GOVERNMENT OF MALAWI

MINISTRY OF AGRICULTURE, IRRIGATION AND WATER DEVELOPMENT

SHIRE VALLEY IRRIGATION PROJECT

Environmental and Social Management Plan for Phase 1

Disclosed on May 24, 2017 (updated and re-disclosed on August 8, 2017)

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List of Acronyms

BMPs	Best Management Practices
BWO	Bulk Water Operator
CC	Construction contractor
DPNW	Department of National Parks and Wildlife
EAD	Environmental Affairs Department
EF	Environmental Flow
Escom	Electricity Supply Commission of Malawi
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
FS	Feasibility Study
GoM	Government of Malawi
Ha	Hectares
IFC	International Finance Corporation
KRC	Korea Rural Corporation
LNP	Lengwe National Park
Masl	Meters above sea level
MDoA	Malawi Department of Antiquities
MWK	Malawian Kwacha (1$ US equals +/-715 MWK)
MoAIWD	Ministry of Agriculture, Irrigation and Water Development
MWR	Majete Wildlife Reserve
PAPs	project-affected people
PCCPLTRPF	Preparation and implementation of a Communications, Community Participation, Land Tenure and Resettlement Policy Framework
PMP	Pest Management Plan
PPE	Protective Personal Equipment
PPP	Public Private Partnership
RAP	Resettlement Action Plan

RoW	Right-of-Way
STD	Sexually Transmitted Disease
SRBMP	Shire River Basin Management Program
SVIP	Shire Valley Irrigation Project
SVTP	Shire Valley Transformation Program
TORs	Terms of Reference
WESM	Wildlife and Environmental Society of Malawi

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1. INTRODUCTION

This is the Environmental and Social Management Plan (ESMP) report for the Malawi Shire Valley Irrigation Project (SVIP), which is part of the Shire Valley Transformation Program (SVTP). This ESMP covers phase 1 of the Program and specifies the environmental management (mitigation and enhancement) measures to be carried out in order to address the impacts described in the Environmental and Social Impact Assessment (ESIA) report. There is also a Pest Management Plan (PMP) report specifically for the pest management issues that may accompany the irrigated agriculture and an Executive Summary that summarizes the key findings and recommendations of the ESIA, ESMP, and PMP.

This ESMP report is the work of Malawi's Ministry of Agriculture, Irrigation and Water Development (MoAIWD), with support of the consulting firm BRLi. In parallel, the Korea Rural Corporation (KRC) is the consultant that prepared the technical Feasibility Study (FS) for SVIP.

. The Government of Malawi will update this report, in response to additional public and stakeholder comments as well as any new technical project information that may become available, particularly once the detailed engineering design of the canal infrastructure is completed.

Measures developed under this assignment has informed the Client and the upcoming Detailed Design study about ways to mitigate the adverse impacts and enhance positive effects of the Project. The ESIA is based on the FS description of the Project.

The project is an agriculture project aiming at irrigating about 43,370 ha of lands in Chikwawa and Nsanje Districts, Malawi. It involves a water intake inside Majete Wildlife Reserve (MWR) and three main canals of a total length of about 133 km.

The Project overall goal is to benefit local communities, which is a major positive impact given the dryness conditions that prevails in the area. Improving livelihood will lead to other indirect positive impacts: improved access to education and health, new opportunities for agribusiness, etc. The Project also has challenges to overcome in order to ensure its environmental soundness. In order to overcome these challenges, important funds, involvement and commitments are necessary for the following infrastructures and activities:

- appropriate wording and inclusion of all applicable mitigation measures in the call for tender (and terms of reference) and in the contract of the construction contractor including leverages such as nonpayment for non-compliances;
- inclusion of all applicable mitigation measures in the Scheme operator (Bulk Water Operator) call for tender (and terms of reference and contract);
- selection of a construction contractor with good reputation who is environmentally and socially proactive;
- phasing and confining work in MWR to minimize impacts on tourism in MWR;
- proper compensation for impacts on tourism in MWR;
- installation of low maintenance and self-reliant wildlife infrastructures in MWR such as a fish barrier to maintain the separation between the Lower Zambezi and the Upper Shire fish assemblage, an artificial wetland, noise barriers, and walls around the Feeder canal;
- installation of sufficient troughs and cattle bridges along the main canals;
- measures to prevent drownings of people (safety ladders) and treatment against schistosomiasis (Bilharzia), as common disease in irrigation schemes.

Although the Project leads to uncommon impacts, with commitments, funds and reliable mitigations, it could become an example for future irrigation schemes in sensitive areas.

The ESMP has budgeted costs for the proposed mitigations for Phase I including infrastructures to build. The following table is a summary of costs.

Table 1 Summary of costs for the ESMP Phase I

Mitigation / compensation	Cost for mitigation / compensation in USD	Cost for mitigation / compensation in Malawi Kwacha (1 USD = 715 Kwacha)
Compensation Plan for Majete Wildlife Reserve	**<u>One year construction period in MWR</u>** **1,351,830** (best case scenario no loss of business revenue) to **1,961,830** (worst case scenario no business revenue) **<u>Two year construction period in MWR</u>** **1,370,990** (best case scenario no loss of business revenue) to **2,610,990** (worst case scenario no business revenue)	**<u>One year construction period in MWR</u>** **966,558,450** (best case scenario no loss of business revenue) to **1,402,708,450** (worst case scenario no business revenue) **<u>Two year construction period in MWR</u>** **980,257,850** (best case scenario no loss of business revenue) to **1,866,857,850** (worst case scenario no business revenue)
Action Plan for the potentially invasive fishes	Costs are presented in the Feasibility study*	
Cost of Action Plan for health and safety	**169,000**	**120,835,000**
Cost of Action Plan for socioeconomic impacts (including cattle bridge, footpath and vehicle bridge) and cultural heritage Plan	**4,063,280**	**2,905,245,200**
Total cost (excluding the invasive fish barrier) **	From **5,584,110** to **6,843,270**	From **3,992,638,650** to **4,892,938,050**

* Cost for the invasive fish barrier inside MWR, as estimated by KRC (2017) is 4.3 million USD, since this subject is a going debate, only the Design study will enable to provide a final cost on this barrier. The amount is therefore not taken into account in the ESMP costing.

** The total cost also excludes costs to implement measures to address construction-related impacts that will be spelled out in detail in the Construction Environmental and Social Management Plan (CESMP) that will be prepared by the contractors as specified in bidding documents. The costs will be part of the contract costs and will be reflected in the bill of quantities. The costs for the Pest Management Plan (PMP) are provided in detail in that plan.

OBJECTIVE OF THE PROJECT

The Project Objective for SVTP Phase I is to (i) provide access to reliable gravity-fed irrigation and drainage services, (ii) secure land tenure for smallholder farmers, and (iii) strengthen management of wetlands and protected areas in the Shire Valley. To achieve part (iii) of the Project Objective, SVTP-I includes a Natural Resources Management Component (US$5.59 million) which is additional to the above-noted ESMP Budget.

OBJECTIVE OF THE ESIA

The ESIA, ESMP, and PMP are well defined to comply with the national policies regarding impact assessment as well as the World Bank triggered safeguard policies. In addition, the AfDB environmental and social standards, the International Finance Corporation (IFC) Performance Standards are applicable, when relevant. This ESMP is based on the Feasibility Study description of the Project.

OBJECTIVE OF THE ESMP

The ESIA report covers the entire SVIP, both Phase I and Phase II, so that all of the expected impacts are considered together in advance of the decision to proceed with construction. However, the ESMP focuses specifically on Phase I of the SVIP irrigation scheme, which corresponds to Phase I of the SVTP. Works under Phase II will not start until there is an approved ESMP for that Phase, independent of who the financiers are. Since Phase II construction would only take place well after the Phase I works are completed (years from now), a separate ESMP for Phase II will be prepared in the future, with up-to-date technical information. Accordingly, this ESMP does not cover the environmental mitigation and enhancement measures specific to SVIP Phase II, such as the impacts those on Lengwe National Park (LNP) which will be affected by the Bangula Canal in Phase II. Thus, ESMP proposes ways to ensure that measures are operational. It provides with cost estimates, schedule and describes the chain of responsibilities for each mitigation and monitoring. The ESMP is presented in Action Plans. A major target of this ESMP is the Detailed Design study as many measures require civil engineer infrastructures.

This ESMP is an accurate document based on knowledge of impacts, it only addresses real issues related to Phase I and shall be read in conjunction with the other measures proposes in other technical studies taking part of SVIP.

SHIRE VALLEY TRANSFORMATION PROGRAM – I

SVIP is part of the Shire Valley Transformation Program – I.

The SVTP is a 14-year program (2017-2031) structured around three coordinated pillars:

(i) Providing reliable, professionally managed and sustainably financed irrigation service to a large number of irrigators in a phased construction of the Shire Valley Irrigation Project (SVIP) scheme and providing multiple services including water supply;

(ii) Support farmer organization within a comprehensive land use plan; supporting land tenure strengthening and consolidation; as well as natural resources management; and

(iii) Establishment of smallholder owned commercial farm enterprises transitioning into commercial agriculture from subsistence farming and integrating them into commercial value chains.

In general terms, SVTP-I initiates the process on all pillars with a major focus on irrigation service provision to the SVIP-I area, land tenure, farmer organization and natural resource management as these precede any downstream development.

The sub-component of the SVTP called “Sub-component 2.2 Natural Resources Management” will be supported largely with GEF-6 funding and will promote an inter-sectoral approach to the management of the Lower Shire landscape by addressing biodiversity conservation, protecting and enhancing the role that forests, woodlands, rangelands and wetlands play in mitigating climate change; and promoting sustainable approaches to forest management that protect forest resources and deliver benefits to local communities.

At landscape and park level, this sub-component would:

(i) Invest in community-level natural resource management in areas adjacent to the irrigation and conservation areas (Lengwe National Park, Mwabvi and Majete Wildlife Reserves, Matandwe Forest Reserve and the Elephant Marsh proposed Community Conservation Area) and in wildlife corridors,

(ii) Provide targeted support to these conservation areas to strengthen conservation and community management and encourage private sector investments (e.g. by tourism concession investors) that could boost revenues for re-investment in local community development and conservation management,

(iii) Invest in establishment of the Elephant Marsh Community Conservation Wetland Area, with a strong emphasis on community-based natural resources management strategies, based on the wetland management plan currently being finalized with the support of the Shire Basin Management program (SRBMP) Phase 1.

Activities that will be implement as part of this sub-component are separate from, and additional to, the mitigation measures specified in this ESMP.

2. RELATION BETWEEN THE ESMP REPORT AND OTHER SVIP STUDIES

The ESIA/ESMP has many links with other studies. These links can be distinguished in three different categories:

- Relations with the Project technical studies (feasibility and design study);
- Relations with Shire River Basin Management Program (SRBMP) funded by the World Bank;
- Relations with other studies under the SVIP.

The following table presents these relations.

Table 2 Relations between studies

Project technical studies	**Relation**
Feasibility Study reports (several versions were produced during the writing of the ESIA, the final version is dated December 2016)	The ESIA is based on FS project definition. The ESIA provides to the FS study the series of mitigations that need to be technically tested. These mitigations only relate to infrastructures or changes in the Project design that will be required to mitigate of avoid impacts.
Design Study (after the FS). This study has not started yet.	The ESIA proposes many measures which technical and economic feasibility have to be studied at the Design Study phase. The Design has to make a final decision on the fate of mitigations presented in the ESIA. Tender documents after the Design phase have to include measures from the ESMP
SRBMP studies	Most of SRBMP studies were not available at time of Vol.1 Baseline report. Their conclusions are used in Vol.2
Component A – Shire Basin Planning Sub-components: A1-Basin planning framework A2-Institutional capacity A3-Water resources information systems A4-Program management monitoring & evaluation Component B – Catchment Management Sub-components: B1-Catchment planning, monitoring and learning B2-Rehabilitation targeted catchments B3-Alternative rural livelihoods B4-Ecological management Component C – Water related infrastructure Sub-components: C1- Kamuzu Barrage C2-Flood management C3-New water investment	The recommendations of this ESIA and ESMP have taken into account the SRBMP. Most activities of the SRBMP relate to catchment management and rehabilitation, as well as the upgrading and future operation of the Kamuzu Barrage that influences the Shire River's flow, well upstream of the SVIP.
Implementation Service Provider (ISP) for Flood Risk Management (SRBMP-1)	This report deals with risk from floods. In some sections, it presents measures to minimize flood impacts on human safety from:

Project technical studies	Relation
	• Ruo River • Thangadzi East River • Mwanza River • Lalanje River • Tombokamwa River
Lengwe National Park, General Management Plan 2016-2020 work document (Component B, Sub component B4)	The ESIA refers to this document has it defines new objectives for the LNP as well as identifies current issues with wildlife and infrastructures of the park.
Shire River Basin Management Program (Phase I) Project Final Environmental and Social Assessment Report (July, 2013)	The overall assessment of impact of SRBMP planned activities is dealt with in this report (except for the impact of Kamuzu barrage).
Independent Environmental Impact Assessment for the Upgraded Kamuzu Barrage (December 2011)	An ESIA was carried out under the Component C.1: upgrading of the Kamuzu Barrage. The barrage is a key element that has many interactions with SVIP as the current objective of the upgraded barrage is to raise the water level up to 40 cm in Lake Malawi.
Climate resilient livelihoods and sustainable natural resources management in the Elephant Marsh, Malawi. Ministry of Water Development and Irrigation. P117617. Description of the livelihoods in the area of the Elephant Marsh Report November 2016	This study addresses the following objectives (MRAG, 2016): • Describe local livelihoods, including spatial and temporal use of resources; • Assess the past, present and potential future influence of human livelihoods on the Elephant Marsh, and what effect these will have on the functional resilience of the Marsh in the future, and the implication for climate change; • Identify the socio-economic impacts of livelihoods and how climate change might affect these livelihoods; • Describe the risks to livelihoods (e.g. flooding or overfishing), and current strategies to increase resilience to these risks that will be exacerbated by climate change; and • Provide an assessment of the support mechanisms for community welfare in line with possible flood mitigation measures and disaster management strategies.
Climate Resilient Livelihoods and Sustainable Natural Resource Management in the Elephant Marsh, Malawi Management Plan for the Elephant marsh	The management plan objectives are to: • To improve understanding of the functional ecology of the Elephant Marsh; • To assess the feasibility of designating the Elephant Marsh as a community-managed protected area and a Ramsar site; and • To identify strategies and development options that would build the resilience of local communities to environmental change At time of ESMP writing, the management plan was not available (not yet published).
Climate Resilient Livelihoods and Sustainable Natural Resource Management in the Elephant Marsh, Malawi Hydromorphology study	The hydromorphology study objectives are to: • To establish the current status and recent trends of the hydromorphology of the Elephant Marsh.

Project technical studies	Relation
	• To establish a hydraulic model predicting flooding patterns in the Elephant Marshes since flow records began. • To evaluate historic land-use change (especially deforestation and agriculture) and its effect on sedimentation and siltation. • To map historic changes in the channel patterns in the marshes.
Climate Resilient Livelihoods and Sustainable Natural Resource Management in the Elephant Marsh, Malawi Sub-Study 4: Biodiversity of the Elephant Marsh (2016)	"This sub study forms part of a larger study on the Elephant Marsh which also includes studies of the hydrodynamics, local communities and ecosystem services, in order to inform a management plan for the marshes and in order to prepare an application for Ramsar status as a wetland of international importance" (Anchor, 2016). This sub-study aimed at describing (through surveys), biodiversity of Elephant marsh. Specialized surveys and studies of several taxonomic groups were carried: plants, aquatic invertebrates, dragonflies, butterflies, reptiles, amphibians, fish, birds and mammals.
Climate Resilient Livelihoods and Sustainable Natural Resource Management in the Elephant Marsh, Malawi Analysis of the potential effects of alternative future scenarios of flow and/or management on the ecological condition of the Elephant Marsh (Ecosystem Functional Model (DRIFT) (2016)	This sub study explores the potential effects of alternative future scenarios of flow and/or management on the ecological condition of the Elephant Marsh.
Climate Resilient Livelihoods and Sustainable Natural Resource Management in the Elephant Marsh, Malawi. Sub-Study 3. Ecosystem Services of the Elephant Marsh. (December 2016).	This study is a desktop study which: • Describes the ecosystem services provided by the Elephant Marsh in physical terms and provide desktop estimates of their economic and social value; • Draws comparisons with other wetlands in Africa of a similar nature; • Discusses how capacity of the system to deliver these services responds to hydromorphology how this has changed over time; • Discusses the wetland's sensitivity and adaptive capacity to multiple pressures, with a description of those pressures. This report is relevant for baseline information and this impact assessment report.
Other SVIP studies	
Public-Private Partnership (PPP Feasibility study) (on going)	The PPP study informed the ESIA about public-private partnership arrangements for irrigation services for SVIP.

Project technical studies	Relation
	The ESIA also makes recommendations about arrangements and responsibilities of the Bulk Water Operator for maintenance and its relationship with parks management (Lengwe and Majete). The ESIA also helps to identify environmental and social risks regarding the Bulk Water Operator.
Hydraulic model study at the headpond of Kapichira dam	Although the title of the study is hydraulic modeling, the main objective of this study is to assess the impact of the Project on the reservoir sedimentation pattern. The study's objectives are also to avoid negative impact on sediment flushing operations at the power station and to minimize the entry of sediment into the proposed feeder canal system of SVIP.
Preparation and implementation of a Communications, Community Participation, Land Tenure and Resettlement Policy Framework (PCCPLTRPF) (on going)	Many elements on socioeconomics are dealt with in the PCCPLTRPF. The ESIA make references to it. This assignment is divided in several studies: • Communication strategy: This study describes the main stakeholders and presents a SWOT analysis. It also presents the communication strategy toward stakeholders. • Gender and Youth Strategy Study: This study describes the current challenges that women and young people face. This report also recommends a series of measures and guidelines aiming at these two groups. In addition, roles of various stakeholders and monitoring actions are defined. • Grievance redress mechanism: This study describes the current method for grievance redress (revolving around traditional leaders). This study also implements the Grievance Redress Mechanism (GRM) and Grievance Redress Committee (GRC) to ensure that people's opinions and grievances regarding the project are documented and addressed. In addition, monitoring of complaints will be carried out under this mechanism. • Resettlement Policy Framework This document provides the basis for the Resettlement Action Plan (regulatory review, gap analysis, etc.). It deals with impact of resettlement but also the issue of access to sources of livelihood and to impact on cultural heritage. The ESIA refers to this study, especially when it comes to the number of affected villages and the number of bridges that shall be built to cross canals (and footpaths for people). • Stakeholders' views report This report presents the main conclusions from various stakeholder's consultation. It discusses stakeholders' views on several topics: land tenure, access to irrigated land, resettlement, agricultural development, access to water for livestock and gender vulnerability. • Socio-economic baseline report This report presents the main socio-economic figures of the SVIP area and discusses about health, land tenure, livestock, agriculture, etc. It also includes a chapter on communities' views of the Project.

Project technical studies	**Relation**
Agricultural Development Planning Strategy (2016)	This study describes the crops of SVIP. Many elements related to agriculture and fisheries are dealt with in this report. It discusses about mitigation for smallholder livestock farmers and assesses the potential for fish farming. In addition, this study describes efficient organization of producers that shall be implemented
Pest Management Plan (2016)	The PMP identifies the main pest based on the type of crops and proposes measures to fight pests.
A Cultural Heritage Impact Assessment Report (2016)	This report provides information on cultural heritage sites based on surveys around Phase I of SVIP. Forty-six sites were identified by the MDoA in addition to those identified by the consultant.
Other report	
Majete Wildlife Reserve, 5 years business plan 2016-2020	This document, written by African Parks, describes the reserve's objectives and presents its zoning. It also describes the various infrastructures of the reserves.

3. PROJECT LOCATION AND DESCRIPTION

Construction work of the SVIP is expected to start in 2018 after a tendering process for a designer, a construction contractor and a Bulk Water Operator. The water will start to flow inside the water intake at Kapichira Dam towards the end of year 2022. The total cost of SVIP, Phases I and II, taking into account direct and indirect construction costs, is estimated at around 519 Million USD. (KRC final report, 2016). This excludes the mitigation measures recommended in the ESIA (for Phases I and II) and detailed in the ESMP (for Phase I), as well as the GEF-funded costs of the SVTP-I Natural Resources Management Component.

As mentioned in the latest version of the FS (Korea Rural Corporation, 2016), the Project consists of several key infrastructures as presented in the following sections. The Project design and construction will be phased according the phases of the Project (Phase I will be designed and built separately from Phase II). Phase I is supposed to start in 2018. Phase II will start at an unknown future date, well after Phase I.

3.1 WATER INTAKE

A water intake will be built at Kapichira reservoir, the highest topographic point of the scheme (145.5~146.5masl), on the right bank of the Shire River, upstream from Escom training dike and the fuse dike, on the opposite side of the water intake of Escom hydropower station.

The SVIP water intake will extract a certain amount of water from the Shire River (the reservoir) to distribute water by gravity to the scheme. At final SVIP development (Phases I and II), the volume of water diverted from the Shire River into the SVIP canal system via this intake will be between 20 and 50 m^3/s depending on the season. Based on the Hydraulic Modeling study, a bathymetric survey was carried out to select the preferred location, which is shown in the following figure.

Figure 1 Water intake location inside MWR

Source: KRC, 2016

The SVIP intake structure will comprise a 46.5 m long intake sill, with 12 sluice gates each 3 m wide.

Escom power plant as a capacity of 132 MW. The by-passed section between the reservoir dam and the power plant is very short (900 meters). An informal environmental flow is currently released from the dam spillway over Kapichira Falls during the rainy season.

3.1.1 Construction and characteristics

No information regarding the construction of the intake is available (quantity of material needed, location of quarries, canal RoW, duration of work, etc.). Most of these details will be provided in the Detailed Design report. One element that is known: in order to prepare the passage for the water intake, part of the reservoir will be dredged (using a dredger).

3.1.2 Operation

The gates will be operated by an automatic control system. When the operator inputs the required amount of water into the system, the system will automatically operate the gates based on the relation between the flow rate, gate opening and water level variation. The 12 sluice gates will be installed into two partitions, the first one comprising 8 gates and the second one 4 gates. The second partition will allow abstraction of 18 m^3/s, and will be operated when the water requirements at the scheme is less than 18 m^3/s. The first partition will allow abstraction of up to 32 m^3/s and will be operated when the water requirements at the scheme are between 18 m^3/s and 32 m^3/s. Both partitions will be operated for scheme water requirements above 32 m^3/s to the maximum requirement of 50 m^3/s (KRC, 2016).

The water intake is not a pumping station as water enters the intake passively (gravity).

3.2 CANALS

There will be three Main Canals:

- A Feeder Canal, also called Main Canal 1, with a total length of 33.8 km (conveying water from the water intake),
- The Supini Canal, also called Main Canal 3, with a total length of 10.7 km (previously called Illovo canal) mainly irrigating Phase I,
- The Bangula Canal, also called Main Canal 2, with a total length of 88.0 km mainly irrigating Phase II but also some Zone in Phase I (before it reaches the Lengwe National Park).

Each main canal will be lined with concrete. However, the Bangula Canal will have a wildlife-friendly surface where it will pass for 14 km stretch through Lengwe National Park. The Main Canal 1 stretch through about 1 km of community land between two portions of Majete Wildlife Reserve will also have a wildlife-friendly surface.

The followings are the characteristics of the canals based on the feasibility study (lined canal). RoWs are estimated.

Table 3 Main canals characteristics

	Slope	Length (km)	Depth (m)	Average Velocity (m/sec) at max. capacity	Peak flow (m^3/s)	Bed width (m)	Upper width (m)	Total Right of Way (RoW) (m)
Feeder Canal (also called Main Canal 1)	1H/1.5V	33.7	2.5	1.51	50	12.7	22.6	40-45

	Slope	Length (km)	Depth (m)	Average Velocity (m/sec) at max. capacity	Peak flow (m^3/s)	Bed width (m)	Upper width (m)	Total Right of Way (RoW) (m)
Supini Canal (also called Main canal 3 and Illovo Canal)	1H/1.5V	10.6	1.3	1.35	14	6.7	13.0	+/-40
Bangula Canal (also called Main canal 2)	1H/1.5V	78.7	1.9	1.13	29	9.1	17.2	30-45

Source: adapted from KRC TF final version, 2016

Each of these canals separate into Branch canals.

Siphons are planned to cross large valleys and rivers with important floods. In total, 11 siphons are planned for a total length of about 4 km. Culverts are planned where topographic changes are high but floods are small. Culverts are also planned to cross small-scale rivers and roads.

INSIDE MAJETE WILDLIFE RESERVE

Due to topographic constraints and to facilitate wildlife movements, the Main Canal inside MWR is going to be partly underground along 1.25 km within MWR boundaries. It will be an open lined canal—but walled off on both sides to prevent wildlife entry—along 1.20 km inside MWR.

The following are the characteristics of the underground canal (siphon) in MWR.

Table 4 Siphons of MWR

Chainage location of siphons	Length (m)	Length in MWR (m)	Size (m)	Name
0+64 to 0+817 (entirely in MWR)	755.40	755.40	8.0 x 3.0	Intake and #1 Siphon
1+237 to 1+430 (entirely in MWR)	195.40	195.40		#2 Siphon
2+710 to 2+890 (partially in MWR)	181.70	100		#3 Siphon
3+400 to 3+800 (partially in MWR)	406.80	200		#4 Siphon
Total length of buried canal inside MWR		**1250.8**		

Source: adapted from KRC TFS Final (2016)

According to the FS, the thickness of concrete will be sufficient to allow large wildlife to pass (50 cm). This thickness shall not compromised at Design phase.

NIGHT STORAGE

Night water storages will be built, their locations are not provided in the FS. Their size is as follow: between 90 and 270 meters long and 40 to 180 meters wide with a depth of 3.5 meters.

3.2.1 Construction and characteristics

Usually canal construction is relatively simply done with an excavator to remove earth. Important elements for ESIA are lacking such as quarries location and duration of work (except for work in LNP which are mentioned in the Option report to last 2 years). The FS report provides with name of 8 borrow pits and quarries, but does not provide with location nor mentioned whether these are existing or not. Quarry sites investigated are Kajawo, Thabwa existing quarry, Nzongwe and Ngabu (KRC, 2016). Further information on quarry and borrow pit sites will be in the Detailed Design report. No quarries or borrow pits will be within the Majete Wildlife Reserve, unless specifically authorized by the Reserve Manager (e.g. as part of the development of a new wildlife drinking area).

3.2.2 Operation

All canals are gravity canals bringing water from the Feeder canal to the Supini and Bangula canals, each of which will lead to Branch canals. In some area, canals may be replaced by siphons (when crossing large rivers such as Mwanza River). As presented in the ESIA, canal crossings of rivers could be (i) siphons; (ii) bridges; (iii) arches; or (iv) large box culverts with natural bottoms to ensure wildlife and fish movement (regular round-shaped culverts are not recommended because they often hinder fish and wildlife movement).

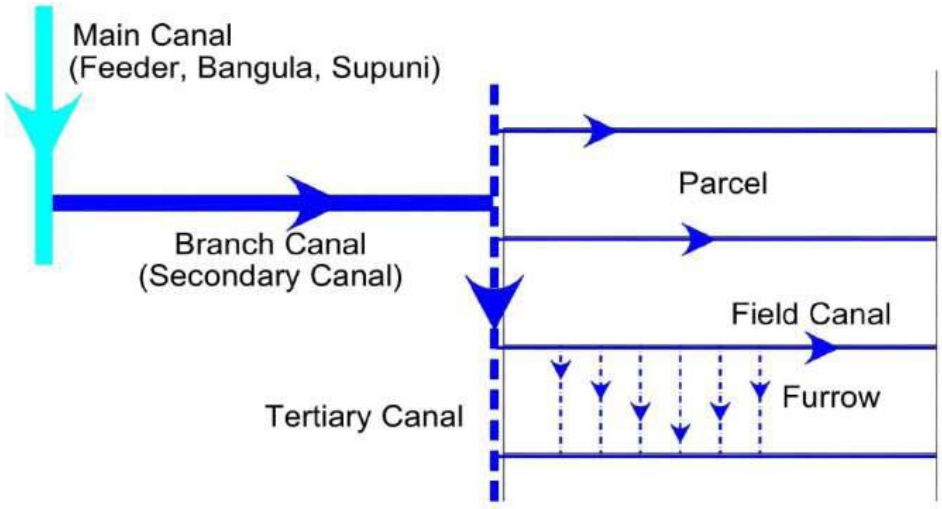
The daily time for irrigation depends on the irrigation methods. For pivot irrigation system, irrigation time is 24 hours, a whole day. For furrow irrigation, water application is normally 12 hours, during the daytime. Therefore, Branch canals shall be used only for 12 hours based on furrow irrigation methods. The main canals are designed for 24-hour continuous supply, for the whole year. Therefore, there is an operating time gap between the main canals and the Branch canals. Night storages will allow storing water when water is not needed in Branch canals (KRC, 2016).

Regarding drainage, the FS report describes using existing rivers and streams as drainage channels, with only the minimum modifications or new ditches where needed to connect these natural drainages to where the water would drain out of the farm fields.

As presented in the ESIA report, SVIP investments should avoid channelization or other river training works except in special circumstances, such as (i) at main irrigation canal crossing points or (ii) to protect buildings or other existing, high-value infrastructure. In particular, SVIP investments will need to strictly avoid dikes or other river training works that would adversely affect natural habitats such as riverine forests or thickets, in order to comply with OP 4.04 and generally accepted environmental good practice standards.

The following figure summarizes the system.

Figure 2 Diagram of irrigation canal



3.3 COMMAND AREAS

The project is made if several irrigated areas as shown in the figure next page: Phase 1 consist of three zones:

- Zone I-1: 9,631ha (total area, including access roads and right of ways)
- Zone I-2: 11,250ha (total area, which is made of Illovo estate)
- Zone A: 5,199ha (total area)

- Phase 2 consists of three zones:
  - Zone B: 9,925ha (total area, which is partly made of Illovo estate)
  - Zone C: 10,749ha (total area)
  - Zone D: 4,076ha (total area)

The total area is 50,830ha of land. The irrigation land covers 43,370ha (without road, canals and infrastructures). Some of this land will be set aside to conserve remnant natural habitats, as grazing land, woodlots, or for other purposes as presented in section 6.1

With current layout, the Feeder canal will cross 2,450m of Majete Wildlife Reserve (most of it inside the reserve fences) and 14km of Lengwe National Park.

3.3.1 Construction and characteristics

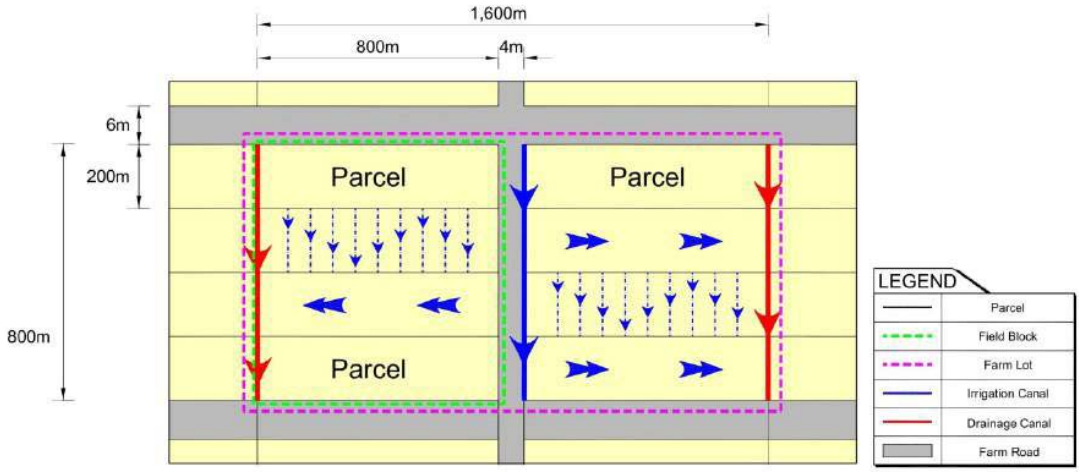
The command area will be made of parcels, drainage channels and farm roads (between 4 and 6m wide). Work will involve land leveling and major earthwork.

3.3.2 Operation

The irrigation and drainage system and roads in a unit parcel of land shall be based on its size. Typically, roads inside the farmland have been planned to be spaced at every 1.5 km distance. In this regard, several parcels comprise a single block around which roads have been planned. A field block shall comprise 6 parcels, and a farm lot shall comprise 2 field blocks (KRC, 2016).

A farm lot=2 field blocks, 1 field block = 6 parcels.

Figure 3 Farm Land Composition and Irrigation and Drainage Canals



Source: KRC, 2016

The field canal will supply irrigation water directly to the parcel through furrows.

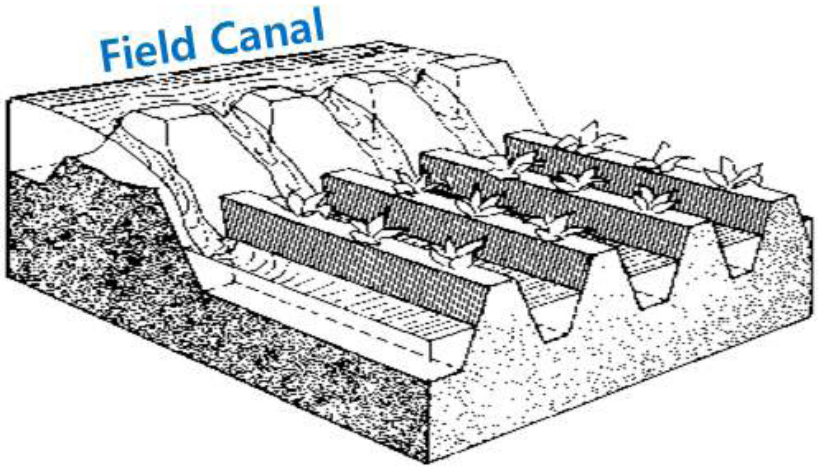
APPLICATION EFFICIENCY

The various efficiency coefficients are:

- Application Efficiency Ea (furrow irrigation): 64%
- Distribution Efficiency Ed: 90%
- Conveyance Efficiency Ec: 90%

Multiplying the three coefficient shows how much irrigation water will return to the system either to the watertable, to drain canals or evaporates. The overall Application efficiency is 52 %, which means that about half of the water is returned to the natural environment (or evaporates).

Figure 4 Furrow irrigation



Source: KRC, 2016

DOMESTIC WATER SUPPLY

From the Feeder canal at Chikwawa, a pipeline for Chikwawa town (as described in the latest FS report) will divert up to 1,240 m^3 per year to supply drinking water to Chikwawa.

3.4 NATURAL RESOURCES MANAGEMENT (NRM) COMPONENT

The Sub-component 2.2 Natural Resources Management will include Site level support for Conservation Areas of the Lower Shire Landscape aiming at:

- Mwabvi Wildlife Reserve and Matandwe Forest Reserve: Support will strengthen inter-agency planning and implementation between DNPW, DoF and develop nature-based tourism to deliver livelihood benefits for local communities and revenues to sustain landscape management. Support would also extend ongoing participatory forest management and linkages to wider tourism packages for the Lower Shire that includes a selection of sites. At Matandwe Forest Reserve, the project will support village-level income generating activities, (such as beekeeping, livestock production, timber/firewood harvest and sale, tree seedling production and sale), the establishment of woodlots and tree-based systems on customary land, and the establishment and management of Village Savings and Loan Schemes in the impact area.
- Elephant Marsh: Government of Malawi is planning to establish the Elephant marsh as Malawi's first 'Community Conservation Wetland Area' with the intention of balancing local livelihood needs with the longer-term, sustainable management of the marsh ecosystem. The project will support start-up management of the wetland management plan for the Elephant Marsh with a strong focus on building resilience of local livelihoods given the impacts of climate variability. This will include the establishment and implementation of a monitoring program covering marsh hydrology, biodiversity and livelihoods. In the context of the park management plan, support would also enable the implementation of the first phase of the Community-based Management Plan for the Elephant Marsh. The project will support conservation measures for the remaining fish biodiversity and wildlife populations through support for participatory planning and identification of areas of usage and non-usage zones, the introduction of community fisheries management regimes and development of community-based ecotourism.

- New Lengwe (the Lengwe "Extension" in the Western part of LNP): the Project will support for the extension of the park management plan to cover New Lengwe, including the development of co-management arrangements with local communities – building on an existing platform of Community-based Organizations around the Park, support for measures to reduce Human Wildlife Conflicts, development of access routes and support for day-to-day Park management, including survey, monitoring and patrolling activities. Support will also be provided to prepare a feasibility for a possible landscape corridor that could protect ecological linkages between New Lengwe and Majete Wildife Reserve, perhaps through the introduction of a community conservancy-based approach.
- Majete Wildife Reserve: The project will provide additional support to expand and consolidate existing community livelihood initiatives from African Parks as well as for investments in Park management – for example, maintenance and management of parts of the perimeter fence by local to prevent and reduce Human Wildlife Conflicts within the surrounding communities.

Annex 1 provides a generic screening plan for individual activities, particularly small livelihood investments under this component (and other components where small individual investments may be required, and Annex 2 provides a screening checklist to be used in such cases to assess potential impacts. Livelihood activities impacted by access to protected areas are addressed separately in the Project's process framework document.

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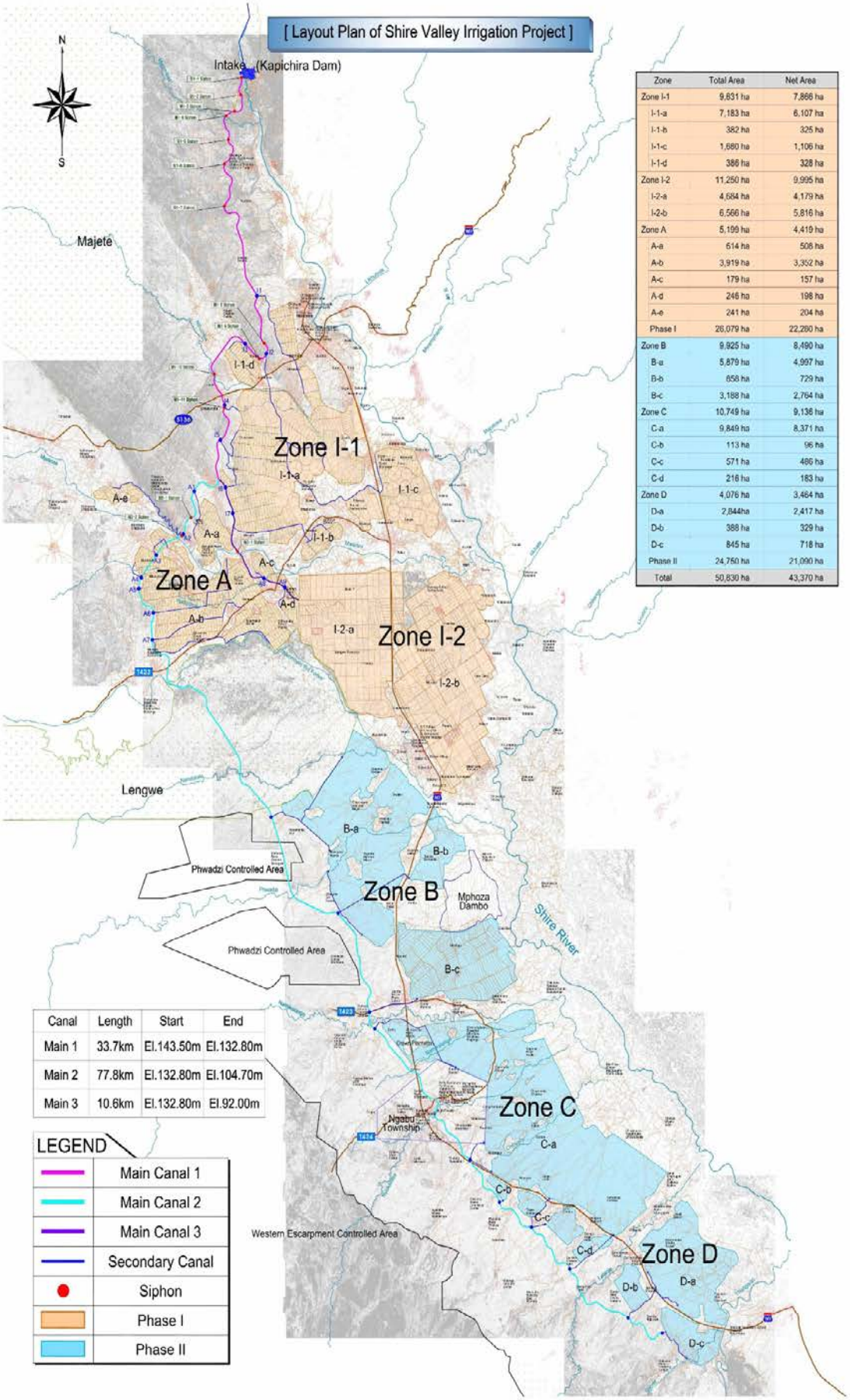
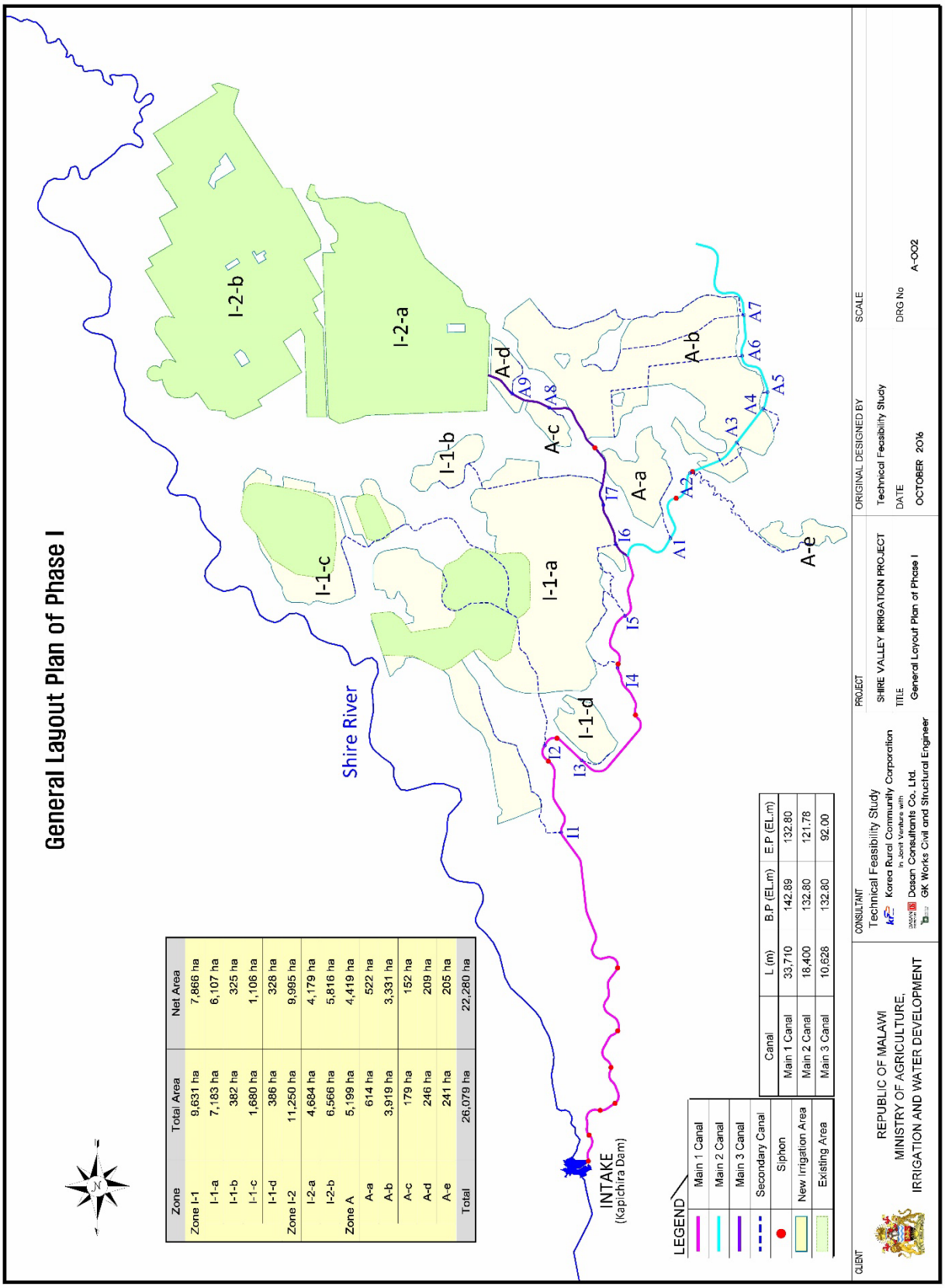
Layout Plan of SVIP

18



Zone	Total Area	Net Area
Zone I-1	9,831 ha	7,866 ha
I-1-a	7,183 ha	6,107 ha
I-1-b	382 ha	325 ha
I-1-c	1,680 ha	1,106 ha
I-1-d	386 ha	328 ha
Zone I-2	11,250 ha	9,995 ha
I-2-a	4,684 ha	4,179 ha
I-2-b	6,566 ha	5,816 ha
Zone A	5,199 ha	4,419 ha
A-a	614 ha	508 ha
A-b	3,919 ha	3,352 ha
A-c	179 ha	157 ha
A-d	246 ha	198 ha
A-e	241 ha	204 ha
Phase I	26,079 ha	22,260 ha
Zone B	9,925 ha	8,490 ha
B-a	5,879 ha	4,997 ha
B-b	658 ha	729 ha
B-c	3,188 ha	2,764 ha
Zone C	10,749 ha	9,138 ha
C-a	9,849 ha	8,371 ha
C-b	113 ha	96 ha
C-c	571 ha	486 ha
C-d	216 ha	183 ha
Zone D	4,076 ha	3,464 ha
D-a	2,844ha	2,417 ha
D-b	388 ha	329 ha
D-c	845 ha	718 ha
Phase II	24,750 ha	21,090 ha
Total	50,830 ha	43,370 ha

Canal	Length	Start	End
Main 1	33.7km	El.143.50m	El.132.80m
Main 2	77.8km	El.132.80m	El.104.70m
Main 3	10.6km	El.132.80m	El.92.00m


General Layout Plan of Phase I
Shire River
I-2-b
I-2-a
I-1-b
I-1-c
I-1-a
I-1-d
A-d
A-c
A-b
A-a
A-e
A1
A2
A3
A4
A5
A6
A7
A8
A9
I1
I2
I3
I4
I5
I6
I7
INTAKE
(Kapichira Dam)
LEGEND
Main 1 Canal
Main 2 Canal
Main 3 Canal
Secondary Canal
Siphon
New Irrigation Area
Existing Area
Zone | Total Area | Net Area
Zone I-1 | 9,631 ha | 7,866 ha
I-1-a | 7,183 ha | 6,107 ha
I-1-b | 382 ha | 325 ha
I-1-c | 1,680 ha | 1,106 ha
I-1-d | 386 ha | 328 ha
Zone I-2 | 11,250 ha | 9,995 ha
I-2-a | 4,684 ha | 4,179 ha
I-2-b | 6,566 ha | 5,816 ha
Zone A | 5,199 ha | 4,419 ha
A-a | 614 ha | 522 ha
A-b | 3,919 ha | 3,331 ha
A-c | 179 ha | 152 ha
A-d | 246 ha | 209 ha
A-e | 241 ha | 205 ha
Total | 26,079 ha | 22,280 ha
Canal | L (m) | B.P (EL.m) | E.P (EL.m)
Main 1 Canal | 33,710 | 142.89 | 132.80
Main 2 Canal | 18,400 | 132.80 | 121.78
Main 3 Canal | 10,628 | 132.80 | 92.00
CLIENT
REPUBLIC OF MALAWI
MINISTRY OF AGRICULTURE,
IRRIGATION AND WATER DEVELOPMENT
CONSULTANT
Technical Feasibility Study
Korea Rural Community Corporation
in Joint Venture with
Dasan Consultants Co., Ltd.
GK Works Civil and Structural Engineer
PROJECT
SHIRE VALLEY IRRIGATION PROJECT
TITLE
General Layout Plan of Phase I
ORIGINAL DESIGNED BY
Technical Feasibility Study
DATE
OCTOBER 2016
SCALE
DRG No
A-002

4. INTRODUCTION TO THE ESMP

This ESMP is divided in 8 sections:

- Measures to be included in the contractual documents of the construction contractor
- Measures to be study at Design phase
- Compensation Plan for Majete Wildlife Reserve
- The Action Plan against invasive fishes
- The Action Plan for health and safety
- The Action Plans for social impacts
- Measures aiming at the Government
- Monitoring Plan

Measures for the following topics are not dealt with in this ESMP:

- Agricultural issues and impact as they are studied in the Agricultural Development Planning Strategy
- Gender, grievances and vulnerable people as they are studied in the Preparation and implementation of a Communications, Community Participation, Land Tenure and Resettlement Policy Framework (PCCPLTRPF);
- Land tenure as they will be dealt with in the Resettlement Action Plan (RAP);
- Mitigation for impacts from the canal inside Lengwe National Park as this park will be impacted during Phase II. The ESIA provides sufficient level of details to understand impacts on LNP.

In addition, this ESMP does not list all generic construction Best Management Practices (BMPs) but only highlights the key issues to be addressed. The call for tender for the construction contractor will require the tendering firm to provide method for excavation work, health and safety, waste management, water work, earth work, etc. The selection criteria for the contractor for Phase I will make sure that the highest standards are aimed, given the high sensitivity of the project area at Majete Wildlife Reserve.

COST OF THE ESMP

As demonstrated in this ESMP and based on detailed analysis of impacts in the Impact Assessment Report (Vol.2), mitigating impacts to an acceptable level will require investing on infrastructures in MWR, to ensures protection of wildlife and to ensure protection of Lake Malawi from the Tiger fish and other Lower Zambezi fishes. Cost for the invasive fish barrier inside MWR, as estimated by KRC (2017) is 4.3 million USD, which will be adjusted as needed during the Detailed Design study. This amount, which will be borne by the civil works Contractor, is additional to the items indicated in the main ESMP budget.

The minimal cost for mitigation for Phase I is **5,584,110 USD.**
This amount is the best-case scenario with no loss of business revenue at Majete Wildlife Reserve.

The maximum cost for mitigation for Phase I is **6,843,270 USD.**
This amount includes the maximum compensation for loss of business in Majete Wildlife Reserve during two years of work (worst-case scenario based on projection for 2018).

5. MEASURES TO BE INCLUDED IN THE CONTRACTUAL DOCUMENTS OF THE CONSTRUCTION CONTRACTOR

This section presents measures for the "Environmental and Social Clauses (ESC) for Contractors". The procurement specialist who will produce the terms of references and the contractual documents shall take them into account. They are non-engineering measures as infrastructures to mitigate impacts are presented in a separate section (measures for the Design Study).

These measures apply whether the Design firm is the same or not as the construction contractor. If the Project is a turnkey project, meaning that the design engineering, procurement and construction is done by the same firm, the following measures must be joined with the Design study measures (see next chapter). The PPP Feasibility Study (BRLi, 2017) recommends that the Project be a concession, Built Operate and Transfer (BOT) or Design Build and Operate (DBO) contract, therefore measures aiming at the Bulk Water Operator may also apply (see chapter 11)

The Procurement specialist is responsible to include these ESC measures in contracts, it is therefore important to ensure continuity between the ESIA, ESMP and contract.

Before the start of construction works, contractors will have to prepare and submit to PMT and Project Engineers their Construction Environmental and Social Management Plan (CESMP), based on final design and locations of different activities, including disposal sites, borrow pits, quarry areas, construction camps, etc. The CESMP will have to be approved by the PIU before the contractor can commence the works. These requirements will be specified in the specifications of the bidding documents.

Measures to be included in the contractual documents of the construction contractor(s)		
Reminder of Construction Impacts (as presented in the ESIA)		Significance
Impact 1	**Impacts from water works**: canals and water intake construction will necessitate crossing rivers and will involve water works such as building small dams and weirs, culverts, siphons and installing gabions to stabilize rivers. These will affect the geomorphology of rivers	Negligible
Impact 2	**Impacts from water works**: canals and water intake construction will necessitate crossing rivers and will involve water works such as building small dams and weirs, culverts, siphons and installing gabions to stabilize rivers. These will affect the water quality of rivers	Negligible
Impact 3	**Impacts from earthwork and land leveling** : canal construction will necessitate important excavation of earth and rocks and the command area will be levelled	Moderate
Impact 4	**Workers influx**: the project will require important workforce consisting of foreign workers. Land will also be required for machinery storage and workers' camps. There is a risk that buildings and amenities do not respect quality standards	Moderate
Impact 5	**Job opportunities**: work will require unskilled and skilled labour for construction	Minor (positive)
Impact 6	**Permanent loss of buildings and other infrastructures**: canals could necessitate destroying buildings and other infrastructures	Minor
Impact 7	**Construction risk and nuisances**: communities and workers are at risk from important works along canals and quarries	Minor

Measures to be included in the contractual documents of the construction contractor(s)		
Impact 8	**Loss of physical cultural heritage**: the canal alignment route and borrow pits will affect some known and unknown cultural heritage sites (mainly pottery)	Minor
Impact 9	**Impact on tourism**: construction activities in MWR and LNP and close to Ng'ona lodge will have deleterious impacts on tourism	Moderate (MWR) / Minor (LNP and Ng'ona lodge)
Impact 10	**Impact on Majete buildings, roads and infrastructures** : Malaria research camp, Heritage center, Entrance gate, Wildlife research camp, Community camp site, electric fences, access road to the park, access to Kapichira Falls viewing site will all be disturbed by construction of the Feeder Canal (Main Canal 1)	Moderate
Impact 11	**Disturbances of wildlife and vegetation**: work will generate noise and necessitate forest and thicket clearing in the right-of-way destroying some habitats and startling wildlife	Moderate
Impact 12	**Disturbance to fish migration to spawning sites:** works in temporary rivers could lead to disturbances of fish migration	Moderate

Mitigations to be included in Environmental and Social Clauses (ESC) for Contractors

Impacts	Measures	Inclusion in contractual documents
Impact 1	The CC shall never build temporary crossing in a tributary river in a meander but rather where the river is flowing in a straight line.	Terms of references Contract
Impact 2	Work close to tributary rivers shall be carried out during the dry season (when rivers are dry)	Terms of references Contract
	The use of silt floating fences in the reservoir when building the water intake is mandatory	Terms of references Contract Bills of quantities CESMP
	The use of silt fences when working close to rivers is mandatory	Terms of references Contract Bills of quantities CESMP
	Refueling activities shall be done away from any waterbody (at least 100 m)	Contract
	Evacuation of concrete wash water in waterbodies is forbidden	Contract
	Emergency spills containment kit in all vehicles and machinery is mandatory	Terms of references Contract

Measures to be included in the contractual documents of the construction contractor(s)		
		Bills of quantities CESMP
	The contractor will need to develop a method for environmentally friendly water work (reservoir and river) and spill containment in its technical proposal.	Terms of references Technical proposal Contract CESMP
Impact 3	Some spoils from excavation could be used as soils for agriculture. Upon request from communities, soils should be given back to communities to level land or spread in the command area. Soil cannot be sold by the contractor to surrounding communities. No spoils can be stored even temporarily close to waterbodies including the Elephant Marsh or Majete Wildlife Reserve. Borrow pits shall have very gentle slopes to minimize the risk of injuries and death. Borrow pits and quarries location shall be done in consultation of local authorities to minimize impacts on land users.	Terms of references Contract CESMP
	Borrow pits and quarries shall not be left unrestored at the end of work (unless requested by local authorities) and shall be filled with unusable soil to reduce their depth or shall be transformed into wetlands or livestock drinking ponds where appropriate. Unusable spoils shall not be left in mounds but shall be flattened at the end of construction and revegetated	Terms of references Contract Bills of quantities CESMP
Impact 4	The construction contractors will be expected, in advance of any construction work, to promulgate this code of conduct for workers (and related visitors), including local workers, workers from other region or countries, and expats. Induction training is mandatory and shall include a cultural induction, delivered with the help of Traditional Authorities. The following is the Code of Conduct, it shall be taught during the induction training: • Prior to entering a village for the first time, the village headman shall be met for the construction contractor to show his respect and present works and activities and to describe the safety risk. • No alcohol or any form of drugs shall be consumed in the communities by any project employees. The contractor/developer should have and enforce an alcohol and drug-free policy (in the work place and while driving vehicles and machinery). • Workers and visitors should not make any disrespectful gestures or use any swearing words to anyone either in the community, or along the access road.	Terms of references Contract CESMP

Measures to be included in the contractual documents of the construction contractor(s)		
	• No unlicensed person shall drive work vehicles. Drivers shall be tested prior to starting work on the project, and have a valid license. International workers shall be responsible to provide a translation into English of their driver license. • Construction company vehicles or trucks shall not be permitted to pick up anyone who is not an employee of the Project, except in case of an emergency. • Heavy machinery shall only be operated by those who have the license and proven skills to use those types of machines. This shall be embedded in the recruitment and other policies of the contractor. International workers shall be responsible to provide a translation into English of their machinery license. • Workers and visitors shall drive slowly when passing though villages that are very close to the access roadside or pedestrians walking along the side of the road. • Drivers and passengers shall watch out for wild or domestic animals or people crossing the access road. In case of collision with any domestic animal, full compensation shall be paid in consultation with the village headman. • Workers who will engage in prostitution, sexual harassment and poaching shall be fired and brought to the local law enforcement for legal prosecution. • Induction training about sexual harassment are mandatory for all workers. During these induction trainings, the local law enforcement will be present to explain the national laws that make sexual harassment and gender-based violence a punishable offence. • It is forbidden for all workers to purchase bush meat, any animal parts, any living animals or any mineral (gold, stones). It is forbidden to fish, hunt or engage in trading activities in or outside the Project area. Any worker engaged in such activities shall be fired. • Wildlife capture, plant collection, or free-roaming pets (which could conflict with wildlife) is forbidden.	
	A grievance redress mechanism must be implemented by the CC to allow community to communicate with the construction contractor about their concerns and grievances (and behavior of workers). The construction contractor is required to hold mandatory monthly meetings between the contractor and village headmen, and must provide a mailbox at the contractor camp site to collect grievances and a billboard so that communities can read answers from the contractor.	Terms of references Technical proposal Contract
Impact 5	During construction, before blasting, it will be important to assess risk to infrastructures by doing a ground-truthing survey of wells, houses, churches, buildings, etc. Ground-truthing shall involve local authorities and the construction contractor.	Terms of references Contract CESMP

Measures to be included in the contractual documents of the construction contractor(s)		
Impact 6	Recruitment policy of the construction contractor shall be developed in his technical proposal. It will need to consider social issues and project acceptability. Considering the high local impact of the Project in terms of land and disruption of existing lifestyles, the contractor will maximise local employment. Recruitment method shall involve consultation of Traditional Authorities (TAs) with the list of required non-qualified work force. The need to have women and youth employment is also required.	Terms of references Technical proposal Contract CESMP
Impact 7	<u>Dust and pedestrians on construction roads</u> All gravel roads used by trucks must be sprayed on a regular basis. Due to low availability of water, it is recommended that the construction contractor pay Illovo to spray road with sugar molasses, as is done along Illovo roads. Roads must be sprayed three times a day (morning, mid-day and evening) with molasses, except when a heavy rain takes place. If molasses is not available, roads must be sprayed 5 times a day with water. Spraying molasses will not be accepted in within Majete Wildlife Reserve (and, in Phase II, Lengwe National Park) It is also required that the construction contractor provides transportation to a designated place for workers at the end of their day of work. This will help reduce the number of pedestrian walking on construction roads.	Terms of references Technical proposal Contract Bills of quantities for the molasses and for transportation CESMP
	<u>Risk of workers not wearing any PPE</u> The construction contractor must provide helmets, gloves and safety boots (and other safety equipment) to all workers. The construction contractor must provide a method in his technical proposal to ensure that PPE are returned. This method could be a deposit on equipment, which shall be recovered at the end of the contract by the worker or penalty fees for workers losing their equipment, etc.	Terms of references Technical proposal Contract Bills of quantities CESMP
	<u>Risk due to poor hygiene and general state of workers camps</u> The construction contractor must develop measures in its technical proposal for the safe evacuation of wastewater and wastes from the various camps, to forbid the evacuation of wastewater in watercourses and forbid burning wastes.	Terms of references Technical proposal Contract Bills of quantities CESMP
	<u>Risks due lower standards among workers</u> A Health and Safety specialist is required full time. He/she shall have a certificate in H&S and a copy of his certificate shall be provided in the technical proposal (with the translation if it is in a foreign language), he/she shall be mobilized at beginning of contract. He/she shall produce weekly reports presenting the work progression and how social and H&S related measures are addressed including the documentation of the grievance mechanism.	Terms of references Technical proposal Contract Bills of quantities CESMP
	In his technical proposal, the construction contractor must develop:	Terms of references

Measures to be included in the contractual documents of the construction contractor(s)		
	• a method for water work at the water intake • a Code of Practice to manage health and safety risks associated with excavation work • an H&S program and training throughout the construction period including an induction training	Technical proposal Contract CESMP
	The construction contractor must install speed breakers in all created access roads. These shall be made of soil spoils and shall be compacted to last. One speed bump shall be installed every 200 meters. The construction contractor must install construction fences around excavators and truck loading excavated earth. The construction contractor must have a small clinic and nurse available on-site all the time with first aid kits. This would also entail that a replacement nurse is available (on-call). In addition, one vehicle shall remain available at all time to drive wounded staff to Blantyre. When using dynamite for blasting, local population shall be warned ahead through radios, public posters, churches and local authorities. A safety patrol with an alarm has to ensure that all individuals are evacuated from quarries area prior to blasting.	Terms of references Technical proposal Contract Bills of quantities CESMP
Impact 8	The construction contractor must apply Chance Find Procedures in case of discoveries of cultural heritage sites during excavation; The construction contractor must avoid construction-related impacts to known cultural resources such as graveyard, churches, etc.	Terms of references Contract CESMP
Impact 9	The construction contractor must have several experiences in effectively applying strict environmental management requirements in large, complex civil works projects.	Terms of references
	The construction contractor must have an environmental specialist in its staff full time (in addition to a health and safety specialist) that reports to and consults with African Parks and the Department National Park and Wildlife on a daily basis. He/she shall produce weekly reports presenting the work progression and how environmental related measures are addressed including the documentation of all exchanges with African Parks and other NGO working in environmental protection (Wildlife and Environmental Society of Malawi, WESM).	Terms of references Contract Bills of quantities CESMP
	The terms of references for the CC shall clearly specify that delays in payment or reduction of payment shall be applied for non-compliances. Local law enforcement shall be involved in cases of serious unlawful activities such as poaching and prostitution. The tender document and the contract shall clearly state roles and authority of African Parks and DNPW as well as chains of responsibilities during construction. The contract must include obligation of termination for work in a set timeframe (and compensation for African Parks in case of delays).	Terms of references Contract

Measures to be included in the contractual documents of the construction contractor(s)		
	African Parks and the DNPW shall have the full authority to stop work and take quick actions in cases of serious non-compliances and offences	
	Work in MWR Noisy processes will be preplanned with warnings and shall not take place during Friday through Sunday and holidays (days which receive a majority of the overall tourist visitation). To minimize disturbance to wildlife as well as tourists, blasting will only be allowed during 11 am to 2 pm (the hottest hours of the day, with generally the least wildlife activity). Earth works shall be limited to the path of the canal and all bare soil shall be rehabilitated at post construction in consultation with African Parks. Excavated materials shall be dumped in predetermined area such as a quarry, outside MWR or only in designated areas specified by African Parks/DNPW. Surplus materials suitable for road surfacing shall be given for free for upgrade of road surfaces in MWR under the supervision of MWR management/DNPW. The construction contractor will have to restore the road from Chickwawa to the reserve and budget this restoration (mainly filling potholes with quality material). Temporary construction roads and tracks shall be limited to immediately adjacent site along the canal in the predefined footprint (10m) from the canal path, these roads and tracks shall be rehabilitated upon completion of construction based on decision by AP (either decommissioned or kept and upgraded for visitors).	Terms of references Contract Bills of quantities CESMP
	The construction contractor must develop a method to phase the work inside MWR and Ng'ona lodge private property in three distinctive confined areas (so that work does not take place simultaneously in multiple areas of the Majete Reserve): • "Heavily impacted area" from Mkulumadzi Road to the Shire River to the reserve boundaries (first phase) • Mwembezi lodge private property (also called Ng'ona lodge) (right outside MWR) (second phase) • Southern MWR (third phase) from Siphon #2 to Siphon #3 The construction contractor (machinery and staff) cannot leave the predetermined confined work area and enter the rest of MWR.	Terms of references Technical proposal Contract CESMP

Measures to be included in the contractual documents of the construction contractor(s)		
Impact 10	Work in MWR All reserve infrastructure shall be assessed prior to machinery deployment. Ground-truthing site visit(s) with African Parks and the contractor shall be done to ensure that the contractor repairs any and all damages to roads, water boreholes, buildings, fences, etc. Pictures shall be taken to assist the ground-truthing visit. The main road to Chickwawa shall be inspected prior to construction by African Parks, the contractor and Escom to determine its baseline status and to inform any damages that are incurred during the construction process (e.g. caused by the great number of trucks that will use this road).	Terms of references Contract CESMP
	Work in MWR The Contractor shall regularly maintain Chikwawa to Majete main road (D135) in good condition (repairing potholes). At a minimum, daily dust control interventions must be put in place along Chikwawa to Majete main road (and within the reserve). During the dry season (May to November), dust control shall be done every two hours (with water only). This will also ensure that villages close to the road are not impacted by dust. The source of water for dust control shall be taken from outside MWR and outside the Kapichira reservoir and in consultation with local communities. If water is pumped from the Shire, the access shall be stabilized to limit erosion in the river (concrete access ramp).	Terms of references Contract Bills of quantities CESMP
Impact 11	Work in MWR Slow moving animals (tortoises, snakes, etc.) shall be protected from persecution from workers by providing sensitization induction training to all workers. Drivers should be also instructed to watch out for wild (as well as domestic) animals, both within and outside of MWR. African Parks or DNPW will need to approve all required access roads. the Contractor will use only those specific roads (to be) specified in a Memorandum of Understanding with African Parks; All machinery (excavator, grader, dredger, etc.) will be checked by Majete Reserve rangers at the entrance to ensure that no mud is present on the wheels, buckets and caterpillar tracks. This is necessary to avoid invasion of the water hyacinth (or other plants). In case of presence of mud (even dry mud), the machinery or vehicle will be forbidden to enter. No construction camp in MWR will be authorized. Workers will need to commute daily to MRW with a bus and will be subject to inspection at the end of the day (inspection of trunks, bags, ice boxes, etc.). Construction workers will not be allowed to travel within MWR on foot or by bicycle. Workers cannot spend the night in MWR. Workers cannot spend the night at rangers' compounds. Identification badge of workers shall be mandatory at entrance and exit of MWR (including daily workers). Workers without a badge will be forbidden to enter MWR.	Terms of references Contract CESMP

Measures to be included in the contractual documents of the construction contractor(s)		
	Access to the construction site must be restricted through controlled access points managed by African Parks; operating hours shall be limited to 9am to 5pm. Noisy operations (blasting) are only permitted between 11am to 2pm, when wildlife activity is relatively low. Speed limits shall be set at 15km/hour for all vehicles and trucks inside of MWR. Dredged spoils and excavated soils cannot be stored in MWR (even temporarily). Vegetation removal shall be limited to the canal path and a pre-agreed footprint either side of the canal during construction. All removed vegetation remains the property of MWR, whose managers will specify to where this will be moved and how. The contractor will delineate the required Right-of-Way (RoW) with African Parks/DNPW staff. RoW limits shall be marked so that no encroachment outside their boundaries takes place. Marking will involve using construction fences (visible plastic fences to ensure that the RoW is respected).	
	<u>Work in MWR</u> Post construction soil rehabilitation is mandatory and under the full responsibility of the construction contractor. It will take place at the end of work in each of the 3 separate work areas in MWR and not at the end of the Contractor's contract to ensure that it is done. Delays in payment will be applied if rehabilitation is not done in the set timeframe including removing all rubbish and construction equipment. Whenever blasting will be used, the best method must be used. An example of such method is called "precision rock blasting" in which cartridges are introduced in drill holes. This technic leads to minimal vibration, noises and flying debris. The method and type of explosive must be detailed in the CC technical proposal	Terms of references Technical proposal Contract Bills of quantities CESMP
Impact 12	It is forbidden to ford cross rivers (to avoid destroying banks). In case where ford crossing is the best and only option, banks shall be stabilized with riprap and the ford crossing and ramp shall be made of concrete. When installing a temporary dike to cross river (for machinery and construction vehicles), the contractor must install culverts to allow for fish passages by : • ensuring that all culverts are installed partially under the river bed level; • avoiding creating water falls (perched culvert) or having a steep slope in the culvert; • avoiding increasing flow to a point where some fishes can no longer swim; • stabilizing the culvert embankment with large riprap or gabion (given the strength of flash floods); • avoiding crossing at areas rich in vegetation (trees and tall grasses) or with shallow rocky areas as they often are valued spawning areas.	Terms of references Contract CESMP

Measures to be included in the contractual documents of the construction contractor(s)		
	All work in temporary rivers are prohibited from November to March and shall be concentrated between July and October to minimize impacts on migrating fishes.	

MONITORING OF ENVIRONMENTAL AND SOCIAL CLAUSES (ESC) FOR CONTRACTORS

In case the Project is designed by a separate firm than the construction contractor

All contractual measures related to the ESMP, described in the CESMP, shall be monitored on a monthly basis by the Supervising Engineer. He shall have in its team an environmental specialist (experienced in wildlife-related issues).

The Supervising Engineer's Environmental Specialist shall meet with the Health and Safety Specialist (from the CC), the Environmental Specialist from the CC, and law enforcement on a monthly basis. When works take place within MWR, the DNPW and African Parks shall be part of these monthly meetings. The Supervising Engineer shall report to the MoAIWD (Ministry of Agriculture, Irrigation and Water Development) all environmental, social, and health and safety issues related to the construction contractor.

Law enforcement will be expected to participate to these monthly meetings to ensure that no sexual harassment and gender-based violence takes place.

Delays in payment or reduction of payment shall be applied for non-compliances for all ESMP measures. Therefore, the CC contract must include a mechanism for withholding payments.

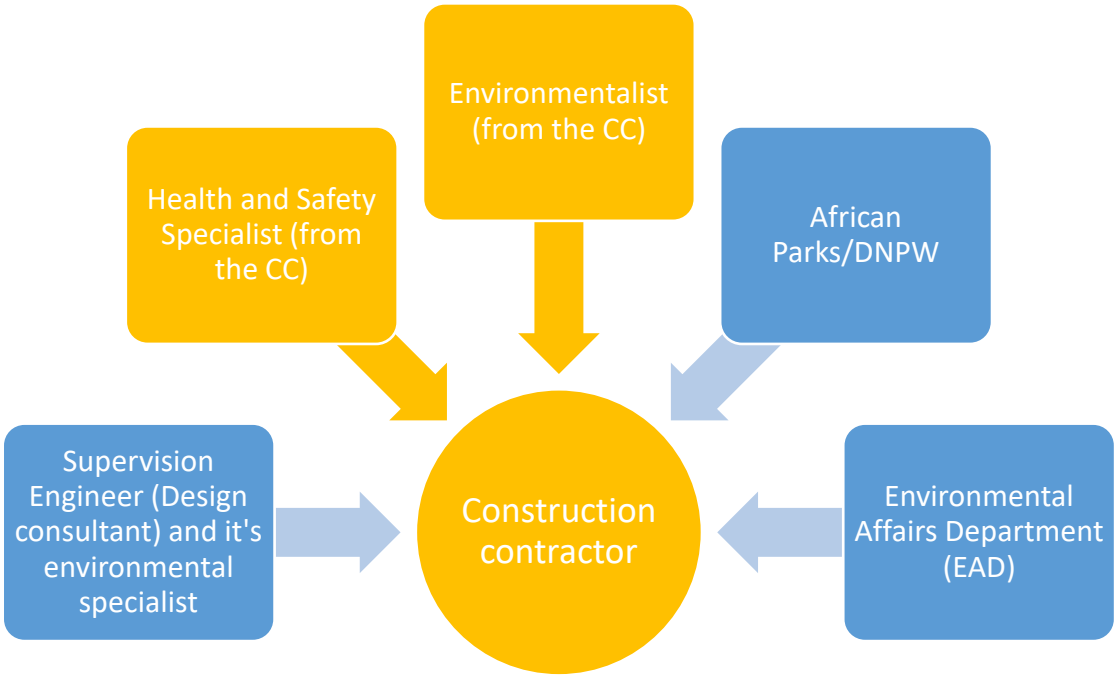
Site visits by the Supervising Engineer will focus particularly on the following sites:

- Majete Wildlife Reserve
- Quarries and borrow pits
- Worker camps
- Canal construction

The Health and Safety Specialist (from the CC) and the Environmental Specialist (from the CC) will have to produce monthly reports dealing with the progression of works and compliance with required environmental, social, and health and safety of measures. They are in charge of the grievance mechanism (and its documentation).

In addition, the Environmental Affairs Department (EAD) is empowered to follow up on construction activities as well. In order to ensure that the EAD follows up on the Project, it is recommended to mobilize an EAD expert full time to follow up on the ESMP and environmental compliance of the construction contractor.

The following figure summarizes monitoring of the construction contractor.

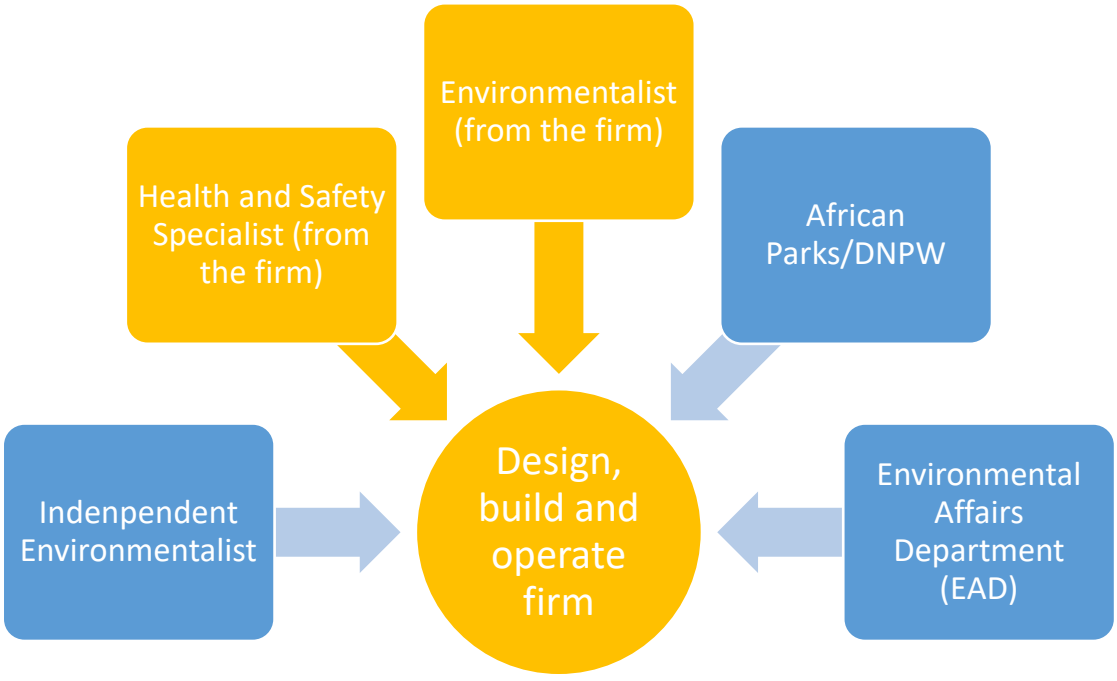


In case if the Project is an Engineering, Procurement and Construction Project (EPC)

The same experts are recommended during construction (Health and Safety Specialist and an Environmentalist) with an EPC, however an external audit for environmental, social and health and safety would be required. Therefore, in the EPC scenario, an independent Environmentalist shall be hired. He would carry out monthly missions for the time of the construction activities. His work shall be budgeted for a 4 expert/month per year of construction.

This independent Environmentalist shall meet with the Health and Safety Specialist (from the EPC firm), the Environmentalist (from the EPC firm), law enforcement, the DNPW and African Parks on a monthly basis. The independent Environmentalist shall report to the MoAIWD all environmental, social and health and safety issues related to the construction phase.

The following figure summarizes monitoring of construction in the EPC scenario.



PERFORMANCE INDICATOR(S)

The number of non-compliance on contractual measures are performance indicators. Measures of the ESMP are straightforward and do not leave room for much interpretation.

RESPONSIBILITIES FOR MONITORING

Actors	Role	Frequency	Outcome
Supervision engineer or an Independent environmentalist (EPC)	Compliance review with all ESMP and contractual measures related to , social impacts and environment.	Monthly monitoring	Monthly report to Project financiers and the MoAIWD
Health and Safety Specialist (from the CC or the EPC firm)	Internal monitoring of H&S and social measures related to the CC or the EPC firm	Full time on site	Weekly report for the CC/EPC firm and the Supervising Engineer/ Independent Environmental Specialist
Environmental Specialist (from the CC or the EPC firm)	Internal monitoring of environmental measures related to the CC or the EPC firm	Full time on-site	Weekly report for the CC/EPC firm and the Supervising Engineer/ Independent Environmental Specialist
Environmental Affairs Department (EAD)	Governmental monitoring of compliance with national regulations regarding health and safety, worker conditions, and environmental protection	To be decided at governmental level	After all visits, the EAD shall produce a report for the MoAIWD

6. DESIGN STUDY MEASURES

This section presents the infrastructure works that shall be designed by the forthcoming Detailed Design study to become part of the Project. It also presents recommendations on how to fine-tune the command area to safeguard natural habitats and maintain other needed non-irrigated lands.

These measures apply whether the Design firm is the same or not as the construction contractor. If the Project is a turnkey project, meaning that the design engineering, procurement, and construction are done by the same firm, the following measures must be joined with the measures for the construction contractor (see previous chapter). The PPP Feasibility Study (BRLi, 2017) recommends that the project be a concession, Built Operate and Transfer (BOT) or Design Build and Operate (DBO) contract; therefore measures aiming at the Bulk Water Operator may also apply (see chapter 11)

The SVTP-I Procurement Specialist is responsible to include these ESC measures in contracts; it is therefore important to ensure continuity between the ESMP and the civil works contract(s).

6.1 FINE-TUNING THE COMMAND AREAS

Under SVTP-I, the layout of new irrigation blocks will include Set-aside Lands that shall not be irrigated. These include (i) pre-identified areas comprising the remaining natural habitats (riverine forests, thickets, dambo wetlands, etc.), frequently flooded areas, soils unsuited for irrigation, cultural heritage sites, and a hundred-meter non-irrigated buffer zone around Lengwe National Park and (ii) woodlots, grazing lands, and other special-use areas that will be identified during the participatory land use planning process that will be part of irrigation block establishment. Avoiding the irrigation-related clearance of the very limited remaining areas of natural habitats (outside of protected areas) will comply with the Bank's Natural Habitats Policy (OP 4.04), while enhancing environmental outcomes. The non-irrigated buffer zone around the edges of the Lengwe National Park is intended to help prevent encroachment upon the park and to reduce human-wildlife conflicts.

The non-irrigated set-aside lands will also include areas that are needed as woodlots or grazing lands, to adequately meet the needs of nearby human populations and thus reduce encroachment pressures on protected areas to obtain fuelwood or construction materials, or to feed or provide a passage corridor for livestock. These non-irrigated set-aside areas will be spatially contiguous where feasible. The adjusted net irrigated area that SVIP is expected to achieve at full development excludes all these types of set-aside lands.

Irrigation command areas can form vast, contiguous patches of land that can block access by herders to traditional grazing areas. It will therefore be important to designate livestock movement corridors so that herders can access grazing lands, including the edges of the Elephant Marsh. This will not only reduce the risk of conflicts between farmers and livestock owners but also the risk of conflicts with people living in urban place (Nchalo, Ngabu, Chikwawa). At this stage, the specific location of designated livestock movement corridors (as a type of non-irrigated set-aside land) is not known, but the Detailed Design study shall take this measure into consideration.

The institutional framework for managing these set-aside lands will involve the irrigation block managers and smallholder-owned commercial farm enterprises (SOCFEs), as well as the traditional authorities. All the SOCFEs to be established under SVTP will include within their by-laws, contracts, or other basic legal documents a commitment to respect whatever rules are established for public use of the set-aside lands, as well as the boundaries and key rules of any nearby protected areas (particularly Lengwe National Park).

Setting aside land as an environmental and social mitigation measure will not necessarily imply that irrigated land will be lost, as the limiting factor is water not as much as available land. However, it will allow the Detailed Design study to fine-tune each command area, taking into account these sensitive areas and to study the possibility to expend the irrigated land in areas with lesser value. The Set-aside Lands Map on the following page shows the location of some of the lands within irrigation command areas that will be set aside and not irrigated. These lands include:

- Valuable open woodlands cover about 720 ha of the command areas of Phases I and II (this figure does not consider small patches of woodland); these shall be set aside.
- In Zone A, 34.5 ha of a marsh called Thanda Marsh and an unnamed grazing area of 29 ha shall be set-aside as well.
- Among the estimated 4,000 ha of heavy vertisols , some 2,000 ha are well delineated in Zone C. These lands will set aside if they are evaluated to be poorly suited for the expected irrigation practices.
- About 430 ha of land are regularly flooded in Zone B along the Nkombedzi Wa Fodya River; this land shall also be set aside.
- All riverbanks shall be protected in the entire command area with an additional buffer zone of 100 meters.

Table 5. Set-aside lands and their coordinates

Land cover type	Command areas	Approximate area (ha)	Coordinates at center point	
Open woodland (including riparian forest)	A	161	16° 9'10.32"S	34°41'37.57"E
	A	181	16°10'45.27"S	34°42'47.87"E
	A	20.8	16° 9'52.92"S	34°45'43.90"E
	I 1	67.7	16° 9'11.77"S	34°47'30.46"E
	I 1	43.9	16° 8'28.80"S	34°48'12.87"E
	B (Phase II)	88.8	16°20'3.82"S	34°48'44.36"E
	C (riparian forest) (Phase II)	12.8	16°24'56.49"S	34°53'11.25"E
	D (contiguous to Nyasa private wildlife reserve beside Kaombe sugar estate) (Phase II)	144 (this surface is the part of woodland beside Nyasa that is affected by the command area)	16°34'1.72"S	35° 3'53.47"E
Marshes and flood prone area	A (Thanda marsh)	34.5	16°11'18.37"S	34°43'33.83"E
	B (flood prone area)	429	16°17'15.91"S	34°51'34.33"E
Heavy vertisols	C (Phase II)	1477	16°29'25.71"S	35° 0'5.69"E
	C (Phase II)	672	16°26'52.11"S	34°57'39.14"E
Grazing area	A	27.8	16°11'16.46"S	34°46'7.11"E
Rivers	Everywhere	141.8 + 100 meter buffer zone on both banks		

RIVER TRAINING WORK

To minimize damage to the terrestrial and aquatic natural habitats associated with the area's seasonal rivers (which flow into the Shire during the wet season), SVIP will use river training works only where needed at canal crossings or to protect existing infrastructure, but not to make frequently flooded lands irrigable.

Any work across a river will have to take its mobility into account to avoid having rivers shifting and no longer flowing through canals. Therefore, design of the river passages shall involve installing

gabions or riprap on riverbanks. In addition, it is recommended not to cross a tributary river in a meander but rather where the river is flowing in a straight line.

When finetuning the command area in the Design phase, it is recommanded to avoid developing irrigated fields too close to any river and to take into account river mobility. SVIP irrigation development will avoid all areas that are in the 1 in 10 year floods of rivers and to stabilize sharp meanders with gabions and riprap. These important aspects shall be taken into account to safeguard rivers from being channelized and to protect croplands from frequent flooding.

In particular, modification of Nkombedzi Wa Fodya (a river that marks the limit of LNP) to keep floods from affecting surrounding agricultural land should be avoided. This river already causes floods at LNP (flooding of offices and lodges), so that any channelization upstream of LNP would likely exacerbate the damage to LNP facilities. Therefore, any proposed modifications to this river shall required approval from DNPW (as LNP managers). This ESMP requires that no SVIP irrigated fields can be located less than 100 meters from this river, or from the boundaries around LNP.

BUFFER ZONES AROUND LNP AND ENCROACHMENT

Any encroachment by the scheme inside LNP is to be strictly avoided and park boundaries shall not be subject to any adjustment to accommodate irrigated lands. In fact, the future Zone A and B shall be designed to leave a non-irrigated buffer zone between the park and the scheme at least 100 meters wide.

6.2 CROSSING STRUCTURES AT TRIBUTARY RIVERS

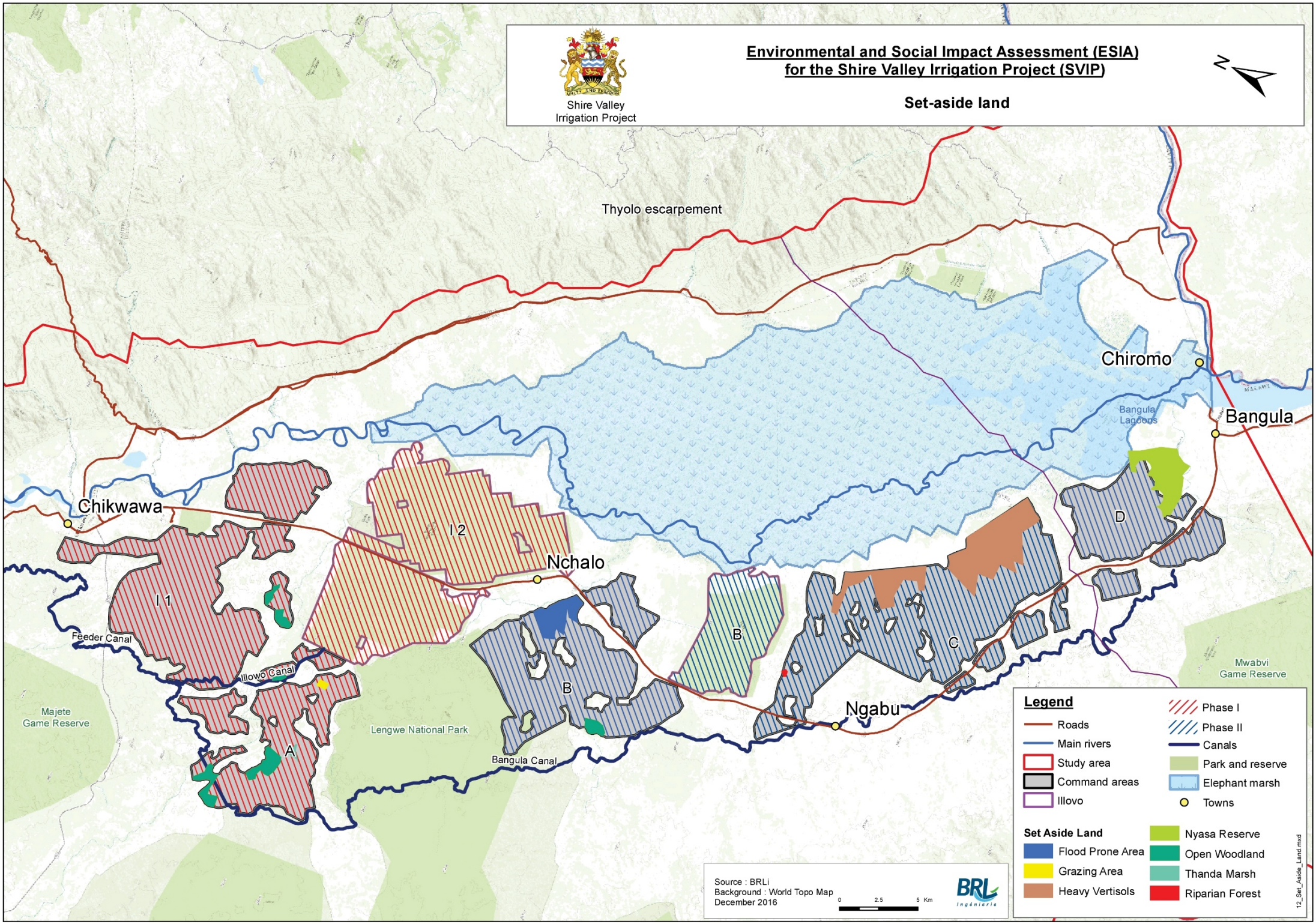
It is important to design culverts that allow for hydraulic transparency and fish movement. As presented in the ESIA, canal crossings of seasonal rivers should be super-sized to enable wildlife passage and minimize any risk of flooding of the main canals.The Q100 (potential 100-year flood) shall be taken into account to select the dimension of culverts and other river crossings during the Detailed Design study.

The estimates of the frequency peak flows for the sub-basins of right-bank tributaries intersecting the SVIP canals are given in the table below (calculations based on the flood frequency relationship established by Mkhandi & Kachroo, 1998). Based on these data, culverts and under passages have to be carefully designed. In addition, tributaries that are crossed by the primary canal have to be stabilized with gabion or rip rap and the primary canal shall always cross a river perpendicularly and in a place where the river is flowing in a straight line (to reduce the impact of river mobility).

Figure 5 Peak flow of right bank Shire tributaries

Tributary rivers name	Catchment Area at SVIP Canal (km^2)	Peak Flow (m^3/s)				
		Q2	Q10	Q20	Q50	Q100
Mwambezi	160	41	111	138	171	195
Masakale	102	34	91	113	140	160
Nthumba	70	29	77	96	119	136
Mwanza	1621	112	304	377	467	535
Nkombedzi Wa Fodya	418	62	168	209	259	297

Tributary rivers name	Catchment Area at SVIP Canal (km^2)	Peak Flow (m^3/s)				
		Q2	Q10	Q20	Q50	Q100
Namitalala	65	28	75	93	116	132
Phwadzi	219	47	127	158	196	224
Namikalango	140	39	105	130	161	184
Nyakamba	78	30	81	101	125	143
Mikombo	47	24	65	81	100	114
Mafume	61	27	73	90	112	128
Lalanje	77	30	81	100	124	142


Shire Valley
Irrigation Project
Environmental and Social Impact Assessment (ESIA)
for the Shire Valley Irrigation Project (SVIP)
Set-aside land
N
Thyolo escarpement
Chiromo
Bangula
Bangula
Lagoons
Chikwawa
I 2
I 1
Nchalo
D
B
C
B
A
Ngabu
Feeder Canal
Illovo Canal
Bangula Canal
Majete
Game Reserve
Lengwe National Park
Mwabvi
Game Reserve
Legend
Roads
Main rivers
Study area
Command areas
Illovo
Phase I
Phase II
Canals
Park and reserve
Elephant marsh
Towns
Set Aside Land
Flood Prone Area
Grazing Area
Heavy Vertisols
Nyasa Reserve
Open Woodland
Thanda Marsh
Riparian Forest
Source : BRLi
Background : World Topo Map
December 2016
0
2.5
5 Km
BRL
Ingénierie
12_Set_Aside_Land.mxd

6.3 INFRASTRUCTURE WORKS TO BE DESIGNED

This section presents environmental and social mitigation civil works that need to be studied in the SVIP Detailed Design. The expected costs of building these civil works are not itemized here, but will be reflected in the bids on the main civil works contract.

ANTI-DROWNING INFRASTRUCTURE

Large concrete stairs shall be built at each village crossed by a Main Canal (Feeder, Bangula, and Supini). The primary purpose of these stairs would be to allow people to access water without undue risk. These stairs shall be large enough so that people can use them to fetch for water and clean their clothes (about 10 meters wide). An estimate, based on density of villages around main canals, is that about 20 stairways will be needed for Phase I (10 on the western bank and 10 on the eastern bank). It is not recommended to:

- build stairs on both side of a canal at any location, since this could be interpreted as an invitation to cross the canal (especially at times of low flow).
- build stairs north of Chikwawa as the area has relatively low population density.

Stairs should only be built at the village level, to maintain a certain level of control over the use of canal. To reduce the incidence of drowning, fixed ladders should be installed every 500 m on both sides of the canal along the full length of the Feeder, Bangula and Supini canals (with alternating position as well). Fixed ladders shall be installed in night storages as well (as mentioned in the FS). Due to their greater depth, night storages shall also be fenced.

Since iron ladders may be stolen, alternatives to iron should be considered during the Detailed Design study, such as hard plastic or recycled half rubber tires embedded in the concrete lining (with holes to avoid retaining stagnant water). Notches can also be made directly in the concrete to offer some grip to people trying to exit the canal.

In area where ramps with gentle slope will be built for canal maintenance, the concrete shall have a higher coefficient of friction or shall be textured to improve grip (with a broom), gritty material can also be added to the surface. This way, if a person or a cow comes to drink it will have a better grip to exist the area. However, access for livestock to these ramps should generally be discouraged, such as through the use of fences.)

WALL OPTIONS IN MAJETE WILDLIFE RESERVE

Wall made of rock in a concrete matrix (with a 0.5 m thickness and a height of 2 meters) to protect the open sections of the Feeder canal in MWR is the selected option by this ESIA and the Detailed Design study should retain this option. The presence of elephants in MWR requires this type of strong barrier to block their access to the irrigation canal.

PASSES

The Detailed Design study shall incorporate the following types of human and animal passageways across the Main Canals:

- Super-sizing box culverts to reduce flooding damage, while also allowing for the passage of most land animal species under the canal throughout most of the year (wildlife underpasses).
- Vehicle bridges (about 5 meters wide) where needed across the Main Canals, including but not limited to the existing Kapichira Falls access road inside Majete Wildlife Reserve).
- Footpaths across the Main Canals (and branch canals) as needed.

- Livestock bridges (if deemed cost-effective) across the Main Canals.

ARTIFICIAL WETLAND IN MWR

Taking into account any further inputs from the MWR Manager, the Detailed Design study shall design a concrete-lined artificial wetland in the small and non-dangerous game section of MWR (see next map) with the following dimensions:

- Diameter : 30 m
- Depth: 0.5 m
- Concrete lining: 10 cm and a geomembrane (to avoid seepage)
- Pipes to convey water from the Feeder canal to the wetland (sluice gates, etc.)

The wetland would require about 350 m^3 of water from the Feeder Canal. If filled every two days, this would be the equivalent of 1230 m^3 per week (or 0.002 m^3/s); this amount is negligible with respect to the flow of the canal or SVIP irrigation water use.

WATER INTAKE SCREENS

The design of the water intake shall be done to ensure no crocodiles and hippos (and only the smallest of fish) could enter the Feeder Canal. For that, the trash rack in front of the water intake shall be strong enough to hold back adult as well as juvenile crocodiles. Spacing should be 5 cm.

A second trash rack shall be installed to keep the invasive Water Hyacinth from entering the water intake. Spacing should be 3 cm.

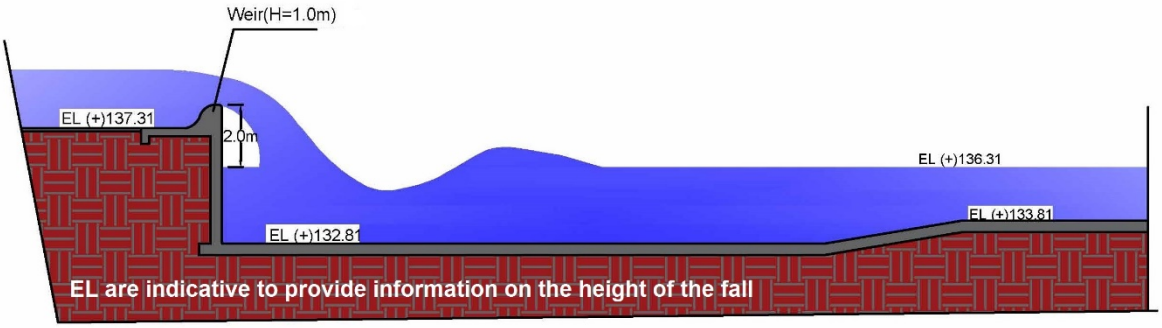
INVASIVE FISH BARRIER

The Detailed Design study shall provide for the installation of a fish barrier as developed by KRC, possibly modified as needed based on further consultation with fish experts. This is to ensure a robust design that would effectively prevent invasive fish species from entering the Upper Shire River and Lake Malawi through the SVIP canal system. The Detailed Design study needs to prove that, at all times and all flows (especially at high flow), the weir drop is higher than the jumping ability of the Tigerfish. (See Chapter 8 for details.)

The planned invasive fish barrier involves a fall with a 1 meter high broad crested weir across the Main Canal 1 (Feeder Canal) combined with a 3.5 meter drop structure as shown in the following figure. This illustration shows the profile of how water would flow across the barrier at maximum capacity (50 m3/s).

For security reasons, the weir will need to be installed inside MWR.

Figure 6 KRC proposal for an invasive fish barrier



Source: KRC, 2017.

6.4 PHASING WORK INSIDE MAJETE WILDLIFE RESERVE AND NG'ONA LODGE PROPERTY

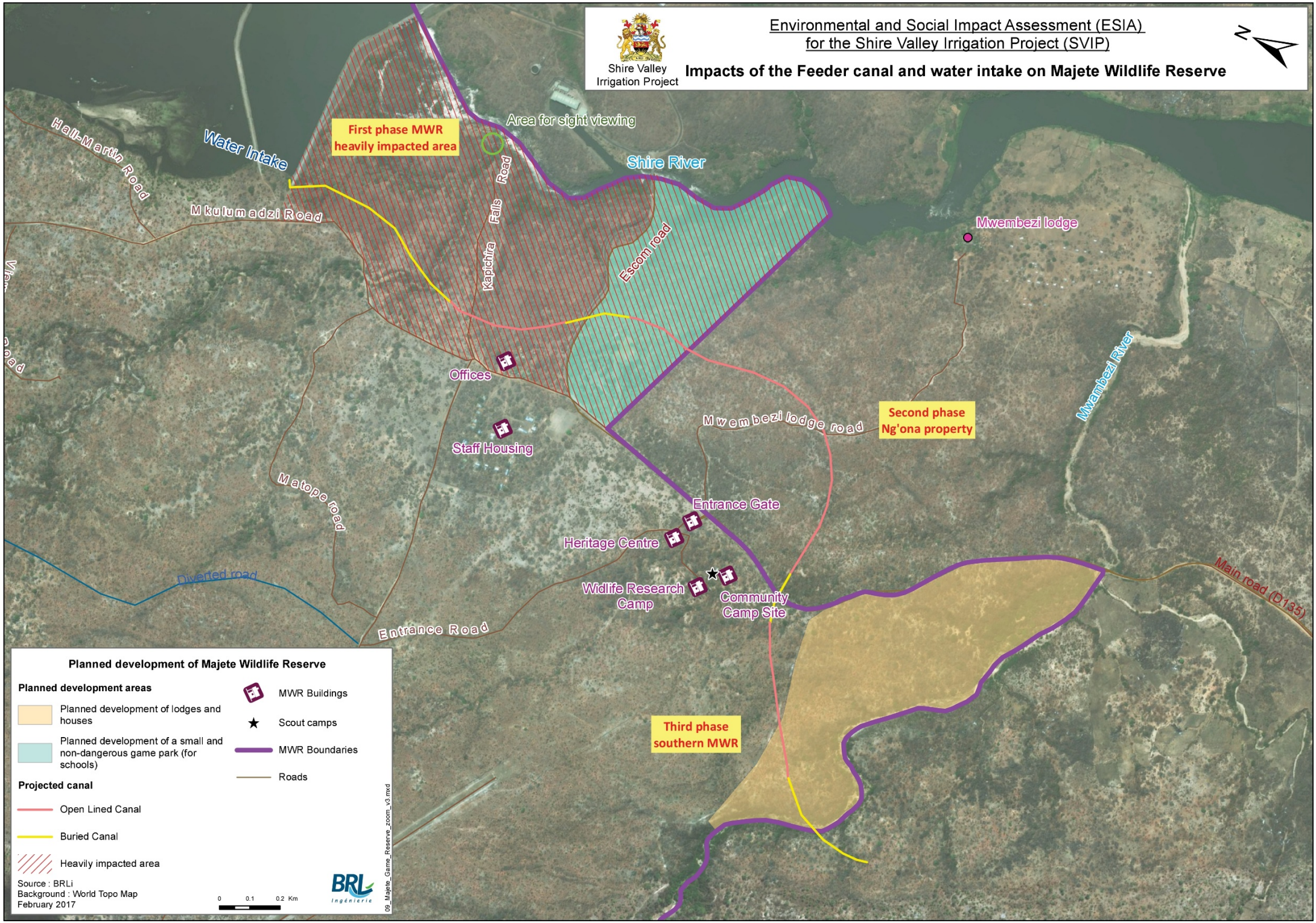
From African Parks' standpoint, Construction of the Feeder Canal (Main Canal 1) should be concentrated in the months of January and February (the time of year with least tourist visitation). Noisy operations (blasting, dredging, etc.) should be restricted to the hottest hours of the day (with least wildlife activity), with the agreed hours (11 am to 2 pm or other) to be defined in a Memorandum of Understanding involving the contractor and African Parks.

Phasing the work inside MWR and Ng'ona lodge private property is necessary. Work shall be phased in three distinctive confined areas (so that no work takes place simultaneously over multiple areas):

- "Heavily impacted area" (first phase)
- Mwembezi lodge private property (also called Ng'ona lodge) (right outside MWR) (second phase)
- Southern MWR (third phase) from Siphon #2 to Siphon #3

The Detailed Design study has to study ways (and feasibility) to phase the Project.,This would require that the excavation be done in one area and followed directly by concrete lining work, before reaching the next phase.

The following map shows these areas.


Shire Valley Irrigation Project
Environmental and Social Impact Assessment (ESIA)
for the Shire Valley Irrigation Project (SVIP)
Impacts of the Feeder canal and water intake on Majete Wildlife Reserve
N
First phase MWR heavily impacted area
Area for sight viewing
Water Intake
Hall-Martin Road
Mkulumadzi Road
Shire River
Kapichira Falls Road
Escom road
Mwembezi lodge
Mwembezi River
Offices
Staff Housing
Mwembezi lodge road
Second phase Ng'ona property
Matope road
Entrance Gate
Heritage Centre
Widlife Research Camp
Community Camp Site
Diverted road
Entrance Road
Main road (D135)
Third phase southern MWR
Planned development of Majete Wildlife Reserve
Planned development areas
Planned development of lodges and houses
Planned development of a small and non-dangerous game park (for schools)
Projected canal
Open Lined Canal
Buried Canal
Heavily impacted area
MWR Buildings
Scout camps
MWR Boundaries
Roads
Source : BRLi
Background : World Topo Map
February 2017
0 0.1 0.2 Km
BRL ingénierie
09_Majete_Game_Reserve_zoom_v3.mxd

7. COMPENSATION PLAN FOR MAJETE WILDLIFE RESERVE

Since the Project will lead to economic impacts on MWR, compensatory mitigation is required by World Bank safeguard policies. Compensation funds shall also reflect the fact that African Parks has invested large amount of money to restore a degraded reserve into a prime touristic area that will be constrained during construction.

This section proposes that some compensation funds be provided to African Parks directly in order for them to minimize their dependency on the construction contractor capacities. These funds relate to mitigations that could be done by African Parks' regular contractors.

All costs were provided by African Parks or by quotation by firms (mobile noise barrier). Any changes in the Design of the Project may lead to adjustment of costs. African Parks initially proposed an additional 5 rangers during the construction; however if the work is confined and phased as proposed in this ESMP, then the need for additional rangers could be reduced to 2 for the time of construction.

Most costs are based on a one-year construction period. If the work takes longer, some adjustment will be needed. The main risk for African Parks would come from delays in work completion, as some mitigations are time related (especially the loss of business revenues). Any delays past the foreseen schedule may not have been budgeted in the compensation package. It is therefore important that sufficient fund be provided in case of delays.

Compensation Plan for Majete Wildlife Reserve This compensation plan concerns activities that do not relate to the construction contractor		
Reminder of impacts (as presented in Vol.2)		**Significance**
Impact 1	**Impact on tourism**: construction activities in MWR will have deleterious impacts on tourism	Moderate
Impact 2	**Impact on Majete buildings, roads and infrastructure**: Malaria Research Camp, Heritage Center, Entrance Gate, Wildlife Research Camp, Community Campsite, electric fences, access road to the park, and access to the Kapichira Falls viewing platform will all be disturbed by construction of the Feeder Canal.	Moderate
Impact 3	**Impact on Kapichira Falls attractiveness**: The attractiveness of the Falls will be reduced during part of the year due to reduced dry season flows, but this will not result in foregone revenues.	Moderate
Impact 4	**Disturbances of wildlife and vegetation**: work will generate noise and necessitate forest and thicket clearing in the right-of-way destroying some habitats and startling wildlife	Major
Impact 5	**Habitat fragmentation**: with the canal passing through MWR wildlife habitats will be fragmentized	Major
Impact 6	**Drowning hazard for wildlife**: open canals represent a drowning hazard for wildlife	Major
Compensation		

Compensation Plan for Majete Wildlife Reserve

This compensation plan concerns activities that do not relate to the construction contractor

Compensation 1

Financial compensation shall be paid for losses of tourism revenue during the SVIP construction work. Taken from the current evolution in tourism, African Parks is projecting **600,000 USD** gross revenue for 2018. The high season is the period where African Parks receives the highest number of tourists. In addition, the Community Campsite which is less than 150m from the path of the canal will be affected and funds from this camp (separate from MWR tourism revenue) go directly to the community for welfare projects that they determine to the tune of around **10,000 USD** per year currently. Arrangement for compensation should be based on the difference between gross revenue before work and during work.

Mobile noise barrier. African Parks shall receive money to purchase mobile noise barriers. The barrier shall be at least 3 meters high, made of absorptive material. The average cost is 1,000 USD per meter (based on US prices for noise barrier specifically designed for construction site). 50 meters shall be installed at the entrance gate (because of the passage of trucks on the road). An additional 50 meters will be required for the offices and 20 meters for the community camp site. The total investment is **120,000 USD**.

Communication and advertisement: funds shall be provided to produce pamphlets or online advertisements prior to work and after work is over to present the work and to re-attract tourists after work (distribution of vouchers, etc.). This fund shall be around **20,000 USD**

Providing a pipeline to extract some water from the canal for water supply for MWR staff village of around 30 households.

Approximate cost ($US)	The total cost will depend on the impact on the reserve's gross revenue and on the upcoming Resettlement Action Plan for Phase I
Responsibilities	African Parks will receive the fund to carry out certain measures in order to ensure quality standards are attained.
Schedule	Prior to work
Monitoring	The Resettlement Action Plan for Phase I shall include all economic impacts at MWR (based on this compensation plan), and develop a monitoring for these impacts
Performance indicator(s)	A suggested performance indicator is the gross revenue of MWR and the community campsite before, during and after work.
Responsibilities for monitoring	The Resettlement Action Plan for Phase I shall determine the responsibilities for monitoring
Outcome, frequency and disclosure	The Resettlement Action Plan for Phase I shall determine the outcome, frequency and disclosure

Compensation 2

Destruction of building is not likely to take place. However, if for any reason it is necessary, the developer has to compensate African Parks for all buildings that will be destroyed to complete rebuild of facility in agreed upon location to a minimum of a similar standard and extent the cost of replacement of such building (according to OP 4.12 on involuntary resettlement). New buildings will have to be completed before the start of construction of the canal so that there is seamless transition to the new facilities before the existing facilities are affected.

Compensation Plan for Majete Wildlife Reserve This compensation plan concerns activities that do not relate to the construction contractor	
Compensation will be necessary to reroute roads and provide an alternative road for tourists to avoid the Hall-Martin road and alternative routing to access southern portion of Mkulumadzi road. African Parks has proposed a diverted road of about 2.24 km. A vehicle bridge shall be installed at Kapichira falls road (however, this will be part of the construction contractor responsibility). Areas where MWR fences will be affected will have to be compensated. The feeder canal will, at least, impact the fence on 3 locations on a 50 meters width.	
Approximate cost ($US)	In case of any destruction of building: Cost of buildings in Majete Wildlife Reserve (cost per m^2 including the total replacement cost (construction, material, etc.) = **800 USD /m^2** 2.24 km diverted road: about $3,000 per kilometer to include a bulldozer and grader. Drifts should also be accounted for at 2,500 USD per concrete drift, three will probably be required = **14,220 USD** Cost for the replacement fences (electric fence): 11 USD / m. The Feeder canal will, at least, impact the fence on 3 locations on a 50 meters width =: **1,650 USD**
Responsibilities	African Parks will receive the fund to carry out the measures in order to ensure quality standards are attained (African Parks would select its regular contractors instead of the Project construction contractor to carry out the measures) Funding agencies will provide the fund
Schedule	Prior to work
Monitoring	The Resettlement Action Plan for Phase I shall include all economic impacts at MWR, and develop a monitoring for these impacts
Performance indicator(s)	A suggested performance indicator is the completion/success of the measures
Responsibilities for monitoring	The Resettlement Action Plan for Phase I shall determine the responsibilities for monitoring
Outcome, frequency and disclosure	The Resettlement Action Plan for Phase I shall include all economic impacts at MWR, and develop a monitoring for these impacts
Mitigation 3 African Parks has to be aware on flow releases at the sluice gates to inform its visitors on time and season where the falls will be visible. This will require that Escom communicates on a regular basis with African Parks.	
Compensation 4	

<table>
<tr><th colspan="2">Compensation Plan for Majete Wildlife Reserve
This compensation plan concerns activities that do not relate to the construction contractor</th></tr>
<tr><td colspan="2">Wildlife will have to be contained away from construction to avoid casualties (mainly from the heavily impacted area). Construction planning will have to consider and provide for materials and costs for the containment of animals. Such costs include erecting temporary wildlife fences around construction sites. These fences have to be wildlife approved and electrified. They cannot be domestic animal fences.

MWR shall keep provision of extra law enforcement personnel to increase patrol and law enforcement effort during construction phase and training session for workers (induction training).

To compensate for the 25 ha of forest cleared in MWR (mainly broadleave deciduous trees), an estimate number of trees proposed is 1 per 10meters (144 trees per ha) which represent 144x25 ha = 3 600 trees (square planting). To ensure conservation gains, this number shall be doubled so every cut trees is replaced by 2 trees. AP has a nursery inside the reserve. Each plant shall be between 2 and 5 years old to ensure success and shall be protected with cages to keep herbivores away. Replanting of trees shall be done by African Parks in MWR to ensure recovery of vegetation and to ensure the use of native species.

An upgrade of existing water points in MWR (Thawale, Nakamba and Nsepete) is necessary because animals will disperse away from the construction and use the existing waterholes which will then need increased capacity. This would be in preference to having a temporary structure that may have its own impacts (water tanker coming every day).</td></tr>
<tr><td>Approximate cost ($US)</td><td>Isolation of construction sites (containment of wildlife), electric fence on the western part of the Mkulumadzi Road until the bridge to Escom (1 km): 11, 000 USD.

Cost to evacuate wildlife stock between the Shire river and the construction site along the canal : veterinary costs for 5 days 3,000 USD, helicopter time for 15 hours is 24,000 USD = 27,000 USD

Cost for 2 extra scouts (including housing) = 320 USD per scout per month including provision for 13th cheques and bonus, pension etc. Housing would need to be built at about 30,000 USD per double unit which houses 2 scouts = 34,160 USD for one year

Cost for planting trees:
• borehole (as water is limiting with the exiting borehole) drilling and pump 20,000 USD
• nursery – structure and fencing 3,000 USD
• tubes and seeds and operating costs 5,000 USD
• staffing for two years x 2 people 7,800 USD
• Total 35,800 USD

Cost to increase the capacity of existing water points (Thawale, Nakamba and Nsepete) at 6,000 USD each is 18,000 USD</td></tr>
<tr><td>Responsibilities</td><td>African Parks will receive the fund to carry out these measures in order to ensure quality standards are attained</td></tr>
<tr><td>Schedule</td><td>At Design phase (most measures need to be implemented before construction)</td></tr>
</table>

Compensation Plan for Majete Wildlife Reserve This compensation plan concerns activities that do not relate to the construction contractor	
Monitoring	Monitoring of wildlife during construction is important in order to assess with scientific facts the effect of construction on wildlife. Monitoring would need to compare animal movement to previous aerial census data which is a helicopter count of the park that gave accurate animal numbers and distribution. Animals may move to another part of the park due to disturbance so the ideal would be to count twice • both before and after the construction at 35,000 USD per aerial survey (70,000 USD). • radio collars costs $10,000 • a fulltime biologist to monitor, about 15,000 USD per year, and collars would need to be fitted at least 6 months before the start, during construction, and at least 6 months at post construction. A total of 2 years of monitoring is therefore necessary (30,000 USD for the biologist) • The total is **110,000 USD** (if construction is longer cost will be amended appropriately)
Performance indicator(s)	Monitoring of wildlife will define performance indicators.
Responsibilities for monitoring	African Parks will carry out monitoring
Outcome, frequency and disclosure	Outcome and disclosure shall be determined based on African Parks confidentiality policy (as some data could attract poachers)
Mitigation 5 The length of the buried canal represents 1.25 km inside the reserve, buried canal will allow animals to pass since the thickness of concrete will be sufficient (50 cm). Therefore, with current layout of the canal inside MWR, there is no need for wildlife overpasses.	
Compensation 6 Building walls along canals using rocks in a concrete matrix will provide efficient protection with little maintenance against (for) large animals such as elephants, will last longer and will have a better appearance.	
Approximate cost ($US)	Wall made of rocks in a concrete matrix (based on current prices in MWR) (given a 0.5 m thickness and a height of 2 meters) is 400 USD per meter. Although a wall is more expensive than an electric fence, it is important not to underestimate the risk associated with elephants and the burden of maintenance of electric fence for African Parks. The open canal section is 1.20 km inside MWR. Walls need to be installed on both side the canal: **960,000 USD**

Compensation Plan for Majete Wildlife Reserve This compensation plan concerns activities that do not relate to the construction contractor	
Responsibilities	African Parks will receive the fund to carry out this measure in order to ensure quality standards are attained. African Parks could select its regular contractors instead of the Project construction contractor to carry out the measures.
Schedule	At the end of Feeder canal construction (before removal of temporary fences) and before water flows in the canal
Monitoring	Monitoring of dead animals could take place at any time (as part of forthcoming MoU between BWO and DNPW)
Performance indicator(s)	The number of dead animal in the canal
Responsibilities for monitoring	Animal drowning could be monitored by the African Parks / DNPW however they will not be responsible for any damages to the canal by elephants
Outcome, frequency and disclosure	Report could be produced by African Parks / DNPW, disclosure will be based on African Parks confidentiality policy

The summary of compensation is presented in the table hereunder. The table is based on the fact that, according to the FS, no building will be affected in MWR.

Table 6 Summary of compensation for MWR

Measures	**One year** construction period cost in USD	**Two years** construction period in USD
Loss of business for African Parks	0 to 600,000	0 to 1,200,000
Loss of income from the community camp site	0 to 10,000	0 to 20,000
Mobile noise barriers	120,000	120,000
Communication and advertisement	20,000	20,000
2.24 km diverted road	14,220	14,220
Replacement fences	1,650	1,650
Isolation of construction sites (containment of wildlife)	11,000	11,000
Evacuation of wildlife	27,000	27,000
Two extra rangers (including housing)	34,160	38,320
Cost for planting trees	35,800	35,800
Cost to increase the capacity of exiting water points	18,000	18,000
Monitoring of wildlife during construction	110,000	125,000
Wall made of rocks in a concrete matrix on both side of the open canal	960,000	960,000
Grand total USD	**1,351,830** (best case scenario: no loss of business revenue) to **1,961,830** (worst case scenario: no business revenue)	**1,370,990** (best case scenario: no loss of business revenue) to **2,610,990** (worst case scenario: no business revenue)

PICTURES OF MITIGATION INFRASTRUCTURES

Figure 7 Mobile noise barrier and concrete and rock wall in MWR

Source: Sound Fighter © System, 2016; BRLi, 2016

8. ACTION PLAN AGAINST INVASIVE FISHES

This Action Plan has one goal: to avoid the invasion of the Tigerfish and other potentially invasive fishes upstream from the natural barrier posed by the Kapichira Falls. Since the Feeder Canal will have a gentle slope and will by-pass the falls, the risk of invasion is to be taken seriously and appropriate mitigations shall be implemented. The ESIA has assessed three options revolving around two methods to keep the fish from passing the water intake: a fish weir and a fish screen. This ESMP proposes Option 3: A high concrete weir.

The World Bank will contract a Panel of Experts to review in depth the design and specific location of this fish barrier to ensure that it would function effectively, with little or no required maintenance over the long term. This expert review will be conducted in parallel with the final design of the Main Canal, and well before the start of canal construction.

As highlighted in the Impact Assessment report, the fish barrier shall be installed inside MWR for the following reasons:

- The fish barrier must catch all risks and be located as far as possible upstream.
- To eliminate the risk of tributary rivers flooding the feeder canal upstream from the fish barrier (such as Mwanza River and other rivers with flash floods) leading to potential colonization of fishes. Tributary Rivers flooding canals is a real risk and has been observed by the ESIA Consultant is other regions of Africa (most of the time it is caused by the absence of culverts across canals or the improper sizing of culverts).
- Outside MWR there would be a real risk of damages from people using the falls for domestic use (washing their clothes on the fall, as observed in Illovo) or to bring their cattle to drink.
- Inside MWR, there is a better chance that defects or breaches in the fish barrier be detected early enough, thanks to good management of African Parks.
- Because human access is strictly controlled inside MWR, the risk of people releasing fish (for intentional stocking or any other reason) into the Feeder Canal upstream of the fish barrier is neglibile.

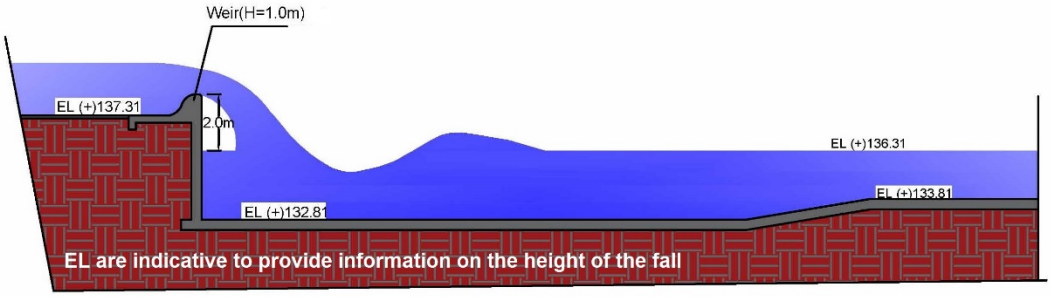
It is not recommended that a fish barrier be installed in the underground section of the canal because of maintenance issues: Any breaches would remain undetected for long periods of time. In addition, underground fish barriers were never designed nor tested. An underground fish screen is also not feasible due to the risk of breaches from debris.

Action plan against invasive fishes This action plan concerns infrastructures that will be built to keep the Tigerfish (and other potentially invasive fishes) from invading Lake Malawi.		
Reminder of potentially invasive fishes impact (as presented in Vol.2)		**Significance**
Impact 1	Risk of Tigerfish and other Lower Shire fishes invasion of the Upper Shire River and thus Lake Malawi	Major
Mitigation		
Mitigation 1: The followings are the basic technical specifications for an Invasive fish weir as designed by KRC in its Feasibility Study Addendum called “Second Proposal for Mitigating the Tigerfish Issue”, KRC, 2017). • The fish weir must be installed inside MWR.		

Action plan against invasive fishes

This action plan concerns infrastructures that will be built to keep the Tigerfish (and other potentially invasive fishes) from invading Lake Malawi.

- The infrastructure involves a fall with a 1 meter high broad crested weir across the Main Canal 1 (Feeder Canal) combined with a 3.5 meters drop structure as shown in the following figure.
- The quality of the concrete for the weir shall be up to the highest standards for concrete in an aquatic environment to ensure long-term use and minimal maintenance.



SECTION A-A

Approximate cost ($US)	The infrastructure has to be budgeted in the Detailed Design study. The estimated cost is, according to KRC, 4.3 million USD if the structure is installed inside MWR. In addition, monitoring cost (as presented hereunder) and maintenance costs need to be budgeted.
Responsibilities	The Detailed Design study will need to design the structure and verify the potential consequences in terms of head loss for the irrigation scheme (KRC has estimated that only 275 ha would be lost). An independent Panel of Experts contracted by the World Bank will review the design and specific location of this fish barrier to provide an additional measure of confidence that it would function effectively. Maintenance of the fish barrier will be the Bulk Water Operator's responsibility (this shall be highlighted in the call for tender). This shall include desilting the weir and removing debris. The Bulk Water Operator (BWO, responsible for Main Canal operation and maintenance) will have a Memorandum of Understanding (MoU) or similar written agreement with African Parks that will clarify the roles and responsibilities of both parties with respect to the inspection, cleaning, and other care of the fish barrier; the protocols for Majete Wildlife Reserve entry and exit by BWO staff; dealing with problem wildlife; and similar operational details.
Schedule	Fish barrier will be incorporated into the Detailed Design of the Main Canal 1. Maintenance will be a recurrent responsibility, although maintenance requirements for this structure are relatively very low. Since it is a fixed, passive concrete structure, the fish barrier is likely to continue functioning as intended even with lapses in routine maintenance.
Monitoring	Inspection and maintenance shall be done by the Bulk Water Operator.
Performance indicator(s)	

Action plan against invasive fishes This action plan concerns infrastructures that will be built to keep the Tigerfish (and other potentially invasive fishes) from invading Lake Malawi.	
Responsibilities for monitoring	Monitoring of fishes is impossible since the weir will block fishes from moving upstream. Due to the high stakes for aquatic biodiversity, it is recommended that the Environmental Affairs Department carry out semi-annual site visits with the Bulk Water Operator and African Parks (because it would be located inside MWR) to verify the continued proper functioning of the fish weir and identify any areas that might need management attention. Each inspection visit shall be followed by a report with pictures. It is necessary that the Bulk Water Operator budget maintenance of the weir including periodic removal of any silt or debris that might accumulate behind the weir.
Outcome, frequency and disclosure	

PICTURES OF MITIGATION INFRASTRUCTURES

Figure 8 Small-scale examples of fish weirs

Source left to right: The Verde Independent | Cottonwood, Arizona (2015) and Trout Unlimited (2013). The planned weir on the Main Canal will be much higher and the water flow will be will also be greater (up to 50m^3/s) than illustrated in the pictures.

9. ACTION PLANS FOR SOCIAL IMPACTS

This section details impacts that do not relate to the construction contractor.

Most social impacts relate to resettlement and will be dealt with in the Resettlement Action Plan.

9.1.1 Action Plan for health and safety

This Action Plan concerns impacts that will take place in Phase I. It mainly aims at activities that do not relate to the construction contractor.

The Project mitigation and compensation package cannot solve all health problems that exist in the study area (and that will not worsen due to the project). In fact, many health measures require the intervention of stakeholders that are not necessarily related to the Project and would require commitments from the Government. In the framework of the Project and this ESMP, attention is paid to schistosomiasis (bilharzia) as this disease is directly related to irrigation schemes and its prevalence could increase due to the Project.

Action plan for health and safety		
Reminder of impacts on H&S (as presented in Vol.2)		**Significance**
Impact 1	**Schistosomiasis**. An increase of schistosomiasis in the command area is expected	Moderate
Impact 2	**Drownings**. The presence of main canals may lead to drownings	Major
Mitigation		
Mitigation 1: In other to fight schistosomiasis, several measures must be implemented at time of Project implementation: • Sensitization and health education by the health sector shall be repeated frequently during many years to obtain the beginning of a result. Sensitization for the use of latrines for defecation or at least, defecation away from houses, paths, water pools could bring improvement. • Treatment of patients by oral praziquantel: systematic mass treatments by praziquantel must be repeated yearly and expended to all people. • Microscopic diagnosis to confirm the cause of the symptoms for urinal and intestinal schistosomiasis shall be strongly reinforced from current situation. • Sensitization at school and village level (it shall focus on other topics of this Action Plan as well): - Health and safety regarding work and the presence of machinery - The use of canal (regarding schistosomiasis) - The risk from drowning in canal - Posters on these three topics shall be made and distributed to school teachers and at health clinics, radio advertisement shall be made		

Action plan for health and safety	
Approximate cost ($US)	The cost of a single 600-mg tablet is about 0.08 USD and an average treatment is estimated to be between 0.20–0.30 USD (WHO, 2016). For a population of 500,000 in Chikwawa district, the total cost per year is between **100,000** and **150,000 USD** (Phase I). The Government can apply to obtain free praziquantel through the WHO web site. The cost to purchase 10 microscopes : **5,000 USD** Sensitization shall involve 2 local health specialists full time for 2 months: **4,000 USD** Capacity building for health specialists to use up to date detection method for both Bilharzias (schistosomiasis) (Ministry of Health): **5,000 USD** The cost for production and printing of posters and radio advertisement shall be around **5,000 USD**
Responsibilities	Health specialists (Ministry of Health). This will require capacity building in order to learn how to detect intestinal schistosomiasis The Project shall request local health workers to carry out a vast sensitization program in the Phase I area on canal and associated risk from schistosomiasis Production and printing of posters and radio advertisement can be delegated to a local publishing company (Blantyre)
Schedule	Prior to construction for sensitization Treatment for praziquantel shall be an ongoing activity that must start during operation of the scheme
Monitoring	Monitoring of schistosomiasis shall focus on both urinal and intestinal schistosomiasis. Monitoring would necessitate additional microscopes. The purchase of equipment shall be done in consultation with local health clinics (an indicative cost of 5,000 USD to purchase 10 microscopes is provided in this ESMP) Monitoring shall be done using a constant sample of all ages in the population to compare the evolution of both infections
Performance indicator(s)	The evolution of number of infections is the performance indicator
Responsibilities for monitoring	Health specialists (Ministry of Health)
Outcome, frequency and disclosure	Monitoring of schistosomiasis shall be reported in a yearly report by health workers (as part of their normal work) (during scheme operation)
Mitigation 2: • Health workers will carry out sensitization at primary schools to inform children about the danger of canals.	

Action plan for health and safety	
• Large concrete stairs shall be built at each village crossed by a main canal (Feeder, Bangula and Supini). The primary purpose of these stairs would be to allow people to access water without danger. These stairs shall be large enough so that people can use them to fetch for water and clean their clothes (10 meters wide). An estimate based on density of villages around main canals gives about 40 stairs in the scheme along Phase I and II (20 on the western bank and 20 on the eastern bank), half of it shall be built in Phase I. Stairs shall not be : - built on both side of a canal at any location, it could be interpreted as an invitation to cross the canal (especially at time of low low) - built north of Chikwawa as the area has little population density. - Built with milder slope than the canal as it could become available to cattle. - Stairs shall only be built in villages to maintain a certain level of control over the use of canals. To reduce the incidence of drowning, fixed hard plastic ladder shall be installed every 500 m on both side of the canal along the full length of the Feeder, Bangula and Supini canals (with alternating position). Fixed ladders shall be installed in night storages as well. The total number of fixed ladder will be around 533 for all phases and 180 for Phase I. Iron ladder is not recommended as people will likely steal it. Hard plastic could be used or half rubber tires embedded in the concrete (these tires must be perforated to avoid creating breeding grounds for mosquitos)	
Approximate cost ($US)	20 concrete stairs will not lead to significant additional cost from normal canal lining (they should be budgeted in the Project cost and shall be designed in the Design study) The cost for fixed ladder cannot be estimated until a decision about the material to use has been made by the Design
Responsibilities	The Design study The exact position of stairs shall be assessed during the final Design in consultation with communities The construction contractor to build them
Schedule	At Design and construction phases and during operation of the scheme
Monitoring	Stability of fixed ladder shall be assessed by the Supervising engineering firm Drowning hazards shall be monitored by the Bulk Water Operator. All accidents shall be recorded in an accident report and the cause of drowning established. Adaptation and additional ladders shall be installed when necessary. Sensitization at schools may be repeated on a regular basis as well.
Performance indicator(s)	The number of people that have drowned in the canal and the evolution of accidents
Responsibilities for monitoring	Supervising engineering firm to assess stability of ladders and Bulk Water Operator to monitor drowning hazards
Outcome, frequency and disclosure	Whenever an accident occurs, the accident report shall be disclosed to MoAIWD and other relevant institutions

9.1.2 Action Plan for socioeconomic impacts

This Action Plan concerns mitigation measures to address impacts on several socioeconomic issues. Measures for gender and vulnerable people are described in the "Preparation and implementation of a Communications, Community Participation, Land Tenure and Resettlement Policy Framework (PCCPLTRPF)" in the "Gender and Youth Strategy" Study. Measures that concern communication and grievance redress are also dealt with in the PCCPLTRPF "Communication strategy" and in the "Grievance redress mechanism". However, this ESMP highly recommends that the PCCPLTRPF Grievance redress mechanism be extended to the construction activities as well, as these are important sources of impacts and conflicts with surrounding communities. From experience, workers and community living around construction sites should have the possibility to express themselves and to share their opinions and complaints about noise, dust, safety and behavior of workers.

The PCCPLTRPF Resettlement Policy Framework (RFP) has estimated a cost for resettlement compensation for Phase I impact as being close to 1 million USD (922,911 USD). However, the RPF does not seem to include cost for bridges to build (the item called "Compensation for premises and related structures" : with an amount of 75,467 USD does not seem to include cattle bridge, footpaths and vehicle bridges as a single vehicle bridge is about 100,000 USD). Therefore, this ESMP budgets these three essential infrastructures.

Action plan for socioeconomic impacts		
Reminder of impacts (as presented in Vol.2)		**Significance**
Impact 1	**Village reorganization and resettlement**: the project will lead to major changes in terms of land occupation and will necessitate physical and economic displacement	Major
Impact 2	**Workers influx**: the project will require important workforce consisting of foreign workers. Land will also be required for machinery storage and workers camps. There is a risk that buildings and amenities do not respect quality standards	Moderate
Impact 3	**Permanent loss of buildings and other infrastructures**: canals could necessitate destroying buildings and other infrastructures	Minor
Impact 4	**Disruption of access** : canals will cross roads, trails, path disrupting access for communities and cattle to grazing sites or to urban centers	Moderate
Impact 5	**Disturbance to existing agriculture**: work will disturb cropping practices since some households will control physically different areas of land	Minor
Impact 6	**Job opportunities**: work will require unskilled and skilled labour for construction	Minor (positive)
Impact 7	**Rapid social changes**: there is a risk that people do not change their lifestyle and develop skills rapidly enough to adapt to the new irrigated environment	Minor
Impact 8	**Hinterland effect**: the development of irrigation may be associated with an increase in human activity and local economy, which may lead to additional pressure on resources (wood for charcoal, fish, etc.)	Moderate

Action plan for socioeconomic impacts		
Impact 9	**Potential delays in irrigated agriculture development**: any delays in the project completion or skills acquisition could delay the benefits	Minor
Impact 10	**Over supply of crops**: increase in production could reduce prices and affect rain fed producers	Major
Impact 11	**Benefits of irrigated agriculture**: the project overall goal is to benefit local communities	Major (positive)
Impact 12	**Reduction of fisheries**: with slightly reduced water in the Elephant Marsh, fisheries could be affected.	Minor
Impact 13	**Impacts on livestock rearing**: the Project will require adaptation of this livelihood strategy	Moderate
Impact 14	**Wildlife-human conflict:** Elephant Marsh is the main site for wildlife-human conflict in the SVTP area. Hippopotamus and crocodiles are the current most conflictual animals and the situation could worsen with intensified agriculture in the vicinity of the Elephant Marsh.	Moderate
Mitigation measures		
Mitigation 1 The current CCPLTRPF assignment aims at collecting people grievances and communicate about the Project. The Communication strategy report provides a tool to ensure social acceptability of the Project. Regarding resettlement, with current knowledge, some avoidance measures were proposed by COWI at the Resettlement Policy Framework stage, the complete set of measures will be developed in the Resettlement Action Plan (RAP) which is still to be produced once the Design study will start. The Resettlement Policy Framework includes a method for valuation for compensation of agricultural produces, forest and fruit trees.		
Mitigation 2 and 6 The RAP should include social preparation and the incorporation of eligibility for priority in employment into the Entitlement Matrix, together with an official mechanism for providing names to the construction contractor and for follow-up to track the numbers of PAPs employed. Avoiding the creation of shantytowns from people attracted to the site to find work is difficult when local enforcement are limited in number. Local law enforcement have to be aware of the risk and shall be ready to answer any complaints about illegal settlement and collaborate with traditional authorities on a regular basis to rapidly take action.		
Approximate cost ($US)		

Action plan for socioeconomic impacts	
	It is recommended to add local law enforcement staff in the study area and to train them on how to deal with all risks (shantytown, prostitution, etc.) from the presence of workers influx. The cost of hiring additional local law enforcement and capacity building shall be discussed at government level
Responsibilities	DNPW and the local law enforcement Funding agencies to provide with funds
Schedule	During construction
Monitoring	DNPW and the local law enforcement shall keep record of the type of offences associated with workers influx
Performance indicator(s)	Crime level, number of cases for illegal use of natural resources (recorded by the DNPW and the local law enforcement). Numbers of PAPs employed
Responsibilities for monitoring	DNPW and the local law enforcement The RAP
Outcome, frequency and disclosure	The monitoring program of the RAP

Mitigation 3

As mentioned in the Resettlement Policy Framework, a number of locations where impact of the canal can be reduced considerably without any additional construction work has been identified. Changes were proposed to avoid village areas and graveyards as much as possible. The result of the proposed changes is a reduction of affected villages from 19 to 6 and affected houses from 121 to 26 in Phase I (a similar investigation has not been done for phase 2 yet.) (COWI, 2016).

The RAP will deal with impacts to infrastructures once the Design is finalized

Mitigation 4

- Bridges shall be built to allow for access across canals where existing footpaths and roads are impacted
- Based on the Resettlement Policy Framework for Phases I and II (COWI, 2016): 67 vehicle bridges (across 10 tarred roads and 57 gravel roads) and 17 footpaths will have to be built. Phase I will require 25 vehicle bridges (across 1 tarred road and 24 gravel roads) and 8 footpaths
- It is recommended that these bridges be built as the canal progresses to avoid forcing people and cattle to travel long way to cross the canal.
- Cattle bridges shall be built every km of main canals. Therefore, the Project Phases I and II will require 133 cattle bridges. Phase I will require 45.
- In the command area, some footpaths shall also be designed to allow people to cross secondary canals, these shall be 1.5 m wide. Spacing between these footpaths small not be more than 1 km.

Action plan for socioeconomic impacts	
• Whenever a canal crosses a seasonal river, box culverts shall be large enough to allow people to walk under the canal (super-sized culverts). It is not recommended to build cattle bridges in Branch or smaller canals as the presence of livestock in the command area will lead to conflicts with farmers.	
Approximate cost	Cattle bridge unit cost: 30,000 USD, for the 45 km of main canals for Phase I the total cost would be **1,350,000 USD** (4,000,000 USD for the whole Phase I and II if one cattle bridge is installed per km). This cost has to be to be budgeted in the Design and bills of quantities of tendering firms Footpath unit cost: **10,000 USD**, total cost **80,000 USD** This cost has to be to be budgeted in the Design and bills of quantities of tendering firms Vehicle bridge unit cost: 100,000 USD, 25 vehicle bridges: **2,500,000 USD**. This cost has to be to be budgeted in the Design and bills of quantities of tendering firms
Responsibilities	Resettlement Action Plan/final Design to determine the best location of bridges and cattle troughs in consultation with communities Design study The construction contractor will build these infrastructures
Schedule	At Design study
Monitoring	The Supervising Engineer shall monitor the work to ensure that bridges are built as work progresses
Performance indicator(s)	The number of bridges and paths built (and the number of complaints regarding access)
Responsibilities for monitoring	Supervising Engineer
Outcome, frequency and disclosure	In the framework of the Grievance redress mechanism, the number of complaints regarding access across the canal shall be recorded
Mitigation 5 The Resettlement Policy Framework (RPF) deals with avoidance measures by recommending starting the project after the harvest. Land acquisition and land redistribution and the establishment of farmer management entities will be planned in advance of construction, so that farmers have some time to adjust to their new plots before the additional stress of physical construction. Land acquisition will be phased according to the Project (Resettlement Action Plan, for Phases I and II) Additional details will be provided in the RAP	
Mitigation 7	

Action plan for socioeconomic impacts
The current CCPLTRPF assignment aims to collecting people grievances and communicate about the Project. The Communication strategy report provides a tool to ensure social acceptability of the Project.
Mitigation 8 Providing for adequate woodlots and grazing land set-aside areas, as part of the SVIP's participatory land use planning process for the irrigated farming communities, will reduce pressures to encroach upon nearby protected areas to obtain construction wood, fuelwood, or livestock forage.
Mitigation 9 Resources shall be provided to support the delivery of advisory services, adaptive research and development, the strengthening of research-extension-farmer linkages, the improvement of market linkages, and increased pluralism in market delivery. These resources could be provided by the Ministry of Agriculture, Irrigation and Water Development and the Proposed organizational setup presented in the Agricultural Development Planning Strategy study (PWC, 2016). Pilot trials shall also be put in place and Phase I success shall be tested prior to implementing Phase II Measures will be developed as part of the Agricultural Development Planning Strategy study (PWC, 2016)
Mitigation 10 In order to avoid oversupply of crops at local market, the project shall focus on exporting crops. In addition, the Project shall study the possibility to transform vegetable for the food industry (tomato sauce, etc.). Measures to mitigate the impact are developed in the Agricultural Development Planning Strategy study (PWC, 2016).
Mitigation 11 The overall goal of the Project is to increase livelihood of communities. The benefit from the Project will also influence several other socioeconomic indicators: general health and education level of the community, etc. These positive side-effects can be numerous and relatively easily achieved: • Greater food security than rain-fed production and increase in the monetary income will reduce poverty and food shortage. • Change in behaviour and acceptance of new mentality particularly associated with health. • Increased access to efficient health system. • Better access to schools. • Development of agribusiness in the area. Enhancement measures are well detailed in the Agricultural Development Planning Strategy where efficient organization of producers are proposed. Institutional measures will also be developed as well as assistance and training to producers once the Project starts. Creation of farmer management entities is another example of enhancement measure. At this stage of the Project, operational enhancement measures are difficult to propose as the Project will engage in several studies related to agriculture development.
Mitigation 12

<table>
<tr><th colspan="2">Action plan for socioeconomic impacts</th></tr>
<tr><td colspan="2">Declines in fisheries (whether attributable to SVIP or simply to overfishing) could be compensated by creating fish farms using native species. Factors to consider for fish farming are presented in the “Agricultural Development Planning Strategy” study (PWC, 2016). In addition, the SVTP Natural Resources Management Component will support measures to improve the sustainability of ongoing fisheries within the Elephant Marsh.</td></tr>
<tr><td colspan="2">Mitigation 13
• Construction of drinking spots along the main canals. Drinking spots shall take the form of pipes or cattle troughs. One cattle trough shall be installed at each village at a location outside of it and on both side of main canals. A first estimate of this ESMP for Phase I is 10 cattle troughs (5 on the western side and 5 on the eastern side of canals). These troughs shall be made of concrete lining with a geomembrane to limit seepage. Their dimensions shall be:
- Diameter : 5m
- Depth: 0.5 m
- Concrete lining: 10 cm (to avoid seepage).
- Pipe across the canal embankment dike at the lowest possible level (to convey water at all time)
• Construction of cattle bridges. Cattle bridges shall be installed at each km along the main canals. Bridges shall be made of concrete and include high walls to avoid accident. Their dimensions shall be:
- Length : 23 meter (to cross main canals, plus length of embankment)
- Width 1.5 meters

Mitigation for smallholder livestock farmers were discussed in consultation meetings by the consultant in charge of the Agricultural Development Planning Strategy (PWC, 2016). The following mitigations reflect smallholder grievances:
• Establishment of conflict management structures at village level and guidelines to deal with farmer’s conflicts.
• Formalization of the marketing of crop residues and organic manure to foster strong collaboration between livestock and irrigation farmers to ensure reciprocal gesture in the disposal of crop residues by crop farmers in exchange of manure.
• In order to ensure that crop residues are available to smallholder farmers, small scale farmers shall have access to the crop residues realized from crops grown on their traditional land parcels.

Once the full soil surveys are available, land that cannot be farmed shall be designated as grazing areas, woodlots, or other non-irrigated lands.</td></tr>
<tr><td>Approximate cost</td><td>10 cattle troughs and pipes (3,000 USD each) : 30,000 USD (indicative cost, to be budgeted in the bills of quantities of the construction contractor)

Cattle bridge unit cost: assessed in Mitigation 4

Conflict management structures at village level, formalization of the marketing of crop residues and organic manure, designating land as grazing sites, are part of the Ministry of Agriculture, Irrigation and Water Development’s responsibilities and shall not lead to additional cost (capacity building may however be proposed as part of the Agricultural Development Planning Strategy study)</td></tr>
</table>

Action plan for socioeconomic impacts	
Responsibilities	Resettlement Action Plan (RAP) to determine the best location of cattle bridges and troughs in consultation with communities Design study Construction contractor Ministry of Agriculture, Irrigation and Water Development
Schedule	Location and budget for cattle bridges and troughs shall be set at construction based on RAP Conflict management will be an ongoing process during operation
Monitoring	Monitoring shall take place in the framework of the Grievance Redress Mechanism (GRM) and Grievance Redress Committee (GRC) (see Preparation and implementation of a Communications, Community Participation, Land Tenure and Resettlement Policy Framework (PCCPLTRPF)
Performance indicator(s)	As described in the Grievance Redress Mechanism (GRM)
Responsibilities for monitoring	
Outcome, frequency and disclosure	
Mitigation 14 SVIP Phase I is not at much risk of increased wildlife-human conflict as its irrigation development areas are far from the Elephant marsh. Phase II, which will take place closer to Elephant is concerned by this issue. Therefore, any SVIP-related measures shall be part of a future ESMP for Phase II irrigation development. However, the SVTP Natural Resources Management Component includes measures intended to reduce ongoing wildlife-human conflicts in and around the Elephant Marsh.	

9.1.3 Action Plan for Cultural Heritage

This Action Plan aims at two situations:

- Salvage archeology to safeguard high priority artifacts prior to construction
- Chance find procedure in case of discoveries during excavation work

Action plan for cultural heritage		
Reminder of impacts on cultural heritage (as presented in Vol.2)		**Significance**
Impact 1	Loss of physical cultural heritage	Minor

Mitigation

Implement the Action Plan in two phases:

- Phase 1: Pre-Construction Data Collection
- Phase 2: Mitigation Plan During Construction : Chance find procedure

PHASE 1 : PRE-CONSTRUCTION DATA COLLECTION

Archaeological rescue excavations

Sites that are categorized by the Baseline report (Vol.1) as of high priority shall undergo controlled archaeological rescue excavations.

Archaeological sites that will be impacted negatively by the Project's future activities and that indicate high scientific value for study and analysis should undergo excavations before any land-transformation activities commence. The reason for that is that Malawi's national heritage legislation requires rescue excavations of sites at risk of destruction from development.

Based on actual Canal alignment routes, actual localization of command areas as well as the site prioritization classification (see baseline report), the following sites shall undergo rescue excavations before Project launch:

High Priority Sites	Data	Coordinates & location	Impacted by the Project
CK46	Decorated pottery. Elevated open air site behind Papa James' concession; dense surface scatters of archaeological material	698155 E 8212354 N Zone I 1, Mwanza River	Yes (Situated in irrigation zone)
CK55	Decorated pottery, stone artefacts, daga remains (house remains). Flat open air site in cultivated field with dense surface scatters of archaeological material	687513 E 8222782 N Zone I 1 Nthumbe River	Yes (45 m west of current Canal RoW)
CK62	Decorated pottery, daga remains (house remains). Elevated open air site with dense surface scatters of archaeological material	688002 E 8214624 N Zone A Mologeni Village	Yes (55 m east of current Canal RoW)
CK64	Decorated pottery, daga remains (house remains). Elevated open air site with associated termite mound; dense surface scatters of archaeological material	688010 E 8214841 N Zone A Mologeni Village	Unclear (ca. 125 m west of current Canal RoW)

Action plan for cultural heritage

CK76	Pottery well embedded in the soil (primary context). Flat open air site behind modern household; dense scatters of archaeological material	680679 E 8205290 N Zone A Ndakwera Village	Unclear (at the edge of irrigation area)
CK77	Pottery well embedded in the soil (primary context). Flat open air site in between modern households; dense scatters of archaeological material	680669 E 8205162 N Zone A Ndakwera Village	Unclear (25 m west of irrigation area)

The above-mentioned archaeological sites are considered as high priority for controlled archaeological excavations as they exhibit dense scatters of surface material as well as decorated pottery that is well embedded in the soil. However, due to heavy rainfall and flashfloods, there is a chance that these are no longer visible.

The reason for choosing more than one site for systematic excavations is that it is impossible at this point to ascertain which site will yield an undisturbed stratigraphic sequence for purposes of site reconstruction and dating.

High priority sites should be excavated by hand, using trowels, hand mattocks, shovels, etc. by natural and/or arbitrary levels. All soil should be screened with sieves. During the course of the excavations, artifacts such as pottery, chipped stone, and slag should be collected for processing. If present, bone, shell, charcoal (for radiocarbon dating), and other organic materials shall also be collected. Soil samples may be collected for later processing for extraction of datable carbon or to assist in the identification of various stratigraphic levels. Complete and accurate notes of field procedures and results should be maintained and excavations documented with photographs, maps, profiles, and plan drawings.

Laboratory Processing And Curation

Laboratory analysis is an interpretive step in an archaeological investigation. While on-site evaluation collects data, laboratory processing and analysis summarizes these data and allows meaningful statements regarding the site. Laboratory processing usually includes washing, sorting, cataloging, and tabulation of collected materials. These may be considered preliminary steps to analysis.

All artifacts and copies of all site forms, notes, reports, photographs, and maps generated from the identification, management, and analysis of cultural properties should be deposited at MDoA. Artifacts could be exposed in the valley at the Tisunge! Lower Shire Heritage Centre at the entrance of LNP.

Permit Procedures

The MDoA under the auspices of the Ministry of Culture is responsible for issuing of permits to conduct archaeological excavations in Malawi.

Ownership Of Cultural Material

All cultural materials recovered in the course of the Project should be considered the property of Malawi.

Specialized Analysis Of Collected Artifacts

If feasible in Malawi, collected artifacts could be further analysed using various techniques ranging from visual analysis by specialists to specialized dating techniques (*e.g.,* C-14 analysis) (at specialized facilities). A major emphasis of analysis is the dating of sites. Dating techniques may include:

- Analysis of diagnostic artifacts, such as ceramics, and chipped and ground tools
- Radiocarbon dating, and
- Analysis of geological strata.
- Another emphasis would be the faunal analysis of bone material, pollen and/or soil analysis and specialized ceramic studies.

Report Preparation

Report preparation and scientific analyses should conform to current internationally accepted practices. Publications in peer-reviewed journals and conference papers on the results of the studies are a positive way in which the Project can meet its obligations regarding transmitting heritage information to the wider public.

PHASE 2: MITIGATION PLAN DURING CONSTRUCTION

Mitigations during construction include:

- Contractor training and awareness program;
- Initial one to two months archaeological monitoring of land transformation activities during construction;
- Chance Find Procedures and salvage excavations in case of discoveries;
- Avoidance of construction-related impacts on important cultural resources

Contractor Training And Awareness Program

As part of this Action Plan, contractors and subcontractors should be sensitized to the future presence of an archaeological monitoring team during land-clearance and mechanical excavation activities. They should equally be given training on the identification of artifactual materials and bones, which might be found in the Project area and procedures (see section on Chance Find Procedures) for reporting the discovery to supervisory personnel. Any artifacts discovered should be considered the property of Malawi and after recording, analysis, and cataloguing prepared for curation at a national institution.

Archaeological Monitoring of Land Transformation Activities

Recognizing archaeological features poses a great challenge to the untrained eye, hence the importance of employing a professional team to carry out an initial one to two months period of archaeological monitoring when works start at Phase I. The following list provides an idea of the types of remains that might be uncovered during land-transformation activities:

Unknown burial places: They often have negligible surface visibility and can be encountered in many locations. Human bones, in an archaeological context, are normally light brown to dark brown, and are often easily distinguishable from surrounding sediments. In contrast to most of the animal bones that would be present in a midden deposit, human bones are usually intact. However, many human burials can be incomplete or contain scattered, partially decayed bones that fragment easily. Also present may be funerary objects associated with the burial. All burial sites must be reported immediately.

Action plan for cultural heritage

Archaeological deposits: archaeological deposits can be darker than surrounding sediments and can be distinguished from natural soils by the following attributes, individually or in combination: black soil, patches of reddish brown or yellow-brown fire-stained (oxidized) sediments, scatters or concentrations of archaeological material such as pottery, stone tools, metal implements and slag.

Monitoring land-clearing activities will assist in determining if deeply buried subsurface deposits are present within the Project area. Monitoring is defined as active observation of earth-moving or other work that could adversely affect cultural resources within the Project Area and includes, as warranted by circumstances: observation, data recording, data recovery, archaeological excavation, photography, laboratory analysis and cataloguing, ancillary special studies, and production of a written report that meets current professional archaeological standards. Such monitoring activities are conducted by qualified archaeologists.

Monitoring, by appropriately qualified personnel, may occur to achieve several objectives:

- To ensure that a site is avoided (including checking to ensure the boundaries of a site are properly fenced, or marked) and/or not inadvertently damaged if it is buried;
- During and just after surface clearing activities to collect surface artifacts and record features uncovered during clearing, and
- During earth moving activities (grading, trenching) to assess if buried sites are present.

To facilitate this one to two month period of archaeological monitoring, specified information must be furnished by the SVIP: (1) Layout plans showing all developments, detailing proposed impacts to the Project area and (2) the proposed construction schedule or activity to be monitored, with types of excavation and/or earth-moving identified.

If potentially important cultural materials are encountered during construction, work will be halted and could continue elsewhere in the area until the archaeological monitoring team evaluates the find. If the Project archaeologist determines that the discovery is important, appropriate salvage excavations will be formulated and implemented (see below “Salvage Excavations”).

The Environmental specialist of the Construction contractor, must be informed of the monitoring team presence and authority to halt and/or relocate construction work. The Construction contractor shall inform all personnel of the monitoring team role. It will follow excavations and construction as closely as conditions require, making all reasonable efforts for safety and non-interference with construction.

An initial two months archaeological monitoring period (until excavations have reached the maximum depth at which important remains could be expected to occur) is budgeted in this ESMP.

Chance Finds Procedures and salvage excavations in case of discoveries

Considering the considerable volume of soil that will be excavated, the Project will have to apply ‘chance finds’ procedures, which set out what is to be done when cultural heritage objects are unexpectedly uncovered during earth work, especially during the absence of an archaeological monitoring team. The following procedures will need to be followed:

- Work should be stopped in the vicinity of the finding (very often work can be continued at another part of the project to avoid costly delays).
- Notify the Supervising Engineer or his/her designee. The finding should be treated as a cultural heritage incident and reported.
- Notify the Malawi Department of Antiquities in the case of any archaeological or palaeontological finds.

Action plan for cultural heritage

- Use heritage experts and relevant community members to assess the significance of the discovery, and report it as required by law.
- Decide on the right way to manage the discovery in consultation with the relevant community groups and/or archaeologists. Resume work if permitted and agreed by the Department of Antiquities and the Supervising Engineer.
- Excavate the discovery: under controlled circumstances data collection during excavation can provide important information concerning a site. Examination of the pit excavation profile often reveals a range of features, which may not be obvious in smaller excavation units. Cleaning and examination of the excavation profile can reveal buried sites, features (*e.g.*, hearths, pits), and concentrations of artifacts. Based on the type of artifacts and features found, samples of artifacts, and soils may be removed for further analysis and processing; detailed photographs should be made, and profile drawings completed. Sites deemed as of high priority, should be tagged and any land-clearing activity needs should continue at a neighboring area to allow the monitoring team enough time to salvage-excavate the discovered features. This activity requires that the individuals performing such work be experienced in salvage excavations. Sites that are problematic to classify may undergo shovel test pits. Shovel test pits or augers may be used to excavate small holes to a depth of approximately one meter below surface during surface survey activities. The purpose of these excavations will be to rapidly verify the horizontal and vertical extent of a site's cultural properties and its scientific importance.

The main purposes of archaeological rescue excavations are to:

- Determine depth of cultural deposits;
- Determine presence/absence of various kinds of artifacts, charcoal, structural remains, and human remains;
- Delineate further site boundaries;
- Delineate further site age;
- Collect special samples (radiocarbon, slag, pollen, etc.).

Avoidance of Construction Related Impacts

A number of methods may be implemented to avoid direct impacts to a cultural resource. Depending upon the type of resource, implementation of one or more of the following methods may be recommended. Avoidance of important sites is generally the preferred option since potential direct site impacts are completely averted. If a site cannot be avoided then steps are generally implemented to reduce direct impacts. Depending on the context, avoidance, relocation, intentional site burial or data recovery may be most appropriate.

Avoidance is one of the primary methods to mitigate direct impacts to important cultural resources. In the case of this Project, avoidance of impacts can often be most easily accomplished by adjusting or rerouting the project activity, if possible, to outside of the boundaries of the cultural heritage resource. For instance, all sacred sites as well as cemeteries that have been identified have been classified as 'High priority sites and have been avoided (see PCCPLTRPF). This recommendation goes hand in hand with the IFC's Performance Standard 8 on critical cultural heritage, which states that, "the client should not remove, significantly alter, or damage critical cultural heritage". In exceptional circumstances, when impacts on critical cultural heritage are unavoidable, the client will use a process of Informed Consultation and Participation (ICP) of the Affected Communities as described in Performance Standard 1 and which uses a good faith negotiation process that results in a documented outcome. The client will retain external experts to assist in the assessment and protection of critical cultural heritage. In addition the client will need to meet the following requirements concerning critical cultural heritage:

- Comply with defined national or local cultural heritage regulations or the protected area management plans;

<table>
<tr><th colspan="2">Action plan for cultural heritage</th></tr>
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Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project; and
Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area.

In planning for Relocation, it is important to consult with community members as well as regulatory bodies over issues such as:

how the material should be handled;
who should be involved or present during the relocation processes;
what, if any, ceremonies should be performed and who should perform these;
where should the features be relocated to; and
how they should be managed in their new location.

Intentionally burying sites under protective cover can also be an effective protection technique. Depending upon types of artifacts present, existing soil characteristics (e.g., pH characteristics and intensification of wet-dry cycles) burial can often provide protection from the compression effects of heavy equipment. Looting potential is also reduced. When a site is buried, soils used to cover the site should be free of artifacts. Occasionally a soil with a distinctive color (e.g., sand) is placed over the site and then the major fill. This permits future removal of the fill if needed, and a method to distinguish, at least for a period of time, the fill soils from the natural surface. Prior to burial, diagnostic artifacts are often collected from the surface of the site. Other types of artifacts may be collected if the site is to be permanently buried. Covering a property with surface features is generally not appropriate.
</td></tr>
<tr><td>Approximate cost ($US)</td><td>Archaeological rescue excavations: 2 expert/month (2 archeologists of the MDoA)

Contractor training and awareness program : 0.2 expert/month (2 archeologists of the MDoA)

Initial one to two months archaeological monitoring of land transformation activities during construction in Phase I : 4 expert/months (2 archeologists of the MDoA)

= 6.2 expert/months = 10,000 USD

For any chance finds, cost for salvage excavation will be paid by the project proponents to comply with national regulation (the Construction contractor is not financially responsible for salvage excavation)</td></tr>
<tr><td>Responsibilities</td><td>Archaeological monitoring team made of 2 archeologists from the MDoA will be in charge of :
• Archaeological rescue excavations
• Contractor training and awareness program
• Initial one to two months archaeological monitoring of land transformation activities during construction
• Salvage excavations in case of discoveries

Construction contractor to implement the chance find procedure (and the MDoA)</td></tr>
</table>

Action plan for cultural heritage	
Schedule	Initial one to two months archaeological monitoring: before beginning of work and shall be carried out in Phase I Training and other activities : throughout the construction of Phase I
Monitoring	Archaeological monitoring of land transformation activities is the main monitoring activity. In addition, work supervision shall take place to ensure compliance with contractual environmental and social measures (E&S measures) including cultural heritage. This work supervision will be done by the Supervising engineering firm. The contractor contract shall clearly state the chain of responsibilities and define the authority of the engineer firm. He shall, in case of non-compliances, have the authority to delay payments and stop construction. The Supervising engineering firm will designate an Environmental supervisor who will be on-site on a monthly basis to audit E&S measures, to meet and carry out a site visit with the designated Environmental specialist of the construction contractor and the Archaeological monitoring team and to write a monthly compliance report.
Performance indicator(s)	The number of salvaged high priority sites is the main performance indicator. The number of non-compliances regarding the Action Plan is also a performance indicator
Responsibilities for monitoring	Archaeological monitoring team (MDoA) Environmental specialist (from the Supervising engineering firm) Environmental specialist (from the construction contractor)
Outcome, frequency and disclosure	Artifact collected during archaeological rescue excavations shall be published in peer-reviewed journals and conference papers Monthly compliance reports (by the Supervising engineering firm)

9.1.4 Action Plan for gender and youth

The tables that follow were produced by COWI (2016) in the Gender and Youth Strategy (CCPLTRPF Consulting Team). The proposed gender and youth activities are activities that stakeholders will implement to address gender and youth issues. The responsible institution is the organization that will implement the activity and will be held accountable for the activity.

PREPARATORY PHASE (SOME OF THE MEASURES WERE CARRIED OUT BY THE CCPLTRPF CONSULTING TEAM).

Main issues	Mitigation measures to be implemented (or that were implemented)	Responsible Institution
	Ensure that all terms of reference for consultants and staff have a gender aspect/expert in them	SVIP Management

Main issues	Mitigation measures to be implemented (or that were implemented)	Responsible Institution
Recruitment and capacity of consulting / project teams/ missions	Train/orient all project staff and consultants on gender and youth issues, including orienting them on SVIP	SVIP Management and Consulting companies
	Where possible, ensure that the composition of staff at all levels is at least 50% women, to be in line with the 50:50 policies	Consulting companies Project Team
Implementation of stakeholder consultation process, community mobilisation and engagement for the SVIP	Implement communication activities at all levels in the project area (ADC and VDC levels)	CCPLTRPF Consulting Team
	Develop community mobilisation guidelines that incorporate gender issues.	Consultants and District Council
	Ensure information education and communication materials are accessible to the illiterate, especially women.	Consulting companies Project Team
	Ensure women, youth and the poor are included in all field level activities, meetings and capacity building processes.	Consultants and District Council
Preparatory studies, baselines data collection, analysis and reporting	Orient all enumerators on gender and youth issues related to Chikwawa and Nsanje	Consultants
	Ensure that all data collection instruments are able to collect gender and youth disaggregated data.	Consultants
	Ensure that all data collection tools are gender/youth-audited by the CCPLTRPF Gender and Youth Expert	Consultants
	Ensure that data is analysed and disaggregated by sex and age to capture gender and youth issues.	Consultants
Institutional development and formation of irrigation options, farmer management entities, SVIP governance and management committees	Ensure that gender and youth issues are used as criteria for choosing the SVIP irrigation institutional model.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that women, youth and poor people are represented and actively participate in irrigation management entities	MoAIWD, National Youth Council, District Council and Technical Teams
	Train all irrigation management entities on gender and youth issues	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure women, youths and poor are included in the management, governance, implementation and technical teams of SVIP	MoAIWD, National Youth Council, District Council and Technical Teams

Main issues	Mitigation measures to be implemented (or that were implemented)	Responsible Institution
	Build capacity of individual farmers on gender and youth issues, including decision making at household level	MoAIWD, District Council, Technical Teams, National Youth Council and Farmer Organisations
	Ensure no discriminatory practices are being used to limit participation of women and youth.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that voices of women, youths and poor are heard by management of the water management entity	MoAIWD, National Youth Council, District Council and Technical Teams
	Implement positive discrimination, if the irrigation or farmer management entities do not have representation from women, youths and the poor	MoAIWD, National Youth Council, District Council and Technical Teams
Land redistribution, resettlement policy framework and grievance mechanism	Ensure that PAPs are gender, age and poverty defined, so that it is known who is most affected by resettlement	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that women, youths and poor are also provided with land in the schemes. Government can lease off land and reallocate equitably amongst beneficiaries.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that women and youths and poor who lose land are appropriately compensated. During compensation, ensure that all household members have access and control of the compensation by adopting a household livelihood and planning approach.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that District Council teams, Committees and experts that value lost assets during compensation, value land as well, not just structures on it.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that District Council teams, Committees and experts that value lost assets during resettlement planning do not sexually abuse women or girls (or any form of gender based violence)	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that land assessment teams include women and youths and ensure that land losses of female headed households are assessed by female officials/experts. Whoever does the valuation should be gender trained.	MoAIWD, National Youth Council, District Council and Technical Teams

Main issues	Mitigation measures to be implemented (or that were implemented)	Responsible Institution
	Ensure that gender and youths sensitive spaces are created for women to lodge their grievances on unfair practices.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that grievances by women are handled by women. Traditional leaders should ensure that women are included in any primary justice structures that they have in place or are to be created.	MoAIWD, National Youth Council, District Council and Technical Teams
	Encourage land being registered jointly in the name of the woman and the man.	MoAIWD, National Youth Council, District Council and Technical Teams
Monitoring and evaluation of gender and youth activities.	Ensure that the intervention logic of any project being designed has SMART and gender and youth sensitive indicators and take into account poverty	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that monitoring the progress made in applying gender and youth approaches in irrigation projects is regularly undertaken.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that all indicators at input, output, outcome and impact level are disaggregated by gender, age, household headship, location and marital status, where necessary. Indicators that can be used are included in the annexes.	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that programme targets are gender and youth disaggregated	MoAIWD, National Youth Council, District Council and Technical Teams
	Ensure that monitoring and evaluation terms of reference and teams have gender and youth expertise.	MoAIWD, National Youth Council, District Council and Technical Teams

PROJECT CONSTRUCTION AND OPERATION PHASE

These mitigation measures developed by COWI (2016) aim at the project implementation phase (construction and operation).

Main issues	Mitigation measures to be implemented	Responsible Institution
	Promote SVIP as multiple-use (irrigation, domestic and livestock uses) irrigation and water programme.	MoAIWD

Main issues	Mitigation measures to be implemented	Responsible Institution
Policy level commitment to mainstream gender and youth issues in the SVIP		in collaboration with other line ministries and government departments
	Ensure that women enjoy de jure and de facto equality in access to land and other property, including inheritance and purchase.	MoAIWD in collaboration with other line ministries and government departments
	When water management institutions do not have any or few women and youth, introduce appropriate institutional measures, such as minimum quotas for women and youth to increase participation of women and youths	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Provide improved coordination among concerned water management institution to facilitate the implementation of multiple-use water projects.	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Support equal employment opportunities in water management institution for both genders and for youth and older people.	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Provide and support capacity building around gender and youth issues in water management entities with particular attention to extension staff.	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Ensure effective linkages with gender and youth ministries and CSOs	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Conduct participatory assessments to understand the social organization of agricultural production and the specific gender and youth division of labour in the project area.	Consultants

Main issues	Mitigation measures to be implemented	Responsible Institution
Land administration, allocation and tenure arrangements for women, youth and poor people	Implement mechanisms to ensure that the landless are also provided land and participate in irrigation activities	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	If irrigation schemes involve land titling or retitling, new land titles should be granted to women or to husbands and wives jointly. Youths should also be included.	MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Disaggregate land ownership data by gender and age to understand land ownership issues amongst women and youth.	Consultants
	Conduct local/grassroots advocacy work with traditional leaders to improve land ownership by women and jointly by woman and man	NGOs, MoAIWD, National Youth Council, District Council and Technical Teams, Water management Institutions
	Ensure that irrigation schemes have both commercial as well food security objectives by adopting integrated farming systems, nor jus commercial mono-cropping	Scheme management
Construction of various irrigation infrastructure and installation of equipment	Ensure that women and youth are involved so that they also benefit from the employment created, where feasible.	Contractors
	Ensure gender sensitive resettlement in terms of targeting, compensation and provision of services to new locations.	MoAIWD, National Youth Council, District Council and Technical Teams, Water Management Institutions
	Provide social safeguards to protect women and girls from being sexually abused	MoAIWD, National Youth Council, District Council and Technical Teams, Water Management Institutions
Gender and youth division of labour	The irrigation scheme should provide labour for irrigation activities in the farm. The irrigation model should not allow farmers to work using their own labour in the blocks.	MoAIWD, National Youth Council, District Council and Technical Teams, Water Management Institutions

Main issues	Mitigation measures to be implemented	Responsible Institution
	Ensure that planners involved in the projects are aware of women's and youth contributions to farm and household production to enable them design plans that are appropriate for women.	Planners, DEC members, irrigation officials
	Irrigation designs should carefully evaluate the availability of women's and men's work in the family and expected impacts of intervention on women's and men's income, time use, and social power.	Water Management Institutions, DEC members, community
	Community labour contribution to irrigation projects should take into consideration the contribution of women and men at household level. Where possible, this labour should be for to compensate for time lost.	Water Management Institutions, DEC members, community
	Provide appropriate labour and time saving technologies to those beneficiaries, especially those who are already overburdened with labour at household level.	Water Management Institutions, DEC members, community
Access and control over economic and social benefits from participation irrigation services	Income from irrigation at household level should be transparently used by adopting a participatory expenditure management at household level	Irrigation Scheme Management
	Provide equal access to training, finance/credit and related irrigations services for men, women and youths.	Water Management Institutions, DEC members, community leaders
	Provide training opportunities for the youth and women in advocacy and engagement and inclusion	Water Management Institutions, DEC members, community leaders
	Provision and promotion of (agriculture-related) vocational skills for youths which will enhance the growth of the sector	Water Management Institutions, DEC members, community leaders
	Monitor use of irrigation income/earnings at household level	Water Management Institutions, DEC members, community leaders
	Ensure that by-laws of irrigation schemes/WUAs or its constitution provide equal opportunities for all members. Ensure that it has some affirmative actions that favour the disadvantaged groups.	Water Management Institutions, DEC members, community leaders

Main issues	Mitigation measures to be implemented	Responsible Institution
Farmer management entities and other institutional arrangements.	Ensure that there are no discriminatory practices that are being used to limit participation of women and youth, even when bylaws provide for equal opportunity. These may include high membership fees, landlessness, access to water etc.	Water Management Institutions, DEC members, community leaders
	Implement positive discrimination, if the criteria for irrigation scheme or WUA membership is discriminatory	Water Management Institutions, DEC members, community leaders
Socio-economic empowerment of women and youths in and around irrigation schemes	Improving access to finance to enable women and youths participate in irrigation technology and value addition	Water Management Institutions s, DEC members, community leaders
	Integrate/promote village loans and savings and income generating activities in irrigation schemes	Water Management Institutions s, DEC members, community leaders
	Training women and men on human rights and the importance of women's participation in decision making at all level	Water Management Institutions s, DEC members, community leaders
	Introducing functional literacy classes in water management institutions to improve women's and illiterate men's ability to read and write so that they can effectively participate in agricultural decision making processes	Water Management Institutions s, DEC members, community leaders
Designing and implementing multiple use irrigation services.	Implement a strong consultation process during the planning and implementation stages to understand gender dynamics	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	During implementation, conduct training programs addressed to women to help them manage and maintain the points of supply will also be necessary. Ensure that planners understand women's and girls' water needs as women and girls will be the main users of those watering points	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Translate multiple water needs into affordable small- and medium-scale technical irrigation designs	Consultants and DEC members, Water management institutions, local leaders and gender CSOs

Main issues	Mitigation measures to be implemented	Responsible Institution
	Ensure that water points are created for domestic and other social uses, especially livestock.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Introduce community water points because tap water may not be feasible as houses are not mostly permanent.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
Irrigation scheme management and farmer management	Ensure that all farmers aggregate their land so that no single farmers are identified by or works on their own land.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	When forming groups, ensure that membership fees are affordable and those that cannot afford are supported with cash transfers to be able to pay	Consultants and District Council
	Adopt management arrangements that have been used for the Phata Irrigation Schemes where possible	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Ensure that farmers are organised in a way that ensure women and youth participate in the activities of the scheme and benefit from it	Irrigation Scheme Management
	Implement gender training programmes for staff and communities around the schemes	Irrigation Scheme Management
	Implement gender sensitive transparent and accountable irrigation revenue management	Irrigation Scheme Management
	Adopt agronomic principles that use technology other manual labour and ensure that farmers are paid when they provide labour.	Irrigation Scheme Management
Reaching the poorest and most vulnerable groups.	Ensure that the vulnerable and often-overlooked groups such as women, youths, PLHIV, elderly, landless workers and poor women farmers are included in all stages, including during consultation, resettlement and land reallocation, during implementation and monitoring and evaluation.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs

Main issues	Mitigation measures to be implemented	Responsible Institution
	In order to know who vulnerable rapid vulnerability assessments should be included in the consultation processes.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
Monitoring and evaluation of gender and youth activities.	Ensure that the intervention logic of any project being designed has SMART and gender and youth sensitive indicators	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Ensure that monitoring the progress made in applying gender and youth approaches in irrigation projects is regularly undertaken.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Ensure that all indicators at input, output, outcome and impact level are disaggregated by gender, age, household headship, location and marital status, where necessary. Indicators that can be used are included in the annexes.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Ensure that programme targets are gender and youth disaggregated	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	Ensure that monitoring and evaluation terms of reference and teams have gender expertise.	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
Gender and youth capacity at various level	<u>Cabinet level:</u> • Presidential directives • Gender and youth briefings and awareness sessions • Policy briefs on gender and youth	MoAIWD

Main issues	Mitigation measures to be implemented	Responsible Institution
	<u>Ministries and departments</u> • Establish focal points in ministries • Train planning and monitoring and evaluation officers on gender and youth • Joint planning and monitoring teams • Technical support on gender and youth	MoAIWD
	<u>District Executive Committees Members</u> • Allocate resources for gender and youth analysis, gender and youth training and mainstreaming • Train of the District Executive Committee on gender and youth • Establish focal points in sectors • Joint planning and monitoring teams • Technical support on gender and youth	MoAIWD
	<u>Community structures</u> • Orient local leaders (such as Councillors, Traditional Leaders, Religious Leaders on gender and youth issues and women's and youth' rights • Train of the ADCs, VDC and AECs on gender and youth • Conduct gender and youth analysis together with District and Community Teams • Train community-based volunteers in gender and youth issues such as gender and youth participation in decision making • Conduct participatory gender and youth analysis, planning and monitoring at community level • Establish local gender and youth forums or advocacy groups	Consultants and DEC members, Water management institutions, local leaders and gender CSOs
	<u>Household level</u> • Sensitization of men, women and youth on the roles and importance of women and youth and women's and youth' rights	Consultants and DEC members, Water management institutions, local leaders and gender CSOs

STAKEHOLDER ROLES

National level

At the national level, the Ministry of Agriculture, Water and Irrigation Development and Irrigation (MoAIWD), will ensure that guidance incorporates gender issues that have been identified and included in the Gender and Youth strategy. The Ministry will ensure that planners involved in the project have requisite gender analysis skills and utilise gender lens in designing the scheme. The Ministry will work closely with the Ministry of Gender, Community Development and Children Affairs and the National Youth Council to ensure that gender issues are implemented and reported in a coordinated way.

District level

At district level, the District Executive Committee will appoint a SVIP committee which will oversee implementation of the gender and youth interventions as prioritised in the Gender and Youth strategy. The DEC will monitor gender mainstreaming and affirmative actions at implementation level. It will ensure that the programme is implemented in a participatory and consultative way to ensure that vulnerable groups such as women, youths, poor men and people living with HIV are engaged, participate and benefit from the programme.

Community level

At community level, water management entities created through the SVIP, will ensure that a certain minimum percentage of women and youths are involved and benefit from the programme equally with men. They will implement affirmative actions on areas where gender gaps are identified. Contractors and consultants will ensure that women, youth and other vulnerable groups are consulted regularly through systematic processes and their views reflected in irrigation designs and specifications. They will create gender capacities within their staff and experts and ensure that all gender and youth issues identified through this guideline are understood and addressed by their teams. This requirement will also be included in their contracts, and the contracts are not engendered, MoAIWD will negotiate for an additional MoU to ensure that gender issues are included. The CCPLTRF Consultant (COWI) will also monitor adherence to the gender strategy, at the feasibility phase.

PERFORMANCE INDICATORS

COWI (2016) has developed performance indicators to monitor gender and youth aspects. At time of monitoring, an independent consultant will be hired to carry out the monitoring as presented hereunder as well as the National Youth Council and the District Council.

Indicators	Type	Method of data collection
Number and frequency of women, men, youths, and other disadvantaged persons consulted during detailed design and implementation	Output	Meetings or process records/registers
Percentage of women and men, boys and girls actively participating in planning sessions for water allocation program for drinking water and agricultural irrigation	Output	Meetings or process records/registers
Percentage of women and men, boys and girls actively participating in water entities	Output	Meetings or process records/registers

Indicators	Type	Method of data collection
Percentage of women and men, boys and girls members of operations and management committees of irrigation projects	Output	Meetings or process records/registers
Women, men, boys and girls and other vulnerable groups in positions of management or leadership in farmer management entities	Output	Meetings or process records/registers
Community satisfaction (disaggregated by gender and age) regarding water distribution schedules and access	Outcome	Household surveys
Access of women and men, boys and girls to support services, such as credit and extension (such as percentage of women in agricultural training and of women clients of credit institutions)	Outcome	Household surveys
Percentage of women and men, boys and girls among total trainees receiving training in the appropriate use of irrigation for high-value crop production	Output	Training reports
Access of landless/vulnerable women and men, boys and girls to water from irrigation schemes	Outcome	Household surveys
Among surveyed women and youths, in target group, percentage rate their access to water for agricultural and domestic use as having improved during the period covered by the program or project	Outcome	Household surveys
Changes in relevant dimensions of well-being, disaggregated by gender, age and wealth group: food and other products, household income, labour and other costs for water conveyance, water quality for drinking, and water quantity for hygiene	Impact	Household surveys

MONITORING

The ESMP recommends that an independent consultant be hired to monitor the proposed indicators and work in close collaboration with the Ministry of Gender, Community Development and Children Affairs and the National Youth Council.

10. ADDITIONAL MEASURES FOR GOVERNMENT ATTENTION

10.1 MAINTENANCE AND STATUS OF INFRASTRUCTURE

It is recommended that the Bulk Water Operator be responsible for maintenance of infrastructure proposed in this ESMP. Other responsibilities include:

- Bridges (cattle, pedestrian, and vehicle): Bulk Water Operator
- Safety stairs and ladders for villagers to bathe and wash and to exit in case of falls: Bulk Water Operator
- Invasive fish barrier: Bulk Water Operator with African Parks (under Memorandum of Understanding)
- Water intake trash rack (to hold back debris, crocodiles and floating Water Hyacinth): Bulk Water Operator
- Walls around the open canal section in MWR : Bulk Water Operator

In order to prepare for long term risks and to ensure that stakeholders interests and mainly those of parks are not affected by others, clear chain of responsibilities have to be defined taking into account all possible situations and “worst case scenarios”. A Memorandum of Understanding (MoU) shall be signed between African Parks and the Bulk Water Operator for MWR to ensure long-term commitments. It is recommended that this MoU clearly state that African Parks and DNPW shall never be held responsible for animal damage to Project infrastructures and that maintenance of all wildlife-related infrastructure shall be paid for by the Bulk Water Operator (including maintenance of the walls around the Main Canal within the Majete Wildlife Reserve).

The bylaws for all Project-related farmer associations shall prohibit people from throwing garbage in the canals, building informal (and often dangerous) bridges, or otherwise degrading the canals. Therefore, the Bulk Water Operator will collaborate with appropriate Government agencies to help ensure adequate law enforcement.

STATUS OF THE FEEDER CANAL INSIDE MWR

The canals shall remain part of the MWR and the right-of-way of the canal shall not be alienated from MWR. Access to the intake and canals for maintenance will be managed in accordance with African Parks access restrictions (and inspection to avoid poaching). This means that there shall not be any independent access gate to canal maintenance road inside MWR. The Bulk Water Operator staff shall enter and exit MWR as prescribed under the forthcoming MoU with African Parks.

In the case of other civil works within the Majete Wildlife Reserve, their status shall be clearly defined in the Memorandum of Understanding with the Bulk Water Operator. African Parks cannot be held financially responsible for the maintenance of any new SVIP infrastructure (road, canal, wall, fish barrier, etc.).

10.2 BENEFICIARY COMMUNITIES AROUND LNP

Since communities in Zones A and B will benefit from the SVIP, and since most illegal wood cutting activities and illegal grazing originate from these communities, part of their inclusion in the scheme shall be conditional upon a signed agreement to comply with the rules prohibiting wood cutting, grazing, or other unauthorized activities within Lengwe National Park (this also applies to MWR and surrounding communities). Village headmen shall sign a contractual agreement or some form of formal engagement to respect this rule prior to their inclusion in the scheme. The SVIP shall be used as an opportunity to request some environmental engagement in exchanges of irrigation.

10.3 MANAGEMENT OF THE RESERVOIR FOR SEDIMENTS AND FALLS

Dredging will extract more than 500,000 m^3 of fine sediment from the reservoir. Transport of these sediments through MWR should be avoided (as transport will require about 1 truck per every 2 minutes through the reserve). Discussion shall be engaged at Government level about ways to dispose of this large amount of sediment and about the need to avoid storing them within MWR. Before dredging commences, the contractor will have to prepare a dredging management plan that has to be reviewed and approved by the PIU.

Although not a primary reason for visitors to come to the Majete Wildlife Reserve, the Kapichira Falls serve as a seasonally valuable tourist attraction.During much of the dry season, this environmental flow is not guaranteed and the Kapichira Falls sometimes dwindle to a trickle. The Project will support the development of operational rules for Kapichira Reservoir between EGENCO and the scheme operator under MoAIWD, based on monitoring during project duration. To inform the operating rules, the project will support monitoring of the actual flows over the fall during SVTP-I before canal operation starts, under the auspices of both EGENCO and MoAIWD to have better reference of the flow situation over the falls in the wet and dry season as well as localized biodiversity, and to include consideration for safeguarding minimum environmental releases as determined necessary over the spillway for adoption when operation commences for Phase I, to be updated in SVTP-II prior to construction of Phase II. The project will also carry out continued monitoring of environmental status of Elephant Marshes under the NRM component.

10.4 SELECTION OF A CONSTRUCTION CONTRACTOR

The selection of the construction contractor will require a conscious decision by the Project proponent and financing agencies prior to tendering for a construction contractor. In many observed cases by the Consultant, the terms of references and contracts for construction contractors do not include measures developed in the ESIA and ESMP. In addition, since many measures proposed in this ESMP involve a cost for the construction contractor, the call for tender shall be clear on the requirement to quantify health and safety measures and other measures in the Bills of Quantities (PPE, speed breakers, construction fences, etc.), including the requirement to prepare a CESMP. .

The bidding document and contract shall reflect the new requirements of the World Bank as highlighted in the document, “Summary of Environmental, Social, Health and Safety (ESHS) Enhancements to Standard Procurement Documents (SPDs) & Standard Bidding Documents (SBDs)”.

One of its requirement is that: “Applicants/Bidders/Proposers are required to make a declaration listing any civil works contracts that have been suspended or terminated by an employer and/or performance security called by an employer, for Environmental, Social, Health and Safety reason/s.”

- The bidding process shall be a two-step one with pre-selection and selection
- The Procurement specialist shall include “special pre-selection criteria” such as :
  - Number of past failures to complete contracts.

- Length of time in business.
- Self-assessment of past client relationship.
- Self-assessment of other relationships (surrounding communities and stakeholders) presenting past claims by NGOs, claims by traditional authorities, etc.
- Description of past injuries and deaths on construction site
- Description of any past violations of environmental laws or regulations for which the applicant (as contractor or sub-contractor) had been held responsible by any governmental authority
- Past projects concerned by an ESIA, ESMP and RAP and monitoring and auditing activities.

- A "Tender Panel" shall be put in place for the pre-selection process. This panel shall assist the Procurement Specialist in the evaluation of each criteria. At a minimum, this panel shall include the full participation of DNPW, which is legally responsible for Majete Wildlife Reserve as well as Lengwe National Park.

For each of these criteria, the bidder shall provide answers and the procurement specialist shall set thresholds. Investigation could be done by the procurement specialist in compliance with national regulation.

10.5 INVOLVEMENT OF AFRICAN PARKS AND THE DNPW IN THE TENDERING

These measures need to be discussed at Government level:

- African Parks and the DNPW should have a right to review the Design for the upcoming Phase I and to propose improvements. Since Phase I construction is expected to begin by 2018, African Parks (through DNPW) shall also be involved in the pre-qualification selection of the construction contractor as advisors (in the Tender Panel).
- African Parks and the DNPW should have the full authority to stop work and take quick actions in cases of serious non-compliances and offences inside MWR, without having to go through long processes of communication. This authority shall be formalized in a MoU (or similar document) between the Contractor, Supervising Engineer, DNPW, African Parks, and MoAIWD before construction starts and shall be added in the contractor's contract.

10.6 LAW ENFORCEMENT AGAINST POACHING AND GENDER BASED VIOLENCE

To minimize the risk of sexual harassment and gender based violence due to the influx of male workers in the Project area, it will be important to mobilize and reinforce the presence of the local law enforcement in the area.

The local law enforcement shall send a strong message to workers who will engage in prostitution, sexual harassment and poaching. Induction training about sexual harassment shall be given to all workers. During these induction trainings, the local law enforcement shall be present to explain the national laws that make sexual harassment and gender-based violence a punishable offence.

Avoiding the creation of shantytowns from people attracted to the site to find work is difficult when local enforcement are limited in number. Local law enforcement have to be aware of the risk and shall be ready to answer any complaints about illegal settlement and collaborate with traditional authorities on a regular basis to rapidly take action.

11. OTHER MEASURES

RESETTLEMENT ACTION PLAN

Ng'ona lodge (also called Mwembezi lodge) is a private property beside MWR. This property will be affected by the Feeder canal RoW and work. Compensation shall be paid to the owner in accordance with the SVTP Resettlement Action Plan (RAP). Mitigation and compensation includes dust control (with the same frequency as MWR), access road repair, compensation for loss of business, production of information pamphlet for clients, compensation for loss of trees, etc.

During the January 2015 flood, the Ruo River changed its course and since then discharges directly into the Tomoninjobi Pool within the Elephant Marsh, rather than having a confluence with the Shire River downstream of Chiromo Bridge. From an environmental perspective, this natural shift in the Ruo River's course has resulted in higher flows into the southern part of the Elephant Marsh, particularly during the wet season. A good way to maintain this additional beneficial flow to the Elephant Marsh would be to maintain this new Ruo River channel and to provide voluntary resettlement options to people who are now more vulnerable to floods since the Ruo River shifted its course.

It must be noted that neither SRBMP, nor any other World Bank-supported projects in Malawi, intend to support diverting the Ruo River channel for flood management in ways that could reduce inflows to the Elephant Marsh. Any future works involving the Ruo River--possibly involving lower-impact flood management approaches--would need to be approved by the Shire River Basin Authority, which has a mandate to consider environmental management (including wetlands conservation) in the planning of new civil works in the Shire Basin.

BULK WATER OPERATOR

- Good maintenance of canals is important to fight schistosomiasis; this should be highlighted in the call for tender for the Bulk Water Operator.
- In the call for tender for the Bulk Water Operator, it is recommended to require that tendering firms provide a health and safety protocol for maintenance work in canals and at the water intake.
- In the call for tender for the Bulk Water Operator, it is recommended to require a protocol for domestic animal and wildlife removal from canals in collaboration with DNPW and to require that this activity be budgeted.
- A Memorandum of Understanding (MoU) shall be signed between African Parks and the Bulk Water Operator to ensure long-term commitments. It is recommended that this MoU clearly state that African Parks and the DNPW shall never be responsible for animal damages to project infrastructure and that maintenance of all wildlife-related infrastructure proposed in this ESIA shall be done (and budgeted) by the Bulk Water Operator (including the walls around the canal).
- The Bulk Water Operator shall be aware of the environmental and social risks associated with the Project.
- To limit the risk of human or animal drownings, the water intake shall never operate rapidly; gates shall be opened progressively to avoid creating a sudden increase of water in the canal.

SUPERVISING ENGINEER

The Supervising engineer shall ensure that the Project is phased. Phasing the work inside MWR and Ng'ona lodge private property in three distinctive confined areas (so that no work takes place in several areas) is absolutely necessary:

- "Heavily impacted area" (first phase)
- Mwembezi lodge private property (also called Ng'ona lodge) (right outside MWR) (second phase)
- Southern MWR (third phase) from Siphon #2 to Siphon #3

Large baobab and small communal forests shall be avoided (not clear-cut) when developing the command area. In advance of any clearing of native trees or shrubs, the following protocol be followed by the Supervising Engineer in charge of work plans and supervision of work:

- Make sure that there are no protected trees, shrubs or plants (National Parks and Wildlife Act (Act No. 11 of 1992) by requesting a clearance from the Department of National Parks and Wildlife (DPNW);
- Establish contact with the DNPW to know what is the procedure in the case of any protected tree in the canal right of way;
- Make sure the forest or bush does not hide a graveyard by talking to village headman (part of the Code of Conduct);
- Make sure that all cut trees return to their owners;
- Make sure that borrow pits, roads and other infrastructures do not destroy protected trees.

The following two pictures show, based on the Consultant's experience with the construction of irrigation schemes, two failed mitigation measures to safeguard protected trees and the reason why they failed. They are shown as examples to avoid.

Source: BRLi, 2017

The construction contractor took the advice from the Supervising engineer to protect the tree at the borrow pit site because of its protected status. However, the contractor's poor judgement and lack of environmental sensitivity has left the tree dead in one season. Roots were dried by exposed sun (the mound is about 5 meters high).

What should have been done: a protection area of at least 10 meters should have been delineated with construction fences, and the slope should have been more gentle to avoid affecting soil property where the tree is rooted.

Source: BRLi, 2017

The protected tree was in the way of the canal, the project spend tens of thousands to avoid it by creating a bend in the canal route. However, nearby excavation, the drainage ditch on the left, compaction and earth fill to create the maintenance road have left the soil impervious to water and has created drainage. The tree died in one season.

What should have been done: the avoidance measures should not have been implemented. Either (i) the tree should have been cut and the loss compensated in close consultation with authorities or (ii) the access road should not have completely surrounded the tree. In general, any action leading to changes in soil properties will affect the nearby vegetation.

12. MONITORING PLAN

This plan summarizes measures that were presented in previous sections.

12.1 SUMMARY OF RESPONSIBILITIES

The following table is a summary of actors' responsibility for mitigation, compensation and monitoring. Performance indicators are presented in the next section.

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
Measures to be included in the contractual documents of the construction contractor				
Mitigations for impacts 1 to 12 to be included in Environmental and Social Clauses (ESC) for Contractors		Construction contractor is fully responsible to budget these measures and to ensure their implementation Procurement specialist is responsible to include ESC measures in contracts	**External monitoring** 1. All contractual measures related to the ESMP shall be monitored on a monthly basis by the Supervision engineer from the Design consultant 2. EPC Project (same firm that designs and builds the Project) all measures shall be monitored by an independent Environmentalist **Internal monitoring** Monitoring of H&S and social measures related to the CC Monitoring of environmental measures related to the CC **Governmental monitoring** Governmental monitoring of compliance with national regulation regarding health and safety, workers condition and environmental protection	**External monitoring** Supervision engineer or an independent Environmentalist (EPC) **Internal monitoring** Health and Safety Specialist (from the CC) Environmentalist (from the CC) **Governmental monitoring** EAD **Inside MWR monitoring** African Parks and DNPW

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
			Inside MWR monitoring African Parks rangers and DNPW on a permanent basis during construction inside MWR	
Design study measures				
Fine tuning the command area	Specify Set-aside Lands, including (i) pre-identified natural habitats (riverine forests, thickets, dambos, etc.), frequently flooded areas, soils unsuited for irrigation, cultural heritage sites, and 100+m buffer zone around Lengwe NP and (ii) the woodlots, grazing lands, and other special-use areas identified during the participatory land use planning process	Design consultant Procurement specialist is responsible to include requirements and measures in contracts	Project financiers and Project proponents have to ensure that measures from the ESMP are indeed included in contracts for the Design study consultant The work of the Procurement specialist has to be monitored	
Crossing structures at tributary rivers	It is important to design culverts that allow for hydraulic transparency and fish movement	Design consultant Procurement specialist is responsible to include requirements and measures in contracts		
Infrastructure to design: Anti-Drowning infrastructures Canal options inside MWR Wall options in MWR Passes	Several specific infrastructures have to be designed	Design consultant		

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
Artificial wetland in MWR. Invasive fishes barrier		Procurement specialist is responsible to include requirements and measures in contracts		
Phasing work inside MWR and Ng'ona Lodge property	It is crucial to phase work in MWR and in the vicinity of Ng'ona property to minimize impacts	Design consultant Procurement specialist is responsible to include requirements and measures in contracts		
Compensation Plan for Majete Wildlife Reserve				
Compensation 1	Compensation for loss of business and funds for noise barriers and online communication and pamphlets	African Parks	The Resettlement Action Plan for Phase I shall include all economic impacts at MWR (based on this compensation plan), and develop a monitoring program for these impacts	The Resettlement Action Plan for Phase I shall determine the responsibilities for monitoring
Compensation 2	Alternative road for tourists to avoid the Hall-Martin road and alternative routing to access southern portion of Mkulumadzi road	African Parks	The Resettlement Action Plan for Phase I shall include all economic impacts at MWR, and develop a monitoring for these impacts	The Resettlement Action Plan for Phase I shall determine the responsibilities for monitoring
Compensation 4	Wildlife will have to be contained away from construction to avoid casualties MWR shall keep provision of extra law enforcement personnel to increase patrol Compensation for the 25 ha of forest cleared in MWR	African Parks	Monitoring of wildlife during construction is important in order to assess with scientific facts the effect of construction on wildlife	Full time biologists

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
	Upgrade of existing water points in MWR (Thawale, Nakamba and Nsepete)			
Mitigation 5	Buried canal	Design	Any changes in the Design regarding the buried canal has to be monitored, if the canal is no longer partially buried, wildlife overpasses will be required	Project financiers and Project proponents
Compensation 6	Walls along canals using rocks in a concrete matrix	African Parks	Monitoring of dead animals could take place at any time	Animal drowning monitoring as part of forthcoming MoU between BWO and DNPW
Action Plan against invasive fishes				
Mitigation 1	Design a fish barrier inside MWR to prevent possible invasion of Lower Shire/Zambezi fish species into Upper Shire River and then Lake Malawi	Design consultant for a fish weir	Monitoring of fishes is impossible since the weir will block fishes from moving upstream, however the state of the weir needs to be monitored	Due to the high risk, it is suggested that the EAD carries out regular site with the Bulk Water Operator and African Park (because it would located inside MWR) to assess the integrity of the fish weir. It is necessary that the Bulk Water Operator budget maintenance of the weir.
Action plan for health and safety				
Mitigation 1	Sensitization and health education by the health sector	Health specialists (Ministry of Health)	Monitoring of schistosomiasis shall focus on both urinal and intestinal schistosomiasis	Health specialists (Ministry of Health)

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
	Treatment of patients by oral praziquantel			
Mitigation 2	Large concrete stairs shall be built at each village crossed by a main canal Fixed hard plastic ladder shall be installed every 500 m on both side of the canal	The Design study The exact position of the stairs shall be assessed during the Final Canal Design, in consultation with communities.	Stability of fixed ladder shall be assessed Drowning hazards shall be monitored	Supervising engineering firm Bulk Water Operator
Action Plan for socioeconomic impacts				

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
Mitigation 2 and 6	The RAP should include social preparation and the incorporation of eligibility for priority in employment into the Entitlement Matrix, together with an official mechanism for providing names to the construction contractor and for follow-up to track the numbers of PAPs employed Avoiding the creation of shantytowns by involving local law enforcement	RAP DNPW and the local law enforcement	DNPW and the local law enforcement shall keep record of the type of offences associated with workers influx	RAP DNPW and the local law enforcement
Mitigation 4	Bridges shall be built to allow for access across canals where existing footpaths and roads are impacted Cattle bridges shall be built every km of main canals Footpaths shall also be designed to allow people to cross secondary canals Whenever a canal crosses a seasonal river, box culverts shall be large enough to allow people to walk under the canal	RAP to determine the best location of bridges and cattle troughs in consultation with communities Design study	The Supervising Engineer shall monitor the work to ensure that bridges are built as work progresses	Supervising Engineer

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
Mitigation 13	Construction of drinking spots along the main canals. Drinking spots shall take the form of pipes or cattle trough Measures to ensure that livestock owner benefit from crop residues and conflict management structures for livestock owners	Resettlement Action Plan (RAP) to determine the best location of cattle bridges and troughs in consultation with communities, Design study Ministry of Agriculture, Irrigation and Water Development	Grievance Redress Mechanism (GRM) and Grievance Redress Committee (GRC) (see Preparation and implementation of a Communications, Community Participation, Land Tenure and Resettlement Policy Framework (PCCPLTRPF)	Same actors as in the GRC
Action Plan for cultural heritage				
Phase 1: Pre-Construction Data Collection	Archaeological rescue excavations, laboratory Processing And Curation and reporting	Archaeological monitoring team made of 2 archeologists from the MDoA		
Phase 2: Mitigation Plan During Construction : Chance find procedure	Contractor Training And Awareness Program Chance Find Procedures and salvage excavations in case of discoveries	Construction contractor to implement the chance find procedure MDoA	As part of monitoring of contractual measures of the construction contractor	Supervising engineering firm MDoA
Action Plan for gender and youth				

Code or name of the mitigation	Description of mitigation	Mitigation actors	Description of monitoring	Monitoring actors
COWI (2016) has developed many mitigation measures which will be implemented by the : • CCPLTRPF Consulting Team • Independent consultants • MoAIWD • National Youth Council • District Councils, District Executive Committee • Water management Institutions			Monitoring shall focus on a series of performance indicators (as developed by COWI)	Independent consultant be hired to monitor the proposed indicators and work in close collaboration with the Ministry of Gender, Community Development and Children Affairs and the National Youth Council

12.2 SUMMARY OF PERFORMANCE INDICATORS

The following table summarizes presented performance indicators, whenever such indicators can be used.

Code or name of the mitigation	Performance indicators
Measures to be included in the contractual documents of the construction contractor	
Mitigations for impacts 1 to 12 to be included in Environmental and Social Clauses (ESC) for Contractors	The number of non-compliances with contract
Design study measures	
Fine tuning the command area	The number of hectares set aside at Design phase as non-irrigated areas (because of their environmental features or designated community uses) in comparison with the ESMP
Crossing structures at tributary rivers	The number of crossing structures that respect the recommendations from the ESMP
Infrastructures to design	The number of infrastructures that were designed to mitigate impacts in comparison with the ESMP recommendations
Phasing work inside MWR and Ng'ona Lodge property	Compliance with phased work at MWR, working within only one of three sections at a time
Compensation Plan for Majete Wildlife Reserve	

Code or name of the mitigation	Performance indicators
Compensation 1	The gross revenue of MWR and the community campsite before, during and after work.
Compensation 2	Completion of the compensation measures (diverted road, etc.)
Compensation 4	Monitoring of wildlife will define performance indicators.
Compensation 6	Monitoring of dead animals could take place at any time (as part of forthcoming MoU between BWO and DNPW).
Action Plan against invasive fishes	
Mitigation 1	Due to the high risk, it is suggested that the EAD carries out semiannual site with the Bulk Water Operator and African Park (because it would located inside MWR) to assess the integrity of the fish weir and identify areas that need to be repaired. It is necessary that the Bulk Water Operator budget maintenance of the weir including silt and debris removal. Each visit shall be followed by a report with pictures
Action plan for health and safety	
Mitigation 1	The evolution of number of infections of schistosomiasis in the performance indicator
Mitigation 2	The number of people that have drowned in the canal and the evolution of accidents
Action Plan for socioeconomic impacts	
Mitigation 2 and 6	Crime level, number of cases for illegal use of natural resources (recorded by the DNPW and the local law enforcement). Numbers of PAPs employed
Mitigation 4	The number of bridges and paths built (and the number of complaints regarding access)
Mitigation 13	Performance indicators are described in the Grievance Redress Mechanism (GRM)
Action Plan for cultural heritage	
Phase 1: Pre-Construction Data Collection	The number of salvaged high priority sites is the main performance indicator. The number of non-compliances regarding the Action Plan is also a performance indicator
Phase 2: Mitigation Plan During Construction : Chance find procedure	
Action Plan for gender and youth	
COWI (2016) measures	Number and frequency of women, men, youths, and other disadvantaged persons consulted during Design study and implementation
	Percentage of women and men, boys and girls actively participating in planning sessions for water allocation program for drinking water and agricultural irrigation
	Percentage of women and men, boys and girls actively participating in water entities
	Percentage of women and men, boys and girls members of operations and management committees of irrigation projects
	Women, men, boys and girls and other vulnerable groups in positions of management or leadership in farmer management entities
	Community satisfaction (disaggregated by gender and age) regarding water distribution schedules and access

Code or name of the mitigation	Performance indicators
	Access of women and men, boys and girls to support services, such as credit and extension (such as percentage of women in agricultural training and of women clients of credit institutions)
	Percentage of women and men, boys and girls among total trainees receiving training in the appropriate use of irrigation for high-value crop production
	Access of landless/vulnerable women and men, boys and girls to water from irrigation schemes
	Among surveyed women and youths, in target group, percentage rate of their access to water for agricultural and domestic use as having improved during the period covered by the program or project
	Changes in relevant dimensions of well-being, disaggregated by gender, age and wealth group: food and other products, household income, labour and other costs for water conveyance, water quality for drinking, and water quantity for hygiene

12.3 SUMMARY OF REPORTING REQUIREMENTS

The following is a summary of all ESMP reporting requirements.

Type of output	Description of the content of the output	Frequency
During Design phase		
Detailed Design report	In addition to usual design elements, the Detailed Design report will need to include the following: • Fine tuning of the command areas based on ESMP recommendations • Crossing structures at tributary rivers (to ensure hydraulic transparency) • Infrastructure to mitigate impacts - Anti-Drowning infrastructure (stairs and ladders) - Canal options inside MWR - Wall options in MWR - Passes (box culvert to allow for dry passages of small to medium size animals, vehicle bridge, footpath, cattle bridge) - Artificial wetland in MWR - - Invasive fish barrier • Phasing the construction inside MWR in three phases	Once
Resettlement Action Plan	The RAP should address all cases of physical or economic displacement of people, including assessing impacts on the N'gona Lodge near MWR.	Once
During construction phase		
Terms of reference and contract for the construction contractor	Contractual documents for the construction contractor shall include all ESMP measures	Once

Type of output	Description of the content of the output	Frequency
Monthly reports of construction activities from the Supervision engineer or the independent Environmental Specialist	Compliance review with all ESMP and contractual measures related to health and safety, social impacts and environment.	Monthly to Project financiers and the MoAIWD
Weekly reports of construction activities from the Contractor's Health and Safety Specialist	Internal monitoring of health and safety and social measures (including the grievance redress mechanism) related to the CC	Weekly report for the CC and the Supervision engineer
Weekly reports of construction activities from the Contractor's Environmental Specialist (from the CC)	Internal monitoring of environmental measures related to the CC	Weekly report for the CC and the Supervision engineer
EAD reports	Governmental monitoring of compliance with national regulation regarding health and safety, workers condition and environmental protection.	Whenever EAD carries out a site mission disclosed to MoAIWD
During Project operation		
Terms of reference and contract for the Bulk Water Operator	Contractual documents for the Bulk Water Operator shall include all applicable ESMP measures	Once
Invasive fish barrier report	Assessment of the integrity of the fish weir and corrective measures	Semi-annually disclosed to EAD
Monitoring of schistosomiasis report	Monitoring of schistosomiasis shall focus on both urinal and intestinal schistosomiasis and details evolution of the number of infections	Yearly disclosed to the Ministry of Health and MoAIWD
Accident report on drownings by the Bulk Water Operator	All accidents involving people in the canal or night storage (or other infrastructure) shall be recorded and the cause of drowning established in an accident report	Whenever an accident occurs, disclosed to MoAIWD and the relevant institutions
Monitoring program of the RAP	The upcoming RAP shall establish its monitoring program	To be determined based on RAP

Type of output	Description of the content of the output	Frequency
Published peer-reviewed journals for artifact collected during archeological rescue excavations	Description of collected artifacts	Once at the end of construction and disclosed to MoAIWD and the MDoA
Reports on gender and youth aspects	Based on COWI work and proposed performance indicators and based on the RAP, a report on gender and youth aspects shall be produced at the beginning of operation	To be determined based on RAP
Memorandum of Understanding (MoU) between the Bulk Water Operator and African Parks	Wildlife-related infrastructures (wall, fish barrier, etc.) status shall be clearly defined in the MoU in order to clarify who will be responsible for maintenance of such infrastructures.	Once
Contractual agreement between communities around Lengwe National Parks and MoAIWD	Since communities in Zones A and B will benefit from the SVIP, and since most illegal wood cutting activities and illegal grazing originate from these communities, part of their inclusion in the scheme shall be conditional on the acceptability of a “no illegal wood clearing rule” and a “no grazing rule” at each village level. Village headmen shall sign a contractual agreement or some form of formal engagement to respect this rule prior to their inclusion in the scheme	Once

ANNEX 1: SCREENING PROCESS OF PROJECT SITES AND ACTIVITIES UNDER COMMUNITY ACTIVITIES

This annex refers mostly to activities under Component 2.2, but can also be applied for minor community level activities that might be undertaken elsewhere in the project.

Introduction to the Screening Process

The key to environmental management for the SVTP is to determine the appropriate studies and follow-up measures that might be needed. The screening process presented here follows OP 4.01 of the World Bank and the Malawi Guidelines for Environmental Impact Assessment. Screening will be carried out at the specific project sites, once they have been identified during implementation of the SVTP component 2.2. The objectives of the screening process for sub-projects include to:

- Determine which construction and rehabilitation activities have potential negative environmental and social impacts;
- Determine the level of environmental analysis and follow-up environmental management work required;
- Determine appropriate mitigation measures for addressing adverse impacts;
- Incorporate mitigation measures into sub-project construction and operation of the development plans;
- Facilitate the review and approval of the construction and rehabilitation proposals and;
- Provide guidance for environmental compliance and outcome monitoring of environmental parameters during construction, rehabilitation, operation and maintenance of Project-supported facilities and related project activities.

The extent of environmental work that might be required, prior to the commencement of construction and rehabilitation of the facilities, will depend on the outcome of the screening process described below.

Malawi's Guidelines for EIA (1997) provide for categorization of projects into either List A or List B depending on the size, nature and perceived environmental consequences of a project. Where it is clear that project activities fall under List A of the Guidelines, an EIA has to be carried out. The screening process will be used to determine the appropriate environmental follow-up measures, depending on the nature, scope and significance of the expected environmental impacts from each SVTP-supported sub-project. The Environmental and Social Screening Form (ESSF, Annex 3) will be completed by trained and qualified personnel, in the implementation of the screening process. The screening form, when correctly completed, will facilitate the:

- Identification of potential environmental and social impacts and their significance;
- Assignment of the appropriate environmental category;
- Determination of appropriate environmental mitigation measures and;
- Need to conduct an ESIA and or prepare Resettlement Action Plans (RAPs) where required.

Screening will be responsibility of the PMT with collaboration of the District Environmental Officer. Subsequent to a desk appraisal of the construction and rehabilitation plans, the initial screening of the proposed project activities will be carried out in the field, using the Environmental and Social Screening Form. The ESSF, when completed, will provide information for the assignment of the appropriate environmental category to a particular activity for rehabilitation and/or construction

of new facilities. The District Environmental Committee (for the District Council) will be responsible for categorizing a construction or rehabilitation activity as either A, B or C.

Category A project activities would have significant and long-term adverse environmental impacts and therefore would require an EIA, in accordance with Malawian legal requirements. However none of the sub-projects are expected to be in this category. Category B projects are those with one or a few potentially significant adverse impacts, which would require an Environmental Management Plan to address specific impacts during project construction or operation, but not a full EIA. Category C projects would not have any significant adverse environmental impacts; they would therefore not require an EIA or a specific EMP, but they would require adherence to good environmental practices, including any applicable Environmental Rules for Contractors.

Assignment of the appropriate environmental category will be based on the provisions of the World Bank Operational Policy (OP 4.01) on Environmental Assessment and the Malawi EIA Guidelines. If the ESSF has only "No" entries, then a C classification would normally be warranted. Hence, the proposed activity will not require further environmental analysis, and the DEC will recommend approval of the screening results for implementation of the project activity to proceed—subject to adherence to environmental and social requirements, such as the Environmental Rules for Contractors, during any civil works.

After reviewing the information provided in the ESSF and having determined the appropriate environmental category, the PMT will determine whether:

(a) The application of simple mitigation measures outlined in the ESSF (Annex 4) and Environmental and Social Rules for Contractors will suffice (Category C);
(b) An Environmental and Social Management Plan (ESMP) needs to be prepared to address specific environmental and social impacts (Category B); or
(c) A full ESIA will need to be carried out (Category A).

Although this screening process includes potential Category A sub-projects, none are expected. Though not highly likely, it is conceivable that, as a result of the screening process, one or more of the sub-projects will be found to require an ESIA. In such a case, the ESIA would identify and assess the potential environmental impacts of the proposed construction activities, evaluate alternatives, as well as design and implement appropriate mitigation, management and monitoring measures. These measures would be captured in the Environmental and Social Management Plan (ESMP) which will be prepared as part of the ESIA report.

The DEC will review the results and recommendations of the environmental and social screening forms; and the proposed mitigation measures presented in the environmental and social checklists. Where an EIA has been carried out, EAD will review the reports to ensure that all environmental and social impacts have been identified and that effective mitigation measures have been proposed.

Based on the results of the above review process and discussions with the relevant stakeholders and potentially affected persons, the DEC, in case of projects that don't require EIA, will make recommendations to the District Council and PMT to go ahead with project implementation. Where an EIA is required the District Council will recommend to SVTP and EAD for the EIA study. After preparation of the ESIA report, EAD (on advice from the Technical Committee on Environment, TCE) will recommend to the National Council on Environment (NCE) for its approval.

To ensure that the screening form is completed correctly for the various project locations and activities, training will be provided to members of the DEC. The Environmental Officer will have to take a leading role in the training. Technical advice on environmental training will also be provided by a contracted safeguards specialist on the PMT.

ANNEX 2: ENVIRONMENTAL AND SOCIAL SCREENING FORM

Government of the Republic Of Malawi

Ministry of Mines, Natural Resources and Environment

ENVIRONMENTAL AND SOCIAL SCREENING FORM

FOR

SCREENING OF POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF THE SHIRE VALLEY TRANSFORMATION PROGRAM – I

INTRODUCTION

This Environmental and Social Screening Form (ESSF) has been designed to assist in the evaluation of planned construction and rehabilitation activities under the SVTP. The form will assist the project implementers and reviewers to identify environmental and social impacts and their mitigation measures, if any. It will also assist in the determination of requirements for further environmental work (such as EIA), and social work if necessary.

The form helps to determine the characteristics of the prevailing local bio-physical and social environment with the aim of assessing the potential impacts of the construction and rehabilitation activities on the environment by the SVTP. The ESSF will also assist in identifying potential socio-economic impacts that will require mitigation measures and/or resettlement and compensation.

GUIDELINES FOR SCREENING

The evaluator should undertake the assignment after:

1. gaining adequate knowledge of baseline information of the area.
2. gaining knowledge of proposed project activities for the area.
3. having been briefed/trained in environmental and social screening.

The form is to be completed by consensus of at least three people, knowledgeable of the screening process.

PART A: GENERAL INFORMATION

Project Name	Estimated Cost (MK)
Project Site	Funding Agency
Project Objectives	Proposed Main Project Activities
Name of Evaluator	Date of Field Appraisal

PART B: BRIEF DESCRIPTION OF THE PROPOSED ACTIVITIES

Provide information on the type and scale of the construction/rehabilitation activity (e.g. area, land required and approximate size of structures).

Provide information on the construction activities including support/ancillary structures and activities required to build them, e.g. need to quarry or excavate borrow materials, water source, access roads etc.
Describe how the construction/rehabilitation activities will be carried out. Include description of support/activities and resources required for the construction/rehabilitation.

PART C: ENVIRONMENTAL BASELINE INFORMATION OF THE PROJECT SITE

CATEGORY OF BASELINE INFORMATION	BRIEF DESCRIPTION
GEOGRAPHICAL LOCATION • Name of the Area (District, T/A, Village) • Proposed location of the project (Include a site map of at least 1:10,000 scale)	
LAND RESOURCES • Topography and Geology of the area • Soils of the area • Main land uses and economic activities	
WATER RESOURCES • Surface water resources (e.g. rivers, lakes, etc) quantity and quality • Ground water resources quantity and quality	
BIOLOGICAL RESOURCES • Flora (include threatened/endangered/endemic species) • Fauna (include threatened/endangered/endemic species) • Sensitive habitats including protected areas e.g. national parks and forest reserves	
CLIMATE • Temperature • Rainfall	

PART D: SCREENING CRITERIA FOR IMPACTS DURING CONSTRUCTION

	AREAS OF IMPACT			IMPACT EVALUATION						POTENTIAL MITIGATION MEASURES
	Is the project site/activity within and/ or will it affect the following environmentally sensitive areas?			Extent or coverage (on site, within 3km -5km or beyond 5km)			Significance (Low, Medium, High)			
1.		No	Yes	On Site	Within 3-5 km	Beyond 5km	Low	Mediu m	High	
1.1	National parks and game reserve									
1.2	Wet-lands									
1.3	Productive traditional agricultural /grazing lands									
1.5	Areas with rare or endangered flora or fauna									
1.6	Areas with outstanding scenery/tourist site									
1.7	Within steep slopes/mountains									
1.8	Dry tropical forests such as Brachystegia species									
1.9	Along lakes , aquifers, riverine ecosystems									
1.10	Near industrial activities									
1.11	Near human settlements									
1.12	Near historic, archaeological, sacred or other cultural heritage sites									
1.13	Within prime ground water recharge area									
1.14	Within prime surface run off									
1.15	Near boreholes or other potable drinking water sources									

2.0 SCREENING CRITERIA FOR IMPACTS DURING IMPLEMENTATION AND OPERATION

	Will the implementation and operations of the project activities within the selected site generate the following externalities /costs /impacts?									
		No	Yes	On Site	Within 3-5 km	Beyond 5km	Low	Medium	High	
2.1	Deforestation									
2.2	Soil erosion and siltation									
2.3	Siltation of watercourses, dams									
2.4	Environmental degradation arising from mining of construction materials									
2.5	Damage of wildlife species and habitat									
2.6	Pollution from Pesticides									
2.7	Nuisance - smell or noise									
2.8	Reduced water quality									
2.9	Increase in costs of water treatment									
2.10	Soil contamination									
2.11	Loss of soil fertility									
2.12	Reduced flow and availability of water									
2.13	Long term depletion of water resource									
2.14	Incidence of flooding									
2.15	Changes in migration patterns of animals									
2.16	Introduce alien plants and animals									
2.17	Increased incidence of plant and animal diseases									

3.0 SCREENING CRITERIA FOR SOCIAL AND ECONOMIC IMPACTS									
	Will the implementation and operation of the project activities within the selected site generate the following socio-economic costs/impacts?								
		No	Yes	On Site	Within 3-5 km	Beyond 5km	Low	Medium	High
3.1	Loss of land/land acquisition for human settlement, farming, grazing								
3.2	Loss of assets, property- houses, agricultural produce etc								
3.3	Loss of livelihood								

3.4	Require a RAP								
3.5	Loss of cultural sites, graveyards, monuments[1]								
3.6	Disruption of social fabric								
3.7	Interference in marriages for local people by workers								
3.8	Spread of STIs and HIV and AIDS, due to migrant workers								
3.9	Increased incidence of communicable diseases								
3.10	Health hazards to workers and communities								
3.11	Changes in human settlement patterns								
3.12	Conflicts over use of natural resources e.g. water, land, etc								
3.13	Conflicts on land ownership								
3.14	Disruption of important pathways, roads								
3.15	Increased population influx								
3.16	Loss of cultural identity								
3.17	Loss of income generating capacity								

OVERALL EVALUATION OF THE SCREENING PROCESS ON THE SITE AND PROJECT ACTIVITY

The result of the screening process would be either (i) the proposed project would be permitted to proceed on the site, provided that standard good environmental and social practices are followed during project construction and operation, including the Environmental Rules for Contractors (typically Category C); (ii) the proposed project would need its own specific Environmental Management Plan (EMP), but not a separate EIA; or (iii) the proposed project would need its own EIA (including an EMP), with the EIA subject to review by Malawi's Environmental Affairs Department.

Some examples are provided in the table below:

The Proposed Project Activity Can Be Exempted From EIA and/or RAP Requirements On The Following.	**The Proposed Project Activity Needs an EMP and possibly also an EIA.**
• Screening indicates that the site of the project will not be within environmentally–sensitive areas .e.g. protected areas	• Field appraisals indicate that the project site is within environmentally – sensitive areas, protected areas.
• No families will be displaced from the site	• Cause adverse socio-economic impacts
• Identified impacts are minor, marginal and of little significance	• Significant number of people, families will be displaced from site
• Mitigation measures for the identified impacts are well understood and practiced in the area	• Some of the predicted impacts will be long term, complicated, extensive
• The stakeholders have adequate practical experiences in natural resource conservation and management.	• Appropriate mitigation measures for some predicted impacts are not well known in the area

[1]*NOTE: Sub-projects affecting cultural property negatively will either require specific institutional arrangements to be followed for funding or will not be funded depending on the location of the project*

Completion by EDO, or EO	
Is This Project Likely To Need An EIA	YES/ NO
List A/B Paragraph Numbers	
Date Exempted	
Date Forwarded To DEA Head Office	
Name & Signature of EDO	

Completion by Director of Environmental Affairs	
Date Received from District Assembly:	
Dated Reviewed:	
Date of Submission of Project Brief	
Date of Submission of EIA Reports	
Date of Approval/Rejection	

NOTES:

- Once the Environmental and Social Screening Form is completed it is analysed by experts from the District Environmental Sub-Committee who will classify it into the appropriate category based on a predetermined criteria and the information provided in the form.
- All projects' proponents exempted from further impact assessment must be informed to proceed with other necessary procedures.
- All projects recommended for a specific EIA will have to follow the procedures outlined in section 24 and 25 of the Environmental Management Act, and the Malawi Government's Guidelines for Environmental Impact Assessment appendix C, page 32.