

ZAMBIA



WORLD BANK

SFG2988 V1



REPUBLIC OF ZAMBIA

MINISTRY OF AGRICULTURE AND LIVESTOCK

# ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ANNEXES

REPORT VOLUME III  
FOR THE PROPOSED

## IRRIGATION SCHEME IN LUSITU IN CHIRUNDU DISTRICT

DECEMBER 2016

# TABLE OF ANNEXES

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<b>LIST OF FIGURES .....</b>	<b>3</b>
<b>LIST OF TABLES.....</b>	<b>4</b>
<b>1 ANNEX 1: MAPS FOLDER.....</b>	<b>5</b>
<b>2 ANNEX 2: INTEGRATED PEST MANAGEMENT PLAN (IPMP) .....</b>	<b>16</b>
2.1 Principles of IPM.....	16
2.2 IPM in World Bank funded projects.....	17
2.3 Implications for the IDSP .....	17
2.4 IPM strategy for Lusitu.....	18
2.4.1 Main pest challenges.....	18
2.4.2 Training.....	18
2.4.3 Cultural practices.....	18
2.4.4 Biological controls.....	19
2.4.5 Mechanical controls.....	20
2.4.6 Chemical controls .....	20
2.4.7 Handling and application of chemicals .....	20
2.4.8 Storage of chemicals.....	21
2.4.9 Virus control in bananas.....	21
2.4.10Monitoring and management.....	21
<b>3 ANNEX 3: LOCATION OF WATER SAMPLING POINT .....</b>	<b>24</b>
<b>4 ANNEX 4: WATER QUALITY RESULTS .....</b>	<b>25</b>
<b>5 ANNEX 5: MAIN PLOT DATA COLLECTION FORM .....</b>	<b>28</b>
<b>6 ANNEX 6: REGENERATION PLOT DATA COLLECTION FORM.....</b>	<b>29</b>
<b>7 ANNEX 7: FAUNA DATA COLLECTION FORM.....</b>	<b>30</b>
<b>8 ANNEX 8: LIST OF BIRDS OBSERVED IN THE FARM AREA .....</b>	<b>31</b>
<b>9 ANNEX 9: PROPOSED HEALTH AND SAFETY POLICY.....</b>	<b>32</b>

9.1	Managing safety at Work place.....	32
9.2	Preventing Accidents and Injuries .....	32
10	<b>ANNEX 10: CHECK LIST FOR THE ECOLOGICAL ASSESSMENT.....</b>	<b>35</b>
11	<b>ANNEX 11: CHECKLIST OF REPTILES IN LUSITU AREA ..</b>	<b>45</b>
12	<b>ANNEX12: CHECKLIST OF FISH IN LUSITU AREA.....</b>	<b>47</b>
13	<b>ANNEX13: CHECKLIST OF LARGE MAMMALS IN LUSITU AREA .....</b>	<b>49</b>
14	<b>ANNEX 14: CHECKLIST OF PLANT SPECIES .....</b>	<b>50</b>
15	<b>ANNEX 15: MINUTES OF MEETINGS WITH STAKEHOLDERS.....</b>	<b>54</b>
	15.1 Introduction.....	54
	15.2 Objectives of the Meeting.....	54
	15.3 Presentation by Mr. Kenneth.....	55
	15.4 Plenary discussion.....	55
16	<b>ANNEX 16: MINUTES OF DISCLOSURE MEETING .....</b>	<b>60</b>
	16.1 Introduction.....	60
	16.2 Opening remarks .....	60
	16.3 Proceedings .....	61
	16.3.1 Presentation of the ESIA .....	61
	16.3.2 Plenary Discussion .....	62
	16.4 Way forward .....	63
	16.5 Closing Remarks .....	63
17	<b>ANNEX 17: COPY OF ZEMA TORS APPROVAL LETTER AND TORS.....</b>	<b>68</b>
18	<b>ANNEX 18: ENGINEERING DESIGN DRAWINGS FOR RESERVOIRS .....</b>	<b>69</b>
19	<b>ANNEX 19: SOIL EXPERT REPORT .....</b>	<b>73</b>
20	<b>ANNEX 20: HYDROLOGICAL EXPERT REPORT.....</b>	<b>74</b>
21	<b>ANNEX 21: LIST OF AFFECTED PERSONS.....</b>	<b>75</b>
22	<b>ANNEX 22: PHOTO BANK.....</b>	<b>80</b>
23	<b>ANNEX 23: ADDENDUM TO ESIA FINAL REPORT LUSITU .....</b>	<b>82</b>

## LIST OF FIGURES

---

Figure 1-1	Irrigation schemes in Zambia ( <i>Source National Irrigation policy</i> ) .....	6
Figure 1-2	Sketch Map of the Location of Lusitu Group 1 Site.....	7
Figure 1-3	Lusitu Group 1 Site Location Map.....	8
Figure 1-4	Contributing Catchments to the Zambezi River between Kariba Dam and Chirundu .....	9
Figure 1-5	Layout of proposed irrigation system (Z&A, 2013/3).....	10
Figure 1-6	Hydrogeological map of Lusitu area (Source: GRESP, 2007).....	11
Figure 1-7	Map of soil suitability for irrigation, Lusitu (Z&A 2013/3).....	12
Figure 1-8	Lusitu project area vegetation cover in 1992. Deep yellow: herbaceous savannah; Green: woodland savannah; White, light blue and red: bare land (Source: Scudder, 2005) .....	13
Figure 1-9	Vegetation of the Project Area .....	14
Figure 1-10	Protected Areas around the Project Area .....	15

## LIST OF TABLES

---

Table 2-1	IPMP implementation and monitoring schedule.....	23
Table 8-1	Birds Observed during Surveys.....	31
Table 10-1	Checklist of Birds in Lusitu .....	35
Table 11-1	Checklist of Reptiles in Lusitu area .....	45
Table 12-1	Checklist of Fish in Lusitu Area .....	47
Table 13-1	Checklist of Mammals in Lusitu area .....	49
Table 14-1	Checklist of Plant Species in the Area .....	50

# 1 ANNEX 1: MAPS FOLDER

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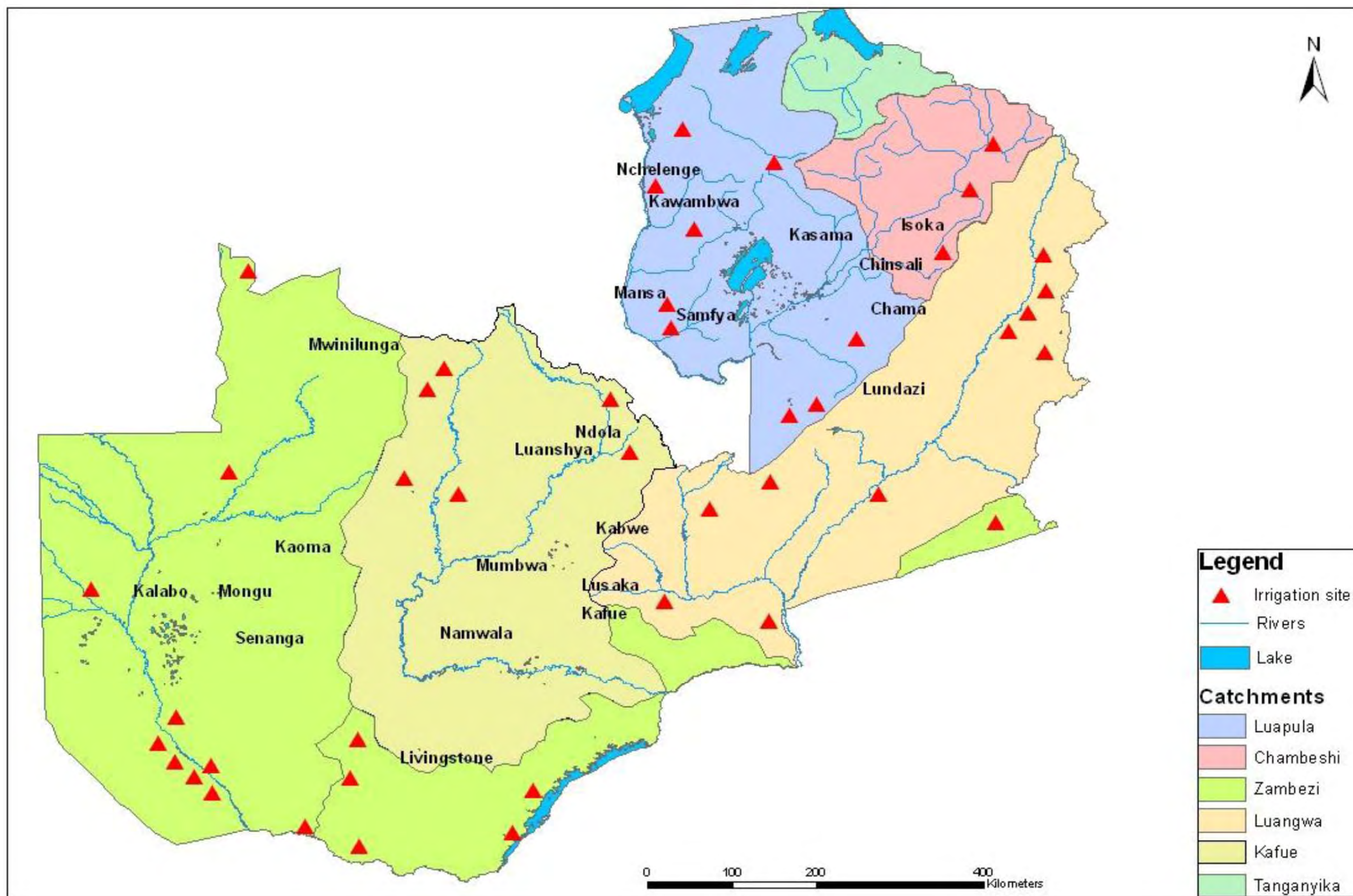


Figure 1-1 Irrigation schemes in Zambia (Source National Irrigation policy)

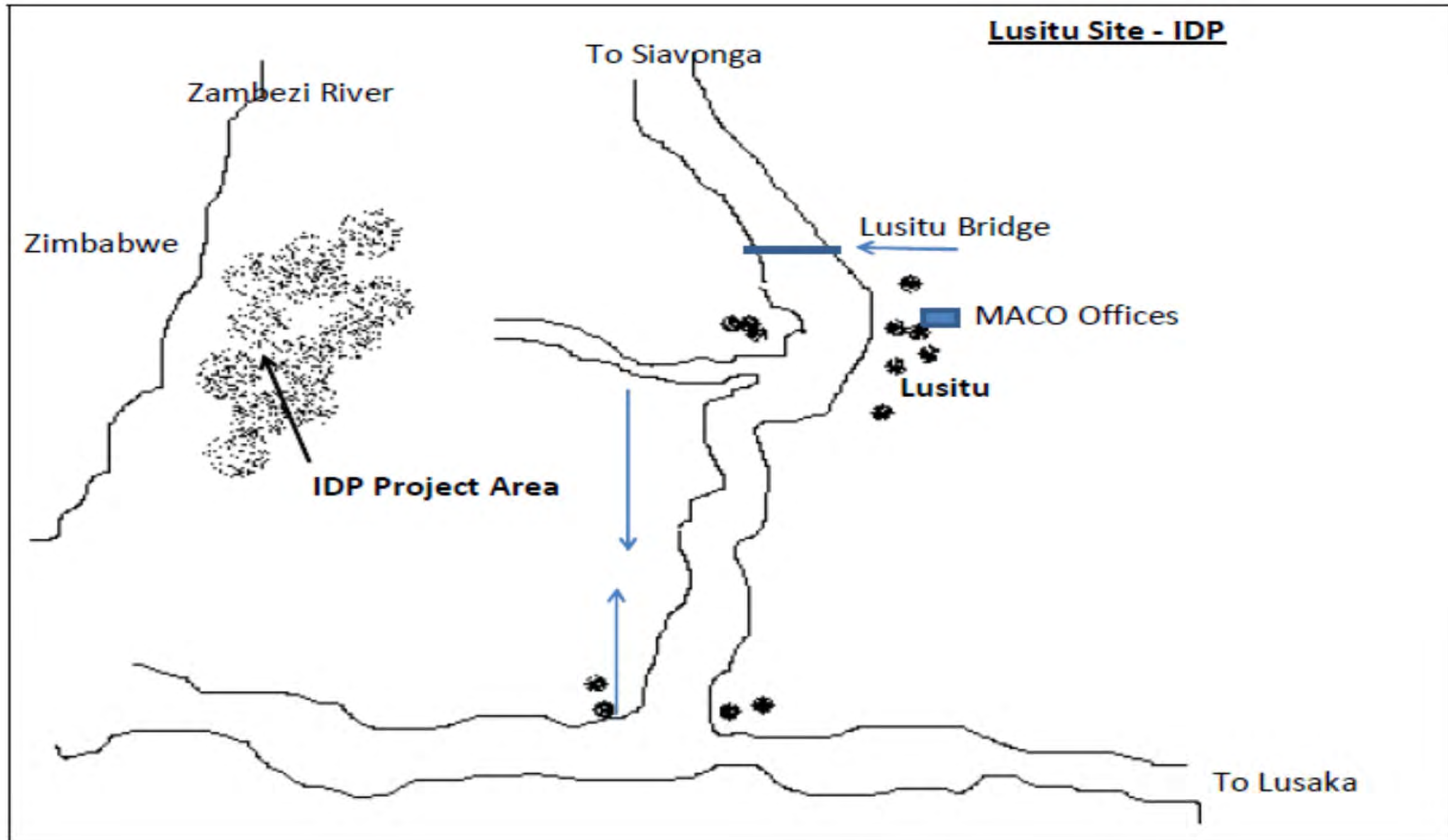


Figure 1-2 Sketch Map of the Location of Lusitu Group 1 Site



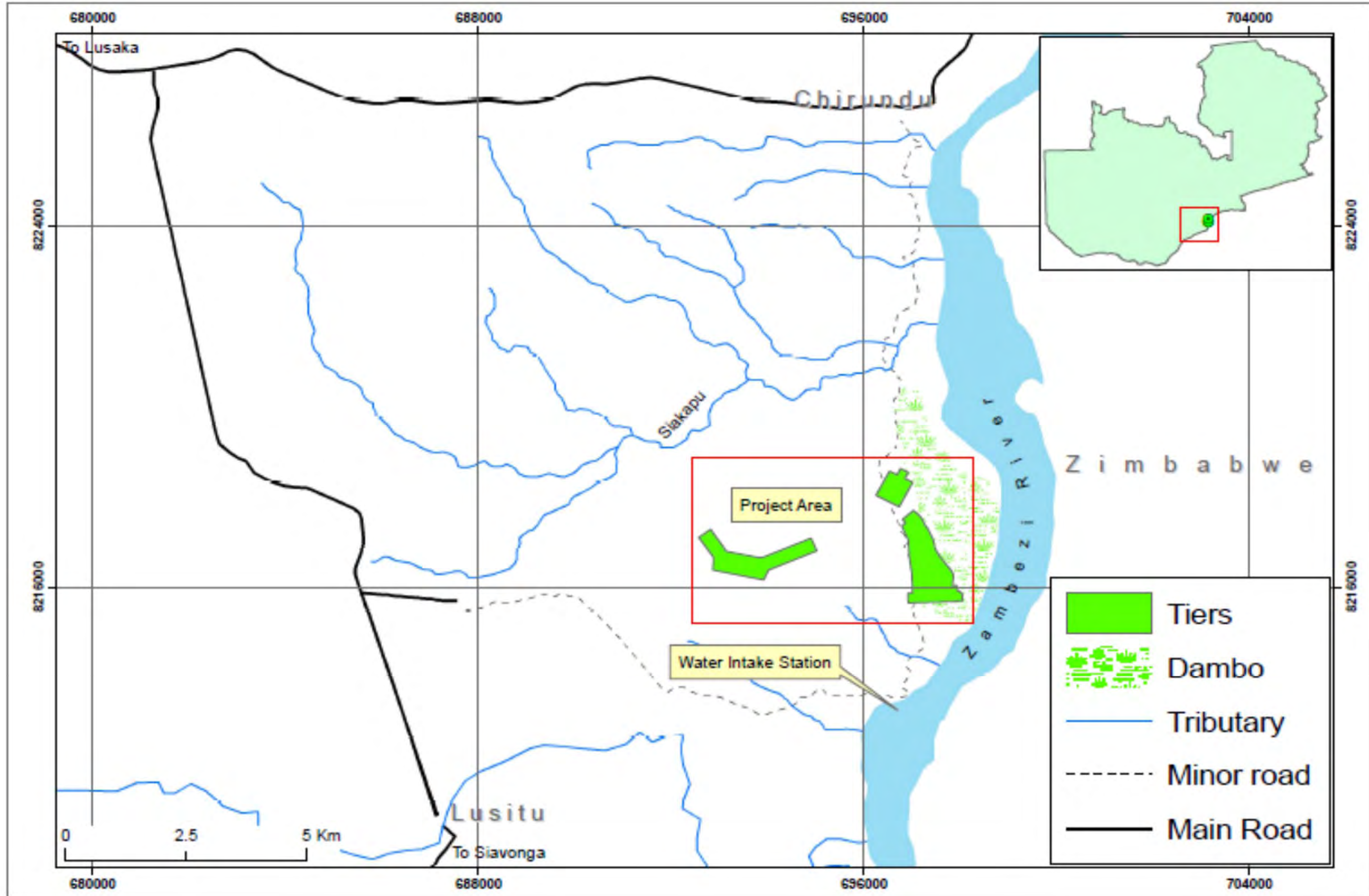


Figure 1-3 Lusitu Group 1 Site Location Map

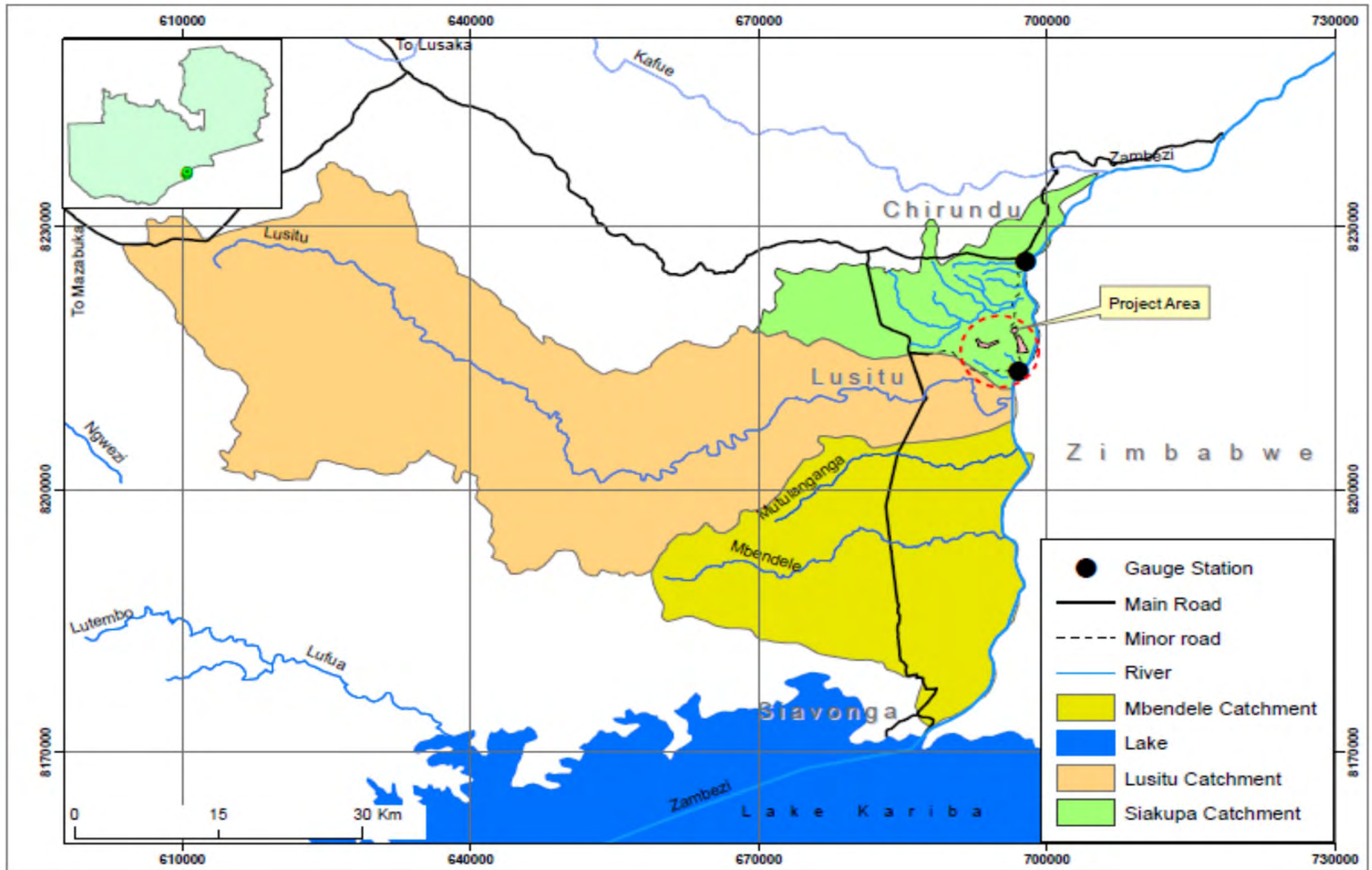


Figure 1-4 Contributing Catchments to the Zambezi River between Kariba Dam and Chirundu

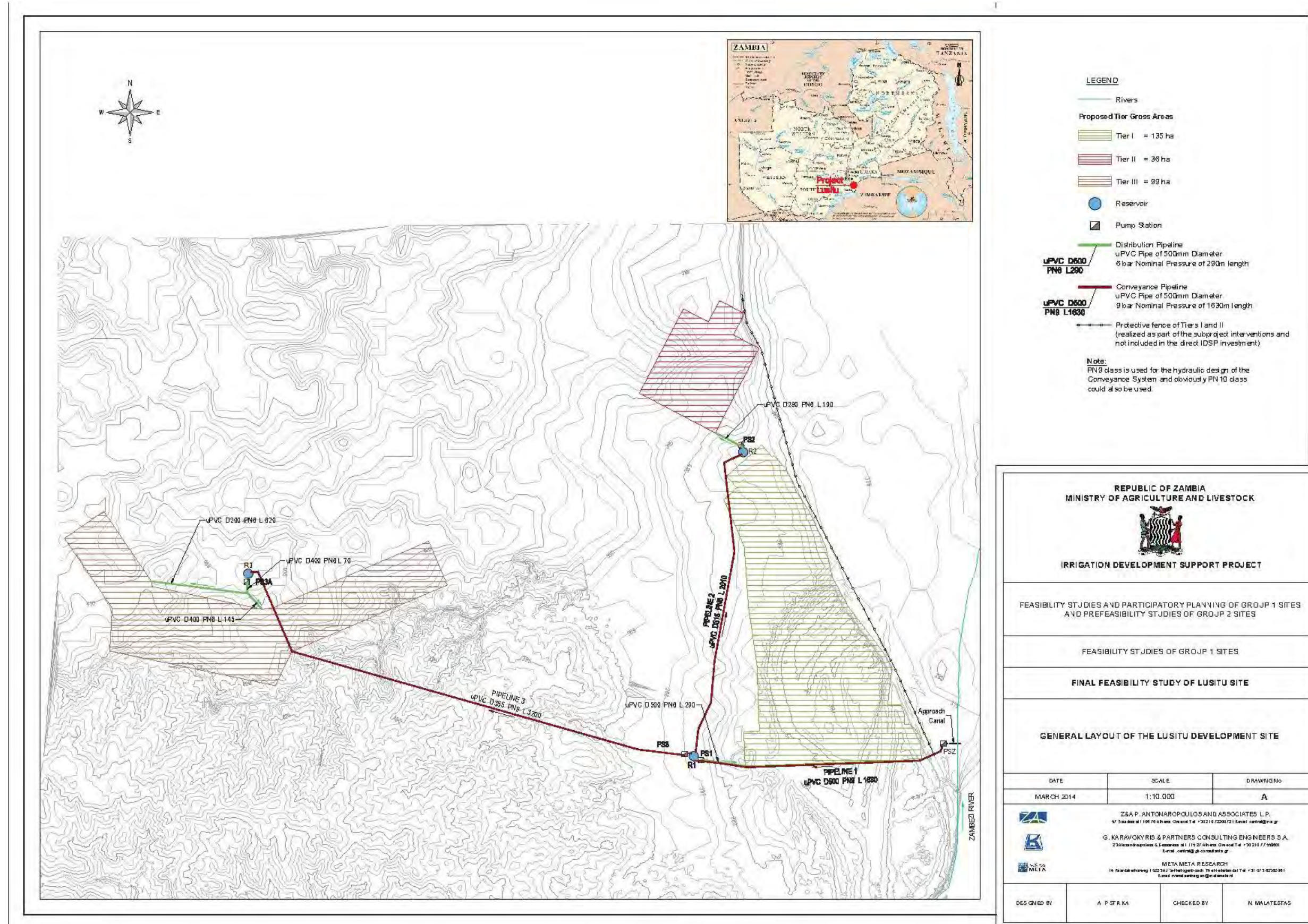


Figure 1-5 Layout of proposed irrigation system (Z&A, 2013/3)

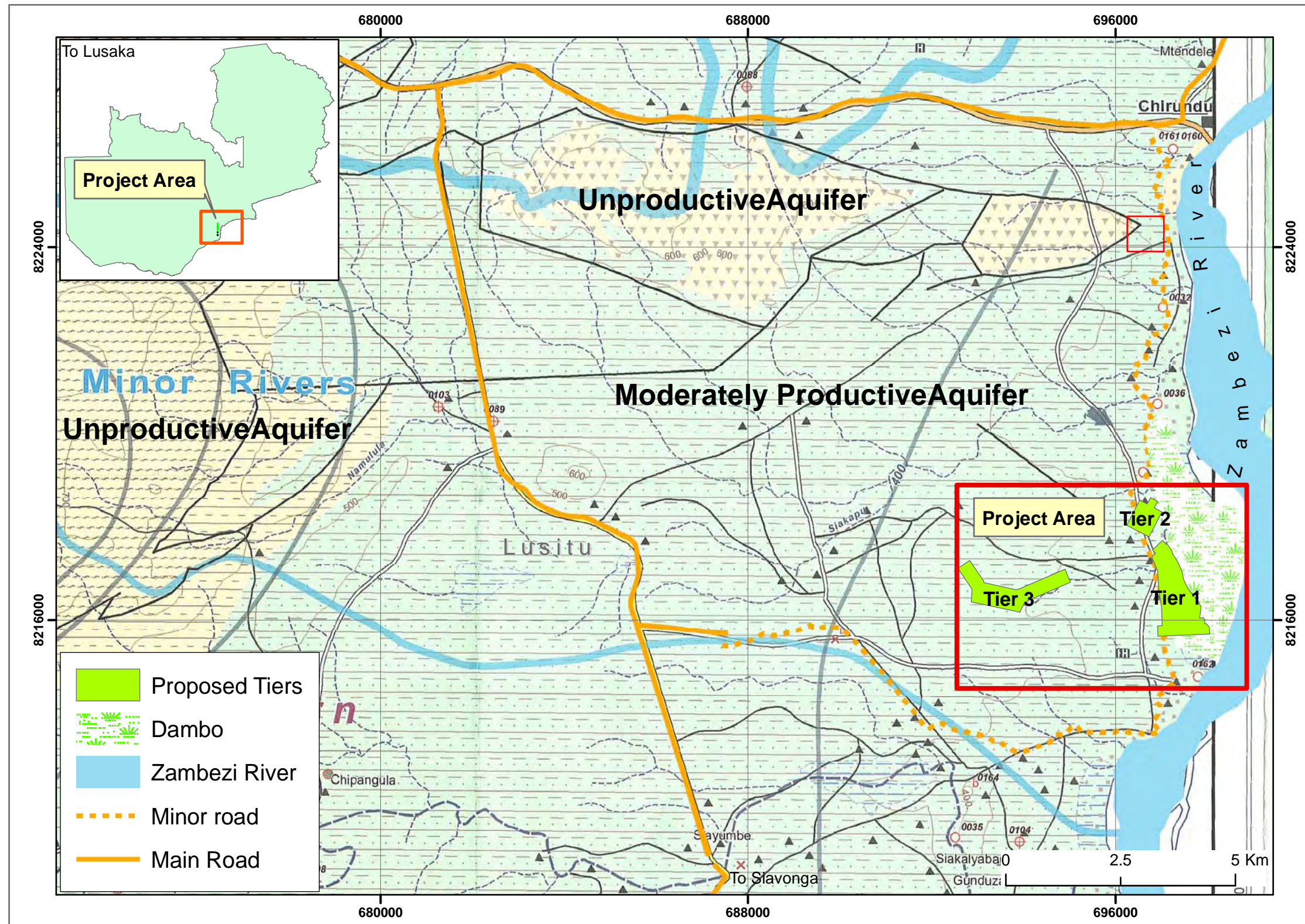


Figure 1-6 Hydrogeological map of Lusitu area (Source: GRESP, 2007)

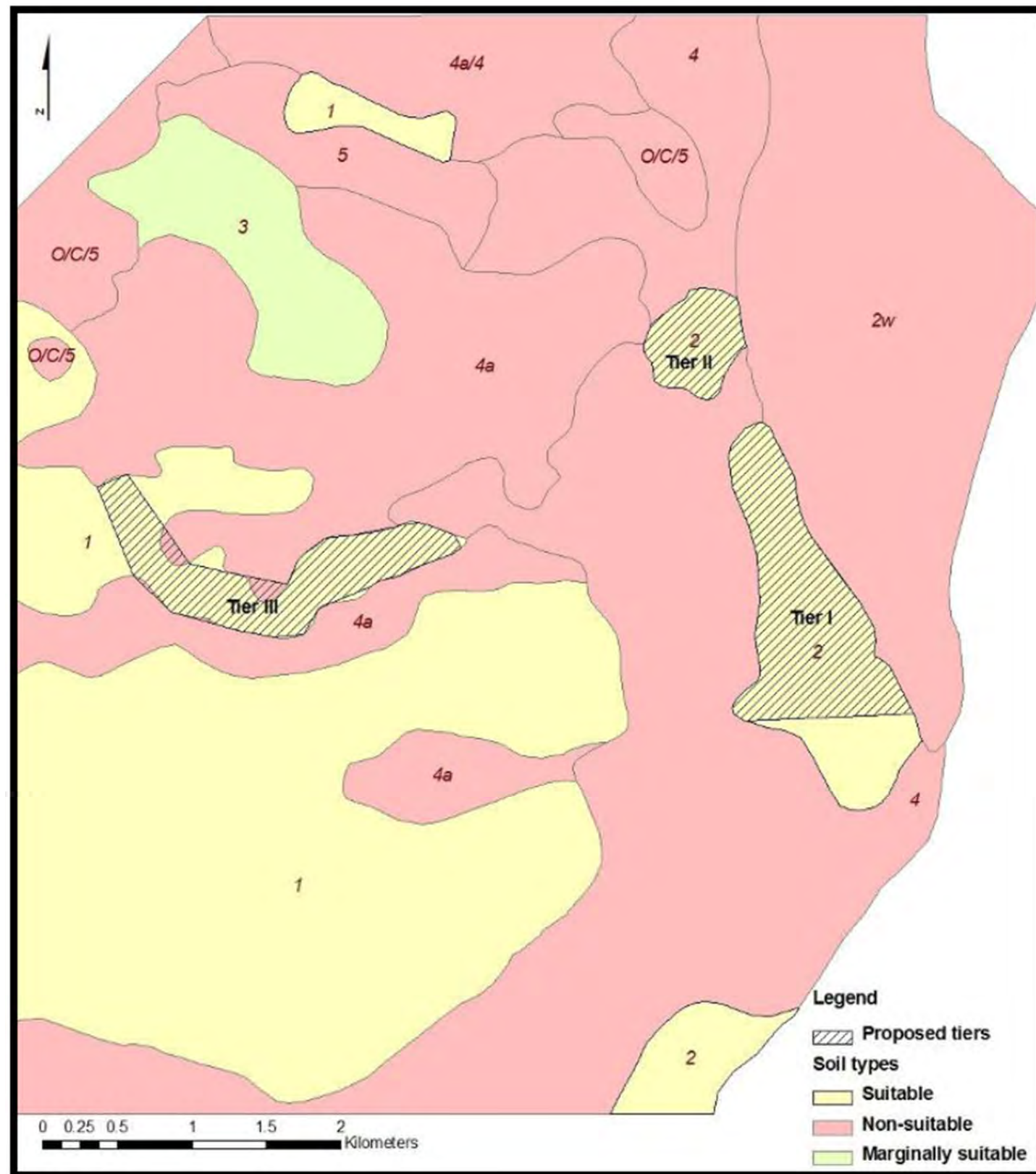


Figure 1-7 Map of soil suitability for irrigation, Lusitu (Z&A 2013/3)

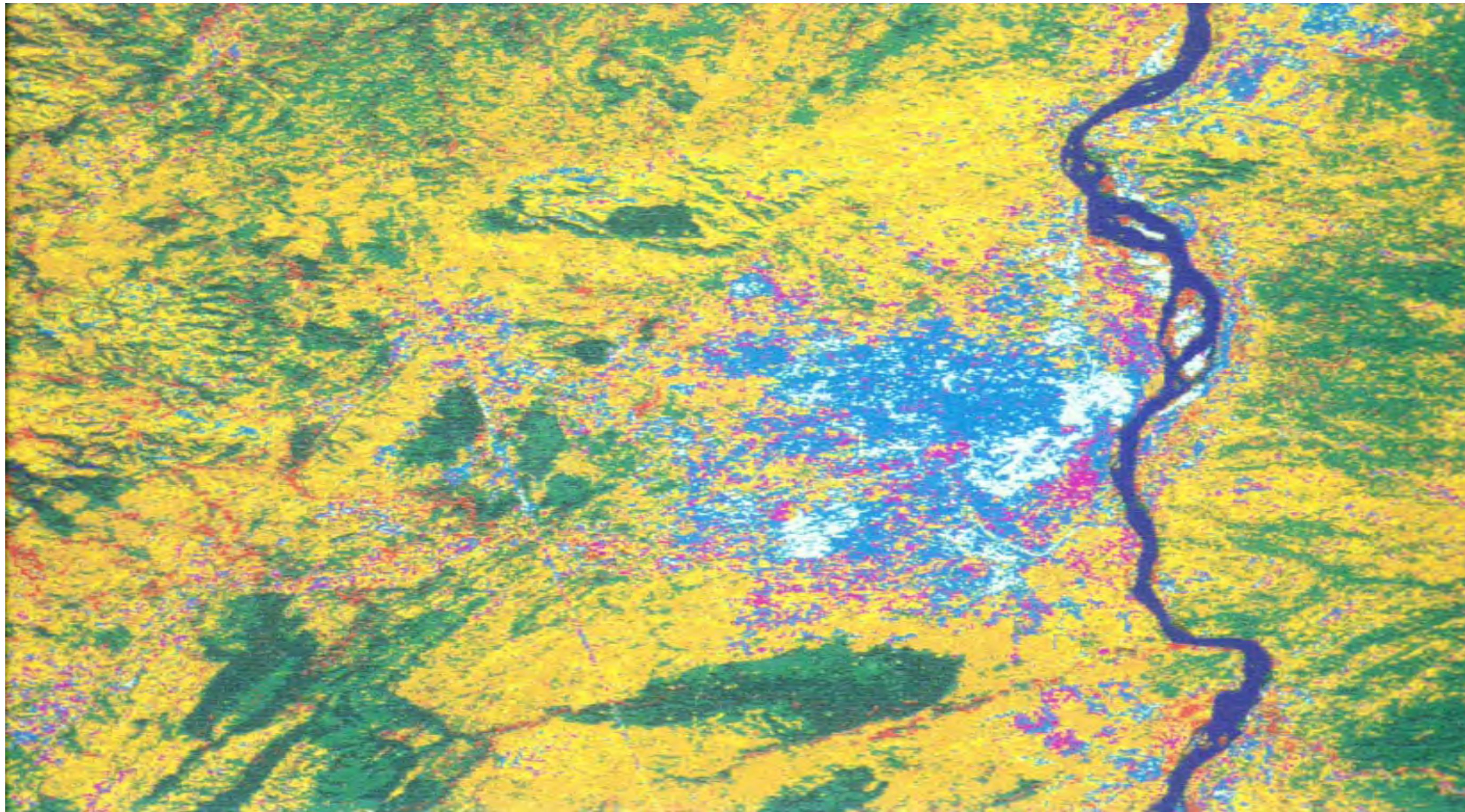


Figure 1-8 Lusitu project area vegetation cover in 1992. Deep yellow: herbaceous savannah; Green: woodland savannah; White, light blue and red: bare land (Source: Scudder, 2005)

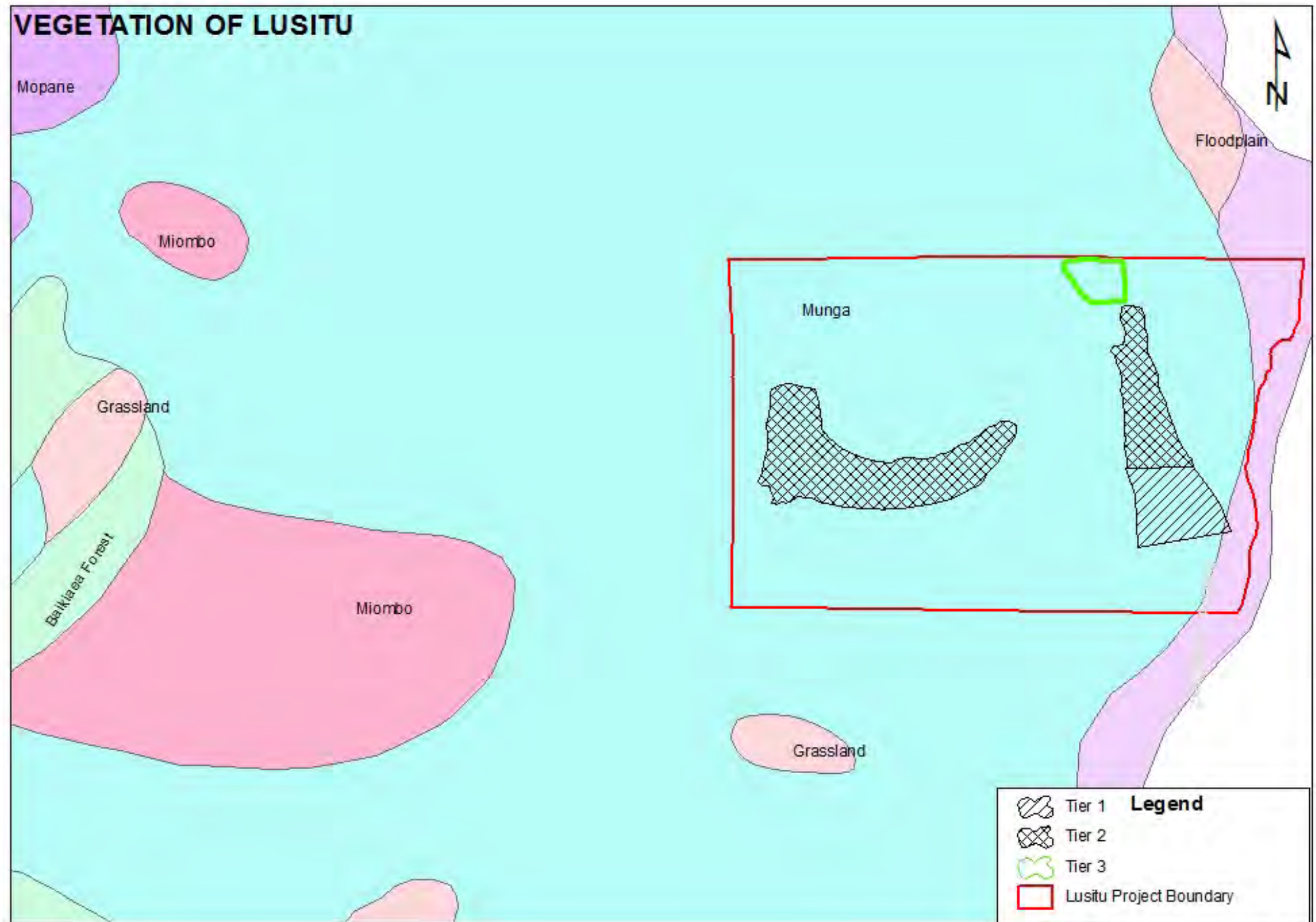


Figure 1-9 Vegetation of the Project Area

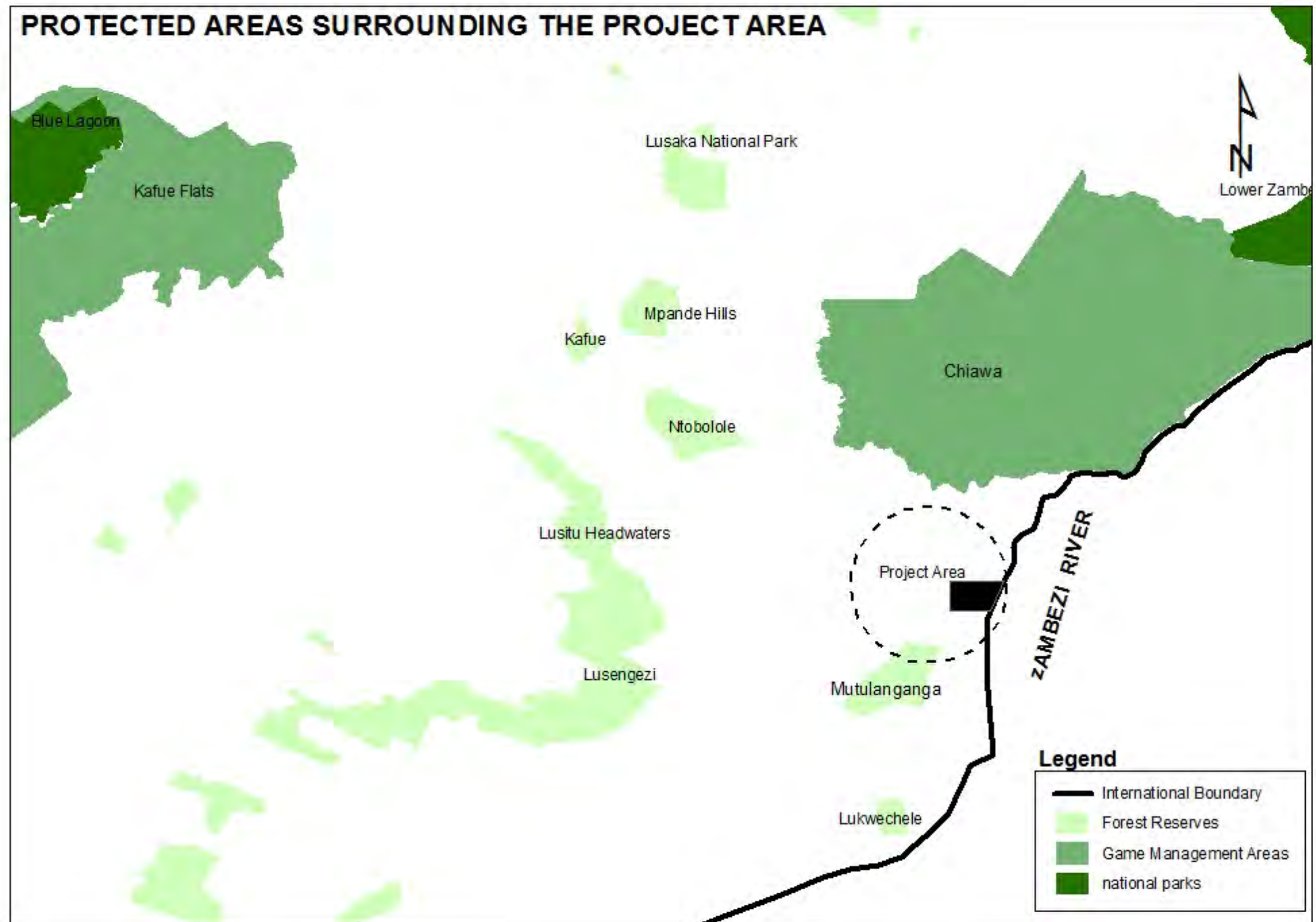


Figure 1-10 Protected Areas around the Project Area



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## 2 ANNEX 2: INTEGRATED PEST MANAGEMENT PLAN (IPMP)

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### 2.1 Principles of IPM

Integrated Pest Management (IPM) is an ecosystem approach to crop production and protection that combines different management strategies and practices to grow healthy crops and minimize the use of pesticides (FAO, 2013). IPM is based on:

- Acceptable pest levels - the emphasis is on control, not eradication. All pests have an economic threshold below which the cost of control exceeds the benefit.
- Preventive cultural practices – with good planning and husbandry, many pest threats can be mitigated.
- Monitoring- inspection and identification. With specialised support and experience, most farmers will be able to undertake this, but recording will remain the responsibility of the IPM manager.
- Safe and responsible controls -in order of priority: mechanical, biological and then chemical. (USEPA, 2012).

The benefits of IPM include:

- Reduced pesticide usage, leading to safer working conditions, less pollution, safer food, reduced resistance in pest populations, the enhancement of natural pest-enemy populations, and usually lower production costs.
- Improved recognition and understanding of pest problems amongst farmers, leading to timely interventions and higher yields.
- Increased bio-diversity.
- More sustainable production systems.

In the context of this IPM plan, pests include agricultural insect pests and plant diseases, weeds, birds, rodents, and human or livestock disease vectors

## 2.2 IPM in World Bank funded projects

### Requirements for World Bank Funded Projects

The World Bank Operational Policy (OP 4.09 - Pest Management, December 1998) states that:

The procurement of any pesticide in a Bank-financed project is contingent on an assessment of the nature and degree of associated risks, taking into account the proposed use and the intended users. With respect to the classification of pesticides and their specific formulations, the Bank refers to the World Health Organization's *Recommended Classification of Pesticides by Hazard and Guidelines to Classification* (Geneva: WHO 1994-95). The following criteria apply to the selection and use of pesticides in Bank-financed projects:

- They must have negligible adverse human health effects.
- They must be shown to be effective against the target species.
- They must have minimal effect on non-target species and the natural environment. The methods, timing, and frequency of pesticide application are aimed to minimize damage to natural enemies. Pesticides used in public health programs must be demonstrated to be safe for inhabitants and domestic animals in the treated areas, as well as for personnel applying them.
- Their use must take into account the need to prevent the development of resistance in pests.

The Bank requires that any pesticides it finances be manufactured, packaged, labelled, handled, stored, disposed of, and applied according to standards acceptable to the Bank. The Bank does not finance formulated products that fall in WHO classes IA and IB, or formulations of products in Class II, if (a) the country lacks restrictions on their distribution and use; or (b) they are likely to be used by, or be accessible to, lay personnel, farmers, or others without training, equipment, and facilities to handle, store, and apply these products properly.

## 2.3 Implications for the IDSP

The intensive agriculture expected to be developed under the IDSP will inevitably lead to an increase in pesticide use. Most of the proposed area (except part of Tier 2 which is still un-cleared) is currently used for rain-fed crop production, mainly sorghum and maize. These crops are normally grown without pesticides, except for seed dressings on purchased seed. Vegetables, in particular, have a much higher requirement for insecticides and fungicides.

Class II products are permitted as Zambia has adequate legal provisions for managing agrochemicals. The Government controls distributors of pesticides through the Environmental Management Act (EMA), particularly, the Pesticides and Toxic Substance Regulations No.28 of 1997. All Distributors are required to be licensed by ZEMA, with conditions. In addition, the distributors are expected to provide the right information to the farmers through right labelling and training (D. Phiri p.c. Sep-13).

In addition, any company who will be distributing the pesticides in the project area will be expected to provide the required training. It is not expected that any Class I chemicals will be required in the project area as there are adequate Class II or III

products to control any pests. Distributors operating in the area must be directed not to supply Class I chemicals.

## 2.4 IPM strategy for Lusitu

### 2.4.1 Main pest challenges

Up to 60% of the irrigated area will be occupied by vegetables in the winter, the balance being planted to bananas, which is a perennial crop. In summer, it is expected that part of Tier 1 and 2 will be planted to maize and soya beans.

Vegetables suffer from a wide range of pests, but one major threat to almost all vegetables are nematodes, which are difficult to control, can build up in the soils over seasons and cause serious losses. As they thrive in light soils, they can be expected to pose a particular threat to intensive vegetable production at Lusitu. As herbicide usage in vegetables is limited by the danger to following crops and limited range available, much of the weed control will be manual, which is a major challenge in such a large area of vegetables. The major diseases in tomatoes are early and late blight, powdery mildew and several viruses introduced by insects. Cabbage and other brassicas are usually attacked by caterpillars, especially the larvae of diamond-back moth. Watermelons and other cucurbits are particularly vulnerable to virus diseases.

Bananas – The major threats to bananas are bunchy-top virus (BBTV) and nematodes. Control of BBTV is covered in section 5.3.9, whereas nematodes will be controlled by a combination of the methods outline below.

Maize - the main pests are stalk borer, maize streak virus, grey leaf spot and termites.

Soya beans – Fungal: rust (*Phakopsora pachyrhizi*), frog-eye leafspot (*Cercospora sojina*), red leaf blotch (*Pyrenochaeta glycines*).

Bacterial: bacterial blight (*Pseudomonas syringae* / *glycines*), bacterial pustule (*Xanthomonas phaseoli*).

### 2.4.2 Training

Training of farmers is the first and most important step. It must be assumed that none of the Tier 1 and Tier 2 farmers have received training in IPM. The Tier 3 senior management is expected to be conversant with IPM, but their middle management will require IPM training. The training will start before the scheme is operational. In addition, pesticide distributors will be required to provide training in safe handling and application to all buyers, and provide labels on all packs.

Pest identification is a key component of training, together with practical methods of monitoring pest populations. Then control methods will be covered, with cultural controls taking priority, followed by biological interventions, and then chemicals as a last resort.

### 2.4.3 Cultural practices

The techniques that will be employed include:

- Good husbandry as healthy crops are more resistant to pest attack and damage

- Crop rotation and timing of planting/harvest – specifically for Tier 1 and part of Tier 2 where annual crops will be grown.
- Inter-cropping – planting different crops within each plot at the same time to repel or disrupt insect pests and nematodes.

Choice of variety or cultivar – this often requires purchasing improved varieties of seed or plant material, which can be relatively expensive. The training will emphasise the benefits of using genetic resistance and tolerance to diseases. There are no GMO cultivars available in Zambia, but there is a wide selection of improved non-GMO varieties with good disease-resistance packages.

Irrigation practices and drainage – good water management to promote crop growth while avoiding excessive watering and standing water.

Field hygiene – removal of diseased and infested plants, both in a growing crop and after harvest, will reduce the chance of spread to other plants or subsequent crops.

Weeding - Weeds disrupt the growth of crops and can act as hosts for pests. Regular hand-weeding is required in small) vegetable plots in Tiers 1 and 2.

Mulching – the use of benign organic matter to protect the soil from direct sunlight and damage by rain or overhead-irrigation improves the environment for crop growth and beneficial organisms. Farmers must first remove seeds from mulch and avoid using diseased plant material. Minimum tillage.

Most of these techniques are standard farming practices, but they require planning by the farmer, which will start with training and improve with experience and extension services provided under the project. They are not foolproof solutions, and need to be augmented with direct interventions (see below) in order to keep pest levels below economic thresholds. Some will require extra labour, such as weeding, mulching and field hygiene.

#### 2.4.4 Biological controls

There is a limited selection of biological controls that can be purchased in Zambia. Predatory insects are not commercially available, but there is an increasing range of bacterial and fungal agents that can be purchased. The major agrochemical suppliers are now actively promoting new biological formulations. The main source of beneficial organisms will be from the naturally-occurring population, which will be encouraged by inter-cropping of plants that attract them, and minimal use of broad-spectrum pesticides.

The controls that can be employed include:

- Bacterial agents e.g. *Bacillus thuringiensis* (BT) suspension for the control of caterpillars and bollworms, and “Nemablok” for nematodes – readily available from suppliers
- Natural insecticides e.g. Neem – not readily available
- Predatory nematodes to control plant-parasitic nematodes – need to be encouraged minimum tillage and mulching.
- Green manures with nematicidal and soil-improving properties e.g. mustard, *Tagetes sp.*, red sun-hemp – seed can be multiplied locally, best planted in rainy season when less demand for cropping land.

The biological controls which are recommended are bacterial agents, which are affordable and can be sprayed, and green manures which have multiple benefits and are cheap to grow.

#### 2.4.5 Mechanical controls

These methods involve actions by the farmer such as hand-picking, erecting insect barriers, using traps, and tillage to disrupt breeding. Hand weeding is also a mechanical control for weeds. The use of simple homemade traps is a practical solution for vegetables.

The traps can be coloured bowls with water, or coloured boards coated with oil. Yellow traps attract leaf-miner adults, whiteflies, aphids (winged forms) and thrips among other insect pests. Thrips are also attracted to white and blue. As the yellow colour attracts many insect species, including beneficial insects, use yellow sticky traps only where necessary. (Infonet, 2013). Sticky yellow boards have been successfully used in Zambia to control crop pests like leaf miner.

Light traps can be used to attract moths of armyworm, stalk-borer, and cutworm, however they also attract many other insects and are not practical for small holders. Specific pheromone traps are the most effective for mass-trapping but are not readily available and not affordable for small holders.

Mechanical controls are not recommended as a major tool in insect pest control, but hand-weeding will be the main method of weed control in vegetables.

#### 2.4.6 Chemical controls

The use of chemicals should be restricted to WHO Class III (slightly hazardous) products whenever possible, with Class II (moderately hazardous) chemicals used only when essential. Class II includes many commonly used pesticides including synthetic pyrethroids, dimethoate, and endosulphan. It will be necessary to educate farmers on the dangers of these chemicals both to themselves and consumers, and the natural pest- predators and wildlife. The list of class 3 alternatives must also be provided. There is a sufficient range of chemicals which are Class II or better available in Zambia to control most of the anticipated pest problems. The list is available from the World Health Organisation (WHO, 2004). The control of nematodes traditionally depends on hazardous Class I chemicals, such as oxamyl or carbofuran, so there must be specific emphasis on using safer alternatives, such as fufural which is a bio-pesticide extracted from sugarcane, or biological controls (see 5.3.4).

#### 2.4.7 Handling and application of chemicals

Although most vegetable farmers are familiar with spraying, all farmers and workers in Tiers 1 and 2 will need training in safe handling and application techniques. Knapsack sprayers will be the main method of application in small plots, but protective clothing, which is rarely used, must also be available from chemical suppliers, together with the required training. Bananas in Tier 3 may be sprayed by tractor-mounted mist-blowers, or motorised-knapsack mist blowers, and herbicides will be applied with knapsack sprayers.

## 2.4.8 Storage of chemicals

The use of chemicals comes with an obligation to store them securely. The development of the scheme must include chemical storage facilities. Tier 3 will build their own store and it is recommended that the groups or cooperatives occupying Tier 2 do the same. Tier 1 is more problematical due to the number of farmers involved, and their habit of keeping their chemicals at home. It is recommended that chemical distributors be required to supply affordable and lockable plastic boxes for farmers to store their chemicals in, as a centralised store for Tier 1 is impractical.

## 2.4.9 Virus control in bananas

The Lusitu site will have a large area (120 ha) of bananas, which poses a particular challenge in pest management due to Banana Bunchy-Top Virus (BBTV) which has decimated many plantations in Zambia. The virus is carried by aphids, and the most effective controls are killing the aphid vector and removing infected plants. Most commonly used aphid insecticides are Class 2 products like diazinon and imidachloprid. Sprays of soap solutions also provide some control of aphids. However, none of these applications are capable of controlling high populations of aphids, which can develop very quickly. Monitoring of aphid populations by field inspections and/or sticky yellow traps is essential so that control measures can be applied on time.

Farmers must regularly inspect their crops for symptoms of BBTV and kill affected plants with glyphosate, followed by removal. Tier 3 has an incentive to assist Tier 2 out-growers in this exercise as it will help to secure the supply of produce and protect the Tier 3 plantation from infection. The use of virus-free plant material (tissue-cultured) in establishing all plantations is essential. The planting of bananas in Tier 1 should be avoided unless it is under an out-grower arrangement with Tier 3.

## 2.4.10 Monitoring and management

A crucial component of a successful IPM programme is the effective and regular monitoring of pest populations. This requires expertise in the form of extension officers, record keeping and some practical traps for insect pests. The traps employed must be of a type that can be easily supplied and maintained, which necessarily restricts the range of insects that can be monitored in this way. Regular field inspections by trained officers will be the most effective method of monitoring, and the officer can provide advice to farmers. Records must indicate quantitative observations and advice given to farmers. This approach will also teach farmers in field situations and make the IPMP more sustainable.

There is an incentive for Tier 3 to cover the IPM management, including the monitoring of pest levels, for Tier 2 banana out-growers, however there is no obvious linkage between Tier 3 and the vegetable growers on Tier 1 and 2, so this responsibility would be best taken on by extension officers of MAL, who are already active in the area and whose capacity is expected to be improved as the scheme develops.

The management of the IPMP requires annual reviews to be made to assess its effectiveness, the levels of adoption and compliance, and to amend the plan if necessary. It must also take note of observations made by the environmental

monitoring team and determine if pesticides are damaging the environment. The annual review should be conducted by MAL, who can out-source the task to an IPM expert if they do not have the capacity.

Table 2-1 below outlines the activities required to implement and monitor the IPM programme.

Table 2-1 IPMP implementation and monitoring schedule

PHASE	ACTION	OBJECTIVE	RESPONSIBILITY	TIMING
Pre- operation	Update IPMP and share with trainers	To ensure training covers all the required components which can be practically applied.	CB&CP	At least 1 month before training starts
	IPM training of lead farmers T1 and extension officers	Teach farmers principles & methods of IPM	CB&CP with external provider	At least 3 months before opening of T1
	IPM training of T2 framers and T3 middle management	Teach farmers/managers principles & methods of IPM	CB&CP with external provider	At least 3 months before opening of T2-3
	Scouting of existing rain-fed crops & report	Establish baseline of pest pressure and train farmers how to scout & record	MAL Extension Officers	Rainy season following IPM training
	Scouting of existing vegetable crops & report	Establish baseline of pest pressure and train farmers how to scout & record	MAL Extension Officers	Dry season following IPM training
	Selection of approved chemical suppliers	Approve only those suppliers that are reputable, registered with ZEMA, and can provide training & protective clothing	IDSP-NC	Before scheme is operational
Operation – Yr1	Training in safe chemical handling/storage	Ensure that all users are aware of hazards and safe handling & application	IDSP-NC	Within 3 months of operation starting
	Commence regular scouting of vegetable crops & recording	Monitor pest levels and implement controls	MAL Extension Officers	Monthly
	Refresher training of lead farmers T1 and extension officers	Reinforce 1 <sup>st</sup> training and address problems which have arisen.	External provider engaged by MAL	1 year after 1 <sup>st</sup> training
	Scouting of T3 & T2 out-grower crops, & records	Monitor pest levels and implement controls	T3 management	Monthly from 1 <sup>st</sup> planting
Monitoring Yr1	Review of IPMP and report to MAL	Assess results and effectiveness of 1 <sup>st</sup> yr of IPMP, report on pest problems and controls used.	External consultant engaged by MAL	After 1 yr of operation
	Corrective actions based on review	Revise IPMP in light of experience in 1 <sup>st</sup> year, explain any new approaches to MAL E.O.s	External consultant with MAL Extension Officers	Following review of IPMP
Operation – Yr2+	Implementation of revised pest control methods	Improve the effectiveness and adoption of the IPMP	MAL Extension Officers with lead farmers and T3 mgmt.	Following approved corrective actions
	Scouting of all crops & recording	Monitor pest levels and implement controls	Lead farmers	Monthly
	Scouting of T3 & T2 out-grower crops, & records	Monitor pest levels and implement controls	T3 management	Monthly
Monitoring Yr2+	Review of IPMP and report to MAL	Assess results and effectiveness of IPMP, report on pest problems and controls used, recommend improvements.	IPM expert from MAL or external	Repeat annually



## 3 ANNEX 3: LOCATION OF WATER SAMPLING POINT

Water Quality Sampling on Zambezi River for Lusitu Site

Sampling Point No.	Name	Latitude (S)	Longitude(E)	Remarks
1	Lusitu Pump House	-16.15045	28.84274	Upstream of site
2	Proposed Site for Pump House (Jordan)	-16.13187	28.85445	Near Tier 1
3	New Chirundu Bridge	-16.03741	28.84891	Downstream of the site

# 4 ANNEX 4: WATER QUALITY RESULTS

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 SCHOOL OF ENGINEERING  
 CIVIL ENGINEERING DEPARTMENT  
 ENVIRONMENTAL ENGINEERING LABORATORY

P.O Box 32379, Lusaka

**PHYSICAL CHEMICAL EXAMINATION OF WATER**

Reference : A13328  
 Attn : SOFRECO  
 Lusaka  
 Sampled by : Client  
 Sampling date : 21.11.2013  
 Report date : 22.11.2013

**Laboratory Results**

Sample Number:	132428	132429	132430	132431	132432	132433	132434	WHO Guideline
Sample ID	T1	T2	T3	T4	T5	T6	M2	(Maximum Permissible
Parameter								value for drinking water)
Bicarbonate (as mg CaCO <sub>3</sub> /l)	68	425	270	80	140	74	40	500
Sulphates (mg/l)	<0.01	107.20	73.80	1.54	0.60	1.66	0.59	250
Chlorides (mg/l)	8.0	10.0	13.0	9.0	15.0	5.0	6.0	250
Total phosphates (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5.0
Magnesium (mg/l)	7.68	39.84	28.80	12.48	2.88	10.08	7.68	-
Calcium (mg/l)	15.2	105.6	60.0	12.0	52.8	13.6	4.8	200
Potassium (mg/l)	1.68	2.12	2.75	1.91	3.17	1.06	1.27	-
Sodium (mg/l)	5.28	6.60	8.58	5.94	9.90	3.30	3.96	200
Manganese (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Cadmium (mg/l)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003
Lead (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
Zinc (mg/l)	<0.001	<0.001	<0.001	<0.001	0.211	<0.001	<0.001	3.0
Copper (mg/l)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	2.0
Aluminium (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.2

Tests carried out in conformity with " Standard Methods for the Examination of water and Wastewater APHA, 1998".



Co-ordinator- Environmental Engineering Laboratory



Nr.	Parameter	T4, Zambezi river @ Lusitu	T1, Zambezi river @ Chirundu	T6, Zambezi river @ Jordan	M2, Musakashi borehole	T3, Kafue river @ Musakashi	T2, Kafue river @ Kafironda	T5, Kalimina School(T05) (Mwomboshi)	WHO Guideline (Maximum permissible value for drinking water)
1	Bicarbonate (mg CaCO <sub>3</sub> /l)	80	68	74	40	270	425	140	500
2	Sulphate (mg/l)	2	<0.01	2	1	74	107	1	250
3	Chloride (mg/l)	9	8	5	6	13	10	15	250
4	Total phosphate (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5
5	Magnesium (mg/l)	12	8	10	8	29	40	3	-
6	Calcium (mg/l)	12	15	14	5	60	106	53	200
7	Potassium (mg/l)	1.9	1.7	1.1	1.3	2.8	2.1	3.2	-
8	Sodium (mg/l)	5.9	5.3	3.3	4	8.6	6.6	9.9	200
9	Manganese (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
10	Cadmium (mg/l)	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.003
11	Lead (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01
12	Zinc (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.211	3
13	Copper (mg/l)	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	2
14	Aluminium (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.2
15	Total Hardness (calculated)	<b>81</b>	<b>70</b>	<b>75</b>	<b>44</b>	<b>268</b>	<b>427</b>	<b>144</b>	500
18	pH	7.1	7	7	5.8	7.8	7.8	6.82	6.5 - 8.5
19	Ec (µS/cm)	93	93	93	50	491	785	372	1500
20	Eh (mV)	-17	-15	-21	54	-85	-61	-58	-
21	TDS(mg/L)	46	47	47	25	245	391	162	1000
22	Temp (°C)	25.4	26.4	26.8	23.9	26.7	26.4	24.9	-
23	Ionic balance, % error	10	11	9	13	-4	-3	11	-
24	Sodium Adsorption Ratio	<b>0.3</b>	<b>0.3</b>	<b>0.2</b>	<b>0.3</b>	<b>0.2</b>	<b>0.1</b>	<b>0.4</b>	-
25	Residual Sodium Carbonate	<b>-0.3</b>	<b>-0.3</b>	<b>-0.3</b>	<b>-0.2</b>	<b>-0.9</b>	<b>-1.6</b>	<b>-0.6</b>	-
26	Magnesium Hazard (MH), %	63.13	45.41	54.96	72.48	44.14	38.31	8.24	-
19	Chloride Toxicity (CT), meq/l	0.25	0.23	0.14	0.17	0.37	0.28	0.42	-





# 7 ANNEX 7: FAUNA DATA COLLECTION FORM

Mammals				Other faunal species
Species	<input type="checkbox"/> No. Seen	<input type="checkbox"/> Signs - write details		
1				
2				Reptiles
3				
4				
5				
6				
7				
8				
9				
10				
12				
13				
14				Amphibians
15				
Birds				Invertebrates
Species	<input type="checkbox"/> No. Seen	<input type="checkbox"/> Signs - write details		
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
12				
13				
14				
15				

Fire occurrence

Recent

Old

*Notes*

## 8 ANNEX 8: LIST OF BIRDS OBSERVED IN THE FARM AREA

Table 8-1 Birds Observed during Surveys

No.	Bird Species	Scientific Name	Latitude	Longitude
1	African Dater	<i>Anhinga rufa</i>	28° 20' 28".90	14° 47' 35".22
2	African fish Eagle	<i>Haliaeetus vocifer</i>	28 21 31.59	14 45 59
3	African Pied Wagtail	<i>Motacilla arguimp</i>	28 19 51.85	14 46 04.04
4	Bateleur	<i>Terathopius ecaudatus</i>	28 20 42.43	14 46 01.90
5	Blue Waxbill	<i>Uraeginthus angolensis</i>	28 20 28.90	14 47 35.22
6	Common Bulbul	<i>pycnonotus barbatus</i>	28 20 39.60	14 46 28.97
7	Crowned Hornbill	<i>Tockus alboterminatus</i>	28 18 26.36	14 46 15.43
8	Emerald-spotted wood Dove	<i>Turtur chalcospilos</i>	28 20 28.90	14 47 35.22
9	Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	28 18 08.55	14 46 57.47
10	Greater Honeyguide	<i>Indicator indicator</i>	28 15 19.71	14 46 21.85
11	Grey Lourie	<i>corthaixoides concolor</i>	28 14 12.75	14 46 28.97
12	Helmeted Guineafowl	<i>Numida meleagris</i>	28 14 21.30	14 47 07.44
13	Lilac-breasted Roller	<i>Coracias caudate</i>	28 20 28.90	14 47 35.22
14	Little Bee-eater	<i>Merops pusillus</i>	28 17 40.79	14 47 33.80
15	Lizard Buzzard	<i>Kaupifalco monogrammicus</i>	28 17 56.44	14 46 46.07
16	Miombo Grey Tit	<i>Parus griseiventris</i>	28 15 54.12	14 47 35.22
17	Miombo Rock Thrush	<i>Monicola angolensis</i>	28 18 34.20	14 46 19.71
18	Paradise Flycatcher	<i>Terpsiphone viridis</i>	28 15 51.77	14 46 24.70
19	Pied Crow	<i>Corvus albus</i>	28 19 36.18	14 47 20.26
20	Red-eyed dove	<i>Streptopelia semitorquata</i>	28 20 28.90	14 47 35.22
21	Reed Cormorant	<i>Phalacrocorax carbo</i>	28 14 18.45	14 47 28.25
22	Rufousbellied Tit	<i>Parus rufiventris</i>	28 20 37.45	14 47 47.33
23	Senegal Wattled lapwing	<i>Vanellus senegallus</i>	28 20 31.75	14 47 38.79
24	Tawny-flanked Prinia	<i>Prinia subflava</i>	28 17 45.05	14 48 16.54
25	Tropical Boubou	<i>Laniarius aethiopicus</i>	28 20 26.76	14 47 34.51
26	White stork	<i>Ciconia ciconia</i>	28 20 31.75	14 47 40.92
27	Yellow-fronted Tinkerbird	<i>Pogoniulus chrysoconus</i>	28 20 31.75	14 47 40.92



## 9 ANNEX 9: PROPOSED HEALTH AND SAFETY POLICY

Occupational safety and health (OSH) policy will ensure that everyone (Worker and Employer) is aware of their rights and responsibilities in relation to health and safety.

Improved occupational safety and health enhances productivity by reducing the number of interruptions in the construction process, reducing absences, decreasing the number of accidents and improving work efficiency. Employers and workers both have responsibilities and rights in relation to (OSH). A preventative approach to OSH is the best strategy to eliminate most workplace accidents, injuries, and diseases.

### 9.1 Managing safety at Work place

Effective safety programmes have several features in common. They manifest throughout organizations, from the highest offices of a general contractor to project managers, supervisors, union officials and workers on the job. Codes of practice are conscientiously implemented and evaluated. Costs of injury and illness are calculated and performance is measured; those that do well are rewarded, those that do not are penalized. Safety is an integral part of contracts and subcontracts. Everybody managers, supervisors and workers—receive general, site-specific and site-relevant training and re-training. Inexperienced workers receive on-the-job training from experienced workers. In projects where such measures are implemented, injury rates are significantly lower than on otherwise comparable sites.

### 9.2 Preventing Accidents and Injuries

Entities in the industry with lower injury rates share several common characteristics: they have a clearly defined policy statement that applies throughout the organization, from top management to the project site. This policy statement refers to a specific code of practice that describes, in detail, the hazards and their control for the pertinent occupations and tasks at a site. Responsibilities are clearly assigned and standards of performance are stated. Failures to meet these standards are investigated and penalties imposed as appropriate. Meeting or exceeding standards is rewarded. An accounting system is used that shows the costs of each injury or accident and the benefits of injury prevention. Employees or their representatives are involved in

establishing and administering a programme of injury prevention. Involvement often occurs in the formation of a joint labour or worker management committee. Physical examinations are performed to determine workers' fitness for duty and job assignment. These exams are provided when first employed and when returning from a disability or other layoff.

The entire work site is inspected on a regular basis and results are recorded. Equipment is inspected to ensure its safe operation (e.g., brakes on vehicles, alarms, guards and so on). Injury hazards include those associated with the most common types of lost-time injuries: falls from heights or at the same level, lifting or other forms of manual materials handling, risk of electrocution, and risk of injury associated with either highway or off-road vehicles, trench cave-ins and others. Health hazards would include airborne particles (such as silica, asbestos, synthetic vitreous fibres, diesel particulates), gases and vapours (such as carbon monoxide, solvent vapour, engine exhaust), physical hazards (such as noise, heat, hyperbaric pressure) and others, such as stress.

Preparations are made for emergency situations and emergency drills are conducted as needed. Preparations would include assignment of responsibilities, provision of first aid and immediate medical attention at the site, communication at the site and with others off the site (such as ambulances, family members, home offices and labour unions), transportation, designation of health care facilities, securing and stabilizing the environment where the emergency occurred, identifying witnesses and documenting events. As needed, emergency preparedness would also cover means of escape from an uncontrolled hazard such as fire or flood.

Accidents and injuries are investigated and recorded. The purpose of reports is to identify causes that could have been controlled so that, in the future, similar occurrences can be prevented. Reports should be organized with a standardized record-keeping system to better facilitate analysis and prevention. To facilitate comparison of injury rates from one situation to another, it is useful to identify the pertinent population of workers within which an injury occurred, and their hours worked, in order to calculate an injury rate (i.e., the number of injuries per hour worked or the number of hours worked between injuries).

Workers and supervisors receive training and education in safety. This education consists of teaching general principles of safety and health, is integrated into task training, is specific for each work site and covers procedures to follow in the event of an accident or injury. Education and training for workers and supervisors is an essential part of any effort to prevent injuries and disease. Training about safe work practices and procedures have been provided in many countries by some companies and trade unions. These procedures include lockout and tagout of electrical power sources during maintenance procedures, use of lanyards while working at heights, shoring trenches, providing safe walking surfaces and so on. It is also important to provide site-specific training, covering unique features about the job site such as means of entry and exit. Training should include instruction about dangerous substances. Performance or hands-on training, demonstrating that one knows safe practices, is much better for instilling safe behaviour than classroom instruction and written examination.

In Zambia, training about certain hazardous substances is mandated by law. Equally important, the programme provides the information in a form to suit the differing needs of health staff, managers and workers. The information is available through training programmes, in print and on computer terminals at work sites.

Information about chemical, physical and other health hazards is available at the work site in the languages that workers use. If workers are to work intelligently on the job, they should have the information necessary to decide what to do in specific situations.

And finally, contracts between contractors and subcontractors should include safety features. Provisions could include establishing a unified safety organization at multi-employer work sites, performance requirements and rewards and penalties.

# 10 ANNEX 10: CHECK LIST FOR THE ECOLOGICAL ASSESSMENT

Table 10-1 Checklist of Birds in Lusitu

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Little Grebe	<i>Tachybaptus ruficollis</i>	PP	Pygmy Kingfisher	<i>Ceyx pictus</i>	A
White-breasted Cormorant	<i>Phalacrocorax carbo</i>	PP	Brown-headed Kingfisher	<i>Halcyon albiventris</i>	R
Reed Cormorant	<i>Phalacrocorax africanus</i>	PP	Chestnut-bellied Kingfisher	<i>Halcyon leucocephala</i>	A
Darter	<i>Anhinga rufa</i>	PP	Senegal Kingfisher	<i>Halcyon senegalensis</i>	A
White Pelican	<i>Pelecanus onocrotalus</i>	PP	Striped Kingfisher	<i>Halcyon chelicuti</i>	R
Pink-backed Pelican	<i>Pelecanus rufescens</i>	PP	Giant Kingfisher	<i>Megaceryle maxima</i>	R
Little Bittern	<i>Ixobrychus minutus</i>	P-minutus PP-paysii	Pied Kingfisher	<i>Ceryle rudis</i>	R
Dwarf Bittern	<i>Ixobrychus sturmii</i>	A	Little Bee-eater	<i>Merops pusillus</i>	PP
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	PP	Swallow-tailed Bee-eater	<i>Merops hirundineus</i>	PP
White-backed Night Heron	<i>Gorsachius leuconotus</i>	R	White-fronted Bee-eater	<i>Merops bullockoides</i>	R
Common Squacco Heron	<i>Ardeola ralloides</i>	PP	Blue-cheeked Bee-eater	<i>Merops persicus</i>	P
Rufous-bellied Heron	<i>Ardeola rufiventris</i>	PP	European Bee-eater	<i>Merops apiaster</i>	P (+A)

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Cattle Egret	<i>Bubulcus ibis</i>	A	Southern Carmine Bee-eater	<i>Merops nubicoides</i>	A
Green-backed Heron	<i>Butorides striata</i>	R	European Roller	<i>Coracias garrulus</i>	P
Black Egret	<i>Egretta ardesiaca</i>	PP	Lilac-breasted Roller	<i>Coracias caudatus</i>	PP
Slaty Egret	<i>Egretta vinaceigula</i>	PP-CC	Racket-tailed Roller	<i>Coracias spatulatus</i>	R
Little Egret	<i>Egretta garzetta</i>	PP	Purple Roller	<i>Coracias naevius</i>	PP
Yellow-billed Egret	<i>Egretta intermedia</i>	PP	Broad-billed Roller	<i>Eurystomus glaucurus</i>	A
Great White Egret	<i>Egretta alba</i>	PP	Red-billed Wood Hoopoe	<i>Phoeniculus purpureus</i>	R
Purple Heron	<i>Ardea purpurea</i>	R	Scimitarbill	<i>Rhinopomastus cyanomelas</i>	R
Grey Heron	<i>Ardea cinerea</i>	PP	Hoopoe	<i>Upupa epops</i>	A
Black-headed Heron	<i>Ardea melanocephala</i>	PP	Red-billed Hornbill	<i>Tockus erythrorhynchus</i>	R
Goliath Heron	<i>Ardea goliath</i>	R-cc	Southern Yellow-billed Hornbill	<i>Tockus leucomelas</i>	R
Hamerkop	<i>Scopus umbretta</i>	R	Crowned Hornbill	<i>Tockus alboterminatus</i>	R
Yellow-billed Stork	<i>Mycteria ibis</i>	PP	Pale-billed Hornbill	<i>Tockus pallidirostris</i>	R
Openbill Stork	<i>Anastomus lamelligerus</i>	PP	African Grey Hornbill	<i>Tockus nasutus</i>	R
Black Stork	<i>Ciconia nigra</i>	PP	Trumpeter Hornbill	<i>Bycanistes bucinator</i>	R
Abdim's Stork	<i>Ciconia abdimii</i>	A	Southern Ground Hornbill	<i>Bucorvus cafer</i>	R-cc
Woolly-necked Stork	<i>Ciconia episcopus</i>	PP	Yellow-fronted Tinkerbird	<i>Pogoniulus chrysoconus</i>	R
White Stork	<i>Ciconia ciconia</i>	P	Black-collared Barbet	<i>Lybius torquatus</i>	R
Saddle-billed Stork	<i>Ephippiorhynchus senegalensis</i>	R-cc	Crested Barbet	<i>Trachyphonus vaillantii</i>	R
Marabou Stork	<i>Leptoptilos crumeniferus</i>	PP	Green-backed Honeyguide	<i>Prodotiscus zambesiae</i>	R

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Sacred Ibis	<i>Threskiornis aethiopicus</i>	PP	Greater Honeyguide	<i>Indicator indicator</i>	R
Glossy Ibis	<i>Plegadis falcinellus</i>	PP	Lesser Honeyguide	<i>Indicator minor</i>	R
Hadada	<i>Bostrychia hagedash</i>	R	Bennett's Woodpecker	<i>Campethera bennettii</i>	R
African Spoonbill	<i>Platalea alba</i>	PP	Golden-tailed Woodpecker	<i>Campethera abingoni</i>	R
Greater Flamingo	<i>Phoenicopterus ruber</i>	PP-RR	Cardinal Woodpecker	<i>Dendropicops fuscescens</i>	R
Fulvous Whistling Duck	<i>Dendrocygna bicolor</i>	PP	Bearded Woodpecker	<i>Thripias namaquus</i>	R
White-faced Whistling Duck	<i>Dendrocygna viduata</i>	PP	African Broadbill	<i>Smithornis capensis</i>	R
Egyptian Goose	<i>Alopochen aegyptiaca</i>	PP	African Pitta	<i>Pitta angolensis</i>	A
Spur-winged Goose	<i>Plectropterus gambensis</i>	PP	Flappet Lark	<i>Mirafraga rufocinnamomea</i>	R
Knob-billed Duck	<i>Sarkidiornis melanotos</i>	PP	Dusky Lark	<i>Pinarocorys nigricans</i>	A
African Pygmy Goose	<i>Nettapus auritus</i>	PP	Red-capped Lark	<i>Calandrella cinerea</i>	A
Southern Pochard	<i>Netta erythrophthalma</i>	PP	Chestnut-backed Sparrow-Lark	<i>Eremopterix leucotis</i>	PP
African Cuckoo Hawk	<i>Aviceda cuculoides</i>	PP	European Sand Martin	<i>Riparia riparia</i>	P
Honey Buzzard	<i>Pernis apivorus</i>	P	African Sand Martin	<i>Riparia paludicola</i>	PP
Bat Hawk	<i>Macheiramphus alcinus</i>	R	Grey-rumped Swallow	<i>Pseudhirundo griseopyga</i>	PP
Black-shouldered Kite	<i>Elanus caeruleus</i>	PP	Mosque Swallow	<i>Hirundo senegalensis</i>	PP
Black/Yellow-billed Kite	<i>Milvus migrans</i>	P-migrans A- parasitus	Lesser Striped Swallow	<i>Hirundo abyssinica</i>	PP
African Fish Eagle	<i>Haliaeetus vocifer</i>	R	African Rock Martin	<i>Hirundo fuligula</i>	R
Palm-nut Vulture	<i>Gypohierax angolensis</i>	R	Wire-tailed Swallow	<i>Hirundo smithii</i>	PP
Hooded Vulture	<i>Necrosyrtes monachus</i>	R	European Swallow	<i>Hirundo rustica</i>	P

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
African White-backed Vulture	<i>Gyps africanus</i>	R	House Martin	<i>Delichon urbicum</i>	P
Lappet-faced Vulture	<i>Torgos tracheliotus</i>	R-CC	Yellow Wagtail	<i>Motacilla flava</i>	P
White-headed Vulture	<i>Trionocephs occipitalis</i>	R	Mountain Wagtail	<i>Motacilla clara</i>	R
Short-toed Eagle	<i>Circaetus gallicus</i>	PP	African Pied Wagtail	<i>Motacilla aguimp</i>	R
Brown Snake Eagle	<i>Circaetus cinereus</i>	PP	Richard's Pipit	<i>Anthus richardi</i>	PP
Western Banded Snake Eagle	<i>Circaetus cinerascens</i>	R	Long-billed Pipit	<i>Anthus similis</i>	R
Bateleur	<i>Terathopius ecaudatus</i>	PP-cc	Buffy Pipit	<i>Anthus vaalensis</i>	A
Gymnogene	<i>Polyboroides typus</i>	R	Striped Pipit	<i>Anthus lineiventris</i>	R
African Marsh Harrier	<i>Circus ranivorus</i>	R-cc	Black Cuckoo-shrike	<i>Campephaga flava</i>	PP
Pallid Harrier	<i>Circus macrourus</i>	P-CC	White-breasted Cuckoo-shrike	<i>Coracina pectoralis</i>	PP
Dark Chanting Goshawk	<i>Melierax metabates</i>	R	Sombre Bulbul	<i>Andropadus importunus</i>	R-RR
Gabar Goshawk	<i>Melierax gabar</i>	R	Yellow-bellied Greenbul	<i>Chlorocichla flaviventris</i>	R
Black Goshawk	<i>Accipiter melanoleucus</i>	R	Terrestrial Bulbul	<i>Phyllastrephus terrestris</i>	R
Ovambo Sparrowhawk	<i>Accipiter ovampensis</i>	R	Common Bulbul	<i>Pycnonotus barbatus</i>	R
Little Sparrowhawk	<i>Accipiter minullus</i>	R	Kurrichane Thrush	<i>Turdus libonyana</i>	R
African Goshawk	<i>Accipiter tachiro</i>	R	Thrush-Nightingale	<i>Luscinia luscinia</i>	P
Shikra	<i>Accipiter badius</i>	R	Heuglin's Robin	<i>Cossypha heuglini</i>	R
Lizard Buzzard	<i>Kaupifalco monogrammicus</i>	R	Red-capped Robin	<i>Cossypha natalensis</i>	A
Common Buzzard	<i>Buteo buteo</i>	P	Collared Palm Thrush	<i>Cichladusa arquata</i>	R
Augur Buzzard	<i>Buteo augur</i>	R	Central Bearded Scrub Robin	<i>Erythropygia barbata</i>	R

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Wahlberg's Eagle	<i>Aquila wahlbergi</i>	A	Eastern Bearded Scrub Robin	<i>Erythropygia quadrivirgata</i>	R
Lesser Spotted Eagle	<i>Aquila pomarina</i>	P	White-browed Scrub Robin	<i>Erythropygia leucophrys</i>	R
Tawny Eagle	<i>Aquila rapax</i>	R	Capped Wheatear	<i>Oenanthe pileata</i>	A
Steppe Eagle	<i>Aquila nipalensis</i>	P	Familiar Chat	<i>Cercomela familiaris</i>	R
Black Eagle	<i>Aquila verreauxii</i>	R-RR	Arnot's Chat	<i>Myrmecocichla arnoti</i>	R
African Hawk Eagle	<i>Hieraaetus spilogaster</i>	R	Mocking Chat	<i>Myrmecocichla cinnamomeiventris</i>	R
Ayres's Hawk Eagle	<i>Hieraaetus ayresii</i>	PP	River Warbler	<i>Locustella fluviatilis</i>	P-RR
Long-crested Eagle	<i>Lophaetus occipitalis</i>	R	Sedge Warbler	<i>Acrocephalus schoenobaenus</i>	P
Crowned Eagle	<i>Stephanoaetus coronatus</i>	R	Marsh Warbler	<i>Acrocephalus palustris</i>	P
Martial Eagle	<i>Polemaetus bellicosus</i>	R	Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	P
Osprey	<i>Pandion haliaetus</i>	P	Lesser Swamp Warbler	<i>Acrocephalus gracilirostris</i>	R
Secretary Bird	<i>Sagittarius serpentarius</i>	PP	African Yellow Warbler	<i>Chloropeta natalensis</i>	PP
Lesser Kestrel	<i>Falco naumanni</i>	P-CC	Green-capped Eremomela	<i>Eremomela scotops</i>	R
Dickinson's Kestrel	<i>Falco dickinsoni</i>	PP	Burnt-necked Eremomela	<i>Eremomela usticollis</i>	R
Eastern Red-footed Falcon	<i>Falco amurensis</i>	P	Yellow-bellied Eremomela	<i>Eremomela icteropygialis</i>	R
Red-necked Falcon	<i>Falco chicquera</i>	R	Red-capped Crombec	<i>Sylvietta ruficapilla</i>	R
Lanner Falcon	<i>Falco biarmicus</i>	PP	Long-billed Crombec	<i>Sylvietta rufescens</i>	R
Peregrine Falcon	<i>Falco peregrinus</i>	P-calidus PP-minor	Willow Warbler	<i>Phylloscopus trochilus</i>	P
Crested Francolin	<i>Francolinus sephaena</i>	R	Yellow-bellied Hyliota	<i>Hyliota flavigaster</i>	R
Shelley's Francolin	<i>Francolinus shelleyi</i>	R	Southern Hyliota	<i>Hyliota australis</i>	R



ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Natal Francolin	<i>Francolinus natalensis</i>	R	Garden Warbler	<i>Sylvia borin</i>	P
Swainson's Francolin	<i>Francolinus swainsonii</i>	R	Common Whitethroat	<i>Sylvia communis</i>	P
Red-necked Francolin	<i>Francolinus afer</i>	R	Fan-tailed Cisticola	<i>Cisticola juncidis</i>	R
Harlequin Quail	<i>Coturnix delegorguei</i>	A	Desert Cisticola	<i>Cisticola aridulus</i>	R
Blue Quail	<i>Coturnix chinensis</i>	A	Croaking Cisticola	<i>Cisticola natalensis</i>	R
Crested Guineafowl	<i>Guttera pucherani</i>	R	Rattling Cisticola	<i>Cisticola chiniana</i>	R
Helmeted Guineafowl	<i>Numida meleagris</i>	R	Short-winged Cisticola	<i>Cisticola brachypterus</i>	R
Kurrichane Buttonquail	<i>Turnix sylvaticus</i>	R	Neddicky	<i>Cisticola fulvicapilla</i>	R
African Crake	<i>Crexopsis egregia</i>	A	Red-faced Cisticola	<i>Cisticola erythropis</i>	R
Black Crake	<i>Amauornis flavirostra</i>	R	Tawny-flanked Prinia	<i>Prinia subflava</i>	R
Striped Crake	<i>Aenigmatolimnas marginalis</i>	A-RR	Yellow-breasted Apalis	<i>Apalis flavida</i>	R
Purple Gallinule	<i>Porphyrio porphyrio</i>	R	Bleating Bush Warbler	<i>Cameroptera brachyura</i>	R
Lesser Gallinule	<i>Porphyryla alleni</i>	A	Miombo Barred Warbler	<i>Cameroptera undosa</i>	R
Black-bellied Bustard	<i>Eupodotis melanogaster</i>	R	Pallid Flycatcher	<i>Bradornis pallidus</i>	R
African Jacana	<i>Actophilornis africanus</i>	PP	Southern Black Flycatcher	<i>Melaenornis pammelaina</i>	R
Painted Snipe	<i>Rostratula benghalensis</i>	PP	Spotted Flycatcher	<i>Muscicapa striata</i>	P
Black-winged Stilt	<i>Himantopus himantopus</i>	PP	Ashy Flycatcher	<i>Muscicapa caerulescens</i>	R
Water Dikkop	<i>Burhinus vermiculatus</i>	R	Lead-coloured Flycatcher	<i>Myioparus plumbeus</i>	R
Three-banded Courser	<i>Rhinoptilus cinctus</i>	R	Chin-spot Batis	<i>Batis molitor</i>	R
Bronze-winged Courser	<i>Rhinoptilus chalcopterus</i>	A	Black-throated Wattle-eye	<i>Platysteira peltata</i>	R

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Temminck's Courser	<i>Cursorius temminckii</i>	A	Livingstone's Flycatcher	<i>Erythrocerus livingstonei</i>	R-RR
Common Pratincole	<i>Glareola pratincola</i>	PP	Paradise Flycatcher	<i>Terpsiphone viridis</i>	A
Rock Pratincole	<i>Glareola nuchalis</i>	A	Arrow-marked Babbler	<i>Turdoides jardineii</i>	R
Ringed Plover	<i>Charadrius hiaticula</i>	P	Miombo Grey Tit	<i>Parus griseiventris</i>	R
Kittlitz's Plover	<i>Charadrius pecuarius</i>	PP	Southern Black Tit	<i>Parus niger</i>	R
Three-banded Plover	<i>Charadrius tricollaris</i>	PP	Rufous-bellied Tit	<i>Parus rufiventris</i>	R
White-fronted Sand Plover	<i>Charadrius marginatus</i>	PP	Grey Penduline Tit	<i>Anthoscopus caroli</i>	R
Caspian Plover	<i>Charadrius asiaticus</i>	P	Spotted Creeper	<i>Salpornis spilonotus</i>	R
Senegal Wattled Plover	<i>Vanellus senegallus</i>	PP	Violet-backed Sunbird	<i>Anthreptes longuemarei</i>	R
White-crowned Plover	<i>Vanellus albiceps</i>	R	Collared Sunbird	<i>Anthreptes collaris</i>	R
Blacksmith Plover	<i>Vanellus armatus</i>	PP	Amethyst Sunbird	<i>Nectarinia amethystina</i>	PP
Lesser Black-winged Plover	<i>Vanellus lugubris</i>	PP-RR	Scarlet-chested Sunbird	<i>Nectarinia senegalensis</i>	PP
Crowned Plover	<i>Vanellus coronatus</i>	A	Yellow-bellied Sunbird	<i>Nectarinia venusta</i>	R
Long-toed Plover	<i>Vanellus crassirostris</i>	R	White-bellied Sunbird	<i>Nectarinia talatala</i>	PP
Ethiopian Snipe	<i>Gallinago nigripennis</i>	PP	Shelley's Sunbird	<i>Nectarinia shelleyi</i>	PP
Marsh Sandpiper	<i>Tringa stagnatilis</i>	P	Purple-banded Sunbird	<i>Nectarinia bifasciata</i>	PP
Greenshank	<i>Tringa nebularia</i>	P	Coppery Sunbird	<i>Nectarinia cuprea</i>	PP
Wood Sandpiper	<i>Tringa glareola</i>	P	Yellow White-eye	<i>Zosterops senegalensis</i>	R
Common Sandpiper	<i>Actitis hypoleucos</i>	P	European Golden Oriole	<i>Oriolus oriolus</i>	P
Little Stint	<i>Calidris minuta</i>	P	African Golden Oriole	<i>Oriolus auratus</i>	A

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Curlew Sandpiper	<i>Calidris ferruginea</i>	P	Eastern Black-headed Oriole	<i>Oriolus larvatus</i>	R
Ruff	<i>Philomachus pugnax</i>	P	Red-backed Shrike	<i>Lanius collurio</i>	P
Grey-headed Gull	<i>Larus cirrocephalus</i>	PP	Lesser Grey Shrike	<i>Lanius minor</i>	P
Caspian Tern	<i>Sterna caspia</i>	PP-RR	Brubru	<i>Nilaus afer</i>	R
White-winged Black Tern	<i>Chlidonias leucopterus</i>	P	Southern Puffback	<i>Dryoscopus cubla</i>	R
African Skimmer	<i>Rynchops flavirostris</i>	PP-CC	Brown-headed Tchagra	<i>Tchagra australis</i>	R
Double-banded Sandgrouse	<i>Pterocles bicinctus</i>	R	Black-crowned Tchagra	<i>Tchagra senegalus</i>	R
Laughing Dove	<i>Streptopelia senegalensis</i>	A	Tropical Boubou	<i>Laniarius aethiopicus</i>	R
African Mourning Dove	<i>Streptopelia decipiens</i>	R	Orange-breasted Bush Shrike	<i>Malaconotus sulphureopectus</i>	R
Cape Turtle Dove	<i>Streptopelia capicola</i>	R	Grey-headed Bush Shrike	<i>Malaconotus blanchoti</i>	R
Red-eyed Dove	<i>Streptopelia semitorquata</i>	R	White-throated Nicator	<i>Nicator gularis</i>	R (445.5)
Emerald-spotted Wood Dove	<i>Turtur chalcospilos</i>	R	White Helmet Shrike	<i>Prionops plumatus</i>	R
Tambourine Dove	<i>Turtur tympanistria</i>	R	Retz's Red-billed Helmet Shrike	<i>Prionops retzii</i>	R
Namaqua Dove	<i>Oena capensis</i>	A	Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	R
Green Pigeon	<i>Treron australis</i>	R	Red-winged Starling	<i>Onychognathus morio</i>	R
Brown-necked Parrot	<i>Poicephalus robustus</i>	PP	Greater Blue-eared Starling	<i>Lamprotornis chalybaeus</i>	PP
Meyer's Parrot	<i>Poicephalus meyeri</i>	R	Southern Long-tailed Starling	<i>Lamprotornis mevesii</i>	R
Lilian's Lovebird	<i>Agapornis lilianae</i>	R	Violet-backed Starling	<i>Cinnyricinclus leucogaster</i>	A
Schalow's Turaco	<i>Tauraco schalowi</i>	R	Wattled Starling	<i>Creatophora cinerea</i>	A
Purple-crested Turaco	<i>Tauraco porphyreolophus</i>	R	Yellow-billed Oxpecker	<i>Buphagus africanus</i>	R-cc

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Grey Lourie	<i>Corythaixoides concolor</i>	R	Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>	R-cc
Great Spotted Cuckoo	<i>Clamator glandarius</i>	A (+P?)	House Sparrow	<i>Passer domesticus</i>	R
Jacobin Cuckoo	<i>Clamator jacobinus</i>	A	Southern Grey-headed Sparrow	<i>Passer diffusus</i>	R
Striped Crested Cuckoo	<i>Clamator levaillantii</i>	A	Yellow-throated Petronia	<i>Petronia supercilialis</i>	R
Thick-billed Cuckoo	<i>Pachycoccyx audeberti</i>	PP	White-browed Sparrow-weaver	<i>Plocepasser mahali</i>	R
Red-chested Cuckoo	<i>Cuculus solitarius</i>	A	Spectacled Weaver	<i>Ploceus ocularis</i>	R
Black Cuckoo	<i>Cuculus clamosus</i>	A	Large Golden Weaver	<i>Ploceus xanthops</i>	R
Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	A	Lesser Masked Weaver	<i>Ploceus intermedius</i>	R
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	A	African Masked Weaver	<i>Ploceus velatus</i>	R
Didric Cuckoo	<i>Chrysococcyx caprius</i>	A	Village Weaver	<i>Ploceus cucullatus</i>	R
African Black Coucal	<i>Centropus grillii</i>	A	Red-headed Weaver	<i>Anaplectes melanotis</i>	R
Senegal Coucal	<i>Centropus senegalensis</i>	R	Red-billed Quelea	<i>Quelea quelea</i>	PP
Burchell's Coucal	<i>Centropus superciliosus</i>	R	Red Bishop	<i>Euplectes orix</i>	R
Barn Owl	<i>Tyto alba</i>	R	Yellow Bishop	<i>Euplectes capensis</i>	R
African Scops Owl	<i>Otus senegalensis</i>	R	White-winged Whydah	<i>Euplectes albonotatus</i>	R
White-faced Owl	<i>Otus leucotis</i>	R	Red-collared Whydah	<i>Euplectes ardens</i>	R
Spotted Eagle Owl	<i>Bubo africanus</i>	R	Parasitic Weaver	<i>Anomalospiza imberbis</i>	PP (725.5)
Giant Eagle Owl	<i>Bubo lacteus</i>	R	Melba Finch	<i>Pytilia melba</i>	R
Pel's Fishing Owl	<i>Scotopelia peli</i>	R	Orange-winged Pytilia	<i>Pytilia afra</i>	PP
Pearl-spotted Owlet	<i>Glaucidium perlatum</i>	R	Red-throated Twinspot	<i>Hypargos niveoguttatus</i>	R

ENGLISH NAME	SCIENTIFIC NAME	Zambian Status	ENGLISH NAME	SCIENTIFIC NAME	Zambian Status
Barred Owlet	<i>Glaucidium capensis</i>	R	Red-billed Firefinch	<i>Lagonosticta senegala</i>	R
Wood Owl	<i>Strix woodfordii</i>	R	Jameson's Firefinch	<i>Lagonosticta rhodopareia</i>	R
Marsh Owl	<i>Asio capensis</i>	R	Common Waxbill	<i>Estrilda astrild</i>	R
European Nightjar	<i>Caprimulgus europaeus</i>	P-RR	Blue Waxbill	<i>Uraeginthus angolensis</i>	R
Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>	PP	Bronze Mannikin	<i>Lonchura cucullata</i>	R
Freckled Rock Nightjar	<i>Caprimulgus tristigma</i>	PP	Red-backed Mannikin	<i>Lonchura bicolor</i>	R
Gaboon Nightjar	<i>Caprimulgus fossii</i>	PP	Cut-throat Finch	<i>Amadina fasciata</i>	PP
Mottled Spinetail	<i>Telacanthura ussheri</i>	R-RR	Village Indigobird	<i>Vidua chalybeata</i>	R
Bat-like Spinetail	<i>Neafrapus boehmi</i>	R	Dusky Indigobird	<i>Vidua purpurascens</i>	R
African Palm Swift	<i>Cypsiurus parvus</i>	R	Pin-tailed Widow	<i>Vidua macroura</i>	R
European Swift	<i>Apus apus</i>	P	Long-tailed Paradise Widow	<i>Vidua paradisaea</i>	R
Horus Swift	<i>Apus horus</i>	PP	Broad-tailed Paradise Widow	<i>Vidua obtusa</i>	PP
Red-faced Mousebird	<i>Urocolius indicus</i>	R	Yellow-fronted Canary	<i>Serinus mozambicus</i>	R
Narina Trogon	<i>Apaloderma narina</i>	A	Bully Canary	<i>Serinus sulphuratus</i>	R
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	R	Black-eared Seed-eater	<i>Serinus mennelli</i>	R
Malachite Kingfisher	<i>Alcedo cristata</i>	R	Stripe-breasted Seed-eater	<i>Serinus reichardi</i>	R
			Cinnamon-breasted Rock Bunting	<i>Emberiza tahapisi</i>	A
			Golden-breasted Bunting	<i>Emberiza flaviventris</i>	PP

# 11 ANNEX 11: CHECKLIST OF REPTILES IN LUSITU AREA

Table 11-1 Checklist of Reptiles in Lusitu area

Scientific Name	Common Name
<b>SNAKES</b>	
<i>Naja mossambica</i>	Mocambique spitting cobra
<i>Dendroaspis polylepis</i>	Black mamba
<i>Hemirhagerrhis nototaenia</i>	Bark snake
<i>Rhamphosis oxyrynchus</i>	Rufous beaked snake
<i>Psammophis phillipsii</i>	Olive grass snake
<i>Psammophis subtaeniatus</i>	Stripe bellied sand snake
<i>Psammophis angolensis</i>	Dwarf sand snake
<i>Dispholidus typus</i>	Boomslang
<i>Thelotornis capensis</i>	Vine (twig) snake
<i>Dasypeltis scabra</i>	Common eggeater
<i>Boaedon fuliginosus</i>	Common house snake
<i>Natriciterea Olivacea</i>	Olive marsh snake
<i>Philothamnus hoplogaster</i>	Eastern green snake
<i>Philothamnus semivariatus</i>	Spotted bush snake
<i>Python sebae</i>	African rock python
<i>Typhlops schlegelii</i>	Blind snake
<i>Attractaspis bibronii</i>	Burrowing adder
<i>Bitis arietans</i>	Puff adder
<i>Causus rhombeatus</i>	Rhombic night adder
<b>OTHER REPTILES</b>	
<i>Agama atricollis</i>	Tree (blue headed) agama
<i>Agama kirkii</i>	Kirk's rock agama
<i>Mabuya striata</i>	Striped skink
<i>Ichnotropis squamulosa</i>	Common rough scaled lizard
<i>Varanus exanthematicus</i>	Rock monitor
<i>Varanus niloticus</i>	Nile monitor
<i>Lygosoma sundvevalii</i>	Writhing skink

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<i>Pachydactylus bibronii</i>	Bibron's gecko
<i>Lygodactylus chobiensis</i>	Chobe dwarf gecko
<i>Hemidactylus mabouia</i>	Tropical house gecko
<i>Crocodylus niloticus</i>	Nile crocodile
<i>Geochelone pardalis</i>	Leopard tortoise
<i>Pelusios sinuatos</i>	Serrated hinged terrapin
<i>Chamaeleo dilepsis</i>	Flap necked chamaeleon

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## 12 ANNEX12: CHECKLIST OF FISH IN LUSITU AREA

Table 12-1 Checklist of Fish in Lusitu Area

<b>PROTOPTERIDAE</b>	<i>Protopterus annectens</i>	Lungfish
<b>MORMYRIDAE</b>	<i>Hippopotamyrus discorhynchus</i>	Zambezi parrotfish
	<i>Petrocephalus catostoma</i>	Churchill
	<i>Marcusenius macrolepidotus</i>	Bulldog
	<i>Mormyrops deliciosus</i>	Cornish Jack
	<i>Mormyrops longirostris</i>	Bottlenose
<b>KNERIIDAE</b>	<i>Kneria auriculata</i>	Southern kneria
<b>ANGUILLIDAE</b>	<i>Anguilla bengalensis labiata</i>	African mottled eel
	<i>Anguilla marmorota</i>	Madagascar mottled eel
	<i>Anguilla mossabica</i>	?Eel
<b>CYPRINIDAE</b>	<i>Barbus fasciolatus</i>	Red barb
	<i>Barbus lineomaculatus</i>	Line spotted barb
	<i>Barbus marequensis</i>	Largescale yellowfish
	<i>Barbus paludinosus</i>	Straightfin barb
	<i>Barbus barotsecensis</i>	Many spotted barb
	<i>Barbus eutaenia</i>	Thick striped barb
	<i>Barbus manicensis</i>	Plain barb
	<i>Barbus viviparus</i>	Twin striped barb
	<i>Barbus radiatu</i>	Red-eyed barb
	<i>Labeo altivelis</i>	Hunyani labeo
	<i>Labeo congoro</i>	Purple labeo
	<i>Labeo cylindricus</i>	Redeye labeo
	<i>Varicorhinus nasutus</i>	Shortsnout chiselmouth
	<i>Barilius zambezensis</i>	?
<b>CHARACIDAE</b>	<i>Brycinus imberi</i>	Imberi
	<i>Micralestes acutidens</i>	Silver robber
	<i>Hydrocynus vittatus</i>	Tigerfish
<b>DISTICHODONTIDAE</b>	<i>Distichodus mossambicus</i>	Nkupe
	<i>Distichodus schenga</i>	Chessa



<b>AMPHILIIDAE</b>	<i>Leptoglanis rotudiceps</i>	Spotted sand catlet
	<i>Amphilius platychir</i>	? Mountain catfish
<b>SCHILBEIDAE</b>	<i>Schilbe mystus mystus</i>	Silver catfish
	<i>Schilbe mystus depressirostris</i>	Butter catfish
<b>CLARIIDAE</b>	<i>Clarias gariepinus</i>	Sharptooth catfish
	<i>Clarias theodora</i>	Snake catfish
	<i>Heterobranchus longifilis</i>	Vundu
<b>MALAPTERURIDAE</b>	<i>Malapterurus electricus</i>	Electric catfish
<b>MOCHOKIDAE</b>	<i>Chiloglanis neumanni</i>	Neumann's suckermouth catlet
	<i>Synodontis zambezensis</i>	Clouded squeaker
	<i>Synodontis nebulosus</i>	Brown squeaker
<b>CYPRINODONTIDAE</b>	<i>Aplocheilichthys johnstonii</i>	Johnston's topminnow
<b>CICHLIDAE</b>	<i>Oreochromis mossambica</i>	Mozambique tilapia
	<i>Oreochromis macrochir</i>	Greenhead tilapia
	<i>Pharyngochromis acuticeps</i>	Zambezi happy
	<i>Pseudocrenilabrus philander</i>	Southern mouthbrooder
	<i>Sargochromis codringtoni</i>	Green happy
	<i>Tilapia sparrmanii</i>	Banded tilapia
	<i>Tilapia rendalli</i>	Northern redbreast tilapia

# 13 ANNEX13: CHECKLIST OF LARGE MAMMALS IN LUSITU AREA

Table 13-1 Checklist of Mammals in Lusitu area

<b>Class/ Order/Family</b>	<b>Latin name</b>	<b>Common name</b>
<b>Order Carnivora</b>		
Canidae	<i>Canis adustus</i>	Side-striped jackal
Felidae	<i>Felis sylvestrus</i>	African wild cat
	<i>F. caracal</i>	Caracal
	<i>F. serval</i>	Serval
<b>Order Proboscidea</b>	<i>Loxodonta africana</i>	Elephant
<b>Order Artiodactyla</b>		
Suidae	<i>Potamochoerus porcus</i>	Bushpig
Hippopotamidae	<i>Phacochoerus aethiopicus</i>	Warthog
	<i>Hippopotamus amphibius</i>	Hippopotamus

# 14 ANNEX 14: CHECKLIST OF PLANT SPECIES

Table 14-1 Checklist of Plant Species in the Area

Botanical Name	Common Name	Local Name
<i>Abrus precatorius</i>	Lucky bean creeper	--
<i>Acacia ataxacantha</i>	Flame acacia	Kananga
<i>Acacia gerrardii</i>	Red thorn acacia	--
<i>Acacia meifera</i>	Black thorn acacia	Mubhadzura
<i>Acacia nilotica</i>	Scented thorn	Cujimwe
<i>Acacia nigrescens</i>	Knob thorn	Myamapanombwe
<i>Acacia sieberana</i>	Paper bark acacia	Muzunganyewe
<i>Acacia robusta</i>	Splendid acacia	Mumunga
<i>Acacia tortilis</i>	Umbrella thorn	Kafifi
<i>Adasonia digitata</i>	Baobab	Mlambe
<i>Afzelia quanzensi</i>	Pod mahogany/Lucky bean	Mpapa
<i>Albizia Anthelmintica</i>	Worm-cure albizia	Muzhvangwa
<i>Albizia versicolor</i>	Poison-pod albizia	Muriranyandze
<i>Allophylus africanus</i>	Black false current	--
<i>Amaranthus spinosa</i>	Pig weed	Sunha
<i>Aristolochia petersiana</i>	Dutchmans pipe	
<i>Asparagus africanus</i>	Wild asparagus	--
<i>Asparagus setaceus</i>	Feather asparagus	--
<i>Azanza garckeana</i>	Snot apple	Mkole
<i>Balanites Maughamii</i>	Y-thorn torchwood	--
<i>Bauhinia petersiana</i>	Coffee neat's foot/Camels foot	Mpondo
<i>Berchemia discolor</i>	Bird plum	Nyii
<i>Boscia mossambicensis</i>	Broadleaf shepards tree	
<i>Cadaba Kirkii</i>	Large-leaf cadaba	
<i>Capparis sepiaria</i>	Wild caper bush	--

<i>Capparis tomentosa</i>	Wooly caper bush	
<i>Carissa edulis</i>	Simple spined num-num	--
<i>Cardiospermum halicacabum</i>		
<i>Cassia abbreviata</i>	Sjambok pod	Nyoka
<i>Cassia singueana</i>	Winter cassia	Mtantanyelele
<i>Cassia obtusifolia</i>	--	
<i>Cleistochlamys kirkii</i>	Purple cluster pear	--
<i>Cleome hirta</i>	Pretty lady	
<i>Cocculus hirsutus</i>	Python climber	--
<i>Colophospermum mopane</i>	Mopane	Mopane
<i>Combretum adenogonum</i>	Four-leaved bushwillow	Kalama
<i>Combretum apiculatum</i>	Red bushwillow	--
<i>Combretum celastroides</i>	Jesse-bush combretum	Kasakasaka
<i>Combretum elaeagnoides</i>	Oleaster bushwillow	
<i>Combretum imberbe</i>	Leadwood	Msimbiti
<i>Combretum obavatum</i>	Spiny combretum	Chifungulu
<i>Combretum microphyllum</i>	Flame creeper	Malohwe
<i>Combretum mossambicensis</i>	Knobbly combretum	
<i>Combretum zeyheri</i>	Large-fruited bushwillow	Kadale
<i>Commiphora mollis</i>	Velvet commiphora	Nkomotwa
<i>Cordyla africana</i>	Wild Mango	Mutondo
<i>Crossospteryx febrifuga</i>	Sand crown berry/Crystal bark	
<i>Croton megalobotrys</i>	Fever berry tree	--
<i>Cucumis anguria</i>	Wild cucumber	--
<i>Cucumis metuliferus</i>	Bitter wild cucumber	--
<i>Delbergia melanoxylon</i>	Zebra wood	Pulupulu
<i>Dichrostachys cinerea</i>	Sickle bush	Muhwaye
<i>Diospyros mespiliformis</i>	Ebony (Jackalberry)	Muchenya
<i>Diospyros quiloensis</i>	Crocodile bark ebony	Kashihe
<i>Diospyros senensis</i>	Ebony (Peeling bark)	Kaonga
<i>Duosperma quadrangulare</i>	Saltbush	Chikonkose
<i>Euphorbia ingens</i>	Common tree euphorbia	Mlangali
<i>Euphorbia tirucalli</i>	Rubber euphorbia	--
<i>Excoecaria Bussei</i>	Pepper Seed Tree	--
<i>Faidherbia albida</i>	Winter thorn	Musangu
<i>Ficus capreifolia</i>	Sandpaper fig	Nsambe
<i>Ficus ingens</i>	Red leaved Rock fig	Mtowe
<i>Ficus Thonningii</i>	Common wild fig	Kachere

<i>Ficus sycamorus</i>	Sycamore fig	Mkuyu
<i>Ficus Zambesiaca</i>	Zambezi fig	
<i>friesodielsia obovata</i>	Bastard dwaba berry	Muchinga
<i>Grewia flavescens</i>	Rough-leafed raison	Manjonjo
<i>Holmskioldia tettensis</i>	Wild chinese hats	--
<i>Hyphaene Petersiana</i>	Ilala palm/Fan palm	Mulala
<i>Indigofera tinctoria</i>	Indigo dye plant	--
<i>Jasminum fluminence</i>	Wild jasmine	
<i>Khaya nyasica</i>	Red mahogany	
<i>Kigelia africana</i>	Sausage tree	Muveye
<i>Kirkia acuminata</i>	White syringa	Mzuba
<i>Lagenaria seciraria</i>	Wild melon/Monkey apple	
<i>Leonotis nepetifolia</i>	Wild dagga	
<i>Lonchocarpus bussei</i>	Small apple leaf	--
<i>Lonchocarpus capassa</i>	Rain tree	Chimpakasa
<i>Maerua angolensis</i>	Bead-bean tree	--
<i>Markamia zanzibarica</i>	Bell bean tree	Kaputa uteye
<i>Mimosa pigra</i>	Sensitive plant	Lungwizi
<i>Momordica balsamina</i>	Balsam pear	
<i>Mucuna puriems</i>	Buffalo bean	
<i>Mystroxyton</i>	Kooboo berry	
<i>Ocimum canum</i>	Lavender plant /Wild basil	Katandanyunyu
<i>Orthanthera jasminiflora</i>	Jasmine creeper	
<i>Pechuel-loeschea leubnitziae</i>	Wild sage	--
<i>phoenix reclinata</i>	Wild date palm	Kanchinda
<i>Phyllanthus reticulatus</i>	Potato bush	Kamujahangaiwa
<i>Piliostigma thonningii</i>	Camels foot	Chitimbe
<i>Pistia stratiotes</i>	Nile cabbage	Tena tena
<i>Pterocarpus angolensis</i>	Wild teak	Mlombe
<i>Pterocarpur lucens</i>	Thorny teak	Modadima
<i>Pycreus mundth</i>	Wild sage	
<i>Salvadora perscia</i>	Mustard tree	
<i>Schrebera trichoclada</i>	Sand jasmine/Wooden pear	Mpumbafumba
<i>Sclerocarya caffra</i>	Marula	Msewe
<i>Selvania mollestra</i>	Kariba weed	
<i>Sesbania sesban</i>	River bean	Musebebe
<i>Solanum panduriforme</i>	Poison apple	Ndunduwa
<i>Sphaeranthus incisus</i>	Wild lavender/Purple pan weed	

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<i>Sterculia africana</i>	Bastard baobab (tick tree)	Mlele
<i>Sterculia quinqueloba</i>	Large leaved star-chestnut	Mfopolela
<i>Stereospermum kunthianum</i>	Pink jacaranda	Mtelelanjobvu
<i>Strophanthus kombe</i>	Zambezi tail flower	--
<i>Strophanthus emini</i>	--	
<i>Strychnos spinosa</i>	Monkey orange	Kasibile
<i>Syzygium cordatum</i>	Waterberry	Mchisu
<i>Tamarindus indica</i>	Tamarind	Mwembe
<i>Terminalia pruniodes</i>	Purple pod terminalia	--
<i>Terminalia sambesiaca</i>	River cluster-leaf	
<i>Terminalia sericea</i>	Silver cluster-leaf	Gonondo
<i>Trichilia emetica</i>	Natal mahogany	Msikisi
<i>Vangueria infasta</i>	Wild medler	
<i>Vernonia gladra</i>	Cornflower vernonia	--
<i>Xanthocercis zambesiaca</i>	Nyala berry	Mpululu
<i>Xeroderris stuhlmannii</i>	Wing pod	Mlombeya
<i>Xeromphis obovata</i>	Thorny bone apple	--
<i>Ximenia africana</i>	Sour plum	Mpenji
<i>Ziziphus abyssinica</i>	Jujube	Mlashawantu
<i>Ziziphus mauritiana</i>	Wait-a-bit (buffalo thorn)	Kankande/Msau

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# 15 ANNEX 15: MINUTES OF MEETINGS WITH STAKEHOLDERS

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## MINUTES OF THE CONSULTATIVE MEETING HELD IN LUSITU ON 18TH JANUARY 2013

### 15.1 Introduction

The meeting opened at 11.26 hrs with a prayer and the National Anthem. This was followed by Mr. Kenneth Nyundu's (chairman) opening remarks. He further took recognition of the presence of the officials that were present. The counsellor gave welcoming remarks and urged the people to participate fully. In addition, he told the officials that the people were ready to listen.

### 15.2 Objectives of the Meeting

Mr. Nyundu outlined the agenda for the meeting and explained the purpose of the meeting. He went on to state the specific objective of the meeting as to inform the general public about the proposed project and its implications. Mr. Kenneth stated that he was aware that other colleagues had already introduced the project to the community in the past and further explained that the meeting marked the official beginning towards actual implementation of the project. He also stated that the meeting provided an opportunity for them to state among other factors what they felt was of concern to their wellbeing or indeed issues that needed attention prior to implementation of the project. Furthermore, he stated that details would be obtained and adequate project information would be exchanged.

He further urged people to freely express themselves during the deliberations. He requested everyone not to interrupt or interject while someone was making a submission. He informed the meeting that minutes of the meeting will be part of the scoping report that will be submitted to the Zambian Environmental Management for approval.

## 15.3 Presentation by Mr. Kenneth.

Mr Nyundu explained to the people that the Ministry of Agriculture and Livestock were responsible for the project and gave a detailed presentation of the proposed project. He also stated that the ministry wanted the local people to be fully involved. He further informed the meeting that the government had sourced money for the project and through the Ministry of Agriculture and Livestock SOFRECO a French consulting company has been hired to undertake the studies. He informed the people that out of the many potential sites throughout the country only three sites had been chosen as beneficiaries under phase 1 on pilot basis and Lusitu was lucky to be amongst those three sites.

In addition, he stated that the people of Lusitu have a very big role to play because if the project worked out according to plan, it would be replicated to other parts of Zambia. He further explained to the people that two hundred and fifty hectares would be targeted for irrigation in Lusitu under the project hence some people may be affected and will have to be resettled elsewhere within the project area. He informed the meeting that for the other two sites more land is targeted stating that about 1500ha in Mwomboshi and 500ha in Musakashi is targeted.

He also explained that water for irrigation will be abstracted from the Zambezi River for irrigation. During the study factors relating to the wellbeing of the people, environment and wildlife would be assessed and the negative effects identified and solutions for minimising these effects suggested. Mr. Nyundu stated that he was one of the team of experts of multidiscipline who are scheduled to visit the area and assess different aspects of the project based on scientific knowledge as well as local knowledge from the people.

Mr. Nyundu also stated that during the project, an exercise would be carried out to ensure that the project is going according to plan. He went on to say that measures of security and safety of the people would be looked at. Those who will be moved will be compensated according to negotiated agreed upon terms. He further said that stakeholder consultations will continue throughout the project implementation process in form of interviews or meetings.

Mr. Nyundu thanked the people for coming and said that without them the meeting could not take place. The floor was then opened for participants to seek clarifications, ask questions or indeed provide suggestions or opinions.

## 15.4 Plenary discussion

The section outlines questions, clarifications and general opinions expressed by the community and responses.

Q. JAMES SIMAPANDE: Wanted to know if the project was being imposed on the community?

In response Mr Nyundu said that the project is not being imposed on the people. If that was the case, this meeting would not have been held.

Q. Edward Silungu: Expressed concern that there is land that is currently being cultivated and there is land that is idle. He wanted to know what will happen to the land currently being cultivated under irrigation.



In response, he was told that another team under SOFRECO will assess the land and its current use and recommendation will be made on how best to move forward. However, he said that it's up to the people to suggest what option would work best for them.

He explained that the project has four tiers or categories. One hectare or less, then up to 5 hectares, then 60 ha or more and commercial farmers. He explained that the tier for commercial farmers was only applicable to Mwomboshi. Under the first tier farmers will be supported with inputs and training since these will be run by households themselves. For tier two he explained that these will be run by groups of farmer on a commercial basis by employing and will benefit from sprinkler irrigation infrastructure. He also explained that for tier three these will be run by a company formed as a community trust. These will be run commercially using center pivot.

Q. Angeline: What other works have been done by SOFECO as company relating to the project?

In response Mr Nyundu said that SOFRECO has done several similar works in other countries elsewhere in Africa and has vast experience in doing such works. He further explained that the approach for SOFRECO was to use mainly local experts supported by international experts in backstopping the work to ensure that it meets international standards.

Q. Mr. Alfred Chikondi (Head teacher): The head thought that the scheme was a very big one and wanted to know if they will educate the community on how to manage it since it was a community project.

In response Mr Nyundu said training and capacity building for the community was a big component of the project and dedicated experts have been engaged to deal with the issue to prepare the community for management of the project during operation stage.

Q. Sinuru Wedi: His concern was on the two hundred and fifty hectares, he wanted to know which land would be used for the project since there is no land that is unoccupied?

In response, he was informed that a dedicated team of experts will carry out surveys to determine the actual land being targeted and through negotiation such land if occupied currently will have to be vacated. This will be done through consultation of all concern stakeholders and agreed upon terms to ensure that no one is left worse off than before.

Q. Maggie Sizwelu: The concern and wanted to know if her land will be retained during the projection operation stage.

In response, Mr Nyundu said that the intention of the project was to ensure better living conditions for the people than before. Therefore, land will be prepared and arranged in manner that will enable functionality of irrigation infrastructure such as canals and pipelines. And resurveyed plots will be given to the people that may not necessarily assume old boundaries especially under tier one.

C. Bridget Mwela: She expressed happiness with the project and shared with the meeting that she had actually seen where a similar project has worked elsewhere and the benefits that the local communities have gotten. She urged fellow community members to support the project as it will develop the area.

Q. Joe Maziba (Chief's Secretary at the palace):

He explained that other meetings had already been held and said that people fully understand the project. He however, expressed the need for the project to take into account animal corridors as they design the boundaries for land to be under irrigation. He also requested the project to ensure that this land is fenced to avoid animal conflict involving elephants as well as domesticated animals grazing crops.

In response he was told that issues raised have been taken note and the study will take them into account.

Q. Gizmo Mukadela: Being one of the youths that had gone for study tour under the same project said he had seen other communities where similar projects have been implemented have developed. He said he was aware that people that were not resident within the project area were against the project because they felt they will not benefit. He personally welcomed the project and urged others to do the same. He also wanted to know how the project will work.

In response Mr Nyundu explained that profits made under tier three will basically subsidize farmers under tier one and to some extent tier two. Hence the need to run tier three farm commercially using capable management team but under supervision of the community trust..

Q. Bridget Mwela: Expressed concern that there aged people within the community and wanted to know if such people could be allowed to benefit from the land allocation during project operation so that their children can support them cultivate on it?

In response she was informed that in the case of the elderly who are venerable, they will not be segregated and will equally benefit since the land belongs to them. He further said that Government was just assisting the community in order to improve their way of living.

Q. Follow Sizimin: said that among community they know amongst ourselves who is capable who is not able to cultivate a certain hectare of land. And as such no one will be allowed to get land that they cannot effectively utilise. In addition, he said some are young farmers who are more productive than the elderly so this should be taken into account.

Q. Gidion: expressed doubts over the project saying that if it comes in good faith then it is welcome but if it comes with problems then they will be war as people will rise against the promoters of the project Furthermore, was also concerned about the livestock passage to the river and land for grazing as well as safety of the crop under irrigation if not fenced.

What he has seen on the paper is exactly in line with what he showed the white man.

In response My Nyundu said whatever is being done was building on past works done regarding the project to ensure continuity. He informed the meeting that government has sourced funds for this project and has decided to improve the wellbeing of people in Lusitu. He urged the people to focus on the benefits the project will bring such as job creation and infrastructure such as roads.

Q. Simakumucha

Said that as a community they have had several meetings in the past where people agreed that the project can go ahead and said those people who are opposing the project were wasting our time. Let the project come.

Q. Benald Nakande: Said that he was one of the people living within the project area and that what he realised was that those who were opposing the project were people are coming from far flanked areas for purposes of denying people of Lusitu from benefiting from the project. He also wanted to know if people in the area can renovate their houses and continue cultivating their land as before.

In response Mr Nyundu said that people should continue living normally until such a time when they informed not do so prior to the project commencement.

#### Remarks from the District Commissioner DC

The District Commissioner expressed gratitude to the Government for facilitating the investment in proposed area and acknowledged the presences of the people present. He called upon the people in the area to work together and embrace the new project. He further stated that the government does not use guns to force people to do what they do not want to do and that's why they have engaged into discussion at all stages of the project to ensure that everyone knows what was going on.

He said that PF government is in a hurry to improve the lives of the people. The benefits go beyond the project area and his appeal was that when engineers/consultants come the people should cooperate so that the project can be carried out in manner such that everyone benefits. He said it was sad that there is less food production in Lusitu and as such the government would like to reduce poverty. One of the benefits of the project is that the road linking Lusitu to other areas will be worked on. He expressed happiness to learn that vegetable production has grown in the area. He also said that the youth will be employed.

Finally, he called upon the community not dehumanize those against the proposed project but educate them about its the benefits. He concluded by thanking the people for finding time to attend the meet despite their busy schedules.

#### Remarks by Chief Representative

He stated that while the project was welcome, once operational the elephants can destroy the crops and the government should address the matter in the design of the project. He also reminded people of Lusitu that currently people were crying for relief maize simply because of being less productive. With the project in the area the scenario will change he said. In addition, the government should work with the people. He further stated that the benefits were for the people and not the government hence the people should cooperate. He implored the people to learn and share with others and may the lord bless this meeting.

#### Closing Remarks

Mr Nyundu thanked everyone for actively participating in the deliberations. He stated that other expects from SOFRECO will come in future and the people should welcome them so that work can progress smoothly for quick implementation of the project. The meeting closed at 15.37hours with a prayer.

## LIST OF PARTICIPANTS FOR THE SCOPING MEETING FOR THE IDSP PROJECT LUSITU SITE HELD ON 18TH JAN 2013 IN LUSITU

NO	NAME	CONTACT NO	ORGANISATION/ENTITY	SIGNATURE	NO	NAME	CONTACT NO	ORGANISATION/ENTITY	SIGNATURE
1	EDWARD SIAULLULA	260979746263			66	FOSTINA MUCHIMBA		FARMER	
2	DOMINIC BBINGA	260978289583			67	FEBBY NSANGANYA		FARMER	
3	SIMON NKABA	260972132286			68	BEST SIANKWEMBO	260966276411	FARMER	
4	CHEALES SYAMUVWAMBA				69	STANLAS SIAMAKOBE		YOUTH	
5	BISWELL NKANDALA	260968709793			70	CHIDENDE SIATUMBU		YOUTH	
6	ALFRED CHIKOONDO	260978081811			71	CHANDA SIANTUMBU		YOUTH	
7	JAMESON SIMAPANDE	260974065327			72	ATHER SIAMUTOMBO		YOUTH	
8	PETER NAMALWA	260965689778			73	BNOSWELL SIMWEELD		YOUTH	
9	RICHARD MUCHINDU				74	MILLIAS SIANYULU		YOUTH	
10	HARRISON NTAULO				75	NOBERT SAI		YOUTH	
11	STANELY NTAULO	260978036952			76	DIIMBE SIMALAMBO	260963739661	YOUTH	
12	FALLS SIANYULU				77	HAROD SIANKWEMBO		FARMER	
13	LEONARD NKANDELA				78	JEFASON JANI		H/MAN	
14	BILLY MUNTALI	260977696220	FORESTRY		79	CAPHANT SIGUNDU	260966157526	H/MAN	
15	ENGENE MWEEMBA	260979466673	AGRICULTURE		80	STENVA SIALWELA		FARMER	
16	CHRISPIN SIMWANZA	260966668843	ZEMA		81	DOMINIC MAZIO		FARMER	
17	O'NEILL CHILYA	260979750881	DISTRICT ADMIN		82	PHILLIMON SIAWWENYA		FARMER	
18	CLEMENT NKANDELU	260979422314			83	MAKEMPE KENNEDY		TEACHER	
19	WEBBY SYANYULA		H/MAN		84	MARIA MUJIMBA		FARMER	
20	KENNETH SIANYULU	260972553987	SENIOR H/MAN		85	LACHELI NKANDELA		FARMER	
21	GIBSON SIANKUSULE	260975425031	VICE H/MAN		86	CHRISTEETAR SIAMAILI		FARMER	
22	UNICE SIMAKUMUCHA				87	SARA SAINA		FARMER	
23	SELINA JIMAIMA				88	JENNEY BBENGULA		FARMER	
24	LUCKSON SAMBOKO	260979841873	DEPT OF AGRICULTURE		89	ESTER SIAMPOLA		FARMER	
25	SIMULULWE MICAH	260977662118	DEPT OF COMM. DEU		90	COTAIL NKABA		YOUTH	
26	GLORIA SAI	260972480608	FARMER		91	MICSON SIAMAKOBE		YOUTH	
27	CORNMAN SIANKWEMBO		FARMER		92	STABRAG SIAMPOLA		YOUTH	
28	KELVIN MAAN		FARMER		93	DENMARK MUKONKA		YOUTH	
29	ENOCK SIGUNDU		FARMER		94	JAMES MUNYON		YOUTH	
30	LIFTEN SIMALUNDU		FARMER		95	ORPHEN CHIKONDO		YOUTH	
31	MICHO SIABBUWA		FARMER		97	BCANSON SIAMUVWAMBA		FARMER	
32	WILSON MUVOMBO		FARMER		98	FINE MWEEMBE		YOUTH	
33	FRED SIMWEELA		FARMER		99	EDWARD SIAZWELA		FARMER	
34	SARIA MULEYA		FARMER		100	JACOB SIMALUNDU		H/MAN	
35	BRIDGET MULELE	260978081542	FARMER		101	TOM SAINA		FARMER	
36	JAPHET SIAMUSOWE		FARMER		102	ROFAILOR SIAGOLOMA		FARMER	
37	JAMSON NTAULO		FARMER		103	LANGSON MULUNGU	260979309550	FARMER	
38	WESLEY MUDENDA		FARMER		104	BEST SIMALUNGU	260978245452	FARMER	
39	CHARLES SIABBIWA		FARMER		105	VICTOR CHINUNGU		FARMER	
40	DOMINIC MAZILA		FARMER		106	JELINA SIALUKUBA		FARMER	
41	PHILIMON SIAWWENYA		FARMER		107	ADJAI MUWELE		FARMER	
42	GIDWELL NKABA		FARMER		108	JOE SIAMALICAULA		FARMER	
43	JONATHAN SAI	260978955789	FARMER		109	VENUS SIMWEELA		FARMER	
44	JOSEPH NKABA		FARMER		110	GILDAH SIANCHEKA		FARMER	
45	WILARD BBOOKESI		FARMER		111	MAYNESS BBOOKESI	260976410521	FARMER	
46	MUSOOJA SIATUMBU		FARMER		112	ROBSON SIANDUBA	260977497074	COUNCILLOR	
47	ENELBU JIMAIMA		FARMER		113	MUTINTA C. ZULU	260979030318	MINISTRY OF AGRIC & L/STOCK	
48	LAZAROUS SIANKUSULE		H/MAN		114	JENNY CHITA	260955192677	OFFICE OF PRESIDENT	
49	GIVE SIANKUSULE	260979196375	FARMER		115	MBWAINGA M. RICHARD	260977828145	HIRUNDU DISTRICT COUNCIL	
50	ADDVAWCE SIAMAYWA	260976445511	FARMER		116	I. S. WAKUNGUMA	260978923700	CHIRUNDU MAIN POLICE	
51	WIVA CHAMUNKUYU		FARMER		117	MAXWELL M. SYAMALIMBA	260966762925	INDU DISTRICT COMMISSION	
52	MIGGIE SIAZWELA		FARMER		118	SYLVESTER HAKALINDA	260977893123	HEADTEACHER	
53	BENITA SIABBOLE		FARMER		119	MOFFAT	26097894488	V/HMAN&V/SECRETARY	
54	HILDA MALLA		FARMER		120	SIMON CHAMUNKUYU	260976604056	PROJECT CHAIRPERSON	
55	EVIDENCE SIAZWELA	260976855800	FARMER		121	EDWARD MWALE		PROJECT SECRETARY	
56	JOE MAZILA	260971545378	FARMER		122	ANGANILE NAMUKWAI		TEACHER	
57	NETRO SIAKUTENGA		FARMER		123	AKATAMAIVEN M.	260966035138	TEACHER	
58	PATRICIA SIAMAKO		FARMER		124	MWEEMPWA A. M	260975184696	D/HEADTEACHER	
59	KESINA MUTANDALIMA		FARMER		125	CHIJOKA CHOOLWE	260976707547	TEACHER	
60	SOPHIA SIANCHINDA		FARMER		126	ANDERSON SIMAKOMWE	260966448074	KAPASO	
61	ABEL SIAMPOLA		FARMER		127	MICHO SYABBUWA			
62	BITWELL SIANKWEMBO	260979838250	H/MAN		128	SIAMBOWE JAPHET			
63	JREEN JAAYA		FARMER		129	JOSEPH NKABA	260978081542	FARMER	
64	CHUNSA SIADABWALI		FARMER		130	KENNEDY NTAMLO	26097529520	FARMER	
65	LACKNESS NKOMESI		FARMER		131	JACOB SIMALUNDU	260977308667	H/MAN	

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# 16 ANNEX 16: MINUTES OF DISCLOSURE MEETING

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## 16.1 Introduction

The Environmental and Social Impact Assessment (ESIA) Public Disclosure Meetings were held at all three IDSP Group 1 sites in July 2014 following written notices given to targeted stakeholders and to the general public through the national print media (See extract from one of the daily newspaper in the annex). . The purpose of making the ESIA draft reports public was; to disclose the outcomes of the Environmental and Social Impact Assessment studies conducted at the three sites; and to seek public input on the recommendations of the ESIA before finalisation of the draft ESIA reports.

The disclosure meeting at Lusitu site was held at Tauya Lodge on the 16<sup>th</sup> of July 2014 and was attended by interested and affected stakeholders that included the local community, representatives of the District Council, traditional leaders, the District administration and the Ministry of Agriculture and Livestock among others (See attendance list in the annex).

## 16.2 Opening remarks

The National IDSP Co-ordinator, Dr. Barnabas MULENGA, gave the opening remarks and reminded participants of the importance of the Public Disclosure Meeting to IDSP as a statutory requirement aimed at satisfying Zambia Environmental Management Agency (ZEMA) and safeguard policies for World Bank. He called upon all participants to fully participate and express themselves freely on the contents and outcomes of the ESIA. He then called upon the District Commissioner Ms Peggy C. Nyerenda to give her remarks. She reminded participant of the key role of irrigation plays in the district particularly that the district does not receive enough rain to sustain rainfed. She went on to outline the benefits of the project and called upon the district to take this opportunity of being included in phase one as a privilege. She then called upon the Permanent Secretary Ministry of Agriculture and Livestock, Mr. J. Shawa, to officially open the disclosure meeting.

In his address, The Permanent Secretary spoke to underscore the key role irrigation can play in agriculture. He went on to state that Zambia had abundant water resources which were yet to harnessed and developed. Despite this the country still lagged behind in the utilization of land under irrigation. Hence

Government through Ministry of Agriculture and Livestock sourced funds to develop irrigation schemes. He cited Mwomboshi, Musakashi and Lusitu as the three irrigation schemes that are earmarked for development under phase one. He alluded to the fact construction of irrigation schemes at the three sites would contribute to effective utilisation of water resources consequently increase land under irrigation. He reaffirmed Government commitment to quicken the process of ensuring smooth operation of the schemes. But he pointed out that Government will observe all procedural requirements such the ESIA in a transparent manner to ensure that development is sustainable. He called upon the Ministry to follow a cost effective approach in sourcing services for the development of the scheme. In conclusion he called upon all participants to freely participate in order to realize the objectives of the meeting

## 16.3 Proceedings

### 16.3.1 Presentation of the ESIA

The ESIA Team Leader Mr Kenneth NYUNDU informed the stakeholders in attendance that the purpose of the disclosure meeting, stating that it was a very important step in the consultative process of the ESIA development. He explained that following the production of the draft ESIA report and prior to submission of the ESIA report to the competent authority, it was a requirement that the findings of the ESIA study and recommendations contained therein are made public to all stakeholders, interested and affected parties. This was aimed at ensuring that the findings and recommendations of the ESIA study are based on factual information and representative of the aspirations of the stakeholders as part of the transparent consultative process.

In his presentation, he gave a brief summary on the project background highlighting its objectives, scope and rationale. He explained that the underlying principle of the IDSP project is based on a partnership arrangement between the Government, private operators and communities. He further went on to explain the key features of the project as being irrigation facilities and associated support infrastructure. He elaborated on beneficiary and targeted groups for the project.

Furthermore, he outlined the contents of the ESIA report citing all relevant sections of the report and their relevance. He went on to elaborate on the approach that the ESIA team used in developing the report, the ESIA study objectives and issues that were captured during consultative meetings with stakeholders as well as the findings of the ESIA study. Based on the findings and conclusions drawn on all relevant subject matters of the ESIA, the stakeholders were informed that the ESIA team identified positive and negative impacts. These were further characterised based on their magnitude, extent, significance and timing. Cumulatively their effects were analysed during the study and he disclosed recommendations and or mitigation measures stated in the ESIA aimed at avoiding or minimising such effects. He also elaborated on the environmental management tool of these effects in form of an environmental management and monitoring plan as contained in the ESIA report.

In conclusion, he informed the meeting that it was the opinion of the ESIA study team that social economic and environmental impacts from the proposed project can effectively be managed and reduced to acceptable levels as long as proposed

measures are implemented. Consequently, the benefits arising from operations of Lusitu Irrigation Scheme as a developmental project outweigh environmental costs. After the presentation, the ESIA Team Leader invited the participants to raise any issues.

### 16.3.2 Plenary Discussion

Mr Ackson Mwanza, Extension methodologies, DACO Office wanted to know how the ownership arrangement would be for the scheme by the different kind of beneficiaries. In response, Ms Deborah PHIRI, Safeguards specialist, ownership arrangements for the scheme are well elaborated in the RAP and the issue was discussed at length during the RAP disclosure meeting. She called upon all participants to take keen interest and read not the ESIA report but the RAP report as well.

Mr Victor Sachinja, Corridors of hope III Project, USAID: What clarification on whether there were threatened species within the project area. Mr Harward Maimbo, Zambia Wildlife agency (ZAWA) elephants are endangered species and are found in the project area. He added on that with the irrigation scheme construction and presence of water in the area, the elephants may come in number from the Zimbabwean side of the Zambezi River and possibly destroy the crops. He wanted to know what mitigation measures are planned. In response, Kenneth Nyundu, ESIA Team Leader acknowledged the fact that elephants are endangered but pointed out that the ESIA findings indicated that these elephants are resident in Zimbabwean side where there is a game management area. He pointed out that two measures are planned, leave animal corridors so that elephants can use them to access the area and two fence the irrigation scheme.

- Mr. J. SHAWA, Permanent Secretary of MAL requested the local people to give their opinion on the issue. Mr Simon Chamunkuyu, PPSC Chairman indicated that the elephants were not resident on the Zambian side but simply cross from time to time. Mr Sai Mofat, PPSC Secretary said that the community through consultation have agreed an electric fence be erected to avoid wild animals and in particular elephants to destroy the crops.
- Dr. Barnabas Mulenga, National IDSP Co-ordinator informed the meeting that the issue of animals following water within the scheme was out because the reservoirs to be constructed will not be open reservoirs and no open channels are planned to avoid exposing water and then attract animals.
- Noah SINKALA, Ministry of Agriculture and livestock (DLFCO) insisted that vegetable gardens and fruits will attract elephants and can easily destroy an electrical fence. In response, Mr Kenneth Nyundu, ESIA Team Leader said that elephants cannot be prevented from crossing the river. All measures that will be taken will aim at minimizing the potential damages caused by elephants. He pointed out that the scheme will use all known measures to protect the crop including that of ensuring ZAWA officers are present in the area to intervene when necessary.
- Ms Jenifer Chita, Office of the President called upon ZAWA to be on board and work with the MAL to ensure that the right mitigation measures are provided to protect the scheme. Mr Patrick Siabasimbi, Chipepo Chiefdom reiterated the need for ZAWA to have a permanent camp in the area.
- Francis C. CHIKONDE, Zambia Development Agency wanted to know if the project has taken into account that Zambezi is a shared water body with

Zimbabwe: In response, Ms Deborah Phiri, Safeguards specialist, IDSP informed the meeting that in line with the World Bank guidelines, Zambia notified Zimbabwe in 2011 and a no objection was granted by Zimbabwe.

- Langson MULUNGU, Community member: said that people who are targeted to be moved from the scheme area will be compensated with houses and he wanted to know what compensation will be given to host community who have offered their land to resettle affected persons. This issue was also reaffirmed by Mr Simon CHAMUNKUYU, PPSC Chairman who said that the community agreed offer land to improve agriculture in the area. He said the community were sensitized on the issue and its concluded except for those who don't attend meeting seem not know what was agreed upon. He called upon his fellow community members to read the RAP report.
- Mr Sai Mofat, PPSC Secretary said that the irrigation project was good for the community and reminded his fellow community members that there is another irrigation scheme in the area and they had faced a problem with wild animals destroying crops. But after putting an electric fence elephants are no longer a problem. The issue of elephants was also talked about by Mr Harrison Ntaulo. In response, Mr. J. SHAWA, Permanent Secretary MAL said the MAL will implement fully measures suggested by ESIA team to deal with elephants. Dr. Barnabas Mulenga, National IDSP Co-ordinator said that each household displaced will receive a new house, an irrigation plot and 'land for land' compensation if they have rainfed land in the tiers. He also said that he has engaged ZAWA to start working on ways on how to mitigate human - wild animal conflicts issues.
- Mr Ackson Mwanza, Extension methodologies, DACO Office what to know if consideration was given to drip irrigation system under the scheme. In response, Mr Kenneth Nyundu, ESIA Team Leader said that different technologies were examined using various factors that included cost effectiveness, efficiency, availability and ease to use.
- Mr Victor Sachinja, Corridors of hope III Project, USAID wanted to know the scenario regarding increase in HIV rates in the project area, what prevention measures are proposed. In response, Mr Kenneth Nyundu, ESIA Team Leader MAL has in place an HIV/AIDs policy and strategic plan which will be applied to the project in line with national strategies on HIV.

## 16.4 Way forward

The ESIA Team Leader, Kenneth NYUNDU, closed the plenary discussion by reaffirming that the ESIA team will revise the ESIA reports taking into account all the issues that stakeholders pointed out during the meeting. He said that the team was still open to further contributions from any stakeholder. In concluding, he highlighted the way forward concerning the ESIA process. He informed the meeting that deliberations of the meeting will be compiled and annexed in the main report for submission to MAL who will in turn submit to ZEMA the competent authority in environment for review and approval.

## 16.5 Closing Remarks

Mr Daniel C. Chamba, IDSP Project Engineer, concluded the meeting by thanking all participants for their active participation and valuable input. He said that MAL will work together with other stakeholders to ensure that implementation of the



project is expedited. He said the MAL is committed to the process and will ensure that actual works start before the end of the year.

## Appendices



REPUBLIC OF ZAMBIA

MINISTRY OF AGRICULTURE AND LIVESTOCK

2<sup>nd</sup> July 2014  
2<sup>st</sup> July, 2014

### ENVIRONMENTAL IMPACT ASSESSMENT PUBLIC DISCLOSURE

This serves to inform members of the public that the Ministry of Agriculture and Livestock (MAL) intends to establish large scale irrigation schemes and construct associated bulk water infrastructure in three districts of Zambia under the Irrigation Support Development Project (IDSP). To this effect, the Ministry initiated the Environmental Impact Assessment (EIA) Study to explore environmental issues of concern in conformity with the Governments Environmental Impact Assessment Regulations (Statutory Instrument No.28 of 1997) and the World Bank Safeguards requirements under the Project. The Environmental Impact Assessments (EIAs) for the Irrigation Development Support Project (IDSP) have been prepared for the Projects Group one sites namely, Lusitu in Chirundu district of Lusaka Province, Mwomboshi in Chisamba district of Central Province and Musakashi in Mufulira district of Copperbelt Province.

This notice serves to advise that MAL will hold Public Consultation Meetings at which study findings will be disclosed and feedback obtained on measures proposed for identified project impacts.

The site disclosures for the EIAs will be conducted on the following dates:

Mwomboshi:- 14<sup>th</sup> July 2014 at Fringilla along Great North Road, Chisamba  
Lusitu:- 16<sup>th</sup> July 2014 at Tauya Lodge, Chirundu  
Musakashi:- 18<sup>th</sup> July 2014 at ZARI Research Centre, Musakashi, Mufulira

All the meetings will start at 09:00hours

For Documentation please contact respective District Councils and:

Ministry of Agriculture and Livestock (MAL)

Documentation Center

Mulungushi House, off Independence Avenue.

Fourth Floor,

Room 426 or Telephone +260-211-251629

LUSAKA.

1657/c-9



## ESIA PUBLIC DISCLOSURE MEETING

IDSP  
- LUSITU Site -  
16<sup>th</sup> July 2014

	NAME	ORGANISATION	CONTACT
1	MICHAEL MWAJE	IDSP	0966597218
2	F. Chikande	ZDA	0975552115
3	Farai Kanyiga	SOFRECO	0966-726867
4	Deborah Phiri	IDSP	0977-988114
5	GRANT MULENGA	IDSP-MAL	0977915085
6	Kenneth Nyanda	Sofreco	0966780120
7	Kamukwi Banda	NATS	0978843865
8	Daniel Chamba	IDSP-MAL	0979 278 663
9	Nathalie Jarno	SOFRECO	0969 45 333 2
10	MWASE PHIRI	ISFA (IDSP)	0977 780 745
11	C.K. Chikanda	ISFA (IDSP)	0966 709110
12	Diana Mulikide	IDSP	0976421305
13	CHARLES M. CHEWE	ISFA/IDSP	0979 578323
14	GABRIEL KAUNDA	ISFA/IDSP	0966-751571
15	MURRAY MURRAY	NATS	0976 327543
16	O'Neill Chiiga	District Admin	0979 750881
17	Grace Kechacha	Structure	
18	Benson Samwamba	"	
19	Simpson Chibwa	OOP (SD)	0976243180
20	Bamabas Muleyana	MAL-IDSP	0966859894
21	M. Mhumbwe	OOP (SD)	0972-948549
22	W. MULENGA	SOFRECO	0967879886
23	N. Sinkala	DLFCO	0972425716
24	F. Banda	ISACO-MAL	0977515451
25	Ni Sambo	MAL	0974841873



## ESIA PUBLIC DISCLOSURE MEETING

IDSP

- LUSITU Site -

16<sup>th</sup> July 2014

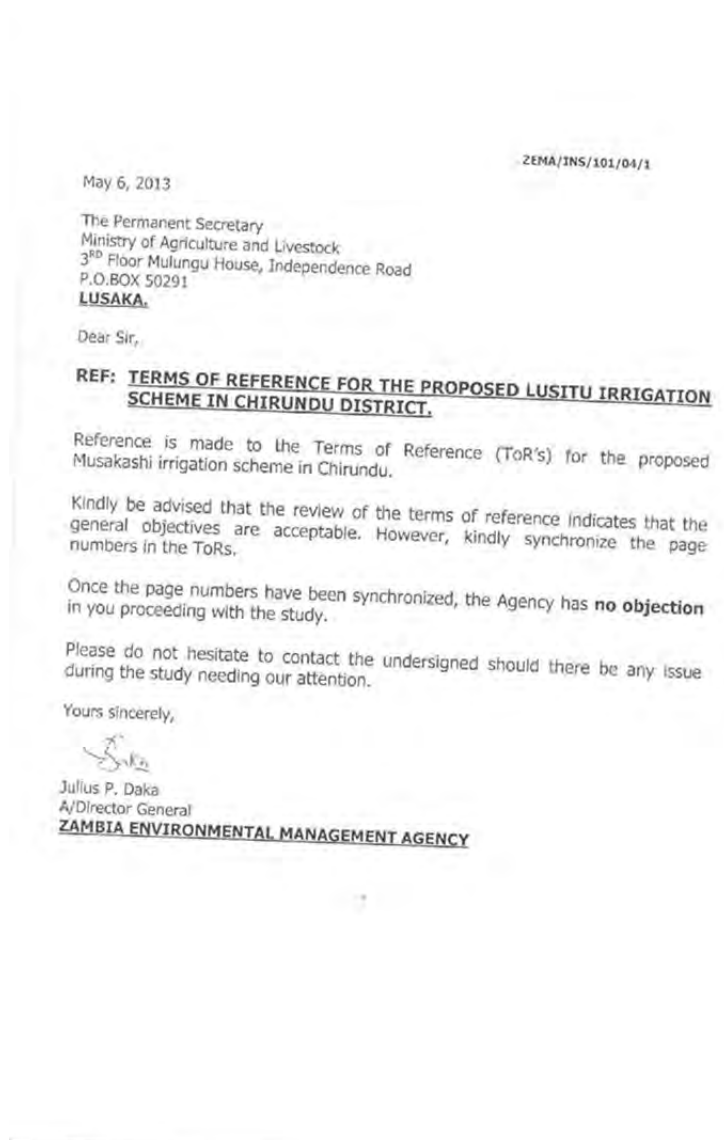
	NAME	ORGANISATION	CONTACT
26	AKASHAMBAIWA MUMBIA	FISHERIES DEPT	0977979660
27	ACKSON J. MWANZA	AGRIC DEPT	0977/0965-998291
28	SEBASTIAN MURORA	AGRICULTURE	0979092224
29	SIMON CHAMUNGU	PPSC - IDSP	0978604056
30	KELYS MURELWA	ZEMA	0977535465
31	VICTOR SIKANDA	CON EN	0976274848
32	BETHY MSHIMBO	ZAWA	0977576441
33	HOWARD MASHA	ZAWA	0973110556
34	SIMON MASHA	CHIEFO CHIEF	0977 871695
35	HARRISON NYALLO	Community member	0971582421
36	LANSON MULUNGU	Community member	0979309550
37	MOFFAT SAI	PPSC Secretary	0978944888
38	LAWARD NYANDELA	PPSC member	09783906796
39	BENSON SIMUNYANDA	PPSC/HWAFKE	0971395683
40			
41			
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<b>ESIA PUBLIC DISCLOSURE METING</b> <b>- LUSITU SITE -</b> <b>TAUYA LODGE - CHIRUNDU</b> 16 <sup>TH</sup> JULY 2014		
<b>TIME</b>	<b>ACTIVITY/ ITEM</b>	<b>Responsible</b>
08.30 - 09.30	Registration	MAL -IDSP (D. Phiri)
09.30 - 09.45	Official Opening & Welcoming Address	Permanent Secretary.MAL (Mr. J. Shawa)
09.45 - 10.00	Introduction of Participants (PS Site visit to Lusitu)	Facilitator/ Chairman. (B. Mulenga)
10.00 -11.00	Presentation of the ESIA	SOFRECO (K. Nyundu)
11.00 - 11.15	<b>Tea Break</b>	
11.15 - 12.30	Plenary Discussion	Participants
12.30 - 13.00	Way Forward	SOFRECO (K. Nyundu)
13.00 - 13.10	Closing Remarks	IDSP Project Coordinator
13.00 - 14.00	<b>LUNCH</b>	



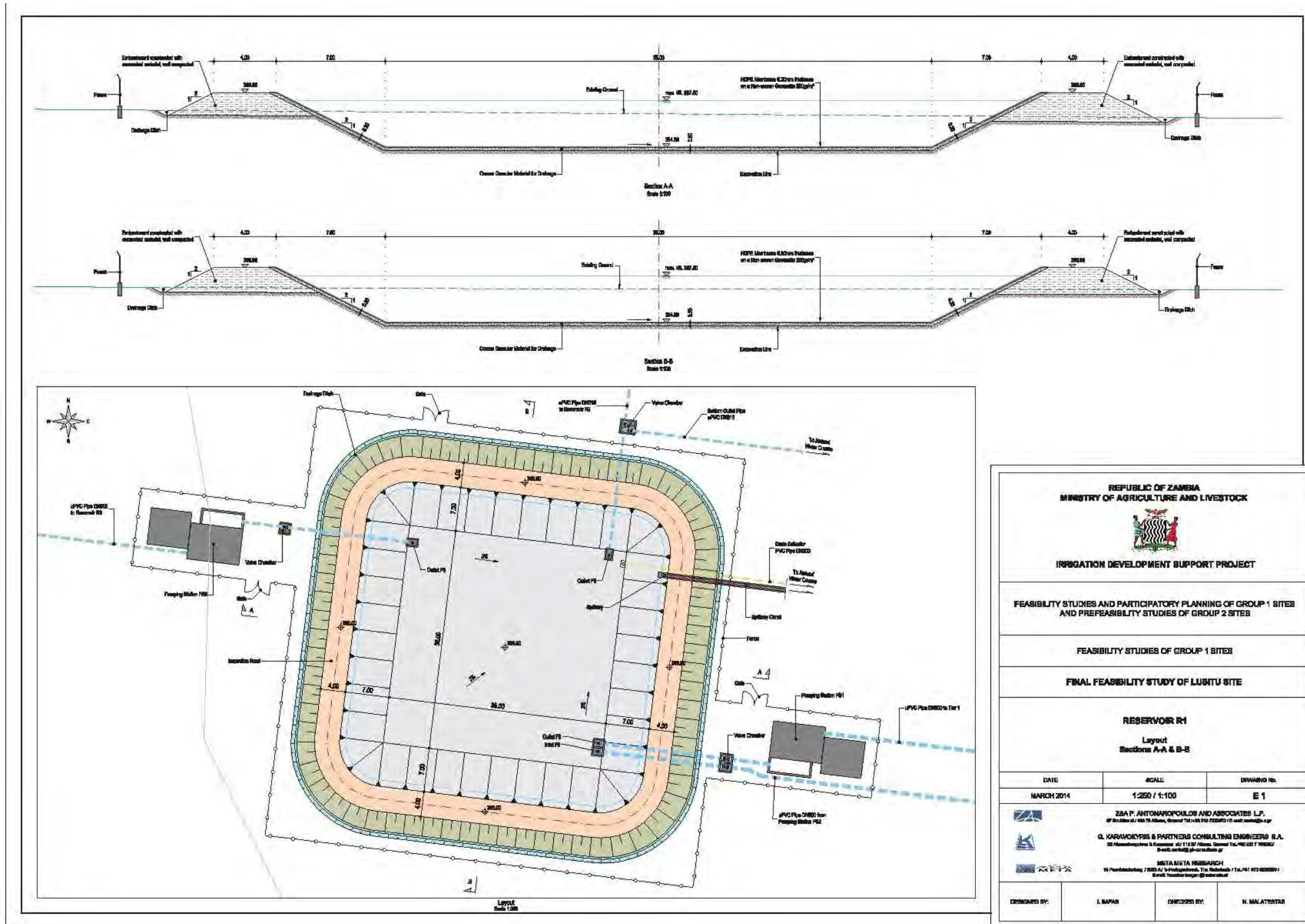
Picture of the Public Disclosure Meeting at Lusitu Site

# 17 ANNEX 17: COPY OF ZEMA TORS APPROVAL LETTER AND TORS



# 18 ANNEX 18: ENGINEERING DESIGN DRAWINGS FOR RESERVOIRS

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Drawing 1 Reservoir R1







# 19 ANNEX 19: SOIL EXPERT REPORT

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Please refer to the attached file named:

Lusitu Detailed Soil Survey Final Report April2012.pdf

## 20 ANNEX 20: HYDROLOGICAL EXPERT REPORT

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Please refer to the attached file named:

Lusitu Hydrology Report\_Draft.pdf

# 21 ANNEX 21: LIST OF AFFECTED PERSONS

**List of affected people - Lusitu**

HH Number on record cards	Name 1	Name 2	Sex	Age	NRC	Residence
12	Kelvin	Sayntumba	M	27	124790/78/1	Chalichusya
68	Belitah	Sibundu	F	36	214885/75/1	Chalichusya
103	danny	Sigundu	M	39	214749/75/1	Chalichusya
122	Abel	Siampola	M	57	139539/75/1	Chalichusya
142	Kenford	Mazila	M	23	140048/78/1	Chalichusya
209	Daiza	Siamaganta	f	63	141676/75/1	Chalichusya
254	Johns	Gomonde	m	29		Chalichusya
301	James	Bogesi	m			Chalichusya
338	Raphael	Siangoloma	m	40	187031/75/1	Chalichusya
340	Paision	Sigundu	m	42	193867/75/1	Chalichusya
356	Nelly	Muute	f	73	118577/75/1	Chalichusya
136	Alfred	Chikondo	M	59	125694/75/1	Chikondo
104	Athens	sibanene	M	31	100508/78/1	Kakunka
123	gildah	siancheka	F	50	159291/75/1	Kakunka
146	Hitra/Choompo	Siabanene	M	29	987237/11/1	Kakunka
152	Andason	siamakobe	M	64	137270/75/1	Kakunka
273	Benson	Simanyeku	m	39	311744/74/1	Kakunka
312	Benson	Siyamuvwamba	m	60	139729/75/1	Kakunka
315	Leonard	Mudenda	m	30		Kakunka
365	Paul	Muyaule	m	59	139528/75/1	Kakunka
372	Jimmy	Siamuvwamba	M	27	127946/78/1	Kakunka
42	Shanga Kunde	Kunde	M	20	128131/70/1	Lilemeke
45	Kismore	Sai	M	22	140187/78/1	Lilemeke
46	Gloria	Sai	F	42	159076/75/1	Lilemeke
158	Jonathan	Sai	M	82	174304/74/1	Lilemeke
165	Miggie	siazwela	M	45	249587/74/1	Lilemeke
170	Anold	Sakabond	M	45	161467/75/1	Lilemeke
184	Wesy	Kilayi	M	30	204976/78/1	Lilemeke
190	Regents	Simunyemu	M	30	215818/75/1	Lilemeke
308	Kennedy	Siakusule	m	47	179046/75/1	Lilemeke
363	Joel Helly	Simunyemu	m	53	158969/75/1	Lilemeke
377	Alvin	Simunyema	m	29	374836/74/1	Lilemeke
41	List	Sialulenga	M	30	104469/70/1	Lwanguloko
168	Ashwell	Masani	M	27	161466/75/1	Lwanguloko
385	Kelvin	Masani	M	27	140041/78/1	Lwanguloko
48	Sophie	Siyalulenga	F	44	166519/75/1	Lwanguloko
238	Lineni	Sai	m	26	124752/78/1	Lwanguloko
321	Autine	Golo	m	28		Lwanguloko
371	Evidence	Siazwela	m	23	140126/78/1	Lwanguloko
60	Ernest	Kachacha	M	33	101889/75/1	Makololo
92	Nkwazi	Chamukuyu	M	25		Makololo
112	Edgar	Chikleke	M	41	224878/75/1	Makololo
154	Annah	siamali	F	47	179090/75/1	makololo

*Benson Siyamuvwamba KAKUNKA Kakunka R.S.S*  
*MOETA SA1 Headman Muchumbi Village M.Saw*  
*STANDROD Siampola CHALICHUSYA VILLAGE Siyantumbu*  
*Joel Helly-S Headman Lilemeke Village J.H.S*  
*STANZIGUZI Makokoto J-S*  
*DICKSON Sitw Kusi Village MAUNSA*  
*Simon Nkabe Village Lwanguloko*

Page 1

183	Webby	sianyulu	M	32	204872/75/1	Makololo
307	Voster	siabbuwa	m	28	380995/74/1	Mampenzi
39	Mimoh	Siabbuwa	M	27	124836/78/1	Mapenzi
25	Elias	Muwele	M	27	124642/78/1	Maunga
27	Charles	Siabbuwa	M	45	176059/75/1	Maunga
27	Charles	Sibbuwa	M	45	176059/75/1	Maunga
28	Dickson	Sitinkwi	M	52	161627/75/1	Maunga
326	Stender	Sitinkwi	m	30	125476/78/1	Maunga
87	Dominic	Sainea	M	40	216456/74/1	Milawo
33	Peter	Siabbuwa	M	48	175771/75/1	Milawo
35	Monday	Sai	M	28	945237/71/1	Milawo
67	Ackim	saina	M	33	443266/75/1	Milawo
135	Elijah	Siamusowe	m	62	138438/74/1	Milawo
174	Zichelele	Sigundu	F	68	118495/75/1	Milawo
180	Edson	Sinabuleya	M	40	275943/74/1	Milawo
185	Martin	Stinkwi	M	40	104494/78/1	Milawo
193	Pearson	Sitinkwe	M	43	192905/75/1	Milawo
305	Mervis	Muvombo	f	36	101364/78/1	Milawo
342	Japhet	Siamusowe	m	25	140701/78/1	Milawo
52	Kapoba	Kasheka	M	59	161658/82/1	Muchimbu
53	Handima	Dorothy	F	55	17197274/1	Muchimbu
54	mbombo	saria	F	0	114029/70/1	Muchimbu
24	Mwinga	Malambo	M	76	109369/74/1	Muchimbu
56	Mulungu	Francis	M	26	247001/75/1	Muchimbu
57	Mulungu	Maxwell	M	19	144355/78/1	Muchimbu
58	Mulungu	Elina	F	67	118648/75/11	Muchimbu
69	Dafeni	Mulungu	M	16	144371/78/1	Muchimbu
73	Erison	Sikapande	M	42	205124/74/1	Muchimbu
74	Richard	Magau	M	46	164711/75/1	Muchimbu
75	Mpundu	Mwike	M	40	627776/11/1	Muchimbu
76	Richard	Kabita	M		471111/11/1	Muchimbu
162	Sara	Nkandela	F	69	141675/75/1	Muchimbu
260	Moffat	siakabo	m	49	160867/75/1	Muchimbu
343	Joseph	Munampeni	m	56	127474/75/1	Muchimbu
61	Rodrick	Siamabobe	M	45	182501/75/1	Mugaule
62	Tryford	Kapalo	M	35	567088/71/1	Mugaule
44	John	Saina	M	43	187069/75/1	Milawo
86	Clement	Kandela	M	45		Mutumbi
129	Rabbecca	siaulula	F	73	118931/75/1	mutumbi
204	Labhani	Siamaila	M	24	140165/78/1	Mutumbi
227	Miki	Kandela	m	25		Mutumbi
242	Nkandela	Solomon	m	45		Mutumbi
258	Lawrence	Siamalili	m	36	359462/67/1	Mutumbi
259	Victor	Chinungwa	m	32	101870/78/1	Mutumbi
269	fatson	Nkandela	m			Mutumbi
274	Moses	Siakwelele	m	47	160617/76/1	Mutumbi
311	Babylon	Siabusu	m	52	175715/75/1	Mutumbi

ACKIM SAINA HEADMAN MILAWO A.S.

JEPHASON JANI Headman Mapenzi J.S.

WISEMAN MULENTA SITE FACILITATOR (SAF) (M.L.)  
 SIMON- EHAMUKUYU P.P.S.C. CHAIR PERSON

318	Alice	Simwiinde	f	34	175918/75/1	Mutumbi
323	Bizywell	Kandela	m	29	105516/78/1	Mutumbi
354	Sibenzu	Munampeni	m	37	209182/75/1	mutumbi
1	Leonard	Nkandela	M	46	123721/75/1	Mutumbi
2	Eliness	Munyama	F	49	471068/75/1	Mutumbi
3	Venus	Simwela	M		175714/75/1	Mutumbi
4	Eliza	Kukule	F	42		Mutumbi
5	Felistas	Simwela	F	38	215849/75/1	Mutumbi
6	Maria	Mujimba	F	66	141654/75/1	Mutumbi
7	Pepekale	Siaubusu	M	18	N/A	Mutumbi
8	Bornface	Siaubusu	M	25	140014/78/1	Mutumbi
9	Fred	Simwela	M	45	140213/78/1	Mutumbi
47	Anold	Nkandela	M	33	333419/74/1	Mutumbi
55	Siapompola	Loveness	F	32	101895/78/1	Mutumbi
114	Loveness	Muvombo	F	32	187091/75/1	Muyaule
120	Mary	Muvombo	F	33		Muyaule
150	Wilson	Muvombo	M	72	128661/74/1	Muyaule
153	janny	siambunda	F	56	127096/75/1	Muyaule
197	Eneless	Bokesy	F	58	205868/75/1	Muyaule
267	Robson	Siamakobe	m		154947/75/1	Muyaule
337	Peter	Namalwa	m		175721/75/1	Muyaule
341	Jameson .m	Simapande	m	59	139736/75/1	muyaule
348	Stambridge	Simapande	m	25	140009/78/1	muyaule
70	Lawrance	Siamaili	M	34	359462/67/1	Shambote
71	Kabita	Kahilu	M	54	169848/84/1	Shambote
72	Bridget	Mweetwa	F	43	209842/75/1	Shambote
229	Mukonka	Denmark	M		140007/78/1	Siakasonka
187	Edith	Nkanka	F	37		0 Siakasuga
300	Misheal	Langisi	m	32	205404/75/1	Siakasunga
31	Patson	Mukonka	M	46	175548/78/1	Siakasunka
277	Beauty	Chamunkuyu	f	52	124540/75/1	sialondwe
275	Gilbert	Siamvula	m	42	186154/75/1	Siamanyangu
10	Langison	Mulenga	M	52	166520/75/1	Siambote
14	Edward	Siazwela	M	68	174230/74/1	Siambote
15	Simalundu	Moonga	M	55	150980/75/1	Siambote
50	Kahilu	Rabbecca	F	25	127926/78/1	Siambote
77	Nomai	Mulungu	F	77	118627/75/1	Siambote
84	Joffery	Simalundu	M		140283/75/1	Siambote
176	Jessy	Nkaba	F	58	118594/75/1	Siambote
177	Cridience	Sialulenga	M	29	104472/78/1	Siambote
350	Kipher	Simalundu	m	25	140348/78/1	Siambote
370	Denes	Siaulula	m	38	232303/74/1	Siambote
379	Joseph	Nkaba	m	48	205295/75/1	Siambote
381	Stenly	Siazwela	M	30	104474/78/1	Siambote
98	Kelvin	Sianyulu	M	25	138610/78/1	Sianyulu
107	Mike	Mazila	M	27	380670/74/1	Sianyulu
111	Christopher	Simalambo	M	43	234028/74/1	Sianyulu

Jacob Kayi

VENUS Simwela

Leonard BOKESI

Wilson Muvombo

Syambote Village &amp; Kayi

MUTUMBI Village V.S.

SIAKASUNGA Village V.S.

Muyaule Village V.S.

Page 3

116	Wisely	Mudenda	M	43	125184/75/1	Sianyulu
119	Friday	Nsanganya	M	35	209832/75/1	Sianyulu
140	Phanwell	Masani	M	44	275966/74/1	Sianyulu
141	Dyson	Nsanganya	M	32	124971/78/1	Sianyulu
149	Reginah	Siakwelele	F	57	127900/75/1	Sianyulu
198	Josam	Sianyulu	M	35	205868/75/1	Sianyulu
212	Dorica	Chinkono	f	63	1417141/75/1	Sianyulu
214	Martha	Sianyulu	f	74	116736/75/1	Sianyulu
219	bungameenda	Mapenzi	f	21	127265/79/1	Sianyulu
223	Sialukuba	Jelina	f	64	141590/75/1	Sianyulu
266	Josias	Sianyulu	m	43		Sianyulu
279	Joe	Mazila	m	38	204828/75/1	Sianyulu
359	Sophia	Magwalo	f		172637/75/1	Sianyulu
247	Confidence	Langise	m	19		Siasunga
148	Willard	Bbokesi	M	26	124989/78/1	Sigankasunka
63	Abel	Sigundu	M	38	214896/75/1	Sigundu
83	Desmond	Sigundu	M	35	140531/78/1	Sigundu
88	Chrisy	Sigundu	M	28	124885/78/1	Sigundu
93	Carlos	Chikoondo	M	23	169954/18/1	Sigundu
94	Costain	Syanzyambula	M	31	781997/11/1	Sigundu
117	Dafeni	Simuunza	M	31		Sigundu
118	Kanshety	Sigundu	M	41	183181/75/1	Sigundu
125	Advent	Mutale	M	23	140031/78/1	Sigundu
131	fisty	siampola	M	24		Sigundu
215	Sigundu	Jelita	f	71	118822/75/1	Sigundu
228	Simunza	Lyford	m	19	140852/78/1	Sigundu
235	Boyd	Sigundu	m			Sigundu
249	Mulungu	Langson	m	42		Sigundu
250	Obby	Sigundu	m	25	124863/78/1	Sigundu
271	Geofrey	Sigundu	m	36	209821/75/1	Sigundu
196	kison	Ntaulo	M	44	188707/42/1	Simangangu
99	Minister	Simadabwali	M	36	101507/78/1	Simanyangu
100	Kenndy	Ntaulo	M	36	208945/78/1	Simanyangu
102	Stanley	Ntaulo	M	31	104497/78/1	Simanyangu
121	Dickson	Tendeka	M	57	201509/74/1	Simanyangu
130	Winnie	Chamukuyu	F	39	206178/75/1	Simanyangu
145	Lucia	Simanyangu	F	75	116658/75/1	Simanyangu
147	Boston	Ntaulo	M	26	138487/78/1	Simanyangu
224	Edward	Mwale	m	74	118897/75/1	Simanyangu
226	Chamukuyu	Christopher	m	29		Simanyangu
230	Winnie	Chamikuvu	f	40		Simanyangu
239	Simon	Chamukunyu	m	63	180556/67/1	Simanyangu
251	Harrison	Natualu	m	39	104496/78/1	Simanyangu
264	Joseph	Siamalichaula	m	29		Simanyangu
265	Litana	Sianzala	f	44		Simanyangu
282	Fenson	Siamabwelele	m	31	125442/78/1	Simanyangu
283	Jameson	Ntaulo	m	55	123898/75/1	Simanyangu

Segunda cabinet Headman Penda Penda  
 SIMON CHAMUKUYU SIMANYANGU

284	Beauty	Sianzala	f	53		Simanyangu
49	Elizabeth	Siankwembo	F	40	159632/75/1	Simunza
108	Bitwell	Siankwembo	M	49	178935/75/1	Simunza
207	Godfrey	Siankwembo	m	48	178936/75/1	Simunza
208	Elina	Chinyama	m	69	141532/75/1	Simunza
210	Cosmas	Siakwendo	m	48	1789341/75/1	Simunza
236	Dorothy	Sinabuleya	f	52	231871/74/1	Simunza
237	Harold	Siamukwembo	m	27	124943/75/1	Simunza
240	Chinyama	Malita	f	50	159289/75/1	Simunza
244	dylon	muvombo	m	64	117093/75/1	Simunza
255	Ever	Siamunkuyu	m	32		Simunza
261	Crackson	Siankwembo	m	45	212781/75/1	Simunza
272	Cosweli	Muuombo	m	31	101833/78/1	Simunza
327	Geogina	Simabuleya	f	37	104481/78/1	Simunza
328	Dauglas	Sinabuleya	m	33	101951/78/1	Simunza
109	Friday	Magwalo	M	31	124810/75/1	Simuza
16	samson	Singubi	M	66	128013/75/1	sitinkwi
19	Kefas	Muzyama	M	43	108542/78/1	sitinkwi
20	Brian	Siavwenya	M		140661/78/1	sitinkwi
64	Lazarus	Siankusule	M	60	107724/74/1	sitinkwi
65	Gibson	Siankusule	M	50	154902/75/1	Sitinkwi
79	Laila	Sitinkwi	F	48	178863/75/1	sitinkwi
80	Malita	Siamwiinde	F	57	318530/11/1	sitinkwi
81	Jefason	Jani	M	55	123729/75/1	sitinkwi
82	Thomas	Saina	M		125899/78/1	sitinkwi
106	Strange	mubemba	M	24	400222/78/1	sitinkwi
132	kepson	Manyika	M	43	177874/75/1	sitinkwi
163	Noria	Saina	F		154951/75/1	Sitinkwi
201	Sarah	Jani	F	76	1415681/75/1	Sitinkwi
217	Magalita	Sitinkwi	f	77	141896/75/1	sitinkwi
234	A	Siakanyankondo	m	32	140186/78/1	Sitinkwi
263	Adijai	Mwele	m	36	215823/75/1	Sitinkwi
280	Elita	Shabondo	f	55	124431/75/1	Sitinkwi
298	Philimon	Siavwenya	m	80	105050/74/1	Sitinkwi
345	Jameson	mungoni	m	59	141673/75/1	sitinkwi
346	Teleza	Mukabu	f	78	118903/75/1	sitinkwi
30	Smith	Siaundu	M	48	187056/75/1	Syangulu
91	Ben	Hamuluwa	M	43	187810/75/1	Tinde
97	Milias	Sianyulu	M	44	175455/75/1	Tinde
113	Fisher	Sianyulu	M	49	166142/75/1	Tinde
252	Blackson	Simadabwali	m	26	125528/78/1	Tinde
324	Ireen	Muchimba	f	34	101467/78/1	Tinde
21	Jacob	Sayi	M	57	140284/75/1	
144	Simon	Nkaba	M	55	325530/11/1	
213	Saliya	Sianyulu	f	78	116737/75/1	
316	Asia	Siabanene	m	33	102450/78/1	
344	Alexander	minziyabantu	m	40	215824/75/1	

Dava Si  
 Muvombo  
 Simunza  
 Tinde v.  
 HANULUWA Ben  
 LAZARUS SIANKUSULE  
 SITINKWI Headman

D. Mupfema  
  
 Siankusule



## 22 ANNEX 22: PHOTO BANK



Zambezi River flow at Lusitu



Abstraction Point for existing irrigation scheme



## 23 ANNEX 23: ADDENDUMM TO ESIA FINAL REPORT LUSITU

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REPUBLIC OF ZAMBIA

Ministry of Agriculture and Livestock



Republic  
of Zambia



World Bank

*Addendum to the*  
**Environmental and Social Impact Assessment**  
**Final Report**  
**VOLUME III**  
for the Proposed

**Irrigation Scheme in Lusitu in Siavonga  
District**

Submitted to World Bank  
December 2016

 **SOFRECO**

# PROJECT BRIEF NOTES

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## **Proponent:**

Ministry of Agriculture and Livestock (MAL), Zambia Ministry Of Agriculture and Livestock (Mal)  
Mulungushi House, Independence Rd, 3rd Floor, Box 50291 Lusaka.

## **Developer's Contact Person:**

Ms Mono Kanjeresa, Safeguard Specialist, +260-211-251629, +260-211-252029

## **Project Location:**

Chirundu District, Lusaka Province, Zambia

## **Project Summary:**

The central concept of IDSP involves re-allocation of land and water resources for irrigated agriculture under a partnership arrangement between the Government, private operators and communities. Under this project different types of farms (i.e. Tier 1 to 3) are envisaged:

- Tier 1 will be for smallholder farmers who wish to take up irrigated agriculture using mainly family labour, with individually farmed plots of 1 ha or less, using surface irrigation to grow vegetables and other high value crops;
- Tier 2 will consist of larger plots of between one and five hectares each, for cultivation by emerging small-scale commercial farmers or small groups of neighbouring farmers, using sprinkler irrigation systems and hired labour to profitably grow mainly field crops; and
- Tier 3 will consist of large plots of at least 60 ha each under centre-pivot irrigation operated by a private company that will eventually be wholly owned by the community but initially will be jointly owned with a private sector investor.

## **Estimated Capital investment and Project Commencement Date:**

Approximate project cost is US\$ 3.7 million. Project commencement date is 2014.

## **ESIA Study Team Leader:**

SOFRECO (Société Française de Réalisation, d'Etudes et de Conseil)

## EXECUTIVE SUMMARY

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This addendum has been prepared to provide supplementary information to the Environmental and Social Impact Assessment (ESIA) final report that was submitted to the Environmental Management Agency (ZEMA) and World Bank in 2015 in order to clarify and update certain aspects contained in the ESIA final report regarding the proposed Lusitu Irrigation Scheme project. Therefore, this report should not be read in isolation but with cross reference to the main Lusitu Irrigation Scheme ESIA final report.

Further, it should be noted that the scope/objective and project area of influence remains unchanged. And the implementer remains Ministry of Agriculture (MAL) and Livestock under the project 'Irrigation Development Support Project (IDSP)' while the operationalization of the proposed project will be facilitated by government through MAL. Ownership of the project at operation will be shared among the local communities, Private Sector as well as government.

The proposed Lusitu project site is located on the left bank of the Zambezi River, 12km south of Chirundu town at latitude 16°06'32" south and longitude 28°50'31" east, and an elevation of 382 m asl will still constitute three land divisions known as tiers 1,2 and 3 Lusitu Irrigation Scheme will have an estimated investment cost of US\$ 3.7 million.

This addendum gives additional information regarding three main aspects namely;

- Clearly defining the study area and its sub components
- Updating maps with associated narrations to ensure clarity in terms of approach to ESIA study in relation to social and environmental receptors
- Updating the Environmental Management Plan in terms of re-assigning responsibilities and re-costing.

By providing this supplementary information, it is the conviction of the ESIA study team that social economic and environmental impacts arising from the proposed project will be better understood in context without leaving any grey areas. And that minimum requirements are met in addressing World Bank Safe guard policies triggered by this project.

**SIGN:**.....

Dr Barnabas MULENGA

Designation: Project Co-ordinator, IDSP

Ministry of Agriculture and Livestock

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# Table of Contents

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<b>EXECUTIVE SUMMARY .....</b>	<b>2</b>
<b>1. Project Area .....</b>	<b>4</b>
1.1 Location and Layout .....	4
1.2 Spatial Extent of the Study Area .....	4
<b>2. Study Approach and Baseline Information .....</b>	<b>6</b>
2.1 Study Approach .....	6
2.1.1 Scoping Studies.....	6
2.1.2 Approach.....	6
<b>3. Additional Baseline information .....</b>	<b>8</b>
3.1 Vegetation type .....	8
3.2 FAUNA.....	9
3.3 Eco-System Sensitivity; Habitats and Species of Special Concern	11
<b>4. Environmental Management &amp; Monitoring</b>	<b>12</b>
4.1 Updated Environmental and Social Management Plan	12
4.2 Environmental Monitoring Plan	23

# 1. Project Area

## 1.1 Location and Layout

The proposed Lusitu project site is located on the left bank of the Zambezi River, 12km south of Chirundu town at latitude 16°06'32" south and longitude 28°50'31" east, and an elevation of 382m asl. The site falls within the customary land controlled by the Sitinkwe community, and can be accessed from both Lusitu town on the Siavonga road and from Chirundu via un-metalled roads which are difficult to pass during the rainy season (See figure 1-1).

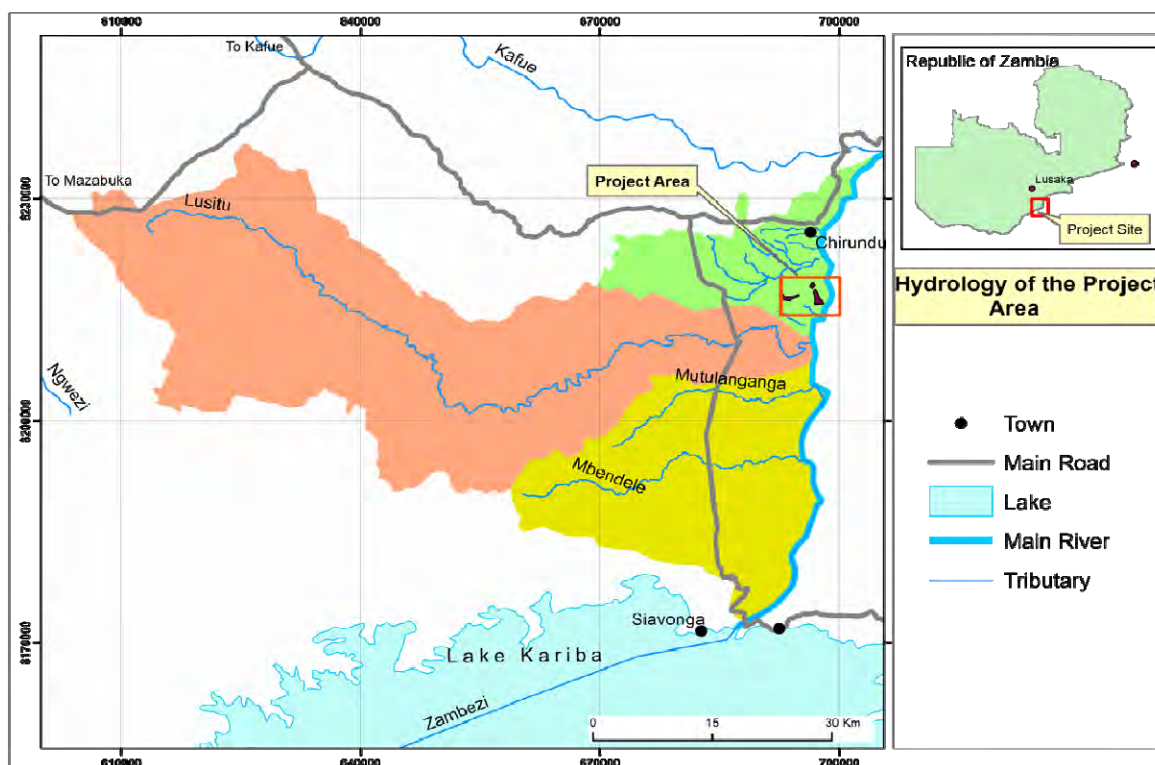


Figure 1-1 Lusitu Group 1 Site Location Map

## 1.2 Spatial Extent of the Study Area

The spatial extent of the study area was Zambezi River sub-catchment including existing settlements. Other linked planned activities such as resettlement areas, roads and transmission lines fall within the area that was assessed. However, independent studies will be conducted prior to operation focusing on planned infrastructure such as feeder roads and power transmission lines. Note that the assessment was also extended to immediate surrounding areas outside immediate project area of influence approximately 5km radius in extent. See the Figure 1-2: below showing study area and figure 1-3 showing resettlement areas. The map also shows some historical sites, dambos and river systems as part of environmental receptors.



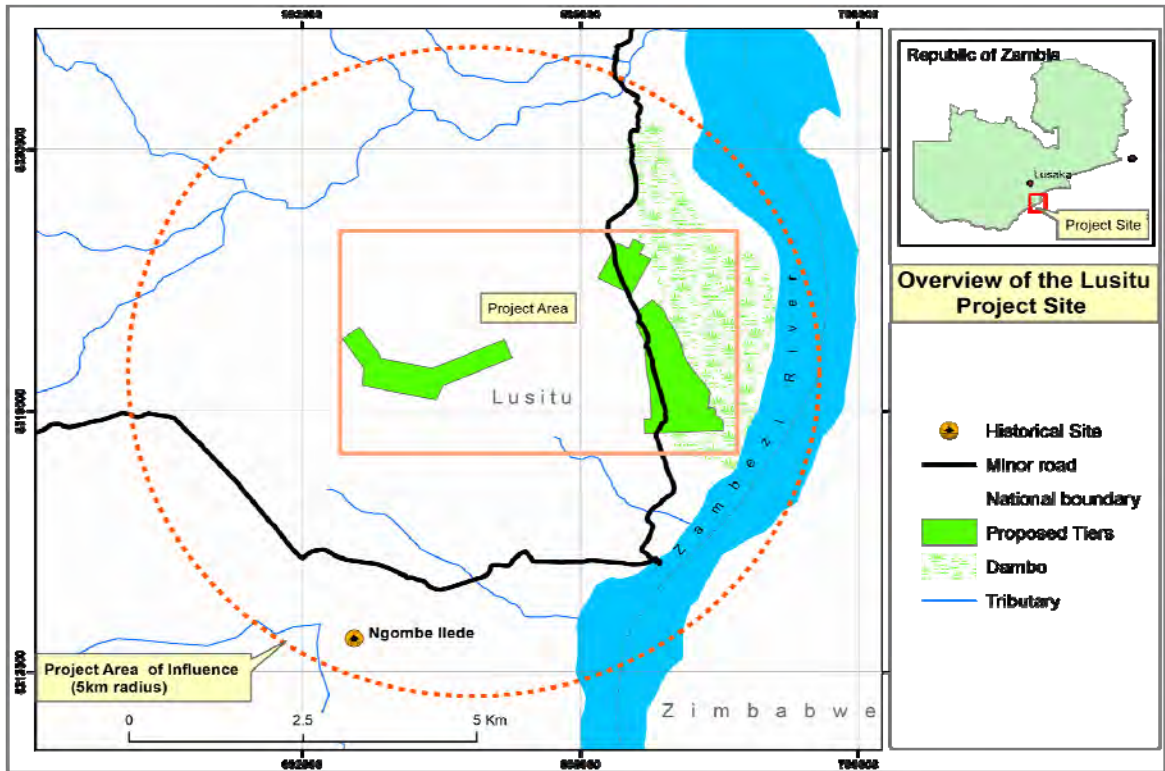


Figure 1-2: Map showing the study area

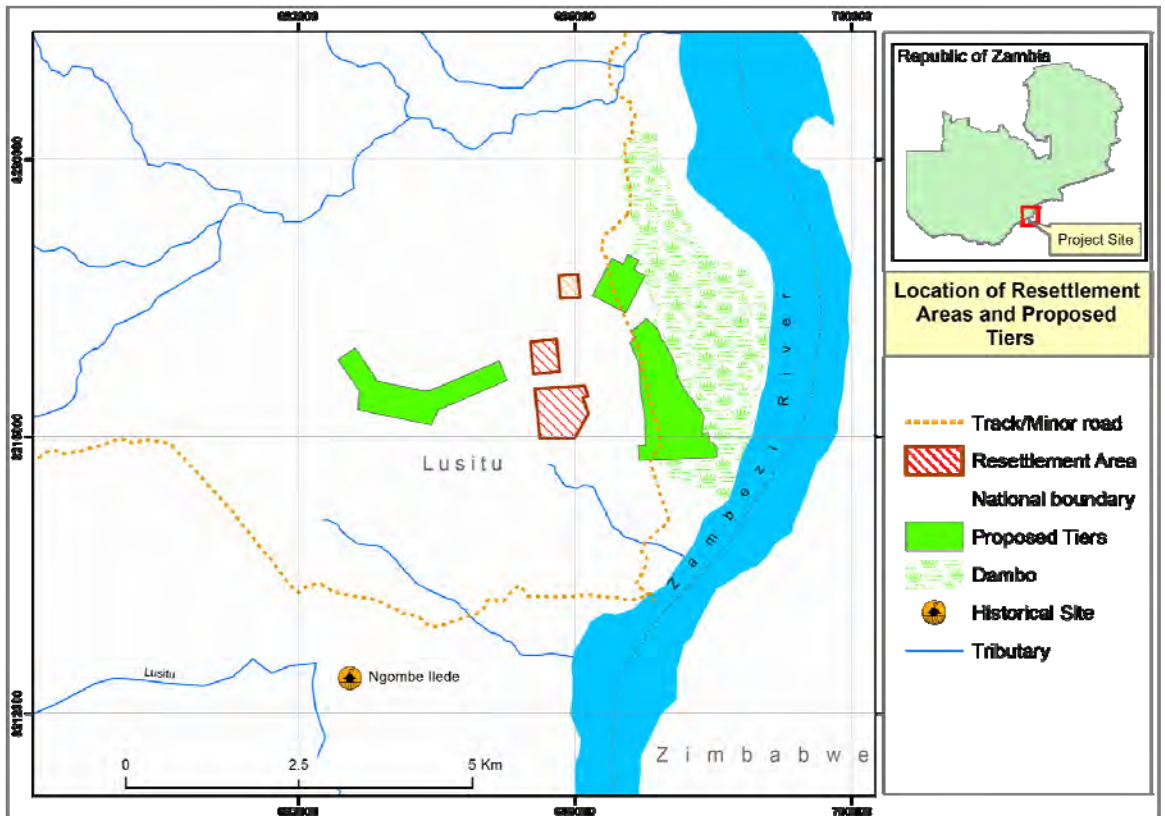


Figure 1-3: Map showing Resettlement Areas and Tiers

## 2. Study Approach and Baseline Information

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### 2.1 Study Approach

#### 2.1.1 Scoping Studies

The Scoping exercise aimed at identifying potential environmental (socio-economic and biophysical) impacts, contemplate environmentally considerate options for the design detail, and identify issues of concern for Interested and Affected Parties (IAPs) and stakeholders. The scoping exercise included review of the project literature, targeted consultations with the relevant authorities and stakeholders and open meetings.

Stakeholder consulted included local communities, civic and traditional leaders. The environmental scoping process provided an opportunity for stakeholders to get clear, accurate and understandable information about the expected environmental issues or impacts of the proposed project; voice their concerns and to raise questions regarding the project; suggest ways for reducing or mitigating any negative impacts and for enhancing its positive impacts. At the same time it provided an opportunity for MAL to incorporate the needs, preferences and values of IAPs into their planning and design decisions. This process of consultation has continued and is vital for ensuring transparency and accountability in decision-making and creating sense of ownership among the community.

#### 2.1.2 Approach

The approach to the scoping exercise was done step-wise starting with a reconnaissance survey for appreciating the project area, followed by initial meetings with public officials and local leadership in the project area and general consultative public meetings and lastly followed by detailed expert studies. The study area assessed was categorized into the following;

- Project Site which included;
  - Zambezi River Sub-catchment also encompassing the resettlement area
  - The area on the left bank of Zambezi River ear-marked for the small scale irrigation scheme and to some extent right bank encompassing game management area on the Zimbabwean side
- Project area of influence which included;
  - Surrounding areas covering 5km in radius considered as immediate area of project influence

The map showing project area of influence is a given in figure 2-1 below.

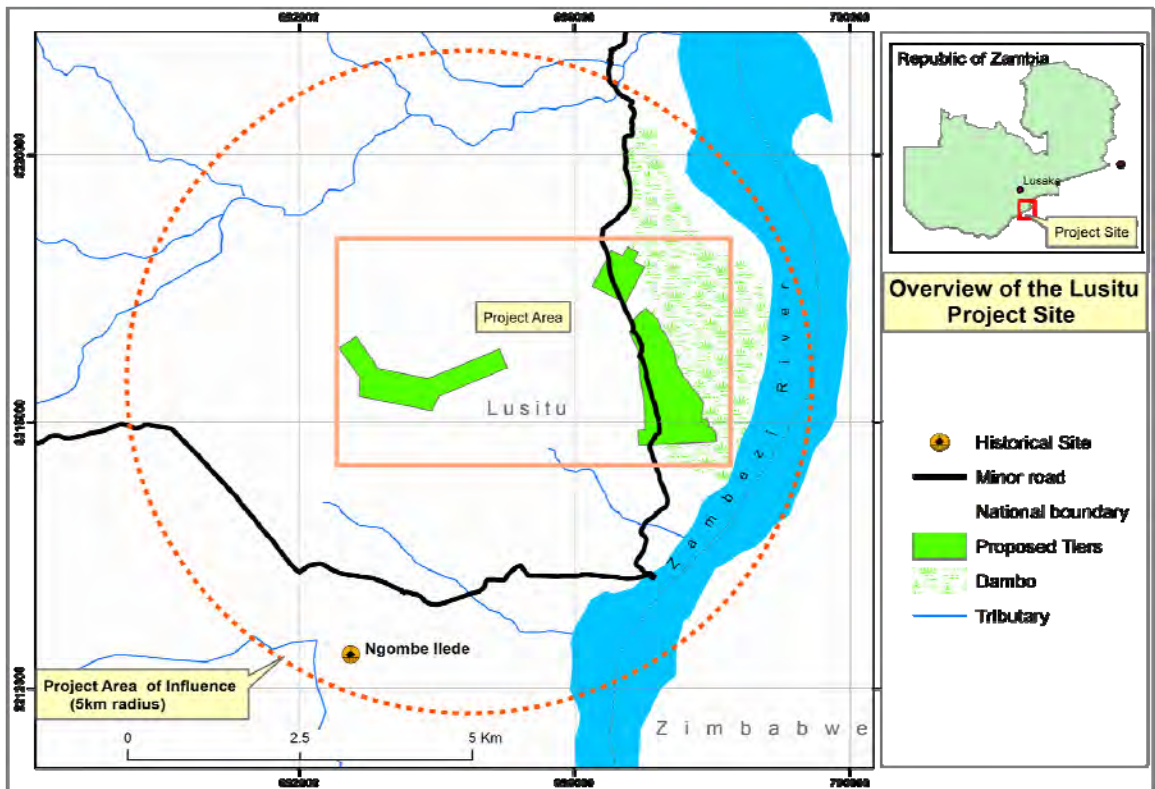


Figure 2-1: Map showing project area of influence

## 3. Additional Baseline information

### 3.1 Vegetation type

According to Trupnel (Vegetation classification of Zambia, 1969), Lusitu vegetation falls under Mopane vegetation, largely with *Colophospermaum mopane* as the dominant tree species. However, field surveys conducted in the area indicated that the area has mixed vegetation that included; riparian, open woodland with mixed tree species. The amorphous arrangement of settlements with agriculture practices coupled with poor rainfall patterns (average annual rainfall range of 625 mm – 677 mm), has led to fragmented and stunted vegetation in the area to such an extent that most plant species are at shrub level.. Therefore the proposed project will not have any significant impact on flora in the area because the area is already depleted of vegetation mainly due to clearing of land for settlements and crop cultivation.

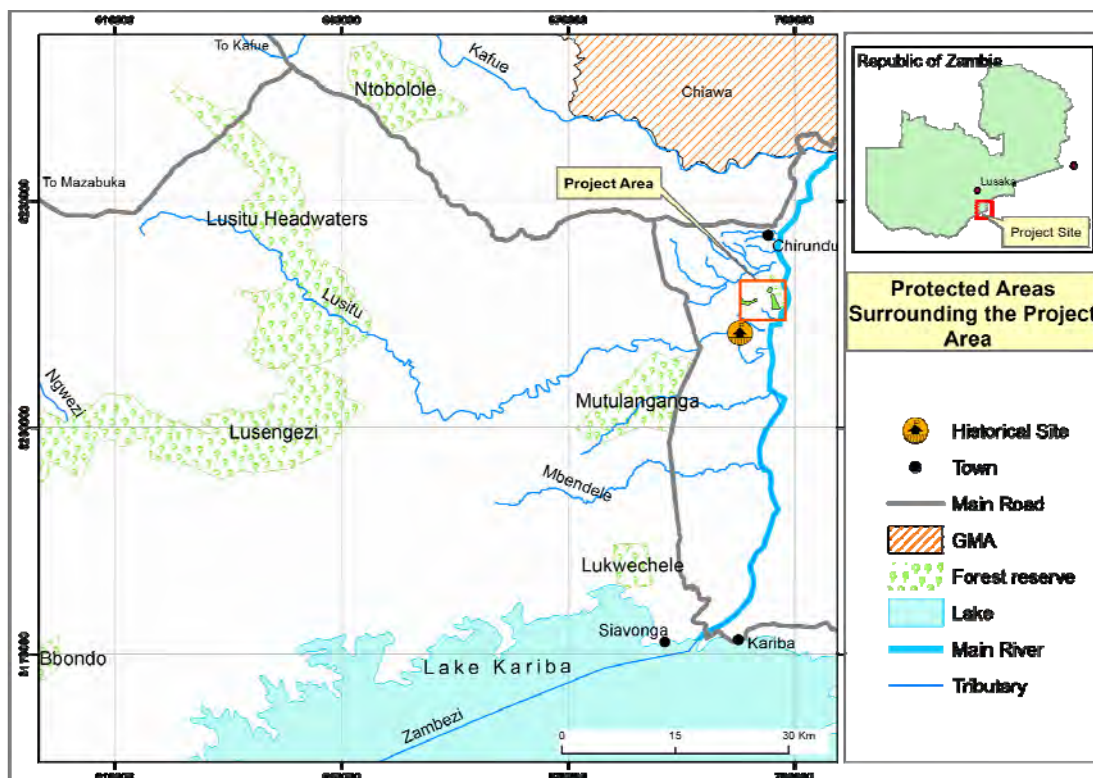


Figure 3-1: Map showing Protected Areas in relation to the Project Area

### 3.2 FAUNA

Literature shows that Lusitu area was once rich in fauna especially mammalian species. However, most of the mammalian life has been disturbed largely due to anthropogenic factors such as poaching, habitat fragmentation, unplanned fires, and deforestation. Ansell (Mammals of Zambia, 1978) documented small and large mammal species that existed in the, Chirundu the project area as well as nearby areas such as Siavonga, Sinazongwe. There were more than 39 mammal species reported by Ansell in the late 1970's, with the more significant species including Sable Antelope, African Wild Dog, Lion, Waterbuck, Common Reedbuck, and Impala.

Table 3-1 Animals existing in Lusitu

No.	Species	Scientific Name
1	African Civet <sup>s</sup>	<i>Civettictis civetta</i>
2	Ant Bear <sup>sp</sup>	<i>Orycteropus afer</i>
3	Baboon chacma <sup>s</sup>	<i>Papio ursinus jubilaeus</i>
4	Bush baby <sup>s</sup>	<i>Galago crassicaudatus</i>
5	Bush Squirrel <sup>s</sup>	<i>Paraxerus cepapi</i>
6	Bushbuck <sup>l</sup>	<i>Tragelaphus scriptus</i>
7	Bushpig <sup>l</sup>	<i>Potamochoerus porcus</i>
8	Duikers Common <sup>s</sup>	<i>Sylvicapra grimmia</i>
9	Elephant	<i>Loxodonta Africana</i>
11	Leopard <sup>l</sup>	<i>Panthera pardus</i>
12	Monkey vervet <sup>s</sup>	<i>Cercopithecus pygerythus</i>
13	Porcupine <sup>v/sp</sup>	<i>Hystrix africaeaeaustralis</i>
14	Pangolin <sup>l</sup>	<i>Manis temminckii</i>
15	Spring hares	<i>Pedetes capensis</i>
16	Warthog <sup>l</sup>	<i>Phacochoerus aethiopicus</i>

A total of 378 birds have been recorded in the area. The greatest concentrations of birds are found in the riverine vegetation. Bird species of the valley of local importance included; the sombre bulbul (*Andropadus importunus*), red-capped robin (*Cossypha natalensis egregior*), the barred long-tailed cuckoo (*Cercococcyx montanus*), the dark-backed weaver (*Ploceus bicolour*) and the mottled spintail (*Telecanthura ussheri*). Below are some of the birds observed during the surveys

Table 3-2 Birds observed during surveys

No.	Bird Species	Scientific Name
1	African Dater	<i>Anhinga rufa</i>
2	African fish Eagle	<i>Haliaeetus vocifer</i>
3	African Pied Wagtail	<i>Motacilla arguimp</i>
4	Bateleur	<i>Terathopius ecaudatus</i>
5	Blue Waxbill	<i>Uraeginthus angolensis</i>
6	Common Bulbul	<i>pycnonotus barbatus</i>
7	Crowned Hornbill	<i>Tockus alboterminatus</i>
8	Emerald-spotted-wood Dove	<i>Turtur chalcospilos</i>
9	Fork-tailed Drongo	<i>Dicrurus adsimilis</i>
10	Greater Honeyguide	<i>Indicator</i>
11	Grey Lourie	<i>corthaixoides concolor</i>
12	Helmeted Guineafowl	<i>Numida meleagris</i>
13	Lilac-breasted Roller	<i>Coracias caudata</i>
14	Little Bee-eater	<i>Merops pusillus</i>
15	Paradise Flycatcher	<i>Terpsiphone viridis</i>
16	Pied Crow	<i>Corvus albbus</i>
17	Red-eyed dove	<i>Streptopelia semitorrquata</i>
18	Reed Cormorant	<i>Phalacrocorax carbo</i>
19	Rufousbellied Tit	<i>Parus rufiventris</i>
20	Tawny-flanked Prinia	<i>Prinia subflava</i>
21	Tropical Boubou	<i>Laniarius aethiopicus</i>
22	White stork	<i>Ciconia</i>

## Animal Human Conflict

There are two game management areas close to Lusitu project area about a kilometer and half away; the Zambezi game amangement area in Zimbabwe (just across the Zambezi River) and the Chiawa Game Management area on the Zambian side. Both areas are rich in wildlife species; elephant, warthog, buffalo, and hippopotamus are common. The pressure from hunting created on wildlife causes animals to go in open areas were where settlements for communities are found thus leading to frequent animal-human conflict. Besides, animals also follow cultivated crops as food. With or without the proposed project the interaction between animals and people is always there in Lusitu leading to incidents of conflict sometimes. The proposed interventions by the project will to a great extent improve the situation instead. The other protected area observed within the vicinity was Mutulanganga national forest which is said to be a sanctuary for elephants whenever threatened by hunting in Chiawa and the Zimbabwean side. Therefore, the proposed project will have no impact on this area because its already depleted of vegetation due to charcoal burning and clearing of land for settlements and crop cultivation. The figure 3-1 below shows protected areas within the area.

### 3.3 Eco-System Sensitivity; Habitats and Species of Special Concern

#### Sensitive Habitats

The project area is habitat to riparian vegetation which is highly modified. Unlike on the Zimbabwean side that constitutes a game management area where the riparian zone is more intact, in the Lusitu area this is not the case. Riparian vegetation is expected not to be under threat as the project activities will not extend into riparian zone. However, these cannot be considered to be sensitive habitats because they are wide spread in the area and do not host any rare species of ecological importance. Therefore the proposed irrigation project will not in any way affect any sensitive habitat

#### Ecologically Important Areas

There are two game management areas close to Lusitu project area about a kilometer and half away; the Zambezi Hunting area in Zimbabwe (just across the Zambezi River) and the Chiawa Game Management area on the Zambian side. Both areas are rich in wildlife species; elephant, warthog, buffalo, and hippopotamus are common. The other protected area observed within the vicinity was Mutulunganga national forest which has been depleted of vegetation due to human settlement and economic activities over the years. Therefore it is important to note that the proposed project will have no direct effect on any ecologically sensitive area.

#### Species of Special Concern

Although the ESIA alludes to the fact that Lusitu area has *Adansonia digitata* as a species of special concern, no threats are known to the tree yet, except for elephants that depend on its barks as food. These species are wide spread in Lusitu area and therefore the project will not have a significant impact on these species. The project will equally not affect endemic birdlife.

**Animal/human interactions** – The ESIA refers to the fact that pressures from illegal hunting on large mammals causes them to go into open areas increasing risks of animal –human conflict. Since cultivated crops will also attract animals, the assessment of impact was expected to be low impact during construction. With or without project animal human interaction is part of life in the area and has been there for time immemorial. The mitigation measures given of leaving animal corridors and fencing are the only practical means of addressing the issue in the area given local prevailing situation. And for this to be effective the operator will have to engage services of the Zambia Wildlife Authority (now Dept of Wildlife) who are mandated to manage the wildlife and deal with emergency situations in the area.

## 4. Environmental Management & Monitoring

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### 4.1 Updated Environmental and Social Management Plan

An Environmental and Social Management plan (ESMP) has been updated taking into account the changes in the institutional arrangements and accountabilities for the project. The detailed procedures needed to address the project impacts and implement the proposed mitigation measures have been outlined in the ESMP. However, it might still be necessary to update the ESMP again in case of time lapse to ensure that prior to construction and operation by the Contractor and Operator respectively. This must be done in a manner satisfactory to the World Bank. The updated ESMP also sets out the budget for implementing the measures during construction and Operation.



**Table 4-1: Environmental & Social Management Plan during the preparation/construction phase**

Table 4-2 Environmental & Social Management Plan during the preparation/construction phase

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMK
					Start	End	
<b>Biophysical Environment Preparation/Construction Phase</b>							
<b>Removal of vegetation</b>	Disturbance of terrestrial ecological & ecosystem services processes	To ensure minimal loss of vegetation	Clearing of vegetation will only be confined to areas where irrigation facilities and associated facilities will be constructed. Ensure that when large areas are cleared for agriculture fields patches of vegetation connecting to each other through the area are left intact	Contractor	Start of Clearing and levelling	Prior to construction	-
	Loss of natural habitat for small mammals, birds and insects.	To ensure minimal disturbance to the habitats	Avoiding damaging riparian vegetation where possible, and limit river and stream crossings as far as possible. Avoid blockage or diversion of rivers and streams where possible. Avoid indirect effect of run-off erosion and sedimentation from roads that may lead to loss of riparian habitats. Monitor and maintain riparian habitat corridors and waterways in adjacent areas to maintain faunal connectivity and migration	Contractor	Start of Clearing and levelling	Prior to construction	60,000
	Loss of species of special concern	To ensure minimal loss of vegetation	Clearing of vegetation will only be confined to areas where irrigation facilities and associated facilities will be constructed. Where possible avoid creating isolated 'islands' of Miombo habitat of less than 100 ha in extent as they will not serve as meaningful refugia for large mammals, snakes, etc	Contractor	Start of Clearing and levelling	Prior to construction	-
	Loss & fragmentation of sensitive habitats	To minimise clearance of vegetation	Clearing of vegetation will only be confined to areas where irrigation facilities and associated facilities will be constructed Avoid indirect effect of run-off erosion and sedimentation from roads that may lead to loss of riparian habitats. Monitor and maintain riparian habitat corridors and	Contractor	Start of Clearing and levelling	Prior to construction	130,000

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMK
			Biophysical Environment Preparation/Construction Phase		Start	End	
			waterways in adjacent areas to maintain faunal connectivity and migration				
	Loss of Fauna diversity	To ensure minimum loss of habitat	Clearing of vegetation will only be confined to areas where irrigation facilities and associated facilities will be constructed. Habitat connectivity, particularly to protected areas, via habitat corridors is maintained. Undertake habitat clearance only during winter when birds are not breeding	Contractor	Start of Clearing and levelling	Prior to construction	-
	Erosion of top soil	To limit clearance of vegetation to critical areas	Clearing of vegetation will only be confined to areas where irrigation facilities and associated facilities will be constructed. Ensure application of good agricultural practices that prevent soil loss and embark on community programmes that will sensitise communities in surrounding areas using inappropriate methods of farming leading to erosion and river siltation. Use of contour ridges where required, and well-designed drains for Tier 1 hose-furrow areas. Making-good of borrow pits with topsoil and vegetation	Contractor PIU	Start of Clearing and levelling	Prior to construction	200,000
<b>Spills and/or accidental releases.</b>	Pollution of surface water as a result of spills	To prevent contamination of water as a result of oil spills.	Oils will be stored and used only in designated areas at the workshops. Dispose any used oil at a designated place in accordance with the law	Contractor	Prior to construction	On-going	55,000
	Contamination of Soil	To prevent contamination of soil	All contaminated soil will be treated. The valuable top soil, containing organic material, nutrients as well as seeds and the soil fauna, will be excavated separately. This will be piled in an adequate manner for reuse. After completion of the construction works the contractor will ensure immediate restoration by spreading piled top soil and by sowing adequate grass. Put up erosion control measures such as gabions and gunny bags filled with soil where there is erosion signs to slow down storm water flow in these	Contractor	Start of Vegetation clearing Activities	On-going	250,000
	Pollution of groundwater	To avoid groundwater pollution					

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMK
			Biophysical Environment Preparation/Construction Phase		Start	End	
			sections during heavy rains.				
<b>Use of equipment and vehicles</b>	Contamination of soil, surface water and/or groundwater due to fuel spills	To prevent the contamination of water and soil as a result of spills and leakages from machines.	Regular servicing and maintenance of equipment and vehicles.	Contractor	Start of clearing activities	On-going	160,000
<b>Noise emission and vibration</b>	Noise pollution from the movement of the site vehicles can disturb workers, community	To minimise noise emission and vibration	All mobile vehicles and equipment will have noise reducers All land preparation activities will take place during the day and any work during night-time will be communicated to the state authorities and local community	Contractor	At start of land clearing	End of construction	40,000
<b>Atmospheric emissions</b>	Nuisance dust pollutes the air, affect the health of site workers	To reduce dust emissions during construction	Water bowsers will be employed on site to suppress dust on all site roads. Designated routes will be established on site for motor traffic. Site workers will be issued with personal protective attire. All the sand or soil heaps will be removed as soon as possible to avoid nuisance dust arising from prevailing.	Contractor PIU	At start of land clearing	End of construction	185,000
	Increased road traffic will lead to deterioration of dirty irrigation scheme roads	To prevent and minimise damage of dirty roads resulting from traffic	Conduct routine road repair and maintenance	Contractor	At start of land clearing	End of construction	250,000
<b>Safety</b>	Increase in road traffic may lead to reduced road safety among the rural communities	To reduce road traffic accidents	Control traffic by introducing speed-humps and elaborate road signs. Road will maintained free of mud, pot-holes, debris and other traffic obstacles. Sensitize the community on general road safety to increasing traffic awareness.	Contractor	At start of land clearing	End of construction	350,000

Table 4-3 Environmental & Social Management Plan during the preparation/construction phase

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMW
			Socio-economic Environment		Start	End	
					Site Clearing/Construction Phase		
Improved Livelihoods	Increased employment opportunities for locals	To increase employment opportunities for the local people in the area	Priority will be given to the local people. Only skills that will not be available within the local community will be sourced from other areas. Skills base for the area will be increased by training the locals especially those skills that can be mastered within a short time.	Contractor PIU	Prior to construction	On-going	130,000
	Increased opportunities for skills transfer	To encourage training of staff on site	Ensuring there is a skill transfer programme. Categorise staff and each group to be supervised by a dedicated skilled personnel to ensure on job training. Encourage job on training through observation and trial under supervision.	Contractor	Prior to construction	On-going	80,000
Revenue for the government from taxes	Increased revenue base for the government	To enhance the tax base for the government for infrastructure development	The Scheme will adhere to all the tax requirements of the Government of the Republic of Zambia.	Contractor PIU	Prior to construction	On-going	-
Migration	Increase in the local population	To reduce pressure on local resources	Measures will include) Adopt selective employment opportunities targeting locals, ii) Ensure adequate facilities are provided for staff such as sanitation facilities.	Contractor	Prior to construction	On-going	65,000
	Increase in Local Economic Activities	To increase the market for local goods and services in the area	To enhance this, developer will ensure that the employees are encouraged to buy most things from within the area. The developer will support improvement of market facilities in the area	Contractor	Start of clearing	On-going	175,000
	Threat to Human Health	To reduce the incidences of HIV/AIDS, increased prostitution and risks to women and children	Construction activities will expose the community to the non-local people which may lead to the spread of HIV/AIDS and other STIs and expose women and children to fraternization-related risks. Measures to minimise this will include; i) sensitise staff and community on the dangers of HIV/AIDS and STIs. Create partnerships with Ministry of	Contractor PIU	Prior to construction	On-going	250,000

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMW
			Socio-economic Environment		Start	End	
			Site Clearing/Construction Phase				
			Health to benefit from dedicated national programmes designed to address spread of HIV/AIDS and other STIs and expose women and children to fraternization-related risks ii) support local programmes by Ministry of Health regarding HIV/AIDS; iii) enforcement of a strict code of conduct on employees/workers; iv) ensuring that regular reports on labour influx and grievances are communicated to the PIU; v) ensuring regular presence of social specialist or community worker on the site.				
Occupational Health & Safety	Increased lung problems due to dust emissions	To reduce the incidences of lung problems	Watering of the area and surroundings during the construction stage will be undertaken regularly.	Contractor	Start of Clearing	On-going	155,000
Land Clearing for scheme development	Loss of grazing land	To limit clearing of vegetation to critical areas only	Designate some areas for grazing coupled with cultivated land for pasture	PIU	Start of Clearing	On-going	-
Wildlife disturbance	Disruption of natural animal corridors	To ensure that wildlife habitat is not disrupted	Carryout a specific study to ascertain appropriate routes for animal corridors and appropriate areas needed for conservation of dambos areas.	PIU	Prior to construction	Before operation	175,000

Table 4-4 Environmental & Social Management Plan during the operation phase

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMW
					Start	End	
<b>Biophysical Environment</b>							
<b>Operation Phase</b>							
<b>Spills and/or accidental releases.</b>	Pollution of surface water as a result of soil erosion	To prevent contamination of water as a result of soil erosion.	Ensure that all people at the farm are trained in handling chemicals/oils and so that no accidental spills are experienced	Operator	Year 1	On-going	60,000
<b>Use of equipment and vehicles</b>	Contamination of soil, surface water and/or groundwater due to fuel spills	To prevent the contamination of water and soil as a result of spills and leakages from machines.	Regular servicing and maintenance of equipment and vehicles.	Operator	Year 1	On-going	170,000
	Contamination of surface water and/ground water due to washing and servicing of equipment	To prevent the contamination of water as a result of washing and servicing of farm equipment.	All maintenance will be done in workshops. Hydrocarbon traps will be installed in the workshop drainage system to treat effluent prior to release to the farm surface drainage.		Year 1	On-going	80,000
	Contamination of water as a result of washing and servicing of equipment		Heavy equipment wash-bays equipped with impervious surfaces and containment to capture effluent from washing operations will be constructed at the open pit workshops		Year 1	On-going	135,000
<b>Atmospheric emissions</b>	Air pollution due to airborne dust generated from the operation of heavy farm equipment used in land clearance.	To minimise atmospheric pollution due emissions from vehicles and other machines	Regular servicing of vehicles and equipment	Operator	Year 1	On-going	165,000
	Air pollution	To control/minimise the generation of dust from the movement of haul trucks and other heavy equipment for dam construction	The site will be routinely sprayed with water in order to suppress dust during operations phase	Operator	Year 1	On-going	170,000

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Time Frame		Cost ZMW
					Start	End	
<b>Biophysical Environment</b>							
<b>Operation Phase</b>							
<b>Soil Degradation</b>	Soil Contamination due to oil spills	To prevent contamination of soils at the workshop.	The service, repair and maintenance of farm equipment and vehicles will be restricted to dedicated areas specifically designed for the purpose.	Operator	Year 1	On-going	-
	Contamination of Soil from disposal of agro-chemicals/ containers	To prevent contamination of soil caused by an accidental release of fuel or oil.	All scheme equipment using hydraulic fluid, oil, fuel or any other substance that has the potential to contaminate surface water, groundwater or soil if released into the environment will be subject to a preventative maintenance programme. Procedures laid down in the Emergency Response Plan will be followed in the event of a spill. IPM training	Operator	Year 1	On-going	-
<b>Agro- Chemicals</b>	Increased usage of fertilizers and agro-chemicals	To ensure usage of agrochemicals/ fertilizers is according to standards	Promote use of organic manures Practice conservation and green farming, Encourage organic farming, careful choice of crops which replenish soil fertility	Operator PIU	From operation	On-going	-
<b>Climate Change</b>	Loss of vegetation	To minimise loss of vegetation	Reforestate disturbed areas where appropriate Minimise clearance of vegetation to critical areas Facilitate the planting of village woodlots within surrounding communities to offset loss associated with cleared areas. Avoid clearing woodlands which are in a mature or climax state Ensure use of well maintained, high efficiency diesel motors Prevent harvest of fuel wood or utilise charcoal from unsustainable harvesting	Operator	Prior to land clearing	On going	140,000

Table 4-5 Environmental & Social Management Plan during the operation phase

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Timing		Cost ZMW
			Socio-economic Environment Operation Phase		Start	End	
Improved Livelihoods	Increased employment opportunities for locals	To increase employment opportunities for the local people in the area	Priority will be given to the local people. Only skills that will not be available within the local community will be sourced from other areas. Skills base for the area will be increased by training the locals especially those skills that can be mastered within a short time.	Operator	Year 1	On-going	90,000
	Increased opportunities for skills transfer	To encourage training of staff on site	Ensuring there is a skill transfer programme. Categorise staff and each group to be supervised by a dedicated skilled personnel to ensure on job training. Encourage job on training through observation and trial under supervision.	Operator	Year 1	On-going	-
Land	loss of agricultural fields	To ensure affected households are not left worse off than before	Compensation and replacement of land will be done after a RAP exercise is undertaken	PIU	Year 1	Farm Closure	-
Revenue for the government	Increased revenue base for the government	To enhance the tax base for the government for infrastructure development	The Irrigation scheme will adhere to all the tax requirements of the Government of the Republic of Zambia.	PIU	Year 1	On-going	-
Migration	Increase in the local population	To reduce pressure on local resources	Measures will include) Adopt selective employment opportunities targeting locals, ii) Ensure adequate facilities are provided for staff such as sanitation facilities.	Operator	Prior to construction	On-going	-
	Increase in Local Economic Activities	To increase the market for local goods and services in the area	To enhance this, MAL will ensure that the employees are encouraged to buy most things from within the area. The Scheme will support improvement of market facilities in the area	Operator PIU	Start of clearing	On-going	175,000



Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Start	Timing End	Cost ZMW
			Socio-economic Environment Operation Phase				
	Threat to Human Health	To reduce the incidences of HIV/AIDS, increased prostitution and risks to women and children	<p>Construction activities will expose the community to the non-local people which may lead to the spread of HIV/AIDS and other STIs. Measures to minimise this will include;</p> <p>i) sensitise staff and community on the dangers of HIV/AIDs and STIs</p> <p>ii) support local programmes by Ministry of Health regarding HIV/AIDs that include;</p> <ul style="list-style-type: none"> <li>- Free male and female condoms distribution</li> <li>- Health talks on HIV/AIDs, transmission, prevention and safer sex.</li> <li>- Male circumcision to minimise sexually transmitted diseases</li> <li>- Free voluntary counselling and testing for HIV/aids</li> </ul> <p>iii) enforcement of a strict code of conduct on employees/workers; iv) ensuring that regular reports on labour influx and grievances are communicated to the PIU; v) ensuring regular presence of social specialist or community worker on the site.</p>	Operator PIU	Prior to construction	On-going	120,000
Poor Sanitation	Pollution of surface and groundwater	To avoid contamination of water resources	<p>Provide adequate sanitation facilities and proper disposal of waste.</p> <p>Ensure communities are sensitized on good hygiene practices</p>	Operator	Start of Clearing	On-going	70,000
Occupational Health	Health related diseases for workers	To minimise any health hazards to workers	<p>Ensure working environment is well kept and conducive for workers</p> <p>Provide personal protective clothing</p> <p>Develop and implement programmes for community awareness and training of workers on safety procedures</p>	Operator			130,000
Human Animal Conflict	Threat to human safety	To prevent risk of animal attack	Provide for undisturbed stretches of vegetation interconnected to provide animal passage	PIU			-Nil

Environmental Aspect/issue	Environmental Impact	Management Objectives	Mitigation/Enhancement Measures	Responsible person	Timing Start	End	Cost ZMW
			Socio-economic Environment				
			Operation Phase				
Domestic Water Supply	Water borne diseases	To avoid water borne disease and ensure good hygiene	Conduct feasibility study to ascertain the adequacy of water availability for the community	PIU	Prior to Operation		135,000
Effects of planned infrastructure such as feeder roads	Disruption to habitat and Displacements	To ensure that impacts are minimised	Conduct specific environmental assessments for all planned associated infrastructure such as feeder roads, powerlines prior to construction	PIU	Prior to construction		180,000

## 4.2 Environmental Monitoring Plan

Under the Environmental Monitoring Plan (EMP), various mitigation measures have been organised into a well-formulated plan, which will serve as a guide for operation phase. While costs associated with implementing the EMP are often deemed unnecessary it's important that adequate resources are allocated to implementation of the EMP in order to comply with the monitoring commitments in the EMP as well as ensuring that unexpected effects resulting from operational activities are detected early enough for mitigation without causing irreversible damage to the environment.

Table 4-6: Environmental Monitoring Programme

Program	Description	Monitoring Location	Frequency	Parameters	Compliance Requirement	Responsible Person	Cost ZMK
Surface water Monitoring	Ambient surface water quality – upstream and downstream of the area of disturbance	Zambezi River, Upstream and Downstream of reservoirs	Monthly	pH, EC, TDS, TSS,SO <sub>4</sub> , Cu, Fe, Co, Mn, NO <sub>2</sub> , PO <sub>4</sub> , Ca-Hardness, Ca, Mg, Pb, Co, Cd Pesticides	Key statutory limits that will be adhered to include the Statutory Limits for effluent discharged to surface waters.	Operator	40,000
Biological Monitoring	Aquatic and terrestrial flora and fauna	Location will be selected in line with the baseline assessment to monitor impacts on biological data	Bi-Annual	Selection of parameters to be determined in consultation with relevant regulatory authorities to ensure potential impacts are detected.	Compliance requirements – to minimise impacts and compare to baseline environmental data.	Operator	78,000
Land Monitoring	Areas disturbed and rehabilitated	Entire Scheme area	Up-dated annually	Record area disturbed versus area rehabilitated.		Operator	-
	Success of rehabilitation	Plots will be determined once rehabilitation has began and will include analogue sites in undisturbed areas.	Annually	To be determined, will include: Erosion rates, growth rates, species richness, important values, species dominance etc.	To meet stable, sustainable landforms at closure.	Operator	80,000
Air Emissions Monitoring	Meteorology	Put up a meteorological station within the Scheme area	Continuous	- Temperature - Rainfall - Humidity - Wind (speed, direction) - Pressure - Evaporation	No compliance requirements – monitoring of natural conditions to supplement other monitoring including runoff volumes, ambient dust loads and noise levels.	Operator	170,000

Program	Description	Monitoring Location	Frequency	Parameters	Compliance Requirement	Responsible Person	Cost ZMK
	Ambient dust	Locations will be established around the area of disturbance to record ambient dust levels – mostly during construction phase	Monthly totals	Total dust levels	Statutory dust emission limits as detailed in Pollution Control Regulations – Third Schedule	Operator	10,000
Noise	Ambient and point source	Construction areas	Monthly	Survey undertaken quarterly to record noise levels in comparison to baseline measurements.	Statutory limit for noise levels	Operator	10,000
	Traffic	Consistent with baseline monitoring program	Annually	Vehicle movements	No compliance requirements – to monitor impacts and ensure mitigation measures are appropriate.	Operator	-