, 35-48, 50, 63, 65-88, 92-104, 109-135, 139-141
Photo	1, 2, 4, 11, 12, 15-17, 21, 23-41, 47, 48, 50-50

5 Resettlement

Scope and Principle
This section addresses physical displacement arising from the hydropower project development. The principle is that the dignity and human rights of those physically displaced are respected; that these matters are dealt with in a fair and equitable manner; and that livelihoods and standards of living for resettles and host communities are improved. This section does not address those that are only economically displaced, who are addressed in Section 4.

Background	
Does the project require or result in any physical displacement of people? Please state the evidence on which this determination is made.	
Yes, this section is relevant	Yes, this topic is relevant; see below.
No, this section is not relevant	Click here to enter text.

Description of physically displaced communities and how they are displaced (distinguish between permanently vs temporarily and include number of people and households)	The hydropower project will need to secure approximately 78 ha of land for temporary project components, and 407 hectares of land for permanent project components. This area does not impact compact villages, but scattered homesteads. A total of 419 PAHs are included in resettlement planning relating to loss of structures, land, crops, trees and graves. The project's RAP covers all types of displacement; however this section 5 focuses on physical displacement and the resulting resettlement only. 71 PAHs will be affected by physical displacement. For the 110km TL from Ngonye Falls sub-station to Sesheke sub-station, assessments and surveys are being developed. The line will run largely parallel to and in the same corridor as the already existing 66 kV line, through areas that are not densely populated. 8 PAHs are expected to be physically displaced. Compensation for right-of-way requirements is covered in section 4.
Name and number of settlements	The affected homesteads are located in the Sioma and Senanga districts of the Western Province and belong to the villages of Imamongo, Linganga, Sioma, Songa, Kabele, Nalubwe, Katulu, Sikuka, Thebe and Kandiana.
Agencies relevant to land acquisition	See section 4.
Agencies relevant to livelihood restoration	BRE and Government of Zambia, including Ministry of Local Government and Housing, Ministry of Agriculture and Livestock, Ministry of Lands and Natural Resources, Ministry of Green Economy and Environment, ZEMA, Ministry of Community Development and Social Welfare, Department of Resettlement and Disaster Management and Mitigation Unit; and local District Departments may play a role, for example in agricultural extension services.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
An assessment of the resettlement implications of the project has been undertaken early in the project preparation stage	✓	Implications for physical displacement were considered from an early stage, and initially assessed for the planned smaller scheme. The social impact assessment, resettlement policy framework and ESIA were developed after design changes to the current larger scheme, including estimates of the numbers of physically displaced households. The RAP was developed, and household surveys conducted with sufficient time remaining before the start of construction.	The assessment takes broad considerations into account, and both risks and opportunities	✓	Some resettlement considerations were taken into account during the change in the hydropower scheme from 45 MW to 180 MW, and the siting of permanent and temporary structures. The assessment of displacement upstream of the headpond, due to backwater effects during floods with a return period greater than 8 years, was very detailed. Risks to meeting resettlement objectives, and opportunities to enhance livelihoods and living standards of resettlees are discussed in the RAP and other project documentation. Although not necessary for the project (as these are not associated facilities) WPC is financing the preparation of the ESIA and RAP for the ZESCO 220/330 kV TLs from Ngonye in a northerly direction to Mongu and west to Shangombo, will finance RAP implementation, and continue to provide technical support to ESMP and RAP implementation.
This has established the socio-economic baseline for resettlement for potential resettlees and host communities	✓	Detailed community- and household-level socio-economic baseline data are included in the ESIA and RAP. A database of PAHs is maintained.			
This has included an economic assessment of required resettlement including ongoing costs for improvement in living standards	✓	There were several initial cost estimates and a very detailed cost estimate in the RAP. The budget allocated for E&S programs including land acquisition and resettlement is significant.			
MANAGEMENT					
A Resettlement Action Plan and associated processes have been developed for project implementation	✓	The RAP sets out resettlement principles, entitlement framework, and detailed plans for asset inventory, compensation (for dry land, flood recession farmland, crops, trees,	Processes are in place to anticipate and respond to emerging risks and opportunities	✘	The project staff including the community liaison staff will remain in close contact with resettlees throughout the implementation of the measures, and resettlees have access

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		homesteads and structures, and transitional allowances). Key measures for livelihoods development include agricultural and livestock development, water and sanitation support, fisheries support, reed beds support, agricultural credit and input support and enterprise development. The plan covers both economic and physical displacement, and has been submitted to ZEMA for approval.			to the grievance mechanism. The RAP also includes a formal monitoring program with multiple indicators and provisions for internal and external monitoring and audits (progress and completion). Risks to livelihoods improvements and to tracking progress are recognized, including the risk of households opting for cash compensation and moving away. However, most households are opting for relocation close to their previous homes. Adaptive management on the basis of monitoring and audit results is planned. However, similar to the findings in section 4 related to economic displacement, the RAP does not include quantitative targets for improving livelihoods, which makes tracking of the success of measures and adaptive management more difficult, and is a **significant gap**. There is also a lack of a clear response mechanisms in case the RAP monitoring shows that any affected households are not achieving self-sufficient, improved livelihoods (i.e. an explicit commitment to and a mechanism for additional support), which is a **significant gap**.
A Resettlement Action Plan and associated processes have been developed for project operation	✓	The RAP includes livelihood restoration, development and monitoring during the implementation and into the operation phase, defining measures for the resettled households and host communities.			
The RAP and associated processes have been developed in a timely manner	✓	The RAP was submitted for final approval almost two years before the start of construction. The implementation of the RAP is scheduled to start immediately after approval and financial close.			
The RAP or associated processes include:					
• up-to-date socio-economic baseline	✓	The most recent socio-economic data collection was undertaken in late 2021 in the process of preparing the RAP. This included the completion of household asset surveys and was supplemented in early 2022 to incorporate farming (dryland and flood recession gardens). Additional studies were undertaken from			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		September 2022 to March 2023 to assess fishing sites.			
• compensation framework	✓	The RAP includes a detailed Entitlement Framework including principles and entitlements such as: use of government-established compensation rates or full replacement rates (whichever is higher); cash or in-kind compensation for land and residential structures, cash compensation for other assets; disruption, moving, and transitional allowances; secured customary land rights; and eligibility for livelihoods restoration programs. Agreements with almost all individual households have been reached and signed based on the definitions of the RAP, but payments and resettlement activities are on hold until ZEMA's approval and financial close of the project. Inflation adjustments are planned.			
• grievance mechanisms	✓	A grievance mechanism has been operational since late 2016. There are detailed provisions for the grievance mechanism including routes of raising grievances through traditional authorities, community liaison officers, and the Resettlement Advisory Committee; a project grievance officer, grievance boxes in the communities, grievance register etc.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• monitoring procedures	✓	A range of social indicators on demographic and livelihood changes and a number of process indicators will be monitored (households identified as vulnerable, livelihood milestones, payment of compensation, engagement, grievances etc).			
Formal agreements with resettlees and host communities are publicly disclosed	✓	Written compensation agreements with individual households will remain private. There are no formal agreements with host communities. The RPF and RAP which were developed in consultation with resettlees will be publicly disclosed. The project has engaged with local communities from as early as 2011, through initial feasibility assessments in 2012, scoping and baseline studies from 2013-2016, initial resettlement planning from 2014-2017, and then revised ESIA studies in 2018-2019. Engagement on the RAP commenced in November 2021, and the draft RAP was presented in February 2023 to stakeholders and PAHs, providing updates on the entitlement framework, housing designs, livelihood restoration activities, host site, land replacement process, and information on the household compensation agreements.			
OUTCOMES					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Plans provide for resettlement to be treated in a fair and equitable manner	✓	The RAP eligibility and entitlement framework describes the criteria for determining which communities, households and persons are deemed eligible for which levels of compensation and resettlement support. The criteria and their application appear equitable and fair, and have been accepted by almost all households.	Plans provide for resettlees and host communities to experience a timely improvement in livelihoods and living standards with the aim of self-sufficiency in the long term	✓	As discussed in section 4, the low current incomes and vulnerable status of local communities pose particular challenges for long-term self-sufficiency. It is likely that local communities will experience significant improvements, given the level of benefits provided, but a number of risks to sustainable livelihoods are recognized and addressed by WPC. The combination of commitments provides assurance that no individuals, households, or sub-groups are likely to be impoverished as a consequence of the project.
Resettlees and host communities will experience a timely improvement in livelihoods and living standards	✓	The quality of housing, and infrastructure and services in resettlement villages and host communities will be improved. Planned livelihoods measures will aim for improvement of livelihoods of physically and economically displaced households. In parallel, communities will also benefit from improved power supplies, local employment and procurement, and payments under the CPA.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	2

Summary of findings and other notable issues
The number of physically displaced households (71 plus those affected by the TL) is relatively small compared to the size of the scheme, and most of them will remain in the area and will experience significant gains in terms of living standards and livelihoods. Resettlement plans have been developed in consultation with affected people, and almost all of them have accepted compensation arrangements. The implementation of the RAP is scheduled to start immediately after ZEMA approval and financial closure.

Ngonye Falls HPP, 180 MW, Zambia

Relevant evidence	
Interview	3-6, 9, 12, 16, 17, 20-29, 31-35
Document	1, 2, 11, 12, 46, 47, 77-82, 92, 101, 132, 139-141
Photo	4, 11-12, 15, 23, 24, 31-41

6 Biodiversity and Invasive Species

Scope and Principle
This section addresses ecosystem values, habitat and specific issues such as threatened species and fish passage in the catchment, reservoir and downstream areas, as well as potential impacts arising from pest and invasive species associated with the project. The principle is that there are healthy, functional and viable aquatic and terrestrial ecosystems in the project-affected area that are sustainable over the long-term, and that biodiversity impacts arising from project activities are managed responsibly.

Background	
Short description of the ecological region in the project area	Terrestrial: Centrally located within the Zambezian or South-Central African Ecoregion characterized by broad-leaf woodland with high floristic diversity and high endemism. Two broad habitat types – broad-leaved Zambezian woodland in the east and arid munga woodland in the west – have a pronounced effect on the distribution of faunal species, in particular birds. Aquatic: the Upper Zambezi Floodplain Ecoregion.
Protected areas (national parks and reserves etc) and their distance from the project	The Ngonye Falls Community Partnership Park (NFCPP), initiated by the Peace Parks Foundation, is seen as a component of the Kavango-Zambezi (KAZA) Transfrontier Conservation Project. The Barotse Floodplain, approximately 70 km to the north, is a Ramsar site, and there are discussions underway to apply for Cultural World Heritage Site status. Sioma Ngwezi National Park is approximately 40 km to the south-west. A major part of the land west of the Zambezi River, between Sioma Ngwezi National Park and the Liuwa Plains, is managed as Game Management Area and National and Local Forest Reserves. The TL from the project to Sesheke sub-station will pass through the Game Management Area, mostly through its Development Zone which runs along the Sioma-Sesheke highway.
Critical habitats in the project area, including important bird areas, hotspots of endemism etc.	Note that the information in the rest of the Background section below refers to the hydropower project only, as the baseline surveys and impact assessment for the TL have only just begun. No IBAs or hotspots. Potential Critical Habitats for three flora species was identified in the ESIA, and follow-up surveys have recently been undertaken. Also, a new critical habitat screening was recently started following a request from investors.
# threatened species in the directly affected area: terrestrial	Mammals: 3 NT (leopard, cape clawless otter, spotted-necked otter), 4 VU (cheetah, hippopotamus, African elephant, ground pangolin). Birds: 6 NT, 5 VU, 1 EN, 3 CR, (4, 1, 0 and 2 confirmed during surveys, respectively). Flora: 1 NT, 4 VU, 1 DD species confirmed to occur in the area.
# threatened species: aquatic	Fish: 2 VU, *Oreochromis andersonii* (three-spot tilapia) and *Oreochromis macrochir* (greenhead tilapia), 2 DD species, *Enteromius* eutaenia (Orangefin Barb) and *Chiloglanis* neumanni (Neumann's Suckermouth). *O. macrochir* and *E.*

	eutaenia confirmed during surveys. Macroinvertebrates: 3 NT dragonflies, 1 DD dragonfly, 1 DD mollusc species.
Any other species of conservation importance	*Aloe esculenta*, recently considered to be possibly extinct in Zambia, confirmed to occur in fair numbers on the large floodplain upstream of the falls along the eastern bank. This floodplain is now the only known locality for this aloe species in Zambia. *Clariallabes* platyprosopos (Broadhead Catfish) has an extremely restricted range: previously only in 2 locations. Several rheophilic and semi-rheophilic fishes (preference for flowing water) are sensitive to changes of the hydrological regime. One amphibian species in the Upper Zambezi region is endemic and may be of conservation concern. Six reptile species expected to be in the area (3 of which were found in surveys) are listed on the CITES Appendix II.
Migratory pathways	Fourteen fish species identified as inter-reach migrators, for breeding, feeding and refuge. Numerous migratory bird species, including 60+ inter-African and Palaearctic migrants. Elephant migrate through the area between the Sioma Ngwezi National Park, the Zambezi River and occasionally the Kafue floodplain.
Invasive species: terrestrial	Very few invasive plant species are present away from disturbed areas in the project area. A highly invasive shrub of wet areas, *Mimosa pigra* (Giant sensitive tree) is present along the river edge in small numbers.
Invasive species: aquatic	Nile tilapia, *O. niloticus*
Key threats to biodiversity	Habitat conversion for agriculture; fishing pressures on some species; (illegal) logging; human-wildlife conflict, (illegal) hunting; illegal wildlife trade and plant collection
Agencies involved in biodiversity conservation	DNPW, NFCPP, Peace Parks Foundation, KAZA, WWF, ZEMA

Minimum Requirements			**Advanced Requirements**		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Assessment of terrestrial biodiversity	✓	A biodiversity baseline and impact assessment (Including an ecological flow assessment) was undertaken in 2018. In 2019, upstream inundation around the headpond was modelled and fish migration requirements were assessed. These results informed the ESIA. In 2023 and 2024, work on biodiversity was continued, with 1) follow-up assessments of three rare plant species, including a critical habitat assessment; 2) a broader	The assessment takes broad considerations into account, and both risks and opportunities	×	A wide range of taxa were surveyed and ecological indicators assessed, including e.g. invertebrates for water quality. Additional studies are still ongoing, and monitoring programmes will identify risks during construction and operation that are difficult to predict and mitigate for. This applies primarily to connectivity issues: for example, terrestrial barrier effects of linear infrastructure such as weir, power canal and TL, and downstream

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		critical habitat screening based on updated IFC PS 6 guidance; and 3) biodiversity and biomass assessment for the TL, including a subcontracted study on aquatic biodiversity, which will inform the TL ESIA. The critical habitat screening will continue to full critical habitat analysis and preparation of a biodiversity action plan (BAP). Most of the affected terrestrial habitats are considered Modified Habitat (degraded woodlands or dryland farmlands), including in the forest reserves and game management area. The transmission line will cross several elephant migration corridors between Sioma Ngwezi National Park and the Zambezi. Some pristine natural habitats are found on islands in the Zambezi River at Ngonye Falls.			fish migration pathways, both for large fish which cannot pass through screens in front of powerhouse intake, and for smaller fish which may be injured or killed passing through turbines. This will inform adaptive management. There has been only limited analysis of opportunities, which is a **significant gap**. The project and its TL are in a region with rich biodiversity, in and between a number of protected areas which are part of the Kavango-Zambezi Trans-frontier Conservation Area (KAZA-TFCA), established by treaty between Zambia, Angola, Namibia, Botswana and Zimbabwe. There may be opportunities to cooperate more systematically with the NFCPP, the Sioma Ngwezi National Park, and the game management areas and forest reserves west of the Zambezi, all of which have limited resources and effectiveness, and with the proposed upstream Barotse Cultural Landscape World Heritage Site (which also supports rich biodiversity). The NFCPP will receive support for tourism development but a more systematic and ambitious initiative to protect biodiversity and develop ecotourism around the falls is conceivable,
Assessment of aquatic biodiversity including passage of aquatic species and loss of connectivity to significant habitat	✓	Aquatic ecology and fisheries in the falls as well as downstream along the Zambezi have been surveyed extensively. The majority of affected aquatic habitats are in an unmodified or natural state, and the fish sampled in the falls area were dominated by rheophilic species (adapted to rocky areas with fast flowing water). Most the fish species identified need to move within or through the falls, and			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		requirements for passage across the headworks and through the channels at reduced flows have been assessed. The falls are the largest and potentially unique ecosystem of its kind on the Upper Zambezi, and ongoing studies will show whether they technically qualify as critical habitat, triggering additional mitigation requirements. Reaches downstream of the tailrace should only be affected by potential connectivity loss, or temporarily during construction. Riparian vegetation around the headpond should benefit from stable water levels.			perhaps including land between the left bank and the power canal where there are only a few farmers, some land is already owned by the project or its partners, and access can be more easily controlled in the future. There is a lack of information on zoning and management plans for the NFCPP, and in any case these should be updated to take risks and opportunities from the hydro project into account.
Assessment of risks of invasive species	✓	The risk of introducing or facilitating the spread of alien and invasive species has been assessed, with concerns primarily about Nile tilapia displacing native tilapia species and with invasive plants that could benefit from soil disturbance during construction.			
MANAGEMENT					
Plans and processes to address identified biodiversity issues have been developed for project implementation	✓	The ESMMP includes a comprehensive set of design, mitigation and monitoring measures for biodiversity during the construction period, divided into responsibilities for the EPC contractor and for WPC. These include, for example, construction	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	The project has a comprehensive monitoring plan, and adaptive management measures for a number of potential risks are already described in the ESMMP. For example, in case problems with downstream fish passage are

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		methods, codes of conduct for workers, and an invasive species management plan. Similarly, the management plan for the TL will cover typical construction impacts as well as specific measures related to the line passing through a game management area and forest reserves; the biomass assessment will inform discussions with the Forestry Department about appropriate compensation. There are no specific compensation or offsetting regulations in Zambia, but individual projects have suggested and negotiated such offsets (for example, ZESCO projects).			detected, a catch-and-release scheme will be attempted. While opportunities for biodiversity support measures have not yet been systematically assessed (see above), the monitoring programme and the engagement with stakeholder such as the NFCPP (which is already required, at a minimum, for implementation of the tourism support programme) and DNPW and the Forestry Department (which is already required because of the alignment of the TL) should allow them to be identified over time.
Plans and processes to address identified biodiversity issues have been developed for project operation	✓	Design and operation of the headworks include a number of features to minimize and mitigate biodiversity impacts during operations, such as: fish passages through the weir and barrage in a number of places; environmental flow releases through the fish passages; design of weir with low slopes to allow animals to pass over it; fencing and physical barriers to prevent entrainment of large mammals in the canal through the side or intake; and a sustainable fisheries programme including measures to prevent fishing at fish passages, in migration channels and spawning sites. Some mitigation	Commitments in plans are public, formal and legally enforceable	✓	The ESIA and ESMMP for the hydro project are public, formal and enforceable, and so will the ESIA and ESMMP for the TL. Additional commitments may arise from application of IFC PS 6, in particular the critical habitats analysis, and subsequent discussions with lenders and would also be public, formal and enforceable.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		measures (for example, for the Aloe species found on the upstream floodplain), have yet to be defined and may depend on the outcomes of the critical habitat analysis.			
OUTCOMES					
Plans avoid, minimise, mitigate and compensate negative biodiversity impacts arising from project activities with no significant gaps	✓	Assuming that the plans for the TL will be similar to the ones for the hydro project in terms of quality, comprehensiveness and ambition, there will be no significant gaps. There may be opportunities to streamline biodiversity management by integrating the plans for the hydro project and the TL.	Plans avoid, minimise, mitigate and compensate negative biodiversity impacts arising from project activities with no identified gaps	✘	There will be a number of residual impacts such as reduced habitat availability in the falls, where compensation is not anticipated or not yet defined, which is a **significant gap**. The CHA update will determine whether additional conservation actions or offsets will need to be undertaken to achieve no net loss or net gain of biodiversity. Monitoring and adaptive management may enable some additional compensation in the future, for example, through adjustment of e-flow releases, but there are practical constraints on adjustments.
			Plans provide for enhancements to pre-project biodiversity conditions or contribute to addressing biodiversity issues beyond those impacts caused by the project	✓	Some support for the NFCPP is already planned, which will focus on accessibility for tourists. This aligns with the rationale of the park, to promote awareness and incentives for conservation. Additional opportunities may still be identified, possibly arising from offsetting discussion.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	3

Summary of findings and other notable issues
The project region is generally rich in biodiversity, and the Upper Zambezi River and Ngonye Falls in particular still provide some undisturbed aquatic habitats. Biodiversity impacts of the hydro project are comprehensively assessed and mitigated, although some residual impacts will remain. There are still some uncertainties regarding the transmission line, potential critical habitat impacts and resulting additional mitigation/compensation requirements, and opportunities for biodiversity enhancement.

Relevant evidence	
Interview	3, 4, 8, 19, 28, 31-33, 35
Document	26-31, 37, 38, 46, 47, 48, 66-69, 89-91, 136, 137, 146
Photo	1-3, 5-9, 13-22, 42-46, 49, 55, 58

7 Indigenous Peoples

Scope and Principle
This section addresses the rights at risk and opportunities of Indigenous Peoples with respect to the project, recognising that as social groups with identities distinct from dominant groups in national societies, they are often the most marginalised and vulnerable segments of the population. The principle is that the project respects the dignity, human rights, aspirations, culture, lands, knowledge, practices and natural resource-based livelihoods of Indigenous Peoples in an ongoing manner throughout the project life.

Background	
Are any of the affected people Indigenous Peoples? Please state the evidence on which this determination is made.	
Yes, this section is relevant	Click here to enter text.
No, this section is not relevant	Not relevant. Neither the Barotse people nor the other ethnic minorities in the project area meet national or international definitions of Indigenous Peoples.

8 Cultural Heritage

Scope and Principle
This section addresses cultural heritage, with specific reference to physical cultural resources, at risk of damage or loss by the hydropower project and associated infrastructure impacts (e.g. new roads, transmission lines). The principle is that physical cultural resources are identified, their importance is understood, and measures are in place to address those identified to be of high importance. This section does not address non-physical cultural resources, which are addressed in Section 1 and/or in Sections 5 and 7 when relevant.

Background	
Does the project affect any physical cultural resources? Please state the evidence on which this determination is made.	
Yes, this section is relevant	Yes, this topic is relevant.
No, this section is not relevant	Click here to enter text.

Sites of physical cultural heritage affected by or in proximity to the project-affected areas	How they are affected
The Litunga's Canal, of historical significance, dating from early 20th century	Western part of the Litunga's canal will be developed into the headrace channel of the project. Potential opportunity to enhance tourism value of remaining portions.
Sioma Mission Grave Site – established in 1953 and still in use	Far upstream, but the length or frequency of seasonal floods may be slightly extended in this area.
Imikaya Namioti's Grave Site – burial site of a great warrior in the early 18th century that is a shrine and spiritually revered	Unlikely to be affected.
Induna (Chief) Ling'anga Muyendekwa's Gravesite	Risk of inundation, depending on exact elevation.
Four sacred trees in separate locations (Ficus sycamorus), two of which are of high local importance as they are believed to have emerged from walking sticks of previous Barotse kings	Three are likely to be affected by the headpond, and 1 will be removed as it is located in the canal.
Litunga's Mafulo Site and Mafulo a Yeta Site – two sites where the Litunga would set up camp in historical times	Litunga's Mafulo Site is downstream and unlikely to be affected. Mafulo a Yeta is in the headpond area.
Sites associated with navigation: District Commissioner Coryndon's Docking Point, Litunga's Historic Docking Site, and Liabwa la Twelufu (the 'canal of twelve')	All lie close to the intake on the river bank and will be inundated by the headpond.

Several archaeological sites of low significance: 1 with a few scatters (stone tools), 1 middle stone age, and 1 late stone age	Middle stone age site will be inundated. Late stone age site is downstream and possibly not affected.
First Sioma Mission Grave Site – the first grave site established in the Sioma area	Far upstream, but the length or frequency of seasonal floods may be slightly extended in this area
A number of islands upstream of Ngonye Falls with associated historical events, e.g. one thought to be the location of Sioma's first settlements	Far upstream, but the length or frequency of seasonal floods may be slightly extended in this area.
Rock outcrops within the river of low local importance (Mashete-a-Mulimu or the 'granaries of god', Imamongo and Imakakata)	Rock outcrops are downstream of the falls or near tailrace, and unlikely to be affected.

Agencies responsible for cultural heritage	National Heritage Conservation Commission (NHCC). The BRE also has a strong interest in the Lozi cultural heritage.
Other important local or regional physical cultural heritage values and issues	ZESCO's draft ESIA for the TL does not mention any specific affected heritage assets. The scoping report reported a 'high incidence of archaeological artefacts' in the project area. The ESIA is being updated, see section 1. Traditional fishing sites, Maungwe and Limbelo, are of heritage value. There are considerations to declare the entire Ngonye Falls as a National Monument, for its combined natural and cultural heritage value. Plans are underway to declare the Barotse Cultural Landscape as a UNESCO World Heritage Site. This would cover a complex of sites and practices in the upstream floodplain, and would not include the Ngonye Falls area.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
A cultural heritage assessment has been undertaken	✓	For the hydro project, the responsible regulator NHCC was contracted for a heritage impact assessment and delivered a thorough analysis in 2018, which was summarized in the ESIA. For the TL, cultural values are one of the aspects in the scope of the ESIA.	The assessment takes broad considerations into account, and both risks and opportunities	✓	The NHCC assessment identified negative impacts of cultural heritage assets as well as multiple opportunities to improve the preservation of heritage.
The assessment includes:					
• identification and recording of physical cultural resources	✓	The NHCC assessment identified the range of physical cultural resources set out in the Background section above.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• evaluation of the relative levels of importance	✓	NHCC identified whether each site was of high, medium or low importance, and this is documented in the ESIA.			
• identification of any risks arising from the project	✓	NHCC identified inundation of upstream sites by the headpond, possible inundation of grave sites on the islands, risk of exposure/ destruction of chance archaeological finds, loss of part of the Litunga's canal, and Litunga's gum trees, Litunga Yeta's walking stick (Mulamu wa Mulena) and Liabwa La Twelufu.			
MANAGEMENT					
Plans and processes to address physical cultural resources have been developed for project implementation	✓	The ESMMP includes a Tourism and Cultural Heritage Management Plan, as one of the plans under the direct responsibility of WPC. It includes measures such as: detailed site investigation before construction starts at any work front; obtain permission from NHCC to alter/destroy any sites deemed to be important; detailed documentation of the Litunga's Canal and other sites to be undertaken by specialist; translocation of affected sacred trees (or where not feasible, obtain cuttings and propagate a new tree at a new location); use of ceremonies or traditional practices during the relocation or destruction of cultural resources.	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	According to an MoU between WPC and NHCC that is under preparation, WPC will invest significant resources in the tourism and cultural heritage management plan, and NHCC will be involved in some aspects of monitoring.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Plans and processes to address physical cultural resources have been developed for project operation	✓	Parts of the Litunga's Canal that remain unaffected will be preserved, excavated and enhanced with a pathway and interpretive boards; a memorial / museum explaining historical events and sites will be established; gathering of documents and a publication on the history of the Litunga canal. Environmental flows at the falls are partly aimed at preserving their heritage value, and any residual impact will be offset by investment in tourism facilities to preserve or increase their accessibility.			
Plans include arrangements for chance finds	✓	The EPC contractor is required to establish a chance find procedure and appoint a cultural heritage officer, in line with Zambian regulations (NHCC act) and IFC PS 6 to protect any previously unidentified resources. There is a monitoring procedure for chance finds. WPC has a chance find procedure for small works outside the scope of the EPC contractor, e.g. resettlement housing. The draft TL ESIA also mentions a chance finds procedure.	Plans are supported by public, formal and legally enforceable commitments	✓	Commitments in the ESIA and ESMMP are public, formal and legally enforceable.
Plans ensure that cultural heritage expertise will be on site and regularly liaised with by the project management team during construction	✓	See above.			
OUTCOMES					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Plans avoid, minimise, mitigate and compensate negative impacts on cultural heritage arising from project activities with no significant gaps	✓	There are plans to preserve identified and unidentified cultural heritage assets, with no significant gaps. Plans are adequate for the purpose of preservation of all types of cultural heritage, including unidentified items (chance finds). Some negative impacts are compensated by improved access and documentation of heritage sites. Trust funds may also choose to invest in cultural heritage-related activities. It assumed that a similar approach would be adopted for the TL.	Plans avoid, minimise, mitigate and compensate negative cultural heritage impacts with no identified gaps	✕	Despite efforts at avoiding, minimizing and mitigating impacts, the hydro project will cause a number of sites and assets to be lost, and there is no specific compensation planned for all of them. Also, at this stage impacts from the TL have not yet been identified in any detail. These limitations are a **significant gap**.
			Plans contribute to addressing cultural heritage issues beyond those impacts caused by the project	✓	The planned preservation, display and interpretation of some cultural heritage features as well as the planned publications will provide improved access for the local population and visitors. WPC is also (through its CSR programme) already supporting various traditional BRE cultural ceremonies in Sioma, Senanga and Mongu district, and plans a visitor centre which will also help to disseminate cultural heritage.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	4

Summary of findings and other notable issues
The Ngonye Falls are an area of historic significance with several sites, which have been assessed in cooperation with the Zambian authorities. Impacts have been avoided and minimized to the extent possible, and there are plans to mitigate and compensate some remaining impacts.

Relevant evidence	
Interview	3-6, 15, 16, 18, 20-21
Document	1, 2, 13, 14, 51, 52, 64, 69, 83-88, 104, 145

Ngonye Falls HPP, 180 MW, Zambia

Photo	2, 4, 9, 25, 59

9 Governance and Procurement

Scope and Principle
This section addresses corporate and external governance considerations for the project, and all project-related procurement including works, goods and services. The principle is that the developer has sound corporate business structures, policies and practices, and that procurement processes are equitable, transparent and accountable.

Background	
Key information on political context and public sector risks	Zambia is a presidential representative democracy, with some powers devolved to provinces and councils. According to the World Bank's Country Policy and Institutional Assessment (CPIA) 2022 the CPIA Index for Zambia is 3.2 (on a scale from 1-6, which is the highest performance), slightly better than the regional average, and including the following indicators: • Economic Management: 2.5 • Structural Policies: 3.8 • Policies for Social Inclusion and Equity: 3.4 • Public Sector Management & Institutions: 2.9 The World Bank's Doing Business index for Zambia in 2020 was 66.9 (where 100 is the best score), significantly above the average for Sub-Saharan Africa, on all sub-indicators except registration of properties. According to the World Bank's Worldwide Governance Indicators, Zambia's performance has decreased over the past 10 years.
Key information on corporate ownership and governance	The developer Western Power Company (WPC) Ltd is an independent power producer (IPP) and special purpose vehicle for the Ngonye Falls project, owned by the private companies African Power Projects Ltd (incorporated in Mauritius) and Scintilla Ltd (incorporated in Zambia), and by InfraCo Africa Ltd (incorporated in England and Wales), a subsidiary of the Private Infrastructure Development Group (PIDG), owned by six governments and the IFC. The development of the project through to financial close is managed by a joint development team drawn from the two main shareholders. In accordance with the Shareholders Agreement, shareholders take decisions by consensus during quarterly board meetings. As part of the CPA, as of 2015 the parties agreed that the BRE represents the communities that host the Ngonye Falls project and holds a non-dilutable equity share of 6% in trust for the community, in recognition of the natural resources being supplied to the development.

Details of the concession, if applicable	n.a.
Key licensing or permitting requirements	ZEMA: has approved the ESIA, approval of the RAP pending ERB: construction and operation license WARMA: water use permit and dam safety registration (issued 2022) WPC and Government of Zambia: Implementation Agreement (signed 2015) and Amendment of Implementation Agreement (signed 2023) WPC and ZESCO: Power Purchase Agreement (signed 2023)
Key information on expected procurement strategy for this project (EPC, BOOT, etc)	EPC
Other relevant information	An agreement has been concluded between ZESCO and WPC for the construction of the TL connecting Ngonye Falls to the Sesheke sub-station (110 km). The TL was included in the tender documents for the EPC contractor. All costs and responsibility will be with WPC, and the TL will be handed over to ZESCO after commissioning.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Assessments have been undertaken of the following through the project development cycle:			There are no significant opportunities for improvement in the assessment of political and public sector governance issues	✓	Board minutes show that there are substantial and well-informed discussions about political and public sector governance issues that could affect the project.
• political and public sector governance issues	✓	There has not been a formal assessment other than the analysis of the legal framework by legal advisers and in the ESIA, but WPC's Zambian shareholders and directors are well aware of political, public sector and regulatory issues in Zambia.			
• corporate governance requirements and issues	✓	WPC have identified corporate governance requirements with reference to InfraCo Africa's requirements, which are based on experience with similar projects.	There are no significant opportunities for improvement in the assessment of corporate governance requirements and issues	✓	Corporate governance requirements and issues have been extensively discussed between shareholders, with legal and other consultants, and financiers.
• major supply needs, supply sources, relevant legislation	✓	WPC has worked closely with their engineering and other consultants on their procurement approach. A single	The assessment includes opportunities for local	✓	The ESIA and ESMMP emphasize opportunities for local suppliers (in particular, for construction materials

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
and guidelines, supply chain risks and corruption risks		EPC contract with a major civil works contractor is being implemented as most appropriate for WPC's current corporate structure, with the E&M manufacturer being selected from a prequalified list. This allocates most supply chain risks to the EPC contractor.	suppliers and local capacity development.		and foodstuffs) and local capacity development. The EPC contractor will be required to assess local availability in detail.
MANAGEMENT					
Processes are in place to manage the following:			Processes are in place to anticipate and respond to emerging risks and opportunities	✓	WPC is keeping abreast of political and regulatory developments and responds to emerging issues appropriately. The BRE and PIDG as public sector shareholders provide some political backing.
• corporate, political and public sector risks	✓	A risk register is maintained and periodically updated, which includes governance risks. These are regularly discussed during Development Team and Board meetings, and addressed through formal policies and agreements such as the Shareholder Agreement and the Implementation Agreement with the Government (which protects the project from a number of risks arising, for example, from adverse policy changes, expropriation, off taker default, equipment imports delays, etc.)			
• compliance	✓	WPC has a compliance system including a compliance policy and procedures, responsible manager, and regular reporting. Registers of permits, licenses and license conditions are maintained and followed up. The shareholders	Contractors are required to meet or have consistent policies as the developer	✓	Through InfraCo Africa's shareholding in WPC, the project including its contractors is required to follow PIDG's Standards and Policies. The EPC tender documents include these requirements which will become contractual obligations.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		agreement defines that PIDG procedures have to be used for these issues. A manual of Internal Controls, Accounting and Reporting Procedures specifies approved processes and their documentation. ZEMA does not require regular reporting but an independent audit 36 months after commissioning, and may require additional inspections or audits.			
• social and environmental responsibility	✓	The Shareholder Agreement specifies that WPC will minimize the impact on the environment, maximize the benefits to the local community, and follow the IFC Performance Standards. A community shareholding arrangement is in place since 2017, and Sustainability and Health and Safety policies since 2019. A plan for completing other corporate policies has been drafted.			
• grievance mechanisms	✓	A grievance mechanism is in place and is described in detail in the RAP. WPC and its contractors are required to apply the requirements of HSES-003-009-PIDG Grievance Mechanism Standard.			
• ethical business practices	✓	WPC has adopted PIDG's Anti-Corruption and Integrity Policy. A project Code of Conduct is in preparation. Business associates are categorised as high- or low-risk and evaluated accordingly.	Sustainability and anti-corruption criteria are specified in the pre-qualification screening	✓	The pre-qualification screening for the EPC contractor included a series of ESG criteria.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• transparency	✓	Transparent, fair and competitive procurement is specified in the Shareholder's Agreement, with thresholds for different procurement approaches, according to the PIDG's Operating Policies and Procedures.			
Policies and processes are communicated internally and externally as appropriate	✓	WPC is currently a small organization with no need for complex internal communications mechanisms. New staff undergo induction training, for example on compliance matters. Policies are communicated externally when required (for example, to protect WPC staff from unreasonable demands). The Sustainability Policy is publicly disclosed through the website.			
Independent review mechanisms are utilised to address sustainability issues in cases of project capacity shortfalls, high sensitivity of particular issues, or the need for enhanced credibility	✓	WPC as a small organisation regularly works with independent advisers and reviewers. An ESG assessment was undertaken in 2019. Dam safety will be independently reviewed. Due diligence reviews are being and will be undertaken by consultants for potential strategic equity partners and lenders.	Anti-corruption measures are strongly emphasised in procurement planning processes	✓	The pre-qualification screening included anti-corruption criteria. For example, bidders were required to provide a current certification of compliance with ISO 37001 (anti-bribery management systems) or alternatively provide a copy of their policy covering anti-bribery and corruption and whistleblowing.
Procurement plans and processes have been developed for project implementation	✓	Detailed budgets have been approved for the development phase, specifying expected expenditures on different consulting and other contracts. The procurement of the EPC contractor is already in the Best and Final Offer stage and the contractor will be			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		announced shortly. The process has followed InfraCo's requirements, adjusted for lender's requirements.			
Procurement plans and processes have been developed for project operation	✓	As part of the EPC contractor selection, proposals for O&M for 5 years were obtained. These are being evaluated separately from the proposals for construction.			
CONFORMANCE AND COMPLIANCE					
The project has no major non-compliances relating to governance	✓	Government agencies and internal reporting provide no indications of any significant non-compliances.	There are no non-compliances	✓	No non-compliances have been identified.
Processes and objectives relating to procurement have been and are on track to be met with:					
• no major non-compliances	✓	There are no indications of any major non-compliances relating to procurement.			
• no major non-conformances	✓	There are no indications of any major non-conformances relating to procurement.	There are no non-conformances	✓	No non-conformances have been identified.
Any procurement related commitments have been or are on track to be met	✓	WPC has made a specific commitment to local content, and EPC contractors were required to demonstrate local content in their bids.			
OUTCOMES					
There are no significant unresolved corporate and external governance issues identified	✓	There are a number of uncertainties for businesses in Zambia in general and for WPC in particular. One example are changes in tax laws; however, WPC is engaging with advisors and monitoring Government's tax policies in detail. Since the tariff negotiated with ZESCO	There are no unresolved corporate and external governance issues identified	✘	There are a number of unresolved external governance issues including tax, offtaker and permitting issues, which is a **significant gap**. For example, the term of the water use permit does not match the term of the PPA. WPC and their advisers are working on resolving these issues.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		was based on a cost-build up methodology, WPC expects that additional costs from tax changes would be addressed through an increased tariff. If there were adverse consequences for WPC, they would be covered under the Implementation Agreement. Some governance issues may have cost and time consequences that are not covered under the Implementation Agreement, but not significant enough to threaten the project's viability.			
Procurement of works, goods and services across major project components is:					
• equitable	✓	Major procurement processes to date have been equitable for various consulting services as well as EPC and O&M contractors.			
• efficient	✓	There are no indications otherwise.			
• transparent	✓	There are no indications otherwise.	Opportunities for local suppliers including initiatives for local capacity development have been delivered or are on track to be delivered	✓	Opportunities for local suppliers including initiatives for local capacity development are on track to be delivered as required in the tender documents for the EPC procurement process. WPC is already implementing initiatives for local capacity development, training around 100 local people.
• accountable	✓	There are no indications otherwise.			
• ethical	✓	There are no indications otherwise.			
• timely	✓	There are no indications otherwise. The EPC contractor will be selected significantly before financial close.			
Contracts are progressing or have been concluded within budget or changes on contracts are clearly justifiable	✓	While the development budget has been higher than anticipated, shareholders remain committed to contribute additional development			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		funding as required. The EPC contract will likely be within budget.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	10

Summary of findings and other notable issues
While the external governance context in Zambia can be challenging, to date WPC and its shareholders have managed these risks well, and have established well-functioning corporate governance policies, plans and processes that show a high awareness of sustainable business practices.

Relevant evidence	
Interview	1, 2, 4-7, 15-17, 26, 30, 35
Document	1-9, 12-25, 56, 65-76, 85, 96, 105-107, 110-127, 133, 139
Photo	4, 36

10 Communications and Consultation

Scope and Principle
This section addresses the identification and engagement with project stakeholders, both within the company as well as between the company and external stakeholders (e.g. affected communities, governments, key institutions, partners, contractors, catchment residents, etc). The principle is that stakeholders are identified and engaged in the issues of interest to them, and communication and consultation processes establish a foundation for good stakeholder relations throughout the project life. Communications and consultation requirements unique to Indigenous Peoples are found in Section 7.

Background	
Directly affected community-level stakeholders	Households affected by land acquisition, traditional leaders and local authorities, resettlement committee, fishers, specific community groups such as women and girls, public servants such as teachers and nurses, businesses such as tourist lodges and farmers in the project-affected area.
Directly affected institutional-level stakeholders	District Councils of Sioma and Senanga and Western Province authorities including appointed and elected officials, BRE, NFCPP, Community Resources Boards National-level stakeholders (ZESCO, ZEMA, DNPW, NHCC, WARMA, ERB, Ministry of Labour, Ministry of Water and Sanitation, Department of Energy, etc.) Civil society/international organizations (WWF, KAZA). Equity partners, lenders, contractors

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Stakeholder mapping has been undertaken to identify and analyse stakeholders	✓	A stakeholder map is contained in the 2020 Stakeholder Engagement Plan (SEP). Mapping started in 2012 and has been updated and reviewed regularly by WPC.	The stakeholder mapping takes broad considerations into account	✓	The stakeholder mapping takes broad consideration into account. It includes, for example, groups like employees, potential employees and potential suppliers, other people in the local community affected by wider project impacts (e.g. construction traffic), and the general public. It also identifies
It establishes those that are directly affected	✓	In combination with the ESIA, supporting studies such as the SIA and tourism impact study, and the social			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		baseline surveys and databases, the SEP describes the project affected communities and other stakeholders in sufficient detail.			communications and consultation strategy, requirements and approaches for each group according to impact/interest and influence.
It establishes communication requirements and priorities	✓	The SEP classifies identified stakeholders according to their impact/interest in and their influence on the project, and groups them depending on the issues of interest to them; whether they are to be informed, information gathered from them, dialogued with/consulted or partnered with; their level of priority; and through which means they can be most effectively engaged with.			
MANAGEMENT					
Communications and consultation plans and processes have been developed at an early stage	✓	The 2020 SEP details engagement activities back to 2012. The earlier, smaller design of the project underwent a full preparation process including consultations.	Communication and consultation plans and processes show a high level of sensitivity to communication and consultation needs and approaches for various stakeholder groups and topics	✓	Over several years since the start of the engagement process (since 2014) multiple communication materials have been made available to affected communities and stakeholders in general. There are flyers and leaflets on: the project; resettlement entitlements; resettlement process; the grievance mechanism; the CPA; employee relations; question and answer guides; and newsletter, bulletins, posters and notice boards in central locations in public places and on the WPC website. Many of the communication materials are in English and Lozi. The community liaison team help with interpretation
They outline communication and consultation needs and approaches for various stakeholder groups and topics	✓	See above. Communication and consultation needs and approaches are defined for the various stakeholder groups and their impacts, interest and influence.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
					of materials and other queries. Meetings are organized in a culturally sensitive manner.
They are applicable to project preparation, implementation and operation	✓	The focus of the SEP is on project preparation, pre-construction and construction; issues for the operation stage are outlined in an indicative manner.	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	A number of processes are established to anticipate and respond to issues arising. There are regular meetings and other communication with institutional-level stakeholders. Regarding affected communities, since 2014 there has been a Project Liaison Committee facilitating communication between directly affected communities, the developer and other stakeholders. A Community Liaison Officer and 4 Community Liaison Assistants are working in the field. There are formal, ad hoc and periodic meetings, and constant presence and availability of the community liaison team. There are several grievance boxes in schools, community centres, and other gathering places. There is regular monitoring and evaluation of communications needs and effectiveness. The monitoring measures described in the ESMMP and RAP will also help identify communication and consultation issues. Recently consultation has focused on affected people covered by the RAP, although there are still ongoing processes to engage with other
They include an appropriate grievance mechanism	✓	A grievance mechanism has been operational since 2016. A grievance register is maintained. Flyers in English and Lozi describe the process and provide contacts.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
					groups. Businesses such as tourism operators were surveyed and included in previous consultations, and are covered in the SEP.
STAKEHOLDER ENGAGEMENT					
There has been engagement with the following groups, or on the following topics, or through the following processes, with directly affected stakeholders:			Engagement with directly affected stakeholders has been inclusive and participatory	✓	There are no indications otherwise. If some local businesses feel under-informed, that is not because of exclusion (as they could easily access materials on the WPC website or contact WPC representatives), but because there has been no recent separate, dedicated effort to engage them (see below).
• Project preparation, on topics of interest and relevance to directly affected stakeholders	✓	Of most interest to stakeholders have been issues of land acquisition, resettlement and compensation; and for some of them, environmental flows over the falls. Regular meetings and workshops have been held on these topics.			
• The business interacts with a range of directly affected stakeholders to understand issues of interest to them	✓	The developer is interacting with the community through surveys, the community liaison team, the resettlement advisory committee, and regular meetings. The developer also has regular contact with stakeholders with direct interests in the project, such as shareholders, potential lenders and investors, BRE, ZESCO, central government agencies, provincial administration offices, and district councils.			
• Environmental and social impact assessment and management planning	✓	Consultants preparing the various specialist studies, impact assessments and management plans have interacted, with support of WPC, with a wide range of stakeholders. There was also formal consultation during			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		the official approval process guided by ZEMA.			
• Siting and design optimisation	✓	Consultation activities were done when there was the change of design from the small (45 MW) to the large scheme (180 MW). Consultation was also undertaken to define the siting of components, such as the power canal part of which will impact on the Litunga Canal, a cultural heritage site.			
• Project benefits	✓	There has been intensive engagement with the BRE, leading up to and since the conclusion of the CPA, as well as a sensitization tour for the general public in the Western Province; and there will be further events to engage with the general public on the CPA.			
• Project-affected communities	✓	There have been regular meetings with *indunas* (chiefs) and other community representatives, household surveys etc. Concerns focus on the loss of land and fishing sites, which is understandable considering the typical livelihoods strategies. There has been limited interest or concern from communities regarding other impacts, such as the disruption associated with project construction, and workforce-community interactions.			
• Resettlees and host communities	✓	Engagement has been with resettlees, host communities and through the Resettlement Advisory Committee. As			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		part of the engagement and to enhance understanding of the technology, WPC organised a study tour of the committee to the Victoria Falls hydropower station.			
• Assessment and planning for cultural heritage issues	✓	NHCC as the responsible organization was contracted directly for the specialist assessment report. NHCC consulted District Administrations and other public sector employees, members of conservation organizations in the Sioma area, traditional authorities, and the local communities.			
• Assessment and planning for public health, including health officials	✓	The Health Impact Assessment involved key informant interviews including with health officials and focus group discussions. Planning for public health measures has not yet included local health officials, but this will be part of the Community Health, Safety and Security plans to be developed between WPC and the EPC contractor.			
• Downstream flow regimes	✓	There has been engagement of the various stakeholders leading up to a stakeholder workshop. However, some tourism operators now feel insufficiently informed or consulted on downstream flows and mitigation measures (see section 11).			
• Plans for the management of climate risks	✓	There has been no specific engagement on this issue, but this gap			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		is not considered significant, as the project fits into mitigation and adaptation plans and policies and has limited opportunities to manage climate risks. The Ministry of Energy and ZESCO will be able to consider implications for generation in the national power system through review of the climate stress test.			
Engagement with directly affected stakeholders has been appropriately timed:			Negotiations are undertaken in good faith	✓	There are no indications otherwise.
• Project preparation, on topics of interest and relevance to them	✓	There are no indications that engagement on this issue / with these stakeholders was not appropriately timed.			
• Environmental and social impact assessment and management planning	✓	See above.			
• Siting and design optimisation	✓	See above.			
• Project benefits	✓	See above.			
• Project-affected communities	✓	See above.			
• Resettlees and host communities	✓	See above.			
• Assessment and planning for cultural heritage issues	✓	See above.			
• Assessment and planning for public health	✓	See above.			
• Downstream flow regimes	✓	There are no indications that engagement on this issue / with these stakeholders was not appropriately timed.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Engagement with directly affected stakeholders has often been two-way:			Feedback on how issues raised have been taken into consideration has been thorough and timely	✘	Feedback has generally been thorough and timely, and affected people feel adequately informed. The permanent presence of developer staff in the project area (community liaison team), the quantity and distribution of printed materials, and information provided in non-technical language (English and Lozi) assure the timely response and feedback on most raised issues. There is a lack of recent materials for and/or engagement with potentially affected business representatives, such as tourism operators. This is a **significant gap** since there is a risk of misinformation (e.g. about e-flow plans and potential benefits for tourism), disagreements and dissatisfaction.
• Project preparation, on topics of interest and relevance to them	✓	Engagement has been frequently and consistently two-way.			
• Environmental and social impact assessment and management planning	✓	See above.			
• Siting and design optimisation	✓	See above.			
• Project benefits	✓	See above.			
• Project-affected communities	✓	See above.			
• Resettlees and host communities	✓	See above.			
• Assessment and planning for cultural heritage issues	✓	See above.			
• Assessment and planning for public health	✓	See above.			
• Downstream flow regimes	✓	Engagement has been two-way, with limitations regarding the tourism operators' group, as described above.			
Engagement is undertaken in good faith	✓	There are no indications otherwise.			
Ongoing processes are in place for stakeholders to raise issues and get feedback	✓	There are various channels for stakeholders to raise issues and get feedback, as described above.			
Ongoing processes are in place for:					
• Environmental and social impact assessment and management planning	✓	See above.			
• Siting and design optimisation	✓	See above.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• Project benefits	✓	Processes are in place through the above-listed channels, as well as through the future trust fund governance mechanisms.			
• Project-affected communities	✓	Processes are in place through the above-listed channels, as well as through channels specific for resettlement and compensation (the Resettlement Advisory Committee and RAP consultation).			
• Resettlees and host communities	✓	See above.			
• Employees and contractors on human resources and labour management issues	✓	Processes are through the above-listed channels. There are very few employees and contractors at this stage, but they have been trained on human resources and labour management issues such as grievance mechanism, health and safety, among others.			
• Assessment and planning for cultural heritage issues	✓	Processes are through the above-listed channels, as well as directly with NHCC.			
• Assessment and planning for public health	✓	Processes are through the above-listed channels, as well as directly with public health authorities.			
• Downstream flow regimes	✓	Processes are through the above-listed channels.			
Engagement with resettlees has been culturally appropriate	✓	Engagement with resettles has been culturally appropriate, with community meetings held in their settlements, and in Lozi language (all	Engagement with resettlees and host communities has been inclusive and participatory	✓	There are no indications otherwise.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		the community liaison staff speak Lozi).			
Resettlees and host communities have been involved in the decision-making around relevant options and issues	✓	Resettlees can choose between different compensation options, have already been involved in the selection of some project sites such as the spoil area, and can influence the choice of replacement land.			
Public disclosure:			The business publicly reports on project performance in sustainability areas of high interest to its stakeholders	×	There are no indications at this stage that the ongoing disclosure of information will be based on a materiality analysis, which is a **significant gap**.
• the business makes significant project reports publicly available	✓	The ESIA as well as a non-technical summary (in English and Lozi) is publicly disclosed, as is the ESMMP. Approval of the RAP by ZEMA is still pending, and as it gets approved will also be publicly disclosed by WPC.			
• the business publicly reports on project performance, in some sustainability areas	✓	Some information on project progress is being provided to stakeholders, and the current draft SEP update includes plans for disclosing monthly or quarterly E&S reports.			
• results of the assessment of strategic fit are publicly disclosed	✓	The ESIA contains a brief chapter on alternatives which describes the rationale for the project.	The assessment of project resilience has been publicly disclosed	×	No assessment of project resilience has been disclosed, which is a **significant gap** (see section 12).
• power density calculations, estimated GHG emissions, and / or the results of a site-specific assessment have been publicly disclosed	✓	Because of its high power density (around 85 w/m^2) the project is not required to estimate and disclose GHG emissions. Power density has not been specifically disclosed, but this gap is not considered significant as it can easily be calculated from publicly disclosed information.			
STAKEHOLDER SUPPORT					

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Affected communities generally support or have no major ongoing opposition to the plans for the issues that specifically affect their community	✓	A majority of affected community representatives are eager to see the project move forward. A small number of tourism operators are opposed or sceptical.	Formal agreements with nearly all the directly affected communities have been reached for the mitigation, management and compensation measures relating to their communities	✓	Formal agreements with nearly all directly affected households and communities have been reached. The ESMMP requires the implementation of a Tourism and Cultural Heritage Management Plan including measures to mitigate impacts on tourism, which may be the basis for also reaching an agreement with tourism operators, in particular if it includes adaptive management and compensation for business losses (see section 4).
Resettlees and host communities generally support or have no major on-going opposition to the Resettlement Action Plan	✓	The RAP as submitted to ZEMA was presented to affected communities generally , and after discussions they accepted resettlement approaches, partly because of expectations of other livelihoods benefits (employment, electricity etc.).	There is consent with legally binding agreements by the resettlees and host communities for the Resettlement Action Plan	✓	There is widespread consent from community leaders and the BRE, with most legally binding household agreements on mitigation and compensation already signed.
Directly affected stakeholder groups generally support or have no major ongoing opposition to the cultural heritage assessment, planning or implementation measures	✓	The project's approach to cultural heritage is broadly accepted.	Formal agreements with the directly affected stakeholder groups have been reached for cultural heritage management measures	✓	The ESIA and ESMMP include management measures to protect cultural heritage, principally the Litunga canal, and are formally approved. NHCC and communities were consulted during the elaboration of these plans, and a MoU with NHCC is under negotiation regarding the cultural heritage approach.
CONFORMANCE AND COMPLIANCE					
Processes and objectives relating to communications and consultation have been and are on track to be met with:			There are no non-compliances	✓	There are no indications for any non-compliances.
• no major non-compliances	✓	There are no indications for any major non-compliances.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
• no major non-conformances	✓	There are no indications for any major non-conformances.	There are no non-conformances	✓	There are no indications for any non-conformances.
Any communications related commitments have been or are on track to be met	✓	There are no indications otherwise.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	11

Summary of findings and other notable issues
Engagement with stakeholders has been proactive, transparent and successful in that there is general support from local communities and other stakeholders. There are some limited opportunities for improvement, principally regarding engagement of tourism operators and regarding plans for ongoing reporting on project progress and sustainability performance.

Relevant evidence	
Interview	4-6, 9, 13-32, 35
Document	1, 2, 7, 42-44, 70-74, 83, 84, 86, 87, 107, 126, 145
Photo	4, 15, 27, 34-36, 40-41

11 Hydrological Resource

Scope and Principle
This section addresses the hydrological resource availability and reliability to the project, reservoir planning and downstream flow regimes in relation to environmental, social and economic impacts and benefits. The principle is that the project's planned power generation takes into account hydrological resource availability and reliability in the short- and long-term, and that the reservoir and downstream flow regimes are planned and managed with an awareness of environmental, social and economic objectives.

Background	
Hydrology and flows	
Average flow at dam (m^3/s)	1,080 m^3/s
Minimum monthly average flow (m^3/s)	Mean annual low flow 239 m^3/s
Maximum monthly average flow (m^3/s)	Mean annual flood peak flow 2,965 m^3/s
Lowest observed flow (m^3/s)	103 m^3/s (based on nearly 100 years of records from Victoria Falls gauging station)
Highest observed flow (m^3/s)	9,912 m^3/s (based on nearly 100 years of records from Victoria Falls gauging station)
Design flow (m^3/s)	1,100 m^3/s (maximum generation flow)
Affected river reaches (start/end and how affected)	From upstream of Ngonye Falls (backwater effect) through several channels within the Ngonye Falls system and the gorge, over an 8km bypass reach, to the tailrace of the power station. The river downstream of the tailrace is not affected, except for a short reach by some turbulence at the outflow, and during exceptional operational conditions: if the powerhouse has to shut down suddenly ('load rejection'), the flows downstream of the tailrace will drop suddenly and water will back up in the power canal and reach the tailrace through the natural river course with some delay, leading to a sudden increase in flows (higher than natural flows as the rejected flow is added to the natural flow) until flows stabilize back down to natural flow levels. The reverse effect occurs when the power station goes back online.
Reservoir	
Reservoir length (km)	ca. 10 km (backwater effect)
Minimum operating level MOL (masl)	The headpond will be maintained at a constant 990 masl, at the weir, except above approximately 7,000 m^3/s (R17.5 flood) when the headpond will rise moderately because the capacity of the flow release gates has been reached, and the weir is overtopped. The headpond level further upstream is slightly higher than 990 masl because of the backwater effect.
Normal operating level (masl)	The headpond will be maintained at a constant 990 masl.

Full supply level FSL (masl)	The headpond will be maintained at a constant 990 masl. For impact assessment purposes, a level of 991 is assumed at the weir to take account of wave and wind effects as well as measurement and modelling error.
Reservoir area at FSL (km^2)	203 ha (additional area permanently inundated), plus a 200 ha buffer zone with occasional inundation
Reservoir area at MOL (km^2)	2.5 km^2
Volume at FSL (million m^3)	The storage volume between 898.5 masl and 990 masl is approximately 5 million m^3. This was calculated to consider potential peaking operations, but no such operations are currently planned, hence this should not be considered 'active storage' volume.
Volume at MOL (million m^3)	See above
Average retention time in days	At average flows of 1,080 m^3/s, a storage volume of 5 million m^3 is equivalent to 1.3 hours.
Number of days for filling	The headpond will fill within a few hours.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Assessment of hydrological resource availability	✓	There has been a series of hydrological analyses to estimate flow duration curves and inform the feasibility and E&S studies. This is complemented by other data and research available on the Zambezi, for example by ZRA and by academic research.	Issues that may impact on water availability or reliability have been comprehensively identified	✘	Issues such as the large catchment and Barotse floodplains leading to relatively steady and predictable flows, as well as the risks of reduced flows due to climate change and upstream abstractions for irrigation, have been identified. Some of these issues such as climate change are still being investigated in more detail (see section 12). The implications of recent changes in government plans to rapidly expand irrigated agriculture (wheat, maize and soya beans for export), which may become more realistic in the Western Province and also in the Angolan part of the catchment with improved power supply, have not yet been reviewed which is a **significant gap** (see also section 1).
Hydrological resource assessment has been undertaken utilising:					
• available data	✓	Available data from the ZRA Victoria Falls gauging station downstream (since 1924) and at Ngonye Falls (since 2005) as well as from weather stations in the catchments have been used.			
• field measurements	✓	The flow series has been continuously updated for the past five years since the feasibility study. New gauges are just being installed. Flows, velocities and depths have also been measured			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		for each of the channels in the Ngonye Falls system.			
• appropriate statistical indicators	✓	The flow data have been analysed appropriately, for example to estimate flood return periods.			
• a hydrological model	✓	Statistical models that have been used to date will now be complemented by a catchment rainfall-runoff model which will be used to model the effects of climate change (see section 12).			
Issues which may impact on water availability or reliability have been identified and factored into the modelling	✓	Such issues are reflected in the historical flow data. For future projections based on the upcoming hydrological modelling, some issues such as evapotranspiration will be included, which satisfies Minimum Requirements.	Hydrological uncertainties and risks have been extensively evaluated over the short- and long-term	✘	Historical data, trends and cycles are well understood. Future changes in precipitation and evapotranspiration will be evaluated through the upcoming hydrological modelling. Other potential issues such as changing land use, vegetation cover, and water abstractions (for domestic and industrial use, new irrigation areas, and agriculture that is no longer viable as rainfed) will not be covered, which is a **significant gap**.
Hydrological resource assessment includes evaluation of scenarios, uncertainties and risks	✓	The significant variability in the historical record at different timescales, and its impact on generation and revenues is well understood. The upcoming hydrological modelling will review some additional scenarios, uncertainties and risks.			
Assessment of important considerations prior to and during reservoir filling	✓	Acquisition of land and compensation for/removal of structures are the most important issues, assessed in the RAP. There are few trees within the permanently inundated area, and the need for vegetation clearance will	The reservoir assessment is based on dialogue with local community representatives	✓	There has been consultation over the ESIA and the RAP, including the area of and around the headpond (see sections 4, 5, 10), and the Sustainable Fisheries Development Plan.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		be assessed at a later stage. The headpond will fill very rapidly.			
Assessment of important considerations during reservoir operations	✓	The headpond level will be maintained at a stable level of 990 masl almost all of the time. There is no need to manage reservoir levels actively for the few secondary uses such as fishing. There is detailed analysis of the increased extent and duration of floodplain inundation around the headpond, and the associated impacts and mitigation measures.			
Assessment of flow regimes downstream of project infrastructure	✓	There has been a detailed analysis of the flow releases through the weir and barrage, necessary to achieve varying levels of habitat quality ('Ecostatus') in each reach of the falls, and additional analysis of flows necessary for fish migration, visual attractiveness of the falls, and social requirements (fishing, washing, reed collection).	The reservoir and flow regimes assessments take broad considerations, risks and opportunities into account	✕	The assessments take visual and tourism considerations into account, including seasonal patterns of flows and their varying attractiveness for visitors, and opportunities to extend the visitor season. This has been discussed in an informal manner, and could be extended in a more formal way, from the falls to the section of the gorge where most visitors stay overnight and where the trophy fishery for tigerfish is located. The need to ensure the safety of locals and visitors from floods and sudden flow variations has been assessed, and access restrictions, resilience programs and emergency response plans will be established. There is some uncertainty over the effects of the future lowest flows
Flow regimes assessment includes all potentially affected river reaches	✓	A number of reaches have been defined and assessed (1 immediately downstream of the barrage, 5 reaches within the islands complex downstream of the weir, the gorge between the islands and powerhouse, and downstream of the powerhouse). River flows downstream of the tailrace could be occasionally affected for short periods during unplanned			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		powerhouse shutdowns (load rejection).			because (a) photomontages or artist's rendering of the lowest flows over the falls have proved to be infeasible, and (b) the proportion of water flowing sub-surface during low flows, which might reduce surface water availability for visual amenity and for aquatic ecology, is unknown. This is a **significant gap**, although it should be noted that this risk is mitigated by the commitment to adaptive management (see below).
Flow regimes assessment includes identification of the flow ranges and variability to achieve different environmental, social and economic objectives	✓	Flows required to achieve the proposed Ecostatus have been modelled for each reach. The range of flows going over the main falls have been documented for the visual impacts analysis. The implications of different environmental releases for generation have been calculated. Generation is resilient to variable flows as the head increases significantly at lower flows, leading to less variability of generation than of flows.	The flows regimes assessment is based on field studies	✓	See under Minimum Requirements. The e-flows assessment was an integral part of the scheme design.
Flow regimes assessment is based on relevant scientific and other information	✓	The biological assessment is based on detailed water quality, diatoms, macro-invertebrate and fish surveys; fisheries assessment is based on detailed inventory of traditional fishing sites (*limbelo* and *maungwe*); visual impacts are based on photographic evidence of waterfalls at different natural flow levels.			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
MANAGEMENT					
Plans and processes for generation operations have been developed to ensure efficiency of water use	✓	For this run-of-river scheme, generation planning is very simple. Efficiency of water use is ensured through the tapping of the full river for peak generation of 180 MW, as opposed to the original 45 MW scheme that would have only tapped the left channel.	Generation operations planning has a long-term perspective	✓	While this run-of-river scheme does not require long term reservoir storage planning, it has been designed based on long term generation and revenue projections.
Plans and processes for generation operations are based on:					
• analysis of the hydrological resource availability	✓	See above. The location and design of the scheme makes it resilient to variable inflows.	Generation operations planning takes into consideration multiple uses and integrated water resources management	✓	The flow split into generation flows and environmental flows takes multiple uses into account. No consumptive uses of water needed to be considered in this river reach. (See above, however, for consumptive uses upstream that may affect the water balance for different uses in the wider upper Zambezi catchment.)
• a range of technical considerations	✓	The design and siting of project components have gone through an iterative process to make the best use of the available resource.			
• an understanding of power system opportunities and constraints	✓	Power system opportunities and constraints have been considered in design of the scheme and its grid interconnections, jointly with the offtaker ZESCO who run the national power system and participate in the southern African power pool.	Generation operations planning fully optimises and maximises efficiency of water use	✓	A pure run-of-river scheme with no active regulation of the headpond minimizes environmental and social impacts but leaves no flexibility to respond to intra-day load fluctuations and supply fluctuations from variable renewables, which are likely to be installed at a large scale over the project's lifetime. Under the given E&S constraint, the current generation operation planning fully optimises efficiency of water use.
• social and environmental considerations including downstream flow regimes	✓	Generation has been planned to maintain the constant level of the headpond and the environmental and social advantages related this operating rule, as well as downstream flows necessary to maintain biological			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		and social values of the island complex and bypass reach. Generation is agreed to be lower than technically possible in order to maintain these values.			
Plans and processes to manage reservoir preparation and filling have been developed	✓	The resettlement planning framework, resettlement action plan, individual household agreements, biodiversity management as well as strategies for residents near the headpond regarding fishing, flood recession agriculture, and flood resilience have been or are being developed in a timely manner.	Generation operations planning has the flexibility to anticipate and adapt to future changes	✓	Within the narrow limits of the headpond, power canal and powerhouse capacity, the scheme has some flexibility.
Plans and processes to manage reservoir operations have been developed	✓	See above. The reservoir operating rules are very simple. The project design provides the mechanism for maintaining a constant headpond level, while delivering environmental flows. Weirs can be lowered to reduce the backwater effect at high flows, and raised to divert sufficient waters for generation at lower flows. Very high flows simply overtop the headworks structures.			
Plans and processes for delivery of downstream flow regimes have been developed	✓	During construction flows in all channels will be maintained, where necessary through temporary culverts. During operation flows downstream of the weir will be delivered through a series of gates, fish passes and occasional spills over weirs. If flow objectives are not met	Reservoir plans are based on dialogue with local community and government representatives	✓	There has been consultation over the ESIA and the RAP, including the area of and around the headpond (see sections 4, 5, 10), and the Sustainable Fisheries Development Plan.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		with the currently planned operational rules, these rules can be adjusted (i.e. most likely increased) in an adaptive manner. The headworks will be operated remotely and can be operated in a flexible manner. A separate E-flows Management Plan document that summarizes these measures is under development.			
Downstream flow plans include:					
• flow objectives	✓	Flow objectives include overall integrity of falls for communities, visitors and tourism operators, year-round flows, biodiversity conservation by minimizing habitat loss and maintaining habitat connectivity, and preservation of traditional fishing practices. These objectives are predicted to be achieved by maintaining Ecostatus B for all reaches ('largely natural with few modifications') except one that will be maintained to a C level ('moderately modified').	Processes are in place to anticipate and respond to emerging risks and opportunities	✓	Planned monitoring is comprehensive. In conjunction with continued stakeholder engagement including the grievance mechanism, WPC's commitment in its Sustainability Policy to '*adaptive management in response to unanticipated effects*', and the adaptive management process described in the draft E-Flows Management Plan, there is confidence that e-flows will be adapted as required to respond to emerging risks and opportunities.
• magnitude, range and variability of the flow regimes	✓	Flow releases will follow the natural variability of the inflows. The power plant will be shut down during the highest and lowest flows, so that the natural flow extremes are maintained.			
• locations at which flows will be verified	✓	Monitoring including locations is described in the ESMMP and will cover flows, water quality, aquatic	Commitments in plans are public, formal and legally enforceable	✓	The e-flow commitments have priority over generation and are public, formal and enforceable as

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		biodiversity, fisheries, sediment, visual appearance, and community incidents related to flows.			part of the approved ESIA/ESMMP. Also, WPC will make public data on generation, flows in each reach and downstream of the powerhouse at least on a monthly basis.
• ongoing monitoring	✓	See above			
Downstream flow plans, where formal commitments have been made, are publicly disclosed	✓	Plans have been discussed with stakeholders and included in the publicly available ESIA/ESMMP.			
OUTCOMES					
Plans for downstream flows take into account environmental, social and economic objectives	✓	Plans take a comprehensive, multi-criteria approach to downstream flows.	Plans for downstream flow regimes represent an optimal fit amongst environmental, social and economic objectives	✓	The plans appear to be an optimal fit between the different objectives as currently understood, with each objective met to a reasonable degree, and with a mechanism provided to change the balance if required.
Where relevant, downstream flows take into account agreed transboundary objectives	✓	While ZEMA will notify other basin countries, there will not be any longer distance or transboundary impacts. The project maintains good working relations with the Zambezi River Authority (ZRA) which is tasked with managing downstream transboundary river reaches, and did not raise concerns.			

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	10

Summary of findings and other notable issues
Historic hydrology is well understood and efforts are underway to better understand future hydrology. The scheme has been designed with a small headpond and as a pure run-of-river scheme, with no active regulation. The flows over the falls between the headworks and the tailrace will be reduced, with impacts on biodiversity, fishing, and visual attraction. These objectives have been comprehensively and systematically assessed, and plans designed for operations and delivery of environmental flows that balance all objectives.

Relevant evidence	
Interview	3-5, 8, 11-14, 19, 28, 30-35
Document	16, 17, 32-39, 97-104, 123, 128-135, 143, 148, 151, 152
Photo	5, 6, 9, 18-20, 43-48, 50-55

12 Climate Change Mitigation and Resilience

Scope and Principle
This section addresses the estimation and management of the project's greenhouse gas (GHG) emissions, analysis and management of the risks of climate change for the project, and the project's role in climate change adaptation. The principle is that the project's GHG emissions are consistent with low carbon power generation, the project is resilient to the effects of climate change, and the project contributes to wider adaptation to climate change.

Background	
Climate Change Mitigation	
Capacity (MW)	180 MW
Average reservoir area (representing area of flooded land, net of pre-impoundment water body) (km^2)	Additional permanent inundation: approximately 203 ha
Power density (W / m^2)	180,000,000/2,030,000 = 89
Emissions intensity (gCO_2e / kWh)	Estimated at 1.25 gCO2e/kWh on the basis of a 2018 G-res assessment (however with some doubts regarding input data and excluding construction emissions)
National and regional policies, plans and commitments relevant to mitigation	Zambian governments have produced a number of plans and policies related to climate mitigation, including the IRP (2023) which outlines future investments into renewable energies, and the Nationally Determined Contribution (NDC, updated 2021) submitted to UNFCCC, which outlines planned reduction of GHG emissions by 47% by 2030 compared to 2010, conditional upon international support.
Climate Change Resilience	
Hydrological data available for the project site and the basin, and observed climate trends	ZRA gauge data at the Ngonye site since 2006, at Senanga since 1947, and Victoria Falls since 1924. Analysis of long-term trends shows a cycle of several decades of higher flows followed by several decades of lower flows (with an estimated period of 59 years), and possible influences by ENSO.
Regional and basin-level climate models relevant to the project location, if any	There have been a number of relevant reports including the World Bank's 'Enhancing the Climate Resilience of Africa's Infrastructure' report, which investigated 121 alternative representations of the climate future by downscaling global models to the Zambezi river basin.
Any climate change predictions for the project location, and degree of consistency	A number of studies have linked global climate models to hydrological models for the Zambezi. All studies predict temperature increases, and several predict significant decreases in precipitation and decreases in flow).

National policies, plans and commitments relevant to adaptation and resilience	The National Climate Change Policy launched 2017 with several objectives, the first of which is to promote and strengthen the implementation of adaptation and disaster risk reduction measures to reduce vulnerability to climate variability and change.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
ASSESSMENT					
Climate Change Mitigation					
For projects with a power density below 5 W/m2, net GHG emissions (gCO2e) of electricity generation have been estimated and independently verified	✓	Not applicable; however the ESIA for the hydro project contains estimates of reservoir emissions (based on a G-res assessment) and construction emissions.	If a site-specific assessment is required, it incorporates a broad range of scenarios, uncertainties and risks	✓	Not applicable
For projects with a power density below 5 W/m2 and estimated emissions are above 100 gCO2e/kWh, a site-specific assessment of GHG emissions has been undertaken	✓	Not applicable			
An assessment of the project's fit with national and/or regional policies and plans on mitigation has been undertaken	✓	The ESIA contains a brief overview of relevant policies and plans. Zambia's NDC includes Renewable Energy and Energy Efficiency as one of the mitigation pillars.			
Climate Change Resilience					
An assessment of the project's resilience to climate change has been undertaken	✓	An initial climate change stress test was undertaken by the feasibility study consultants, showing that under two 'worst case' climate scenarios flows would be reduced by 10-26% and 11-36%, but energy generation by	Assessment of resilience incorporates sensitivity analysis and project-specific hydrological modelling using recognised climate models	✓	WPC has assumed the hydrological risk in the 25-year PPA with ZESCO. The planned climate change risk assessment will develop a qualitative climate change risk and opportunity register for the scheme,

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		only 2-9% and 5-21%. An additional, more in-depth study (climate change risk assessment) is planned.			complemented with quantitative assessments of the impact of climate change on energy generation and floods.
The assessment:					
• incorporates an assessment of plausible climate change at the project site	✓	The upcoming climate change risk assessment will assess plausible climate projections for the catchment.			
• identifies a range of climatological and hydrological conditions at the project site	✓	A hydrological model will be developed to derive a range of conditions at the site.			
• applies these conditions in a documented risk assessment or stress test	✓	The assessment will develop a comprehensive qualitative climate change risk and opportunity register for the scheme, complemented with detailed quantitative assessments of the impact of climate change on energy generation and floods.			
The risk assessment or stress test encompasses:					
• dam safety	✓	The assessment will determine the impact of climate change on a suitable design flood. As described in section 4, because the tailrace levels rise significantly with increasing floods (almost reaching headpond levels so that project infrastructure is surrounded by water on all sides), any additional water releases due to the failure of a project dam or weir would have limited impacts. By the same logic, even if flood projections increase because of climate change,			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		this has little incremental impact on community exposure.			
• other infrastructural resilience	✓	A qualitative assessment of the resilience of other infrastructure (e.g. TLs) will be included in the upcoming climate change risk and opportunity register. Risks should be limited given the generally flat and dry terrain.			
• environmental and social risks	✓	Significant reductions in rainfall and runoff, as predicted in a majority of climate models for the upper Zambezi region, will have impacts on other aspects of the region which are not project-related, such as habitats and agricultural productivity. Such risks have been considered in the ESIA and the draft cumulative impacts assessment, and will be integrated into the upcoming climate change risk and opportunity register.			
• power generation availability	✓	This was the main focus of the stress test and will be the main focus of the climate change risk assessment.			
An assessment of the project's potential adaptation services and fit with national and/or regional policies and plans for adaptation has been undertaken	✓	There is a brief overview of relevant policies and plans in the ESIA, and the NDC lists key vulnerable sectors that need to adapt to climate change as: agriculture, water, forestry, energy, wildlife, infrastructure, and health. The project has not assessed its fit with adaptation policies, but this gap is not significant as a run-of-river scheme is unlikely to be relevant for			

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		Findings and Observations	Requirement is met: yes (✔) or no (✘)		Findings and Observations
		adaptation efforts in any of these sectors.			
MANAGEMENT					
Climate Change Mitigation					
If GHG emissions estimates assume design and management measures, there are plans to put these measures in place	✓	No design or management measures are specifically assumed in the GHG emissions estimates.	Design and management measures have been developed for implementation and operation phases of the project to respond to risks and opportunities including offsetting emissions	✘	The EPC contractor will have to demonstrate that they have considered GHG emission reductions in their design and construction activities, for example through energy-efficient worker accommodation and equipment; reduction of vehicle trips; worker training; and supply chain management including avoidance of procurement of excessive materials. No risks and opportunities during the operations stage have been considered (e.g. vegetation clearance in headpond; GHG reduction measures during operations such as use of electric vehicles; offsetting for residual emissions, for example through reforestation; or the sale of voluntary carbon credits), which is a **significant gap**.
			Plans have been developed to monitor parameters used in GHG emissions estimates or to monitor GHG stocks	✓	The EPC contractor will measure and report their GHG emissions. No further monitoring e.g. of reservoir emissions is planned, which is not a gap as default parameters were used in the G-res estimate and there are no significant GHG stocks.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Climate Change Resilience					
The project design is based on plausible climate change scenarios	✓	The project design is based on historical flow series, not projected future flows. This is a gap but not significant because (a) the project design is resilient to future flows changes, as shown by sensitivity testing, and (b) any significant decreases of flows will occur over a long-time horizon, beyond the end of the financing period.	Resilience measures take account of a broad range of risks and inter-relationships	✘	The resilience of the scheme is the result of site conditions and a design that is appropriate for historically highly variable flows, within years and between years. A full climate change risk assessment has yet to be undertaken, and therefore no specific resilience measures have been identified or adopted, which is a **significant gap** at this stage in project development. While the flood resilience measures for the population around the headpond are primarily a mitigation measure for project-induced flooding, they are also useful for adapting to current and future climate variability, including droughts. The RAP shows a high level of climate awareness, for example through climate proofing for resettlement housing and livelihoods restoration measures. Climate change impact on the reduced flow reaches have also been considered.
			Processes are in place to respond to unanticipated climate change	✘	A full climate change risk assessment has yet to be undertaken, and no specific processes to respond to unanticipated climate change have been identified, which is a **significant gap**.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
Structural and operational measures are planned for design, implementation and operation phases to avoid or reduce the identified climate risks	✓	As a run-of-river scheme with very limited storage capacity, there are limited opportunities for adaptation to changing runoff. However, there is also no critical need to adapt to lower or higher flows (including floods), given the inherent resilience of the scheme, with less variability of generation than of flows, and with infrastructure that can be overtopped, or if it should fail during extreme floods, would cause little incremental damage.	Plans have been developed to provide adaptation services if necessary	✓	The lack of storage capacity also results in limited ability to provide adaptation services for water resources, and hence no specific plans have been developed. Indirectly, plans for power supply, flood resilience in the floodplain area, benefit sharing and livelihoods development may assist with adaptation.
OUTCOMES					
Climate Change Mitigation					
The project's GHG emissions are demonstrated to be consistent with low carbon power generation	✓	GHG emissions are expected to be very low.	Project net emissions are minimised or project operations facilitate system emissions reductions	✓	The project has a very low emissions intensity per kwH, aims to further reduce emissions during construction, and will create conditions for a significant expansion of variable renewables in the Zambian grid.
The fit of the project with national and regional policies and plans for mitigation can be demonstrated	✓	The project contributes to Zambia's plans for basing power generation on renewable energy.			
Climate Change Resilience					
Plans will deliver a project that is resilient to climate change under a range of scenarios	✓	Because of the design of the scheme, where generation is strongly influenced by tailwater levels and therefore reduced at high flows, the predicted reductions in runoff lead to relatively small reductions in generation. Also, increases in flood estimates only result in a small increase in the probabilities of	The project is resilient under a broad range of scenarios	✘	The lack of a full climate change risk assessment at this stage makes this impossible to confirm, which is a **significant gap**.

Minimum Requirements			Advanced Requirements		
Requirement is met: yes (✔) or no (✘)		**Findings and Observations**	**Requirement is met: yes (✔) or no (✘)**		**Findings and Observations**
		damages from dam failure, as increased tailwater levels reduce the incremental impact.			
The fit of the project with national and regional policies and plans for adaptation can be demonstrated	✓	There has been no specific analysis of the fit with adaptation policies and plans, but there are no indications of any inconsistencies.	The project will contribute to climate change adaptation at local, regional or national levels	✓	The project will boost socio-economic development in the region and thus provide alternatives to climate-dependent livelihoods, especially agriculture.

List of significant gaps against **Minimum Requirements**	Number of **Advanced Requirements** met
None	6

Summary of findings and other notable issues
The project will cause minimal GHG emissions and will make a significant positive contribution to climate change mitigation, by avoiding fossil fuel-based power generation in the Southern African Power Pool, and by supporting the expansion of variable renewables. The resilience against future flow variability or flow reductions has been and is being further assessed and considered in the project design. With a run-of-river design, the project has limited ability to support adaptation to climate change, except by diversifying and strengthening the regional economy.

Relevant evidence	
Interview	4, 5, 11-14, 35
Document	32-34, 128-132, 138, 147-152
Photo	--

Appendix 1 – Interviews

Ref	Interviewee/s, Position	Organisation	Date	Location
1	Sipho Phiri - Chairman	WPC	18-Mar-24	WPC
2	Peri Zagaretos - Deputy MD	WPC	18-Mar-24	WPC
3	Martin Lorenz - Environmental Consultant	DH Engineering Consultants	18-Mar-24	WPC
4	Doug Smith - Environmental and Social Specialist	WPC	18-Mar-24	WPC
5	Andy Fleming - Technical Director	WPC	18-Mar-24	WPC
6	Angela Chisembele - Stakeholder Engagement Manager	WPC	18-Mar-24	WPC
7	Peter Hutchinson - Compliance Manager/ Financial Director	WPC	18-Mar-24	WPC
8	Nyundo Armitage, Byron Bester	Armitage, Digby Wells	19-Mar-24	WPC/Online
9	Alex Armitage	Armitage	19-Mar-24	WPC
10	Nchimunya Chigwedere	CV People Africa	19-Mar-24	Online
11	Tom Beskeen	Mott Macdonald	19-Mar-24	Online
12	Krishna, Fidel - Feasibility Study engineers	Mott Macdonald	19-Mar-24	Online
13	Happy Malawo - Zambezi Catchment Manager	Water Resources Management Authority (WARMA)	19-Mar-24	Online
14	Pherry Mwiinga - Senior Hydrologist	Zambezi River Authority	19-Mar-24	Online
15	Dr Mundia - BRE / Government Liaison	WPC	20-Mar-24	Mongu/Sioma
16	Ngambela (Prime Minister)	Barotse Royal Establishment (BRE)	20-Mar-24	Mongu
17	Mr Akapelwa - (P.S. WP), Nyambe Wamunyima (Senior Planner)	Western Province Provincial Administration Office	20-Mar-24	Mongu
18	Victor Syatyoka - NHCC Conservation Officer (Archaeologist)	National Heritage Conservation Commission (NHCC)	20-Mar-24	Mongu
19	The Warden	Department of National Parks and Wildlife (DPNW)	21-Mar-24	Sioma
20	Group Meeting with West Bank Indunas	West Bank	21-Mar-24	Sioma
21	Group Meeting with East Bank Indunas	East Bank	21-Mar-24	Sioma
22	Stella Sakala – Resettlement Specialist	WPC	22-Mar-24	Sioma
23	Eddie De Villers – Manager	Whispering Sands Lodge, Sioma	22-Mar-24	Sioma
24	Thelma Chisanga – Manager	Ngonye Camp, Sioma	22-Mar-24	Sioma
25	Moses Mukumbuta – Manager	Country Lodge, Sioma	22-Mar-24	Sioma
26	Sidney Hamooya (Council Secretary), Dr Sililo (District Commissioner)	Sioma District Council	22-Mar-24	Sioma
27	Group Meeting People affected by Land Acquisition (West Bank)	West Bank	22-Mar-24	Sioma

28	Hendrie Le-Roux	Commercial Farmer	22-Mar-24	Sioma
29	Group Meeting Women affected by Land Acquisition (West Bank)	West Bank	22-Mar-24	Sioma
30	Chembo Sichinga, Steven Mwiinga	Energy Regulation Board (ERB)	25-Mar-24	Online
31	Bonje Muyunda - Principal Environmental Specialist	Zambia Electricity Supply Corporation (ZESCO)	28-Mar-24	Online
32	Constantino Mwembela	Zambia Environmental Management Agency (ZEMA)	29-Mar-24 and 12-Apr-24	Online
33	Marco Alexandre	Ecotone	03-Apr-24	Online
34	Cheryl Ng - Health and Safety Consultant	InfraCo/PIDG	04-Apr-24	Online
35	Emily Wood - Group Head of HSES, Ridouan Lerhrissi - HSES Manager	InfraCo/PIDG	10-Apr-24	Online

Appendix 2 – Documents

Ref	Author	Date	Title	Notes/Links/Language
1	WPC, BRE	2013-02-16	MoU with Barotse Royal Establishment	Community
2	WPC, BRE	2017-05-22	Community Participation Agreement	Community
3	ZEMA	2018-11-14	Letter from ZEMA - Approval of Revised ESIA ToRs	Environmental and Social
4	ZEMA	2021-04-06	ESIA Decision Letter	Environmental and Social
5	WPC	2021-04-06	ESIA Decision Letter Conditions Tracker	Environmental and Social
6	ZEMA, WPC, ERB	2024-02-13	ESIA Validity Extension Letters	Environmental and Social
7	WPC, GRZ	2015-01-01	Pre-IA Correspondence with Min of Energy on Project Development Rights	Implementation Agreement
8	GRZ, WPC	2015-12-08	Implementation Agreement	Implementation Agreement
9	Senior Chief Lukama	2020-01-31	Signed wayleave consent form	Land Rights
10	WPC	2023-04-14	Wayleaves layout diagram	Land Rights
11	WPC	2024-02-05	Land and water rights memorandum	Land Rights
12	WPC	2024-02-05	Land rights register	Land Rights
13	WPC, NHCC	2022-03-10	Draft NHCC Memorandum of Understanding	National Heritage Commission
14	WPC	2022-09-29	Cover Letter - Draft NHCC Memorandum of Understanding	National Heritage Commission
15	ZDA	2021-07-12	ZDA Investment Certificate of Registration	Other Permits and Licenses
16	ZESCO, WPC	2023-10-27	Power Purchase Agreement	Power Purchase Agreement
17	WARMA	2022-11-24	Water Permit	Water Rights
18	WPC	2024-02-05	Key Project Agreements Structure	WPC Project Management
19	WPC	2024-02-05	Licenses and Permits Tracker	WPC Admin
20	WPC	2024-02-05	Key Project Agreements Tracker	WPC Admin
21	WPC	2023-03-09	Board Pack Mar 2023	Board
22	WPC	2023-08-01	Board Pack Aug 2023	Board
23	WPC	2024-01-26	Board Pack Jan 2024	Board
24	WPC	2024-01-26	Company Secretarial Report	Company Secretarial
25	WPC	2023-09-10	Manual of Internal Controls, Accounting and Reporting Procedures	Governance
26	Ecotone	2018-10-10	Biodiversity Assessment - Part 1 Baseline Biodiversity Assessment	Biodiversity
27	Ecotone	2018-10-10	Biodiversity Assessment - Part 2 Impact Assessment, Management Plan, Monitoring Plan	Biodiversity
28	Mott MacDonald	2019-11-04	Fish Migration Requirements & Fishway Design Report	Biodiversity
29	SLR	2023-11-11	Key plant species survey and monitoring - Proposal	Biodiversity

30	WPC	2024-01-09	Critical Habitat Assessment Update ToRs	Biodiversity
31	Ecotone	2024-02-16	Ecotone proposal for Critical Habitat Assessment	Biodiversity
32	Imagen Consulting	2019-09-01	Potential Upstream Abstraction Assessment	Climate Change
33	Mott MacDonald	2019-10-29	Energy generation climate change stress test	Climate Change
34	Mott MacDonald	2023-09-09	Climate Change Risk Assessment Proposal	Climate Change
35	WPC	2017-03-07	Aesthetics of the Ngonye Falls Impact Study	EFlows
36	WPC	2018-03-15	EFlows Determination - Stakeholder Workshop Record	EFlows
37	Ecotone	2018-11-05	Ecological Flow Assessment	EFlows
38	Ecotone	2019-09-04	Final RDRM Based EFlows Tables	EFlows
39	Mott MacDonald	2019-09-04	FS-CA-H-001-C Eflow Scenarios - Power and Energy Simulations	EFlows
40	DH Engineering	2018-10-26	EIA Scoping Report and Terms of Reference	ESIA
41	Hydropower Sustainability Council	2019-01-21	Environmental, Social and Governance (ESG) Rapid Assessment	ESIA
42	WPC	2019-06-19	ESIA Disclosure Presentation Posters	ESIA
43	DH Engineering	2020-09-25	Environmental Impact Statement - Non-technical Summary (Lozi)	ESIA
44	DH Engineering	2020-09-25	Environmental Impact Statement - Non-technical Summary	ESIA
45	DH Engineering	2020-09-29	Environmental Impact Statement - Annexes	ESIA
46	DH Engineering	2020-09-29	Environmental Impact Statement	ESIA
47	DH Engineering	2023-04-13	Environmental and Social Management and Monitoring Plan (ESMMP)	ESIA
48	WPC	2024-01-26	Cumulative Impact Assessment	ESIA
49	Mott MacDonald	2018-12-05	Greenhouse Gas Emissions Assessment	GHG
50	DH Engineering	2020-06-21	Health Impact Assessment	Health
51	WPC	2017-06-01	Litungas Canal Heritage Feature	Heritage
52	NHCC	2018-04-01	Heritage Impact Assessment	Heritage
53	WPC	2014-02-01	Incident Report Register	HSES Management System
54	WPC	2022-08-31	WPC_PROC_5_v1 International Visitor Checklist Form	HSES Management System
55	WPC	2023-01-01	WPC_PROC_2_v1 Incident Reporting Procedure	HSES Management System
56	WPC	2023-08-01	WPC_PROC_1_v1 Risk Assessment Procedure	HSES Management System
57	WPC	2023-08-01	WPC_PLAN_2_v1 WPC Emergency Response Plan	HSES Management System
58	WPC	2023-08-01	WPC_PROC_3_v1 Fire Action Procedure	HSES Management System
59	WPC	2024-01-18	WPC_PLAN_2_v2 WPC Occupational Health and Safety Plan	HSES Management System
60	WPC	2023-12-01	Health and Safety Statistics	HSES Management System
61	WPC	2023-11-08	HR Consultant - ToRs	HSES Management System
62	WPC	2023-12-01	HR Consultant Proposal	HSES Management System
63	WPC	2023-04-20	Community Benefits Sharing Plan	HSES Management System

64	WPC	2023-08-01	WPC_PROC_4_v1 Chance Finds Procedure	HSES Management System
65	WPC	2023-08-24	Risk Assessment Plan	HSES Management System
66	WPC	2023-11-09	EFlows Management Plan	HSES Management System
67	WPC	2024-02-08	Policies Management Plan	HSES Management System
68	WPC	2019-07-01	Health and Safety Policy	HSES Management System
69	WPC	2019-11-22	Sustainability Policy	HSES Management System
70	WPC	2014-02-01	Stakeholder Engagement Register	HSES Management System
71	WPC	2014-02-01	Communications Register	HSES Management System
72	WPC	2014-02-01	Community Payments Register	HSES Management System
73	WPC	2024-02-01	Grievance Response Mechanism Register	HSES Management System
74	DH Engineering	2024-02-08	Grievance Response Mechanism - Description from RAP	HSES Management System
75	WPC	2014-02-01	Ngonye Project HSES Planner	HSES Management System
76	WPC	NA	WPC HSES Management System	HSES Management System
77	Nomad Consulting	2019-09-06	Resettlement Policy Framework	RAP
78	WPC	2023-10-01	Examples of RAP Individual Household Compensation Agreements	RAP
79	Armitage	2024-01-19	Resettlement Action Plan	RAP
80	Armitage	2024-01-19	RAP Designs for Replacement Housing	RAP
81	WPC	2024-01-19	RAP Implementation Plan	RAP
82	Armitage	NA	Resettlement Action Plan - Database of PAPs	RAP
83	BRE	2020-09-28	BRE Sensitisation Tour Report	Social
84	BRE	2020-09-28	BRE Sensitisation Tour plan	Social
85	WPC	2022-08-08	Structure Diagram of the BRE	Social
86	Nomad Consulting	2019-09-06	Social Impact Assessment	Social
87	DH Engineering	2020-07-17	Stakeholder Engagement Plan	Social
88	DH Engineering	2020-09-18	Tourism Impact Assessment	Social
89	WPC	2023-04-17	T-line Biodiversity Assessment TOR	T-Line
90	Armitage	2023-08-10	T-line Biodiversity Assessment Proposal	T-Line
91	Armitage	2023-12-14	T-line Biodiversity Assessment Desktop Study	T-Line
92	ZESCO	2023-09-01	T-line Resettlement Action Plan (initial ZESCO draft)	T-Line
93	ZESCO	2023-09-01	T-line ESIA (initial ZESCO draft)	T-Line
94	ZESCO	2022-03-01	T-line ESIA Scoping Report (Sesheke - Mongu - Shangombo)	T-Line
95	ZESCO	2022-03-01	T-line ESIA Terms of Reference (Sesheke - Mongu - Shangombo)	T-Line
96	ZEMA	2022-04-19	Approval of T-Line ESIA Terms of Reference	T-Line
97	Mott MacDonald	2017-12-08	Headpond Level, Weir and Flood Impact Assessment	Upstream
98	Mott MacDonald	2018-08-01	Upstream flood modelling update	Upstream

99	Mott MacDonald	2019-01-18	Flood modelling and compensation flood level	Upstream
100	Mott MacDonald	2019-05-23	Headpond Level, Weir and Flood Impact Assessment Report	Upstream
101	WPC	2019-06-20	Impact on Upstream Flooding	Upstream
102	Mott MacDonald	2017-03-16	Visual Impact Assessment	Visual
103	Mott MacDonald	2017-06-02	Landscape and Visual Impact Assessment	Visual
104	Mott MacDonald	2019-04-12	Revised Landscape and Visual Impact Assessment	Visual
105	WPC	2024-01-18	Project Development Budget	Budget
106	Energy Regulation Board	2023-01-01	ERB Zambia Energy Sector Report 2022	Macroeconomics and Market
107	WPC, APP, IA, Scintilla	2024-02-01	WPC Shareholder Agreement with amendments	Sponsor Funding
108	WPC	2022-10-01	Ngonye Falls Project Map 1_9000 A1	Maps
109	WPC	2022-11-18	Ngonye Falls Project - Benefits Paper for GRZ	
110	Mott MacDonald	2024-02-09	EPC Procurement Clarifications and BAFO	EPC
111	WPC	2022-04-29	EPC Procurement – Pre-qualification Descriptive Document	EPC
112	WPC	2022-04-29	EPC Procurement – Pre-qualification Questionnaire EPC	EPC
113	WPC	2022-04-29	EPC Procurement – Pre-qualification Questionnaire OEM E&M	EPC
114	Mott MacDonald	2022-12-01	EPC Contractors Prequalification Evaluation Report	EPC
115	Mott MacDonald	2022-12-01	E&M OEM Contractors Prequalification Evaluation Report	EPC
116	Mott MacDonald	2023-05-15	EPC Procurement - Design Basis Statement	EPC
117	Mott MacDonald	2023-05-15	EPC Procurement - Specification	EPC
118	Mott MacDonald	2023-05-15	EPC Procurement - Instructions to Bidders	EPC
119	Mott MacDonald	2023-12-22	EPC RfP Bid Evaluation Report	EPC
120	WPC	2023-08-04	EPC Procurement Plan	EPC
121	WPC	2023-10-06	EPC Procurement Update Memo 3 - Oct 2023	EPC
122	WPC	2024-02-12	RfP for Construction Owners Engineer	Owners Engineer
123	WPC	2024-01-19	Ngonye Falls Models, Parameters and Data	Model
124	Mott MacDonald	2024-02-01	Ngonye Falls Project Construction Schedule	Design and Engineering
125	WPC	2024-02-06	Ngonye Falls Project Plan and Gantt Chart	WPC Project Management
126	WPC	2024-02-06	Development Stage Risk Register	WPC Project Management
127	WPC	2024-02-06	WPC Ngonye Falls Documents Catalogue	WPC Project Management
128	Mott MacDonald	2019-06-19	Ngonye Falls HPP - Final Feasibility Study - Drawings	Design and Engineering
129	Mott MacDonald	2019-06-19	Ngonye Falls HPP - Final Feasibility Study - Appendices	Design and Engineering
130	Mott MacDonald	2019-06-19	Ngonye Falls HPP - Final Feasibility Study - Main Report	Design and Engineering
131	Multi Consult	2016-09-15	Technical and Economic Feasibility Report	Design and Engineering
132	Mott MacDonald	2017-08-25	Outline Options and Optimisation Study	Design and Engineering
133	Mott MacDonald	2018-10-16	Notes on legal and lenders requirements for Dam Safety	Design and Engineering

134	AECOM	2017-07-13	Scheme Hydraulic Modelling Study - Additional Option Development	Hydrology
135	Mott MacDonald	2018-02-01	Ngonye Falls Technical Note - Hydrology	Hydrology
136	Armitage	2024-03-19	Terrestrial Ecological Impact Assessment	T-Line
137	Digby Wells	2024-02	Aquatic Biodiversity and Impact Assessment	T-Line Biodiversity Study
138	IHA	2018-11	G-Res Outputs and Inputs	Climate
139	WPC	2024-03	Financial Summaries for HSS Assessment	Community
140	WPC	2024-03	Ngonye Falls Broad Considerations Risks and Opportunities	HSES Management
141	WPC	2024-04	Ngonye Falls Potential Positive Impacts	HSES Management
142	Winton et al	2021	Anthropogenic influences on Zambian water quality: hydropower and land-use change	Environ. Sci.: Processes Impacts, 2021, 23, 981
143	World Bank	2010	The Zambezi River Basin: A Multi-Sector Investment Opportunities Analysis	
144	SIOMA DISTRICT ADMINISTRATION - DISASTER MANAGEMENT AND MITIGATION UNIT (DMMU)	2024	DISTRICT DISASTER PREPAREDNESS PLAN FOR THE YEAR 2024 TO 2025	Community
145	WPC	2013-2023ses	Stakeholder Engagement Minutes: • 2013-2018 BRE • 2014-2023 ZESCO • 2016-2018 ESIA • 2019 ESIA Feedback • 2020 Queen's Heritage • 2021 ZESCO T-Line Community Meetings • 2022 Livelihood Specialist Stakeholder Engagement Summary Lists	Community
146	WWF		Factsheet: The Barotse Floodplain – For People and Nature	
147	Government of Zambia	2023	NATIONAL ADAPTATION PLAN FOR ZAMBIA	Climate
148	Evans Kaseke, Zambezi Basin Strategic Planning, Zambezi Watercourse Commission, Harare, Zimbabwe	2016	ZAMBEZI BASIN STRATEGIC PLANNING IN THE CONTEXT OF A CHANGING CLIMATE - OVERVIEW	Climate
149	Government of Zambia	2021	Nationally Determined Contribution (NDC) of Zambia for the timeframe 2015-2030	Climate
150	Government of Zambia	2023	Integrated Resource Plan (IRP)	Climate

151	Chisanga et al	2022	Modelling climatic trends for the Zambezi and Orange River Basins: implications on water security	Journal of Water and Climate Change Vol 13 No 3, 1275 doi: 10.2166/wcc.2022.308
152	Hamadudu and Killingtveit	2016	Hydropower Production in Future Climate Scenarios; the Case for the Zambezi River	Energies 2016, 9, 502; doi:10.3390/en9070502

Appendix 3 – Photographs

Photo 1: Aerial view of Mongu town, capital of Western province, with Barotse floodplain in background

Photo 2: Boats to be used in Kuomboka ceremony, the Litunga's (King's) move to his flood season residence, in Barotse floodplain

Photo 3: Causeway across Barotse floodplains

Photo 4: Meeting at the Litunga's (King's) court in Mongu

Photo 5: Aerial view upstream above Ngonye Falls

Photo 6: Aerial view across top of falls to right bank

Photo 7: Fish biodiversity on upper Zambezi

Photo 8: Hippo skull at Ngonye Falls Community Partnership Park visitor centre

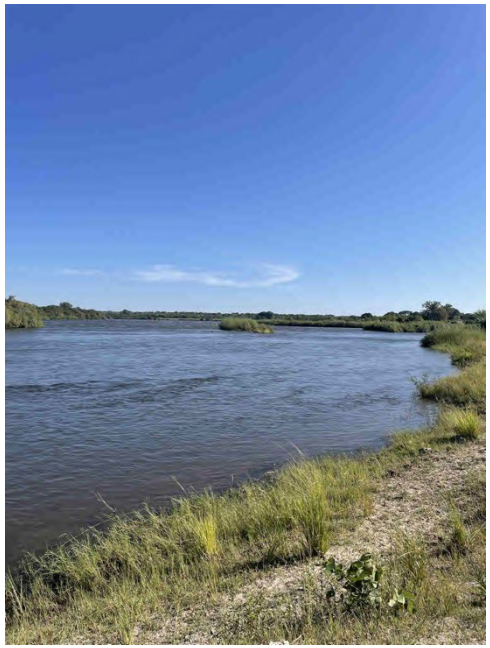

Photo 9: View upstream at barrage site; with several cultural heritage sites associated with river navigation

Photo 10: Aerial view towards downstream along right bank highway

Photo 11: Crops near power canal with depression from former quarry, to be used for spoil dump

Photo 12: Existing 66 kV Sesheke-Mongu transmission line

Photo 13: Natural vegetation at powerhouse location

Photo 14: Ground hornbills

Photo 15: Meeting with WPC community liaison team

Photo 16: Fish trap in Ngonye Falls channel

Photo 17: Fish traps

Photo 18: Main falls view upstream

		
Photo 19: Central part of falls	Photo 20: Main falls view downstream	Photo 21: Limbelo fish trap
		
Photo 22: Typical temporary side channel in falls complex	Photo 23: Community directly impacted by headpond 1	Photo 24: Community directly impacted by headpond 2

Photo 25: Stones cut in Litunga's canal

Photo 26: Commercial farmer growing crops for essential oils on left bank with assessor

Photo 27: WPC information and grievance box at tree used for community meetings

Photo 28: Mbuyu community school 1

Photo 29: Mbuyu community school 2

Photo 30: Mbuyu community school 3

Photo 31: Homestead impacted by permanent infrastructure 1

Photo 32: Homestead impacted by permanent infrastructure 2

Photo 33: Family compound near power canal

Photo 34: Meeting with left bank chiefs

Photo 35: Meeting with affected women

Photo 36: Meeting with Sioma District authorities

Photo 37: Family compound near powerhouse, before relocation

Photo 38: Resettlee in family compound

Photo 39: Replacement house under construction

Photo 40: WPC information and grievance box at community building on right bank

Photo 41: WPC information and grievance box at Mbuyu school on left bank

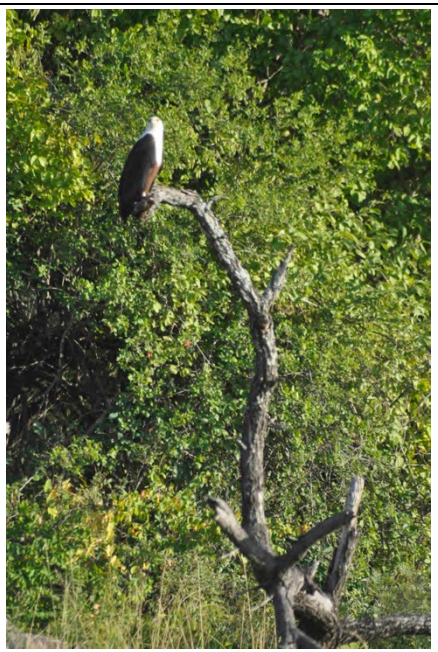

Photo 42: Fish eagle

		
Photo 43: Aerial view downstream along bypass reach below falls	Photo 44: Aerial view from right to left bank with lodges in foreground and powerhouse bay on left in background	Photo 45: Assessment team at powerhouse location
		
Photo 46: Zambezi River just downstream of falls	Photo 47: Tourist lodge in bypass reach	Photo 48: Water supply pump of a lodge in the bypass reach

Photo 49: Cape clawless otter tracks on sandbank

Photo 50: Pool and natural basin at one of the tourist lodges on right bank

Photo 51: M10 highway bridge over Zambezi River (Sioma Bridge) downstream of powerhouse

Photo 52: Sioma bridge from upstream

Photo 53: Aerial view of Sioma bridge from downstream

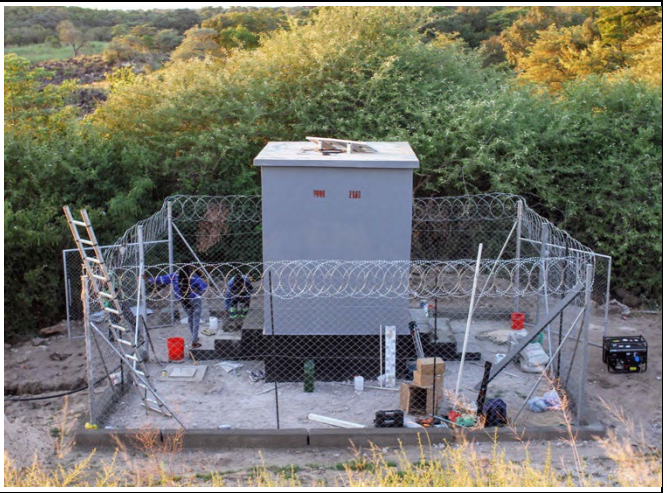

Photo 54: Gauge station building at Sioma Bridge

Photo 55: Aerial view of rcommissioneriver ca 5km downstream of powerhouse

Photo 55: Sesheke substation, where new 220/330kV transmission line from Ngonye Falls will feed into national grid

Photo 57: Next Zambezi bridge downstream, at Sesheke - Katima Mulilo

Photo 58: KZA-TFCA map in NFCPP visitor centre

Photo 59: Nayuma museum in Limulunga, the winter residence of the Litunga

Photo 60: Tourism attractions between Ngonye Falls and Sioma Ngwezi National Park