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PROJECT : ITEZHI TEZHI HYDRO POWER PROJECT
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LIST OF ACRONYMS

AfDB	African Development Bank
ECO	Environmental Coordinator
ECZ	Environmental Council of Zambia
ESAP	AfDB Environment and Social Assessment Procedures
ESIA	Environment and Social Impact Assessment
ESMP	Environmental and Social Management Plan
GMA	Game Management Area
ITHP	Itezhi Tezhi Hydro Power Project
KNP	Kafue National Park
RAP	Resettlement Action Plan
TA	Traditional Authorities
ZAWA	Zambia Wildlife Authority

1 INTRODUCTION

This document is a summary of the Environmental and Social Impact Assessment (ESIA) documentation for the proposed Itezhi Tezhi Hydropower Project (ITHP). Two separate ESIA reports, for the Surface Power Plant and Transmission Line (T-line) components respectively, have been prepared and finalized by ZESCO Limited Environmental and Social Affairs Unit in 2008.

This ESIA summary is prepared in accordance with the African Development Bank's (AfDB) 2001 Environmental & Social Impacts Assessment Procedures (ESAP). In order to fulfill the requirements of the Bank's Information Disclosure and Public Consultation Policy, this ESIA summary will be posted on the Bank's website at least 120 days prior to presentation of the investment proposal for Board approval.

Specifically, this summary provides information on project activities; anticipated impact of the project activities; measures to be put in place to mitigate identified adverse impacts; and institutional arrangement to facilitate implementation and monitoring of the Environmental and Social Management Plan (ESMP).

Attached to this document as Annex 1, is a summary of the Resettlement Action Plan (RAP).

2 PROJECT DESCRIPTION AND JUSTIFICATION

2.1 Project Description

The proposed ITHP will be located in Itezhi Tezhi District in the Southern Province of Zambia. A surface power plant will be built adjacent to the existing Itezhi Tezhi Dam; it will utilize the existing reservoir. In order to evacuate the power generated, a 300km 220/330kV T-line will be installed from Itezhi Tezhi through a substation at Mumbwa, onto a substation at Lusaka-West (Figure 1).

2.1.1 Surface power house and associated infrastructure

A surface powerhouse and ancillary structures will be added to the existing rock-filled dam on the Kafue River. The project will involve: modifications to the existing intake, construction of an underground cavern to house two Kaplan turbines connected to synchronous generators with maximum capability of 120 MW, construction of an access tunnel to the underground cavern and the placement of a switchyard at the outlet of the access tunnel. The dam will maintain its current height.

Other infrastructure to be constructed include: a water and sewerage reticulation plant, and rehabilitation of existing facilities; and workshops and staff housing.

2.1.2 Transmission line and associated infrastructure

The proposed Itezhi-Tezhi – Mumbwa 220 kV single circuit T-line will originate from a 220 kV substation on the South bank of the Kafue River at Itezhi Tezhi Dam located approximately 100m from the power house. The T- line will initially run between the Namwala Road (on the South bank) and the Kafue River for the first few kilometers, it will then cross the Kafue River near Mwanalushi farm on the North bank. From there, the T-line will be aligned with the New

Namwala road (R353) (North East of R350) for about 35 km (crossing streams such as Baunza, Banga etc...). The line will follow the old game fence into areas including Kalombe Tsetse Control Point, North of Kasaka School, (D180) North of Banamwaze into Nansenga, then the substation (near Nambala) in Mumbwa. The line will traverse several chiefdoms along this routing (Kaingu Shimbizi, Chilyabufu, Muwezwa, Chibuluma and Moono). This portion of the route will be approximately 146km long and generally traverses less populated and environmentally sensitive areas.

At the proposed Mumbwa substation, a single circuit 330kV (stepped up from 220 kV) Mumbwa – Lusaka West T-line will be constructed. The line route from Mumbwa substation will be aligned with the Nambala Mission road but South of Sanje Forest Reserve, into Nangoma to enable easy access. After which it will cross the Lusaka - Mongu road West of Mamvule and continue North, traversing areas including behind Mubula Community School into Mwembeshi, then onto Lusaka West substation. The line will traverse several Chiefdoms (including: Moono; Shakumbila; and part of Nkomesha) between the Mumbwa and Lusaka substations.

The average distance between the line and roads will be maintained at between 2 and 3 km.

Substations: all 330 kV, 220 kV and 33 kV switchgear will be designed for outdoor operation. All insulators will have minimum creepage distances of 20 mm/kV. All equipment will comply with relevant IEC standards or equivalent standards approved by ZESCO.

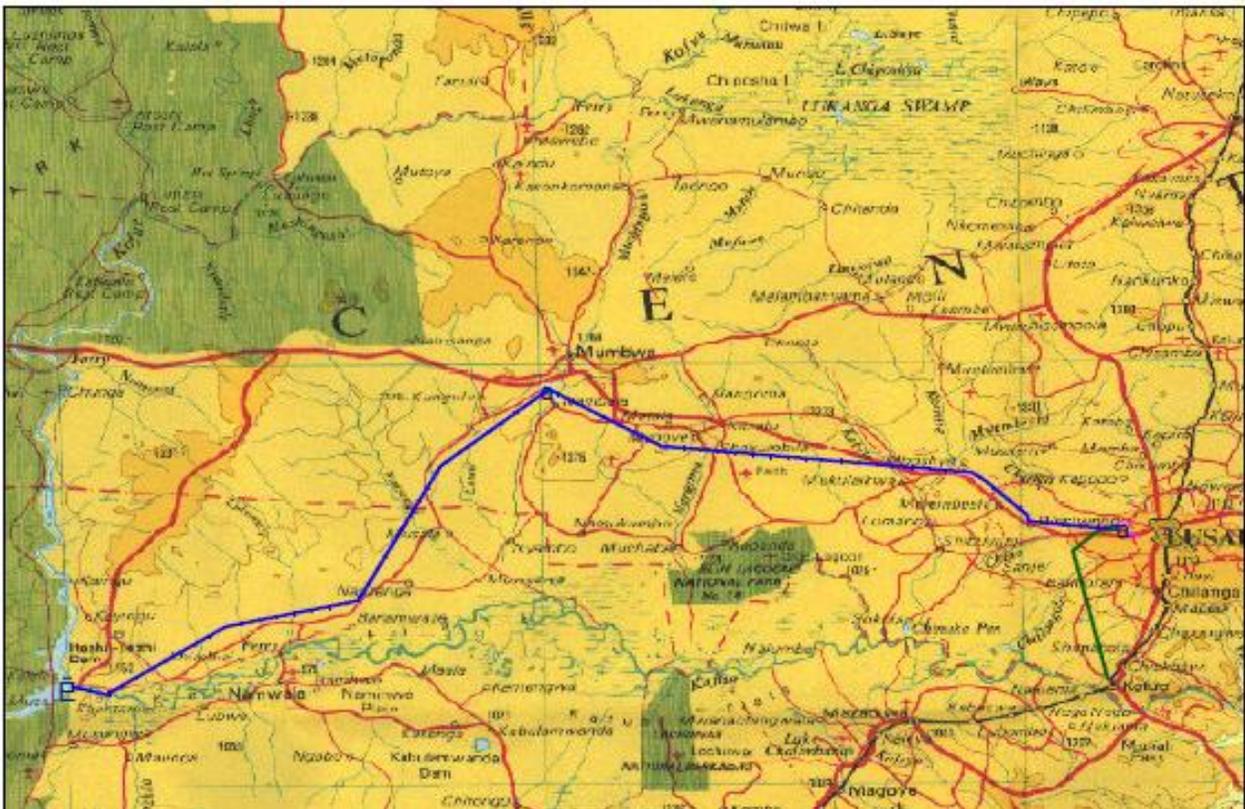


Figure 1: Proposed route for the ITT-Mumbwa-Lusaka-West, Power Line

2.2 Project Justification

Over recent years, demand for electricity has been increasing as a result of improvements in the national economic growth rate (GDP of approximately 4%), as well as increase in regional power demand. This increase in demand has led to a power supply shortages being experienced within Zambia and the Southern African region; specifically, in 2007 demand for power outstripped supply. The current national hydropower installed (1730 MW) is thus inadequate to meet both regional and local power demand.

The Kafue River System presents an opportunity to develop an additional power station that could contribute to ameliorating the impact of power shortages. The Itezhi Tezhi Dam has potential for hydropower development that has not been exhausted; the proposed power plant will utilize the head from the dam and other existing infrastructure.

The proposed T-line will also provide security of supply by opening up a central transmission network therefore reducing over dependency on the existing Eastern transmission network that converges at Leopard's Hill substation.

3 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

The IHPP ESIA studies have been carried out in accordance with the Environmental Policy, Procedures and Guidelines of the AfDB and have also taken in to account the requirements of the World Bank. Specifically, the ESIA's conform to the AfDB Environment and Social Assessment Procedures (ESAP, 2001). The ESIA's also conform to the national regulations of the Republic of Zambia. Environmental clearance was given for the T-Line component in December 2008 and for the power house component in January 2009.

3.1 Legislative and Institutional Framework

EIA in Zambia is governed by the provisions of the Environmental Protection and Pollution Control Act No.12 of 1990, Statutory Instrument No.28 of 1997 - The Environmental Impact Assessment Regulations. The implementation of the project requires administrative clearance by the Environmental Council of Zambia (ECZ) in conformity with the provisions of the Act. The ECZ is mandated to monitor the implementation of mitigation measures highlighted in the impact study reports.

Other relevant Legislation includes:

- Water Act (CAP 312)
- National Water and Sanitation Act (No. 28 of 1997)
- The Electricity Act (No. 15 of 1995)
- Natural Resources Conservation Act (CAP 315)
- Forestry Act (CAP314)
- Local Government Act (CAP 22 of 1991)
- Zambia Wildlife Authority Act ((No. 10 of 1991)
- Fisheries Act (CAP 314, 1974, 1998)
- Lands Act, 1995 (CAP 292, CAP 289, CAP 288)
- Mines and Minerals Development Act (CAP 320)
- National Heritage Conservation Commission Act(No. 23, 1989)

- International Conventions and Protocols (e.g. RAMSAR, Convention on Biological Diversity)

4 DESCRIPTION OF PROJECT ENVIRONMENT

4.1 The Bio-physical Environment

Topography: The average altitude of the Kafue River Basin is between 1000 and 1200 meters above sea level. The upper Basin is largely mountainous and forested. However, further downstream the topography is gently undulating on a vast plateau, interrupted by ranges of hills and mountains of moderate height. A significant feature of the Basin is the presence of swamps and marshes that regulate the flow of the Kafue River. The flood plain area (Kafue Flats) located downstream of the Itezhi Tezhi Dam cover an areas of approximately 5000km². Due to the impervious nature of the soils, water is mostly lost through evaporation.

Soils: The surface soils are two to five meters thick, with alluvium in the floodplain in the order of 10-12 meters thick. Most of the soils have been formed through weathering of the granitic substrate. The alluvium of the flood plain is mostly sandy.

Hydrology: The total drainage area between the Dam and Kafue Gorge is about 45,400km². The basin is drained by many rivers. The length of the river (from source to its confluence with the Zambezi River) is 1550km, with a total drop in gradient of approximately 1,400 meters. (Figure 2).

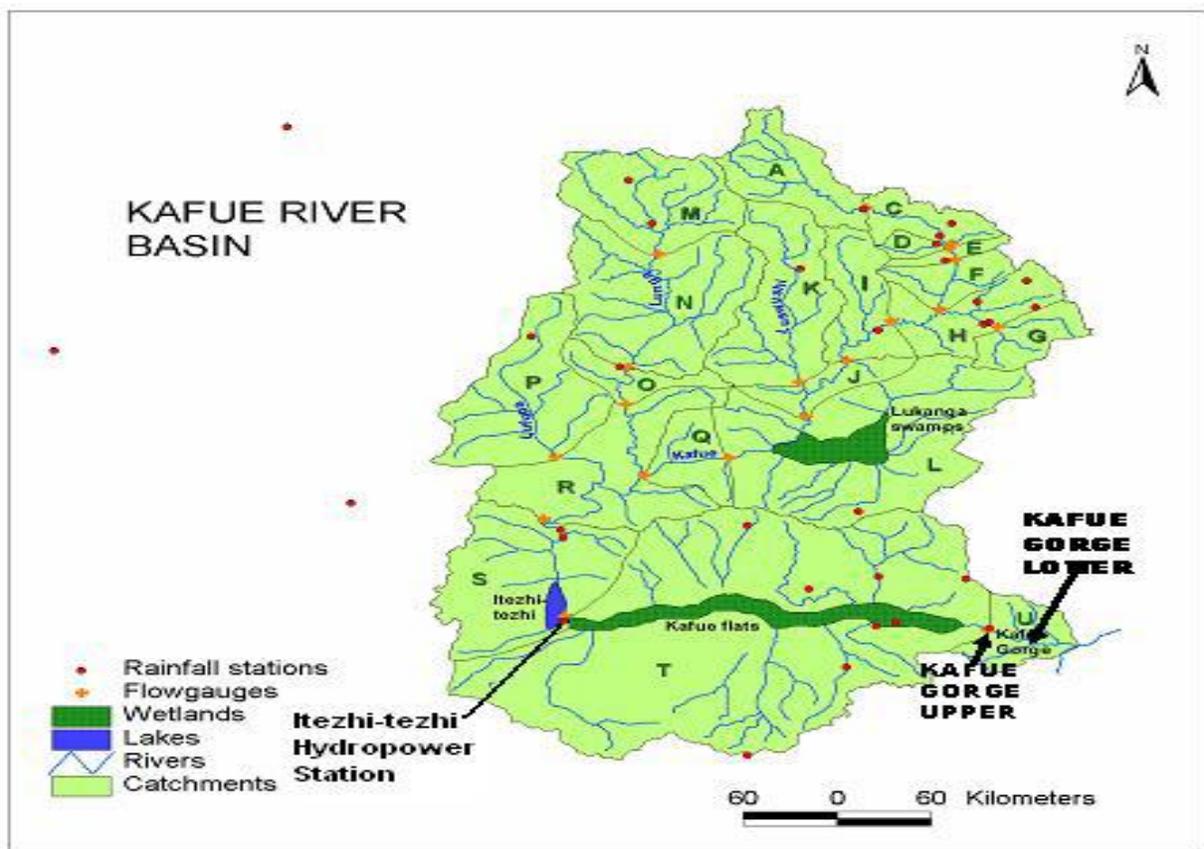


Figure 2: Hydrology of the Kafue River Basin

Meteorology: The climate is generally subtropical continental and can be classified as four main seasons:

April – August	Cool and dry
September – October	Hot and dry
November – January	Hot and wet
February– May	Cool and wet

The annual rainfall for the area is about 687mm, and the average temperature is approximately 19°c .

Seismicity: The project area lies within a minor seismic region, about 200 km west of the more active regions of the East African Seismic System. Frequent low intensity seismic activity occurs, with occasional larger events. Historical data (records kept from early 1900s to 1978) indicates that no earthquakes larger than 5.6 M have occurred within a 300km radius of the dam site. The two largest earthquake events recorded and presented in Table 1.

Table 1: Largest Seismic events with 300 Radius of project Site

Date	Magnitude	Epicenter	Distance from site
15 May 1968	5.6	15 S 26.5 E	20km
12 Aug 1969	5.2	16.6S 28.8 E	80km

Terrestrial habitats: Five (5) distinct habitat types occur in the project area. They include: dry deciduous forest; riparian woodland; open forest with grass; termitaria vegetation; and grasslands. These habitats support a large variety of biodiversity including large fauna, birds, reptiles and rodents.

Protected areas: The Itezhi Tezhi Dam area is bordered by the Kafue National Park (KNP) to the West and the Namwala Game Management Areas (GMA) to the East. KNP has the largest variety of large wildlife species in the country (about 80% of all Zambian mammalian species are represented). These species are distributed throughout the park. The GMA is a buffer zone on the perimeter of the national park. Table 2 shows habitat preference of some big mammals in KNP and adjacent areas.

Table 2: Habitat Preferences of some Big Mammals Predators in KNP and adjacent Areas (After Ansell, 1960, 1978)

Species	Open Woodland and savanna	Dense woodland and thicket	Grassland	Floodplain	Riverine
Elephant	Common	Common	Occasional	Occasional	Common
Zebra	Common	Rare	Common	Common	Rare
Impala	Common	Rare	Occasional	-	Common
Puku	Common	-	Common	Common	Common
Roan	Common	-	Common	Common	-
Sable	Common	Rare	Occasional	-	-
Hartebeest	Common	-	Common	Common	-
Reedbuck	Common	-	Common	Rare	Common
Oribi	Occasional	-	Common	Common	-
Warthog	Common	Occasional	Common	Occasional	Rare
Kafue lechwe	-	-	-	Common	Common
Wildebeest	Common	-	Common	Common	-
Sitatunga	-	-	-	-	Common
Kudu	Occasional	Common	Rare	Occasional	
Buffalo	Common	Occasional	Common	Common	Rare
Eland	Common	-	Occasional	-	-
Oribi	Occasional	-	Common	Common	Occasional
Common duiker	Common	Occasional	-	-	-

4.2 Socio-economic Context

Population: The population of Itezhi Tezhi is approximately 4000. 17 villages occur in the project area. More broadly, the project originates from Itezhi – Tezhi in the Southern Province, and traverses two other provinces, namely Central and Lusaka Provinces. In 2000, Southern Province had a population of 1,212,124 while Central Province had a population of 1,012,257. Lusaka Province (one of the most populous provinces) had a population of 1,391,329.

Settlement pattern, land tenure and land use: The project area stretches over four districts in which the towns are planned and zoned into residential, industrial and commercial/offices areas. In rural areas however, villages are many and scattered but mostly concentrated in places where there is either a school or rural health centre.

The predominant ‘land type’ is customary, followed by state land and leasehold. Traditional Authorities (TA) have rights over traditional land. They have the mandate to recommend to Government, lease to those who want to acquire land. At Itezhi Tezhi, part of the land is under Local Authorities and the Zambia Electricity Supply Corporation Limited; and the land in Kafue National Park is under the jurisdiction of the Zambia National Wildlife Authority.

Land use in the project area is broad and includes: dwellings, grazing, fisheries, hydropower generation, conservation, agriculture, mining, tourism, industry, and commerce and service provision.

Local economy: At Itezhi-Tezhi, ZESCO Limited is the main employer. However, fishing is the main economic activity in the District. Lusaka city and Mumbwa provide the market for the fish. The local authority collects levy on all the fish leaving the District. Tourism is another important economic activity in the area. The department of national parks and wildlife service and the lodges collect revenue from local and foreign tourists who visit the area to view game in Kafue National Park.

More broadly however, across the four (4) districts, farming is a significant economic activity in the project area with many people earning their living from farming and other associated activities such as farm produce trading. The farming of cash crops such as cotton, sunflower and maize is of particular importance. The keeping of cattle is also a major activity. The agricultural produce from both commercial and subsistence farmers is transported to markets in urban centers. Furthermore, the civil service (Government) is the main formal employer.

Public social services: At Itezhi Tezhi the District Hospital caters for people in the town and has bed capacity of about 54 and there are 11 rural centers. More broadly, all the Districts have a general hospital which acts as a referral hospital to all the rural health centers scattered in the Districts.

The four Districts also have many institutions of learning which provide education to the residents. Specifically, Itezhi Tezhi has one high school (Itezhi Tezhi High School), 49 basic schools and 21 community schools. The majority of the schools are concentrated in the rural areas and few are in town.

Piped and treated water supply is provided to the resident in the towns; sewage reticulation is also available. However, in the villages water is drawn from unprotected shallow wells and a few boreholes provided by Government. Pit latrines are commonly use in the villages.

Areas of cultural significance: There are a number of archaeological sites around Itezhi Tezhi Dam area. The Nkala fortified camp is located on Nakalomwe Hill on the western side of the Dam. At Namwembwe Hill west of the Dam, there is a sacred tree that is of mystical and religious importance to the local (Ila) people. However, the proposed project, however, does not affect any known cultural sites.

5 PROJECT ALTERNATIVES

5.1 Justification on the Choice of Technology

5.1.1 Power house options

Technically, the construction of either a surface or underground power house is feasible. However, comparison of the two options based on specified technical considerations and cost implications yielded the results indicated in Table.3.

Table 3: Surface Power House Evaluation Criteria

No	Underground Power House System	Surface Power House System
1	During cavern excavation should heavy ingress of ground water or other geological surprises be encountered, these could result in time and cost over runs	Under similar conditions engineering solutions are less expensive
2	Underground excavation works require higher expertise in deployment of equipment and personnel within a limited space to work simultaneously	Severity of these requirements is relatively less.
3	Underground excavations require adequate ventilation facility to safeguard health of workmen and minimize hazards due to dust and noise	Requirement is less stringent
4	Requirement of auxiliary power will be higher	Relatively lower
5	In the present case, surge shaft is not required	Surge shaft is required
6	Total project cost excluding T-line works is about 173 million USD	Total project cost excluding T-line works is about 165 million USD
7	Project execution time – 52 months after award of contract	Project execution time – 42 months after award of contract
8	Enhanced risks due to flooding and fire hazards	Risks are relatively less severe. Emergency evacuation could be done in a shorter time
9	Less vulnerable to seismic induced damage	Relatively more vulnerable
10	Less vulnerable to risks of war damage, terrorists attacks, vandalism, etc	Risks are there

It was concluded that the surface power house option would be more viable vis-à-vis in comparison to an underground power house.

Construction of the surface power house will involve: excavation - approximately 140,000m³ of rock will be removed and dumped (although it is anticipated that 30% will be used during construction works); diversion of the road to Namwala and provision made for a bridge crossing over the power house tailrace as a permanent arrangement. The total length of the bridge would be about 40m; and construction of office accommodation, stores and workshop (as had also been planned for the underground option).

5.1.2 Transmission line options

The Route selection process was conducted using various methods and evaluated based on constraints (environmental, social, distance and cost implications). Physical features and broad social parameters of the areas were among the evaluation criteria considered when selecting the route (Table 4).

Table 4: T-line Route Evaluation Criteria

Evaluation criteria	ITT-Muzuma	ITT-Mumbwa-Lusaka West Upper	ITT-Mumbwa-Lusaka West Lower
Length of T-line	Approximately 360km	Approximately 350km	Approximately 273km
Construction costs (based on anticipated impacts, distance & type of line structure, conductor & insulators)	Higher (due to anticipated compensation, foundation costs in flood plains)	High (due to compensation for crop land, dwelling structures, GMA and park permits)	Moderate (since it avoids many settlements, the GMA, the park and is shorter)
Settlements/Agricultural land	Several around Namwala, Choma (near Njase) & into Muzuma east of Choma	Few sections in Chief Kaingu's, then Moon, Shakumbila and Nkomesha	Few sections in Kaingu, Chilyabufu, Moono, Shakumbila and Nkomesha
Game Management area	Non	Namwala GMA	Non
Protected Areas (National Park)	Non	Kafue National Park	Non
Protected Area (Forest Reserve)	Non	National Park wood land	Non (Avoids Sanje Forest Reserve)
Wetland Areas/Flats	Part of Kafue Flats, Naminwe flood plains and several dambos over long distances	Partly into the Kafue Flats & several but short low depressions (north of Banamwaze) that get waterlogged during the wet season.	Partly into the Kafue Flats & several but short low depressions (north of Banamwaze) that get waterlogged during the wet season.
Archaeological/ Historical	Not known	Not known	Not known
Accessibility	Restricted in dambos (west of Namwala & Maala) & the Kafue Flats	Marginally accessible (would require new access road in some sections)	Fairly accessible in most sections using existing road infrastructure
Security of supply	Restricted since it does not offer much flexibility into the grid	Good: it provides flexibility & a new transmission corridor into the grid	Good: it provides flexibility & a new transmission corridor into the grid
Extension potential	Low/Limit	Restricted into Western & North-western provinces due to KNP	High into Western (restricted) and North Western Province

The Itezhi Tezhi – Mumbwa – Lusaka West route was chosen. The T-line is 273km long and generally traverses through less socio-economic and environmentally sensitive areas.

Construction/ installation of the T-line will mainly involve: bush clearing; foundation construction; tower erection and accessory fitment; stringing; and energizing.

5.1.3 No project option

The “no option or zero option” alternative was not considered because the power deficit situation in the country needs be addressed urgently to avoid adverse impact on the growth of the national economy. Electric energy is one of the key ingredients in economic development and subsequently poverty alleviation. Doing nothing therefore, would not be in line with the Governments policy on economic and rural development.

6 POTENTIAL IMPACT OF THE SURFACE POWER HOUSE

6.1 Impact Period

The main impact period is *Construction*: construction of the surface power house and associated project infrastructure (such as the water and sewerage reticulation system, housing and workshops). The blasting, excavation and drilling of the rocky terrain although confined to specific sites will result in permanent change to the physical landscape (geology) and may also result in minor and temporal seismic activity. Other impacts are anticipated to be localized and temporal.

6.2 Impacts on the Natural Environment

Geology and soil: the proposed location is rocky, construction works will involve blasting with explosives, drilling and excavation. These activities will generate large quantities of rubble in form of stone, aggregates and soil. Blasting, drilling and excavation may result in loosening of rocks on the hill leading to periodic rock falls, which is a safety hazard.

Topography: Part of the hill will be excavated to facilitate the construction of the surge chamber and the power house itself. The topography of the area will be modified since part of the hill (towards the foot of the hill) will be excavated to accommodate the power house.

Hydrology and Water Quality: The Kafue River is less than 1km from the proposed site for the power house. Excavations and other construction works may increase the sediment load arising from the waste water mixed with soil that may flow from the construction site; this may affect the fish and other forms of aquatic life.

Landscape and Scenic beauty: The power house will be located at the foot of a hill and part of the hill excavated to facilitate the construction. Secondly, many trees will be cut at the power house site. These activities will distort the landscape and scenic beauty of the area.

Air Quality and Noise: construction works will involve blasting with explosives, drilling and excavation. These activities will generate noise which will be a nuisance to the tourists and people living in the vicinity of the project (Itezhi Tezhi town, Musungwa and Kalala Lodges, and the villages). Construction activities, particularly blasting, drilling and excavation, will generate dust emissions which will affect the workers on site and other people in the vicinity.

Waste Generation: Construction will produce waste such as concrete, steel bars, bolts, nuts, cables, cable drums, waste oils, paper, plastics, metal, woody vegetation and domestic waste which have adverse impacts on the environment. Construction will produce large quantities of rubble from the blasted rock.

Loss of Vegetation: Removal of natural vegetation is inevitable during construction. Indiscriminate removal of vegetation may induce soil erosion from runoff rain water considering the fact that the power house is located at the foot of the hill and may also lead to a permanent loss of some tree species in the immediate project area. Vegetation removal on the banks of the Kafue River may lead to erosion of the banks and may increase the sediment load of the river. The riverine ecosystem may also be affected by vegetation removal.

Disturbance of Wildlife: There is high risk that some of the workers may engage in poaching of wildlife using guns, snares and other methods. The power house may also partially block the corridor to the river for some animal species. The cutting of trees and excavation may also lead to habitat destruction for some small animals, birds and reptiles and some may be killed.

6.3 Impacts on the Social Environment

Health: If proper water supply and sanitation facilities are not put in place at the site, there is the risk of waterborne diseases such as diarrhoea, dysentery and typhoid breaking out among the workers. Various types of accidents may also occur during construction. Furthermore, communicable diseases such as HIV/AIDs and sexually transmitted infections (STIs) may spread.

Safety on Site and on the Road: Location of the power house at the foot of a hill on the road to Namwala, Ngoma ZAWA camp, Kalala and Musungwa Lodges will obstruct the smooth flow of traffic and may lead to an increase in road traffic accidents.

Destruction of Archaeological Heritage: Although there are no known archaeological sites at the proposed power house site, however artefacts may be found during construction. Excavation works may lead to the destruction of such artefacts.

6.4 Impact Mitigation

Most of the project impacts are anticipated to occur during construction, once construction has taken place, few significant impacts will be directly associated with the project. The mitigation measures proposed for the most significant impacts identified are described in Table 5:

Table 5: Mitigation measures for potential impacts of significance

Topic	Type of impact	Mitigation measures and comments
1.0 Physical Environment		
1.1 Geology and Soils	Rock destabilisation and stone rubble generation	To stabilize the slopes of the hill, gabions and other environmentally friendly methods should be employed. The rubble (rock and aggregates) should be used in various construction activities and the excess should be dumped in designated areas. Landscaping should be done at the end of the project to prevent soil erosion.
1.2 Topography	Distortion of topography of the area	Slope stabilisation should be done using gabions and other environmentally friendly methodologies. Grassing as opposed to shot creting should be done. Site restoration and landscaping in work areas should be done.
1.3 Hydrology	Water Quality effects	Settling ponds should be constructed to allow the suspended sediments in the waste water to settle in the ponds before the waste water is discharged in the Kafue River.
1.4 Landscape	Scenic beauty distortion	Vegetation removal should be kept to a minimum by ensuring that only trees on the direct area of construction are removed. A re-vegetation programme should be implemented at the end of construction to plant trees and grass to facilitate ecological restoration around the Power House.
2.0 Biological Environment		
2.1 Flora	Deforestation	Vegetation removal should be kept to a minimum by ensuring that only trees on the direct area of construction are removed. A re-vegetation programme should be implemented at the end of construction to plant trees and grass to facilitate ecological restoration.

2.2 Fauna	Disturbance to wildlife	A vigorous campaign for anti-poaching and environmental conservation should be instituted. Any animal, bird or reptile that is found during construction should be rescued and released in the natural environment nearby.
3. Socio-economic Environment		
3.1 Health	Health risks	Clean and safe drinking water should be provided on site. Water borne toilets, and not pit latrines, will be provided in designated areas for use by construction workers. Rubbish bins will be provided for domestic waste which will be collected and disposed in designated places. Health awareness campaigns should be conducted regularly to educate workers and the local community on the dangers and prevention of HIV/AIDS, STIs and other communicable diseases.
3.2 Safety	Accident risks on site and on the road	Appropriate road signs should be placed on the Itezhi Tezhi – Namwala road, which will be re-routed. A speed limit of 30km/h will be set for all motorists driving in and around the construction area. Regular safety awareness campaigns will be conducted. Work areas will be clearly be clearly labeled and all workers and visitors will be required to wear appropriate protective clothing. First Aid training should be provided to all the workers and a First Aid box should be available on site all the time.
3.3 Archaeological and Heritage sites	Disturbance to Archaeological and Heritage sites.	Workers should be sensitized on the need to watch out for archaeological artefacts. If any artefact is found, National Heritage Conservation Commission should be contacted immediately for advice on how to conserve them. A hotline will be provided to the supervisors and foremen to ensure immediate notification of relevant authorities on discovery of artefacts

7 POTENTIAL IMPACT OF THE TRANSMISSION LINE

7.1 Impact Period

The main impact period is *Construction*: installation of approximately 300 km of T-line. The Acquisition of the way leave will result in the some permanent resettlement (dwellings) and temporal displacement of land use (subsistence agriculture). Furthermore, the occurrence of blasting at isolated spots along the routing will result in the most significant impact (geology, seismicity). The erection of the towers will have a significant impact on aesthetics especially as the routing is through touristic areas. Other impacts are anticipated to be localized and temporal. During maintenance, vegetation that has overgrown will be cleared from access roads. The opening up of previously inaccessible areas (in the vicinity of the protected area) may result in forest degradation and increased occurrence of poaching.

7.2 Impacts on the Natural Environment

Geology and soil: localized blasting and drilling during construction of the line foundations may cause rock movement and breakages, disturbing the general geology. However, such disturbance will be confined to the construction period only. Furthermore, areas with sandy soils (e.g. Itezhi Tezhi town, north of Lubanda and some areas around Banamwaze) may be susceptible to soil erosion due to machine disturbance during construction; upland soils around Mumbwa may be subjected to water erosion on steep slopes after disturbance by foundation excavations and use of heavy equipment.

Topography: Although the proposed T-line route avoids hills in the project area, undulation areas may be affected due to use of heavy equipment and bush clearing (for way-leave), which also increases susceptibility to water induced soil erosion when the area is opened up.

Seismicity: blasting may induce minor localized earth movements though this will not be of similar magnitude as the frequent low intensity seismic activities (and occasional larger events) experienced occasionally at Itezhi Tezhi. Use of dynamite (and other explosives) around Lusaka West substation may induce localized earth shaking.

Hydrology and water quality: The T-line will cross the Kafue River once and over many streams into Mumbwa and then Lusaka west substation. Use of construction equipment for materials haulage, access road construction and during maintenance of the T-line could cause stream bank erosion. Over the Kafue River crossing, use of water transport will be required which may result in water pollution due to use of fuels and lubricants. Greater impacts will occur if construction occurs during the wet season.

Landscape and scenic beauty: The two types of towers that will be used will result in visual protrusion on the landscape. The double circuit towers and self supporting Guyed Vee towers will be of a particular height in order to meet the minimum ground clearance required by international standards. The towers will be above most tree lines, especially in the Kafue Flats, and will stand out.

Air quality and noise: Air quality may change due to pollution from construction. Blasting and drilling for foundations in rocky areas and use of heavy vehicles will produce localized air pollution. In the long –term, indirect activities - Industrial activities resulting from the provision of electricity may also contribute to air pollution in the study area. However during line operation maintenance, no such noise and less air pollution will be experienced.

Waste generation: significant wastes such as human waste, construction waste and general house hold wastes from consumption will be generated during the construction period.

Loss of vegetation: T-line construction includes bush clearing. A way-leave of 50m width (25m from the centre of the line on either side) will involve cutting down of trees resulting in the opening up of forested areas. Plant species heterogeneity may be affected and subsequently affect both grazing and browsing animals. Way-leave clearing will also hence increase vulnerability of soil to degradation in open forest areas. There is also a danger that deliberate fires may be started by construction workers.

Disturbance of wildlife: The way-leave for the proposed T-line could open or truncate some migratory routes for wild animals from the GMA and KNP such as Elephants and antelopes. However, open areas under the way-leave could also provide new grazing grounds for animals, especially antelopes. Disturbance may lead to the death of some animals with low mobility. Poaching may occur.

7.3 Impacts on the Social Environment

Settlements and land use: The project area stretches over four districts in which some settlements will be affected and relocation required. Specifically, 101 households will have some form of asset displaced. The way-leave acquisition for the T-line will not entail conversion of land into a different land tenure system. However, the land for the proposed substation in Mumbwa will be converted from customary to leasehold. Land use under the T-line will be restricted to activities such as animal, grazing, growing of low crops (but not under irrigation) and access (traversing).

Employment creation and impact on economic activities: The magnitude of the T-line project will entail creation of employment opportunities for both unskilled and skilled labor in the local

communities. It is envisaged that during annual bush clearing, the contractors will create employment for locals in their respective sections on the T-line. Planned new developments such as agricultural expansion, tourism and mining in Lusaka West will be supported by availability of reliable electricity supply from the proposed T-line.

Health: The influx of people in the project area seeking employment may create stress on public health services. For instance, a potentially serious adverse effect of a project work force on local people is the introduction of infectious diseases, especially sexually transmitted ones (such as HIV/AIDS).

Safety on Site and on the Road: Various types of accidents may occur during construction.

Destruction of Archaeological Heritage: The proposed line project will cover a distance of approximately 300km over which some heritage resources may be discovered or disturbed during construction. However, most of the documented heritage and archeological sites in Itzhi Tezhi and other Districts outside the proposed project area, and will not be affected by the proposed line.

7.4 Mitigation and Enhancement Measures

The mitigation measures proposed for significant direct impacts identified are described in Table.6.

Table 6: Summary of environmental impacts and mitigation measures

Impact	Associated Impact	Mitigation
Bush clearing	Soil erosion	Trees will be stumped to encourage re-growth; Access roads will be compacted where feasible; Use of heavy equipment will be avoided in erosion prone areas such as steep slopes; clearing will be restricted to prescribed way-leave in riverine areas;
	Bush fires	Workers will be sensitized against causing bush fires; all wood will be surrendered to local communities
Danger of electrocution	Vandalism	Construction workers and local communities will be sensitized against tampering with the line; pylons and cables will be clearly labeled with dagger signs and protective features will be put in place
Wildlife depletion	Poaching	Prevention of bush fires that could destroy animal habitats;- Sensitization of workers against poaching;-Placement of bird diverters on the line in identified migratory sections of the line;- use of toxic chemicals (herbicides) will be avoided when bush clearing to avoid contaminating wildlife habitats
Public Health	Introduction of disease	Awareness campaigns among workers & communities against diseases such as HIV/AIDS;-Use of mobile toilets or pit latrines in designated areas during construction;-Disposal of waste in designated areas and in a prescribed and acceptable manner only;-Establishment of campsite in areas less ecologically sensitive
Pollution/Waste	Introduction of communicable disease	Disposal of waste in designated areas only; avoid disposal of waste in ecologically sensitive environments such as water courses
Hydrocarbons waste (oils and lubricants)	Water/soil contamination through leakages	Procure Polychlorinated Biphenyls (PCBs) free transformer oil; Construct oil interceptors and containment chambers around transformers in substations; Setup workshops in less sensitive areas with appropriate oil interceptors
Settlements	Resettlement /relocation	Deviation of line to avoid built-up areas where necessary; compensation of displaced households based on an independent valuation report/assessment

Economic co-benefits	Labour influx/in migration	Hiring of unskilled labor locally to create employment; local farmers and suppliers will be encouraged to service project contractors
Culture and heritage	Destruction	Inform local leadership and NHCC for recovery and preservation; Use of the EMP for guidance on handling
Construction activities	Material usage	Source construction materials locally where applicable and subcontract locals; Use road worthy construction equipment; Use standard construction methods such as watering access roads to reduce dust

8 ENVIRONMENTAL HAZARD MANAGEMENT

The project sponsor ZESCO, has implemented a behavior-based safety observation tool and senior leadership training aimed at strategic and operational aspects of effectively managing safety. In order to protect the local population from major sexual and infectious diseases for example, public health awareness will be carried out. The project management team will arrange for sex education among project labour and the community in collaboration with the Ministry of health in the respective districts. These educational campaigns targeting both the local community and construction workers will be given at regular intervals throughout the construction period.

9 ENVIRONMENTAL AND SOCIAL MONITORING PROGRAMME

The successful implementation of the project Environmental and Social Management Plan (ESMP) requires co-operation between the various parties involved in project construction.

The ESMP provides details on: guidelines for preventative and mitigations measures¹; and the duties and responsibilities of the project developer and contractors with respect to environmental management and protection during the construction and operational phases. The Contractor is required to comply with all requirements and to include the cost of compliance in the contract price.

ESMP Cost: The Budget for ESMP implementation is US\$ 206080.00 and US\$275000.00 for the T-line and power station components respectively; the allocations include compensation costs (land acquisition/relocations). These costs will be included in the overall project budget.

Institutional arrangements: The project developer will appoint an Environmental Coordinator (ECO) to monitor implementation of the ESMP; contractors will also be required to appoint a site Environmental Officer who will work in close collaboration with the ECO. Furthermore, due to the size and nature of the project, the project developer will also appoint a Safety Officer, who will ensure health and safety standards are followed; on their part contractors will also be required to have a safety officer on site who will maintain close liaison with the developers officer.

¹ For site establishment, excavations, blasting, use of heavy duty machinery, waste management, safety, soil erosion, noise and dust nuisance, water pollution, disturbance of archaeological and cultural sites, deforestation, wildlife, general pollution, disruption of the socio-economic state, employment and other benefits to local communities.

Monitoring: The project developer has a dedicated Environment and Social Affairs Unit with oversight over environmental issues. Staff will be made available to the project. The Environmental Council of Zambia (ECZ) will visit the site periodically for environmental monitoring.

Other institutions and Government offices that will be contacted to ensure successful implementation of the ESMP include: Ministry of Energy and Water Development; Ministry of Tourism Environment and Natural Resources; Ministry of Lands; Ministry of Local Government and Housing; Ministry of Education; Ministry of Health; Ministry of Mines and Minerals Development, and Ministry of Transport and Communication.

Reporting: The ECO will prepare weekly, monthly, quarterly and annual reports. The quarterly report will be sent to the ECZ, Department of Energy and District Commissioners.

10 PUBLIC CONSULTATION

Scoping exercises were undertaken. With regards to power generation component, the exercise was undertaken when raising the height of the dam was under consideration. Potential affected persons and stakeholders including chiefs and government institutions operating in the area were consulted. . With regards to the T-line, consultations took place between April and August 2008; Headmen, local communities, the local business community, and households residing along the proposed route participated in the meetings. The scoping reports are annexed to the ESIA documentation. Key participants from government included the Zambia Wildlife Authority and District Council officials.

11 COMPLEMENTARY INITIATIVES

The magnitude of the project will result in co-benefits, the creation of employment opportunities for both unskilled and skilled labor in the local communities. Furthermore, provision of electricity will promote economic development in the rural districts. The project will enhance social service delivery: health care; telecommunication; recreation trade and commerce; and infrastructure development in mining and agriculture.

12 CONCLUSION

The Project impact assessment has demonstrated that significant impacts will affect both the physical and social environments. Construction will permanently alter the geology of specific sites and routing of the T-line will displace some dwellings permanently and land use temporarily. Other associated impacts will be mostly minor and/or temporal.

The project sponsor will need to ensure that contactors comply with requirements of the ESMP. The need to issue Environmental Compliance Reports will have to be stated and fully described in contracts. However, good working practice, health and safety, are usually components of company procedures.

To ensure implementation of the proposed mitigation, monitoring and positive impact enhancement aspects, it is recommended that the mitigation and monitoring costs be included in the total project cost.

13 REFERENCES AND CONTACTS

13.1 References

The following documents have been referred to: African Development Bank's Public & Private Sector Operations 2001, Environmental and Social Assessment Procedures; Initial EIA Report of the Itezhi Tezhi Hydro Power Project, and addendum on Surface Power Station (2008); Power Station ESMP (2009); Itezhi Tezhi Hydro Power project Transmission Line ESIA (2008).

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

SUMMARY ANNEX I

SUMMARY RESETTLEMENT ACTION PLAN (RAP)

Project Name: Itezhi-Tezhi Hydro Power Project

Country: Zambia

Project Number: P-ZM-FAO-003/ P-Z1-FAB-007

1. Description of the project, project area and area of influence

1.1. The project has two components which are construction of a 274 km transmission line to evacuate power from the Itezhi Tezhi (ITT) hydro power station and the development of the hydropower station at Kafue dam. ZESCO limited intends to construct a 220/330 kV transmission line to evacuate this power from the Itezhi-Tezhi hydropower station into the national grid at Lusaka West. With the construction of the Kafue dam and the Kafue Gorge Power Station, there is still great potential for further development of hydropower in Kafue basin and the Government intends to build two additional power stations along the Kafue River (Itezhi-tezhi – 120MW and Kafue Gorge Lower 750MW). This project hence is the construction of the Itezhi-Tezhi 120 MW power station.

1.2. The route of the transmission line passes through four districts of Itezhi-Tezhi, Mumbwa, Chibombo and Kafue. The line will start at the proposed switch yard on the south bank of the Kafue River at Itezhi-Tezhi, traversing through a short section of the Kafue Flats east and then cross the river to the north bank; turn east and terminate at the new substation at Mumbwa. From there it will be up-rated into a 330 kV section to Lusaka West substation. The proposed Itezhi Tezhi Hydropower project is located in the Itezhi Tezhi District in Southern Province of Zambia. The power plant will be built adjacent to the existing Itezhi Tezhi Dam and will utilize the water of the reservoir.

Project alternatives

1.3. Various alternative options were considered in the selection of the line routing. These included environmental, social and economic parameters. The first option was to construct the power line from Itezhi–Tezhi to Muzuma substation in Choma. The line would cross the Choma – Kalomo road (T2) mid-way between Choma town and Kozo Lodge then into the substation at Muzuma. On this option the line would have been about 360km long. The second option is a proposed line to originate from a switch yard on the south bank of the Kafue River at Itezhi - Tezhi. On this option, the line would cross the Kafue River east of Itezhi-Tezhi, then run through Namwala Game Management Area, then through Nalusanga gate into a new substation at Mumbwa. The line would then be placed on the south side of the Lusaka – Mongu road till it crosses at a point near Nangoma then into Lusaka west substation. This option would have been about 350 km long. The third option is the lower line route proposed to originate from the Itezhi-

Tezhi switch yard on the south bank of the Kafue River at Itezhi Tezhi dam. The line will be between the Namwala Road and the Kafue River through Choma and Khuta Farms on the south bank of the Kafue River. The line will therefore traverse through several Chiefdoms from ITT, namely; Shimbizi, Chilyabufu, Muwezwa, Chibuluma, Moono, Shakumbila, part of Mungule and into Nkomesha in Lusaka West. This option is generally passing through less socio-economic and environmentally sensitive areas, hence selected for development.

2. Potential Impacts

2.1. Activities that would give rise to resettlement would include, the transmission line (i) bush clearing, (ii) transmission line construction, (iii) construction and siting of associated construction camps, (iv) opening up access roads in the way-leave, and substation construction at Mumbwa. On the hydropower station, it suffices to say that the dam is already in existence and situated in an area whose land belongs to ZESCO. However, over the years and due to changes in district administrative jurisdiction, ZESCO will have to reclaim some pieces of land to ensure no obstruction to the power station activities including raw water intakes for the power station; emergency spillway discharge channel; switchyard construction at Itezhi-Tezhi; and land near sewerage ponds. With this, the potential impacts on settlements are within the context of the transmission line rather than the hydro-power station.

2.2. **Impacts pertaining to resettlement:** Resettlement will have to take place to give way to the way-leave and also on community health and safety considerations. Fears and concerns over potential impacts of exposure to Electric and Magnetic Fields (EMF) from high-voltage power lines and substations; and hazards such as those resulting from electrocution from direct contact with high-voltage electricity. The EHS guidelines recommend that objects, such as fences or other metallic structures (e.g. hand pumps) that are located near the lines should be grounded or resettled.

2.3. In order to mitigate against EMF risks, ZESCO Limited has various approaches, environmental and safety guidelines such as way-leave guidelines and the general safety Rule Book revised and updated in 2007. Public health awareness campaigns are conducted among construction workers and the communities in project areas.

2.4. **Physical displacement:** There are a total of 101 locations or households, representing approximately 404 persons at an average household size of 4 people where displacement has been identified. These include homestead structures that will be affected (physical displacement) by the construction of the lines. In line with the African Development Bank policies and other funding agencies on involuntary resettlement and displacement, it is ZESCO's practice to align any transmission line to avoid affecting households and other infrastructure. The ITT line project despite the distance the actual displacements are likely to be relatively low. Some structures will also be affected by construction of the access roads, substation and other associated infrastructure. These may cause rise to the resettlement and relocation of homestead structures in the project area.

2.5. **Economic displacement:** Development of a 50 m swath of way-leave and construction activities will affect various portions of agricultural crop fields and some livestock enclosures depending on the timing of the construction. The on-going valuation assessment shall outline the affected livestock dwelling structures. Effect on agricultural fields may not be fully known

at the moment since most of the farming activities in the project area are seasonal. Crop damage will occur if construction activities in some portions will take place before harvesting. However, compensation is worked out in collaboration with the Ministry of Agriculture. Fence damage may also occur although this is embedded in the line construction contract. The access road to be constructed for construction and maintenance purposes of the line will have a long-term impact on agricultural fields. It is always ZESCO's desire to minimize economic impact by aligning the route in isolated and less inhabited areas.

3. Organizational Responsibility

3.1. Planning implementation and management of the RAP will be conducted by a range of project authorities, decision-makers and departments and district government authorities in consultation with affected people.

3.2. ***The Environmental Coordinator:*** At the level of ZESCO Limited, the Environmental Coordinator (ECO) is responsible for planning, implementation and on-going management of all compensation issues on the project. The ECO in consultation with the project/site manager is responsible for consulting with the local community on compensation schedules. This includes:

- (i) Ensuring compliance with agreed mitigation measures in the EMP including contractor's movement on the line, construction schedule and land access schedules.
- (ii) Ensuring that compensation requirements are met before commencement of construction.
- (iii) Liaising with communities and the contractor for and any grievance that may delay project implementation; and
- (iv) Implementing the re-location plan.

3.3. ***ZESCO Limited Capital Cost Controller:*** The Capital Cost Controller (CCC) will assist the project team with the administration and control of the field activity and relocation budget, e.g. by recording expenditure and by reporting on trends and variances so that management is warned in advance of potential problems; more importantly to provide funds in a timely manner for compensation.

3.4. ***Projects Consultants and Contractors:*** The Consultants and Contractors will assist the ECO in locating any affected persons that may have been missed during the first asset survey; assisting the ECO to follow up on relocations providing the relevant information required to implement the relocations; provide description of skills that will be required for the locally sourced construction labor to evaluate which of the affected persons may qualify for employment.

3.5. ***The Project Team and Composition:*** The Relocation Project Team members shall be required to ensure that the project is implemented successfully and provide progress reports to the company management and other stakeholders. The Team shall comprise:

- The Project Manager
- The Site Manager
- Electrical Engineer

- Civil Engineer
- Environmental Coordinator

4. Community participation

4.1. **Communities** have been consulted during the design and preparation stages of the RAP. Thorough consultations were held during the scoping exercise and issues raised continue to be addressed. Given the length of the transmission line, ZESCO has made every effort to minimise the number of affected persons, in addition ZESCO's practice is to maximize employment of affected people during construction and operation especially for way leave maintenance. Affected persons raised concerns regarding the following:

- (i) **Resettlement:** What would happen to people whose houses will be demolished by the project? Measures will be taken to ensure that the number of house affected is kept to the barest minimum.
- (ii) **Land Tenure:** No impact will occur on the existing land tenure, except for the proposed new substation at Mumbwa.
- (iii) **Land Use:** Land use in the project area may be affected where land under the power line will be restricted to short crops and animal grazing. There shall be no structures (buildings) in the power line way-leave and farming in the way-leave will also be restricted.
- (iv) **Fishing:** Fishing will not be adversely affected and fishing communities will continue to fish in the river and dam to supplement incomes and nutrition.
- (v) **Local Economy:** The construction of the power line will benefit the local economy. People in the area will be employed and will be able to earn some income and in so doing provide ready market for produce and other goods.
- (vi) **Mining:** There is one commercial mining (Luri Gold Mine) activity in Mumbwa and none in the vast sections of the project area. The mining activities will not be interrupted by the project.
- (vii) **Energy:** The project will help reduce reliance on charcoal and wood as electricity will be made available. This will reduce deforestation.
- (viii) **Water and Sanitation:** The project will attract some people from outside the project area hence sanitation situation can be affected negatively leading to outbreak of diseases.
- (ix) **Health:** Once construction starts there will be some people from outside the project area who will be employed on the project. This may lead to the spread of communicable diseases such as STIs, HIV/AIDS and dysentery.
- (x) **Education:** The project will have some positive impacts on education in the area as some schools will be electrified.
- (xi) **Employment:** There will be temporary employment opportunities to the local communities during construction.
- (xii) **Infrastructure and Social Services:** The infrastructure and social services in the project area are not well developed. The economic developments induced by the project will have positive spill-over effects on the development of infrastructure and social services.
- (xiii) **Cultural, Archeological and Historical Environment:** There are no known cultural and archaeological sites in the project area. However, excavation and other construction activities may lead to the discovery of new cultural and archaeological sites and these will be handled under the "chance find" procedures.

5. Integration with host communities

5.1. Since the project shall involve linear relocation often within the same compound or within the same village, there will be no issues that are associated with the dynamics of host communities, nor the need for provision of additional services to curb demand increases due to resettlement.

6. Socio-economic studies

6.1. **Population and Demographics:** The proposed transmission line originates from Itezhi – Tezhi in the Southern Province and traverses two other provinces, Central and Lusaka Provinces. In the project area, according to the 2000 Census of Population and Housing, ITT had a population of 43,111 of which 22,170 (51.4%) were males and 20,941 (48.6%) were females and Mumbwa had 158,861 of which 79,066 (49.8%) were males and 79,795 (50.2%) were females. Chibombo District had population of 241,612 of which 121,948 (50.5%) were males and 119,664 (49.5%) were females while Kafue had 150,217 of which 77,001 (51.3%) were males and 73,216 (48.7%) were females. The project area has 9 wards with a combined population of 60,851 as follows: 3 wards in Itezhi– Tezhi; 4 wards in Mumbwa; 1 ward in Chibombo and 1 ward in Kafue District.

6.2. **Settlement Patterns and Traditional Authority:** The project area stretches over four districts in which the four towns are planned and zoned into residential, industrial and commercial/offices areas. Houses are built in designated residential areas. Settlements in the rural parts of the Districts are organized in form of villages. A group of villages in a defined geographical area make up chiefdom, headed by a chief. The villages in this area are scattered but concentrated in places where there is a school or rural health centre. There are two predominant groups in the area, namely; Ila and Sala people. However, dwelling structures in rural areas are mainly traditional while some families have improved dwelling structures.

6.3. **Local Economy and livelihoods:** Farming and associated activities such as trading in farm produce are the most dominant economic activity in the project area. Cash crops include cotton, sunflower and surplus maize. Cattle keeping are a major activity in Lubanda and Banamwaze. In addition, people in the project area are involved in fishing activities. The ITT dam and the rivers in the project area provide abundant fishing grounds. Tourism is also a growing economic activity, especially in ITT. Mining is also one of the growing economic activities in Mumbwa. There are several government institutions (civil service) and non-governmental organizations in all the districts which offer employment opportunities.

6.4. **Land Tenure:** The land tenure system in the project area can be categorized into three: leasehold, state and customary. The land allocation system is normally through traditional leadership with endorsement from local authorities. However, within council boundaries, land is under the control of the District Councils; and land in the outskirts of town is under the jurisdiction of traditional chiefs. The GMA, Forest areas and other protected land parcels are state land managed by quasi and Government entities such as the Zambia Wild Life Authority and the Forestry Department. Leasehold title holders include farmers, agro processing industries, mining companies, non-Governmental organizations such as churches and individuals.

- 6.5. **Land use:** Land use in the project area includes: dwelling, grazing, fisheries, hydropower scheme, conservation, agriculture, mining, and tourism, industrial, commercial and service provision. The area under the Local Authority is divided into residential, commercial, industrial and services (churches, schools etc). The flood plains are used for cattle grazing and fishing. In urban and peri-urban areas, land is demarcated into three main zones, namely residential, office/commercial and industrial zones.
- 6.6. **Planned development activities:** In ITT, the new local Council has come up with a development plan for the Council area that includes zoning off the area into residential, commercial and industrial. Mining prospectors and commercial agriculture has been increasing in Mumbwa. Other planned developments are in the social sector such as office blocks, residential houses, guesthouses, recreation clubs, upgrading of schools and other social facilities. In the vicinity of Lusaka West Substation, new developments include water harvesting, agricultural expansion, tourism and mining.
- 6.7. **Employment:** The main employers in the area are: Civil Service (teachers, health workers, community development, social welfare, agricultural extension, police and immigration), ZESCO workers, Zambia Wild Life Authority Officers (ZAWA), Zambia Telecommunication Cooperation (Zamtel), Municipal Councils, private sector driven especially, Transportation, Telecommunication, Local Authorities and NGOs. Farming is the most common occupation in the rural areas including trading in agricultural produce. However, due to the proximity of the KNP and Namwala GMA, tourism also contributes in employment opportunities.
- 6.8. **Infrastructure and Social Services:** All the 4 districts have infrastructure and services such as telecommunication, shops and schools among others. There are small shops in the project areas stocking groceries and household commodities. More-over, at district centers are television, telephone and GSM mobile coverage, banks and big shops. Much of the rural areas have access to radio, although only few households have radio receivers and a few selected places have mobile network in the project areas.
- 6.9. **Water supply, Sanitation and Waste Management:** The established towns of ITT, Mumbwa including Chibombo have municipality water and waste management services. Some of the services are provided by utilities such as ZESCO. In villages and households along the proposed line route have traditional waste pits for waste management. In Itezhi-Tezhi the municipality is also assisted by ZESCO on collection and disposal of domestic waste.
- 6.10. **Health:** There are a number of health facilities available in the four Districts. All the Districts have a general hospital which acts as a referral hospital to all the rural health centres scattered in the Districts. The ITT District Hospital caters for people in ITT town with the bed capacity of about 54 beds in 7 wards and 11 rural centres. Mumbwa District Hospital has approximately 80 beds spaces and 28 Rural Health Centers which are under the District Hospital's Administration. The most common diseases in the project area are malaria, diarrhea, respiratory infections and sexually transmitted infections (STIs) including HIV/AIDS related, upper respiratory, eye infection, skin infection, T.B, acute abdominal like appendicitis.
- 6.11. **Education:** The four Districts have many institutions of learning which provide education to the residents. ITT has one high school namely ITT High School; ITT has also has 49 basic schools and 21 community schools. The majority of these schools are concentrated in

the rural areas and few in town. Combined enrolment for basic and primary schools was 13,638 of which 6,920 were boys and 6,728 were girls, representing an almost 50-50 enrolment sex ratio. While there many primary schools scattered throughout the districts, there is need to build more to cater for the population. Staffing in the rural schools in the districts is generally low as many teachers, especially female teachers, shun rural areas and prefer to work in urban areas.

6.12. **Industries:** The section of the four districts where the proposed transmission line will pass, have very few industries. Many of the industrial activities are small scale like household food processing (grain threshing and milling) and light metal fabrication. Mumbwa district has a cotton ginnery while the line section in Kafue district has a number of upcoming quarry plants.

6.13. **Transport:** The proposed transmission line is passing through rural areas where most people use various forms of transportation (ox carts, bicycles, open vans, motor cycles etc.) and buses for public transport for long distances. For short distances, walking, cycling and motor cycling is common. In urban centres however, some people own vehicles or use employment related transportation while public transport include buses and taxis.

6.14. **Minerals/Mining:** Mining is an important activity in Mumbwa District while there is little mining activities in Itezhi-Tezhi. Minerals mined include copper, cobalt, and gold. The most prominent mine near the line route in Mumbwa is Luri Gold mine located south of the cotton ginnery. Mining activities in Lusaka West include quartzite stones and sand for building.

6.15. **Tourism:** The transmission line project traverses through Itezhi tezhi and Mumbwa Districts that are generally tourism districts. The KNP that is located in both districts, attracts a substantial number of tourists annually. Some of the most famous lodges in Itezhi tezhi are Musungwa, Ngoma and New Kalala. Other tourist attractions within Itezhi tezhi district include animal species, the Kafue River system, Mayovu trees (cultural value), important hot springs, Heritage sites, important fishing grounds and the Itezhi-tezhi dam. Chibombo District does not have any major tourist attraction. In Lusaka West, tourism through game ranching and game cropping is a growing sector.

6.16. **Archaeological and Cultural Heritage:** The National Heritage Conservation Commission Register was used to conduct a heritage assessment survey whose findings include in Mumbwa, 4 sites for Later Stone Age, 3 sites for Later Iron Age, 1 site with a combination of Later Stone Age, Later Iron Age and Sangoan, 1 site for Middle Stone Age and Sangoan, 1 site with a combination of Later Stone Age and Later Iron Age and 2 sites of colonial heritage importance. These sites however, are outside the study area and hence will not be affected by the proposed line and the other Districts don't have any Cultural Heritages. There are no old or new graveyards sited in the project areas.

7. Legal framework including mechanisms for conflicts resolution and appeals

7.1. In Zambia, there are various legal instruments that are used in administration of various land use systems. These include but not limited to the following:

- Environmental Legislation: the Environmental Protection and Pollution Control Act No. 12 of 1990, Statutory Instrument No. 28 of 1997 – The Environmental Impact Assessment Regulations.
- *The Water Act*: The water Act that is administered by the Department of Water Affairs.
- Energy Legislation: The Electricity Act, the Petroleum Act (No. 13 of 1985), the Zambia – Tanzania Pipeline Act, the Energy Regulation Act, CAP 436 of 1995, the Rural Electrification Authority Act (No. 20 of 2003) and the Zambezi River Authority Act.
- Natural Resources Conservation Act (CAP 315).
- The Forestry Act (CAP 314): provides for the conservation and management of forest reserves.
- Local Government Act (CAP. 22 of 1991) in relation to environmental regulation, care and maintenance of public water.
- The National Water and Sanitation Act No 28 of 1997 established the National Water and Sanitation Council (NWASCO) and define its functions. ;
- *The Zambia Wildlife Authority Act of 1998*: The National Parks and Wildlife Act (no.10 1991) provide for the establishment of National Parks, Game Management Areas (GMA); licensing of hunting.
- *Fisheries Act*: The Fisheries department administers the Fisheries Act (CAP 314, 1974, 1998) that regulates fishing, fishing methods and equipment.
- *Lands Act 1995 (CAP 292, CAP 289, CAP 288)* and the Lands Acquisition Act, 1995 for the allocation and alienation of land under statutory leaseholds.
- *Mines and Mineral Development Act (CAP 320)*, the Petroleum and Production Act (No. 13 of 1985) and the Zambia Iron and Steel Authority.
- *National Heritage Conservation Commission Act* No. 23, 1989 provides for the conservation of ancient, cultural and natural heritage and establishes the Commission and sets out its functions.

Legal framework adopted for the transmission line project

7.2. ZESCO Limited has an established compensation procedure and all valuers engaged on various projects follow national valuation procedures in line with the principles outlined in Section 5 and 12 of part III (Principles for assessment of compensation) of the Land Acquisition Act. Potential financier's requirements and guidelines applicable on such projects, such as some sections of the AfDB resettlement policy, relating to provision of compensation are also followed. Any compensation on any transmission line project is based on the new compensation policy of ZESCO that was developed from the national legislation such as the Electricity Act, Land Acquisition Act, etc.

7.3. ZESCO has established valuation procedures as indicated above and borrow from time to time any financier's guidelines such as the AfDB resettlement policy, relating to provision of

compensation. Other guidelines from other financiers such as the Development Bank of Southern Africa (DBSA), the World Bank and the European Investment Bank, have been used before on such projects. However, it is always the company's approach to regard national laws when incorporating such external guidelines. Where it is noted that the Zambian legislation and the potential financier's (like the AfDB) policy differ, ZESCO Limited will follow the best standard suitable for the assignment.

Grievance Redress Mechanism

7.4. Grievances are inevitable in projects that involve disturbing people's livelihoods and wellbeing. Transmission line projects often give rise to grievances among the affected persons. This could vary from rates of valuation, compensation eligibility criteria and actual compensation payments. Timely redress or resolution of such grievances is vital to the smooth and satisfactory implementation of the relocation program. ZESCO Limited has put in place procedures that allow affected people to lodge complaints or claims with the Project Team. The full time Project Team ensures that all such grievances are resolved in a fair manner and within a reasonable time frame.

7.5. It is the practice at ZESCO that grievances should be resolved within the Project context without taking a protracted course to the detriment of the project and the affected individual. Hence, grievances related to any aspect on projects are handled through negotiations with affected persons. The complaints received from PAPs can be in verbatim, or in writing. Any project team member that receives such complaint notes the same in writing for further consideration.

7.6. When reported, a formal file for each grievance is opened and contains the following documents for ease of follow-up and verification:

- Description of the grievance;
- Location of the complainant on the project;
- Date the grievance received;
- Description of the resolution; and
- Date the grievance was resolved.

7.7. If the matter still remains unresolved after all levels of grievance redress have been utilized, the complainant may then forward his/her case to a court of law. In addition to the above mechanisms, and at the option of the Affected People, grievances may be taken to other mediating bodies, such as the local leadership or any other dispute resolution mechanism as may be decided by the affected people.

8. Eligibility

8.1. ZESCO Limited has experience on compensation issues from various projects. Based on that experience, ZESCO Limited has developed a draft compensation policy drawn from the Land Acquisition Act as outlined above. The compensation modalities, principles and the preferred compensation options are embedded in the company policy. The general objectives of the compensation policy are therefore to (i) take into consideration project options and locations that avoid involuntary resettlement where feasible and to minimize population displacement; (ii) ensure that displaced people receive compensation and assistance so that they would be at least the same or better off as a result of the project; (iii) communities in project areas benefit from the project where feasible; (iv) project stakeholders are consulted and given the opportunity to participate at an early stage in the project cycle (during environmental studies, feasibility studies, design, implementation, and operation of the project); and (v) appropriate assistance and compensation is provided to any affected persons or to individuals with user rights of any parcel of land that falls within the project area.

8.2. The two most important elements that are considered and covered in compensation are: (i) compensation for loss of any fixed assets and or other physical infrastructure; and (ii) improvement of local incomes through the provision of jobs on the project. For purposes of this project, the “cut-off-date” for compensation eligibility was 11th September 2010.

8.3. Table 1, below summaries the eligibility criteria for compensation and relocation assistance for different categories of the community.

Table 1: Eligibility Categories

Type of Loss		Application	Entitled Person	Compensation
Economic displacement (Affected people listed in the line route)				
1	Arable land	Loss of arable land.	Eligible landholder	• Not required unless where there is irrigated cropping.
			Non-titled but with user rights	• Cash compensation where applicable
			Lease holder	• Cash compensation equivalent to replacement cost of gross harvest for one cropping season
		Temporary acquisition	Eligible landholder	• Cash compensation based on opportunity lost during the period.
2	Standing crops, trees	Crops or trees affected	Owner of crops or trees	• Compensation in cash calculated on the basis of type, age and productive value of affected crops or trees.
3	Field fences	Damage to fences during construction of the line.	Owner	• Restoration as imbedded in line contracts

Type of Loss		Application	Entitled Person	Compensation
4	Grazing land	Grazing land affected by the lines	Eligible landholder	<ul style="list-style-type: none"> • Not required. Livestock graze freely and will be able to continue grazing under the lines after construction
5	Structures	Livestock enclosures	Owner	<ul style="list-style-type: none"> • Individuals rebuild their own livestock enclosures, and full once payment for construction
		Loss of or damage to water structures	Owner	<ul style="list-style-type: none"> • Replacement or compensation to cover cost of restoring the facilities.
Physical displacement (Affected people in the line route)				
6	Residential land	Loss of residential land	Eligible landholder	<ul style="list-style-type: none"> • Compensation in cash based on evaluation criteria.
			Non-titled but with user rights landholder	<ul style="list-style-type: none"> • Compensation in cash as above.
7	Structures	Homestead structures	Owner	<ul style="list-style-type: none"> • Compensation in cash for affected structure and other fixed assets based one evaluation criteria and without deductions for salvaged materials. • Assistance in restoration of any remaining structure, if applicable.

9. Valuation of and Compensation for Losses: Costs and Budget

9.1. Table 2, below summarizes the cost categories for compensation and the replacement of structures and assets by section based on the valuation conducted by an independent property valuator engaged by ZESCO Limited. The cost presented below, ZMK 1,102,260,000.00 (equivalent to USD235, 000) excludes implementation costs and contingencies which, if added, would bring the cost to approximately ZMK1,145,386,000 (USD244,000); and the cost of perennial crops will only be valued at the time of implementation. This is the practice followed by ZESCO to ensure that prices for crops represent the most current market values and to explore possibility for PAPs to harvest the crops or avoid planting a new crop in which case the PAP shall be compensated for the foregone season.

Table 2: Valuation and Compensation Costs for Assets and Structures

LINE SECTIONS	Number of affected Persons/household	Types of Assets Affected	Total Cost (ZMK)
SECTION A Lusaka West Substation – Mwembeshi River	22 Households	Pit latrine, thatched kitchen shelters, huts, houses, traditional grain barns, piggery shelters, cattle kraals, pigeon shelters, grocery shops, church building, bath shelters, and borehole.	398,910,000.00
SECTION B Mwembeshi River – Proposed Mumbwa Substation	72 Households	Pit latrine), thatched kitchen shelters, huts, houses, traditional grain barns, piggery shelters, cattle kraals, pigeon shelters, bar tavern shop, baptism pool, bath shelters, dug-out water well.	660,350,000.00
SECTION C From Proposed Mumbwa Substation – Itzhi-Tezhi	7 Households	Pit latrine, thatched kitchen shelters, huts, houses, traditional grain barns, piggery shelters, cattle kraals, pigeon shelters, bath shelters.	46,000,000.00
GRAND TOTAL	101 Households		1,102,260,000.00

Livelihood improvement and restoration

9.2. As a measure to enhance the community benefits from the project, in line with AfDB's policy, ZESCO's practice is to consider local people for jobs on various projects that it undertakes, especially in rural areas. In order to continue with the practice, ZESCO Limited will encourage the line contractor(s) to employ local people on the project, both women and men. The affected and local people will receive priority during the recruitment process. Such employment will provide valuable support to the community in the project area during the duration of the project and during annual way-leave maintenance during operation.

10. Implementation schedules

10.1. As shown in the preliminary implementation schedule, ZESCO is already advanced with the compensation process which commenced after March 2010, and is expected to complete before the project is approved. Adequate financing has been made available and compensation and resettlement process is progressing well. The Bank Appraisal Team will assess and evaluate the process to ensure that it complies with AfDB's Involuntary Resettlement policy.

Preliminary implementation schedule

Task/Activity	Jun 09	Jul 09	Aug 09	Sep 09	Oct 09	Nov 09	Jun - Sep 10	Jan 11	Jun 11	Jul 11	Aug 11	Sep 11
Preliminary assessment of affected structures/infrastructure												
Procurement of Valuator, field valuations and report preparation												
Request for compensation and compensation payments												
Establish a project management team for the line project												
Community sensitization on grievance mechanism & procedures												
Relocation of affected people into new structures												
Procurement of contractor for the transmission line												
Commencement of construction works on the line & mitigation monitoring												

11. Monitoring and Evaluation

11.1. A Project Team has been established for the project which includes responsibilities for monitoring implementation of the resettlement program. The primary objectives for this include, but not limited to the following:

- Represent the company directly on the project.
- Liaison with affected parties (landowners, hamlet residents and farmers) in all decision making relating to the resettlement planning, implementation and monitoring;
- Responsible for ensuring that compensation principles, policies, and procedures are followed.
- Liaise with the financing agencies in monitoring of the relocations through incorporating directly affected parties' needs by recruiting from the communities and supporting some community development initiatives;
- Act as a team to deal with any grievance arising from compensation issues on the project.

11.2. **Internal monitoring:** ZESCO Limited will provide the Project Team with resources to implement and monitor the relocation process on the project. In order to assist with this monitoring, the Project Team will maintain the initial survey baseline information prior to relocation impacts. The project staff will submit periodic progress reports to management. The

main objective of the progress reports will be to inform management on re-location progress and to capture any affected people that may have been left out during the initial asset survey.

11.3. **External monitoring:** The transmission line project will cause resettlement in the identified locations. However, the re-locations may not warrant the engagement of an external monitoring firm. It will be incumbent upon the Competent Authority, the Environmental Council of Zambia, to monitor the implementation of the Environmental and Social Management Plan that also covers re-location.

11.4. **Evaluation:** Internal evaluations of the implementation of the re-location plan shall be conducted to determine whether the objectives of the compensation policy on the project have been achieved and that all affected people will have been fully paid.