



Ministry of Agriculture, Irrigation and Water Development

Diamphwe Multipurpose Dam & Associated Structures ESIA and RAP

Volume 2 Appendices

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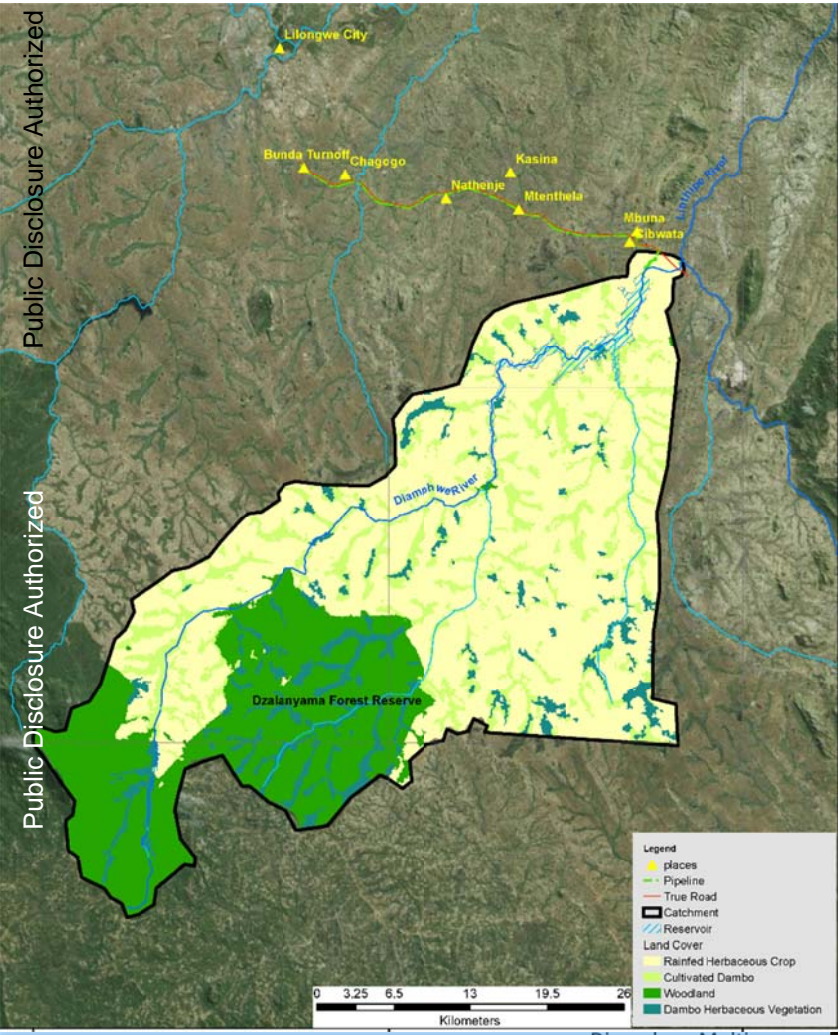


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APPENDIX 1. REFERENCES

REFERENCES

INDEPENDENT ENVIRONMENTAL AND SIA AND RAP FOR DIAMPHWE MULTIPURPOSE DAM AND ASSOCIATED STRUCTURES

DOCUMENT	Compiler
CONTRACT	
Request for Proposals: Independent Environmental and Social Impact Assessment and Resettlement Action Plan for Diamphwe Multipurpose Dam and Associated Structures (June 2015)	Gvt of Malawi, Ministry of Agriculture, Irrigation and Water Development, National Water Development Programme
Consulting Services for Independent (1) Environmental and Social Impact Assessment and (2) Resettlement Action Plan for Diamphwe Multipurpose Dam and Associated Structures: Technical Proposal (June 2015)	SMEC
Form TECH - 4 Description of Approach, Methodology and Work Plan	SMEC
Form TECH - 5 Work Schedule	SMEC
RAP Outline	SMEC

GOVERNMENT	
Legislation	
Laws of Malawi Consolidated to April 2010	Gvt of Malawi
Constitution of the Republic of Malawi	Gvt of Malawi
Environment Management Act (CAP 60:02)	Gvt of Malawi
Local Government Act (CAP 22:01)	Gvt of Malawi
Chiefs Act (CAP 22:03)	Gvt of Malawi
Town and Country Planning Act (CAP 23:01)	Gvt of Malawi
Monuments and Relics Act (CAP 29:01)	Gvt of Malawi
Public Health Act (CAP 34:01)	Gvt of Malawi

Cooperative Societies Act (CAP 47:02)	Gvt of Malawi
Labour Relations Act (CAP 54:01)	Gvt of Malawi
Occupational Safety, Health and Welfare Act (CAP 55:07)	Gvt of Malawi
Land Act (CAP 57:01)	Gvt of Malawi
Registered Land Act (CAP 58:01)	Gvt of Malawi
Deeds Registration Act (CAP 58:02)	Gvt of Malawi
Lands Acquisition Act (CAP 58:04)	Gvt of Malawi
Customary Land (Development) Act (CAP 59:01)	Gvt of Malawi
Local Land Boards Act (CAP 59:02)	Gvt of Malawi
Land Survey Act (CAP 59:03)	Gvt of Malawi
Biosafety Act (CAP 60:03)	Gvt of Malawi
The Forestry Act (CAP 63:01)	Gvt of Malawi
Plant Protection Act (CAP 64:01)	Gvt of Malawi
Special Crops Act (CAP 65:01)	Gvt of Malawi
Agriculture (General Purposes) Act (CAP 65:05)	Gvt of Malawi
Game Act (CAP 66:03)	Gvt of Malawi
Fisheries Conservation and Management Act (CAP 66:05)	Gvt of Malawi
Crocodiles Act (CAP 66:06)	Gvt of Malawi
National Parks and Wildlife Act (CAP 66:07)	Gvt of Malawi
Road Traffic Act (CAP 69:01)	Gvt of Malawi
Public Roads Act (CAP 69:02)	Gvt of Malawi
Water Works Act (CAP 72:01)	Gvt of Malawi
Water Resources Act (CAP 72:03)	Gvt of Malawi
Irrigation Act (No16 2001)	Gvt of Malawi
Gender Equality Bill (2012)	Gvt of Malawi
National Policies, Guidelines etc.	

Guidelines for Integrating Environmental Sustainability and Natural Resource Management in Policy Making and Planning in Malawi (October 2001)	Office of the President and Cabinet (OPC)
National Environmental Policy (2004)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs
National Climate Change Policy (2012)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs
National Environmental Action Plan (NEAP) (2003)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs
Guidelines for Environmental Impact Assessment (April 2011)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs
Malawi EIS documentation X 3	Various
MEMP Phase 1 Final Report (Aug 1996): Monitoring Environmental Change in Malawi	Malawi Environmental Monitoring Programme (MEMP)
GIS Technology Transfer: An Ecological Approach	J R Eastman and J Toledano, The Clark Labs for Cartographic Technology and Geographic Analysis, Clark University USA
Environmental Impact Assessment Guidelines for Irrigation and Drainage Projects (2002)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs
Sector Specific ESIA Guidelines (2006)	
National Biodiversity Strategy and Action Plan (Nov 2006)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs
Malawi State of Environment and Outlook Report: Environment for Sustainable Economic Growth (2010)	Environmental Affairs Department, Ministry of Natural Resources and Environmental Affairs

Environmental and Social Management Framework (March 2011)	National Water Development Programme (NWDP), Ministry of Natural Resources and Environmental Affairs
Revised Decentralised Environmental Management Guidelines (January 2001)	Ministry of Local Government and Rural Development
National Water Policy (2005)	Ministry of Irrigation and Water Development
Water (Water Pollution Control) Regulations	
Safeguard plans for new water sources	MWDI, LWB
National Irrigation Policy and Development Strategy (NIPDS) (2011)	Ministry of Irrigation and Water Development
National Sanitation Policy (2008)	Ministry of Irrigation and Water Development
Irrigation, Rural Livelihoods and Agriculture Development Project: Resettlement Policy Framework, Volume 1: Social Impact Assessment (undated)	Ministry of Agriculture and Food Development
The Agriculture Sector Wide Approach (ASWAp): Malawi's Prioritised and Harmonised Agricultural Development Agenda (03 Sep 2010)	Ministry of Agriculture and Food Development
Malawi National Land Policy (2002)	Ministry of Lands, Housing and Urban Development
National Forest Policy of Malawi (1996)	Ministry of Natural Resources and Environmental Affairs
Technical Order for the Regulation of Forest Produce from Customary Land (2007)	Dept of Forestry
A Guide to Community Based Forest Management in Malawi (Nov 2001)	Dept of Forestry
National Energy Policy for Malawi (2003)	Ministry of Energy and Mining
Malawi Electricity Investment Plan (2010)	Ministry of Natural Resources and Environmental Affairs
Environmental Social Management Guidelines in the Road Sector (March 2007)	Environmental and Social Management Unit, National Roads Authority

Gender Policy (2008)	Ministry of Gender, Children, Disability and Social Welfare
Report of the Law Commission on the Development of the Gender Equality Act (Feb 2001)	Malawi Law Commission
Malawi National HIV/AIDS Policy (2003)	Gvt of Malawi
National Decentralisation Policy (1998)	
Census figures: Lilongwe District; Mazengera TA, villages = Ntsilizika/Tsizika, Msondoka, Kanyenda, Kumkama; Kalumbu TA, villages = Mpasu, Mphando, Bowa, Mtileni, Chikanda, Tchete, Chilima, Bisani, Chembe, Mpani, Khuzi, Msamba. (Also, Mphete, Mthiko, Mnilo?) (still to check, with correct name spelling etc.)	
Census figures: Dedza District; Kaphuka TA, villages = Kuntamba, Lumwila, Mtontho, Tsoyo, Nkomela, Chaluma, Mngongonda, Napulu, Kamgongo, Nthache, Kangulu, Mbalira, Nthanthila; Chilikumwendo TA, villages = Kaname, Chimwala, Dulampingo. (Mbalame, Mwangala, Ntunga?) (to check)	
Malawi Atlas of Social Statistics (2008)	National Statistical Office
Population Projections (undated)	Malawi Growth and Development Strategy (MGDS), Ministry of Development Planning and Cooperation
Lilongwe District Socio-Economic Profile (Dec 2006)	Lilongwe District
Lilongwe District Socio-Economic Profile (Dec 2011)	Lilongwe District
Malawi Economic Recovery Plan (2012)	Office of the President and Cabinet (OPC)
District Environmental Action Plans?? Or Area Development Plans??	
Village Development Plans??	
PROJECT-RELATED	
Inception Report	WAPCOS

Revised Stakeholders Consultations Report (SCR) (2014)	WAPCOS
Revised Baseline Assessment Report (BAR) (2015)	WAPCOS
Draft ESIA	WAPCOS
Comments on Stakeholders Consultations Report (Oct 2014)	Ministry of Agriculture, Irrigation and Water Development, NWDP
Response to Comments on Draft Stakeholders Consultations Report (December 2014)	WAPCOS
Final Comments on Draft Stakeholders Consultations Report (January 2015)	Ministry of Agriculture, Irrigation and Water Development, NWDP
Response to Comments on Revised Baseline Study Report (December 2014)	WAPCOS
Comments on Baseline Study Report (March 2014) + Comments on Revised Baseline Report (October 2014)	Ministry of Agriculture, Irrigation and Water Development, NWDP
Comments on Diamphwe Baseline Report (March 2014)	Not referenced
ESIA covered under the Water Resources Development Plan Study (2001)	Niras-Norconsult
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Feasibility Studies and Preliminary Design for Lilongwe's New Water Source: Report on Methodology for Site Selection (2009)	Sogreah (now Areteria)
Feasibility Studies and Preliminary Design for Lilongwe's New Water Source: Water Demand Assessment Report (2010)	Sogreah
Feasibility Studies and Preliminary Design for Lilongwe's New Water Source: Updated Feasibility Study Report (2010)	Sogreah
Feasibility Studies and Preliminary Design for Lilongwe's New Water Source: Preliminary Design Report (2011)	Sogreah

Feasibility Studies and Preliminary Designs of Mult-Purpose Raw Water Sources Development for Lilongwe City: Comments on the Draft Preliminary Resettlement Action Plan for the New Dam on Diamphwe River (December 2012)	Ministry of Agriculture, Irrigation and Water Development
Inception Report	Studio Pietrangeli
Various geotechnical etc. reports, including review by World Bank and independent consultant	Studio Pietrangeli
Comments on Pre-Feasibility Study for Irrigation Potential (March 2014)	Ministry of Agriculture, Irrigation and Water Development, NWDP
Comments on Hydrological Study Report (March 2014)	Ministry of Agriculture, Irrigation and Water Development, NWDP
INTERNATIONAL POLICIES, STANDARDS etc.	
World Bank Operational Policies	
OP 4.00 Operational Policies	World Bank
OP +BP 4.01 Environmental Assessment	World Bank
OP +BP 4.02 Environmental Action Plans	World Bank
OP + BP 4.04 Natural Habitats	World Bank
OP 4.07 Water Resource Management	World Bank
OP + BP 4.10 Indigenous Peoples	World Bank
OP + BP 4.11 Physical Cultural Property	World Bank
OP + BP 4.12 Involuntary Resettlement	World Bank
OP + BP 4.20 Gender and Development	World Bank
OP + BP 4.36 Forests	World Bank
Op 4.37 Safety of Dams	World Bank
GP 14.70: Involving Nongovernmental Organizations in Bank-supported Activities	World Bank

World Bank Policy on the Disclosure of Information	World Bank
IFC Performance Standards	
PS + Guidance Note (GN) 1: Assessment and Management of Environmental and Social Risks and Impacts	IFC
PS + GN 2: Labour and Working Conditions	IFC
PS + GN 3: Resource Efficiency and Pollution Prevention	IFC
PS + GN 4: Community Health, Safety and Security	IFC
PS + GN 5: Land Acquisition and Involuntary Resettlement	IFC
PS + GN 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	IFC
PS + GN 7: Indigenous Peoples	IFC
PS + GN 8: Cultural Heritage	IFC
Environmental, Health, and Safety (EHS) General Guidelines (2007)	IFC
Handbook for Preparing a Resettlement Action Plan (2002)	IFC
Doing Better Business through Effective Public Consultation + Disclosure: A Good Practice Manual (1998)	IFC
Stakeholder Engagement: A Good Practice Handbook for Companies Doing Business in Emerging Markets (2007)	IFC
Policy on Social and Environmental Sustainability (2006)	IFC
Policy on Disclosure of Information (2010)	IFC
African Development Bank	
Handbook on Stakeholder Consultation and Participation in ADB Operations (2001)	AfDB
Involuntary Resettlement Policy (November 2003)	AfDB
Safeguards and Sustainability Series Vol 1 Issue 1 (Dec 2013)	AfDB

Environmental and Social Assessment Procedures for African Development Bank's Public Sector Operations (June 2001)	AfDB
Integrated Environmental and Social Impact Assessment Guidelines (October 2003)	AfDB
Malawi Country Strategy Paper 2013-2017	AfDB
Climate Adaptation for Rural Livelihood and Agriculture (CARLA), Malawi	AfDB
UN + International Agreements, Conventions	
2014 Millennium Development Goal Report for Malawi (2014)	Gvt of Malawi, Ministry of Finance, Economic Planning and Development
Agenda 21, Convention on Biological Diversity (1992)	UN
Malawi's Progress Towards Achieving Sustainable Development Goals 20 Years Since the 1992 Earth Summit in Rio (May 2012)	UN
Convention Concerning the Protection of the World Cultural and Natural Heritage (1972)	UN
The Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)	UN
Convention on the Rights of the Child (1989), monitored by the UN's Children's Fund (UNICEF),	UNICEF
Covenant on Economic, Social and Cultural Rights (ICESCR)	UN
Economic Analysis of Sustainable Natural Resource Use in Malawi: Economic Study (2011)	UNDP, UNEP
United Nations Development Programme, Country: Malawi, Project Support Document, Environment and Natural Resources Management (ENRM) Support to Malawi 2013 - 2016	Ministry of Natural Resources and Environmental Affairs and UNDP
SADC (Southern African Development Community)	
SADC Environmental Legislation Handbook (2012), Malawi Chapter 8	

Protocol on Health in the Southern African Development Community (1999)	
SADC HIV and AIDS Strategic Framework 2010-2015 (October 2009)	
Protocol on Fisheries (2001)	
Protocol on Forestry (2002)	
Protocol on Gender and Development (2008)	
Code of Conduct on Child Labour (undated)	
Dar-es-Salaam Declaration on Agriculture and Food Security in the SADC Region (2004)	
SADC Declaration on Poverty Eradication and Sustainable Development (2008)	
OTHER MISCELLANEOUS DOCUMENTS	
Independent ESIA for Water Intake Works on Shire River, Water Treatment Works, Pump Stations, Pipelines and Reservoirs: Final Draft Environmental and Social Impact Assessment Report. Volume 2: Environmental and Social Impact Assessment (Main Report) (June 2015)	Prepared by SMEC for Ministry of Agriculture, Irrigation and Water Development
Independent Environmental Impact Assessment for the Upgraded Kamuzu Barrage. Final Environmental and Social Impact Assessment Volume 1 – Main Report + Volume 2 - Technical Reports (Dec 2013)	Prepared by SMEC for Ministry of Agriculture, Irrigation and Water Development
Independent Environmental Impact Assessment for the Upgraded Kamuzu Barrage. Final Resettlement Action Plan. Volume 1: Main Report + Volume 2 - Record of Consultation (Dec 2013)	Prepared by SMEC for Ministry of Agriculture, Irrigation and Water Development
Independent Environmental Impact Assessment for the Upgraded Kamuzu Barrage. Final Environmental and Social Management Plan (Dec 2013)	Prepared by SMEC for Ministry of Agriculture, Irrigation and Water Development
Population Dynamics, Climate Change and Sustainable Development in Malawi (Nov 2012)	African Institute for Development Policy (AFIDEP) and Population Action International, Nairobi and Washington DC.

Malawi	P J Spong and B Walmsley
Measuring Progress Towards Empowerment: Women's Empowerment in Agriculture Index: Baseline Report (2014)	International Food Policy Research Institute (IFRI)
Naturalisation of Lake Malawi Levels and Shire River Flows: Challenges of Water Resources Research and Sustainable Utilisation of the Lake Malawi-Shire River System (2000)	O S Shela, 1st WARFSA/WaterNet Symposium: Sustainable Use of Water Resources, Maputo, 1-2 November 2000
Women and Land: Securing Rights for Better Lives (2011)	D Budlender and E Alma, International Research Centre, Ottawa, Canada
Women's Individual and Joint Property Ownership: Effects on Household Decisionmaking, IFPRI Discussion Paper 01347 (April 2014)	International Food Policy Research Institute (IFRI)
Women's Land Rights in Southern Africa: Consolidated Baseline Findings from Malawi, Mozambique, South Africa, Zambia and Zimbabwe (Oct 2009)	T KachiKa, Niza and ActionAid International
Women's Access to Land and Household Bargaining Power: A Comparative Action Research Project in Patrilineal and Matrilineal Societies in Malawi (March 2011)	M Kathewera-Banda et al, Women's Legal Resource Centre (WOLREC)
Consultancy Services to Undertake Survey and Feasibility Studies of New Irrigation Schemes in Malawi: Diamphwe Feasibility Study Report (June 2015)	SMEC; Department of Irrigation, Ministry of Agriculture, Irrigation and Water Development
Land Tenure, Farm Investments and Food Production in Malawi (July 2008)	E W Chirwa, Institutions and Pro-Poor Growth (IPPG)
Making Nutrition a National Priority: Review of Policy Processes in Developing Countries and a Case Study in Malawi (2008)	J Meerman, FAO
Profiles of Tools and Tactics for Environmental Mainstreaming: No.1 Environmental Impact Assessment (EIA) (2009)	International Institute for Environment and Development (IIED), UK
Project for Improvement of Blantyre City Roads in the Republic of Malawi: Preliminary Study Report (undated)	Japan International Cooperation Agency (JICA)
Screening for Intake and Outfalls: A Best Practice Guide (February 2005)	Environment Agency, Bristol, UK

The Challenges of Enforcing Environmental Impact Assessment (EIA) in Malawi: Lessons from the Kayelekera Uranium Mine (2012)	MK Mbeko, Dissertation, Faculty of Law, University of Malawi
Malawi MASAF III APL II (LDF Mechanism), Report No: ICR00003221 (March 2015)	The World Bank
Maps	
Location map of Lower Diamphwe Dam	SMEC proposal
Topo map with design layout overlaid on 1:250,000 sheet	SMEC
Admin map with all the administrative boundaries (District, traditional authorities and villages)	SMEC
School map showing the data from 2013 school project from Ministry of Education	SMEC
Population density map showing enumeration area wise population from 2008 census	SMEC
Lilongwe population density map showing ward enumeration areas from 2008 census	SMEC
General land use over dam site and pipeline	SMEC
General land use within dam catchment area	SMEC
Google photographic maps of dam site and pipeline	SMEC

APPENDIX 2. TERMS OF REFERENCE

6.0 SCOPE OF WORK

The Consultant is expected to utilize the preliminary ESIA information from the Feasibility Study, Preliminary Design of the Lilongwe's New Water Source, the BAR and SCR reports by WAPCOS, and all other relevant documents to prepare a detailed ESIA and RAP. This will involve recommending the necessary mitigation measures for the Diamphwe Multipurpose Dam, which would store 134 Mm³ (enough water to meet projected Lilongwe needs up to 2045 even during a period of drought) with a spillway crest elevation of 1175.7 masl and dam crest elevation is 1180.3 masl. The corresponding dam height would be 30 m. The dam would be a RCC dam with overflowing free ogee spillway, a concrete stilling basin, and a rock fill saddle dam. The project also includes a raw water pipeline from the dam to the Water Treatment Plant (WTP) and Balancing Tank. Another balancing tank is projected at the elevation 1265m on the northern side of the M1 Road, where there is a mountain pass (road top elevation at 1250m). A pumping station will be required to lift the treated water from the WTP to the balancing tanks. The treated water transmission system from the balancing tanks to the City (Bunda turn-off) will be composed by twin gravity pipelines laid in parallel DN 1100 and DN 900 of 30,500 meters each. The 1000 mm DN pipeline from Mbuna will mainly supply the southern part of the city. This pipeline shall supply Chiseka Reservoirs, Mwenda Reservoirs, Chikungu Reservoirs, Tsabango Reservoirs and Ngwenya Reservoir. The other 800 mm DI pipeline will supply mainly the northern part of the city through Kanengo Reservoirs. There shall be additional reservoirs at Chikungu, Mwenda, Tsabango, Kanengo and Sandula. It is proposed that one ground level tank and a tower be constructed at Chikungu. The same arrangement is proposed at Tsabango. Water shall be pumped from the lower level tanks to the towers.

The design further proposes new reservoirs at Chiseka, Salima Road, and Mchezi. At Salima Road, a ground level tank and a tower will be constructed where water will be pumped from the lower level tank to the tower. Salima Road Tanks will be sited opposite the construction site of the TTC. Salima Road ground level tank will be filled by a booster station at Mchezi lifting water from Kanengo Tanks. Furthermore, it is proposed that a tank be constructed at Mchezi to break the pressures from Salima Road Ground Level Tank before supplying Mchezi Area. The tower is targeting the TTC and the surrounding areas of the tanks. Sandula is currently supplied by pumping from Kanengo Tanks. It is proposed that the present pumping station be extended to accommodate additional pumps to Sandula. The tanks at Chiseka will supply Likuni, Chigwirizano, Bunda Area, Western Bypass and settlements along Bunda Road. There will be a tank at Bunda to supply the Bunda Area. This tank will be filled by pumping from Chiseka Reservoirs.

The details of work for this assignment shall comprise, but not limited to, the following:

6.1 Review of Previous Studies

- a) Review the Inception Report, Baseline Assessment Report (BAR), and Stakeholder Consultation Report (SCR) submitted to the Client by WAPCOS, along with all written technical comments provided to WAPCOS by the Client, including those comments originating from the World Bank or IFC;
- b) Gather additional social baseline information that was not provided by the previous BAR, SCR, or other ESIA-related documents, by carrying out consultations with local communities that might still be needed, as well as meetings with various stakeholders discussing the project plans;
- c) Review the major findings of the preliminary ESIA covered under the Water Resources Development Plan study for LWB by Niras-Norconsult (2001);

- d) Review the major findings of the preliminary ESIA under Engineering Studies (2002) by Safege;
- e) Review the preliminary ESIA of the Feasibility Study and Preliminary Designs for Lilongwe's New Water Source report by Sogreah (2011) and validate the modelling, assessments and recommendations of this study. The review should include, but not limited to:
 - i) All methodologies and processes used in the analysis of the preliminary ESIA;
 - ii) The socio-economic issues including sacred burial grounds; and
 - iii) The specified areas of inundation to ascertain affected property and resettlement requirements; and
- f) Examine all relevant national policies and legislation, with a view of extracting all data pertaining to the project.

6.2 Detailed Independent Environmental and Social Impact Assessment and Resettlement Action Plan

- a) Using the Inception, Baseline Assessment, and Stakeholder Consultation Reports by WAPCOS as a starting point, fill in any significant gaps with respect to the issues noted below. Avoid repetition of previous work, except where needed to ensure adequate quality. Re-do field work and desk analysis where necessary to fill key information gaps or to verify any reported findings that might be questionable. The baseline information that will need to be part of the ESIA and (where relevant) RAP includes but is not limited to the following:
 - i) Physical environment: geology, topography, soils, climate and meteorology, surface and groundwater hydrology, river flows, water quality and sedimentation, earthquake faults and any potential for induced seismicity from dam installation;
 - ii) Biological environment: The Consultant should obtain biological baseline data through a combination of (i) terrestrial and aquatic field surveys in representative areas of the inundation zone and affected downstream areas (not just around the site of the dam wall), (ii) scientific search of literature and data bases; and (iii) consultation with Malawian and international experts on the area's terrestrial and aquatic biodiversity (particularly the fish and other species of conservation or special management interest). Good-quality aquatic biodiversity baseline information (on fish, freshwater crabs, and other aquatic life) will be important for determining adequate environmental flow requirements for the future dam, as well as other mitigation measures that might be needed. With respect to **habitats**, the ESIA should note any significant natural sites, estimate the extent of modified, natural, and any critical habitats (as defined in IFC Performance Standard 6), and clearly distinguish between relatively natural habitats (with mainly natural vegetation) and highly modified landscapes within the project area; this is important for proper application of the World Bank's Natural Habitats OP 4.04 and IFC's PS6. The ESIA should also indicate the main locations and approximate surface area of each major vegetation type (illustrated with sample ground-level photos from the project area), including cropland (existing cultivation and short-term fallow), young forest regrowth, relatively mature forests or woodlands, tree plantations, wetlands (including dambos), and natural grasslands or savannahs (if any). With respect to **species**, the ESIA should indicate the flora and terrestrial and aquatic fauna that are known or believed to occur in the project impact area, including species of commercial importance, species with the potential to become nuisances or disease vectors, and especially species of conservation or special management concern. For globally threatened fish species such as Mpasa *Opsaridium microlepis* and Sanjika *O. macrocephalum*, the

ESIA should provide information on (i) the evidence (direct observation, sampling, published reports, etc.) of their occurrence within the project area; (ii) the relative importance of the project area to these species' survival; (iii) the specific aquatic habitats required by these species, taking into account how these habitats could change under the project; and (iv) these species' migratory behaviour, with a view towards the likely impacts of the future dam as a fish migration barrier. With respect to Nile Crocodiles, the ESIA should specify (i) their approximate population along the to-be-affected sections of the Diamphwe River (upstream and downstream of the dam wall) and (ii) the key river segments in terms of crocodile nesting habitat (sand banks, etc.).

- iii) Socio-cultural environment including population, migration patterns, land use, water uses from the Diamphwe River upstream and downstream of the dam site, planned development activities, community structure, employment, distribution of income, goods and services, recreation/tourism, public health (including the baseline presence of vector-borne diseases such as malaria and bilharzia) and physical cultural resources. With respect to the latter, the planned impoundment area needs to be assessed for sites and objects of archaeological or historical interest, fossils, sacred sites, and cemeteries.
- b) Provide a site-specific map of the area (Scale 1:50,000 or larger) showing the proposed project area of influence and project site plans (1:10,000 or larger). Separate maps should indicate, at a minimum, (i) the complete inundation zone, including the larger patches of mature forest or woodland within this zone; (ii) the portion of the Diamphwe River downstream of the dam that would be affected by altered flows under the project; and (iii) environmentally and socially sensitive sites within the overall project area where quarries, disposal sites, access roads, or similar facilities should not be located. The ESIA should discuss and present the analysis and the results aided by well-referenced and detailed maps and charts to readable scales;
 - c) Describe the major activities to be undertaken during construction and operation of all the main civil works, including the decommissioning of any temporary facilities (construction camps, equipment staging areas, etc.) and the associated site restoration;
 - d) Describe the pertinent regulations, protocols and standards pertaining to the project and their implication on the project in Malawi as well as at international and regional level. Reference should be made but not limited to the National Environmental Policy (2004), Environment Management Act (1996), the National Water Policy (2005), Water Resources Act (1969), Water Works Act (1995), Fisheries Policy, Fisheries Act (1997), National Land Policy (1998), Land Acquisition Act (), Wildlife Policy (), Wildlife Act (2004) and other relevant legislation.
 - e) Present a thorough Analysis of Alternatives, comparing the selected project with other options, in terms of the proposed dam location; impoundment area; treatment works and balancing tank locations; alignment of the conveyance mains to Lilongwe; dam and spillway design; and planned operating regime (water releases from the dam). The Analysis of Alternatives should indicate the project location and design that would be the best overall, taking into account specific environmental and social impacts as well as economic considerations. Among the specific alternatives (for meeting Lilongwe's future water needs) that should be evaluated are (i) a new dam on alternative rivers besides the Diamphwe; (ii) alternative sites on the Diamphwe River (e.g. Upper Diamphwe); (iii) alternative dam wall heights and reservoir full supply levels; (iv) urban water supply vs. multipurpose (urban plus irrigation) reservoir; and (v) alternative

water flow regimes (run-of-river, specific desired river regulation, maximizing water storage for urban use and/or irrigation, optimizing reservoir water quality by limiting water residence time, etc.).

- f) Taking into account the substantial public consultations already conducted by WAPCOS, undertake any additional public consultation that might still be needed to ensure that all interested and affected stakeholders are involved in the ESIA as well as RAP preparation, with their views incorporated within the ESIA and RAP reports. The Consultant must ensure that all public consultation carried out is properly documented. Accordingly, the ESIA should describe all the public consultation carried out on this project's environmental and social impacts (broadly interpreted), including (i) mode of consultation; (ii) dates and locations of specific consultation events; (iii) which organizations, interest groups, or individuals were invited to provide comments, and which ones did so; and (iv) the main issues raised. In view of the high social sensitivity of the Lower Diamphwe Dam site, the Consultant will coordinate stakeholder consultation activities—including site visit logistics and messaging to local residents—closely with the main counterparts in the MWDI, Lilongwe Water Board, and other key Government agencies officials at the national and district levels.
- g) Identify the environmental and social impacts (direct and indirect, short and long-term and cumulative) associated with the project at and around the site. In this context, “the project” includes the dam wall; saddle dam(s); inundated area and designated buffer zone around it; raw water conveyance main; treatment works; balancing tanks; treated water conveyance main to Lilongwe; ancillary project facilities; new or improved access road(s) to different project sites; quarries and borrow pits; construction, staging, and storage areas and temporary use sites; and any other civil works, along with other project activities such as irrigation and fisheries promotion. The analysis of impacts should include positive as well as negative impacts on the physical (including chemical), biological, and social (including economic and cultural) components of the environment associated with the construction and operation of the project, including but not limited to:
 - i) Involuntary resettlement (to be detailed in the RAP) and related social impacts;
 - ii) Effects on wildlife, forests, and terrestrial biodiversity;
 - iii) Effects on existing or proposed protected areas or other sites of conservation or special management interest;
 - iv) Effects on the water quality regimes of the river and reservoir. The ESIA should indicate the potential risks to water quality within the reservoir and downstream, and how these risks should be mitigated. It should scientifically assess whether any pre-impoundment biomass clearing (if so, how much and where) might be needed to maintain desired levels of water quality or for other specific objectives (such as boat navigation channels), bearing in mind the environmental value of submerged trees as habitat for fish and birds. Beyond any biomass clearing that may (or may not) be warranted, the ESIA should specify the location of any refuse dumps, latrines, and other potential water contamination sources; the ESMP should then specify which sites will need to be cleaned up prior to inundation;
 - v) Effects on fish and other aquatic life, particularly those species of conservation concern or economic importance, with special focus on key issues including the planned fisheries development (including potential cage farming) in the Diamphwe Reservoir; risks to native aquatic species from non-native fish species (if any are introduced) and guidance on which fishery species could be promoted without threatening the survival of native aquatic species; conservation and management of crocodiles (whose population might be fragmented by the dam wall); and blockage

of river fish migrations. Based on preliminary findings noted in the BAR, the Consultant should make a special effort to assess the project's impacts on any fish species of global conservation concern such as Mpasa and Sanjika, along with feasible mitigation measures.

- vi) Ecological and social impacts of altering river flow regimes downstream of the dam, including an environmental flow assessment of how changes in the quantity, quality, and timing of flows would affect the ecological health of the Diamphwe River, the key ecosystem services it provides, and downstream water users and uses;
 - vii) Effects on floating aquatic weeds, and whether any control or contingency measures might be needed (taking into account the World Bank's Pest Management OP 4.09);
 - viii) Induced development around the dam project area (including possible human in-migration);
 - ix) Impact of the proposed construction works on soil erosion and siltation, and of future Diamphwe Dam operation on downstream river bank erosion. Also, address the need for catchment management measures such as a reservoir-edge buffer zone, assistance to farmers on erosion-prone agricultural lands, and/or strengthened protection and management of the upstream Dzalanyama Forest Reserve. The ESMP should describe in detail the catchment management measures that are recommended for support under this project, taking into account the findings and recommendations of the Linthipe Catchment Management Strategy currently being prepared by the National Water Resources Authority;
 - x) Effects on physical cultural resources, including sacred sites (if any) and cemeteries. With respect to the latter, the ESIA should clearly indicate which cemetery sites would be inundated and the number of graves involved. The ESIA should also indicate whether any prevailing taboos about "water that has touched the dead" could affect the acceptability of water from the Diamphwe Dam for human consumption. Any needed salvage or relocation of culturally significant items (including any physical relocation of human remains, if required) will need to be specified in the ESMP;
 - xi) Public health impacts which might include an increase in water- and vector-borne diseases such as malaria and (if present) bilharzia. Appropriate prevention, monitoring, and treatment measures for such diseases (to mitigate any potential project-induced increase) should be specified in the ESMP; and
 - xii) Worker and public safety during project construction and operation.
- h) Show the entire project area and project-affected areas, including the area to be inundated. The desired buffer zone should extend at least 15m on the ground beyond the highest reservoir water line; it could also extend further to help safeguard water quality, reduce sedimentation, or enhance biodiversity or other environmental features.
- i) Ensure that the ESIA addresses the full range of relevant environmental issues, with the entire project area divided into project impact zones along the lines suggested below, though the Consultant is free to use their own discretion.
- Upstream of the dam wall, including the reservoir area and the river further upstream;
 - Downstream of the Diamphwe Dam;
 - Dam construction site
 - Conveyance main to the Treatment Works
 - Site for the Treatment Works and other related facilities
 - Conveyance main to the Balancing Tank and Balancing Tank site
 - Conveyance main to Lilongwe

- j) Provide a detailed and practical Environmental and Social Management Plan (ESMP) that prescribes measures to avoid, minimize, compensate, or otherwise mitigate the negative impacts identified, as well as to enhance any expected positive impacts; this should include any needed training and capacity-building activities. The ESMP must include (i) an implementation schedule (in relation to the construction schedule for the main civil works); (ii) the lead institution (national or district government agency, contractor, or other) responsible for implementing each recommended activity; (iii) budget for all up-front investment costs and recurrent operating costs; and (iv) recommended source of funding for all recurrent costs, including environmental management and monitoring. The ESMP should include binding Environmental Rules for Contractors to follow in order to prevent or minimize adverse construction-related environmental and social impacts, along with clear penalties for non-compliance. These rules should include (i) site-specific technical specifications (where and how to dispose of excavated earth, allowable sites for construction camps and equipment staging areas, legal sites for quarries and borrow pits, etc.); (ii) chance finds procedures for any physical cultural properties unexpectedly discovered during construction; and (iii) rules of conduct for construction personnel that prohibit hunting, bush-meat purchase, vegetation burning, washing of machinery or changing of lubricants in waterways, improper waste disposal, inappropriate interactions with local people, etc. The ESMP should also provide the environmental and social boundary conditions for the future dam's operating rules, including environmental flow releases. Overall, the ESMP must provide the information needed to guide management decisions in an effective manner;
- k) Propose an Environmental (including social) Monitoring Plan (EMP) for (i) **performance supervision** of how well project construction and operation including the implementation of key mitigation measures are carried out from an environmental and social (including health and safety) standpoint and (ii) **outcome monitoring** of key selected environmental and social indicators, such as for reservoir and river water quality, indicator species of conservation or special management interest, etc. The EMP should specify the planned monitoring activities, key indicators, monitoring frequency and duration, budget and skilled personnel needs, institutional responsibility for each monitoring activity, and means of verification;
- l) Prepare a separate Resettlement Action Plan (RAP) for the project, consistent with the standards in the World Bank Policy on Involuntary Resettlement (OP 4.12). The RAP will need to take into account those households who would be physically displaced to make way for the Diamphwe Dam and reservoir (including buffer zone) and associated facilities, as well as those who would lose farmland, grazing land, or other assets (even if not physically displaced themselves). The RAP needs to include a detailed implementation schedule (linked to the construction schedule for the dam, water treatment plant, pipelines, and other main civil works), clear institutional responsibilities, and an itemized budget. The RAP should include, among other information, the number of people to be displaced, as well as an inventory of all the property and structures to be affected or lost due to the project. It should indicate the alternative places for relocating displaced people, along with suitable investments in land use intensification or alternative livelihood development, to ensure that they are not made worse-off as a consequence of the project. This should be done in accordance with the Land Acquisition Act and other relevant legislation and guidelines, as well as the World Bank's OP 4.12 and the broadly similar IFC Performance Standard 5. In a manner analogous to the EMP, the RAP should include monitoring of the well-being of project-affected people who are resettled or receive compensation for lost assets or livelihood restoration assistance. It is expected that all costs related to RAP implementation will be

borne by the new Lilongwe Water Project, as part of the overall cost of Diamphwe Dam construction;

- m) Propose a Social Communications and Grievance Redress Plan that outlines the procedures for grievance redress and other conflict management throughout project preparation, construction, and operation. This plan will comprise a portion of both the ESIA and the RAP; and
- n) Prepare Bills of Quantities, to be included in tender documents, for implementing (i) impact mitigation and enhancement measures under the ESMP and (ii) environmental and social monitoring activities under the EMP.

To maximize the opportunity for good environmental and social planning and design of the project, the Consultant should work closely with the technical design team, among others. As appropriate, the Consultant will offer suggestions on how the project design or operating plans may be changed to improve environmental and social performance. Any changes accepted by the Ministry of Irrigation and Water Development will be incorporated into the project detailed plan and design.

APPENDIX 3. ESIA STUDY TEAM

DIAMPHWE ESIA STUDY TEAM

Specialists	
LUKE PALFREEMAN	Team Leader
PENNY GEERDTS	Sociologist
WONGANI CHISALA	Country Manager
CHRISTOPHER MPANGA	Environmental Scientist
Dr CHAITALI GHOSH	GIS
JOHN MWALWANDA	Resettlement Expert
Dr CHIMWEMWE MHANGO	Biodiversity
Dr BOSCO LUSUWA	Fisheries
SHADRECK ULAYA	Project administrator
PATRICK MBUNDUNGU	Surveyor
WELLS KAPUSA	Surveyor
Sub - Consultants	
MALAWI DEPARTMENT OF ANTIQUITIES	Cultural Investigations
LILONGWE CENTRAL WATER LABORATORY	Water Quality Testing
MALAWI BUREAU OF STANDARDS Testing Service Department	Noise Monitoring
Site Survey Team	
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ZIONE KAWENDA	
KUMBUKANI MUNTHALI	
LINDA KALULU	
ANDREW CHUMACHIYENDA	
STEVENS MAKINA	
MARTIN MAKHAIKA	
Data Input	
DANIEL LIVUZA	
DAN KALUDZU	
CHIKONDI MWAKAMO	
SARAH	
CHIFUNDO NTUPANYAMA	
BLESSINGS BELEKANYAMA	
CHISOMO NTETEKI	

APPENDIX 4. WATER QUALITY MONITORING REPORT

DIAMPHWE DAM WATER QUALITY REPORT

by

Innocent Kauta MANDA

CHIEF WATER CHEMIST/HEAD, CENTRAL WATER LABORATORY

NOVEMBER 2015

1.0 INTRODUCTION

As part of the Environmental and Social Impact Assessment (ESIA) work conducted by SMEC for Government of Malawi proposed DIAMPHWE dam Project on Diamphwe River for water supply to Lilongwe city, water quality baseline data was obtained by conducting water quality testing. The water quality team was tasked to:

- 1.1 Carry out water quality testing at four sites as indicated in Table 1. The sites were selected under the guidance of SMEC.
- 1.2 Produce a water quality report for Diamphwe Dam Project based on the findings of the water quality testing.

This report therefore fulfils the requirement of the water quality team to produce a report of the findings on the water quality testing conducted in order to collect water quality baseline data for the proposed Diamphwe dam project on Diamphwe River. A total of four sample locations were used to collect water quality data for the proposed project. All sample sites are listed in Table 1. Figure 1 shows location of the sampling sites.

Table 1: GPS Coordinates of the sampling sites

Identity of Sampling site	Location	Coordinates		Field Observations
Site 1A	NYAMAZAANI VILLAGE, T/A CHADZA, LILONGWE DISTRICT	0602343 0602321	8420410 8420396	Flow blocked and diverted from main stream by farming activities
Site 1B	NYAMAZAANI VILLAGE, T/A CHADZA, LILONGWE DISTRICT	0611183 0611239	8420410 8420396	Normal flow
Site 2	MALENYA VILLAGE, T/A KALUMBU, LILONGWE DISTRICT	0611183 0611239	8430968 8430996	Normal flow
Site 3	CHIMBOWA VILLAGE, T/A MAZENGERA, LILONGWE DISTRICT	0583869 0614389	8457032 8435736	Normal flow
Site 4	MBALAME VILLAGE, T/A MAZENGERA, LILONGWE DISTRICT	0617450 0617486	8437474 8437512	Normal flow

NB: Mbalame Village is site below the proposed dam and close to the lower end of Diamphwe River, while Chimbowa and Malenya Villages are within the dam area. Nyamazaani village is at the upper tail end of the proposed dam area. (GPS Coordinates extracted from Fisheries Report)

Figure 1: Location of sampling sites

2.0 METHODOLOGY

All samples were collected in duplicates using grab sampling method. Sample collection and on site analysis were conducted on 2nd October, 2015. At each site one of the duplicates was acidified with nitric acid as sample preservation for metal analysis, while the other sample (from each sampling site) was refrigerated (at about 4°C) for anion analysis. pH, dissolved oxygen (DO), electroconductivity (EC) and Turbidity were all analysed on site at the time of sampling.

In the laboratory at Central Water Laboratory, government of Malawi main referral water testing laboratory, analysis of the water samples was carried out in accordance with standard methods for examination of water and wastewater as recommended by APHA, 21st Edition.

3.0 RESULTS AND DISCUSSION

Water quality results for all the parameters analysed are shown in Table 2.

3.1 PHYSICOCHEMICAL WATER QUALITY

Chemically, water delivered from the four sites under review was found to be alkaline and soft. This remark is made based on power of hydrogen ions (pH) and Total Hardness (as CaCO₃) values registered that ranged from 8.12 to 8.60 and 43 to 82 mg/l respectively.

Physical parameters tested namely, Turbidity and Suspended Solids, registered values that ranged from 3.0-28.0 NTU and <0.10-25.0 mg/l respectively

3.2 NUTRIENT LEVELS

Phosphates and nitrate levels ranged from 0.024 to 0.029 mg/l and 0.110 to 0.243 mg/l respectively. These values are relatively low to impact negatively on the quality of water in Diamphwe River. However continued monitoring particularly during the commencement of heavy rains is required to assess the impact of the flush rains on the quality of water in all the four sites under review.

3.3 EFFLUENT QUALITY

Two main effluent parameters: COD and BOD were analysed to assess if the water in Diamphwe River is polluted by human activities (agriculture or sewage).

COD levels ranged from 20.38 to 79.9 mg/l, while BOD levels ranged from 10.0 to 19.45 mg/l. These results indicate that all BOD levels are within acceptable limits of 20mg/l, while only one site (Site 1A: Nyamazaani Village) registered COD levels above the recommended standard of 60mg/l according to Malawi Standards for Effluent Quality.

Table 2: WATER QUALITY TEST RESULTS FOR DIAMPHWE PROPOSED DAM SITE

LAB No.		920	921	922	923	924
DATE SAMPLED		02/10/2015	02/10/2015	02/10/2015	02/10/2015	02/10/2015
MAP SHEET/GRID REF.	UTME	0602343/0602321		0611183/0611239	0583869/0614389	0617450/0617486
	UTMN	8420410/8420396		8430968/8430996	8457032/8435736	8437474/8437512
SOURCE TYPE/LOCATION		SITE 1A. NYAMAZAANI VILLAGE, T/A CHADZA, LILONGWE DISTRICT	SITE 1B. NYAMAZAANI VILLAGE, T/A CHADZA, LILONGWE DISTRICT	SITE 2. MALENYA VILLAGE, T/A KALUMBU, LILONGWE DISTRICT	SITE 3. CHIMBOWA VILLAGE, T/A MAZENGERA, LILONGWE DISTRICT	SITE 4. MBALAME VILLAGE, T/A MAZENGERA, LILONGWE
pH Value		8.12	8.57	8.60	8.56	8.58
CONDUCTIVITY ($\mu\text{S}/\text{cm}$ at 25°C)		182	145	233	197	232
TOTAL DISSOLVED SOLIDS, mg/l		101	80	128	108	128
CARBONATE (as CO_3^{2-}), mg/l		10.0	10.0	14	11	16
BICARBONATE (as HCO_3^{2-}), mg/l		39	37	60	53	56
CHLORIDE (as Cl^-), mg/l		17.8	8.1	15.2	12.2	14.3
SULPHATE (as SO_4^{2-}), mg/l		6.3	6.3	9.77	9.16	7.63
NITRATE (as NO_3^-), mg/l		0.144	0.169	0.110	0.243	0.230
FLUORIDE (as F^-), mg/l		-9	-9	-9	-9	-9
SODIUM (as Na^+), mg/l		14	9.1	13	8	9
POTASSIUM (as K^+), mg/l		0.7	1.9	0.9	1.0	1.0
CALCIUM (as Ca^{++}), mg/l		10.1	9.5	16.3	14.4	18.8
MAGNESIUM (as Mg^{++}), mg/l		5.6	4.2	8.2	8.2	8.5
SOLUBLE IRON (Fe^{++}), mg/l		0.1	1.2	0.2	0.045	0.3
MANGANESE (as Mn^{++}), mg/l		-9	-9	-9	-9	-9
TOTAL HARDNESS (as CaCO_3), mg/l		48	43	75	70	82
TOTAL ALKALINITY (as CaCO_3), mg/l		49	47	72	62	75
SILICA (as SiO_2), mg/l		-9	-9	-9	-9	-9
TURBIDITY, NTU		3.0	28	10	5.0	6.0
SUSPENDED SOLIDS, mg/l		<0.10	25	8.0	4.0	5.0
PHOSPHATE (PO_4^{3-}), mg/l		0.027	0.028	0.029	0.024	0.027
DISSOLVED OXYGEN (DO), mg/l		4.24	3.64	4.68	4.64	5.15
BIOLOGICAL OXGEN DEMAND (BOD_5), mg/l		10.0	16.0	15.6	19.45	14.2
CHEMICAL OXYGEN DEMAND (COD_{Cr}), mg/l		79.9	58.8	21.17	33.71	20.38

***-9= Not Determined

Analysis conducted by Central Water Laboratory

GPS Coordinates extracted from Fisheries Report

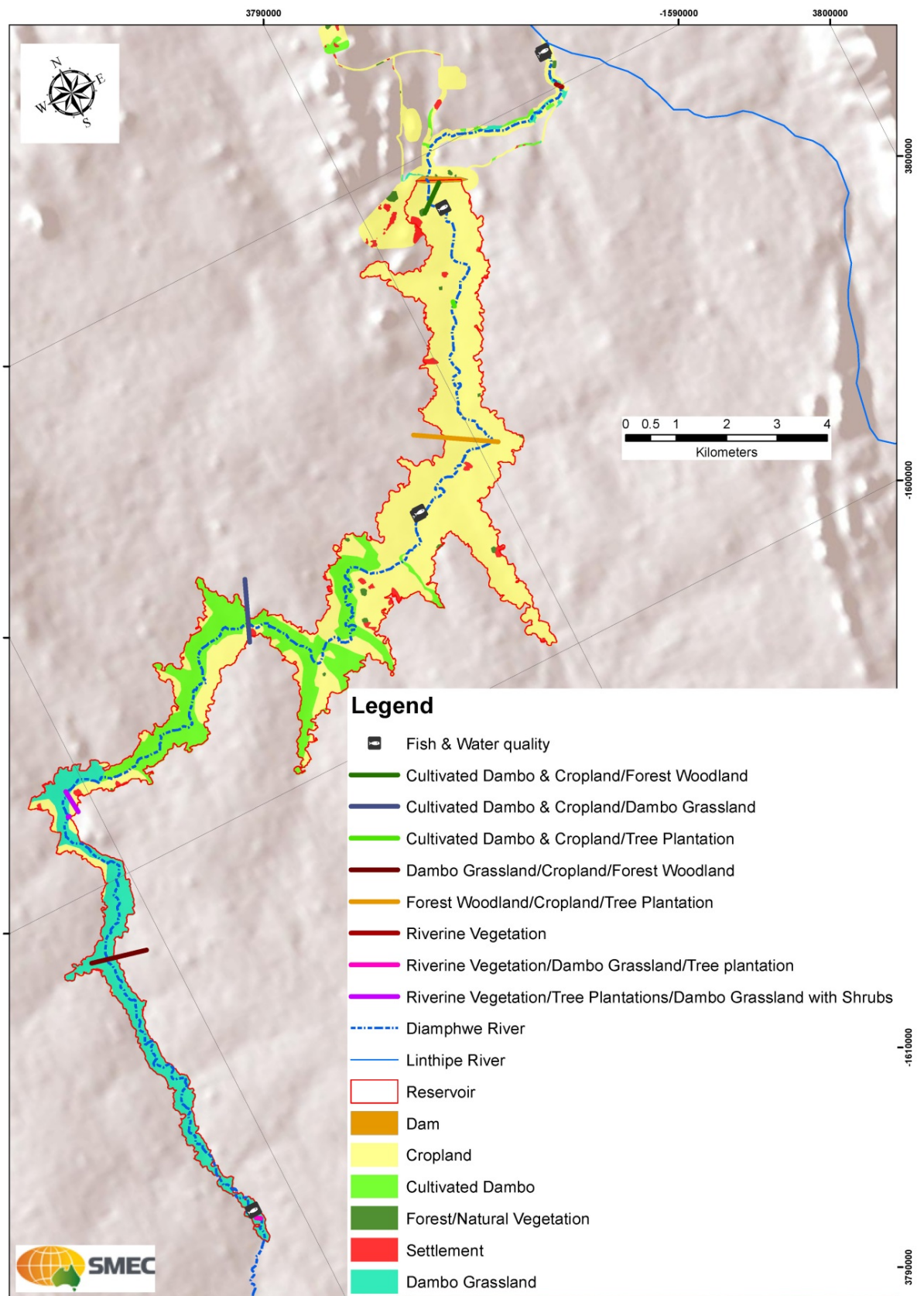
4.0 CONCLUSIONS AND RECOMMENDATIONS

Based on this single set of data generated from analysis of water samples under review, the following conclusions and recommendations can be made:

- Chemically, water delivered from the water points under review, registered chemical parameters and nutrient levels within the acceptable limits according to Malawi Standards.
- The nutrient values are very low indicating no sign of eutrophication
- The clarity of water was not objectionable except for one site (Site 1B: Nyamazaani Village) which registered Turbidity above the acceptable limit of 25 NTU according to Malawi Standards.
- BOD levels indicated that there is no sign of pollution from human activities. However, the COD value which was above the acceptable limit of 60 mg/l indicates some form of pollution from human activities. It is worth noting that the water quality expert who carried out sample collection and on site testing reported that the water at the site which reported COD value above the accepted limit was not flowing i.e. was stagnant (was blocked and diverted from the main stream for irrigation use) and this could explain the relatively high COD value comparative to the other sites where water was flowing without any obstruction.
- Based on these findings, it is clear that the water in Diamphwe River is generally not negatively impacted by human activities prior to the construction of the dam.
- This report strongly recommends resampling of all the four sites during the rainy season particularly the site which registered COD value above the recommended limit to ascertain whether the contamination at the site with COD value above the acceptable limit is sporadic or continuous and to assess the impact of flush rains on the quality of water in Diamphwe River.

REFERENCES

American Public Health Association (APHA) (1995). *Standard methods of the examination of water and wastewater*, (21ST Ed.), Washington: APHA, AWWA and WEF.



APPENDIX 5. SPECIALIST BIODIVERSITY REPORT

Environmental and Social Impact Assessment Report

Terrestrial Ecology Baseline Survey Report

Dr Chimwemwe Mhango: Ecology Specialist

December 2015

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1.0 INTRODUCTION

1.1 Current Status of Biodiversity in Malawi, Lilongwe and Dedza

Malawi has diverse habitats and ecosystems which support diverse species and a large number of flora and fauna. The biodiversity includes: forestry, fisheries, and wildlife resources. The vegetation in Malawi is extensively miombo woodland, deciduous forests, and thickets, evergreen and semi-evergreen forests and montane grassland. Malawi has about 5,500 to 6,000 flowering plants, and 250 species of bryophytes, 200 of which are mosses. Out of the documented more than 6,000 plant species, 253 are considered threatened, vulnerable, rare or endangered (SOER 2010).

The number of invertebrate species in Malawi is not known but presently, over 8,770 invertebrate species have been documented in Malawi with insects dominating, (SOER 2010). Nematodes, crustacean and insects are better known than expected while earthworms, myriapods, and arachnids are more poorly represented. Non-insect aquatic invertebrates include 280 species, 93 lacustrine, and 187 associated with water (NABSAP 2006). Non-insect aquatic invertebrates include: mollusks, nematodes, crustaceans (copepod, cladoceran, crabs, ostracods, isopods and small prawns), rotifers, annelids, and acarins. Chironomids, water mites and nymphs of various insects are most common (NABSAP 2006).

There are 83 amphibian species in Malawi and 6 species are listed in IUCN Red Data List. Most of the amphibian species are frogs and toads, with two species being caecilians. Eleven species of amphibians are currently listed on the IUCN Red Data List. There are 140 reptilian species recorded in Malawi from 22 families, but very little is known about their conservation status (NABSAP 2010). Twelve reptilian species are endemic to Malawi and 6 species are considered to be rare (SOER 2010).

The number of bird species is 648 from 78 families (NABSAP 2006; SOER 2010). Over a third of these bird species are considered to be uncommon or rare and of long-term conservation concern. Eighteen bird species continue to be listed on the IUCN Red Data List (Pullanikkatil and Chilambo 2010). Ninety four birds in Malawi are restricted range species found only in one or a few biomes (NABSAP 2006) and these could be under threat because most of their habitats are degraded especially those outside protected areas (SOER 2010).

About 192 mammalian species have been recorded in Malawi, 125 species of which are small mammals. Most large mammals such as elephants (*Loxodonta africana*) occur in the national parks and wildlife reserves. Eight mammal species are listed on the IUCN Red Data List. Hippopotamus and otters are only large mammals in Malawi and are aquatic habitats. The hippopotamus populations show a declining trend due to habitat loss and conflict with human activities (SOER 2010). Hippopotamus populations are protected within Liwonde National Park, Kasungu National Park, and Vwaza Wildlife Reserve.

In terms of fish species, there are over 1,000 species in the country's water bodies. The number of fish species represents about 15% of the global total of fresh water fish and approximately 4% of the world's fish species. The number of species and genera in the country's water bodies continues to increase with new discoveries and taxonomic revisions that alter the nomenclature and phylogenetic groupings (Eccles & Trewavas 1989, Konings 1990, Ribbink 2001). Lake Malawi alone contains over 800 fish species, which

is more than any other lake in the world and its fishes represent an evolutionary and biologically spectacle of global importance. The IUCN Red List data for Malawi lists 9 species as endangered, 93 as vulnerable and 3 as near threatened (IUCN, 2014).

However, biodiversity in Malawi is continually facing pressure from high population growth rate, extreme poverty, habitat loss and degradation, and invasive alien species, (NBSAP 2006). High population growth is leading to clearing of land for agriculture and human settlements that have also resulted in reduction of forest cover from 45% in 1975 to 28% in the early 2000's, (NBSAP 2006). Malawi is one of the poorest countries in the world, nearly half the population (52.4%) live below the poverty line, while 22% live in dire poverty (NBSAP 2006; SOER 2010). The country's population is estimated to be 13 million as of 2008, with a growth rate of 2.2% (NSO, 2008). In general, nearly 90% of the Malawi population is forced by their low economic base to depend on natural resources for energy (fuel wood), food, construction material, medicine, and fodder. Deforestation is causing significant changes in species and ecosystems in Malawi because species disappear together with their forest habitats. Currently between 50,000 and 70,000 hectares of natural forests are being destroyed annually such that over the past 25 years, forest resources have declined from 47% to 28%, (SOER 2010). Lilongwe used to be characterized with miombo woodland as the main vegetation but it is currently absent from the Lilongwe plain but still found in graveyards and protected areas like Dzalanyama Forest, Chongoni Forest and Dzedza Forest, (Malawi Government 2013). According to Malawi Government (2013), Lilongwe is one of the districts in Malawi currently experiencing high deforestation and degradation of forest resources. The main causes are: agricultural expansion which is causing land use changes; fuelwood and charcoal production for both domestic and commercial purposes; poverty and high population growth rate. Even Dzalanyama Forest Reserve is also experiencing illegal tree cutting and harvesting, charcoal making as a means of generating income because of reduction of land per capita as a result of rapid population increase. This pressure on forest resources was also evident in the project impact area as forested woodland was only found in graveyards which are customary protected areas; and in communal or individual woodlot areas. Most areas are currently under cultivation including marginal hilly areas and the river banks.

In Malawi, wildlife resources are also disappearing mostly due to habitat loss and degradation. Amphibian species are threatened with habitat destruction as land is cleared or drained for agriculture and development which also has an impact on their breeding habitats, (NBSAP 2006). In Lilongwe wildlife animals are mostly found in protected areas because most large mammals have been locally extirpated in areas outside protected areas mainly as a result of hunting and habitat degradation. Some large mammals still remain in the Dzalanyama forest and these include: velvet monkey, baboon, duiker, a head of sable antelopes, leopard and hyenas, Malawi Government 2013. However, their populations are not known because no animal counts have been done, however it should be mentioned that the number are declining. In Malawi, birds are also under threat from habitat destruction, especially when forests are cleared in areas outside protected areas (SOER 2010). In Lilongwe, Dzalanyama forest is one of the important bird areas (MW 011) in Malawi and has more than 300 species of birds. Thuma forest reserve also has 170 bird species including the Natal francolin though there may be more unrecorded species, Malawi Government 2013. Some large mammal populations within protected areas are showing

a declining trend due to poaching (SOER 2004). Fisheries in Lilongwe district exist in rivers and the riverine fish species are mostly composed of cyprinids, (Malawi Government 2013).

1.2 Previous Studies in the Project Impact Area

Previous ESIA studies have been carried out in the project impact area. These studies have been done by SOGREA, SAFEGE and WAPCOS. The findings in relation to biodiversity in the project area are presented below.

Flora

WAPCOS baseline studies in the project impact area describes the vegetation in the proposed dam areas as Miombo woodland type dominated by various *Brachystegia* and *Julbernadia* tree species. There are scanty and indigenous trees with the most commonly found species being: *Brachystegia floribunda* (Tsamba); *Julbernadia paniculata* (Mtondo); *Parinari curatellifolia* (Muula), *Brachystegia spiciformis* (Mvukwe), *Terminaria sericea* (Naphini), *Piliostigma thonningii* and *Combretum sp.*. WAPCOS states that most of these trees are in the regeneration stage except for a few large standing trees located in graveyards and the hills. During this study, only *Terminaria sericea* (one tree), *Piliostigma thonningii* and *Combretum* species were recorded from the species listed above. The reason could be that most of these species have been cleared from the area and only a few if any exist currently. *Piliostigma thonningii* was only recorded in the riverine vegetation (9 trees) and *combretum sp.* were recorded only in forest woodland (graveyards).

Exotic fruit trees are scattered on farmland and gardens, graveyards and homesteads and include the following tree species: *Mangifera indica* (mango); *Psidium guajava* (guavas). In addition exotic trees in the area also included: *Acacia polyacantha* and *Eucalyptus sp.* This study also found this to be the case but also *Gmelina arborea* was another common exotic timber trees recorded in the area.

In the wider catchment, previous studies also mentioned that there are Four Forest Reserves in Dedza and Lilongwe District but only three forest reserves are closer to the project impact area namely: Dedza Forest Reserve (which is supposed to be Dzenza Forest Reserve) 829ha and located about 7.5km and Chongoni Forest Reserve, 13,639 ha located 15km from dams site in Dedza District Only; and Dzalanyama Forest Reserve, 989,000ha located 35km from dam site which is in both Lilongwe and Dedza District; and Thuma Forest Reserve 188700ha 35km from dams site located in Lilongwe District only, (WAPCOS 2014). The commonly observed tree species in each of these reserves are: Dzalanyama, *Julbernadia paniculata*, *Parinari curatellifolia*, *Brachystegia spiciformis*, *Terminaria sericea*, *Brachystegia floribunda*, *Colophospermum mopane*, *Combretum zeheri*, *Bauhemia thonningii*, *Uapaka kirkiana*, and *Syzygium guineense*; Chongoni Forest Reserve, *Adima microcephala*, *Burkea Africana*, *Pterocarpus angolensis*, *Sclerocarya caffra*, *Bauhimia thonningii*, *Terminaria sericea*, *Brachystegia floribunda*, and *Syzygium cordatum*.; and Thuma Forest Reserve, *Brachystegia bohemia*, *Julbernadia globiflora*, *Combretum sp.* *Diplorhus sp.*, *Diospyrus sp* and *Acacia spp.*

Previous studies on engineering designs and ESIA classified the project impact area into the following categories: cultivated area; bushland with grassland patches; dense woodland patches (graveyards); and riparian.

Fauna

Previous studies in the project impact area states that there is a decline in wildlife as a result of loss of habitats due to clearing for settlement, agriculture, firewood and brick making. No large mammals were observed during previous surveys but few wildlife animals exist comprising of small mammals, birds, snakes, frogs and insects.

WAPCOS (2014) states that there are six species of mammal species that are known to occur in the project impact area and these include: *Mus sp.*; Thomson's gazelle, *Eudorcas thomsonii* (does not exist in Malawi but common duiker, *Sylvicapra grimmia* exists in the project impact area); Hyaena, *Crocuta crocuta*; Otter, *Aonyx capensis*; monkey, *Chlorocebus pygerythrus*; and hare, *Lepus sp.*. Villagers reported presence of rats in the area though small mammals were not observed because the area is highly disturbed and the animals tend to hide.

Previous studies only mentions that birds exist in the project impact area with Pied Kingfisher as the mostly observed bird species. However, they state that forest woodlands in graveyards are fragmented habitats where birds occur in the project impact area, and no birds are observed in open areas.

Diamphwe River supports aquatic life which includes crocodiles, fish, amphibians (frogs and toads), (WAPCOS 2014). WAPCOS (2014), states that reptiles present in the project impact area includes mostly snakes and crocodiles. The following reptilian species were reported to occur: crocodiles, *Crocodylus niloticus*; green mamba, *Dendroaspis angusticeps*, and python, *Python sebae*. The reptiles injure livestock and pose a threat to humans. There were no amphibians that have been recorded to occur in the project impact area contrary to expectations of finding amphibians in riverine environments.

The main fish species recorded in Diamphwe according to WAPCOS 2014 include: *Tilapia rendalli*, *Clarius gariepinus*, (*Mlamba*), *Lephrunops sp.*, *Oreochromis shiranus* (*Makumba*), *Opsaridium microlepis* (*Mpasa*) which is listed as Endangered, *Opsaridium microcephalum*, which is listed as Vulnerable, and *Labeo sp.* (WAPCOS 2014). However, this study did not record the endangered *Mpasa* fish species and local people indicated that this Lake Salmon does not reach the dam site because of a barrier (water fall) located downstream of the dam.

WAPCOS (2014) states that the following insects exist in the project impact areas: mosquitoes, grasshoppers, Tsetse flies, Ticks, bees, wasps and scorpions.

No species lists or inventories have been developed for the project impact areas in the previous studies. Conservation status was only assessed for fish species and no other wildlife species and plant species observed in the project impact area. Few studies on flora and fauna have been done in the project impact area and most of them in relation to plants. However, these studies have not been detailed baseline studies therefore a lot of gaps exist on ecological information that exist for the area.

2.0 METHODOLOGY

2.1 Literature Reviews

Relevant literature was reviewed as a way of collecting secondary data on ecological aspects in the project impact areas. Reviewed literature included documents relating to the project, flora and fauna in the project impact areas and wider catchment and their conservation status. In addition previous studies on the ecological baseline and ESIA studies were also reviewed as a way of identifying existing gaps and informing planning of ecological field studies. These included:

- Documents identified in the consultancy TORs including reports prepared by WAPCOS, Safège, Sogreah and Studio petrangeli and other documents from National Water Development Programme
- Legislation and policies relating to environment, forestry, fisheries and parks and wildlife of the Government of Malawi
- International policies and standards and guidance notes from the World Bank, IFC and African Development bank
- Other documents of interest such as the Lilongwe District State of Environment Report and the Lilongwe and Dedza Socio-economic Profile

2.2 Consultations

Consultations were also carried out before during and after ecological surveys to source ecological information and verify findings. The following consultations were carried out:

- Consultation meetings with the client Lilongwe Water Board
- Consultation with community members during surveys on different habitats; flora and fauna that are known to occur in the project impact areas and their habitats
- Consultations with technical government officers and field assistants in the following departments: forestry, fisheries, wildlife and environment in Lilongwe and Dedza Districts and the Lilongwe Headquarters.

2.3 Ecological Surveys

Vegetation Surveys

Vegetation surveys were carried out between 8th and 12th October, 2015. Vegetation surveys were carried out in all identified terrestrial habitats that occur in the project impact area and these included: dambo grassland/wetlands; cultivated dambo and cropland; riverine/riparian; tree plantations and forest woodlands.

The vegetation surveys were carried out with the main objective of identifying vegetation categories and provide a full description; species found in each habitat type and their conservation status. The surveys used line transects walks across the Diamphwe River (sampling 100m transects across the reservoir) and sampling 100m transects parallel with the river banks. Transect walks across the Diamphwe river were

done by sampling 100m transects in different habitat types identified at the different sites, mostly targeting tree plantations and cultivated land. In addition 100m transects were also done in selected graveyards to capture vegetation types and species in mature forest woodlands. The transects along the river banks were also done to sample plant species with 50m of the river bank. This transects were 100m on either side (Dedza and Lilongwe sides) of the river.

Table 1: Vegetation Survey Sampling Sites and Transect types and Locations

Date	Sampling Site GPS Locations	Sampling Site Village Names	Transect Type	Habitats sampled
08/10/15	0602309	8420252	Nyamazani Village	100m Lilongwe river bank side 100m Dedza river bank side Riverine/ dambo grassland/ Tree plantation
			Chamangwana Village	
09/10/15	0601742	8426010	Kadzakatha Village	Transect walk across the reservoir into graveyard Dambo grassland/ / Cultivated Crop /Forest Woodland
	0602792	8425754	Wilinda/Village & Graveyard	
10/10/15	0602806	8429146	Chilikumwendo Village	100m Dedza river bank side 100m Lilongwe river bank riverine/tree plantations/dambo grassland with shrubs
	0602623	8428696		
	0602841 0602649	8428696 8428698	Bisai Village	
10/10/15	0607732	8431170	Mchiteni Village	Transect walk across reservoir Cultivated dambo and cropland/ dambo grassland
	0607263	8430072	Mtanthila Village	
11/10/15	0612102	843184	Mlombwa Graveyard & village	Transect walk across reservoir from one graveyard to the other Forest Woodland /Cultivated cropland/ tree plantation Forest Woodland
	0613266	8431286	Kandeweza Village	
	0614283	8430354	Manondo Graveyard	
11/10/15	0613718	8433971	Mtontho Village	100m on Dedza side of river bank 100m of Lilongwe river bank Cultivated dambo and cropland/ tree plantations
	0613726	8434062	Kaphweleza Village	
12/10/15	0614481	8436174	Kuntamba Graveyard & Village	Transect across the river from one graveyard to another Cultivated dambo & cropland/ Forest woodland
	0613940	8435586	Kumkama graveyard	
12/10/15	0617479	8436748	Mbalame village	100m on Dedza side of river bank 100m on Lilongwe side of river bank Riverine vegetation Riverine vegetation
	0617318	8436564		
	0617403	8436843	Chisindo Village	

Wildlife Surveys

Wildlife surveys were carried out between 8th and 15th October, 2015. Wildlife surveys were carried out in all identified terrestrial habitats that occur in the project impact area and these included: dambo grassland/wetlands; cultivated dambo and cropland; riverine/riparian; tree plantations and forest woodlands.

The wildlife surveys were carried out with the main objective of identifying wildlife species found in each habitat type and their conservation status. The following gaps guided the survey:

- Compile a comprehensive and accurate local and regional species list/inventory of mammals and their habitats in the project impact area especially assessment of graveyard sites as 'animal refuge areas' ; determine whether certain species mentioned in previous studies really exist and
- Identify any important bird habitats especially assessment of riverine and forest woodlands in graveyards; compile an inventory of bird species and their conservation status; determine whether birds from catchment area habitats such as Dzalanyama forest reserve use or transit in the project area

The surveys used survey transects located along the riverine/riparian zones and the forest woodland within graveyard sites; dambo grassland and cultivated areas. Transects were 100m cutting across the habitats. Each site had three 100m line transect with traps placed at 10m spacing across transect.



Thus a total of 30 traps were placed per transect. In areas where transects were made on either side of the river; 15 traps were set 10m apart; making a total of 30 traps per site. Types of traps used were Type of traps used were the Sherman, snap trap and pitfall traps. For pitfall traps, drift fence was made parallel to the river bank on one side of the 20l buckets that were dug into the ground. Oatmeal mixed with peanut butter was used as bait and baiting was done every morning during the time that traps were being checked.



Line transects for traps along the river bank were set parallel to the river on either side (Dedza and Lilongwe side). Traps were left on each site for three consecutive nights for seven sites and two nights for one site. There were a total of 830 trap nights during this survey.

No of Trap Sites	Number of Traps	Trap nights per site	Total Number of Trap Nights
2	25	3	150
5	40	3	600
1	40	2	80
Grand Total			830

Date	Sampling Locations	Site GPS	Sampling Site Village Names	Transect Type	Habitats sampled
08/10/15 to 11/10/15	0602351	8420183	Nyamazani Village	100m Lilongwe river bank side	Riverine/ dambo grassland/ Tree plantation
	0602385	8420203	Chamangwana Villge	100m Dedza river bank side	
08/10/15 To 12/10/15	0601978	8426010	Kadzakatha Village	Lilongwe River Bank Side	Dambo grassland with reeds
09/10/15 to 12/10/15	0602777	8425748	Wilinda Graveyard	River bank Side	Forest woodland
10/10/15 to 13/10/15	0602753	8429027	Chilikumwendo Village	Dedza river bank side	riverine
11/10/15 to 14/10/15	0613781	8433982	Mtontho Village	100m Dedza River Bank side	Cultivated Land highly disturbed
	0613672	84334004	Kaphwereza Village	100m Lilongwe River Bank side	
12/10/15 to 15/10/15	0612192	8431600	Mlombwa Graveyard	Lilongwe side	Forest Woodland

Date	Sampling Site GPS Locations	Sampling Site Village Names	Transect Type	Habitats sampled	
12/10/15 to 15/10/15	0612180	8431638	Ndingo Graveyard	Dedza side	Forest Woodland
13/10/15 to 15/10/15	0614481	8436174	Mbalame Village		Shrubs and riverine

2.4 Data Analysis

Data collected was compiled into species lists and inventories. The national and international species conservation status of species was also determined. Biological statistical tools were used to determine biological diversity in the different habitats and project impact areas

3.0 BASELINE ENVIRONMENT

This section of the report presents the ecological baseline in the project impact area based on primary and secondary data sources. It describes the terrestrial flora and fauna found in the project impact areas; their species abundance and richness; and assessment of diversity. It also describes the conservation status of the different flora and fauna species found or known to occur in the project impact areas.

3.1 Vegetation

Vegetation types in the project impact area

There were five vegetation types identified in the project impact area and these included: dambo grassland; cultivated dambo/cropland; riverine vegetation;

Dambo grassland

This is mainly composed of grasses, mostly *Setaria grandis*, *setaria sphacelata* and *Leersia hexandra*, sometimes with scattered shrubs. Shrubs recorded included: *Flueggea virosa*, *Diospiros heterophylla*, *Asparagus terrisfolias*, and *Senna senguana*. There were very few cultivated parcels of land. This was mostly located in the flood plain area upstream of the reservoir up to Chilikumwendo area. Mostly it had tobacco nurseries. In addition, in some areas people would plant *Eucalyptus saligna* trees and *Gmelina arborea*.



Cultivated land (cultivated Dambo & Cropland)

Cultivated land consisted of cultivated dambo and cropland. Cultivated dambo is mainly floodplain area that has been cultivated and is mainly used to grow crops even during the dry season such as vegetables, tomatoes, Irish potatoes, maize and sugarcane. Irrigation of crops is done in this area during dry season. Cultivated damboland could also have some scattered trees or private plantations with the most common tree species being *Eucalyptus* sp. especially *Eucalyptus saligna*, *Gmelina arborea* and fruit trees such as *Mangifera indica* and *Psidium guajava*.

Cropland is cultivated for growing crops mainly rain fed agriculture and was mostly found to be in the inundation area in the downstream part of the reservoir. In most areas it has scattered few trees mostly mangoes, *Faldebia albida* and *Bauhinia* sp. that have been left to grow.



Riverine/Riparian Vegetation

This is vegetation on the river bank mostly composed of reeds (*Phragmites mauritiana*) and other tree species that grow along the river bank mostly *Rauvolfia caffra*, *Mwimbi*; *Toona ciliata* or *cinderella*; *Acacia albida*, *Albizia versicolor*, *Oncoba spinosa* and *Parkia filicoedia* or *mkundi*. In addition the following plant species were very common: *Lantana camara* (invasive species); *Syzygium cordatus*; *Psidium guajava*; *Phragmites mauritiana*; *Vernonia glabra*; *Maytenus heterophylla*; *Flueggea virosa*, *Diasyrea lycidoides*; *Tithonia diversifolia*; and *Sida acuta*.



Species Richness and Abundance

72 plant species were recorded in the project impact area representing 28 families. The most abundant and dominant woody species were: *Rauvolfia caffra* (23%) mostly recorded in the forest woodland (graveyards); *Toona ciliata* (16%), mostly recorded in forest woodland (graveyards); *Eucalyptus saligna* (11%) mostly recorded in dambo grassland vegetation; *Euphorbia tirucalli* (9%) mostly recorded in graveyards; and *Gmelina arborea* (8%). *Gmelina arborea* and *Eucalyptus saligna* which are exotic trees were mostly recorded in dambo grassland areas. In addition the following shrubs were mostly recorded in riverine and dambo grassland: *Flueggea virosa*, *Diospiros heterophylla*, *Asparagus terrisfolias*, and *Senna senguana*. In the riparian areas of Diamphwe the common reed, *Phragmites mauritiana* covers most areas of the river bank.

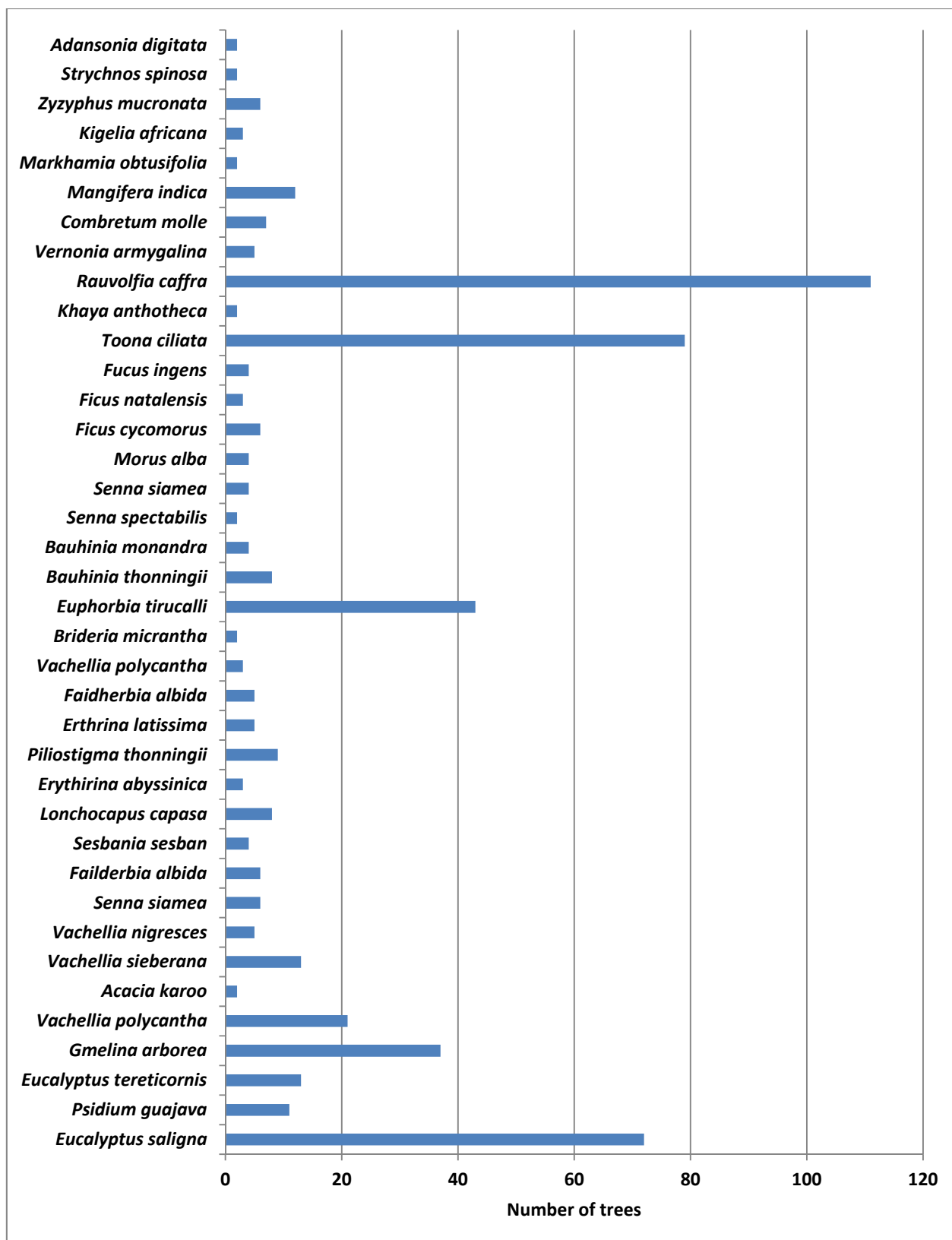


Figure 1: Abundance of Woody tree Species recorded in the project impact area

Vegetation Structure

There is variation in age structure of trees found in the different habitats. The riverine vegetation recorded the largest population of young trees (63%): 29% being in the <10cm DBH group; and 33% in the >10-20cm DBH group. If compared amongst the different habitats: the riverine habitat has 85% of all <10cm DBH group and 51% of the >10 -20 DBH range. Older trees were mostly recorded in the graveyards with: 76% of all trees with DBH >50cm; and only having only 7.2% trees <10cm DBH. It was observed that trees with large DBH in forest woodlands or graveyards were being harvested for timber and it was established that they are cut into timber for use by villagers in making coffins. Forest woodlands have a very good representation of all trees in different age groups than riverine and cultivated areas. Cultivated areas had the least amount of trees with most of them having a DBH size of >11-20cm. Vegetation structure across habitats is presented in **Figure 2** below.

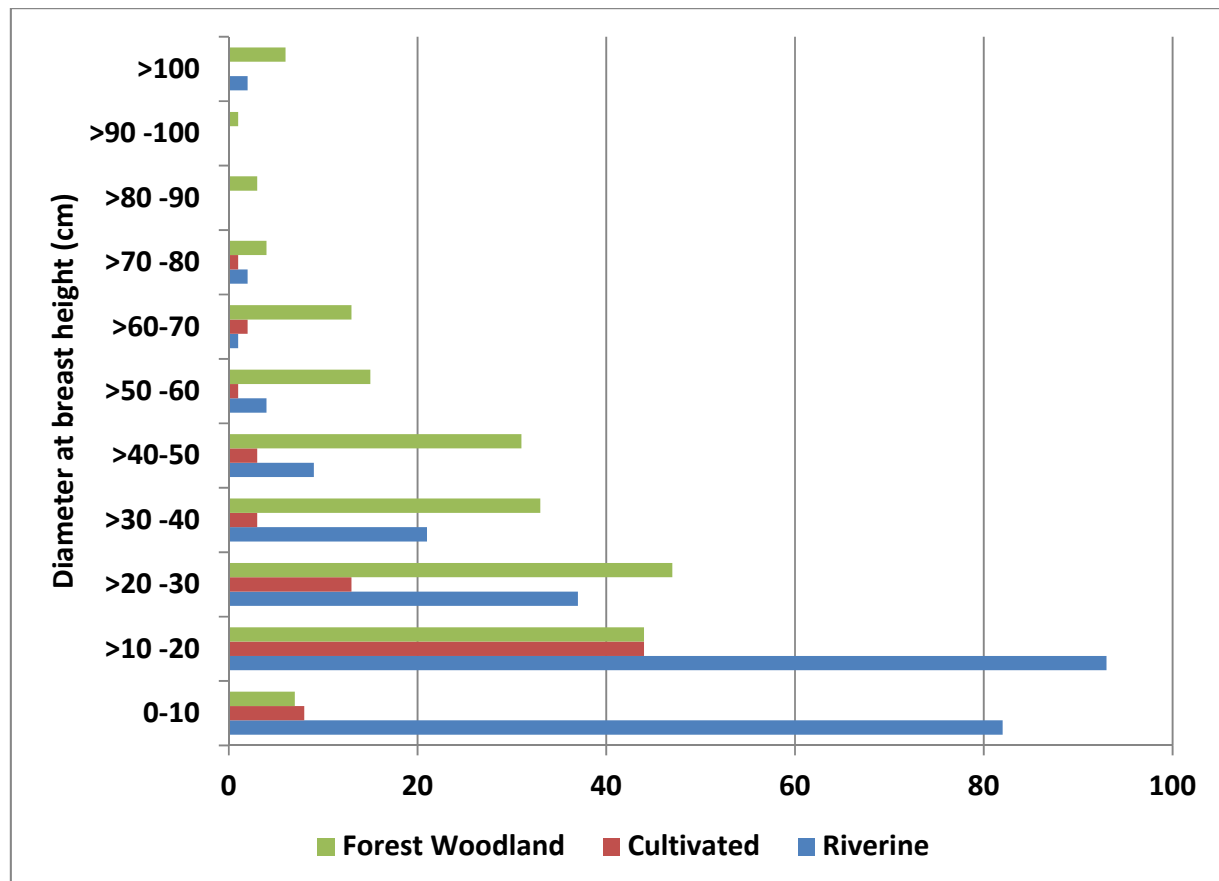


Figure 2: Age structure of woody plant species in the different habitats

Optimum Habitats

Optimum vegetation habitats were mostly found in graveyards which contained mostly large size and indigenous tree species in very large numbers. Very good canopy cover of more than 90% was observed only in forest woodlands located in graveyards. In addition, the riverine vegetation habitats were also found to be more diverse with 62% of the recorded species; followed by forest woodland containing 31% of the recorded species. Cultivated areas in the project impact areas were found to be the most degraded habitats recording very low numbers of trees, large numbers of young trees and containing less number of tree species recorded (15%).

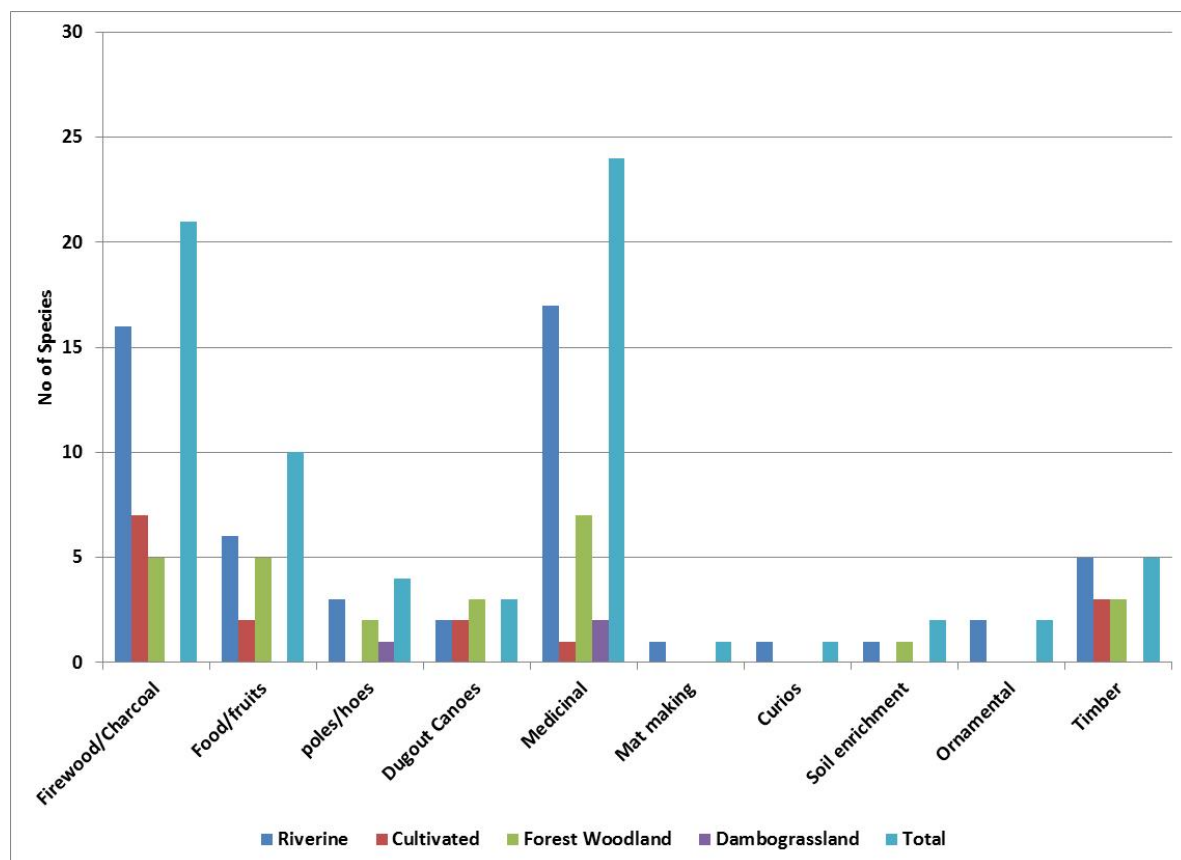


Figure 3: Use by local people of plant species from different habitats in project impact area

A lot of the plant species are used for Medicinal purposes, firewood, and as food/fruits with most of these species found in riverine vegetation followed by forest woodland, (. Most of the plant species that are used by local people are also found mostly in the riverine vegetation. This means that the riverine and forest woodland vegetation plays an important ecosystem function of provisioning of medicine, food, and woodfuel energy to support local livelihoods and health.

Conservation Status of Flora in the Project Impact Area

Seventeen plant species of international and national conservation significance were recorded in the project impact area. Ten species have international conservation significance while 11 species have national conservation significance.

Table 2: Plant Species of conservation Significance in the Project Impact Area

English Name/Chichewa Name	Scientific Name	Conservation Significance		
		National	CITES	IUCN
Poison pod albizia	<i>Albizia versicolor</i>	EN		-
	<i>Piliostigma thoningii</i>	EN		-
	<i>Rauvoifia caffra</i>	EN		NT
African Sausage tree (<i>Mbvunguti</i>)	<i>Kigelia africana</i>	EN		-
	<i>Oncoba spinosa</i>	EN		EN
Bleedwood teak (Mlombwa)	<i>Pterocarpus angolensis</i>	Protected		V
African mahogany (<i>Mbawa</i>)	<i>Khaya anthotheca</i>	Protected/T		V
Red hot poker tree	<i>Erythrina abyssinica</i>	NT		-
(Makoma)	<i>Bridelia micratha</i>	Protected/NT		-
Cinderella	<i>Toona ciliata</i>	NT		-
Naphini	<i>Terminaria sericea</i>	Protected		-
Blue gum	<i>Eucalyptus tereticornis</i>	-		V
Guava	<i>Psidium guajava</i>	-		NE
	<i>Faidherbia albida</i>	-		V
	<i>Azanza garkeana</i>	-		R
	<i>Ficus Cycomorus</i>	-		V
	<i>Markhamia obstuforlia</i>	-		V

The riverine vegetation was found to contain 13 out of the 17 species recorded and having species in almost all categories (refer to **Figure 4**) below. Forest Woodland mostly in graveyards and cultivated dambo grassland recorded low numbers of species with conservation significance. General assessment indicated that some of these threatened tree species were very common in the riverine and forest woodland vegetation types. In the riverine vegetation the following were very common: *Psidium guajava*, and *Oncoba spinosa*. In forest woodland especially graveyards, the following species were very common: *Toona ciliata* and *Rauvoifia caffra*.

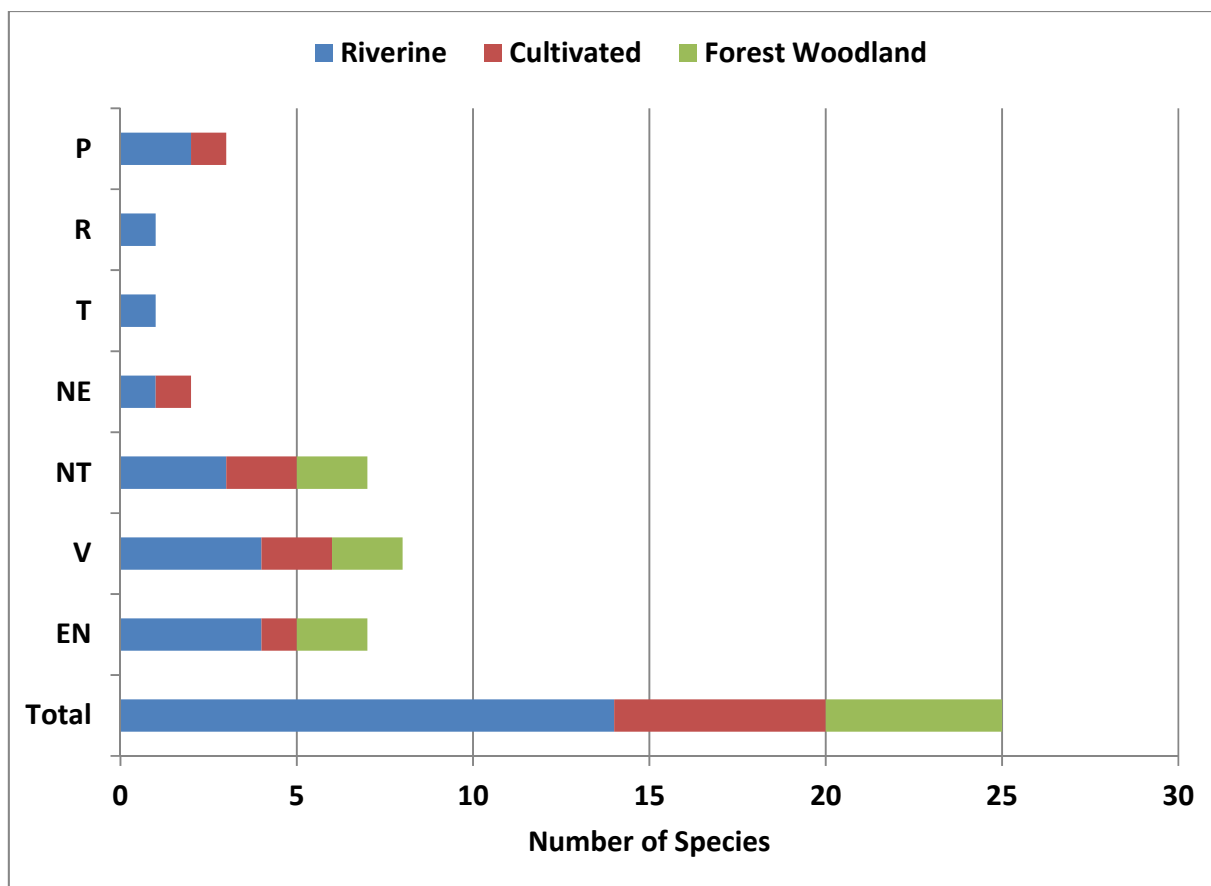


Figure 4: Number of Species with Conservation Status and their habitats

3.1 Mammals

Species Richness and Abundance

A total of 18 mammal species are known to occur in the project impact area. This ecological baseline study recorded 13 species from 8 families. These are presented in **Table 3** below.

Table 3: Mammals Recorded in the Project Impact Area

Family	Scientific Name	Common Name	Comments
Muridae	<i>Mastomys natalensis</i>	Multimammate rats	Also mentioned by locals
	<i>Aethomys kaiseri</i>	Bush Rats	
	<i>Grammomys dolichurus</i>	Woodland mouse	Also mentioned by locals
	<i>Dasymys incomptus</i>	Shaggy swamp rats	Also mentioned by locals
Soricidae	<i>Mus minutoides</i>	Pygmy mouse	
	<i>Sylvisorex megalura</i>	Climbing Shrew	
	<i>Crocidura hirta</i>	White toothed shrews	
Dendromurinae	<i>Dendromus mesomelas</i>	Brant's climbing mouse	
Gergilidae	<i>Tatera branstii</i>	Gerbil's tatera	
Gliridae	<i>Graphiurus murinus</i>	Woodland dormouse	

Sciuridae	<i>Paraxerus sp.</i>	Squirrel	
Thryonomyidae	<i>Thryonomys sp.</i>	Cane rat	
Leporidae	<i>Lepus sp.</i>	Hare	

The most abundant mammal species was *Mastomys natalensis*, multimammate rats followed by woodland mice (*Grammomys dolichurus*) both under the family Muridae. *Mastomys natalensis* was recorded in all the habitat types while the woodland mice were recorded from graveyards and few from riverine.

Six mammal species that are known to occur with certainty in the project impact area based on interviews with local and these are presented in **Table 4** below

Table 4: Mammals Known to Occur in the Project Impact Area

Family	Scientific Name	English Name	Chichewa Name	Comment
	<i>Sylvicapra grimmia</i>	Common Duiker		
Mustelidae	<i>Aonyx capensis</i>	Clawless Otter	<i>Katumbu</i>	Very common during rainy season
Canidae	<i>Canis mesomelas</i>	Jackal	<i>Nkhandwe</i>	
Hyaenidae	<i>Crocuta crocuta</i>	Spotted Hyaena	Fisi	In caves located in Ndombamwili hills
			<i>Misangala</i>	
Nesomyidae	<i>Cricetomys sp.</i>	Giant Pouched Rat	Bwampini/Ku nda	
	<i>Pelomys fallax</i>	Creek rat	Mende	
	<i>Dasymys incommutus</i>	Water rat	Thukwi	
			Sakhwi	
			Kalikongwe	
	<i>Aethomys crysophilus</i>	Red veld rat	Mphakadzi	

The locals indicated that the common duiker and Jackals are usually found in forested areas such as graveyards and private plantations and would move to riverine vegetation to drink water and hide during the day. This information was also collaborated by the DNPW that locals still sight common duiker and jackals are most likely to occur in the area hunting at night. Clawless otters are common in Diamphwe River and are commonly seen during the rainy season, but inhabit and hide in deep pools during the dry season. They usually attack fishermen's traps to steal fish caught and eat any crabs that may also be trapped in nets. DNPW also said that the otters in that area should be the clawless otter and not the spot necked otter.

Optimum Habitats

Mammals were mostly found or known to occur in graveyards and riverine vegetation areas because these are areas where vegetation cover still exists in the project impact area. This was followed by dambo grassland and only 2 species of mammals were recorded in cultivated areas.

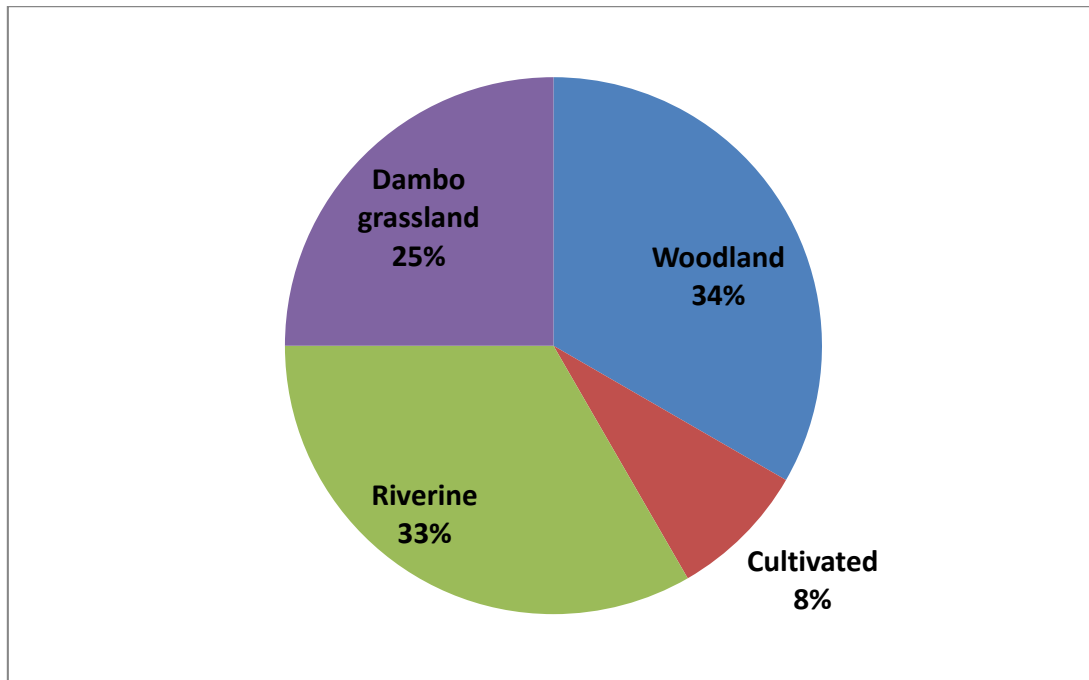


Figure 5: Species Composition in relation to Habitats

Currently, a large proportion of the project impact area has been degraded through farming and cutting of trees such that only remnants of forest woodland which can be suitable large mammal habitats remain as graveyards. However because these areas are constantly visited by human beings for cultural practices such as 'Gule Wamkulu' they mostly act as refugee areas for small mammal species. According to Dzalanyama Forest reserve used to have large mammals but now they have been locally extirpated due to poaching. Large mammals that existed in the past include: Buffalo, Eland, Greater Kudu, Sable antelope, waterbuck, Lions and Zebra. However, the following animals are sometimes sighted in Dzalanyama Forest Reserve: Reed buck, Impala, Bush buck, Warthog, Bush pig, Ant bear, Spotted Hyeana, and Leopard especially during the rainy season, (Consultation with DNPW 2015).



Figure 6: Some mammal habitats in the project impact area, cultivated grassland (L) and Forest Woodland Mlombwa Graveyard (R)

Conservation Status of Mammals in the Project Impact Area

One mammal species of international conservation significance was recorded in the project impact area. Two species that are known to occur by locals were found to be protected under the Malawi National Parks and Wildlife Act 2004. These are presented in **Table 5** below.

Table 5: Mammal Species of Conservation Significance Known to Occur in Project Impact Area

English Name	Scientific Name	Conservation Significance		
		National	CITES	IUCN (2014)
Common Duiker	<i>Sylvicapra grimmia</i>	Protected	-	-
Jackal	<i>Canis sp.</i>	Protected	-	-
Clawless Otter	<i>Aonix capensis</i>	-	II	NT

3.2 Avifauna

Malawi has about 653 bird species and 18 are near endemics (Pullanikkatil and Chilambo 2010). The project impact area is not located in the 22 Important Bird Areas but is located about Km from Dzalanyama Forest Reserve which is an Important Bird Area in Malawi (MW011). In Dzalanyama Forest Reserve, 296 bird species have been recorded with 28 species being biome restricted species 22 of which are of the Zambezian Biome; 5 afrotropical Highland Biome and 1 East African Coast Biome. Key species are A1 (significant numbers of globally threatened species or other species of global conservation concern) *Dendropicos stierlingi* (Stierling's woodpecker) and A3 site (site has significant component of the group of species whose breeding distributions are largely or wholly confined to one biome) because 22 of the 33 species of the Zambezian Biome recorded in Malawi occur in this forest reserve. However, none of these bird species were recorded during this survey.

Species Richness and Abundance

During this survey, a total of 57 species, belonging to 28 families were recorded, as indicated in **Figure 7** below.

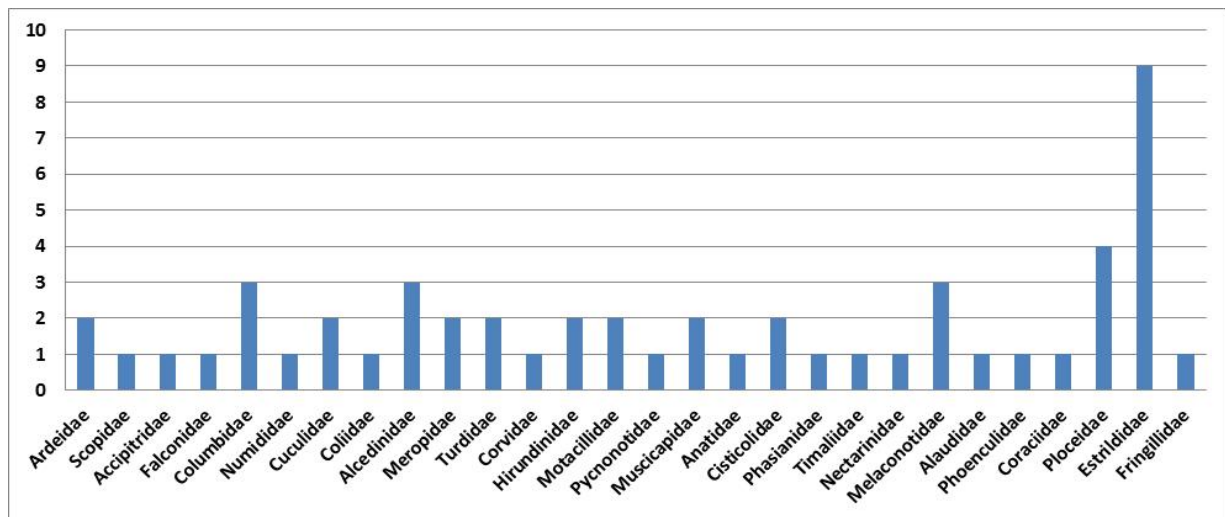


Figure 7: Families of Bird Species showing number of species recorded in the Diamphwe project area

The dominant families included: *Estrildidae* (finches, blue waxbill and manikin) with nine species; followed by *Ploceidae* (weavers, bishops and quelea) with 4 species; then *Columbidae* (doves), *Alcedinidae* and *Melaconotidae* with 3 species each. Appendix 7.3 shows the list of bird species recorded in the project impact area, their habitat and conservation status.

Optimum Bird Habitats

Ecological surveys established that birds were mostly found in the riverine vegetation especially where there were reeds and trees. Almost half of the species recorded inhabited river/riverine vegetation. Forest woodland in graveyards also acted as bird habitats for forest dwelling bird species since the area is heavily deforested and trees remain along the river bank only as patches of forest remnants most of them composed of exotic *Eucalyptus sp.*

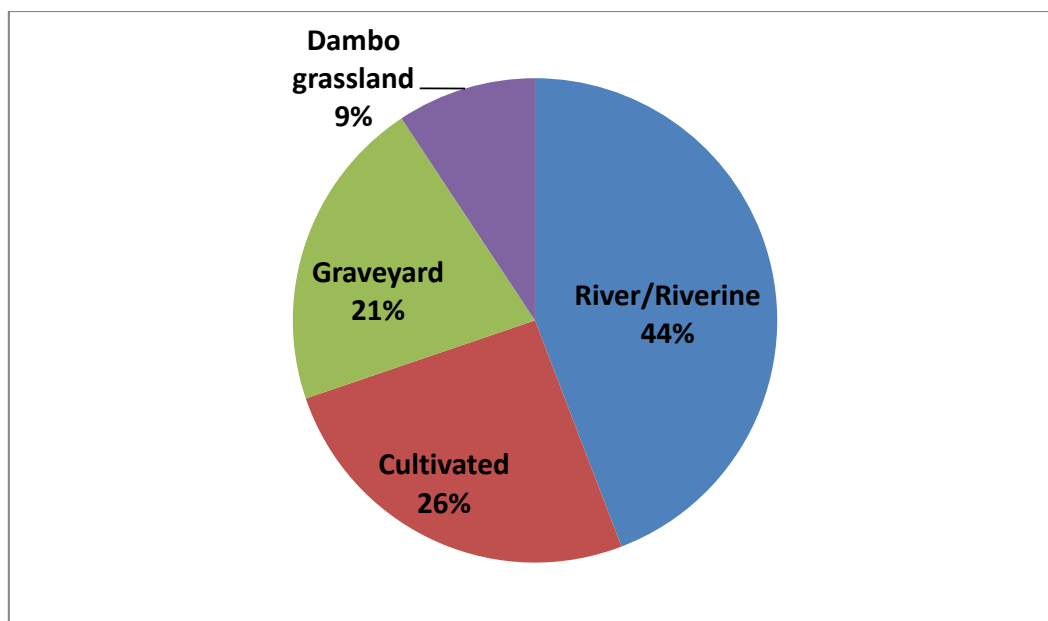


Figure 8: Percentage of Bird Species Recorded in the Project Impact Area

Bird's nesting sites were observed in the riverine vegetation mostly in reeds and trees close to the water. Locals also indicated that the riverine vegetation is also used for nesting by water ducks.



Figure 9: Riverine Vegetation showing Golden Weavers nests

Conservation Status of Birds in the Project Impact Area

There were no species of globally threatened species recorded in the project impact area. In addition no near endemic species were recorded in the project impact area. Some of the species mentioned to occur in the project impact area are protected under the National Parks and Wildlife Act of 2004. These are presented in **Table 6** below.

Table 6: Bird Species of Conservation Significance in the project impact area

English Name	Scientific Name	Conservation Significance		
		National	CITES	IUCN (2014)
Little sparrow hawk	<i>Accipiter minullus</i>	-	II	-
Pelegrine Falcon	<i>Falco peregrinus</i>	-	II	-
Broadbilled Roller	<i>Eurystomus glaucurus</i>	Protected		LC
Red Winged Francolin		Protected		LC
Guinea fowls		Protected		LC
Owls	<i>Different types</i>	Protected		LC

However, locals mentioned and identified the red winged francolin and guinea fowls as being present along the riverine vegetation and are usually hunted at night for food. Owls were also mentioned as being present in graveyards and they indicated that there are different types of owls based on different types of songs heard at night. They are hunted therefore appeared to be common. The red winged francolin is a protected bird species under the National Parks and Wildlife Act (2004). In addition the act protects all species of owls and rollers.

3.3 Reptiles and Amphibians

Reptiles

There are 140 reptilian species recorded in Malawi from 22 families, but very little is known about their conservation status (NABSAP 2010).

Species Richness and Abundance

Eight families and 13 reptilian species are known to occur in the project impact area. 6 species were recorded during this survey: Nile crocodile, *Crocodylus niloticus*; Agama lizard; *Agama sp.*; Three tined grass snake, *Psammophis phillipsii*; Monitor lizard, *Varanus niloticus*; Rainbow Rock Skink, *Trachylepis margaritifera*; and African Striped Skink, *Trachylepis striata*. In addition, locals mentioned that the following reptilian species occur in the project impact area: python, *Python sebae*; Mambas, *Dendroaspis sp.*; Green water snake, *Philothamnus hoplogaster*; Brown water snake, *Lycodonomorphus rufulus*; Common puff adder, *Bitis arietans arietans*; wolf snakes, *Lycophidion sp.*; and tortoises.

Optimum Habitats

Reptiles were mostly observed in river/riverine habitats including also those species that were mentioned to occur by the local people. Working with locals, the places identified as being inhabited by crocodiles were deep pools occurring along the stretch of the proposed reservoir site. On one pool, one crocodile was found basking in the riverine vegetation on the river bank, (refer to Figure X below). In addition snakes are also common along the reeds and riverine vegetation along the river bank.

Conservation Status of Reptiles recorded in the Project Impact Area

Twelve reptilian species are endemic to Malawi and 6 species are considered to be rare (SOER 2010). Species of conservation significance recorded or known to occur in the project impact area are presented in **Table 7** below.

Table 7: Reptilian Species of Conservation Significance in the Project Impact Area

English Name	Scientific Name	Conservation Significance		
		National	CITES	IUCN
Nile Crocodile	<i>Crocodylus niloticus</i>	Protected	II	LC
Nile Monitor Lizard	<i>Varanus niloticus</i>	Protected	II	LC
Python	<i>Python sebae</i>	Protected		LC
Mamba	<i>Dendroaspis sp.</i>	Protected		LC

Amphibians

There are 83 amphibian species in Malawi. Most of the amphibian species are frogs and toads, with two species being caecilians.

Species Richness and Abundance

Only four amphibian species from four families were recorded during this survey and these included frogs and toads. The recorded species are: Mullers or common plantana, *Xenopus muelleri* of family Pipidae; flat backed toad, *Amietophrynus maculatus* of family Bufonidae; Mascarene ridged frog, *Ptychadena mascareniensis* of family Ptychanidae; and Mabled snout burrower, *Hemius marmoratus* of family Hemisotidae. The most abundant species was *Xenopus muelleri* which was very common in Diamphwe River and because this is a fully aquatic species it was able to survive in river water under rocks. The number of species recorded during this study is not a true representative of amphibians in the project impact area because amphibians are best studied during the rainy season when they come out to breed and their habitats are created, e.g. temporary pools and wetlands.

Optimum Habitats

Optimum habitats for amphibians were mostly riverine with shrubs; pools and ponds especially where little water was remaining stagnant; and reeds. A lot of *Xenopus muelleri* were observed in stagnant pools with rocks where Diamphwe River was flowing slowly and there were a lot of algae. However, the study was done during the dry season when a lot of amphibian habitats are dry.

Conservation Status of Amphibians in the Project Impact Area

Eleven species of amphibian species that occur in Malawi are currently listed on the IUCN Red Data List. There were no amphibian species of conservation significance that were recorded during this survey.

However, since amphibian surveys are best carried out in the rainy season when they come out to breed, this data may not be a true representation of the area. Reference can be made to another survey where only 3 species were collected in the dry season but this number moved to 18 species after carrying out the survey during the rainy season.

4 IMPACT ASSESSMENT AND MITIGATION

Impact; mitigation and residual impact if any after mitigation/ Environmental Flows

4.1 Impacts on Vegetation and Proposed Mitigation Measures

Based on the vegetation survey findings, the vegetation, both aquatic/riverine and terrestrial are sensitive to project related activities. The project activities will have positive and negative impacts on vegetation in the area. The anticipated positive and negative impacts on vegetation and the proposed mitigation measures are presented below.

4.1.1 ANTICIPATED POSITIVE IMPACTS

Rehabilitation of Degraded Buffer Zone areas

Currently the buffer zone is mostly degraded through clearing for cultivation. The project will have a positive impact because the buffer zone will be rehabilitated through planting of indigenous trees that used to exist in the project impact area.

Improved Catchment Management

The project plans to put in place proper catchment management of the Diamphwe River and its tributaries in order to ensure sustainability of the water resource and the reservoir over the long-term. Re-afforestation programmes of the Diamphwe river bank areas with indigenous riverine trees like *Mbawa*, and other indigenous tree species; protecting surrounding hills and Dzalanyama, Dzonze and Chongoni forest reserves and allowing natural regeneration of trees; and encouraging establishment of individual and communal woodlots can be some of the catchment management initiatives that can be implemented in the catchment.

Maintenance of at least 90% of the Flow during the Dry Season

During the dry season since there will still be release of 90% of the flow this means that the areas that experience no flow during the dry season will have water flow.

4.1.2 ANTICIPATED NEGATIVE IMPACTS

Inundation of vegetation

The reservoir will inundate the following vegetation types: forest woodland found in graveyards; riverine vegetation found along the riverbank; tree plantations that are located near the river bank. The areas of

natural vegetation that are going to be inundated by the reservoir: graveyards;

ha of forest woodland in

Clearance of vegetation due to Construction Activities

The project activities will involve construction of the following: dam; access roads; water treatment plant (WTP); Water Treatment Works; balancing tanks; raw water and clear water main pipelines. These construction activities will need clearance of land that also includes vegetation. The vegetation types to be affected as a result of construction works include:

Alteration of ecosystem in the reservoir and downstream areas

Riparian or riverine vegetation has many ecological benefits such as: material and energy exchange in the river; high habitat diversity, habitats for many wildlife species; acting as corridors for migrating and dispersing organisms; and filters between terrestrial and aquatic systems. Damming of the Diamphwe river will affect alter the ecosystem functions of the riverine vegetation because of inundation and during the rainy season the floodplain areas between the dam site and where Diamphwe joins Linthipe will no longer be flooded because the flood disturbance regime will be changed. As a result floodplain vegetation communities downstream will be impacted because flooding will not be there during the rainy season. The riverine vegetation that provided diverse vegetation habitats, wildlife refuge areas; and habitats for many wildlife species will be inundated. Alteration of river flow regime has been found to alter riverine species composition and richness downstream with the most affected being hydrophytic species. In addition, damming blocks downstream dispersal mechanism for plants and fragments the riparian vegetation community.

Loss of Plant Species of International and National Species with Conservation Significance

The fact that there are species of conservation significance both at national and international level means that the project may impact negatively on the flora. These include: *Albizia versicolor*, *Markhamia obtusifolia* in Forest woodland in graveyards; *Piliostigma thonningii*, *Kigelia fricana*, *Oncoba spinosa*, *Pterocarpus angolensis*, *Khaya anthotheca*, *Erythrina abyssinica*, *Bridelia micratha*, *Terminalia sericea*, *Eucalyptus tereticornis*, and *Azanza garkeana* in Riverine vegetation; and *Rauvolfia caffra*, *Toona ciliata*, *Faidherbia albida*, *Psidium guajava* and *Ficus cycomorus* located in Forest woodland, riverine vegetation and cultivated land. Despite the fact that the vegetation in the project impact area is already degraded due to human activities, there is a need to protect the flora species with conservation significance. Most species of conservation significance are located in the riverine and forest woodland vegetation types. The impact will be high for the riverine vegetation which will be inundated along the length of the reservoir and also where a lot of species with conservation significance were recorded while it is estimated that only X graveyards will be inundated.

Risk of invasion of the reservoir by invasive plants

During the ecological survey, the red water fern which is an invasive plant was recorded at Kaphwereza Village which is part of the midsection of the proposed reservoir. Increase in surface area of stagnant

water of reservoir has been found to result in an increase in potential area of infestation of red water fern *Azolla filiculoides*.

Proposed Mitigation Measures for impacts on vegetation

There is need to replace these lost tree species and habitats through rehabilitation. The proposed mitigation measures include: avoid and minimize cutting of trees by restricting to only to areas where its necessary to do so during clearance of vegetation at construction sites; replacement of inundated riverine vegetation by transplanting the reeds into the periphery of the reservoir; replanting of lost indigenous riverine tree species identified from the ecological baseline survey; re-afforestation programmes in the buffer zone with riverbank tree species; creation of new graveyards and plant lost tree species that are known to occur in forest woodlands; supply households with exotic tree seedlings (5 saplings per tree cut) so that they can replace their tree plantations in household woodlots; develop community woodlots in affected villages; ensure that species of conservation significance are also replanted in the graveyards; and train and empower community in tree nursery creation; re-afforestation programmes; management and protection of village forest areas and wider catchment including the nearby forest reserves of Dzedza, and Dzalanyama Forest Reserves.

Loss of vegetation especially trees will take a longtime to mitigate but will be temporary and will require the participation of Department of Forestry through the District Forestry Offices for Lilongwe and Dedza. Consultations with the District Forestry Officers indicated that they have already been involved in similar projects and have the capability to mobilise local communities through Forestry Assistants and Extension workers. Lilongwe District Forestry Office indicated that their field staff has worked with Lilongwe Water Board before in the rehabilitation of the Kamuzu Dam riverine vegetation and planting of indigenous trees along the buffer zone. Dedza Forestry Office indicated that they are working with the communities in TA Chilikumwendo in rehabilitation of riverine vegetation through planting of trees along Diamphwe River. Tree species with conservation significance need to be planted in the new graveyards and community Village Forest Areas where they will be protected.

Proposed mitigation measures for alteration of ecosystem downstream especially riverine vegetation is as follows: ensure that environmental flows maintain soil moisture in the riverine environment downstream in order that hydrophytic species survive. This will prevent thriving of generalist species or invasive species taking over and changing vegetation composition and ecosystem functions downstream. Since 90% of the flow will be maintained the impacts may be low to medium if stable low flows are maintained to encourage riverine vegetation encroachment downstream of the dam. In addition, during construction the contractor will include interim flow release strategy to maintain environmental flow downstream. Hydrological monitoring of flow regime downstream can ensure that impacts are minimized during implementation or operation phase and environmental water release requirements should be incorporated into the dam's operation rules. In terms of riverine vegetation fragmentation, there is need to reestablish the riverine vegetation on the reservoir bankside through replanting e.g. reeds and where possible connect this to tributary riverine vegetation. In case of invasion of reservoir by the red water fern *Azolla filiculoides* that already exists in the Diamphwe River, there is need to address this potential problem before construction of the reservoir by removing this

fern from areas of invasion and constantly monitor and address any sign of invasion in the reservoir during operation phase.

4.2 Impacts on Mammals and Proposed Mitigation Measures

The project activities will have negative impacts on mammals through loss of wildlife habitats and migration corridors. Most small mammals were recorded in the riverine vegetation and forest woodland in the graveyards. Most of the riverine vegetation along Diamphwe and the tributaries is going to be lost through inundation. In addition, forest woodland in graveyards that are going to be inundated will also be inundated. There were only small mammals recorded in the project impact area mostly in forest woodland graveyards and riverine vegetation. The impact on small mammals is going to be low because the species that were recorded are not rare or of conservation significance. In addition, they are not specialists to particular habitats and can migrate to nearby areas because they have short home ranges. Since flooding will be gradual these animals will move to occupy other habitats nearby and migrate to nearby graveyards. As a result impacts will be very low to low on small mammals.

The mammal species of conservation significance are the common duiker, jackals and the clawless otter. The common duiker is solitary and is known to travel long distances average of about 7km/day with home ranges of up to 15ha. According to local people they usually travel between the riverine vegetation in Diamphwe and the forest woodlands in graveyards or forest plantations nearby. Thus the riverine vegetation on Diamphwe and other tributaries into Diamphwe like Lingodzi act as wildlife corridors and refuge areas especially during the day. Inundation of riverine vegetation will mean loss of migratory corridors for common duiker and jackals which may be travelling from the forest reserves into the graveyards as patches of forest woodland. The average territory size is about 18km² but some can have a home range of up to 24.9 km² (James 2014) and they usually travel long distance based on availability of food (small mammals, reptiles) including small livestock. Locals in Kadzakatha village indicated that jackals visit the area to scavenge and hunt during night time. They indicated that forest woodland graveyards act as refuge areas especially large sized ones with a lot of vegetation. The impacts on common duiker and jackals will be minimal because only a few forest woodlands located in graveyards will be inundated and they can use the other graveyards with forest woodland. In addition, the riverine vegetation will still remain upstream that can be used by the common duiker and other mammals until the riverine vegetation is rehabilitated along the bankside of the reservoir. The mitigation measures to this impact will be to replant the reeds along the banksides of the reservoir and replant trees in new graveyards that will be created.

The clawless otter is of conservation significance nationally and internationally. Threats to otters include absence of riverine vegetation and erosion of riverbanks. According to Laliviere (2001), the clawless otter makes extensive use of reed beds (*Phragmites* and *Typha*) and prefers shallow not deep water. Since the riverine vegetation which is mostly composed of reeds *Phragmites* and going to be inundated, this means that otters will lose their optimum habitat along the Diamphwe River banks. However construction of dams has been found to be beneficial to otters where there is flooding of natural valleys because it increases amount of water and creates a habitat for fish, frogs and crabs that it feeds on. But damming also has a negative impact when it reduces the amount of water available to support fish and crabs and also does not support riverbank vegetation. Clawless otters have been found to thrive in dams

that are not too deep and preference is usually on the edges of the reservoir and associated rivers and streams. Deep parts are avoided because they are not good for foraging and temperatures are too cold. The locals reported that otters are very common and easily seen during the rainy season when there are large amounts of water in Diamphwe River and not during the dry season when water is mostly left in deep pools. The anticipated negative impact will be high downstream of the reservoir between dam site and where the Diamphwe joins the Linthipe where during the dry season there will be reduced river flows and therefore less optimum conditions for otters. Fluctuation of water levels downstream of the dam results in scarce riparian vegetation that does not offer enough refuge and security for otters (Pedrosso *et. al.* 2007). Optimal habitats for otters are areas with good bankside vegetation cover with potential holts for providing shelter. In addition otters need water flow during the dry season or warmest period of the year and dams usually reduce or even eliminate water flows and this sometimes results in reduction of otter populations such that they can survive by using reservoirs and irrigation channels. Damming therefore leads to fragmentation of habitats and possibly otter populations because otters become constrained to unaffected river stretches up and down stream of the dam or other streams within the vicinity. Their density in freshwater rivers may reach 1 otter per 3-4km of stream and density depends on availability of food and home ranges (1 male and 1 female) are usually between 14 and 19km and nightly movements may reach 13km and males may move longer than that since they are nocturnal (Lariviere 2001). This means that damming of the river will fragment populations of otters because they move long distances and have long home ranges. They dig dens in sandy soils and are usually <15m depth, and never located >50m from shoreline or river bank.

In terms of impacts on the clawless otter, the proposed mitigation measures will be to rehabilitate the bankside of the reservoir with reeds through replanting. However, because the reservoir will be created by flooding natural valleys the otters can still use the reservoir as a new habitat as has been observed in other dam projects. In addition, they can migrate upstream to areas where the riverbank will still have the reeds and riverine vegetation however, there is need to ensure that these remaining habitats are protected and managed properly. The residual impacts however will be fragmentation of populations of otters due to the barrier of the dam because the home range of otters means that there is mixing of populations upstream and downstream of the dam.

4.3 Impacts on Avifauna and Proposed Mitigation Measures

The avifauna in the project impact area will have both positive and negative impacts. The positive impact is that the reservoir will create a larger wetland area that will be a new habitat for water birds. Since the dam site is in the Dzalanyama forest reserve catchment area, which is an important bird area in Malawi, more birds will be able to use the reservoir. However, during the study important bird species from Dzalanyama Forest Reserve were not recorded during the survey.

However, the following negative impacts are expected:

Loss of habitats for bird species

The inundation of riverine vegetation especially reeds will negatively impact on a lot of bird species that live and sleep in the riverine vegetation. 44% of the bird species recorded during this survey were recorded in the riverine vegetation.

Inundation of some forest woodland vegetation type in graveyards will also mean loss of other bird species habitat. 21% of the birds recorded in this study were found in forest woodland. However, since birds are mobile in air they can be able to colonize other nearby similar habitats.

Inundation of riverine vegetation will remove refuge areas for ground bird species such as guinea fowls, red francolin and quails which are already under hunting pressure and use the riverine vegetation as refuge areas. The guinea fowls and red francolin are protected under the National Parks and Wildlife Act of 2004.

Loss of nesting sites

Some bird species that nest in riverine vegetation and some that nest on the ground in dambo grassland and cultivated land will also lose their nesting habitats when these areas are inundated.

Proposed Mitigation measures

The proposed mitigation measures include the following: rehabilitate the reservoir bank sides with reeds and riverine vegetation. However, there won't be any residual impacts because the birds can move and occupy other habitats within the vicinity that is nearby forest woodland graveyards and upstream and downstream riverine vegetation.

There were 2 species that are listed under CITES II, Little sparrow hawk, *Accipiter minullus*, and Peregrine falcon *Falco peregrinus*. Therefore these species should be protected and there should be measures to ensure that there is no trade in these bird species.

The proposed mitigation measures for protected ground bird species such as the Guinea fowls and quails which use the riverine vegetation as refuge and nesting areas are the following: sensitise local communities and construction workers on the need to protect these species; put in place measures to relocate these birds upstream of the dam to the remaining riverine vegetation; and restrict hunting of these bird species during the initial flooding period of the reservoir in collaboration with local chiefs until they have moved or migrated to other nearby refuge areas.

If the above mitigation measures are implemented then impacts will be low because the birds can easily fly to other habitats that will remain nearby. For ground birds the impacts are going to be medium because the loss of habitat is also going to increase their vulnerability since they are hunted by locals for food.

4.4 Impacts on Reptiles and Amphibians and Proposed Mitigation Measures

Impact on reptiles will be both positive and negative.

Positive Impacts

Impacts will be positive for crocodiles because large water bodies will be created all year round deep water habitat in the reservoir compared to the current situation. During the dry season crocodiles are only restricted to deep pools in the river.

Amphibians will have positive impacts through creation of a new habitat, the reservoir. Downstream because river flow will be maintained during the dry season they will have river flow and pools of water which they do not have during the dry season now.

Negative Impacts

Reptiles and amphibians are sensitive to the project activities during construction and inundation of the reservoir. The crocodile is protected under the National Parks and Wildlife and is listed under CITES II for Malawi. One crocodile was recorded in the riverine vegetation near the deep pools that exist in the Diamphwe River. Locals however indicated places where crocodiles exist and the areas were mostly those with deep pools, with rocks or reeds on the river bank and sandy soils. They indicated that crocodiles are very common. According to Kalowekamo (2005) the Nile crocodile reaches maturity at the age of about 12 to 15 years weighting between 70 to 100kgs with a length of between 2 to 3m long. Courtship and mating takes place in the water between July and August and females dig nests and lay their eggs in November. Nests are usually located in sunny sandy banks above flood water level with good cover and the nesting sites are used for the rest of her life.

Loss of Habitats and nesting sites

There will be inundation of the riverine vegetation where crocodiles bask in the sun and use where there are sandy river banks to lay their eggs. In addition, there will be clearing of vegetation at the dam site and associated structures including blasting of rocky places to extract quarry and construction materials. Riverine vegetation was found to be where most of the reptiles including crocodiles are known to occur and they nest within 50m of the river bank. Since they usually nest above flood level and use the nesting sites for life, inundation of the riverbank in the reservoir site will greatly impact crocodile nesting sites. In addition reed frogs will be greatly impacted by inundation of riverine vegetation because they should inhabit riverine vegetation along the Diamphwe River even though they were not recorded because the survey was carried out in the dry season.

Fragmentation of Crocodile Populations

Construction of the dam will separate crocodile populations upstream and downstream of the dam because the Nile crocodile is not territorial especially during the rainy season when there are high floodplain water levels. They have been known to travel as far as 36km especially during the rainy season when there is flooding. Since flood water movement will be controlled by the dam then there will be separation of crocodile populations and this impact is minimal though it will be a residual impact because it cannot be mitigated.

Construction sites acting as death traps for Reptiles and Amphibians

Reptiles and amphibians are usually victims to construction activities because they create death traps. This project will involve digging of trenches where the raw water main and clear water mains are going to pass and these will pass along the river bank; and also through cultivated agricultural land. Reptiles are crawling animals and, amphibians also move on the ground and can easily fall into these trenches if they are not protected.

Increased Human-Wildlife Conflicts

The reservoir will increase the habitat of crocodiles and monitor lizards which will increase the threat to humans and their wildlife. The reason being their populations are going to increase and also the reservoir will move closer to people especially during rainy season when the river will flood upstream. According to Calverey and Downs (2015), the Nile crocodile has a restricted home range during the dry season when water levels recede by they move a lot from November until the rainy season ends because water levels increase as a result they move into the floodplain. Local people in the project impact area indicated that during the dry season the crocodiles in Diamphwe River stay close to their pools but they move a lot during the rainy season reaching the margin areas of flood water levels.

Proposed mitigation measures

The following mitigation measures are proposed for amphibians and reptiles: create artificial nesting sites for crocodiles by depositing sand in strategic areas to act as nesting sites; rehabilitate the banks sides of the reservoir and revegetate with reeds to recreate the riverine habitat that will be lost; fence off trenches during construction and refill them as soon as possible; remove any reptiles or amphibians that fall into borrow pits or pipeline trenches; if the crocodile population increases such that it poses a threat to humans and livestock then the Department of Wildlife and National Parks can do problem animal control, they can give hunting quotas to crocodile hunters; fencing off the reservoir or ensure that the buffer zone is a restricted area for local communities to avoid or minimize conflicts; and sensitise construction workers on protected species such as python, mambas not to be killed unnecessarily.

5.0 ENVIRONMENTAL MANAGEMENT & MONITORING

The project activities will impact the flora and fauna in the project impact areas and as such there is need to put in place biodiversity management and monitoring measures

6.0 REFERENCES

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7.0 APPENDICES

7.1 PLANT SPECIES LIST

Family	Scientific name	MAIN HABITAT				Abundance	Uses	Conservation status
		Woodland in grave yard	Cultivated land	Riverine	Dambo grassland			
Myrtaceae	<i>Eucalyptus saligna</i>		X	X		72	Firewood	LC
	<i>Psidium guajava</i>		X	X		11	Food and firewood	LC
	<i>Eucalyptus tereticornis</i>			X		13	Poles/firewood	V
	<i>Eucalyptus camaldulensis</i>			X		1	Firewood	LC
Fabaceae	<i>Vachellia gerrardii</i>			X		1	Firewood	LC
	<i>Albizia versicolor</i>	X				1	Making Dugout canoes	EN
	<i>Erythrina abyssinica</i>			X		3	Medicinal	NT
	<i>Vachellia polycantha</i>		X	X		18	Firewood	LC
	<i>Vachellia seyal</i>			X		1	Medicinal	LC
	<i>Acacia karoo</i>			X		2		LC
	<i>Vachellia sieberana</i>			X		13		LC
	<i>Vachellia nigresces</i>	X				5	Medicinal	LC
	<i>Senna siamea</i>			X		6		LC
	<i>Faidherbia albida</i>	X	X	X		11	Canoes	V
Rubiaceae	<i>Gmelina arborea</i>		X	X		17	Timber and firewood	LC
	<i>Vangueria infausta</i>	X				1	Food	LC

Family	Scientific name	MAIN HABITAT				Abundance	Uses	Conservation status
		Woodland in grave yard	Cultivated land	Riverine	Dambo grassland			
Poaceae	<i>Bambusa vulgaris</i>			X		1	Firewood	LC
	<i>Phragmites mauritiana</i>			X		Many	Mat making	LC
Nymphaeaceae	<i>Nymphaea caerulea</i>			X		1	Medicinal	LC
Aracidae	<i>Pistia stratiotes</i>			X		1	Medicinal	LC
Boraginaceae	<i>Trichodesma physaloides</i>			X		1	Medicinal	LC
Solanaceae	<i>Solanum incanum</i>			X			Medicinal	LC
Acanthaceae	<i>Achylanthes aspera</i>			X			Soil enrichment	LC
Malvaceae	<i>Hibiscus cannabinus</i>			X		1	Vegetable	LC
	<i>Azanza garkeana</i>			X		1	Food	R
Papilionoideae	<i>Sesbania sesban</i>	X				4	Soil enrichment	LC
	<i>Jacaranda mimosaeifolia</i>	X	X			1	Firewood	LC
	<i>Lonchocarpus capasa</i>	X		X		8	Hoe handles	LC
	<i>Bauhinia thonningii</i>			X		1	Firewood	LC
	<i>Piliostigma thonningii</i>			X		9	Firewood	EN
	<i>Ptericarpus angolensis</i>			X		1	Curios	V
	<i>Erythrina latissima</i>			X		5		LC
	<i>Vachellia polycantha</i>	X		X		17		LC

Family	Scientific name	MAIN HABITAT				Abundance	Uses	Conservation status
		Woodland in grave yard	Cultivated land	Riverine	Dambo grassland			
Euphorbiaceae	<i>Bridelia micrantha</i>			X		2	Edible fruits	EN
	<i>Euphorbia tirucalli</i>	X				43		LC
	<i>Strychnos spinosa</i>	X				1		
Caesalpinioideae	<i>Bauhinia thonningii</i>	X		X		8	Food and hoe handles	LC
	<i>Bauhinia monandra</i>		X			4		
	<i>Senna spectabilis</i>			X		2	Ornamental	LC
	<i>Senna siamea</i>			X		4	Charcoal	LC
Lamiaceae	<i>Ocimum canum</i>			X		1	Mosquito repellent	LC
Moraceae	<i>Morus alba</i>		X	X		4	Edible fruits	LC
	<i>Ficus cycomorus</i>	X	X	X		6	Food and firewood	V
	<i>Ficus natalensis</i>	X				3	Medicinal	LC
	<i>Ficus ingens</i>	X				4		LC
	<i>Ficus capensis</i>	X				1	Medicinal	LC
Meliaceae	<i>Toona ciliata</i>	X	X	X		79	Timber and firewood	NT
	<i>Melea azedarach</i>			X		1	Ornamental and firewood	LC

Family	Scientific name	MAIN HABITAT				Abundance	Uses	Conservation status
		Woodland in grave yard	Cultivated land	Riverine	Dambo grassland			
	<i>Khaya anthotheca</i>			X		2	Timber	V
Apocynaceae	<i>Rauvolfia caffra</i>	X	X	X		111	Timber	EN
Astraceae	<i>Vernonia amygalina</i>		X	X		5	Medicinal	LC
Combretaceae	<i>Combretum molle</i>	X				7	Firewood/poles Medicinal	LC
	<i>Terminalia sericea</i>			X		1	Medicinal/ Timber/ firewood	P
	<i>Combretum apiculatum</i>	X				1	Firewood/medical	LC
Anacardiaceae	<i>Mangifera indica</i>	X				12	Food	LC
	<i>Sclerocaria birrea</i>	X				1	Timber	LC
Bignoniaceae	<i>Markhamia obtusifolia</i>	X				2	Firewood	V
	<i>Kigelia africana</i>			X		3	Making Canoes and medicinal	EN
Rhamnaceae	<i>Zyzyphus mucronata</i>	X				6	Medicinal	LC
Loganiaceae	<i>Strychnos spinosa</i>	X		X		2	Medicinal	LC
Tiliaceae	<i>Grewia bicolor</i>				X	1	Poles and firewood	LC
	<i>Flueggea virosa</i>			X			Medicinal	LC
	<i>Diospiros lycioides</i>			X			Medicinal	LC
	<i>Asparagus terrifolias</i>			X			Medicinal	LC

Family	Scientific name	MAIN HABITAT				Abundance	Uses	Conservation status
		Woodland in grave yard	Cultivated land	Riverine	Dambo grassland			
	<i>Senna senguana</i>			X			Medicinal	LC
Polygalaceae	<i>Securidaca longepedunculata</i>			X		1	Medicinal	LC
Pittosporaceae	<i>Pittosporum viridiflorum</i>	X				1	Medicinal	LC
Bombacaceae	<i>Adansonia digitata</i>	X				2	Food and Fibre	LC
Fraxinaceae	<i>Oncoba spinosa</i>			X		1	Medicinal	EN
	<i>Azolla filiculoides</i>			X		In some areas		Invasive

LC – Least Concern

EN – Endangered

NT – Near Threatened

T – Threatened

7.2 MAMMALS SPECIES LIST

Family	English name	Scientific name	MAIN HABITAT				Abundance	IUCN Red List status
			Woodland in grave yard	Cult. land / gardens	Rivers and riverine	Dambo grassland		
Muridae	Multimammate rats	<i>Mastomys natalensis</i>	X	X	X	X	19	LC
	Bush Rats	<i>Aethomys kaiseri</i>	X			X	2	LC
	Narrow Footed Woodland mouse	<i>Grammomys dolichurus</i>	X		X		17	LC
	Shaggy swamp rats	<i>Dasymys incomptus</i>		X		X	1	LC
Soricidae	Pygmy mouse	<i>Mus minutoides</i>			X	X	5	LC
	Climbing Shrew	<i>Sylvisorex megalura</i>					2	LC
	White toothed shrews	<i>Crocidura hirta</i>	X				4	LC
Dendromurinae	Brant's climbing mouse	<i>Dendromus mesomelas</i>	X			X	5	LC
Gergilidae	Gerbil's tatera	<i>Tatera branstii</i>					4	LC
Gliridae	Woodland dormouse	<i>Graphiurus murinus</i>	X				3	LC
Sciuridae	Squirrel	<i>Paraxerus sp.</i>			X		1	LC
Thryonomyidae	Cane rat (<i>Ntchenzi</i>)	<i>Thryonomys sp.</i>			X		Common	LC
Leporidae	Hare	<i>Lepus sp.</i>				X	Common	
Bovidae	Common Duiker (<i>Gwape</i>)	<i>Sylvicapra grimmia</i>	X		X		Known to occur	LC
Musteridae	Clawless Otter	<i>Aonyx capensis</i>			X		Known to occur	NT
Canidae	Jackal (<i>Nkhandwe</i>)	<i>Canis sp.</i>	X				Known to occur	LC

Family	English name	Scientific name	MAIN HABITAT				Abundance	IUCN Red List status
			Woodland in grave yard	Cult. land / gardens	Rivers and riverine	Dambo grassland		
	<i>Misangala</i>							
Nesomyidae	Giant Pouched Rat	<i>Cricetomys sp.</i>			X			
Hyaenidae	Spotted Hyaena	<i>Crocuta crocuta</i>					Known to occur	

7.3 BIRD SPECIES LIST

Family	English name	Scientific name	MAIN HABITAT				Abundance	CONSERVATION status
			Woodland in grave yard	Cult. land / gardens	Rivers and riverine	Dambo grassland		
Meropidae	Blue-cheeked Bee eater	<i>Merops persicus</i>			x		Common	LC
	Little bee-eater	<i>Merops pusillus</i>		X	x		Fairly common	LC
Estrildidae	Red-billed fire finch	<i>Lagonosticta senegala</i>	X	x	x		common	LC
	Jamesons' fire finch	<i>Lagonosticta rhodopareia</i>	X		x		Fairly common	LC
	African quail finch	<i>Ortygospiza atricollis</i>		x	x		Common	LC
	Purple indigo bird (purple widow finch)	<i>Vidua purpurascens</i>		x	x		Rare	LC
	Common waxbill	<i>Estrilda astrild</i>	X				Fairly common	LC
	Zebra waxbill	<i>Amandava subflava</i>		x			Common	LC
	Red-throated peters twin spot	<i>Hypargos niveoguttatus</i>			x		Common	LC
	Blue waxbill	<i>Uraeginthus angolensis</i>	X	X				LC
	Bronze mannikin	<i>Lonchura cucullata</i>	X	X	x		common	LC
Ploceidae	Golden weaver	<i>Ploceus xanthops</i>			x	x	common	LC
	Yellow crowned bishop	<i>Euplectes afer</i>		x	X		common	LC
	Yellow weaver	<i>Ploceus subareus</i>					common	LC
	Lesser masked weaver	<i>Ploceus intermedius</i>		X	X	X	Common	LC
Motacillidae	African (Grassveld) Pipit	<i>Anthus cinnamomeus</i>		X		X	Fairly common	LC
	African Pied Wagtail	<i>Motacilla aquimp</i>			x		common	LC
Coliidae	Speckled mouse bird	<i>Colius striatus</i>	X	X		x	Fairly common	LC
Columbidae	Blue spotted wood dove	<i>Turtur afer</i>	X	X	x		common	LC
	CapeTurtle dove	<i>Streptopelia capicola</i>		x	x		common	LC
	Red-eyed dove	<i>Streptopelia semitorquata</i>	X				common	LC
	Emerald-spotted dove	<i>Turtur chalcospilos</i>			x		Fairly common	LC

Family	English name	Scientific name	MAIN HABITAT				Abundance	CONSERVATION status
			Woodland in grave yard	Cult. land / gardens	Rivers and riverine	Dambo grassland		
Pycnonotidae	Common bulbul	<i>Pycnonotus barbatus</i>	X		x		common	LC
Ardeidae	Cattle Egret	<i>Bubulcus ibis</i>		X	x	X	common	LC
	Black Egret	<i>Egreta ardesiaca</i>			x		Fairly Common	LC
Accipitridae	Little Sparrow hawk	<i>Accipiter minullus</i>					Rare	CITES II
Falconidae	Peregrine Falcon	<i>Falco peregrinus</i>					Rare	CITES II
Scopidae	Hammerkop	<i>Scopus umbretta</i>	X		x		common	LC
Cuculidae	Burchelle's coucal	<i>Centropus burchelli</i>	x		x		Fairly common	LC
	Common(Eurasian)cuckoo	<i>Cuculus canorus</i>		x			Fairly common	LC
Anatidae	White faced Whistling Duck	<i>Dendrocygna viduata</i>			x	X	Rare	LC
Malaconotidae	Brown-crowned Tchagra	<i>Tchagra australis</i>		x			common	LC
	Tropical boubou	<i>Laniarius aethiopicus</i>	X		x		common	LC
	Black caped puff back	<i>Dryscopus cubla</i>	X		x		common	LC
Corvidae	Pied Crow	<i>Corvus albus</i>	X		x		common	
Muscicapidae	African Paradise Flycatcher	<i>Terpsiphone viridis</i>	X				Rare	LC
Nectariniidae	Amethyst(Black) sunbird	<i>Chalcomitra amethystina</i>			x		Fairly common	LC
Cisticolidae	Red faced cisticola	<i>Cisticola erythrops</i>		X			Fairly common	LC
Phoeniculidae	Green wood hope	<i>Phoeniculus purpureus</i>	X	x			Rare	LC
Alcedindae	Pied kingfisher	<i>Ceryle rudis</i>			x		Fairly common	LC
Turdidae	White headed Robin chat	<i>Cossypha heuglini</i>			x		Fairly common	LC
	Common stone chat	<i>Saxicola torquatus</i>		X	x		common	LC
Alcedindae	African Pigmy kingfisher	<i>Ispidina picta</i>			x		Fairly common	LC

Family	English name	Scientific name	MAIN HABITAT				Abundance	CONSERVATION status
			Woodland in grave yard	Cult. land / gardens	Rivers and riverine	Dambo grassland		
Timaliidae	Arrow-marked warbler	<i>Turdoides jardineii</i>	X	x	x		Fairly common	LC
Numididae	Helmeted Guinea fowl	<i>Numida meleagris</i>	X				Fairly common	LC
Fringillidae	Yellow-fronted canary	<i>Serinus canicollis</i>		x	x		Fairly common	LC
Muscicapidae	Black-throated Wattle eye	<i>Platysteira peltata</i>			x		Common	LC
Ardeidae	Black headed Heron	<i>Ardea melanocephala</i>			x	x	Common	LC
Cisticolidae	Rattling Cisticola	<i>Cisticola chiniana</i>		x	x		Common	LC
Alcedindae	Woodland kingfisher	<i>Halcyon senegalensis</i>			x		Common	LC
	Red-billed Quelea	<i>Quelea quelea</i>			x		Common	LC
Coraciidae	Broad-billed Roller	<i>Eurystomus glaucurus</i>		x			Common	P
Turnicidae	Small Button Quail	<i>Turnix sylvatica</i>			X		common	P
	Common quail	<i>Coturnix coturnix</i>			X		Common	P
Phasinidae	Red-necked spur fowl	<i>Pternister afer</i>				X	Fairly common	LC
Alaudidae	Flappet Lark	<i>Mirafraga rufocinnamomea</i>					Common	LC
Hirundinidae	Barn (European) swallow	<i>Hirundo rustica</i>		x	x	x	Common	LC
	White-throated swallow	<i>Hirundo albigularis</i>			x		Common	LC

7.4 REPTILES SPECIES LIST

Family	English name	Scientific name	MAIN HABITAT				Abundance	Conservation status
			Woodland in grave yard	Cult. land / gardens	Rivers and riverine	Rocky Outcrops		
Crocodylinae	Crocodile	<i>Crocodylus niloticus</i>			X		Very common	CITES II
Varanidae	Monitor Lizard	<i>Varanus niloticus</i>			X		Very common	CITES II
Agamidae	Agama lizard	<i>Agama sp.</i>				X		LC
Scincidae	Rainbow rock skink	<i>Trachylepis margaritifer</i>				X	common	LC
	African striped skink	<i>Trachylepis striata</i>		X		X	common	LC
Colubridae	Three tined Grass snake	<i>Psammophis phillipsii</i>			X		Common	LC
	Green water snake	<i>Philothamnus hoplogaster</i>			X		Common	Protected
	Brown water snake	<i>Lycodonomorphus rufulus</i>			X		Common	LC
Elapidae	Mamba	<i>Dendroaspis sp.</i>	X		X			Protected
Boidae	Python	<i>Python sebae</i>	X		X			Protected
Viperidae	Common Puff adder	<i>Bitis arietans arietans</i>	X		X			LC
	Wolf snakes	<i>Lycophidion sp.</i>	X		X			Protected
	Boom slang	<i>Dispholidus typus</i>			X			Protected

7.5 AMPHIBIAN SPECIES LIST

Family	English name	Scientific name	MAIN HABITAT				Abundance	IUCN Red List status
			Woodland in grave yard	Pool of Water	Riverine	Rivers		
Pipidae	Mueller's Plantana	<i>Xenopus muelleri</i>				X	Very common	LC
Bufonidae	Flat backed toad	<i>Amietophrynus maculatus</i>					6	LC
Ptychadenidae	Mascarene ridged frog	<i>Ptychadena mascareniensis</i>					2	LC
Hemisotidae	Mable snout borrower	<i>Hemisus marmoratus</i>		X			5	LC

APPENDIX 6. SPECIALIST FISHERIES REPORT

Environmental and Social Impact Assessment Report

Macro-invertebrate and Fisheries Baseline Survey Report

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December 2015

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1.0 INTRODUCTION

This short report furnishes the baseline information on some aspects of the aquatic ecology of the Diamphwe River system in central Malawi, a proposed site for the establishment of a multipurpose dam. The report comprises background information, methodology, results of fish, macro-invertebrate and water quality baseline surveys that were carried out in the proposed project impact area. It also touches on expected impacts of the dam project given the extant fauna and the biological environment in the area.

1.1 Current Status of Fish Biodiversity in Malawi and Lilongwe

Malawi's landscape comprises an array of habitats and ecosystems among which comprise woodlands, montane grasslands, wetlands and fresh water bodies of varying sizes. These ecosystems harbour a rich variety of flora and fauna, including more than 5000 plants and over 8,500 invertebrate species, mostly insects (SOER 2010). Nematodes, crustaceans and insects dominate the invertebrate species count while earthworms, myriapods and arachnids are poorly represented. The country has about 280 species of non-insect aquatic invertebrates that include mollusks, nematodes, crustaceans, rotifers, annelids and acarins. Chironomids, insect nymphs of various taxa as well as water mites are also widespread (NABSAP 2006). Eighty three amphibian species occur in Malawi, most of which are frogs and toads. Over 120 reptile species are known to occur in the country, twelve of which are natives (SOER 2010). There are about 648 bird species in Malawi, 94 of which occur within a restricted range in one or a few biomes (NABSAP 2006). A hundred and ninety two species of mammals also occur in Malawi, majority of them as small mammals.

The fish biota of Malawi, especially that prevalent in Lake Malawi, represents one of the most diverse species assemblages in the world with more than 600 species of cichlids alone (GENNER and TURNER 2005). The total number of described fish species accounts for about 15% of the global total number of fresh water fish species and roughly 4% of the world's fish species (KONINGS 1990; RIBBINK 2001). Most of these cichlids have evolved in this lake within a geologically short period and are found nowhere else in the world as

natives (GENNER and TURNER 2005). The riverine fishes of Malawi mostly consists of fishes that are also widely distributed on the African Continent and include fish families of Cyprinidae, Cichlidae, Mormyridae, Clariidae, Bathyclariidae, Bagridae, Distichodontidae, Protopteridae, Malapteruridae and Mochokidae Amphilidae, Alestidae, Mastacembelidae and the introduced family Salmonidae (LIKONGWE 2005; KADYE *et al.* 2008; TWEDDLE and SKELTON 2008). While the fish fauna of Lake Malawi, the country's largest lake, is dominated by cichlids, cyprinids dominate in the rivers that drain directly into this lake (LIKONGWE 2005; KADYE *et al.* 2008). Most of the large cyprinid genera of *Barbus*, *Labeo*, and the salmon-like *Opsaridium* undertake seasonal breeding migration runs up tributary rivers of the lake (TWEDDLE and SKELTON 2008; LIMUWA *et al.* 2012).

1.2 Previous Studies in the Project Impact Area

Most of the previous reports on Diamphwe River system relate to its hydrology and its potential for agricultural development and the possible effects of human activities on this ecosystem. In his report on the surface water resources of the Nyasaland protectorate, Starmans (1957) observed that although the Diamphwe river drainage system is perennial, its dry season flow may be deemed rather small relative to the size of its catchment area and suggested that many of the springs in this system are small and comparatively shallow, recharging quickly at the onset of the rains but reverting to normal flows equally fast. In 1963, Rimmington also reported that some of the rivers that drain into the Diamphwe stop flowing towards the end of the dry season, resulting in the destruction of "perched" water tables that are much needed for agricultural development in the area (Rimmington 1963). Using the Diamphwe and Lilongwe catchments as case studies, Mloza-banda *et al.* (2004) appraised and discussed the influence of crop production, livestock grazing, the nature of water regime and the right of use of resources as vital factors that contribute to human-induced ecosystem changes in wetland ecosystems, thereby attesting to the existence of linkages between social and biophysical systems in wetland ecosystems (Mloza-Banda *et al.* 2004). As way back as early 1960s, the rapidly increasing human population in this area was leading to increased encroachment onto the wetlands on the river margins (Rimmington 1963). In his report of severe frost in Malawi in the 1950s, Willan (1957) postulated that the general absence

of trees in the Diamphwe plain, particularly in stream banks, may have been partly driven by the regular occurrence of frosts and low temperatures. In a preliminary study on biodiversity of riverine fishes in Malawi and their aquaculture potential terms of fish biodiversity, Likongwe (2005) observed that most of the fishes he found in Malawian rivers including the Diamphwe River were those that are already known to be widely distributed on the African continent.

2.0 METHODOLOGY

2.1 Literature Reviews

Biological communities of an aquatic ecosystem may be affected by natural environmental stresses like droughts or floods, by imposed stress like sewage pollution and toxic wastes or by anthropogenic environmental manipulation like reservoir construction or channel modification (AKINDELE and LIADI 2014). By virtue of their limited mobility, macro-invertebrates integrate the effects of different stressors, thereby providing a broad measure of the aggregate impact of environmental degradation (BARBOUR and PAUL 2010; MURALIDHARAN *et al.* 2010). Since different aquatic invertebrates have different tolerances to pollutants, their assemblages can be used to determine the quality of the aquatic environment. Their quantities, species composition and richness, endemism or rarity may be indicative of the nature of physical and chemical habitat impairment resulting from environmental disturbances (PARKERS 2004). When assessed together with chemical/physical parameters, aquatic macro-invertebrate communities are a vital direct measure of localized water quality (BAKER *et al.* 2001).

Fish are an integral part of aquatic ecosystems. The overall assemblage structure of fishes reflects serve as indicators of long-term ecological effects, broad habitat conditions and thus integrated environmental health (KLEYNHANS 1999). The need to undertake fish biodiversity assessments when development projects are being considered cannot be overemphasized since, in terms of biodiversity loss, fish account for a large proportion of the endangered vertebrate species in the world (MOYLE 2004).

2.2 Ecological Surveys

2.1 Water Quality

All samples were collected in duplicates using grab sampling method at four sites along Diamphwe River (Nyamazaani village at 0602321,8420396; Malenya village at 0611239, 8430996; Chimbowa village at 0614389, 8435736 and Mbalame village at 0617486, 8437512). At each site one of the duplicates were acidified with nitric acid to preserve the sample for metal analysis, while the other sample was refrigerated (at about 4°C for anion analysis. Dissolved oxygen (DO), pH, electroconductivity (EC) and turbidity were all analysed on site at the time of sampling. Further laboratory analysis of the water samples was carried out at the Central Water Laboratory, the Government of Malawi's main referral water testing laboratory, in accordance with standard methods for examination of water and wastewater as recommended by APHA, 21st Edition.

2.2 Fish survey

Fish sampling was conducted from 28th September to 01st October 2015 at four sites on the Diamphwe River at Nyamazaani village, T/A Chadza (0602321, 8420396), Malenya village, T/A Kalumbu (0611183, 8430968), Chimbowa village, T/A Mazengera (0614389, 8435736) and Mbalame village, T/A Mazengera (0617450, 8437474) in Lilongwe district. Mbalame village is a site below the proposed dam and close to the lower end of Diamphwe River, Chimbowa and Malenya and villages are within the dam area while Nyamazaani village is at the upper tail end of the proposed dam area. Sample collection was done in a diversity of habitat types including riffles, runs and pools (figure 1).

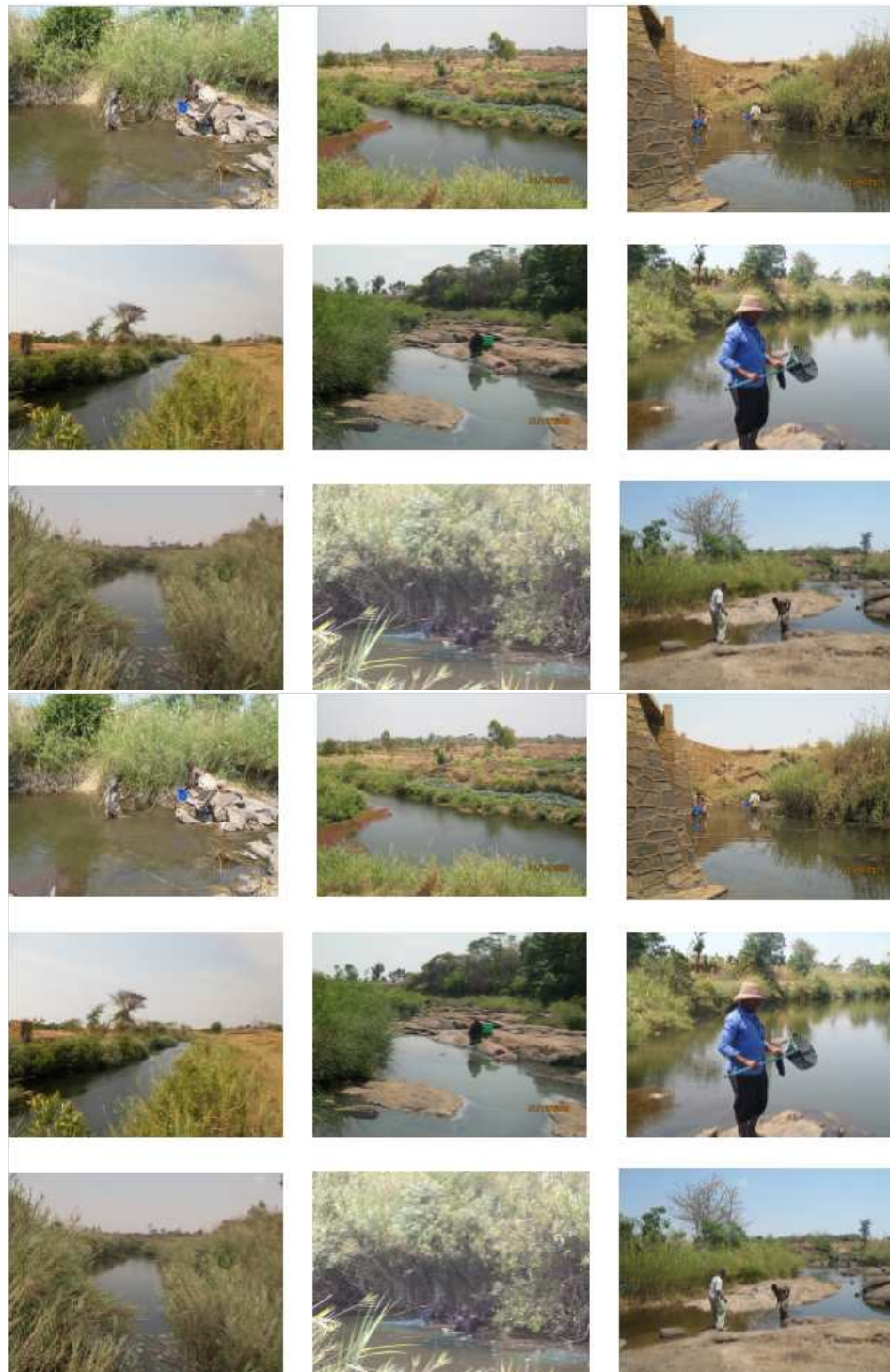


Figure 1: Some of the riverine habitats that were sampled for macro-invertebrates and fish on Diamphwi River, Lilongwe, Central Malawi

Seine nets were used to catch fish. A few fish samples were also obtained from fishermen's fish traps and hook and line. Fish were identified to the lowest possible taxon (JUBB 1967; KONINGS 1990; SKELTON 2001) and their lengths and weights were determined. Fish diversity was assessed using the Shannon diversity index while the conservation status of each species was assessed using the most current FishBase data and IUCN Red list data base. Key interviews with local people resident along these two rivers provided information relevant to fish, fisheries and fishing activities in this river system. The key informants included McKenzie Chilembwe (Chinziri Village, T/A Mazengera), David Tsirizani (Kaphweleza Village, T/A Kalumbu), Madalitso Mlaliki (Mbalame Village, T/A Kaphuka), Sofaya Medison, Mwadini Shaibu (Nyamazaani village, T/A Chadza), Never Humwell, Pingeni Humwell and Frank Kumbukireni (Malenya village, T/A Kalumbu)

2.3 Macro-invertebrates survey

At each site, sampling of aquatic invertebrates was done on the lower and upper reach within a 100m stretch using opportunistic sampling (sampling on as-encountered basis) and semi-systematic methods (with discrete sampling of riffles, rapids, pools, river margins) to have a clear picture of species distribution within the sampling reaches and to collect as different species as possible within the proposed project area. Within each of the habitat types, dip nets were placed downstream and "sediment kicking" and "rock rolling" was done upstream for at least 1 minute. The contents of dip nets were then placed on a sorting tray and collected. Invertebrates were also collected by scooping, sediment grabbing, hand picking and substrate shaking.

All the habitats were sampled by using suitable method(s) appropriate to the habitats. The main micro-habitats sampled included aquatic macrophytes, marginal vegetation, submerged and emergent vegetation, small rocks, tree roots and floating plant debris. Some collected invertebrate specimens (usually adults) were identified in the field. Others that could not be identified in the field were put into transparent envelopes and preserved in 95% ethanol in collecting bottles for later sorting and identification to the lowest possible taxon (family, genus and some to species level) in the laboratory under an Olympus microscope and using invertebrate field guides and other books at the Department of Biological Sciences at Chancellor College and museum collections at the

Museums of Malawi (HARDE 1984; SCHOLTZ and HOLM 1985; PICKER *et al.* 2004; TARBOTON and TARBOTON 2005; DIJKSTRA 2007).

3.0 BASELINE ENVIRONMENT

3.1 Water quality

Chemically, water from the four sampling points on Diamphwe River was found to be alkaline and soft. This remark is made based on power of hydrogen ions (pH) and Total Hardness (as CaCO₃) values registered that ranged from 8.12 to 8.60 and 43 to 82 mg/l respectively. Physical parameters tested, namely turbidity and suspended solids, registered values that ranged from 3.0-28.0 NTU and <0.10-25.0 mg/l respectively. Phosphates and nitrate levels ranged from 0.024 to 0.029 mg/l and 0.110 to 0.243 mg/l respectively. Two main effluent parameters: COD and BOD were analysed to assess if the water in Diamphwe River is polluted by human activities (agriculture or sewage). COD levels ranged from 20.38 to 79.9 mg/l while BOD levels ranged from 10.0 to 19.45 mg/l

The Phosphate and nitrate levels recorded for this river system (phosphates: 0.024 - 0.029 mg/l; nitrates: 0.110 - 0.243 mg/l) are relatively low to impact negatively on the quality of water in Diamphwe River. COD and BOD analysis as a proxy for assessment of water pollution by human activities (agriculture or sewage) indicated that all BOD levels (10.0 - 19.45 mg/l) are within acceptable limits of 20mg/l on the Malawi Bureau of Standards for Effluent Quality and all but one site (Site 1, Mbalame village) registered COD levels above the recommended standard of 70mg/l according to Malawi Standards for Effluent Quality (range: 20.38 to 79.9 mg/l).

Generally, the values obtained for the chemical parameters and nutrient levels in the water from the four sampling points on this river system, are within the acceptable limits according to Malawi Bureau of Standards. The nutrient loading values are quite low and indicate no sign of eutrophication. The clarity of water was not objectionable except for one site which registered turbidity and suspended solids above the acceptable limit of 25 NTU and 25 mg/l respectively according to Malawi Bureau of Standards. The water of

Diamphwe River is therefore generally not negatively impacted by human activities prior to the construction of the dam.

3.2 Fish and fisheries

A total of 179 individual fishes species belonging to five families of Amphiliidae, Cichlidae, Cyprinidae, Clariidae and Mormyridae were sampled from Diamphwi River. In total, ten species were represented and these comprised *Amphilius uranoscopus* (Amphiliidae), *Astatotilapia calliptera*, *Tilapia rendalli*, *Oreochromis shiranus* (Cichlidae), *Labeo cylindricus*, *Labeobarbus johnstonii*, *Barbus palludinosus*, *Barbus trimaculatus* (Cyprinidae), *Clarias gariepinus* (Clariidae) and *Petrocephalus catostoma* (Mormyridae)(Figure 2).



Figure 2: Some of the fishes from Diamphwi River, Lilongwe, Central Malawi, namely *Oreochromis shiranus* (Top row left), *Astatotilapia calliptera* (Top row right), *Labeobarbus johnstonii* (Middle row left), *Labeo cylindricus* (Middle row right), *Petrocephalus catostoma* (Bottom row right) and *Amphilius uranoscopus* (Bottom row left)

Only two species heavily dominated the catch by numbers and together made up about 94% of the fish sampled. *Astatotilapia calliptera* was by far the most common species (about 69% of the catch) followed by *Barbus palludinosus* which made up about 25% of the catch by numbers. Fish diversity as measured by the Shannon index was higher in the lower section of the river at Mbalame Village (Shannon diversity index = 1.12) but generally dwindled upstream at Chimbowa village (Shannon diversity index = 0.31), Malenya village (Shannon diversity index = 0.36) and at Nyamazaani village (Shannon diversity index = 0.47). Species richness correspondingly declined upstream from 7 seven species in the lower stretches of this river at Mbalame Village to only two at the upper sampling points at Malenya and Nyamazaani villages. Details of the ten identified species, including their IUCN Red List Status are given in Table 1. Of the ten fish reported to occur in these rivers, none is documented as endangered under the IUCN; eight are of least concern while two are not yet evaluated.

Table 1. Fish species of Diamphwi River, Lilongwe, Central Malawi and their IUCN conservation status

Family	Species	Habitat	IUCN Red List Status
Amphiliidae (Loach catfishes)	<i>Amphilius uranoscopus</i> (Pfeffer, 1889)	<i>Demersal</i> : Prefers clear, flowing water in rocky habitats	Least Concern (LC)
Cichlidae	<i>Tilapia rendalli</i>	<i>Benthopelagic species</i> ; prefers quiet, well-vegetated water along river littorals or backwaters, floodplains and swamps. It has a wide range of temperature tolerance and salinity.	Least Concern (LC)
	<i>Oreochromis shiranus</i> Boulenger, 1897	<i>Benthopelagic/demersal</i> : Found mainly in densely vegetated shallow waters around the lake.	Not yet assessed for the IUCN Red list
	<i>Astatotilapia calliptera</i> (Günther,	<i>Benthopelagic</i> : Occurs in	Least

	1894)	vegetated areas in shallow water, but also found in rivers and streams around the lake	Concern (LC)
Cyprinidae	<i>Labeo cylindricus</i> Peters, 1852	<i>Benthopelagic</i> : potamodromous, sediment-free and sediment-rich rocky biotopes; favours clear, running waters in rocky habitats of small and large rivers, lakes and dams	Least Concern (LC)
	<i>Labeobarbus johnstonii</i> (Boulenger, 1907)	Benthopelagic, potamodromous. Found in all types of habitat, inhabits inshore areas of the lake, but ascends rivers to breed	Least Concern (LC)
	<i>Barbus paludinosus</i> Peters, 1852	<i>Benthopelagic</i> : prefers quiet, well-vegetated waters in lakes, swamps, and marshes or marginal areas of larger rivers and slow-flowing streams	Least Concern (LC)
	<i>Barbus trimaculatus</i> Peters, 1852	Freshwater; benthopelagic; potamodromous Found in shallow water near river outlets or close to swampy areas Hardy, commonly occurs in a wide variety of habitats, especially where there is vegetation	Least Concern (LC)
Clariidae	<i>Clarias gariepinus</i> (Burchell, 1822)	Freshwater benthopelagic occur mainly in quiet waters, lakes and pools (Ref. 248) and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in rapids	Least Concern (LC)
Mormyridae	<i>Petrocephalus catostoma</i> (Gunther, 1866)	Occurs in shallow and muddy waters, sheltered	Not yet Evaluate

		bays, in lagoons, and swampy areas. Prefers quiet parts of rivers where there is abundant vegetation.	d
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Fishing activities in Diamphwi River

There is significant amount of fishing taking place in Diamphwi River which seems to support livelihoods for a remarkable number of people. The number of fishermen as estimated by the local fishermen could reach as much as 1800 people across the span of this river. Local fishermen reported that the main species in the fishery comprise ten groups namely Kambuzi (*A. calliptera*), Matemba (*B. palludinosus*, *B. trimaculatus*), Mphondo or Mbalawala (*Labeobarbus johnstonii*), Ningwe (*Labeo cylindricus*) Nkholokolo (*A. uranoscopus*), Mphuta or Kanenere (*Petrocephalus catostoma*), Nkhunga (*Anguilla nebulosalabiata*), Chambo (*O. shiranus* and *T. rendalli*) and Mlamba, ntcheka or mphindira (*Clarias gariepinus*). Nkhunga was reportedly common in the past but is now rare and no longer a significant part of the fish catches. Almost all the fish caught from this river are consumed at household level or sold directly at local markets.

The main fishing gears used in this river fishery are hook and line (mbeza), mosquito net seines, gill nets (Ukonde), fish traps (Mono) and a locally available poisonous plant known as *Katupe* that is pounded and applied into water sections of the river to indiscriminately kill fish. *Katupe* is mostly used by women fisher folks. The local fisher folks reported that fish catches were more abundant in the remote past than is the case at present. The fisher folks suggested that the declining catches are due to the effects of the harmful *Katupe* and other non-selective gears like the mosquito-net seine. They also think that there were fewer fisher folks in the past relative to now. The increased number of those engaged in fishing now means that there is less fish to go around. In terms of seasonal changes in the catches, fisher folks indicated that more fish are caught in dry season than wet season. The informants attributed this trend to the relative ease of access to the river in the dry season compared to the flooded swollen river flow in the wet season which scares fisher folks.

3.3 Invertebrates

A total of 718 individual aquatic macro-invertebrates belonging to 45 families and 68 species were sampled in *Diampwi* River. Crabs and bivalves were also encountered (figure 3). The number of invertebrate families ranged from 19 at Mbalame village (site 1, the lowest sampling point in the river) to 27 at site 2 in Chimbowa village (near lower start of proposed dam) but were not significantly different among the four river sites that were sampled (Chi-square test, $p=0.5793$). Site 3 (Malenya village) and 4 (Nyamazaani village) had 20 and 25 families of invertebrates, respectively. Aquatic macro-invertebrate diversity as gauged by the Shannon index was lower in at site 1, Mbalame village (Shannon index = 2.53) in the lowest reaches of the river but generally higher in the upper reaches, being highest at Chimbowa village near the proposed dam site (Shannon index = 2.84). Shannon index values of 2.61 and 2.74 were recorded at Malenya village (site 3) and Nyamazaani (site 4), respectively.



Figure 3: Some of the macro-invertebrates, including a bivalve mollusc and a crab from Diampwi River, Lilongwe, Central Malawi

Table 2: Invertebrates families (and species) of Diamphwi River system, Lilongwe, Malawi

Family	Species
Actiidae	<i>Utethesiapulchella</i>
Aeshnidae	<i>Anax imperator</i>
	<i>Anaxsperatus</i>
	<i>Anaxtritis</i>
Anthopholidae	<i>Xylocopacaffra</i>
Argulidae	unidentified
Baetidae	unidentified
Belestomatidae	<i>Appassussp</i>
Chaoboridae	<i>Chaoborussp</i>
Chironomidae	<i>Chironomusformosipennis</i>
	<i>Chironomussp</i>
Clorocyphidae	<i>Platycyphacaligata</i>
Coenagrionidae	<i>Ceriagrionglabrum</i>
Corbiculidae	<i>Corbiculasp</i>
Corduliidae	<i>Phyllomacromiacontumax</i>
Corduliidae	<i>Phyllomacromiasp</i>
Culicidae	<i>Culexsp</i>
Daphniidae	<i>Daphniasp</i>
Dytiscidae	<i>Aciliussp</i>
Ephemeridae	
Gerridae	unidentified
Gomphidae	<i>Ictinogomphusferox</i>
Gomphidae	<i>Paragomphusgenei</i>
Gryllotapidae	<i>Gryllotalpaafricana</i>
Gyrinidae	<i>Dineutesaereus</i>
Heptageniidae	unidentified
Hirudinidae	<i>Hirudomedicinalis</i>
Hydrophilidae	<i>Berosussp</i>
Hygrobiiidae	unidentified
Iridinidae	<i>Asphathariasp</i>
Leptophlebiidae	unidentified
Lestidae	<i>Lestesplagiatus</i>
Lestidae	<i>Lestesuncifer</i>
Lestidae	<i>Lestesvirgatus</i>
Libellulidae	<i>Aethriamantarezia</i>
	<i>Crocothemiserythraea</i>
	<i>Nesciothemisfarinosa</i>
	<i>Orthetrumcaffrum</i>
	<i>Orthetrumabbotti</i>
	<i>Orthetrumcrysostigma</i>

	<i>Orthetrumcrysostigma</i>
	<i>Orthetrum</i> sp
	<i>Rhythemissemihyalina</i>
	<i>Trithemisarteriosa</i>
	<i>Trithemisfurva</i>
	<i>Trithemiskirbyi</i>
	<i>Trithemisstictica</i>
	<i>Urothemisedwardsi</i>
	<i>Orthetrum</i> sp
	<i>Orthetrumjulia</i>
Lymnaeidae	<i>Lymnae</i> sp
Mantidae	unidentified
Nepidae	<i>Laccotresph</i> sp
Nepidae	<i>Ranatra</i> sp
Nepidae	unidentified
Nymphalidae	<i>Charaxesvaranes</i>
	<i>Hamanumida daeddalas</i>
	<i>Protogoniomorpha parhassus</i>
Perlidae	<i>Catopsiliaflorella</i>
Pieridae	<i>Euremabrigitta</i>
Planorbidae	<i>Biomphalaria</i> peifferi
Simuliidae	<i>Simulium</i> sp
Tipulidae	<i>Tipula</i> sp
Veliidae	unidentified

The three most dominant macro-invertebrate families in the lower reaches of the river were the skimmer dragonflies (family Libellulidae), 'spreadwings' damselflies (family Lestidae) narrow-winged damselflies (family Coenagrionidae), ramshorn snails (family Planorbidae) and small air-breathing freshwater snails of the family Lymnaeidae. These three families together comprised over 65% of all the 19-family invertebrate samples at Mbalame village. Invertebrate families Libellulidae (skimmers), Lymnaeidae (air-breathing aquatic snails), Lestidae (spreadwings damselflies), Aeshnidae (Hawkers or darners dragonflies) and the Culicidae (mosquitoes) were the commonest invertebrate families at site 2, Chimbowa village. These families made up about 55% of all the sampled individuals of the 27 families at this site. Of the 20 families samples at site 3 (Malenyavillage), five of them namely Lestidae, Aeshnidae, Ephemeridae (may flies), Dytiscidae (diving water beetles) and the Libellulidae dominated the collection and together made up about 57% of all the sampled individuals. At site 4, Nyamazaani village,

six invertebrate families of Lymnaeidae, Lestidae, Ephemeridae, Planorbidae, Baetidae (Small Minnow Mayflies) and Libellulidae dominated the sample and together contributed about 67% of all sampled individuals.

Overall, 'spreadwings' damselflies (Lestidae) small air-breathing freshwater snails (Lymnaeidae), skimmer dragonflies (Libellulidae), hawkers or darners (Aeshnidae), mosquitoes (Culicidae), ramshorn snails (family Planorbidae) and may flies (Ephemeridae) were the dominant invertebrate families of Diamphwi River ecosystem. Together they comprise about 64% of all sampled individuals in this river.

Table 3 below presents invertebrates that were encountered during the survey in the proposed project area, identified to species level and then assessed for their IUCN red list status (October 2015-3 IUCN red list). The results indicate that no endangered species of aquatic invertebrates were encountered in the project sites during the surveyed period. Most of them were either not evaluated by IUCN or were under least concern. However *Hirudo medicinalis*, recorded during the survey at site 1 (Mbalame village) and was mentioned during interviews with local fishermen (they are bitten by it at times) is of conservation significance as it is under the red list category of near threatened species (IUCN 2015-3 red list).

Table 3: The conservation status of invertebrates (IUCN RED LIST) of Diamphwi River that were identified to species level

SPECIES	Number sampled	IUCN Conservation status (2015-3 red list data)
<i>Aethriamanta rezia</i>	1	Least concern
<i>Anax imperator</i>	1	Least concern
<i>Anax speratus</i>	1	Least concern
<i>Anax tristis</i>	1	Least concern
<i>Catopsilia florella</i>	1	Least concern
<i>Ceriagrion glabrum</i>	2	Least concern
<i>Charaxes varanes</i>	1	Least concern
<i>Crocothemis erythraea</i>	3	Least concern
<i>Dineutes aereus</i>	2	Not yet assessed
<i>Eurema brigitta</i>	1	Least concern
<i>Gryllotalpa africana</i>	1	Not yet assessed
<i>Hamanumida daeddalas</i>	2	Not yet assessed
<i>Ictinogomphus ferox</i>	1	Least concern
<i>Lestes uncifer</i>	3	Least concern
<i>Nesciothemis farinosa</i>	2	Least concern
<i>Ortherum caffrum</i>	1	Not yet assessed
<i>Orthetrum abbotti</i>	1	Least concern
<i>Orthetrum crysostigma</i>	2	Not yet assessed
<i>Paragomphus genei</i>	3	Least concern
<i>Phyllomacromia contumax</i>	1	Least concern
<i>Platycypha caligata</i>	1	Least concern

<i>Protogoniomorpha parhassus</i>	1	Not yet assessed
<i>Rhyothemis semihyalina</i>	1	Least concern
<i>Trithemis arteriosa</i>	2	Least concern
<i>Trithemis furva</i>	2	Least concern
<i>Trithemis kiblyi</i>	3	Least concern
<i>Trithemis stictica</i>	1	Least concern
<i>Urothemis edwardsi</i>	1	Least concern
<i>Utetheisa pulchella</i>	1	Not yet assessed
<i>Xylocopa caffra</i>	1	Not yet assessed
<i>Biomphalaria pfeifferi</i>	10	Least concern
<i>Chironomus formosipennis</i>	8	Not yet assessed
<i>Hirudo medicinalis</i>	1	Near threatened
<i>Lestes virgatus</i>	30	Least concern
<i>Orthetrum julia</i>	7	Least concern

Aquatic macro-invertebrates occupy a diverse array of in-stream micro-habitats including riffles, pools, logs of wood and leaf mats and play an integral role in the aquatic food web (ERMAN 1996; BAKER *et al.* 2001). By virtue of their limited mobility, macro-invertebrates integrate the effects of different stressors, thereby providing a broad measure of the aggregate impact of environmental degradation (BARBOUR and PAUL 2010; MURALIDHARAN *et al.* 2010). Since different aquatic invertebrates have different tolerances to pollutants, their assemblages can be used to determine the quality of the aquatic environment (MURALIDHARAN *et al.* 2010).

Overall, the dominant invertebrate families of the Diamphwi River ecosystem comprised damselflies (Lestidae), dragonflies (Libellulidae), darners (Aeshnidae), may flies (Ephemeraeidae), skimmer mosquitoes (Culicidae), small freshwater snails (Lymnaeidae) and ramshorn snails (Planorbidae). The Lestidae (damselflies) Libellulidae (dragonflies) and Aeshnidae (darners) all belong to the insect order Odonata. The Odonata are very dependent on ecological conditions of the environment (CORBET 1999) and are thus an important indicator of ecological balance; their abundance in an area is a good indication of the quality of its freshwater (ACQUAH-LAMPTEY *et al.* 2013). They have been used as bio-indicators for assessing wetland quality in a number of countries across the world (Europe, Japan, the USA, Australia, South Africa (SAMWAYS and STEYTLER 1996; CLAUSNITZER and JÖDICKE 2004). Ephemeropteran insects have a strong negative response to anthropogenic disturbances in aquatic ecosystems and their absence is an indication of pollution and low biological water quality (LENAT 1988; AKINDELE and LIADI 2014). The fact that Diamphwi has a rich diversity of Odonates and ephemeropteran insects does point to the fact that its water quality is reasonably good.

Moreover, the entire Shannon index values for aquatic macro-invertebrate diversity in this river system ranged from 2.53 (site 1, Mbalame village) to 2.84 (site 2, Chimbowa village). When the value of the Shannon diversity index for macro-invertebrates is less than 1.0, it is an indication that the habitat structure in question is polluted and degraded (AKINDELE and LIADI 2014). The values obtained in this river system therefore do not indicate a state of environmental impairment.

4 IMPACT ASSESSMENT AND MITIGATION

4.1 Impacts on fish and Proposed Mitigation Measures

Dams come with varied environmental consequences that include both direct impacts to the biological, chemical and physical properties of rivers and riparian environments. The establishment of a dam on Diamphwe River will basically transform a freely flowing water system by introducing an impoundment within the river system. This will result in changes

in river discharge regime, habitat loss or alteration as well as changes in water quality and temperature, significantly impacting on fish life in this river. Within the context of the biology of the fishes found in this river, the section below discusses, these impacts in terms of interference with fish migration, changes in river discharge regime, habitat loss or alteration, changes in thermal and chemical characteristics of water in the river, construction-related habitat loss and alteration and, finally, increased predation risk for fish enhanced fisheries development.

Interference with fish migration

A dam on Diamphwe River will likely interfere with upstream fish migration and negatively affect those species whose life cycles hinge on longitudinal spawning movements along the stream during some times of the year. In this river system, the cyprinid *Labeo cylindricus* is a migratory species that is dependent on moving upstream in masses to breed. Blockage of its spawning migration routes may lead to its decline in this river just as it happened to the fish following the damming of perennial rivers flowing into Lake Baringo in Kenya (Nyamweya *et al.* 2012). Like *Labeo cylindricus*, *Labeobarbus johnstonii* also typically ascends into rivers for spawning purposes. *Barbus trimaculatus* also undertakes upstream spawning migrations after rain. Likewise, *Petrocephalus catostoma* undertakes upriver breeding migration.

Although the new dam will interfere with fish migratory patterns, some natural barriers already exist on this river drainage that clearly preclude the movement of some fishes into Diamphwe River. Messrs McKenzie Chilembwe, David Tsirizani and Madalitso Mlaliki reported of a 5m high waterfall on the Linthipe River close to its confluence with Lilongwe River near Mayani in Dedza. This fall is reportedly so vertically steep that no fish is likely to pass through this barrier. During this survey, there was no single report of the lake-river migrating *Opsaridium microlepis* on the upper part of this barrier, including the Diamphwe River. Diamphwe river drains its waters about half a kilometer downstream of sampling site 1 (Mbalame Village). None of the studies on *Opsaridium microlepis* ecology to date report of the occurrence of this species upstream of this reported water fall.

Changes in river discharge regime habitat loss or alteration

The construction of a dam on Diamphwe River will alter the river discharge regime patterns, especially reducing downstream flooding episodes. This will depress sediment transport and reduce or destroy seasonally available inundated habitats critical for some fish species downstream of the dam. *Clarias gariepinus* migrates laterally towards flooded plains to breed, returning to the river soon afterwards while the juveniles remain in the inundated area where they grow before joining the adult population in the main river. This species may be negatively affected downstream of the dam.

Changes in thermal and chemical characteristics of water in the river

Dam construction will likely alter the thermal and chemical characteristics of water in the Diamphwe River by either acting as a nutrient trap and heat exporter if the dam is designed as a surface-release reservoir or as a nutrient and cold-water exporter if the dam is designed as a deep-release reservoir. If a deep-release reservoir design is adopted, there is likelihood that the outflow of anoxic water from the depths of the dam may cause fish deaths downstream of the dam. If the dam assumes a surface-release reservoir design, water spills over the crest of the dam during high water periods can potentially have over-saturated concentrations of atmospheric oxygen and nitrogen gases. Prolonged exposure to such levels of gases will be lethal to fish downstream. *Amphilius uranoscopus* and *Labeo cylindricus* favour clear running waters and any environmental perturbations tend to depress their populations. However, *Tilapia rendalli*, which is tolerant to a wide range of temperature and salinity will be minimally affected downstream of the dam.

Construction-related habitat loss and alteration

Construction works of the dam on Diamphwe will change the bathymetric setting of the water course through excavations and inundation of parts of the riparian environments that were hitherto dry land. This will change the nature of microhabitats at the proposed dam site. New lacustrine-like micro-habitats will dominate riverine ones, favouring fish species that do well in slow-moving aquatic habitats at the expense of those fast-current riverine ones. *Barbus paludinosus*, a hardy species that prefers quiet waters in lakes, swamps and marshes or marginal areas of slow-flowing rivers will likely thrive. Another

hardy species, *Clarias gariepinus* that is widely tolerant of extreme environmental conditions and spends its life mainly in quiet waters, lakes and pools with soft muddy substrates is likely to thrive as well. *Astatotilapia calliptera* and *Oreochromis shiranus* that thrive in vegetated areas of shallow waters around lakes will likely do well under the new dam conditions. *Petrocephalus catostoma* which occurs in quiet muddy waters of sheltered bays will also benefit from the new dam conditions. However *Labeo cylindricus*, *Labeobarbus johnstonii* and *Amphilius uranoscopus* which favour clear, running waters in rocky habitats will be negatively impacted by the within-dam microhabitats.

Increased predation risk for fish and enhanced fisheries development

The proposed Diamphwe dam will create an environment that amasses fish within a concentrated area and will offer new opportunities for setting up or expanding existing fisheries activities in this area, providing major socio-economic benefits in the process. Fish populations adapted to the new dam micro-habitats (predictably *Barbus paludinosus*, *Clarias gariepinus*, *Astatotilapia calliptera* and *Oreochromis shiranus* and *Petrocephalus catostoma*) will likely increase substantially in the newly expanded aquatic environment due mostly to increased productivity arising from copious quantities of nutrients released from dead submerged vegetation and soils. The expanded fisheries may, however, be short-lived as the amount of available nutrients in the dam will dwindle over time. Ecological competition among the fish plus increased fishing activities is likely to undercut the population boom of those fish species which will have initially dominated the dam's ecosystem.

General impact of dam on fish biodiversity

All the fish species recorded in this river are not endemic to this river ecosystem but are widely distributed across Malawi and Africa. A significant portion of them are hardy and tolerant of a wide range of ecological conditions. Most of them (8 out of 10) are also of least concern under the IUCN red list status. At the species level, the potential impact of the dam will be limited to only those populations in this river system. With the proposed 90% environmental flows downstream of the dam, it is less likely that these populations could get decimated.

Mitigation measures

Although most (8 out of 10) of the fish species found in Diamphwe River are not listed as threatened under IUCN, some have requirements for well-vegetated river margins (e.g. *Oreochromis shiranus* and *Barbus paludinosus*), for clear flowing waters (e.g. *Amphilius uranoscopus*, and *Labeo cylindricus*) while others are migratory, ascending rivers to breed (e.g. *Labeobarbus johnstonii* and *Barbus trimaculatus*). To mitigate against severely impacting on these fish, deliberate efforts will have to be undertaken to avoid completely obliterating upstream and downstream movement of fish in the design of the dam. There will be need to maintain adequate environmental flows downstream to avert seriously impacting on fishes that prefer micro-habitats in relatively fast flowing river reaches (e.g. *Amphilius uranoscopus*, *Labeo cylindricus*). The control of downstream flows from the dam should be such that the seasonal flooding regimes of the river downstream are not compromised so that fish populations that undertake lateral migrations out of the main river channel to breed in flooded riparian microhabitats (e.g. *Clarias gariepinus*) are not critically undermined. In the short term, the Diamphwe dam's reservoir will significantly boost fish stocks and create new fishing opportunities in the area. To safeguard the sustainability of the new fisheries, there should be deliberate management plans drawn in consultation with local authorities for regulating fisheries activities in the new dam.

4.2 Impacts on Invertebrates and Proposed Mitigation Measures

Macro-invertebrates directly depend on adequate habitat and water quality for their survival and display different sensitivities to habitat disturbances. When constructed, Diamphwe dam will create a more or less homogenous lacustrine environment that will result in drastic changes in not only water quality but also in the longitudinal distribution of macro-invertebrate species, particularly their abundance, community composition, structure, density and diversity. The dam is likely going to generally result in diminished number of colonizing taxa, both in the reservoir and downstream compared to the undammed upstream stretches of this river system. Following the impoundment of this river system, pollution-tolerant opportunistic macro-invertebrates that favour slower currents and can exploit a variety of habitats will increase in numbers while the pollution- and disturbance-sensitive ones will decline in numbers.

Two of the most abundant insect groups sampled in this river were the Odonata and Ephemeroptera. Once constructed, Diamphwe dam will trap silty sediments which were previously washed downstream as the river flowed unimpeded. This new set of microhabitats will not be suitable for Ephemeropteran macro-invertebrates that thrive better in un-sedimented substrates in runs and riffles rather than in sedimented pool microhabitats. On the other hand, the Chironomidae, Tipullidae and Oligochaetae macro-invertebrates that do well in heavily sedimented substrates will thrive. Within Odonata, families of Gomphidae and Aeshnidae are very sensitive to ecological, habitat and environmental changes. The destruction of river bank vegetation during dam construction will negatively impact on Odonate diversity in the short term because changes in environmental structures such as shade cover affects the micro-climate required to sustain the abundance of Odonata.

To mitigate against effects of the dam on macro-invertebrate community diversity and integrity, reasonable water flows must be allowed downstream of the dam to allow for continued reproduction of aquatic macro-invertebrates whose life cycle is heavily dependent on water or its proximity. Riparian vegetation would have to be restored to increase habitat heterogeneity necessary to sustain macro-invertebrate diversity.

4.3 Impacts on water quality and Proposed Mitigation Measures

Substantial changes in water quality may ensue during the early phases of reservoirs created by river impoundment. The proposed Diamphwe dam will likely lead to one or several of the following changes in the physical-chemical nature of the Diamphwe water system. The construction of Diamphwe dam may result in low dissolved oxygen levels in the reservoir as a result of the death and decomposition of aquatic macrophytes, enhanced active organic decomposition in the bottom sediments as well as the lack of flow-induced turbulence that would normally promote the dissolution of oxygen in the water body. Diamphwe dam may lead to increased salinity downstream because impeded river flow will leave less amounts of water available to dissolve the salts in that section of the river. There will be increased siltation above the dam which will lead to higher levels of suspended solids in water. This will reduce overall light penetration and water

transparency of that part of Diamphwe River. This will be exacerbated by the release of organically-bound elements from flooded vegetation, excreta and soils that will result in an upsurge of mineral enrichment and high productivity and possible eutrophication. The silt building up behind the dam will also traps nutrients, making them no longer available to the ecosystems downstream. There will be a high likelihood of metals like Lead, Copper, Zinc, Manganese and Iron exhibiting enhanced concentrations in the dam sediments relative to the riverbed of the downstream section of the flowing river. To track and remedy for any major changes in the physical-chemical character of the water of Diamphwe River ecosystem after dam construction it is recommended that a regular water sampling, analysis and monitoring programme on the new impoundment be instituted as a matter of highest priority soon after the inauguration of the reservoir.

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6.0 APPENDICES

6.1 Fish species list

Family	English name	Scientific name	Main habitat	Abundance	IUCN Red List status
Amphiliidae	<i>Amphilius uranoscopus</i>	Stargazer mountain catfish	Demersal; prefers clear, flowing water in rocky habitats	Not common n = 1	<u>Least Concern (LC)</u>
Cichlidae	<i>Tilapia rendalli</i>	Red-breasted tilapia	Quiet, well-vegetated water along river littorals or backwaters, floodplains and swamps	Not common n = 1	<u>Least Concern (LC)</u>
	<i>Oreochromis shiranus</i>	Tilapia, Makumba	<i>Benthopelagic/demersal:</i> Found mainly in densely vegetated shallow waters around the lake	Not common n = 1	Not yet Evaluated
	<i>Astatotilapia calliptera</i>	Eastern happy, Makwale	Benthopelagic; vegetated areas in shallow lake water, but also found in rivers and streams around the lake	Very common n = 125	Least Concern (LC)
Cyprinidae	<i>Labeo cylindricus</i>	Red eye labeo, Ningwi	Benthopelagic; favours clear, running waters in rocky habitats of small and large	Not common n = 3	Least Concern (LC)

Family	English name	Scientific name	Main habitat	Abundance	IUCN Red List status
			rivers, lakes and dams		
	<i>Labeobarbus johnstonii</i>		Benthopelagic; all types of habitats in the inshore areas of the lake, but ascends rivers to breed	Not common n = 3	Least Concern (LC)
	<i>Barbus paludinosus</i>	Straightfin barb, <i>Matemba</i>	Benthopelagic; quiet, well-vegetated waters in lakes, swamps, and marshes or marginal areas of larger rivers and slow-flowing streams	Very common n = 45	Least Concern (LC)
	<i>Barbus trimaculatus</i>	Three-spot barb, <i>Matemba</i>	Benthopelagic; occurs in shallow water near river outlets or close to swampy areas in a wide variety of habitats, especially where there is vegetation	Not common n = 1	Least Concern (LC)
<i>Clariidae</i>	<i>Clarias gariepinus</i>	North African catfish, <i>Mlamba</i>	Freshwater benthopelagic occur mainly in quiet waters, lakes and pools (Ref. 248) and prefer rather shallow and swampy areas with a soft muddy substrate and calmer water. They may also occur in fast flowing rivers and in rapids	Not common n = 1	Least Concern (LC)

Family	English name	Scientific name	Main habitat	Abundance	IUCN Red List status
<u>Mormyridae</u>	<i>Petrocephalus catostoma</i>	Churchill, Kanenere, Mphuta	Occurs in shallow and muddy waters, sheltered bays, in lagoons, and swampy areas. Prefers quiet parts of rivers where there is abundant vegetation.	Not common n = 1	Not yet Evaluated

6.2 MACRO-INVERTEBRATE SPECIES LIST

SPECIES	Number sampled	IUCN Conservation status (2015-3 red list data)
<i>Aethriamanta rezia</i>	1	Least concern
<i>Anax imperator</i>	1	Least concern
<i>Anax speratus</i>	1	Least concern
<i>Anax tristis</i>	1	Least concern
<i>Catopsilia florella</i>	1	Least concern
<i>Ceriagrion glabrum</i>	2	Least concern
<i>Charaxes varanes</i>	1	Least concern
<i>Crocothemis erythraea</i>	3	Least concern
<i>Dineutes aereus</i>	2	Not yet assessed
<i>Eurema brigitta</i>	1	Least concern
<i>Gryllotalpa africana</i>	1	Not yet assessed
<i>Hamanumida daeddalas</i>	2	Not yet assessed
<i>Ictinogomphus ferox</i>	1	Least concern
<i>Lestes uncifer</i>	3	Least concern

<i>Nesciothemis farinosa</i>	2	Least concern
<i>Ortherum caffrum</i>	1	Not yet assessed
<i>Orthetrum abbotti</i>	1	Least concern
<i>Orthetrum crysostigma</i>	2	Not yet assessed
<i>Paragomphus genei</i>	3	Least concern
<i>Phyllomacromia contumax</i>	1	Least concern
<i>Platycypha caligata</i>	1	Least concern
<i>Protogoniomorpha parhassus</i>	1	Not yet assessed
<i>Rhyothemis semihyalina</i>	1	Least concern
<i>Trithemis arteriosa</i>	2	Least concern
<i>Trithemis furva</i>	2	Least concern
<i>Trithemis kiblyi</i>	3	Least concern
<i>Trithemis stictica</i>	1	Least concern
<i>Urothemis edwardsi</i>	1	Least concern
<i>Utetheisa pulchella</i>	1	Not yet assessed
<i>Xylocopa caffra</i>	1	Not yet assessed

<i>Biomphalaria pfeifferi</i>	10	Least concern
<i>Chironomus formosipennis</i>	8	Not yet assessed
<i>Hirudo medicinalis</i>	1	Near threatened
<i>Lestes virgatus</i>	30	Least concern
<i>Orthetrum julia</i>	7	Least concern

APPENDIX 7. MOAIWD ADVICE ON ENVIRONMENTAL FLOWS, DAM BUFFER ZONE AND DESIGN FLOOD

Telephone: (265) 01 770 344/ 221
Telegrams:
Fax No. (265) 01 773 737
Email: secretary@irriwater.org



MINISTRY OF AGRICULTURE, IRRIGATION
AND WATER DEVELOPMENT
TIKWERE HOUSE
CITY CENTRE
PRIVATE BAG 390
LILONGWE 3
MALAWI

MINISTRY OF AGRICULTURE, IRRIGATION AND WATER DEVELOPMENT

Ref. No. IWD/Conf/9/111

18th November, 2014

The General Manager
Lilongwe Water Board
P.O. Box 93,
Lilongwe 3,
Malawi

Dear Sir,

Contract No. WRM/C/22 for Consultancy Services for Detailed Design and Environmental and Social Impact Assessment (ESIA of Diamphwe Multi-Purpose Dam and associated Structures: Guidance on Design Optimized Dam Design

Reference is made to your letter dated 17th October 2014 ref no WRM/C/22/02 on above captioned matter, and the following are the pieces of advice for your consideration:

A. Environmental flow

The ministry has reviewed the recommendation from the consultant and noticed the following:

- 1) In assessing the environmental flow the consultant has considered all the relevant issues that are required in the riverine ecosystem;
- 2) The Consultant has looked at the different flow assessment techniques ranging from hydrological index, natural habitat, discharge methods, habitat inundation methods to holistic approaches; and
- 3) The Consultant has also looked at the required or recommended environmental flows for different objectives and has recommended environmental releases for different months which is equivalent to 10% of the annual average flows in the dry season and 20% of annual average flow in the rainy season,

However, the ministry would like to advise that the policy on ascertaining the environmental flow has been that of the hydrological index using the flow duration curve, that is to say that all designs are to allow a 90% percentile compensation flow i.e Q90 which is interpreted as "the flow which is available 90 percent of the time" should be released as environmental flow. This agrees partially with the consultant recommendation though the difference has been that consultant's recommendation uses the Annual Average Flow (AAF) which varies with time.

B. Riparian buffer zones.

The policy of the ministry on the conservation and management of the riparian buffer zones adjacent to a water course has been that "no person shall cultivate or undertake any development activity within a minimum of 15m from the highest ever or 100 year flood level on either side of a river or stream." What this means is that, a 100 year flood buffer zone should be demarcated on both sides of a riverine water course and any development should start 15m from that 100 year flood contour line.

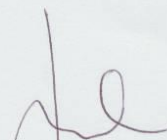
C. Design floods for spillway

The ministry would like to confirm and ascertain that its policy and guidelines in design floods as set in its water resource regulation are as follows:

Class of dam	Minimum retention of spillway design
Very Small	1 in 20 years
Small	1 in 500 years
Medium	1 in 1,000 years
Large	1 in 10,000 years

I hope you will find the above information useful, and should you have doubts, further clarification could be sought from the ministry.

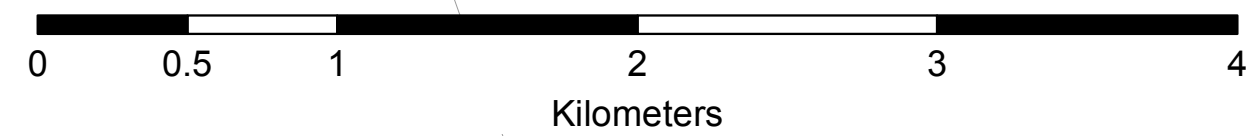
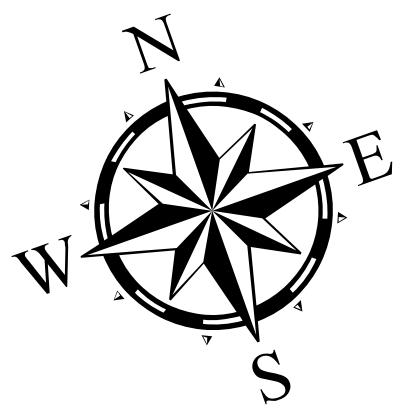
Yours faithfully



P.W.R. Kaluwa

For/SECRETARY FOR IRRIGATION AND WATER DEVELOPMENT

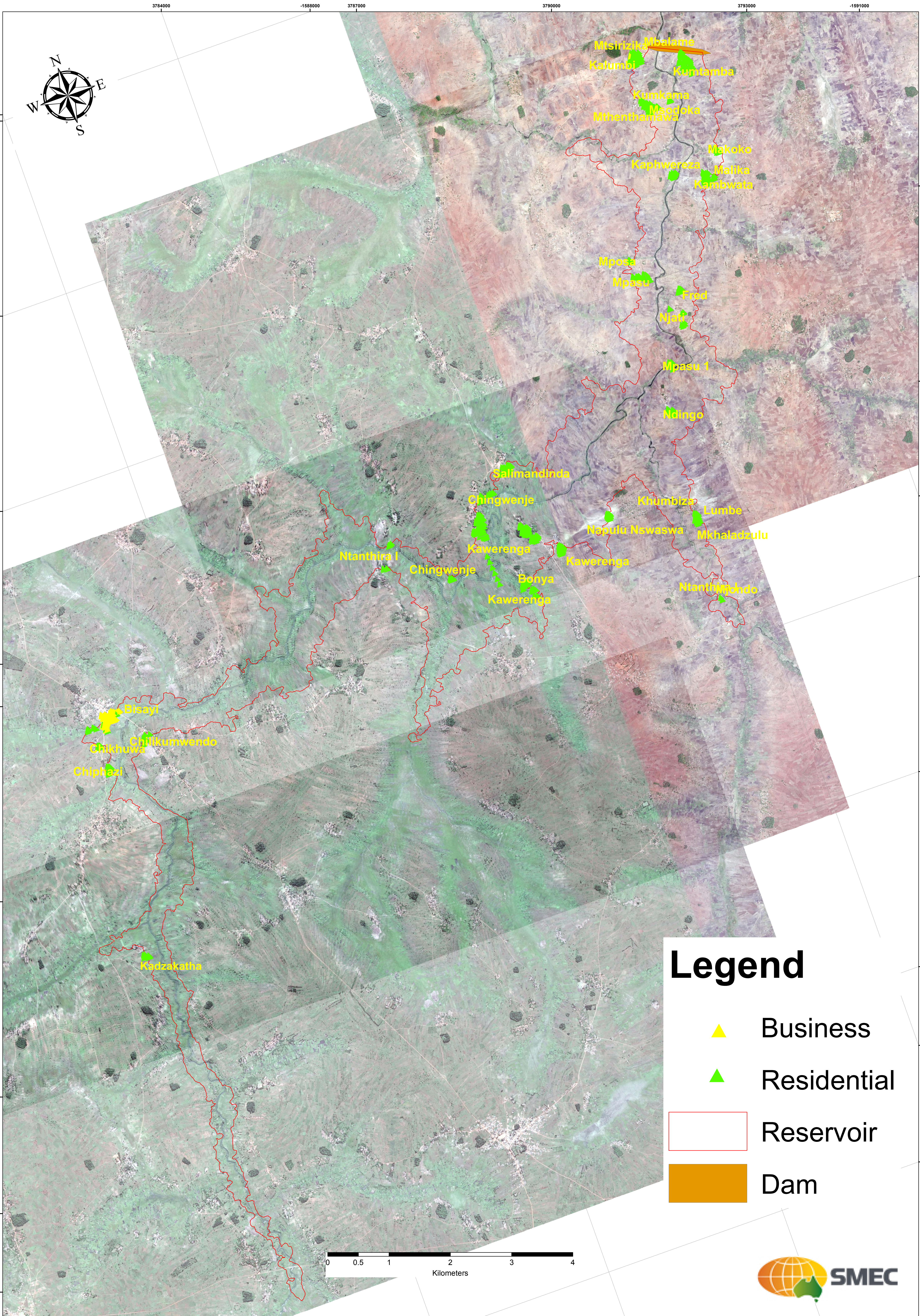
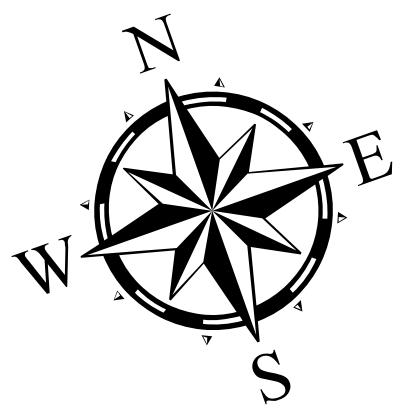
APPENDIX 8. AFFECTED VILLAGES, STRUCTURES AND ASSET MAPS



Legend



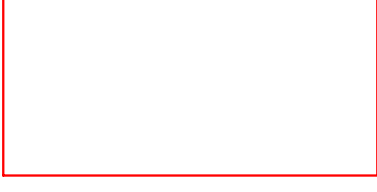

- ▲ Affected Villages
- Reservoir
- Dam
- Cropland
- Cultivated Dambo
- Forest/Natural Vegetation
- Settlement
- Dambo Grassland



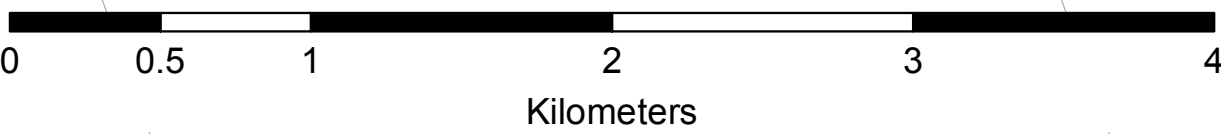
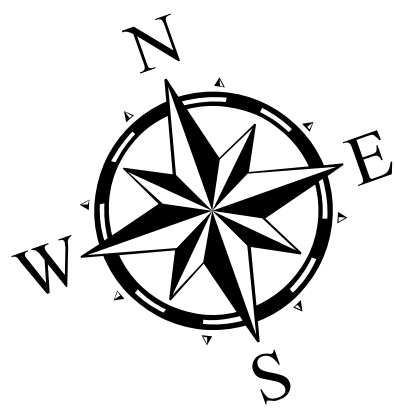


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Kilometers

Legend

-  Business
-  Residential
-  Reservoir
-  Dam





Legend

- ▲ Affected Villages
- Diamphwe River
- Surveyed Plots Dedza
- Surveyed Plots Lilongwe
- Reservoir
- Dam



APPENDIX 9. STAKEHOLDER COSULTATIONS

Consultation Outcomes

Date	Place	Discussion	Issues	Participants
21 August	LWB Office	SMEC team members met with members of the LWB and a representative of the NWDP.	Introductions were made and the Client provided background and documentation relating to the project. Arrangements were made for an informal visit to the Dam site on the same day.	SMEC: P Geerdts (Sociologist), C Mhango (Ecologist) and C Ghosh (GIS Expert) LWB: S Maliano, C Kachingwe NWDP: P Kutengule
	Project site	SMEC team members informally visited the Project site and Kuntamba village in Dedza District.	Initial discussions about Project and location of the dam wall was shown by GVH Makoko and villagers.	SMEC: P Geerdts, C Mhango, C Ghosh
28	Forestry Headquarters Office, City Centre, Lilongwe	Information on forest reserves in study area; studies, documentation, activities by Forestry Department in Project area	Department of Forestry is working in Dzalanyama Forest Reserve through a project financed by JICA. They have data; it is in electronic form and kept under the authority of Mr Onaka who is Adviser to Forest Conservation (he went on leave that day and will be coming back after a month). Referred to the District Forestry Officer for Lilongwe.	SMEC: C Mhango Department of Forestry: Alinafe Kaudzu, Assistant Officer to JICA (Tel: 0999 754920 / 0884 062701)
	Lilongwe District Forestry Office, Amina House, Lilongwe	Information on forest reserves and activities by District Forestry Office, in Project impact area, the wider catchment area,	Collected documents - Lilongwe Socio-Economic report (old and latest draft), Lilongwe District State of Environment Report electronic copy, and Dzalanyama Forest reserve document in soft copy; indicated that there may be village forest areas on customary land in the Project impact areas.	SMEC: C Mhango, P Geerdts Department of Fisheries: Jipate Munyenyembe, Lilongwe District Forestry Officer (DFO)

Date	Place	Discussion	Issues	Participants
		and Lilongwe District .		(Tel: 0999 792427)
	Fisheries Department Headquarters, Capital Hill, Lilongwe	Information on fisheries resources in Project (Diamphwe and Linthipe Rivers);	Department of Fisheries has not carried out any recent studies in Diamphwe; no data specific to Diamphwe; Diamphwe mostly has subsistence fisheries. Damming might have positive impact on fisheries resources. On negative impacts, concern would be maintaining environmental flows for Linthipe which flows to Lake Malawi. The endangered fish Mpasa is migratory and Linthipe is one of the major rivers that fish uses. Need to maintain flows during the dry season. and check how far it migrates and possible if any impacts.	SMEC: C Mhango Department of Fisheries: Mr Orton Kachinjika, Assistant Director of Fisheries
September				
04	LWB Office	Introductory meeting with SMEC Team Leader	Introduction of Team Leader, confirmation of programme and staffing; outstanding documentation and information; arrangement of site access and meeting.	SMEC, LWB
08	Makoka Village	A more formal site visit coincided with SMEC representatives attending a meeting with 55 villagers and members of the Lilongwe and Dedza Dam Project Committees (DPCs) at Makoka Village, together with representatives of the LWB, the NWDP, and the MoAIWD. Walked to dam site and surrounds	<p>The meeting was chaired by a Community Development Officer (representing the Ministry of Gender) of Lilongwe DC. Introductions were made and a synopsis of anticipated Project activities was given by the LWB, the NWDP and SMEC; after which villagers were provided the opportunity to raise any issues or concerns. Some issues raised included:</p> <ul style="list-style-type: none"> - Government commitment and timing of the Project - How compensation is to be calculated and government commitment to pay compensation - Where PAP would be located - Management of potentially affected graveyards - Previous consultants (WAPCOS) promised a community workshop to discuss how environmental and social studies would be undertaken - Use of local people to assist with site surveys <p>During this meeting the following was agreed on:</p> <ul style="list-style-type: none"> - SMEC would meet with leadership of the TAs potentially affected to inform them of SMEC's proposed work plan prior to starting fieldwork in their areas. - The following District meetings were agreed: <ul style="list-style-type: none"> 16/9/2015: Kaphuka TA, Dedza District 18 /9/2015: Chilikumwendo TA, Dedza District 20/9/2015: Mazingela TA, Lilongwe District 	<p>SMEC: L Palfreeman, P Geerdts, C Mhango, C Ghosh, J Mwalwanda and S Ulaya</p> <p>LWB: C Kachingwe</p> <p>NWDP: P Kutengule</p> <p>MoAIWD</p> <p>DPC and community members</p>

Date	Place	Discussion	Issues	Participants
			<p>22/9/2015: Kalumbu TA, Lilongwe District</p> <p>24/9/2015: Chadza TA, Lilongwe District</p> <p>- LWB would organise a workshop with the Lilongwe and Dedza DPCs on 14 September 2015 in fulfilment of a commitment promised by WAPCOS), for the Committees to obtain more detailed information on the Project.</p>	
14	Local Church Hall	Community workshop with DPC members and local leaders as an orientation to the Project - social and environmental aspects.	LWB gave an overview of the Project, followed by a presentation of the composition of the SMEC teams, and work planned for the social aspects (by P Geerds and J Mwalwanda) and the environmental aspects (by C Mhango). The Asset Surveyor, Patrick Mbundungu, was introduced to those present.	<p>SMEC: P Geerds, C Mhango, J Mwalwanda, P Mbundungu</p> <p>LWB: C Kachingwe</p> <p>DPCs: 27 members (5 women and 22 men), representing different villages from Lilongwe and Dedza Districts</p> <p>Dedza DC: two Community Development Assistants (CDAs) of the Gender Office</p>
16	Kaphuka TA residence	Introducing SMEC Teams and asking permission to work in the area.	SMEC teams were given permission to work in the area.	<p>SMEC: J Mwalwanda, P Mbundungu</p> <p>DPC members: Golden Chimzimu, Uladi Paulo, Kaphuka TA</p>
	Chilikumwendo TA residence	Introducing SMEC Teams and asking permission to work in the area.	SMEC teams were given permission to work in the area.	<p>SMEC: J Mwalwanda, P Mbundungu</p> <p>DPC member: Elisy, Chilikumwendo TA</p>
18	Kalumbu TA residence	Introducing SMEC Teams and asking permission to work in the area.	SMEC teams were given permission to work in the area.	<p>SMEC: J Mwalwanda, P Mbundungu</p> <p>DPC member: Davite Tsirizani, Kalumbu TA</p>
16-22	Villages in Kaphuka,	Ground-truthing exercise for villages,	Shared the aim of the study to respective village heads; collected GPS coordinates for villages in the study area, and for social structures e.g. graveyards, schools, markets.	SMEC: J Mwalwanda, P

Date	Place	Discussion	Issues	Participants
	Chilikumwendo, Chadza, Kalumbu and Mazengera TAs	social structures along Diamphwe River and within demarcated proposed Project study area.	Collected Village Development Committee (VDC) Development Plans. Recorded names of villages, and obtained estimates the number of households per village where available.	Mbundungu DPC members and Chiefs
18	Kaphuka TA Court, Linthipe, Dedza; Mazengera TA Headquart-ers, Lilongwe; Chilikumwendo TA Headquart-ers, Dedza	Informed TAs about the commencement of ecological and socio-economic studies; discussed possibility of some graveyards being inundated, asked TAs to consult with VHS on mitigation, compensation measures; notified them about an archaeologist and cultural expert coming to carry out studies; consulted on possibility of carrying out vegetation and animal surveys in graveyards	On issue of access to graveyards, TA Kaphuka indicated that he welcomed the Project together with a majority of people in his area; he mentioned that the issue of graveyards is not new - it has been discussed before since some graveyards are located very close to the river bank; he has to consult his VHS since graveyards are very important culturally due to the Gule Wamkulu cult; women are not allowed access to the graveyards unless they have been initiated; need to ensure that when gaining access it is through VHS so that cultural procedures are followed; he has to consult affected VHS on the inundation of the graveyards, and concerned families will make final decision. TA Mazengera indicated that the issue was not new; she will consult with her GVHS that are affected and will get back to SMEC. TA Chilikumwendo said that their culture is Ngoni thus they do not have Gule Wamkulu; chiefs should be consulted and notified in advance as it is not culturally right for people to gain access to graveyards without seeking consent from chiefs.	SMEC: C Mhango, C Mpanga LLWB: C Kachingwe TAs: Kaphuka, Mazengera, Chilikumwendo
21	Linthipe Extension Planning Area (EPA)	Collected village household numbers in Kaphuka TA under Linthipe EPA	Collected the number of villages in Kaphuka TA, under Linthipe EPA.	SMEC: J Mwalwanda, P Mbundungu Acting Agricultural Extension Development Co-ordinator (AEDC),

Date	Place	Discussion	Issues	Participants
21	LWB Office	Progress meeting with LWB	<p>WAPCOS: limited survey information/data, no information on pipeline.</p> <ul style="list-style-type: none"> - SMEC commenced geo-referencing surveys and programme for site surveys; enumerator training on Oct 12 - Cut-Off date to be managed by LWB - Overall Compensation budget estimates to be +/- 30%; no PAP sign-off - SMEC to consult with Chiefs before going into field; to use local villagers with survey teams - LWB suggest using Department of Antiquities for cultural/ graveyard survey - Other issues: need construction schedule, cannot survey during wet/ breeding season, need re-do all surveys, no 'float' in ESIA schedule if things are delayed. 	<p>Lucy Mwalughali Chiefs</p> <p>SMEC: L Palfreeman, Wongani Chisala, C Mhango</p> <p>LWB: Sinosi Maliano</p>
28	Msodoka Village, GVH Chinzili, Mazengera TA	2 Small Group Discussions (SGDs) - Groups 1 & 2	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	<p>SMEC: John Mwalwanda, Connex Makuya</p> <p>Villagers: Women group; VHs and elderly group</p>
29	Kuntamba Village, Makoko GVH, Kaphuka TA	2 Small Group Discussions (SGDs) - Groups 3 & 4	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	<p>SMEC: John Mwalwanda, Connex Makuya</p> <p>Villagers: Farmers, fishermen group; youth group</p>
30	Malenya Village, GVH Malenya, Kalumbu TA	2 Small Group Discussions (SGDs) - Groups 5 & 6	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	<p>SMEC: John Mwalwanda, Connex Makuya</p> <p>Villagers: Farmers group; VHs, traditional healers, gule wankule dancers group</p>
October				
01	Chinthakhw a Village,	2 Small Group Discussions (SGDs) -	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where	<p>SMEC: John Mwalwanda, Connex</p>

Date	Place	Discussion	Issues	Participants
	GVH Chinthakw a, Chadza TA	Groups 7 & 8	applicable.	Makuya Villagers: Religious group; VHs, elders, farmers, development agents, ADC members group
02	Kamwala Village, GVH Mbalira, Kaphuka TA	1 Small Group Discussion (SGD) - Group 9	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: John Mwalwanda, Connex Makuya Villagers: VHs, elders group
	Chinthakw a Village, TA Chilikumwe ndo	1 Small Group Discussion (SGD) - Group 10	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: John Mwalwanda, Connex Makuya Villagers:Elders, farmers group
06	Chingwenje Village, GVH Chingwenje, Kalumbu TA	2 Small Group Discussions (SGDs) - Group 11 & 12	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: John Mwalwanda, Connex Makuya Villagers: Youth group; elders, farmers group
	LWB office	Meeting to follow up LWB's review of SMEC's Review report (submitted 28/9/2015) and to discuss a number of other issues	SMEC highlighted issues on information requirements, and need to confirm length of raw water pipeline to be included in ESIA.	SMEC, LWB
07	Ntotho Village, GVH Ntotho, Kaphuka TA	2 Small Group Discussions (SGDs) - Group 13 & 14	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: J Mwalwanda, C Makuya Villagers: Women group; leaders, elders group
08	Kawelama	2 Small Group	Collection of views from villagers on the proposed Project; social and resource mapping;	SMEC: J Mwalwanda, C

Date	Place	Discussion	Issues	Participants
09	Village, GVH Kawelama, Kaphuka TA	Discussions (SGDs) - Group 15 & 16	potential positive and negative impacts and mitigation; potential places to relocate where applicable.	Makuya Villagers: Women group; chiefs elders, farmers group
	Kathukena Village, GVH Kathukena, Mazengera TA	2 Small Group Discussions (SGDs) - Group 17 & 18	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: J Mwalwanda, C Makuya Villagers: Farmers group; youth group
	Mkanda Village, GVH Mkanda, Mazengera TA	1 Small Group Discussion (SGD) - Group 19	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: J Mwalwanda, C Makuya Villagers: Men, women farmers group
	Chemboaga Village, GVH Chemboaga, Mazengera TA	1 Small Group Discussion (SGD) - Group 20	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: J Mwalwanda, C Makuya Villagers: Men, women farmers group
10	Chaponda Village, TA Mazengera	2 Small Group Discussions (SGDs) - Group 21 & 22	Collection of views from villagers on the proposed Project; social and resource mapping; potential positive and negative impacts and mitigation; potential places to relocate where applicable.	SMEC: J Mwalwanda, C Makuya Villagers: Men, women farmers group; youth group
13	LWB Office	SMEC Presentation to LWB, World Bank (WB) and International Finance Corporation (IFC)	SMEC presentation of key issues and Project risks. WB/IFC issues: graveyards, downstream water use, biodiversity, PAP.	SMEC, WB, IFC, LWB
14	Capital Hotel	SMEC Presentation to LWB, World Bank and IFC	SMEC presentation of key issues and project risks: - SMEC highlighted Project risks and initial survey findings. Noted that WAPCOS ESIA had significant gaps and PAP probably much larger - WB/IFC interested in maintaining Program schedule and delivery of ESIA/RAP by mid	SMEC, WB, IFC, LWB

Date	Place	Discussion	Issues	Participants
			December - SMEC confirmed was possible subject to Project risks.	
20	NWDP Office	Workshop on environmental and social issues and key Project risks	Focus on key issues. Confirmation that pipeline study stops at Bunda Turnoff.	SMEC, WB, LWB, NWDP
23	SMEC Office	Survey findings and consultation with villagers	Department of Antiquities (DoA) summarised survey findings, importance of graveyards as monuments and graves must be exhumed and relocated. DoA to meet with SMEC, WB and Client to discuss status of study and future work.	SMEC: L Palfreeman, W Chisala DoA: Chrissy Chiumia, Oris Malijani, Topeka Zakeyo
26	World Bank Office	Cultural survey and graveyard issues	Discussed cultural survey findings, graveyard issues and how to address in ESIA, ESMP and RAP.	SMEC, WB, DoA, LWB, NWDP
November				
02	WaterAid	Meeting to discuss Project and identify any issues important to WaterAid	WaterAid's main focus is to facilitate water supply to low income households. - Currently looking at Peri-Urban communities in Lilongwe - Very interested in Diamphwe Project and fully support initiatives to develop new water sources - Major issue is catchment management and maintaining water quality. In particular forest destruction due to charcoal production is of major concern. Mentioned catchment problems associated with Kamuzu Dam. Water Act includes catchment management requirements.	SMEC: L Palfreeman WaterAid: Mercy Masoo (tel. 0888 614650; Website www.wateraid.org.uk)
03	Dedza	LWB arranged meeting with Community representatives, MoAIWD, NWDP, and SMEC	- SMEC presented status of Census survey - General discussions regarding Cut-Off date and consultations with TAs - Strong support for the proposed Dam Project.	SMEC: L Palfreeman, P Geerds MoAIWD, Water Resources NWDP LWB District Commissioners (DCs), TAs
	Dedza	Meeting SMEC, LWB and NWDP	- SMEC: highlighted major Program risk associated with large numbers of PAP being identified. Estimate 5000 or more PAP. Noted that total of 9 enumerators and 2 surveyors	SMEC: L Palfreeman, P Geerds NWDP

Date	Place	Discussion	Issues	Participants
			<ul style="list-style-type: none"> - LWB noted that Water Resources is undertaking catchment management studies (Arecon). Will arrange visit to Kamuzu Dam - LWB will arrange meeting with TA and DoA re graveyards. 	LWB
04	Dam site	Health Specialist introduced to Lilongwe and Dedza DPCs by SMEC (J Mwalwanda)	Informal meeting with members of the DPCs to plan community consultation. The Dam site was visited to have an understanding of the Project.	SMEC: J Mwalwanda, Gloria Kunyenga (Health Specialist) DPCs: Lilongwe, Mackenzie Chilembwe and Tsilizani David; Dedza, Uladi Paulo
	Mdeza Health Centre	Health facility servicing the communities in the proposed Project area	Discussed with the medical person in charge about current health issues. Some anticipated challenges include: increased cases of malaria, bilharzia and diarrhoea due to stagnant water around dam site, malnutrition due to farming land shortages, respiratory diseases due to dust in the construction phase, STDs and HIV due to workers on the site. The Centre has only 12 staff members and thus a heavy workload; also shortage of drugs. Maternity cases are referred to Chitowe Health Centre. Would like Project to support Centre with better services, increase number of staff.	SMEC: G Kunyenga Mdeza Health Centre: Samuel Ridi, Medical Assistant
04	Concern Universal, Dedza office	NGO implementing projects in the proposed Project site	Studies are underway for the organisation to introduce a one-year project in the area that will focus on enhancing good governance, growth and accountability, health, food security and nutrition. The Project shall have no serious impact on the organisation's interventions; rather, it will provide additional benefits to communities through access to health services, in that it will have to consider additional services to address Project impacts. It is expected that the Project will take corporate social responsible role e.g. provision of new clinics, water points, development of trading centre for social activities.	SMEC: G Kunyenga Concern Universal Dedza office: Gift Munthali, Health Manager (Tel: 0997579173)
	District Environmental Health Office (EHO), Dedza	Responsibility for provision of health services in the District; perception of the Project; positive and negative impacts	Proposed Project will have many benefits as well as challenges to health/ wellbeing of the people around the Dam and relocated PAP. Need to consider proximity of the people to health services, provision of psycho-social support to affected households, sensitisation on disease prevention, accident prevention measures, water reusage in the city.	SMEC: G Kunyenga Dedza District Health Office: Mrs Elizabeth Chingayipe, Chief Preventive Health Officer (Tel: 0888364552 / 0994208130)
	Dedza District	Perception of the Project; positive and	Welcome the development, but DC is to be informed each step of the way about Project activities. Issues: timing of land acquisition, to coincide with harvesting; after land has been	SMEC: P Geerdts DC: Mr Gwedemula,

Date	Place	Discussion	Issues	Participants
04	Council (DC) Administration Office	negative impacts; mitigation measures	acquired, people to be advised how best to utilise/invest compensation payments e.g. savings scheme.	Director of Administrator (DOA) (tel: 0888 869494)
	Dedza DC, Gender, Child & Community Development Office	Perception of the Project; positive and negative impacts; any mitigation measures; potential involvement of the Office	Project is national, to benefit the nation rather than individuals, and out of the control of the District. Outlined improvements anticipated: electricity to neighbouring villages; road infrastructure; agricultural investment through irrigation projects; fish ponds as income-generating activity, and improved nutrition; employment/job opportunities; forestry development. Negative: governance issues, with some people losing positions; resettlement impacting on nutrition. Outlined Dept projects that could assist e.g. Food Utilisation and Dietary Diversification; Community Saving and Investment Promotion, and encouragement in income-generation activities; gender-based violence awareness training; literacy classes.	SMEC: P Geerds DC: Maria Goma, District Community Development Officer (DCDO) (tel. 0881 151662)
	Office for Kasusu Community Based Orphan Care Organisation (KACO), Dedza	Activities of the NGO; potential role in the Project	Target vulnerable groups i.e. women widows, orphan children, the elderly, people with disabilities; provide education/bursary support to orphans, and economic empowerment to parents/guardians; enhancement of early childhood development through supporting community-based child care; community population education programme; hygiene and sanitation; food security. Work with other NGOs (eg Concern Universal) and DC departments. Part of District NGO network.	SMEC: P Geerds KACO: Rev Gladstone Kachale (Tel: 0999 213 255)
05	Dedza DC, Social Welfare Office	Activities of the Department; potential involvement in the Project	Work of the Dept targets juvenile offenders, street children, orphans, children with AIDS, people with disabilities, and commercial sex workers. Also promotes girl-child education. Work with NGOs and the DC (e.g. CD and Youth Offices). Need to start sensitising communities on the implications of the dam project, particularly around HIV/AIDS, and the potential for commercial sex work.	SMEC: P Geerds DC: Mphatso Chisepa, Social Welfare Assistant (tel. 0881 7250820) and Selima Kasamalenji, Child Protection Worker (Tel: 0999 095042)
	Chinkhuti Village, Lilongwe DC	Health issues facing communities; perception of the Project; positive and negative impacts;	Community feels Project is good for the Government, not for them as their source of livelihood will be destroyed. The Government should consider provision of food, social amenities like clinics and schools, compensation packages, and enough land, to those families that will be relocated. Anticipate water shortage problems and inadequate land for farming, and thus increased malnutrition for relocated families. Project will improve	SMEC: G Kunyenga Community of Chinkhuti village (10 women, 22 men: one was a DPC member

Date	Place	Discussion	Issues	Participants
		mitigation measures	health services in community and better access to safe drinking water.	who organised the meeting)
	Kumkama Village, Lilongwe DC	Health issues facing communities; perception of the Project; positive and negative impacts; mitigation measures	Community feels the benefits of the Project include health services, employment opportunities, fishing and irrigation. They feel Project may bring problems of malnutrition due to inadequate farm land, psychological problems of being relocated, health challenges for most vulnerable groups like widows and child-headed families. However, the community is ready to relocate but the Government needs to give them enough information about this arrangement. As it is now, the information is not clear of what is expected of them as far as their health concerns are concerned.	SMEC: G Kunyenga Community of Kumkama village (7 women, 9 men; 2 DPC members)
05	World Vision (WV) Office, Dedza	Activities of the NGO; potential role in the Project	WV currently does not work in the Project area as they only work in one TA per DC; however, they can be approached to assist with service provision, and sign an agreement to undertake work. Current projects: water supply; health/M-Nech (Newborn and Child Health Care); education; food security; sponsorship. Work in partnership with the DC in the provision of services. However, encouragement of savings groups is different from the DC in that all the money is shared amongst members; for the COMSIP (Community Savings Investment Programme) of the CD Dept a certain % goes to develop the area through public works.	SMEC: P Geerds World Vision: Prisca Gauti, Development Facilitator, Health (Email: priscagauti@yahoo.com); Joseph Chelewani, Development Facilitator, Food Security (Tel: 0 888 694689)
	Dedza DC, Water Development Office	Perception of the Project; positive and negative impacts; mitigation measures; potential involvement of the Dept	Involved in rural water supply, in the provision of boreholes and shallow wells, and pumps. Mobilise communities to take ownership of the facility, training Water Point/Borehole committees to manage, maintain it themselves. Recommend that communities affected by the dam project benefit from the water, preferably through a piped water system, with tanks, water treatment works, distribution pipeline, taps provided by the government (through a mini Water Board); managed by a local committee, who would set up a fee system per household for water provision. The supply of replacement boreholes would be second choice. Ensure communities have proper training to manage whatever water system is set up. Recommends that all activities undertaken by consultants be with involvement of DEOs. No map of water provision in area.	SMEC: P Geerds DC: Charles Yatiwa, District Water Officer (DWO) (Tel: 0999 265 680)
	Office of the Catholic Development	Activities of the NGO; potential role in the Project	Relief and development arm of the Catholic Church; this office is involved with the Dedza Church district, which has the Diamphwe river as its boundary. Thematic areas: agriculture + food security, water + sanitation, environmental rehabilitation, income-generating activities + economic empowerment, health, education, human rights. Also provide	SMEC: P Geerds CADECOM; Patrick Namakhoma (Tel: 0122 3453; 0995 899411)

Date	Place	Discussion	Issues	Participants
	Commission in Malawi (CADECOM), Dedza		disaster relief e.g. in times of drought, floods. Work with other NGOs to co-ordinate activities, and with government offices. National office in Lilongwe, but work independently.	
05	Dedza DC, Animal Health and Livestock Development Office	Perception of the Project; positive and negative impacts; any mitigation measures; potential involvement of the Office	Offer veterinary services in district Extension Planning Areas (EPAs); the EPA serving Dedza District near the dam is Inthipe. Involved in: animal health, disease control; improved pasture establishment; animal feed and soil conservation; public health relating to animal food. Collaborate with DC sections, and with NGOs - although NGOs in the area come and go! Could assist with improvement of alternative pasture land, especially for the many dairy farmers in the area.	SMEC: P Geerds DC: Arnold Nthala, District Animal Health and Livestock Development Officer (DAHDO) (Tel: 0 999 171281); Moses Katseka, Assistant Veterinary Officer (AVO) (Tel: 0999 256 221)
	Office of the Rights Advice Centre (RAC), Dedza	Activities of the NGO; potential role in the Project	Offer paralegal service, but no service of private lawyers; can refer to Legal Aid in Lilongwe, but few lawyers available. Concerned with human rights issues, informing communities about new legislation, and awareness campaigns e.g. around human trafficking. For the project could offer mediation around disputes in compensation, advise the client to seek legal advice, or go to other government institutions to obtain support (e.g. the Office of the Ombudsman in Lilongwe).	SMEC: P Geerds RAC: Stanley Gome, Finance and Administration Officer (Tel: 0888 991444); James Njala, Paralegal
	Office of the Centre for Children Aid, Dedza	Activities of the NGO; potential role in the Project	Focus on youth, only in Dedza District. Youth empowerment in rural areas, working through youth clubs, CBOs, schools - through established structures to avoid duplication. Train in life skills, human rights, gender issues, HIV/AIDS, early pregnancy. Part of District Education Network and District CSO Network. Has little funding, few resources. Would be available to undertake a suitable project, if required, with planned ToR and budget.	SMEC: P Geerds Centre for Children Aid: Heston Nalikole, Executive Director (Tel: 0888 995660)
06	Dedza District Council (DC) Office	Perception of the Project; positive and negative impacts; any mitigation measures; potential involvement of the Office	Explained composition and ToR of DESC and how it relates to DEC; comprises Officers of various Offices; can invite specific NGOs that are implementing projects with environmental aspects. Only one EDO in Dedza District, responsible for: co-ordinating all environmental activities at district level; involved in the screening process of projects; supervise/ monitor environmental micro projects; implement ESMPs of LDF (Local Development Fund) projects; do environmental inspections of projects etc. If project needs a full EIA, it is referred to the national Environmental Affairs Dept; if full EIA is not required, ESMP is applied at District level. Already involved in Project, in choice of site, accompanying environmental team on site (WAPCOS?); falling under the District Planning	SMEC: P Geerds DC: Bruno Kamanga, Environmental District Officer (EDO), Secretariat for DESC, acting Monitoring and Evaluation Officer (Tel: 0999 656728)

Date	Place	Discussion	Issues	Participants
06	Dedza DC Office	Perception of the Project; positive and negative impacts; any mitigation measures; potential involvement of the Office	<p>Office (DPO) he is involved in all planning activities. When ESIA Report is finalised he will monitor whether EMPs are being adhered to during implementation.</p> <p>The Dam is 'multipurpose', including irrigation, supplying water through gravity-fed system of canals) to 1000 ha - 500 ha in Dedza and 500 ha in Lilongwe. All people losing agricultural land upstream of the dam to be reallocated land as part of the irrigation scheme; all to have the option of benefitting. Communities have agreed on this all with WAPCOS, and are expecting it. Recommend growing rice, beans, tomatoes, green maize as cash crops. Water distribution to be managed by Water User Associations, after provision of training. DC Office can supervise layout, construction etc of canals, and provide technical know-how/advice on cash crop production. Currently farmers are using small hand/petrol pumps, and treddle pumps; no large irrigation scheme in the area; usage is seasonal.</p>	<p>SMEC: P Geerds DC: Gift Moloko, District Irrigation Officer (DIO) (Tel: 0999 717675; 0888 063420)</p>
	Dedza DC Fisheries Office	Perception of the Project; positive and negative impacts; any mitigation measures; potential involvement of the Office	<p>1 DFO and 3 technicians (not based in Dedza). Co-ordinate all fisheries activities in the district. Work with fish farmers; some in Kaphuka TA who use fish ponds in the dhambos. High demand for fish from locals, so no need to look for markets in the towns elsewhere. Provide inputs to encourage fish ponds (e.g. wheelbarrows, shovels, pipes, outlets to construct the ponds), but no fingerlings. The Office can advise on placement of sites, on construction of ponds, how to stock with fish and farm etc., but have limited resources (transport) to monitor progress. Recommend fish farming for the project as it is a good business, using the dam and fish ponds. Farmers to form groups, working in co-operatives. With all interventions for the dam project need an overall/umbrella committee, with a subcommittee for fisheries.</p>	<p>SMEC: P Geerds DC: Ida Kandiuzi, District Fisheries Officer (DFO) (Tel: 0888 388601)</p>
09	Chitowo Health Centre	Health issues facing communities; perception of the Project; positive and negative impacts; any mitigation measures	<p>There is no medical assistant at the clinic making it difficult for people to access all important services, and too great a workload for staff. Project will bring electricity to the facility as they face problems without it. Relocation of families may result in overpopulation as not all will leave but rather intergrate into the nearest communities, resulting in communicable disease transmission and pressure on health services. The Government to consider extension of Chitowo Health Centre, and more HSAs to be deployed for health promotion in communities.</p>	<p>SMEC: G Kunyenga, N Lufesi (Assistant Health Specialist) Chitowo Health Centre: Felix Sandikonda, Nurse in charge/Midwife Technician</p>
	Diamphwe Health Centre	Health issues facing communities; perception of the Project; positive and negative impacts; any mitigation	<p>Facility faces medical supply problems as it caters for people from Dedza and Lilongwe, being located inbetween. Issues: low literacy level for most women, who thus do not practice family planning; high population puts pressure on limited resources at the facility; the Project will contribute to poor hygiene and sanitation problems due to limited land to construct latrines; malnutrition will increase due to land shortages for cultivation; promiscuity will increase leading to unwanted pregnancies and disease transmission such</p>	<p>SMEC: G Kunyenga, N Lufesi Diamphwe Health Centre: Henry Kuzemba, Medical Assistant; Samuel</p>

Date	Place	Discussion	Issues	Participants
		measures	as HIV; early marriages due to high illiteracy levels. The Government should consider expanding the Health Centre and improve in provision of supplies and outreach services etc.	Kapangani, Assistant EHO; Enos Sinoya, Laston Owen, Max Chaduka, HSAs (Tel: 0999 235002) (HSA = Health Surveillance Assistant in the Ministry of Health responsible for community surveillance and Health promotion activities)
10	Chidothi/Njiwa Villages	Health issues facing communities; perception of the Project; positive and negative impacts; mitigation measures	Communities feel there are positive and negative impacts of Project on health issues: there will be an improvement of livelihoods as selling of their farm products will not be a problem, providing money to feed families, leading to improved health; employment opportunities; improved income is equal to improved health. However, relocation may bring water, food and land shortages, and poor hygiene and sanitation/health. Isolation of ancestors will bring psychological torture. There will be marriage breakups and hence HIV transmission. Government should consider providing enough land for graveyard, farming and other social amenities.	SMEC: G Kunyenga, N Lufesi Chidothi and Njiwa villages; community members (12 men, 10 women of the 2 villages)
10	Kangong'o Village	Health issues facing communities; perception of the Project; positive and negative impacts; mitigation measures	Community is currently facing drug shortages in hospitals; Project will ensure availability of drugs. To improve health they depend on selling farm products; Project will help in market demand from construction workers, to earn a living and live a better life health-wise. There is no bridge to access services at Kamphata Health Centre, especially needed for pregnant women; Project will provide a bridge on Diaphmwe River. Each household has a pit latrine - no open defecation is practiced. Community expects to be relocated to a place where they can maintain this practice. Integration problems, either at relocated area or in same community, will bring insecurity problems, disease, accidents and possibly robbery.	SMEC: G Kunyenga, N Lufesi Kangong'o village; community members (12 men, 4 women)
11	Kamuzu Dams 1 and 2	Review catchment management measures, including social dimension	<ul style="list-style-type: none"> - Rehabilitation and 15 meter buffer area. Noted well established and successful tree planting within the 15 BZ - Onsite nursery supplying seedlings for dam areas as well as to the surrounding communities - Catchment management committee set up to manage catchment issues. Some funding to implement catchment projects 	SMEC: P Geerds, L Palfreeman, C Mpanga LWB: C Kachingwe

Date	Place	Discussion	Issues	Participants
12			<ul style="list-style-type: none"> - LWB hire local army personnel to patrol the catchment to prevent illegal tree clearing - LWB to provide Sedimentation Report - LWB Water Resources Contact for catchment management: Peter Kadewere, Principal Hydrologist in MoAIWD (Tel. 0888 893847). 	
	Kamphata Health Centre	Health issues facing communities; perception of the project; positive and negative impacts; any mitigation measures	Health Centre serves majority of PAP. Currently facing: infrastructure problems; services are increasing at the facility, but inadequate rooms - Project might consider extra provision; shortage of staff, considering the workload; most outreach services do not take place due to lack of transport; drug shortage is also a problem. More accidents and injuries will occur during Dam construction; early pregnancies, marriages plus disease transmission. Government should consider supporting Health Centres to carry out their work and provide necessary services to the community.	SMEC: G Kunyenga, N Lufesi Kamphata Health centre: Daniel Mtenje, Nurse/Midwife Technician
	National Smallholder Farmers Association of Malawi (NASFAM), Nthenje	Health issues facing communities; perception of the project; positive and negative impacts; any mitigation measures	NASFAM serves communities in the Dam area, in Lilongwe and Dedza, by promoting rural livelihoods. Services offered are extension activities, gender action learning, and promoting farming as a business. Currently promote crop production in the rainy season. With the Dam construction farmers will be displaced and have small plots to grow crops. Less food will worsen the situation of malnutrition. If integrated with irrigation farming the Dam will promote growing crops all year round, which will promote crop rotation and include vegetables such as tomatoes. NASFAM will promote crops by finding markets (targeting bigger shops in town). Drowning from swimming is a danger as it will take some time to learn how to use the water. Government should integrate climate change issues and prevention of water pollution. Employ locals for Dam construction so they benefit economically and health will improve.	SMEC: N Lufesi NASFAM: Elijah Longwe, Centre Manager (0999 119628)
	Kasina Health Centre	Health issues facing communities; perception of the Project; positive and negative impacts; any mitigation measures	Health Centre has a community development arm to help deal with child/adult malnutrition. Facility has organised different groups e.g. for women, men, chiefs (men/women separately), youth. Mixed opinions on what the Dam will bring. Some think it will provide an opportunity to sell land to displaced communities, as income for families; can grow vegetables/maize and catch fish to boost family nutrition - as they have been trained to do. For those on the lower side of the Dam, overflowing can put people at risk of diarrhoea and other waterborne diseases. Mixture of different cultures can lead to proliferation of different social diseases e.g. STIs, HIV, bilharzia.	SMEC: N Lufesi Kasina Health Centre: Sister Stella Ovuntamba - Team leader, Community Programmes (Tel: 0994 654381); Boniface Chawala, Extension Worker; 20 women village leaders that gather at Health Centre to discuss nutrition

Date	Place	Discussion	Issues	Participants
				project activities in their areas
			<p>Heath Centre aims to increase agriculture productivity and appropriate use of maize, soya beans, chickens and other small livestock. Facility has developed training for transformation in order to combat children/adult malnutrition. People around the Dam will get clean water if this has been considered, improving sanitation, hygiene. Since the area is close to the main road it has potential to turn into a small town and promote different businesses e.g. restaurants, rest houses; however, this can contribute to diseases (spread of food-borne diseases, STIs). People relocated may experience problems e.g. weather change, difficulty in construction of houses, starting new fields (elderly, children, widows). Security will be a problem as chiefs lose power. Government should ensure that human dignity is restored to PAP by ensuring that people are relocated in places with similar weather, culture. Water should first be provided to local communities, and then to Llongwe city.</p>	<p>SMEC: N Lufesi Kasina Health Centre: Sister Stella Ovuntamba, Team Leader, Community Programmes (Tel 0994 654381); Boniface Chawala, Extension Worker</p>
13	Makoko village	<p>Health issues facing communities; perception of the Project; positive and negative impacts; mitigation measures</p>	<p>Health benefits of the Dam will include employment, which will help families have food, fishing for protein, good water, electricity. Despite the benefits, most disease will increase e.g. malaria, schistosomiasis, HIV/AIDS and STIs. If relocated people choose to stay on, and with influx of others, sanitation will become a problem since there are few toilets in the community. Concern for drowning in the dam, especially children.</p>	<p>SMEC: N Lufesi Dedza DPC (8 members): Uladi Paulo (vice secretary (Tel. 0994 811643) Group Mbwadzuwa; Raphael Foloko; Samson Fanizo; Rodrick Jeremiah; GVH Makoko; GVH Chaponda</p>
	Lilongwe DPC	<p>Health issues facing communities; perception of the project; positive and negative impacts; any mitigation measures</p>	<p>Project will bring: clean water closer to communities, fishing, employment; will stop need for women to walk long distances for water. Diarrhoea will decrease as people stop drinking water from wells/river. May have population increase if unmarried women/teenagers are promiscuous with people constructing the Dam. Those close to the Dam, increased episodes of malaria as water may become breeding place for mosquitoes. At time of dam construction sanitation will be compromised as people move into area seeking employment; families will be disturbed if women indulge in sexual relationships with those from other areas, leading to transmission of STIs, HIV/AIDS, and congestions at health centres, which currently do not have enough health workers, drugs and space. Water</p>	<p>SMEC: N Lufesi DPC Lilongwe (8 members): Mackenzie Chilembwe (Chair) (Tel: 0999 434373); VH Felemu (Vice Chair); Tsilizani Daniel (Secretary); Bester Lundu (Treasurer); Eric</p>

Date	Place	Discussion	Issues	Participants
13	Lilongwe DC District Environmental Health Office (DEHO)	Health issues facing communities; perception of the Project; positive and negative impacts; mitigation measures	<p>pollution and toxicity may result if catchment areas are not well controlled. Government to include programmes to improve water quality, and consider relocating people in areas with similar weather patterns.</p> <p>Dam will bring reliable water source for people in the area; food security will improve through irrigation farming, reducing diseases (e.g. diarrhoea), malnutrition. Fish will provide source of protein. Possible increase in malaria, schistosomiasis, accident related diseases, HIV and STI transmission, teenage pregnancies. People relocated may face challenges with weather, malnutrition if relocated to unfertile soils. Women, children, elderly may have problems with construction of houses, starting new farms. Health centres already experience challenges e.g. drug shortages, inadequate human resources. Government to consider involving DHO in planning process of Dam; District to design programmes to help in dealing with increased number of diseases; also ensure that water is used by communities to avoid sabotage (through cutting pipes - citing example of Mpira Dam in Ntcheu where the town was without water for several days). DoH and Water should check water quality regularly; sensitise community on water use and possible risks of the Dam. Government to consider upgrading one health centre in the area, especially Diamphwe, and equip it with enough staff, medicines, an ambulance, and an emergency room.</p>	<p>Timothy; Robert Victor; Nsonga Laimu; Chikondano Jaziyele</p> <p>SMEC: N Lufesi Lilongwe District DEHO: Paul Chunga, District EHO (Tel: 0999 793186); Grenville Kachisi, Assistant District EHO (Tel: 0888 790709)</p>
	Lilongwe DC Planning and Development Office (PDO)	Perception of Project; positive, negative impacts; mitigation measures; potential involvement	Aware of the Project; concerned that people losing the land will not benefit from irrigation, fishing and social services; should be encouraged to buy land in areas where they can take advantage of Project benefits, use the water. Provided names and contacts of District Officers.	SMEC: P Geerdts DC: Peter Jimusole, Director of Planning and Development (DPD) (Tel: 0888 641596)
	Lilongwe DC Community Development Office (CD)	Perception of the project; positive and negative impacts; mitigation measures; potential involvement of the Office	Sending a team out to monitor SMEC's survey activities in the field. CD Assistants (CDAs), as the frontline staff, have asked what they can do for the Project. Involvement: capacity building programmes; community entry; mobilise communities to understand Project activities (change mindset to 'ownership'); Economic Activities Programmed, encouraging savings with compensation payments; adult literacy; sensitise around gender issues, to increase participation of women in decision-making processes.	SMEC: P Geerdts DC: Annie Kamwendo, District Community Development Officer (DCDO) (Tel: 0888 350197)
17	Mapiri Lodge, Dedza	Activities of NGO; potential role in the Project	Church and Society is part of CCAP (Church of Central Africa Presbyterian), with Head Office in Nkhoma. They are downstream of the Project area, using water from the Linthipe River, so concerned about less available water. Diamphwe water should be pumped to	SMEC: P Geerdts Church and Society: Simon Mvula, CCAP

Date	Place	Discussion	Issues	Participants
			<p>Dedza town as Dedza has water problems, mainly created by increasing deforestation. Operate in Project area, with relief and development services: relief during natural disaster, devastation; development through digging shallow wells, constructing houses for the needy, assisting in establishing and supporting schools, etc. People from the Project area use CCAPs Nkhoma hospital. Nkhoma University offers courses in education, nursing, theology.</p> <p>Process of preserving physical and cultural resources affected by the Project, as part of the Projects ESIA. Presentations on: situation analysis (LWB); overview of the Project (Water Resources Department); environmental/social status (SMEC); survey findings of the physical cultural resources (DoA); roles, expectations of CSOs (Lilongwe District Commissioner). CSOs responded: implementers to take into consideration governance issues; legal framework is required to back up the investment; request a visit to Project area; CSOs will sensitise communities around Project; have the capacity to monitor and evaluate; to be included in all consultation meetings around graves. Agreed to consider exhuming graves; Chiefs to consult with communities, and look at sites for graveyards;</p>	<p>Church elder (Tel: 0999 281997 / 0888 523603)</p>
	Mapiri Lodge, Dedza	Meeting with Civil Society Organisations (CSOs) to update them on Project developments/status, and sensitise them on graveyards and other physical cultural resources		<p>SMEC: L Palfreeman, P Geerdts, W Chisala MoAIWD: P Kaluwa (Deputy Director, Water Resources); J Kumwenda (Deputy Director, Water Supply Services) NWD: Z Kasomekera (Programme Manager, LWP); P Kutengule (Environmental Social Safeguards Specialist) LWB: C Kachingwe (Water Quality Manager) DoA: A Topella (Archaeologist), O Molajani (Geoarchaeologist) DCs: C Makanga (Lilongwe DC), J Kanyangalazi (Dedza DC) CSOs: CCJP, CCAP, NICE, WRE, PRO LWB</p>
18	Panjira Lodge,	DoA presentation on findings around	Graveyards are key assets identified in the area, used for two reasons: Dambwe and Burial places. Discussion on way forward around graveyards. Agreement as to how to proceed:	<p>SMEC: J Mwalwanda DoA</p>

Date	Place	Discussion	Issues	Participants
	Dedza	cultural heritage, and particularly graveyards; legal process around interment of graves	Chiefs to go back to respective communities to discuss options, and meet again to continue planning way forward based on their particular villages.	MoAIWD: Director Water Resources NWD: Programme Manager, PMU LWB: Safeguards Officer Lilongwe, Dedza DC: DCs, Councillors, CSOs, MPs, Chiefs, reporters
19	Dedza DC Agriculture Office	Perception of the Project; positive and negative impacts; any mitigation measures; potential involvement of the Office	Agriculture: Involvement in Project has been through facilitating meetings with local leaders (TA) and DOs to date.g. in Salima (2013); positive results after mobilising communities, who had fears about the project. As part of the Department: Land Resources Conservation Office can take soil samples, but analysis at national (not District) level, and LRCO officer can be involved in conservation measures required to prevent siltation of the dam; Irrigation Officer to advise on irrigation system; Extension and Crop Officers to advise on crops to grow, and agricultural methods. Provide value of crops/trees through national office. Land: Office will assist in resolving issues over land, and reallocation of land with all stakeholders; can work with valuation under the Department of Valuation. Housing: involved in waste management infrastructure and house design (building regulations). Waste infrastructure cannot be less than 50m away from the water source. Encourage compensation that covers building houses of higher quality than what exists.	SMEC: P Geerds DC: Owen Kumwenda, District Agriculture Development Officer (DADO) (Tel:0999 409606); Moffat Nkhoma, District Land Officer (DLO) (Tel: 0999 472383); Chrispin B Naphiyo, District Housing Officer (DHO) (Tel: 0999 474651 / 0888 770338)
	Dedza Catholic Commission for Justice and Peace (CCJP) office	Activities of the NGO; potential role in the project	As social advocacy arm of the Catholic Church, JP is involved in thematic areas of: Human Rights, Good Governance, Rule of Law, Gender, HIV/AIDS, Climate Change and voter education. Work with chiefs, VDCs, ADCs, opinion leaders. Have volunteers at community level; given basic training in human rights, and as paralegals. CCJP can give communities info about the Project, working with other CSOs e.g. use the medium of posters, leaflets, open day, their community radio. As Chair of Dedza CSO Network Committee, outlined the structure, and it's objectives.	SMEC: P Geerds CCJP: Lawrence Puliti, CCJP Co-ordinator (Tel: 0999 206909)
19	Dedza National Initiative for Civic Education	Activities of the NGO; potential role in the project	NICE covers whole district, with involvement in good governance, human rights, capacity building in leadership skills (e.g. on roles, responsibilities of GVHs and VHs, writing of district and village level Development Plans). For Project, volunteers at community level can sensitise PAP, communities and their leadership around their contribution to the Project. Head office is in Lilongwe: contact is Christopher Naphiyo (RCEO) (Tel. 09999917294	SMEC: P Geerds NICE: Jean Bulirani, Assistant District Civic Education Officer (ADCEO) (Tel. +265 992

Date	Place	Discussion	Issues	Participants
	(NICE) office		/ 0888349396).	884426)
23	LWB Water Quality and Environmental Management Division office	Project institutional base	Institutional make-up, and roles and responsibilities of LWB in relation to MoAIWD and NWDP as relating to the Project. Capacity within LWB for environmental/social activities; catchment management, with an example of involvement in Kamuze Dams I and II; grievance mechanism.	SMEC: P Geerds LWB: C Kachingwe, Safeguards Officer (Tel: 0888 364967)
	District Forestry Office (DFO), Lilongwe	Information on Village Forest Areas (VFAs); capacity of DFO Lilongwe in implementation of the ESMP; data; contacts of Forestry Staff in Project area; NGOs working in forestry in the area	Received electronic copy of VFAs in Lilongwe District and Project Impact Area. Forestry works with the following NGOs: World Vision (regeneration of Chilenje Hill); NASFAM, Inter Aid, Plan Malawi in reforestation programmes; field staff working with LWB in rehabilitation of Kamuzu Dam BZ. On measures to mitigate impacts on vegetation and endangered species, there are currently plans to restock Dzalanyama with wildlife in collaboration with Department of National Parks and Wildlife (DNPW).	SMEC: C Mhango Department of Forestry: Mr Jipate Munyenyenbe, DFO, Lilongwe (Tel: 0999792427)
	Department of National Parks and Wildlife (DNPW) Headquarters, Lilongwe	Information on wildlife known to exist in Project area and Dzalanyama Forest; documentation, including studies on crocodiles in Diamphwe River; impacts and proposed mitigation	Received electronic copy of report on animals that currently exist in the Project Impact Area; large mammals that may exist in the area, including types of otters; no known studies on crocodiles in Diamphwe and no crocodile hunting licences issued for Diamphwe; no reports on crocodile attacks or deaths to DNPW; for crocodiles there will be a habitat created, so positive impact; some wildlife seeking refugee in graveyards may lose habitats.	SMEC: C Mhango DNPW: Mr Manda, Deputy Director, Research and Development; Mr Mgoola, Assistant Director Research and Development, Lilongwe (Tel: 0888353993 / 0993189350)
27	NWDP Office	Project institutional base	Status of the Project; structure, roles and responsibilities of NWDP, in relation to the MoAIWD and the LWB; capacity within the LWDP to fulfil required/recommended functions e.g. grievance redress, GIS. On land for resettlement, NWDP/LWB to organise a meeting with DCs and TAs around land availability and potential relocation sites; views of	SMEC: P Geerds NWDP: Prisca Kutengule, Environmental Social

Date	Place	Discussion	Issues	Participants
			PAP to be taken into consideration on where they would like to resettle.	Safeguards/Community Development Specialist (Tel: 0999 225472)
December				
02	Panjira Lodge, Dedza	Chiefs presented feedback after consultation with their respective subjects on the potential transfer of affected graveyards, and cultural procedures on how to transfer such graveyards	NWDP Environmental and Social Safeguards Specialist made presentation on World Bank OP 4.11: Physical Cultural Resources, and reiterated requirement for Physical Cultural Resources Management Plan (to be done by DoA). DoA made presentation on findings. Chiefs from across the Project potentially affected areas reported that people have accepted that graves to be affected can be exhumed/reburied as long as culturally accepted procedures are followed. Chiefs will help in identifying required alternative burial sites for exhumed remains; to be agreed with affected villagers and PAP. Need for sensitisation of relevant stakeholders e.g. CSOs, MPs, Councillors (DCs to identify).	SMEC: J Mwalwanda MoAIWD: Director Water Resources NWDP: Programme Manager, PMU; p Kutengule, Safeguards Specialist LWB: C Kachingwe, Safeguards Officer DoA: Director Lilongwe, Dedza DC: District Commissioners, Councillors, CSOs, MPs, Chiefs, reporters
21 Oct 2015 - 20 Jan 2016	Reservoir area	Census, socio-economic and asset surveys - DPC members and chiefs of villages where surveys have been undertaken	Administered 4,388 census surveys and 473 socio-economic surveys, and 45,169 asset surveys for Diamphwe Reservoir.	SMEC: J Mwalwanda, 2 surveyors, 9 Enumerators Chiefs, DPC members PAP

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 1 Report

28 September 2015

1. Village Names:
 - o Mtenthamawa,
 - o Msonga
 - o Mtsilizika
 - o Kumkama
 - o Kalumbi
 - o Chimbowa
 - o Msodoka
 - o Kamakhala
2. Facilitator: John Mwalwanda
3. Notetaker: Connex Makuya
4. Interest group: Leaders

Social Mapping

The Small Group Discussion (SGD) took place at Group Village Headman Chinzili of Mazengera T.A. in Lilongwe District. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households per village (increasing):

Village name	Number of households
Mtenthamawa	52
Msonga	46
Mtsilizika	98
Kumkama	48
Kalumbi	25
Msodoka	75
Chimbowa	30
Kamakhala	45

It was indicated that the area is inhabited by the Chewas.

There are a number of religious groups, including: Church of Central African Presbyterian (CCAP), African Isaac, African Abraham and Baptist Church.

In the area, communities use water from one shallow well and two boreholes. The shallow well serves Mtsilizika and Kalumbi villages. Both boreholes serve the villages of Msonga, Kamakhala, Chimbowa, Mtenthamawa, Msodoka and Kumkama. There is water all year round at these water sources.

The community has one under-five clinic at Mwango, and several traditional herbalists.

The community has a primary school at Mwango. They use the school ground for meetings, football and netball. Swimming, fishing and laundry are done at and on the Diamphwe River.

There is a court at each village head headquarters. Courts are heard based on the level of crime. There are three levels: Village head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big dance (gulewamkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos and on agricultural land during the dry season. The livestock is fed along the Diamphwe River and around Maye Hill. The feed is usually abundant during the rainy season, from November to March, although this is the time that livestock are tethered to protect them from eating crops, and are therefore usually lean, unlike from March to October when they are plump.

Resource Mapping

The following natural resources were reported to be found in abundance: water and rocks, in that order of ranking.

The community indicated that everyone has equal access to land, and that includes women, whether married or not, and the poor. In the past, the chiefs allocated land to families in the area. The head of the family is now allocating this land - to family members.

Usually women collect water from a shallow well and the two boreholes in the area, and the Diamphwe River.

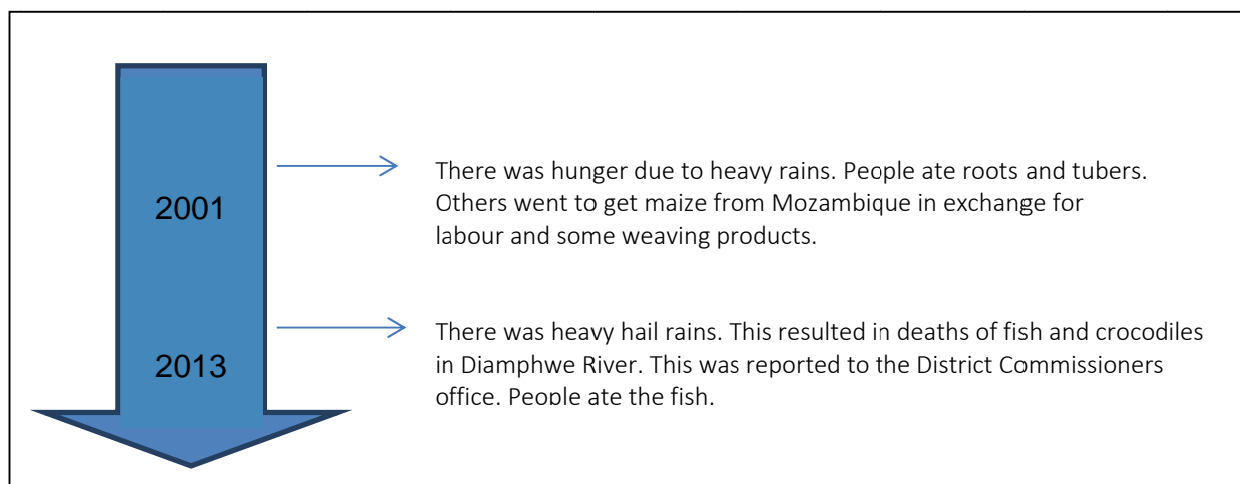
Trees were reported as a scarce resource therefore firewood is too. Most firewood is collected by women, from Mwangu, Maye and Kaphwiti hills.

Livestock is taken to the hills, and along the dambos close to the Diamphwe River.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. The community has been involved in tree nurseries and tree planting. They also have been involved in road construction and maintenance.

Historical Mapping Timeline

The group came up with events that have happened in the community and its part of their history in the area. This is depicted in the time line below.



Seasonal calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													The boreholes and Diamphwe River have water all year. Shallow wells dry up in dry season.
Livestock Forage availability													Livestock have more forage in rainy season though not accessible due to tethering.
Credit availability													
Non-Agricultural activities													
Season for additional activities													

Generally the participants linked the activities on the calendar, for instance food availability and rainfall, livestock forage to health status of the goats, income and expenditure to the rainy season.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in order of importance: irrigation farming, source of drinking water, fishing, employment at project site and access to electricity.

Economically active individuals will benefit from the development as they can engage in these activities and access electricity into their houses.

Project Negative Impact and Mitigation Measures

The participants ranked the negative impacts in order of significance as follows:

- Loss of land for farming and housing; must be compensated and resettled close to current area. Should be enough land to continue economic activity as before resettlement. Resettled land should be identified through consultation with community and a general consensus should be reached and agreed upon.
- Floods into graveyards; chief must be compensated; government should exhume remains (content) and rebury at new resettlement land. Chewas require funding for the cultural value they have on guluwamkulu

- Loss of dambo land for grazing livestock; compensation
- Increased amount of crocodiles in Diamphwe River; a fence should be erected to protect community.

The group emphasised that they would like to get resettled near the project area. This will help them access all the perceived benefits as a result of the construction of the dam.

The group identified the aged, female-headed households and orphans as vulnerable groups. The aged do not have the energy to actively participate in agricultural activities, which is the source of livelihood. The female-headed households and orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

W

STG

SGBS

WOMEN

MSOBOKA VGE

TA MAZENBARRA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 28/9/15

AVH
ETHN21L1

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOHN MUTHUNGA	RESEARCHER SPECIALIST	SMET	muthun@wanda 1981@gmail.com	0993514578	[Signature]
Stella Biko	Nankungu	msonga			S. Biko
Eneiet Chitenge	II	Kunkumba			E. Chitenge
Jenga Kalumbi	Mrs Chiz	Kalumbi		0997614604	J. Kalumbi
Catherine Mager	Mrs Ngizwaa	Chimbora			C. Mager
Genesis Pithisi	Wamukulu wa mukazi	mpizika			G. Pithisi
mele mager	member	Kalumbi			

886 women, msodoka visit

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:





NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Kalosa Kalumbi	Chief's mother village	Kankama			K. Kalumbi
Fikiesi Chitachwe	member	Kalumbi			F. Chitachwe
Adesi Cosmas	village member	mtanzike			A. Cosmas
Alena Fonias	Nankungosi	mtenthemwa			A. Fonias
Mtida Nepuleni	Nankungosi	Kamakwala			M. Nepuleni
Mzalusi yira Zuman	Chief's mother	msodoka			M. Zuman
Christina Eliyoti	village member	msodoka			C. Eliyoti

Sat morning, msdawa vto

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Chukendano Jazene	committee member	msdawa		0884526970	
Nepigala Eliot	Chair YDC	Chamda		0996320210	
Innocent Mawo	DRIVER	SMEC	Imajo78@gmail.com	0999 581 229	
Bemex Makya		SMEC		0996 244218	

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 2 Report

28 September 2015

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 - o Msonga
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 - o Msodoka
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2. Facilitator: John Mwalwanda
3. Note taker: Connex Makuya
4. Interest group: Women

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The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos and on agricultural land during the dry season. The livestock is fed along the Diamphwe River and around Maye Hill. The feed is usually abundant during the rainy season, from November to March, although this is the time that livestock are tethered to protect them from eating crops, and are thus usually lean, unlike from March to October when they are plump.

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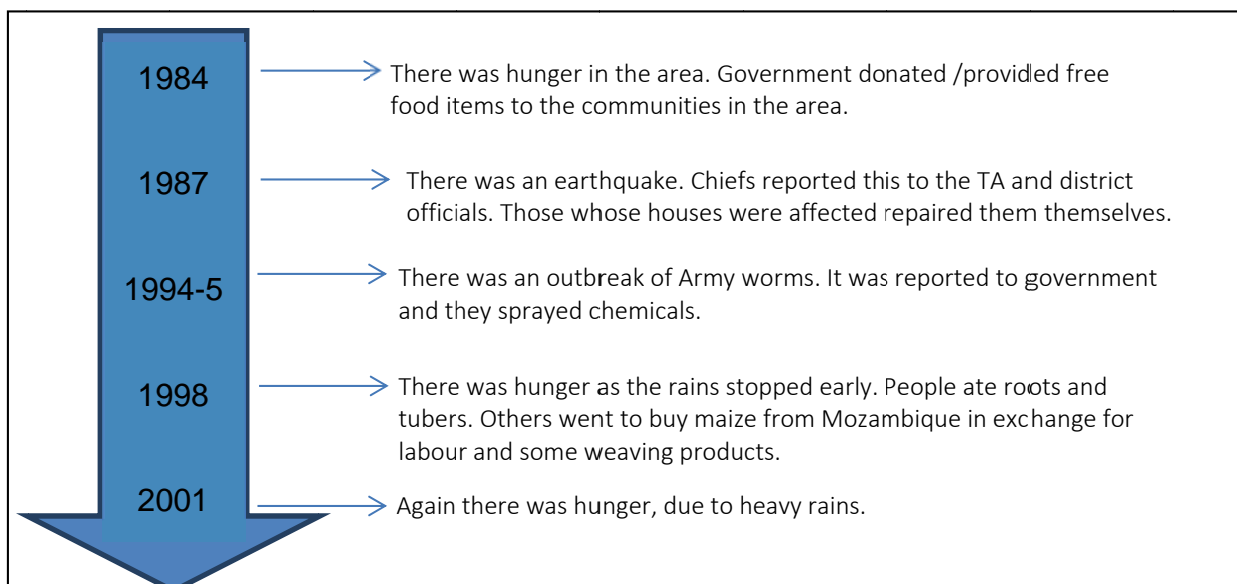
Firewood was reported to be a very scarce resource. Most is collected, by women, from Mwangu, Maye and Kaphwiti hills.

Livestock is taken to the hills, and along the dambos close to the Diamphwe River.

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Busiest month													
Food lean period													Look for piece work (ganyu)
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													Realise proceeds from agricultural produce
Non-Agricultural activities													
Season for additional activities													
Holidays													No holidays. Take Sunday as a holiday

Generally the participants linked the activities on the calendar, for instance food availability and rainfall, livestock forage to health status of the goats, income and expenditure to the rainy season.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in order of importance: irrigation farming, fishing and an opportunity for small scale business development.

Economically active individuals will benefit from the development as they can engage in these activities.

Project Negative Impact and Mitigation Measures

The participants ranked the negative impacts in order of significance as follows:

- Loss of land for farming and housing/residence, and grazing; they have to be compensated, and be resettled close to their current area – where the land is enough to carry on their economic activities as they are doing now, prior to the resettlement.
- Loss of a graveyard; their chief has to be compensated, and government will decide on what to do.
- Cost of shifting and resettlement; since they are Chewas, there will be a need to help them fund the cultural value they have on Gulewamkulu before resettlement.
- Acceptance in the resettled area; as a community, if they move to some place there is concern that they will face resistance at the new site; they would like to be resettled in one area.




The group would like to get resettled near the project area. This will help them access all the perceived benefits as a result of the construction of the dam.

The group identified the aged and orphans as vulnerable groups. The aged do not have the energy to actively participate in agricultural activities, which is the source of livelihood. The orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

STDS Village Heads / EARLY on 2014 VHS
ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOHAN MUTHUNATHA	REPRESENTATIVE 8 PERCENTS	SMEC	mw	0993514876	
INNOCENT MAUTO	DRIVER	SMEC	1mauto78@gmail.com	0999 581 229	
Lennox Makoza		SMEC		0996 24428	
V.H. Chimbowa	Village Head	Chimbowa	—	0995386100	STK.
V.H. Kumkama	Village Head	Kumkama	—	—	Relisoni
Xhane Dalava		Mthamau	—	0	.Y.D
Guzani Fonjasi	Village Head	Mthamau	—	0996 328 340	BT




ST
CHN 2014

JEK Village Head / Easay Masoduka VHO

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Bester Lunde	MSUNGA	Kunkwena	—	09946257758	
Eric Timothy	Committee member	MTSHIZIKA	—	0888086350	
Kumbwela Million	Village member	Kamakhala	—	—	Kumbwela
Mabvuts Chasalino	Village Head	Msdoka	—	—	mc
Isaki Jeki	Village Head	Msilizika	—	—	Is
Maxwell Lamoni	Village Head	Kamakhala	—	0995 399 329	maxwell
Jackson Penda	Group Village H	SVH	—	099546298	

M SAKA VIB

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Mikioni Galaton	Village Head	Kalumbi	—	0998722887	MG
Naliveti Mhimwandege	Village Head	Msonga	—	—	MM

Small Group Discussion 3 Report

Date: 29th September, 2015

1. Village(s) Name:
 - o Chayimedi
 - o Potolani
 - o Kuntamba
 - o Sitalichi
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Farmers, fishermen

Social Mapping:

The SGD took place at **Kuntamba** Village Head. The members present drew a map on flipchart paper on which their villages were located, and their proximity to social structures and institutions.

The estimated number of households has been increasing.

It was indicated that the area is inhabited by the Chewas.

There are a number of religious groups, including: Church of Central African Presbyterian (CCAP), African Isaac and Roman Catholic.

In the area, all four villages use water from a borehole at Chayimedi Village. The borehole, along with Diamphwe River, provides water all year round.

They use grounds located on dambo land at Chayimedi and Kuntamba villages for meetings, football and netball. Swimming, fishing and laundry are done at and on the Diamphwe River.

There is a court at each village head headquarters. Courts are heard based on the level of crime. There are three level; those at Village head, Group Village Head and those that are referred to the national judicial system through the police.

It is at these local judicial courts where Big dance (gulewamkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos and along the Diamphwe River during rainy season, and on agricultural land during the dry season. The feed is usually abundant during the rainy season, from November to March, although this is the time that livestock are tethered to protect them from eating crops, and are thus usually lean, unlike from March to October when they are plump.

Resource Mapping

The following natural resources were reported to be found in abundance: bananas, guavas, paw-paws, in that order of ranking.

Scarce resources include: land, livestock, mangoes and oranges.

The community indicated that everyone has equal access to land, and that includes women (both married and unmarried) and the poor. The chiefs allocate land to the families in the area.

Usually women collect water from Diamphwe River and the borehole in the area.

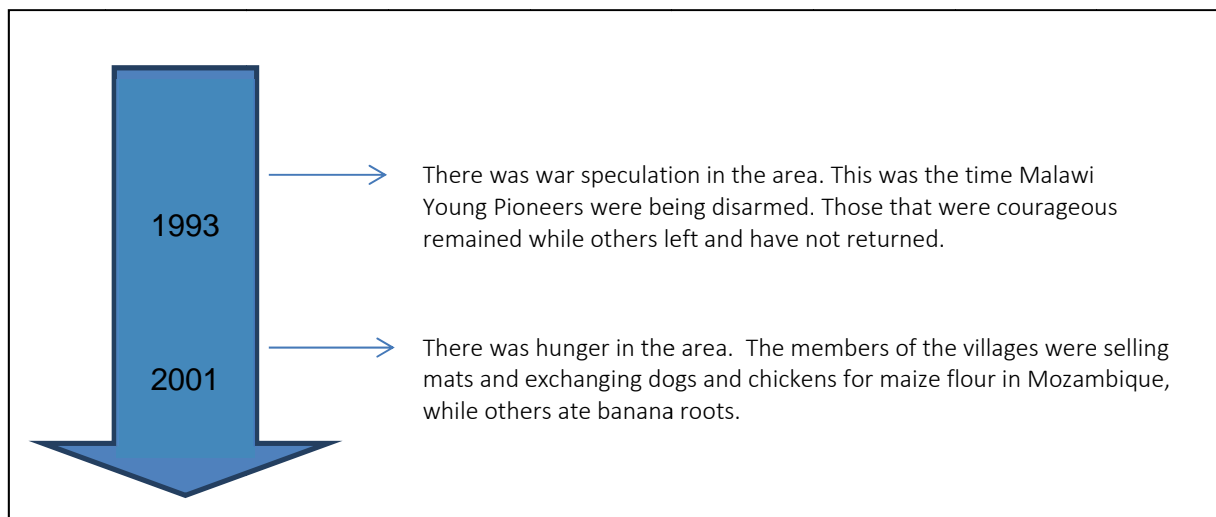
The women also collect firewood along the Diamphwe river and community woodlots.

Livestock graze on dambos along the Diamphwe River during the rainy season, and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility.

Historical Mapping

The group came up with events that have happened in the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													The boreholes and Diamphwe River have water all year. Shallow wells dry up in dry season.
Livestock Forage availability													Livestock have more forage in rainy season though not accessible due to tethering.
Credit availability													
Non-Agricultural activities													
Season for additional activities													

Generally the participants linked the activities on the calendar, for instance food availability and rainfall, cultural activities to income generation (Gulewamkulu active during financial prosperity), livestock forage to health status of the goats.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in order of importance: employment, irrigation farming, increased food security and fishing opportunities.

The group identified that active individuals benefit from the development as they can be engaged in the activities (such as: irrigation and working at the project site).

Project Negative Impact and Mitigation Measures

The participants ranked the negative impacts in order of significance as follows:

- Loss of land for farming, housing and grazing; they have to be compensated, and be resettled. The land has to be enough for housing and agricultural activities.
- Loss of a graveyard; their chief has to be compensated, and government will decide what to do.
- The community felt that there would be an infringement on their human rights; as a result, the community should be resettled on government-owned land where there are no chiefs. Government should be involved in public sensitisation in the new area.
- There is fear of flooding as a result of the dam; it was indicated that there should be relief items and donations.
- There is fear of community dispersion (members of the community will be scattered); as a result there should be enough land for every member in the community to resettle.
- Firewood scarcity (as a result of the removal of trees); it is indicated that there should be programs to promote tree planting for the community.
- Lack of cleaning water; which should be mitigated through provision of boreholes.
- No fishing; which should continue if regulated by government.

The group emphasised that they would like to get resettled near their current settlement. This will help them to access all the perceived benefits as a result of the construction of the dam.



The group identified the aged and female-headed families as vulnerable groups, in order. The aged do not have the energy to actively participate in agricultural activities, which is the source of livelihood. The female-headed households require assistance from relatives and/or the community, which many not have the resources to provide for them.

SADS KUN TAMBUT VITE FARWELLS after 40 years

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOYTO MATHANWA	Research Assistant	SMEC		0993514874	
INNOCENT MUTO	DRIVER	SMEC	imuto18@gmail.com	0999 581 229	
PITINZANI CHAGWA	Fisherman	Chaimedi		0999 469 093	P. Chagwa
Peter James	Fisherman	Chaimedi			Peter James
Landirani Mtengaboda	Farmer	Chaimedi		0999 225 594	Landirani Mtengaboda
Alli Kamwaza	Farmer	Sitalichi			Ali Kamwaza
Kambani Notisi	Farmer	Chaimedi			Kambani Notisi

Kumtamba Kambura & Phizambura

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Robert Moyo	Fisherman	Sitalishi	—	0992 263 801	Ramabha
Cecilia Kamwaza	Farmer	Sitalishi	—	—	ce
Alice Ziyaya	Farmer	Kuntamba	—	—	no
Emilia Phiri	Farmer	Chaimedi	—	—	EP
Rodesi Mbulu	Farmer	Chaimedi	—	—	Rmbura
Panesi Ganizani	Farmer	Chaimedi	—	—	FG
Hendina Nkhondo	Farmer	Chaimedi	—	—	HENDINA

Kun Tambe Farmers' & Fishermen

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Lamewano Ali	Farmer Kuntamba	Kuntamba	—	—	
Alice Gombega	Farmer	Chaimedi	—	—	Alice
Mares Miki	Farmer	Sitalichi	—	—	
Beatrice Chasesa	Farmer	Sitalichi	—	—	
Alinafe Kalembeui	Farmer	Kuntamba	—	0999 570 581	Alinafe
Elifa Foloko	Farmer	Kuntamba	—	—	ET
Kanex Makuya		SMEC		099624428	

[Handwritten signature]

KUNITAMBA Farmers & Farmwomen

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Eniya Gideon	Farmer	Chaimedi	—	—	Eniya Gideon
Magdalena Landiani	Farmer	Chaimedi	—	—	Magdalena Landiani
Benedetta Malixesi	Farmer	Chaimedi	—	—	Benedetta
Namaka Kaphezi	Farmer	Kuntamba	—	—	—
Mullisani Benjamen	Farmer	Chaimedi	—	0997 185 005 150 05	Mullisani
Winkson Kashezi	Farmer	Kuntamba	—	0999 510 581	Winkson Kashezi
Greta Chumbale	Farmer	Kuntamba	—	—	—

1. Village(s) Name:
 - o Chayimedi
 - o Potolani
 - o Kuntamba
 - o Sitalichi
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Youth

Social Mapping

The Focus Group Discussion (FGD) took place at Kuntamba Village Head. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing, and more increase is expected as the group members have indicated that they intend to get married and have children.

It is indicated that the area is inhabited by the Chewas; there are also traces of Yao.

There are a number of religious groups, including: Church of Central African Presbyterian (CCAP), African Isaac, Islam, Baptist Church and Roman Catholic.

In the area, all four villages use water from a borehole at Chayimedi village. There is water all year round at the borehole and from the Diamphwe River.

The community uses grounds located on dambo land at Chayimedi and Kuntamba villages for meetings, football and netball. Swimming, fishing and laundry are done at the Diamphwe River.

There is a court at each village head headquarters. Courts are heard based on the level of crime. There are three levels: Village head, Group Village Head and those that are referred to the national judicial system through the police.

It is at these local judicial courts where Big dance (gule wa nkulu) takes place.

The community use the land, not only to cultivate the land for crop production, but also to collect firewood and to graze livestock on village dambos along the Diamphwe River during rainy season and on agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land, trees, bananas, paw-paws.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, which includes women (both married and unmarried) and the poor. The chiefs allocate Land to the families in the area.

Usually women collect water from Diamphwe River and the borehole in the area.

The women also collect firewood along the Diamphwe River and community woodlots.

Livestock graze on dambos along the Diamphwe River during the rainy season, and on agricultural land during the dry season.

[illegible]

Generally the participants linked the activities on the calendar, for instance food availability and rainfall, education and cultural activities to income generation and amount of farm produce.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in order of importance: food secure area, irrigation farming, employment, fishing opportunities and increased social economic status.

Active individuals benefit from the development as they can be engaged in the agricultural-based activities (such as: irrigation and employment opportunities).

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing and farming; the participants indicated that there will have to be compensation.
- No portable water
- Loss of a graveyard; their chief has to be compensated, and government will decide what to do.
- There is fear of flooding as a result of the dam; it was indicated that there should be relief items and donation to the affected people.
- Loss of land for grazing livestock and community dispersion (members of the community will be scattered); there should be enough land for every member of the community to resettle with enough land for all of the livestock.
- Loss of source of firewood; it was suggested that those affected receive compensation.
- Loss of entertainment grounds;
- No fishing; it was suggested that fishing be regulated and laws should be enforced so that fish are available all the time.
- Lack of cleaning water; to be mitigated through the provision of boreholes.

The participants would like to be resettled to land close to their current settlement, preferring land along the M1 road as it has opportunity for business ventures. They requested that their new settlement should have entertainment ground facilities (provided by efforts from the government).

The group identified the aged and orphans as vulnerable groups, in that order. The aged do not have energy to actively participate in agricultural activities, which is the source of livelihood. The orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

SECS YOUTHS Kumbumba VETA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOHN Mwambiwa	RESEARCHER SPECIALIST	SMEC		0943574836	John
Innocent Majo	DRIVER	SMEC	imajio78@gmail.com	09494 581229	John
Kwezekani Willison	Farmer	Zitalichi	—	—	Kwezekani
Rebecca Bauleni	Farmer	Zitalichi	—	—	Rebecca
Eneless Nkhata	Student	Zitalichi	—	0888 832 605	E. Nkhata
Esinta Jekitala	Farmer	Kuntamba	—	—	Esinta
Ainafe Kuyenda	Student	Chaimedi	—	—	Ainafe

Kuntamba YNTAS

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Diana Yshane	Farmer	Chaimedi	—	—	Ziganda
Rosemary Willy	Farmer	Chaimedi	—	—	morimeie
Lefnat Ekeloni	Farmer	Zitalichi	—	—	iefinab
Fikria Gotiati	Student	Chaimedi	—	—	Viginia
Nzayawikanyi Winkison	Student	Kuntamba	—	—	magan elini
Jester Nelson	Farmer	Chaimedi	—	—	JESTER
Tikitata Samalani	Fisherman	Kuntamba	—	—	Tikitata

WINIAMBRA YESUAS

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Gideon Solijala	Farmer	Chaimedi	—	—	S. Gideon
Kumbukani Sizivoneka	Farmer	Chaimedi	—	—	KS
Howard Dzingondo	Farmer	Potlalani	—	—	H. Chingondo



Small Group Discussion Report

Date: 30th September, 2015

1. Village(s) Name:
 - o Malenya,
 - o Mphazomba,
 - o Mtende,
 - o Kauchi,
 - o Bwemba,
 - o Mwambo,
 - o Chilunje,
 - o Chaluma,
 - o Mlombwa,
 - o Mzingwa,
 - o Mkhazombwa,
 - o Salima,
 - o Chikwenje
 - o and Mphaleidyani
2. Facilitator Name: John Mwawanda
3. Note Taker and Reporter Name: Connex Makuya
4. Interest group name: Farmers

Social Mapping

The Focus Group Discussion (FGD) took place at Group Village Headman Malenya. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Baptist Church, Assemblies of God, African Isaac and African Abraham.

In the area, communities use water from shallow wells and boreholes. The boreholes are at Mnobwa and Mzingwa villages. Chankhalala River passes through Mnombwa and Phaleidyani villages. These water sources provide water all year round.

Ant mawemwa

S.A.A. Farmers

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
HEmitala B'iwasi	Farmer	Malenga		0993 270 197	HEmitala
Willy Macilikwa	Farmer	Mtende			W. Macilikwa
Thengo Mafi	Farmer	Salimandinda			Thengo
D'vasoni Sajiwa	Faxler	Malewya		0997987502	D. Sajiwa
MACKENZIE CHILEMBWE	CHAIRMAN	G.U.H. CHINZIRI		09999434373	Mack
ISIZI'ZAI' DOLITE	SECRETARY	KP MUSTETA		0991345553	ISIZI'ZAI' DOLITE





List members

SAs Farmers

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOHN MUTHAMBA	RAP SECRETARY	SMEC		099351482	
INNOCENT MAUTO	DRIVER	SMEC		0999 581 229	
Lourex Makuya		SMEC		0996244218	
Yafeta Jeki	Farmer	Mphaleidyani		—	YJ
Epleni Mthamanga	Farmer	Mwambo		—	Epleni
Joseph Mlambo	Farmer	Mhombo		0995 426 420 0995 426 420	
Thomas Besamu	Farmer	Chinkhuti			T Besamu

first meeting

5405 Farmers

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Gladys Ninyodi	Farmer	Bwenba			
Naliseu Bengamu	Farmer	Chingwenje			Naliseu
Rita Tchund	Farmer	Malenga			Lita
Namayelo Samisoni	Farmer	Malenga			
Thomas Thaulo	Farmer	Malenga			Thomas Thaulo
Jabesi Kaweche	Farmer	Moboko			J. Kaweche
Chinengo Jositho	Farmer	Kaluchi		0993 230 375	Chinengo

The community has a nursery school at Malenya village, which has a community ground on the same property. They use these premises for meetings, netball and football. It is also used for court, along with courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos, agricultural land and around the hills during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land for farming, trees, fish, livestock, hills, rivers and crocodiles.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

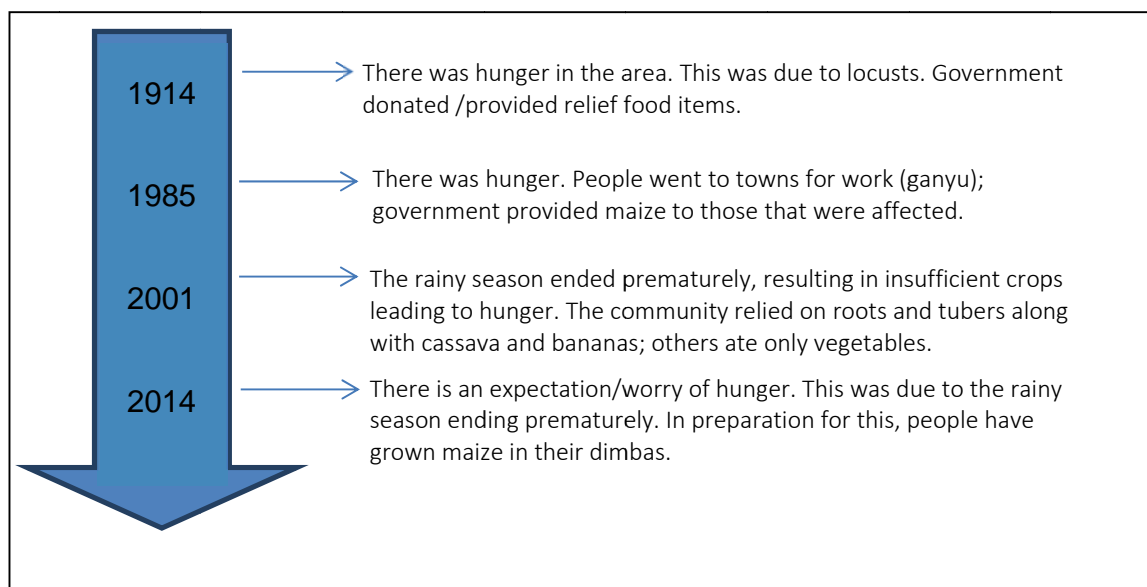
Usually women collect water from the shallow wells and boreholes in the area. The women also collect firewood around the villages from trees planted by the community.

Livestock graze on village dambos along Diamhpwe River, agricultural land and around the hills during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and health facility. They also indicated that they have been involved in road construction and maintenance.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													

Generally the participants linked the activities on the calendar, for instance food availability and money was linked to rainfall. They indicated that the amount of produce harvested would determine how much food and money would be available to that particular household, as well as the larger community.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, employment, fishing and portable piped water. The active individuals will benefit from the development as they can get engaged in the activities to generate money.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; they have to be compensated. In addition to this, there is a request to be resettled within the same catchment area.
- Loss of water sources
- Loss of fruit trees; there should be compensation.
- Fear of hunger for the members of the affected villages
- Loss of the graveyard; compensation and the government should decide what to do.
- Generation of school fees for the children

The participants emphasised that they would like to be resettled near the project area. If this is not possible, there is preference to be resettled at Dzalanyama in Lilongwe or Kasungu District.

The group identified the aged and orphans as vulnerable groups, in that order. The aged do not have energy to actively participate in agricultural activities, which is the source of livelihood. The orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 30th September, 2015

1. Village(s) Name:
 - o Malenya
 - o Mphazomba
 - o Chilunje
 - o Mlombwa
 - o Mzingwa
 - o Mkhazombwa
 - o Salima,
 - o Mphale
2. Facilitator Name: John Mwawanda
3. Note Taker and Reporter Name: Connex Makuya
4. Interest group name: Chiefs, local leaders, traditional healers and elders

Social Mapping

The Focus Group Discussion (FGD) took place at Group Village Headman Malenya. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Baptist Church, Assemblies of God and African Abraham.

In the area, communities use water from shallow wells and boreholes. The boreholes are at Mnobwa and Mzingwa villages. Chankhalala River passes through Mnombwa and Phalidyani villages. These water sources provide water all year round.

The community has a nursery school at Malenya village, which has a community ground on the same property. They use these premises for meetings, netball and football. It is also used for court, along with courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos, agricultural land and around the hills during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land for farming, trees, fish, livestock, hills, rivers and crocodiles.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

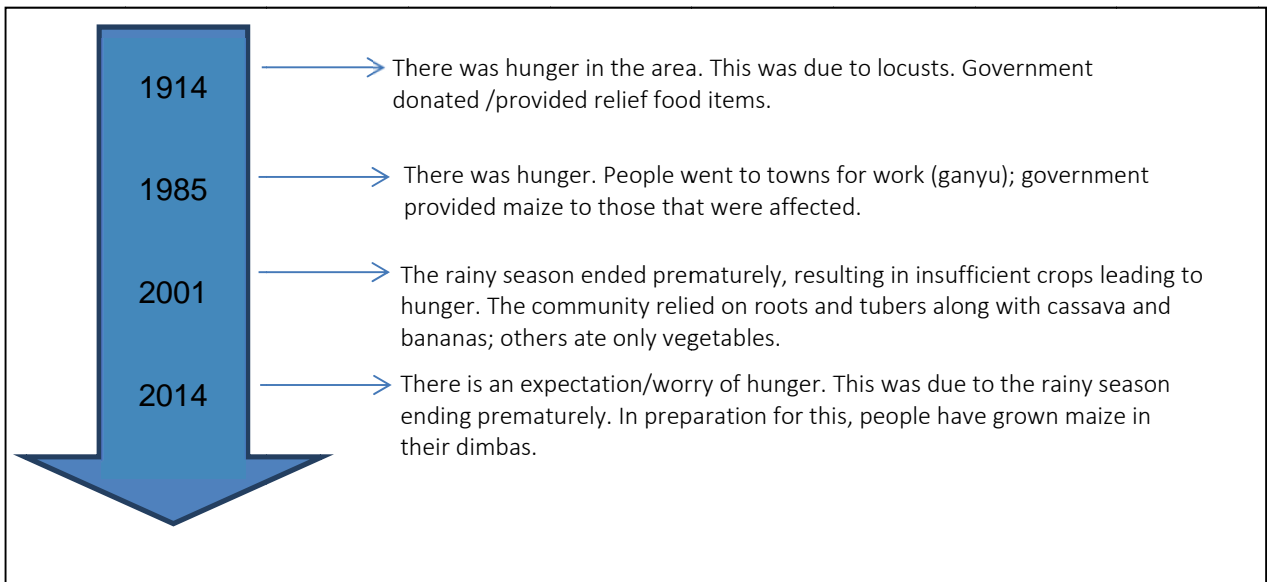
Usually women collect water from the shallow wells and boreholes in the area. The women also collect firewood around the villages from trees planted by the community.

Livestock graze on village dambos along Diamhpwe River, agricultural land and around the hills during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and health facility. They also indicated that they have been involved in road construction and maintenance.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													These are farming months which coincide with the rainy season
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													

Generally the participants linked the activities on the calendar, for instance food availability and rainfall. They also identified a link between income and expenditure as a result of the rainy season.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: portable piped water, employment, irrigation farming and fishing.

The active individuals will benefit from the development as they can get engaged in the activities to generate money.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; they have to be compensated. In addition to this, there is a request to be resettled within the same catchment area.
- Loss of graveyard; compensation and the government should decide what to do.
- Loss of grazing land
- Community dispersion (members of the community will be scattered); they indicated that all the affected members have to resettle on the same piece of land so that they still leave as a community and continue with their cultural values and beliefs.
- Difficulty accessing water, schools and health facilities; if these become inaccessible, the government should provide these facilities in an accessible position.
- People will not be fishing; as it is a means of livelihood, people should be given access to fish.

There are specific interest groups that will be affected by the project:

The herbalist discussed these negative impacts, in order:

- Loss of trees (plant parts for medicinal use)
- Clients may not have access to their service when resettled

The gule wa mkulu elders discussed these negative impacts, in order:

- Graveyard resettlement will disrupt their base.

The participants emphasized that they would like to be resettled in the catchment area and close to the project area to access perceived benefits from the dam construction.

In addition to this, the group identified the orphans, the poorest, and the disabled as vulnerable groups, in that order. The orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

MALENYA VHS

SLAs

TRAINING REPORT + SLAs INTERVIEW

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: Sept 30, 2015


NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Njuzi Fonirasi	Member	Mambwa	—	—	<u>NJUZI</u>
Mr Nkhwanagwa	Traditional healer	Malenya	—	0998 032 458	<u>MR NKHWANGWA</u>
Thembakalo Thamsani	Village Head Village Head	Malenya	—	—	<u>T. Thamsani</u>
Chifuniro Zakeya	Member	Salimandinda	—	0996 375 081	<u>Zakeya</u>
Sikatha Saonda	Village Head	Chilungu	—	—	<u>SS</u>
Abigail Zama	Village Head	Mkhwazimba	—	0993 219 298	<u>ZAMA</u>
Divasoni Sajiwa	<u>SLH</u>	malenya	—	09977987522	<u>Divasoni</u>

Maelenya VLB
 30/09/15
 STAs TRASHION HARBOR & GUIC WARDEN.

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:




NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
INNOCENT MAMBO	DRIVER	SMEC		0999 581 224	
Elinati Zikiyele	Nankungwi	Filimoni	—	—	Elinati
Namasoka Ziuluka	Nankungwi	Malixoti	—	—	UZ
Gelita Zandisi	Nankungwi	Mambwa	—	—	UZ
Nazondani Sitekimani	Nankungwi	Mzingwa	—	0999 8703 63	hazondani
Nabengo Chivonekera	Nankungwi	Mambwa	—	—	.
Namamesa Thaulo	Nankungwi	Malenya	—	—	.

MALSIYA V&E

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
MACKEZIE CHILEMBWE	CHAIRMAN	G.U.H. CHINZIRI		0999434373	
TSELI'ZANI DAKIZA JSTN	SECRETARY	KPUSILELA		0991345533	
MUNATUNDAWA		SMEC		0996244218	
KOMEX Nkoya					

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 1st October, 2015

1. Village(s) Name:
 - o Veremu
 - o Chinthankhwa,
 - o Jamu
 - o Khomani
 - o Kamsampha
 - o Pemba
 - o Jekeseni
 - o Phula
 - o Mkute
 - o Tsoka
 - o Chidede
 - o Chilamba
 - o Gwirize
 - o Kapezawathu
 - o Jabesi
 - o Kamkota
2. Facilitator Name: John Mwawanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Farmers

Social Mapping

The Focus Group Discussion (FGD) took place at Village Headman Chinthankhwa. The members present were drawn from different development agents, church leaders and members of the local development committee. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Catholic, African Isaac and Baptist Church.

In the area, communities use water from shallow wells and boreholes. These water sources provide water all year round, however the shallow wells sometimes dry up.

There is a community ground that is used for meetings, netball and football.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos and agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land for farming, trees, and dimba land.

Tamed livestock (such as cattle) was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

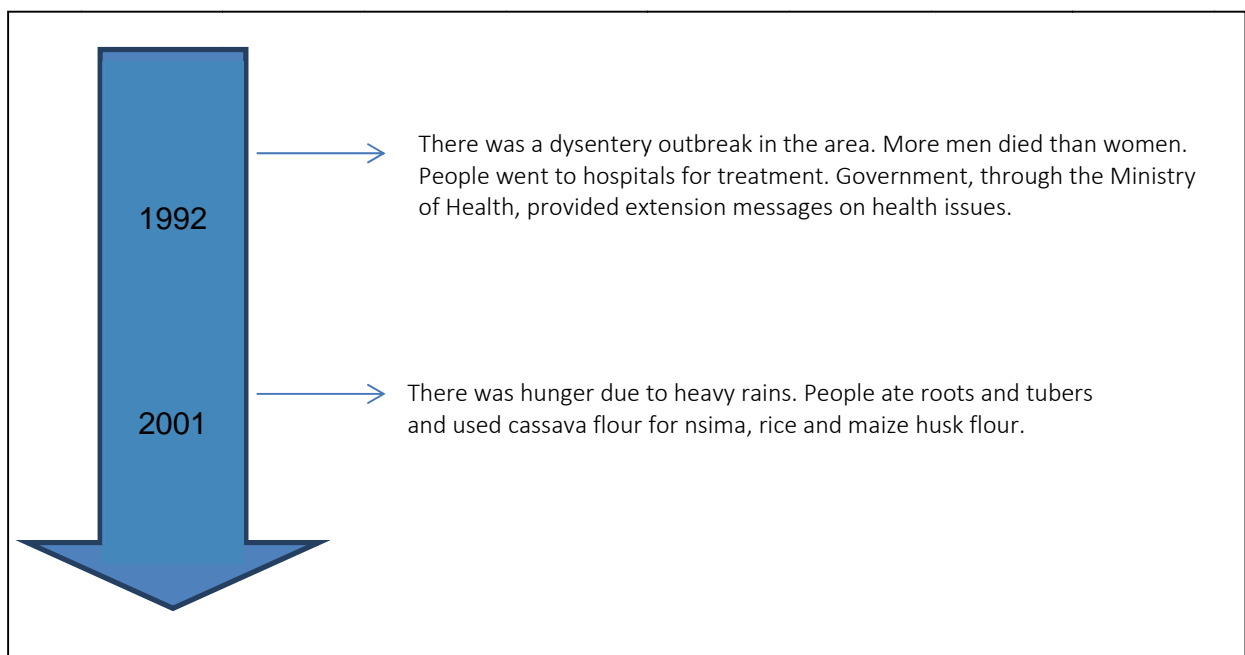
Usually women collect water from the shallow wells and boreholes in the area. The women also collect firewood from dambo fields and around the hills.

Livestock graze on village dambos and in the hills.

The community has been involved in a community development project through which they provide sand and stones, mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in road construction and maintenance. In addition to this, they have also planted trees as a community.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													They indicated there are no holidays. They take Sundays to be their holidays

Generally the participants linked the activities on the calendar, for instance between income and hard work on agricultural fields during the rainy season. Both agricultural and non-agricultural work was reported to be done by both men and women, and primarily women do most of the household activities.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, piped water for drinking, fishing and business opportunities. The economically active individuals will benefit from the development as they can get engaged in the activities to generate money.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; members indicated that they will have to be compensated and resettled close to current area. The land where they will be resettled should be enough to continue economic activities as before resettlement.
- Loss of land for grazing livestock; the chief will have to be compensated for dambo land lost, and the government should provide land for grazing livestock.
- Loss of graveyard; the group indicated that there will have to be compensation. The remains (contents of the graveyard) will have to be exhumed and buried in the resettled area.
- Loss of trees and fruit trees; the group indicated that there should be compensation.
- Communication will be cut between the communities in Dedza and Lilongwe; government should provide reliable bridges where people currently cross Diamphwe River.
- Services from schools, hospitals and churches more difficult to access.

The participants emphasized that they would like to be resettled close to the project area as to access perceived benefits as a result of the construction of the dam.

In addition to this, the group identified the aged living with orphans, and female headed households as vulnerable groups, in that order. The aged living with orphans do not have energy to actively participate in agricultural activities (source of livelihood) and the orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

Chinthankhwa - Farmers

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOHN MATHWANA	RAH SPECIALIST	SMEC	mathw@smec.co.za	099 254 4444	[Signature]
CHILEMBE MAKONZELA	CHIRMAN				
ISIZANI DAVITE	SECRETARY				
VELEMY SOLIBERA	NTCHAMALI VAGISI	VELEMA	SOLILARA	099 813 9444	SOLILARA
KEFASI BIKAVUSI	MLINI		KEFASI BIKAVUSI		K. B. BIKAVUSI
OSIWA DIANTONIO	UMINI		OSIWA ANTONIO		R. B. BIKAVUSI
SIMEYITHIWA	UMINI		SIMEYITHIWA	099 660 7586	S. CHITHIWA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Welosi lugan.	elime	menba	welosi		welosi
Jonesi Richard	Uimi	menba	Jones		Jones
Robertimzati	mli mi	thamni Robert			mzati
malen. cnakana	Ntshchali Sekitale	Sekitale	maleni		cnakana
Mphatso Anderson	Heath Zamungu	chirndy ntshchali	Wase Mphatso 091085914		Wase
Saidi	Uimi	lembi	Dolofe		Saidi
Davulesi					
Ketigasi	Uimi	Davulesi	Ketigasi		Davulesi

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Diamphwe Multipurpose Dam ESIA & Rap					Date:
NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Mtshelke Masella	linini	nchawintha Amuzi	mtshelke		lasella
Saceka Lukesi	uphisici	Saceka	CHIRUMBA		S. Lukesi
Emile Katzen	ulini	Katzen	zpmilo		u Katzen
Zamutolo					
Mudekani	malini	Zamutolo	mudekani		m. Zamutolo
Sichinathe Sezen	VDC Ntshaman	Sichinathe	sezen	0998305667	S Sezen
P					

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 1st October, 2015

1. Village(s) Name:
 - o Veremu
 - o Chinthankhwa,
 - o Jamu
 - o Khomani
 - o Kamsampha
 - o Pemba
2. Facilitator Name: John Mwalwanda
3. Note Taker Name:Connex Makuya
4. Interest group name: Religious, development agents and local area development committee members

Social Mapping

The Focus Group Discussion (FGD) took place at Village Headman Chinthankhwa. The members present were drawn from different development agents, church leaders and members of the local development committee. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Catholic, African Isaac and Baptist Church.

In the area, communities use water from shallow wells and boreholes. These water sources provide water all year round, however the shallow wells sometimes dry up.

There is a community ground that is used for meetings, football and netball.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos and agricultural land during the dry season. The feed is usually abundant from January to September.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land for farming, trees, and dimba land.

Tamed livestock (such as cattle) was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

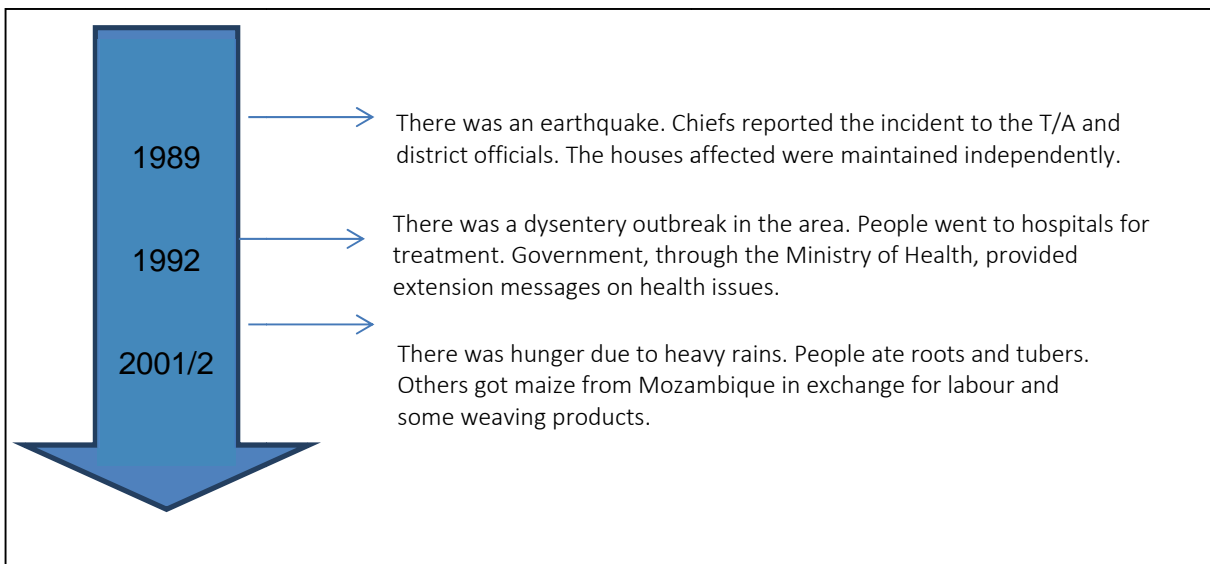
Usually women collect water from the shallow wells and boreholes in the area. The women also collect firewood from dambo fields and around the hills.

Livestock graze on village dambos and in the hills.

The community has been involved in a community development project through which they provide sand and stones, mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in road construction and maintenance. In addition to this, they have also planted trees as a community.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													This depends on the depth of the water source. Shallow well dry up while boreholes do not
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													They indicated there are no holidays. They take Sundays to be their holidays

Generally the participants linked the activities on the calendar, for instance between income and expenditure as a result of the rain season experienced. When there are good rains the yields are higher and the farmers earn more money, which is disposable. The more income earned the more will be spent.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: piped water for drinking, irrigation farming and fishing. The economically active individuals will benefit from the development as they can get engaged in the activities to generate money.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; members indicated that they will have to be compensated and resettled close to current area. The land where they will be resettled should be enough to continue economic activities as before resettlement.
- Services from schools, hospitals and churches more difficult to access; government should provide these in the new area.
- Loss of land for grazing livestock; the chief will have to be compensated for dambo land lost.
- Loss of trees and fruit trees; the group indicated that there should be compensation.
- Cost of construction of dwelling houses; must be compensation to help funding for construction of new dwelling houses for the affected community members.
- Communication will be cut between the communities in Dedza and Lilongwe; government should provide reliable bridges where people currently cross Diamphwe River.

The participants emphasized that they would like to be resettled close to the project area as to access perceived benefits as a result of the construction of the dam.


In addition to this, the group identified the aged living with orphans, and female headed households as vulnerable groups, in that order. The aged living with orphans do not have energy to actively participate in agricultural activities (source of livelihood) and the orphans and female headed-households require assistance from relatives and/or the community, which may not have the resources to provide for them.

Chinthankumar Religion, Development Agents

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOTHN MUMTHLAWA	RAP SPECIALIST	SMEC	mumthlawas@gmail.com	0993514976	
Selemu Solajara	WASH NICHAMAKI	Selemu NICHAMAKI	SOLAJARA	0998134444	X Solajara
Davitekalinde		VDC	Davite		D. Kalinde
Chanelo HANSA	KULIMA	HANSA	Chanelo	0994811155	HANSA
Witikesi Wilson	KULIMA	Witikesi	Wilson		Witikesi
Witikesi Wilson	KULIMA	Witikesi			Witikesi

utilita
alisoni patlipose ulini

Patlipose

alisoni

Sohomale matefu

U
lini uathilira matefu

Sohomale

Medison Jamison

Busa

Medsoni
mBusa

0998717141

E. Jamison

Sogumani Sakti Kosi

ada mthulila
ulini

Sakti Kosi

Sogumalithabu

Si

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 2nd October, 2015

1. Village(s) Name:
 - o Kamwana
 - o Chimtenga
 - o Chimangiro
 - o Kangulu
 - o Kathumba
 - o M'maso
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Chiefs and elders

Social Mapping

The Focus Group Discussion (FGD) took place at Kamwana Village. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Seventh Day Adventist (SDA), African Abraham, New Apostolic Church and Baptist Church.

In the area, communities use water a boreholes and the Diamphwe River. These water sources provide water all year round.

The community has primary schools at Luwani, Njuchi, Kanyezi and Bua. These school grounds are used for meetings, netball and football. Swimming, fishing and laundry are done at the Diamphwe River.

They access health services from Kanyezi (Katchale) Health Centre.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos and agricultural land during the dry season. The feed is usually abundant in the rainy season (November to July).

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land for farming, trees, livestock, water, bamboo, crocodiles and fruit.

Fish and wild game were reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

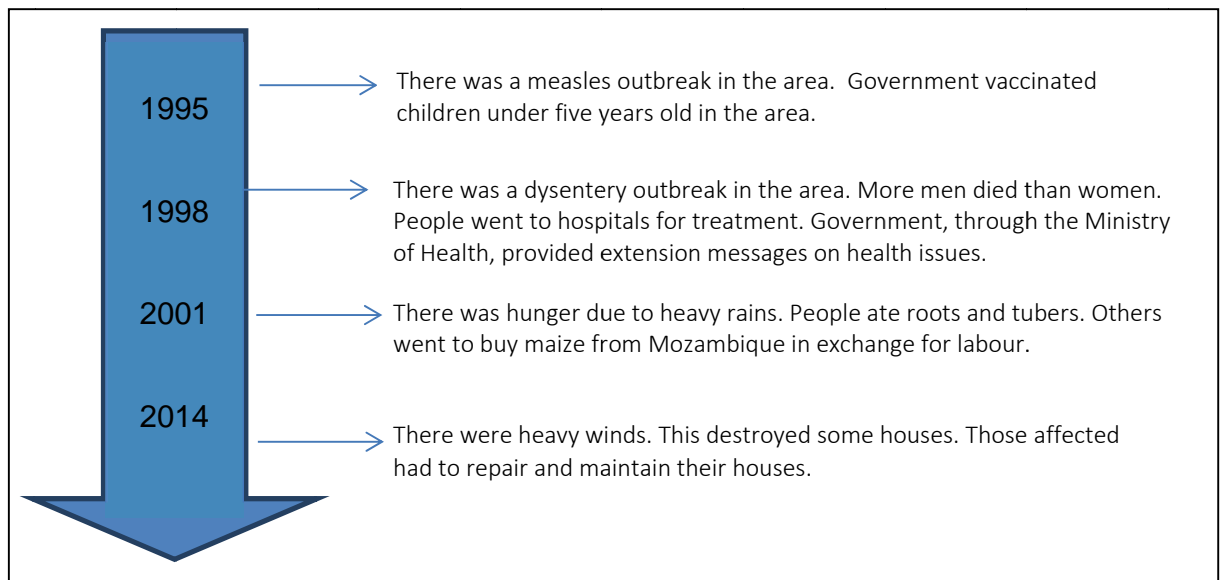
Usually women collect water from a borehole in the area and the Diamphwe River. The women also collect firewood from their own fields and from homestead wood plots.

Livestock graze on village dambos.

The community has been involved in a community development project through which they collect sand and stones, mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in tree nurseries and tree planting. In addition, they also fund raise through ganyu to carry out repairs and maintenance of boreholes.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													Sundays are assumed to be holidays.

Generally the participants linked the activities on the calendar, for instance food availability in relation to amount of rainfall. They also indicated the link between credit availability and income generated.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, employment opportunities, positive change in social economic status, tapped water for home use, access to electricity due to the project, and fishing opportunities. The youth will benefit more (in areas such as employment) during construction of the dam project.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; members indicated that they will have to be compensated and resettled close to current area.
- Loss of land for grazing livestock; must be compensated.
- Lack of portable water for home use; boreholes in the resettled area should be sunk so that they can be accessed for portable home use.
- Loss of bamboo, trees and fruit trees; the group indicated that there should be compensation.
- Fear of community dispersion; it was indicated that the chief should have a leading role in the identification and choosing of land, which will assist in accounting for cultural beliefs and values.
- Loss of graveyard; the group indicated that there will have to be compensation. The remains (content of the graveyard) will have to be exhumed and buried in the resettled area. Graveyards are a base for gule wa mkulu, and as a result the government should fund a proper ceremony.

The participants emphasized that they would like to be resettled close to the project area. If there is no available land close to the project site, Dzalanyama in Lilongwe would be the most preferable resettlement location. Other accepted locations would include: Kasungu and Mchinji in Lilongwe. The land should be enough to continue their economic activities.

In addition to this, the group identified the aged and orphans as vulnerable groups, in that order. The aged do not have energy to actively participate in agricultural activities (source of livelihood) and the orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: Oct 2, 2015

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
TEREZA KAMWALO	Village Head's Wife	KATHUMBWA			Tereza
Julietta Nameri	Elder	KAMWALA			Julietta
NFUNEI JOSTINO	Elder	MIMASO			
JEANROSE MAFLENI	Elder	KAMWALA		0993 873 486	Jeneleza
NASWALO EFULEDI	Elder	CHAKUKHONDE			
JENNIFER FONI	Farmer	CHAKUKHONDE			
FLORENCE CHIMENGO	Elder	CHIMANGIRO		0991 572 715	Fug.

SGDs KAMWALA

.00

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: Oct. 2, 2015

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Baster Yohane	Farmer	Kamwala			
Kajole Tchupa	Village Head	Chakukhonde			Kajole
Akisoni Njamawawa	Village elder	Mmaso			
ZINKANI THOMAS	Village Head	Kamwala		0995 259 404	Z. Thomas
INNOCENT MAUTO	DRIVER	SMEC		0999 58 229	

SGDs

KAMWALA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: Oct 2, 2015

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
SAMSON FANIZO	VILLAGE ELDER	KAMWALA		0994 224 917	S - FANIZO
EVANCE KAYEDZEMBA	VILLAGE ELDER	KANGULU			E. Kayedzema
EKILINDA CHADZA	VILLAGE HEAD	CHAKUKHONDE			
NASHUPIKA ZENINYASI	ELDER	CHINTENGA			
ZIKUBWEJERA ZENINYASI	ELDER	CHINTENGA			
ZISIKAWA JIDIGA	FARMER	KANGULU			
KONSOLATA JOSITINDO	FARMER	CHIMANGILO			Konsolata Jositino

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 2nd October, 2015

1. Village(s) Name:
 - o Katande
 - o Gidion
 - o Robert
 - o Bonga
 - o Dazi
 - o Chinthankhwa
 - o Chika
2. Facilitator Name: John Mwawanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Elders, Chiefs, Development Agents and Farmers

Social Mapping

The FGD took place at Chinthankhwa Village. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Seventh Day Adventist (SDA), Church of Central African Presbyterian (CCAP), African Abraham, Zion, Rainbow Covenant, New Apostolic Church and Baptist Church.

In the area, communities use water a borehole and the Diamphwe River. These water sources provide water all year round.

The community has primary schools as Luwani, Njuchi, Kanyezi and Bua. These school grounds are used for meetings, netball and football. Swimming, fishing and laundry are done at and on the Diamphwe River.

They access health services from Kanyezi (Katchale) Health Centre.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos along the Diamphwe River and agricultural land during the dry season. The feed is abundant during the rainy season (January to February).

Resource Mapping

Trees are a natural resource reported to be found in abundance.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

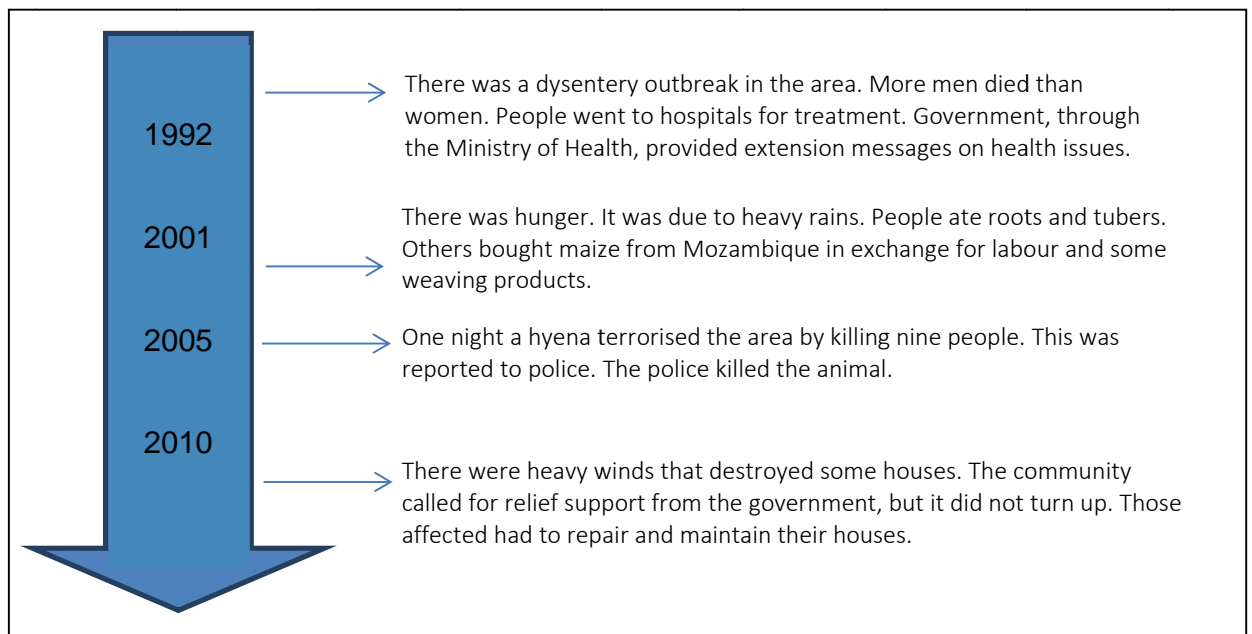
Usually women collect water from the boreholes in the area and the Diamphwe River. The women also collect firewood from their own fields and from homestead wood plots.

Livestock graze on village dambos along the Diamphwe River, and around the hills.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in tree nurseries and tree planting.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													Sundays are assumed to be holidays.

Generally the participants linked the activities on the calendar, for instance food availability in relation to amount of rainfall. They also indicated the link between income and expenditure (more income leads to increased spending).

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, safe piped water to the communities, fishing and employment. The youth will benefit more (in areas such as employment) during construction of the dam project.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; members indicated that they will have to be compensated and resettled close to their current area.
- Loss of trees and fruit trees; must be compensated.
- Loss of land for grazing livestock; must be compensated and resettled close to their current area.
- Loss of graveyard; the group indicated that there will have to be compensation. The remains (content of the graveyard) will have to be exhumed and buried in the resettled area.
- Loss of communication between people in Dedza and Lilongwe sides of the river.
- Fear of crocodiles when the water level rises due to the construction of the dam; a fence should be erected around the body of water.

The participants emphasized that they would like to be resettled close to the project area. The land should be enough to continue their economic activities.

In addition to this, the group identified female-headed households, the aged and orphans as vulnerable groups, in that order. Female-headed households will be affected as they rely on other community members. The aged do not have energy to actively participate in agricultural activities (source of livelihood) and the orphans require assistance from relatives and/or the community, which may not have the resources to provide for them.

2/10/15

CHUTHANKWA

SGA

EDOAS/CHUTT / FARMERS/DEV AGENTS

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Chinchaka Jata	Village Head	Chinthankwa			
Rosemary Sitandi	Village Head	Madazi			
Mabvuts Zinzela	Village Head	Bonga			mabvuts
Eluby Mutyaru	Village elder	Robert			
Peter Essau	Village Head	Gedion		0993 742 618	P. Essau
Wilson Andrew	Farmer	Gedion		0995 238 832	
Belixai Charles	Farmer	Katande			B. T

SGDs CHINKHANTHA

00

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: Oct. 2, 2015







NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Sphoriano Kaperekeza	Village Elder	Dazi		0998 147 851	Sphoriano Kaperekeza
Mangwa Pilato	Member	Chinkhankhwa		0998 360 633	Mangwa Pilato
Gutsu Lemezan	Village elder	Katando			Gutsu
Robert Mpinga	Farmer	Robert			Robert Mpinga
Lameck Dazi	Farmer	Dazi			Lameck Dazi
Isaki Thomas	Farmer	Chinkhankhwa		0997 320 908	Isaki Thomas
Kawedi Njala	Farmer	Chinkhankhwa			Kawedi Njala

SGDs CHINKWANTHA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: Oct. 2, 2015

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Charles Giesheani	Farmer	Robert			
Fikani Chagwa	Farmer	Gideon			
Musa Litani	Farmer	Gideon			
Shaine Kapelekeza	Farmer	Dazi			
Marko Lifadi	Farmer	Chimbankwa			
Imagant Majo	DRIVER	SMEC			

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 6th October, 2015

1. Village(s) Name:
 - o Kaluchi
 - o Savala
 - o Maloko,
 - o Chingwenje
 - o Chimbano
 - o Maliyoti
 - o Chiononga
 - o Chinkhuti
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Youth

Social Mapping

The focus Group Discussion (FGD) took place at Chingwenje Village Head. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing. The group members indicated that this will increase further as they intend to get married and have children.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Province Industrial Mission (PIM) and Church of Central African Presbyterian (CCAP)

In the area, communities use water from three boreholes located at Kaluchi, Chingwenje and Moloko villages; and the Diamphwe River. These water sources provide water all year round. Dimbas are along the Diamphwe River where irrigation farming is practiced. There are woodlots located at Chiononga, Savala and Kaluchi villages.

The community utilises ground located at PIM premises (close to the nursery school) for meetings, football and netball. Swimming, fishing and laundry are done at and on the Diamphwe River. Adult literacy classes, night secondary school and under-five clinics are held at the nursery school.

There are income-generating projects funded by an Italian woman named Maria. These projects included layers, broilers, a piggery and a maize mill

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos along the Diamphwe River during the rainy season and agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land, bamboo, trees and sisal.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

Usually women collect water from the boreholes in the area and the Diamphwe River. The women also collect firewood along the Diamphwe River and from community and family woodlots.

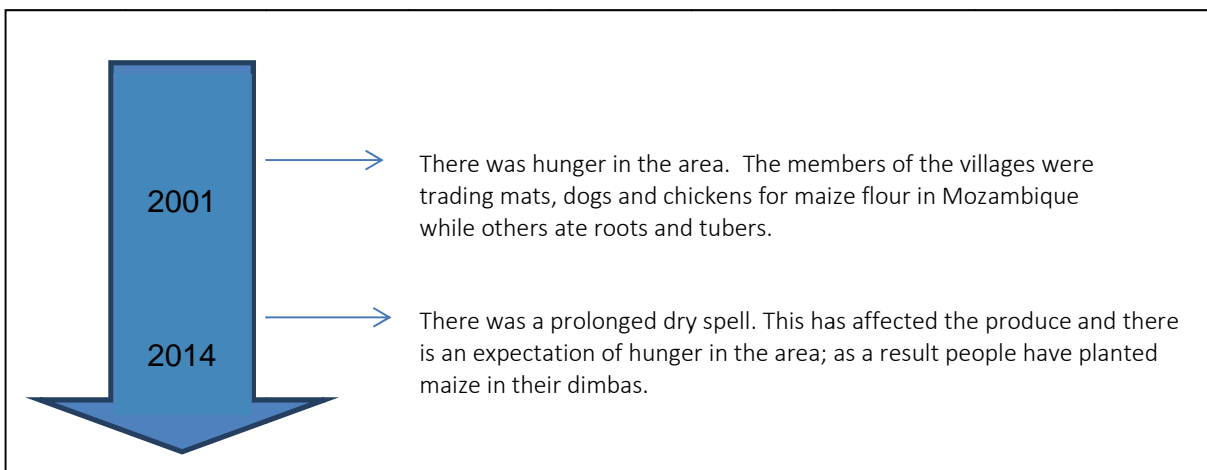
Livestock graze on village dambos along the Diamphwe River during the rainy season and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in forestation projects resulting in family and community woodlots.

It was also indicated that crocodiles in the area had killed people, and were a concern for the community.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													

Generally the participants linked the activities in the area with reference to the calendar activities, for instance weddings take place when people have money from produce proceeds.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: piped water source for community, irrigation farming, fishing, employment and business opportunities.

The group identified that active individuals, like themselves (youth), will benefit more from the development because they are able to engage in agricultural based activities, such as irrigation and employment opportunities.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing and farming; members indicated that they will have to be compensated, and feel that the youth should identify suitable land to resettle with sufficient land for farming, housing and grazing and is ideal to start businesses. This should be close to their current settlement.
- No portable water
- Loss of trees (community and family woodlots affected)
- Changes in coping strategies; the need for seed funds to assist with dimba activities in new or other businesses if their crops fail.
- Settlement dispersion (scattered) and the impact on relationships; given enough land for the whole community to resettle.
- Loss of grazing livestock
- Nursery school will be affected
- Loss of graveyard

The participants emphasized that they would like to be resettled close to the project area. The land should be enough to continue their economic activities.






In addition to this, the group identified the aged, orphans and female-headed households as vulnerable groups, in that order. The aged are unable to work. Orphans may have financial difficulty. Female-headed households require assistance from relatives and/or the community, which may not have the resources to provide for them.

S & A CHINGWENI VILLAGES MONITORING

ATTENDANCE REGISTER

Diamphe Multipurpose Dam ESIA & Rap

Date: 6/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JOHN MATHEWASHA	RAP SECRETARY	SMEC		0993514476	
ISAK'ZAN DOLIE	SEKRETARY	KPHWELIYA		0991345553 0991355	
MANUEL Banda	Member	MOLOKO		0864349041	
FAMLODI F. BULAGISI	Member	CHINKHUTI		0995301121	F. Bulagisi
KABWABA FILIGASI	Member	CHIMBANO			K. Filigasi
MACHITLHE ISHIMELI	Member	Sakala			
KAYENE ZEVINATI	Member	Moloko			

SAID CHINKWINDI YOUNG

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Aaron Chipeso	member	Kaluchi		0888408532	
NDISO Eliya	member	Savala			
EFFEESI Sakeni	Member	Cuingwele		0999184389	
Stella Richard	committee	Chdongo			S, Richard
Egling mukuluka	committee	Kaluchi			E. mukuluka
EFILIDA Chivadza	member	maligeti			E. chivadza
honiZani Zetha	Member	Maligeti			

STH CHMUNE NGB Ymif.

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
CHMUNDO	AFUNU	CHMUNDO			
P. Patrick Thomson	Member	Chingwenje		0995627671 0888086395	P. Thomson
Lourex Makuya	Junior RAP Specialist	SMEC		099244218	
Thandiwe	Driver	SMEC		0551878284	

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 6th October, 2015

1. Village(s) Name:
 - o Kaluchi
 - o Savala
 - o Maloko,
 - o Chingwenje
 - o Chimbano
 - o Maliyoti
 - o Chiononga
 - o Chinkhuti
 - o Chinganji
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Elders

Social Mapping

The Focus Group Discussion (FGD) took place at Chingwenje Village Head. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Province Industrial Mission (PIM) and Church of Central African Presbyterian (CCAP)

In the area, communities use water from three boreholes located at Kaluchi, Chingwenje and Moloko villages; and the Diamphwe River. These water sources provide water all year round. Dimbas are along the Diamphwe River where irrigation farming is practiced. There are woodlots located at Chiononga, Savala and Kaluchi villages.

The community utilises ground located at PIM premises (close to the nursery school) for meetings, football and netball. Swimming, fishing and laundry are done at and on the Diamphwe River. Adult literacy classes, night secondary school and under-five clinics are held at the nursery school.

There are income-generating projects funded by an Italian woman named Maria. These projects included layers, broilers, a piggery and a maize mill

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos along the Diamphwe River during the rainy season and agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: land, water, trees, bamboo, firewood and bananas.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

Usually women collect water from the boreholes in the area and the Diamphwe River. The women also collect firewood along the Diamphwe River and from community and family woodlots.

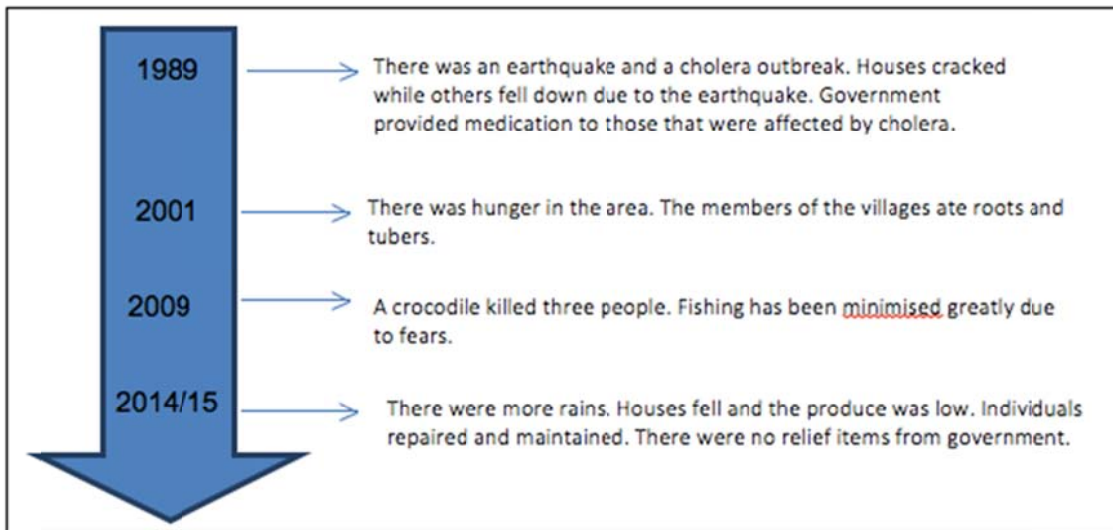
Livestock graze along the Diamphwe River during the rainy season and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in forestation projects resulting in family and community woodlots.

It was also indicated that crocodiles in the area had killed people, and were a concern for the community.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													
Holidays													Sundays are holidays.

Generally the participants linked the activities in the area with reference to the calendar activities, for instance good rains results in more produce which leads to more income, ultimately leading to more dances.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, piped water source for the community, fishing and employment.

The group identified that economically active individuals will benefit more from the development because they are able to engage in agricultural-based activities, such as irrigation and employment opportunities.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing and farming; members indicated that they will have to be compensated. They would like to resettle close to the project site.
- Loss of the graveyard; the chief must be compensated, and also identify a new graveyard. The community should receive funds to have a ceremony for the remains.
- There will be no portable water; the government should provide water to the community.
- The community fears the new environment when resettled
- Loss of natural resources (trees, grazing land)
- Settlement dispersion (scattered) which will impact on relationships; the land for resettling should be enough for the whole community.

The participants emphasised that they would like to be resettled close to the project area.

In addition to this, the group identified the aged, orphans and female-headed households as vulnerable groups, in that order. The aged are unable to work. Orphans and female-headed households require assistance from relatives and/or the community, which may not have the resources to provide for them.

SLAs ERS / FARMER CITHNMENT 25 VET

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 6/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
COHEN MUTLWANTWA	RAP SPECIALIST	SMEC		0993514876	[Signature]
TSIK'AHU DOWITE	RELATION	KPHUOLETA		0991345353	To DOWITE
Andreas Chabenda	Mining	Choneng		0995255522	Andreas
Sadrack Foster	Commute	Chingori		0996567105	Sadrack
EMILY FEDDYAN	Mining	Choneng			EMILY
CECILIA	HEALTH	DALUCH		0994532708	PAULICIA
LIYANCI	LAISON	CHINGORI			LIYANCI

Sitha Elizabeth Parmanas Chankwisi

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 6/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Mwenha Kamoto	member	MOLOLO		0993324835	Mwenha Kamoto
Teepu	local	Maligati		0996573365	Teepu
MANESI CHIMAMB	member	Chingwey			MANESI
LIGINES MBIDZI	NANKUNSWI	Chimbano			Ligines
NACHINEYI ChSasale	member	Chingwey			Nachineyi
DAVUYAYO JAMPUNIK	V.H Sakala	SALVAKA			V H Sakala
SAMISON NSDACA	MEMBER	CHINGAWI		0991387597	SAMISON

8th August 2015

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 6/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Samson Medala	Wardens wa wundia	Chingoni			Samson
Herziva medala	Wardens wa wundia	Kalachi			Herziva
Nelson Rachingamba	Vh	Chingoni		0881438379	Nelson
Bonux Makuya	Junior RAP Specialist	SMEC		0996 244 218	Bonux
Timothy R. J. J. J.	Brnle	SMEC		0791973284	Timothy

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 13 Report

07 October 2015

1. Village Names:
 - o Mtontho
 - o Malika
 - o Kambwata
 - o Chidothi
 - o Njiwa
 - o Mbwadzulu
 - o Chipanangwe
 - o Njiwayoyera
 - o Kaziputa
 - o Kasauka
 - o Sunga
2. Facilitator: John Mwalwanda
3. Notetaker: Connex Makuya
4. Interest Group: Women

Social Mapping

The SGD took place at Mtontho Group Village Head.

The members present drew a map on flipchart paper on which their villages were located.

The area is inhabited by Chewas.

There are a number of religious groups, including: African Isaac and Jehovah's Witness.

In the area, communities use water from shallow wells and boreholes. These water sources provide water all year round. Dambos are along Kasisiti and the Diamphwe River where irrigation farming is practiced. There are woodlots located at Njiwa, Sunga and Mtontho villages.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wamkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos along the Diamphwe River during the rainy season and agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: trees and livestock.

Land was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

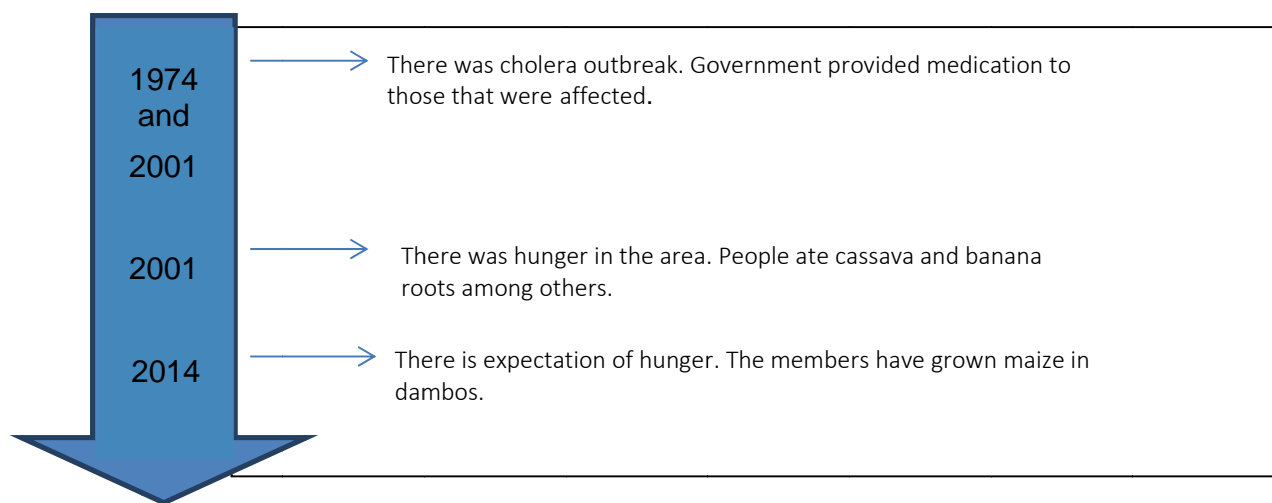
Usually women collect water from the shallow wells, boreholes in the area and the Diamphwe River. The women also collect firewood along the Diamphwe River and from community and family woodlots.

Livestock graze along the Kasisiti and Diamphwe Rivers during the rainy season and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in forestation projects resulting in family and community woodlots.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

[illegible]

availability												
Non-Agricultural activities												
Season for additional activities												

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: safe piped water, irrigation farming, business opportunity, employment and fishing.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing and farming; must be compensated. They would like to resettle close to the project site.
- Loss of graveyard; must be compensated, government should decide what to do.
- Loss of livestock grazing area; must be compensated.
- Loss of trees; must be compensated.

The participants indicated that there is not a preference for the placement of resettlement, as there will be financial compensation.

In addition to this, the group identified the aged and orphans as vulnerable groups, in that order. Both groups are unable to work and require assistance from relatives and/or the community, which may not have the resources to provide for them.

Sch 5 Women in itio Govt

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

7/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
JONAH MUALINDABA	RAAF Specialist	SMEC		0993514876	Jonah
ESTHER LONDOLI	MEMBER	MILITHE			
ABRAHAM IREXIS LONDOLI	MEMBER	MILITHE			Jeen Jewand
MARIA SABAREKA MILINDJANA	MEMBER	KASUKUKA		-	
SINTELEKA MULITANI	MEMBER	MILITHE		-	
MALISI	MEMBER	KAMBATA		-	
JETU AMOSI	MEMBER	MILITHE		-	

SGA Women's Initiative

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 21/10/18







NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
ROSEMARY JAMES	MEMBER	USINTA NOYER A		-	
EUSE JEKOTATA	MEMBER	CHIRAPUSANDA		-	
BELEA MAGE	MEMBER	KAMBUSHTA		-	
NABISA KAMATI	MEMBER	MOTUSHTO		-	
CHINASI VIKILAMU	MEMBER	MOTUSHTO		-	
LIZIESS SIMILIS	MEMBER	MALIKA		-	
BEATRICE PIASI	MEMBER	MOTUSHTO		-	

Sta women who

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 7/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
MUNDAERA Lili	MEMBER	MALIKIA		-	
Eckelezi Bizali	MEMBER	SMUSA		-	
LIXONIA Lumbelo Evdassess	MEMBER	MALIKIA		-	
Evdassess MASACHG	MEMBER	MINDITHS		-	
Bonwey Makuya	JUNIOR RAP SPECIALIST	SMEC		0996244218	
Imothy & Strands	Driver	SMEC		075 1878 284	

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 7th October, 2015

1. Village(s) Name:
 - o Mtontho
 - o Malika
 - o Kambwata
 - o Chidothi
 - o Njiwa
 - o Mbwadzulu
 - o Chipanangwe
 - o Njiwayoyera
 - o Kaziputa
 - o Kasauka
 - o Sunga
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: Connex Makuya
4. Interest group name: Leaders and Elders

Social Mapping

The Focus Group Discussion (FGD) took place at Mtontho Group Village Head. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: African Isaac and Jehovah's Witness.

In the area, communities use water from shallow wells and boreholes. These water sources provide water all year round. Dimbas are along Kasisiti and the Diamphwe River where irrigation farming is practiced. There are woodlots located at Njiwa, Sunga and Mtontho villages.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos along the Diamphwe River during the rainy season and agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: trees and livestock.

Land was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

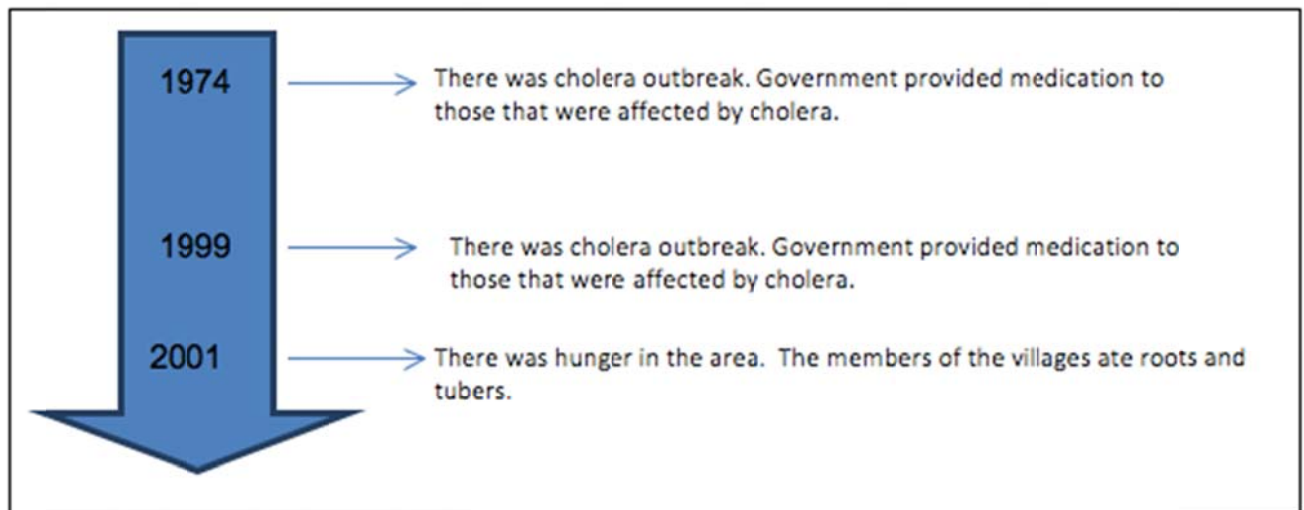
Usually women collect water from the shallow wells, boreholes in the area and the Diamphwe River. The women also collect firewood along the Diamphwe River and from community and family woodlots.

Livestock graze along the Kasisiti and Diamphwe Rivers during the rainy season and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in forestation projects resulting in family and community woodlots.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													These are months when it is very easy to get a loan. There are Village savings and loans (VSL) which run for the whole year.
Non-Agricultural activities													
Season for additional activities													
Holidays													Sundays are holidays.

Generally the participants linked the activities in the area with reference to the calendar activities, for instance good rains results in more income from produce, which can be used to purchase rice and fund entertainment.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, piped water source for the community, fishing, employment and tourism.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing and farming; must be compensated. They would like to resettle close to project site.
- Dispersion of settlement (scattering)
- Loss of graveyard; chief must be compensated and should identify a new graveyard in the resettled area. The community should receive funds to have a ceremony for the remains. Government will decide on what to do.
- Expectation that Katawa River will flood when dam is full; there will be a need for relief items to affected people.
- Loss of livestock grazing area; compensation.
- Loss of trees; must be compensation.
- Low school attendance

The participants indicated that the preference for resettlement would be in the Dedza district in close proximity to the dam catchment area.

In addition to this, the group identified the aged and female-headed households as vulnerable groups, in that order. The aged are unable to work and both the groups require assistance from relatives and/or the community, which may not have the resources to provide for them.







SEAs Chiefs / members report ~~meeting~~ meeting

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

7/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
STAN MUKAMANA	RAP SECRETARY	SMEC		099 3814876	
MUKAMANA	MEMBER	MISITHA			
John Sambe	MEMBER	Childlife			
Leopoldo J. J. J.	MEMBER	KAMBATA			
MAGAZSALA BICKES MUMU		CHIBITHI		099 6 156 625	CHIBITHI, 
BENARD SCOTIE	MUMU	MALIKA			
MUBETONZI CHABUKA	SVH	MISITHA		099 3831 2061 099 3820661	

85A CHAPTER 1 EVENTS INFO TAB

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 21/01/15








NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
DEDALE MABOBE	MEMBER	MALIK		-	
CHINWAZINU BASINIA KUIE	MEMBER	CHINWAZINU		-	
DIVATA CHABUKA	MEMBER	MOSITHI		-	
LOYE JIMIED	MEMBER	CHINWAZINU		-	
FALYED MABE	MEMBER	KAMUKATA		-	
SEDIUS VIKIYANU MFIYU		SUNSA		0798776884	
PANUS'OSO MABIKU	G.U.H	MABIKU		0791885190	

SAS CATERLEBERG WILKINS

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
STANLEY LEBIYABU	MEMBER JUNIOR	MBIAJULU			
Conner Mkhaya	RAP Specialist	SMEC		096244218	
Timothy Mthembu	Driver	SMEC		0888 692 918	
Jackson Mthembu	MEMBER	MAZIKA		099 2676455	
BALSON MUTHUNGA MATHA	MEMBER	SUNGA		0992191936	
STANLEY ALI	MEMBER	SUNGA		—	
MOSES PIRSI	MEMBER	MILITHO			

SUNGA KODANI
MATHA

MEMBER

SUNGA

099 8117028



Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 15 Report

08 October 2015

1. Village Names:
 - o Kawelama
 - o Chinkhalamba
 - o Psyata
 - o M'machimadza
2. Facilitator: John Mwalwanda
3. Notetaker: Connex Makuya
4. Interest group: Women

Social Mapping

The Focus Group Discussion (FGD) took place at Kawelama Village Head.

The members present drew a map on flipchart paper on which their villages were located.

It was indicated that that the area is inhabited by Chewas.

African Abraham is the only identified religious group in the area.

In the area, communities use water from shallow wells, boreholes and the Diamphwe River. These water sources provide water all year round. Dambos are along the Diamphwe River where irrigation farming is practiced.

The community utilises a ground at Chinkhalamba for meetings, football and netball. The community access milling services at Kabwazi trading centre. The area also has a community – based childcare (CBCC).

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wamkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on village dambos along the Diamphwe River during the rainy season and agricultural land during the dry season.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: trees and livestock. Land was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

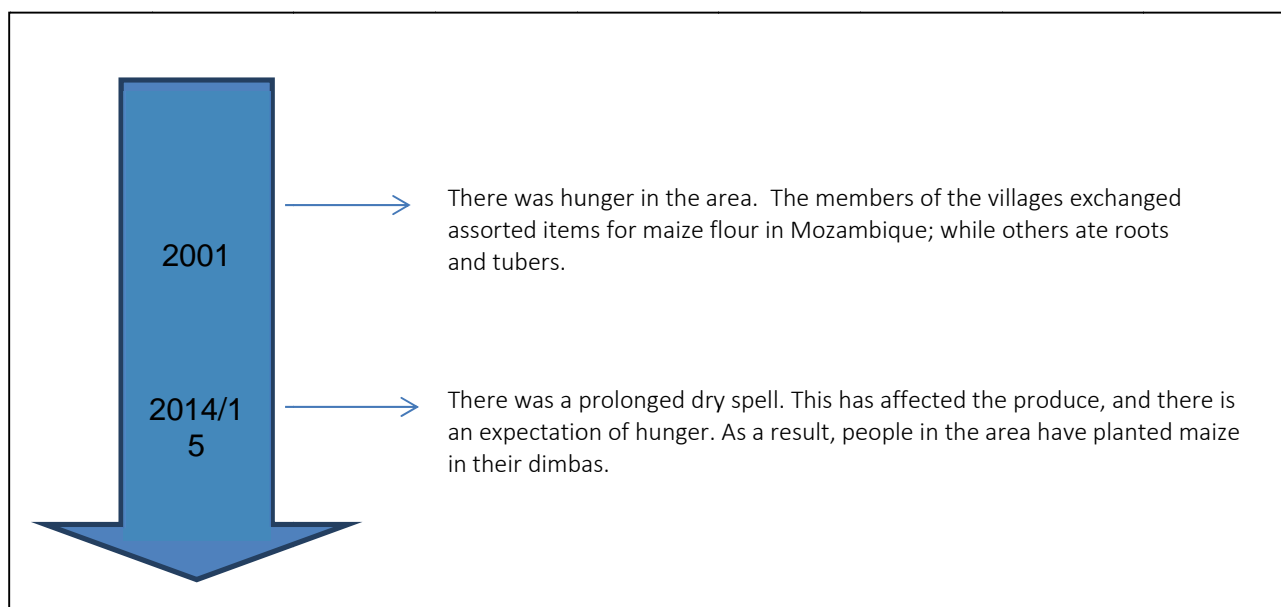
Usually women collect water from the shallow wells, boreholes and the Diamphwe River. The women also collect firewood from the fields, usually mango trees and community woodlots.

Livestock graze along the Diamphwe River during the rainy season and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in maintenance of roads and community fund raising activities.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

[illegible]

availability											
Non-Agricultural activities											
Season for additional activities											

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, fishing and employment.

The group identified that economically active individuals will benefit more from the development because they are able to engage in agricultural-based activities, such as irrigation and employment opportunities.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; members indicated that they will have to be compensated. They would like to resettle close to the project site and to their current settlement.
- Loss of the graveyard; the chief must be compensated, and also identify a new graveyard. The community should receive funds to have a ceremony for the remains.
- No potable water; the government should provide water to the community.
- Loss of trees and fruit



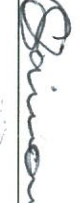


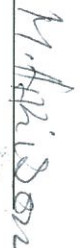

In addition to this, the group identified the aged, orphans and female-headed households as vulnerable groups, in that order. The aged are unable to work. Orphans and female-headed households require assistance from relatives and/or the community, which may not have the resources to provide for them.

Govt
 Kaveri Amt
 SGTB CHBES & SUBSAL

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
STAN MUMUKHATA	RAF SPECIALIST	SMEC		0993819876	
Bisaka Basilini	farmer	Machumachi		0778182870	
Chikoodi Simon	farmer	Phyats		0995521532	
Bason William	farmer	Baselmans		—	
Chilidgis Duface	farmer	Baselmans		—	
Melondo Harrison	member	Kaselmans		0995134364	
Johna Paulini	farmer	Chumkholomkha		—	

Kaunthana Chittha

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap




Diamphwe Multipurpose Dam ESIA & Rap					Date:	8/10/15	
NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE		
Falkson Jigms	refuser	Phyats		095 220 6639	Falksoni		
Sungani fenti	Ubc Chris (vis)	Danselans		095 8076 555	Sungani		
Remond Alsus	Chief	moschimsa		-			
Wilson Stepe	Chief	Chinikhtake		095 586 5501	G. S. IEPPE		
Petel Banks	member	Danselans		-			
Dominik Samson	Chief	Danselans		-	Dominik		
Thobani Mpende	farmer	Danselans		-	Thobani		

KANEMANA CHIEF

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/18

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Motisi Chisong	USC Secretary	Physits		0753898158	
Sping Edward	farmer	Chinkhlangda		-	S. PURING
Cosmos Mangstunde	member	Quaklums		-	Cosmos
Reliangi Pandengda	member	Quaklums		-	
Imothly Nindak	Brider	Domec		0951673784	
Khusfahs Dimon	farmer	Quaklums		-	KHAROT CHA

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion Report

Date: 08th October, 2015

1. Village(s) Name:
 - o Kawelama
2. Facilitator Name: John Mwalwanda
3. Note Taker Name: John Mwalwanda
4. Reporter : Connex Makuya
5. Interest group name: Chiefs and Elders

Social Mapping

The Focus Group Discussion (FGD) took place at Kawelama Village Head. The members present drew a map on flipchart paper on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

It was indicated that that the area is inhabited by Chewas.

There are a number of religious groups, including: Church of Central African Presbyterian (CCAP), African Abraham, Catholic and New Jerusalem.

The area has a community-based childcare (CBCC) and night classes for secondary school students. There is gule wa mkulu for entertainment.

There are courts at each village headquarters. Courts are heard based on the level of crime. There are three levels: Village Head, Group Village Head, and those that are referred to the national judicial system through the police.

It is at these local judicial courts where the Big Dance (gule wa nkulu) takes place.

The community uses the land, not only to cultivate for crop production, but also to collect firewood, and to graze livestock on during the dry season, and the village dambos along the Diamphwe River. The feed is usually abundant during the rainy season (November to July).

Resource Mapping

Water was reported to be the most abundant natural resource.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

Usually women collect water from a borehole and the Diamphwe River. The women also collect firewood from their own field and community (homestead) woodlots.

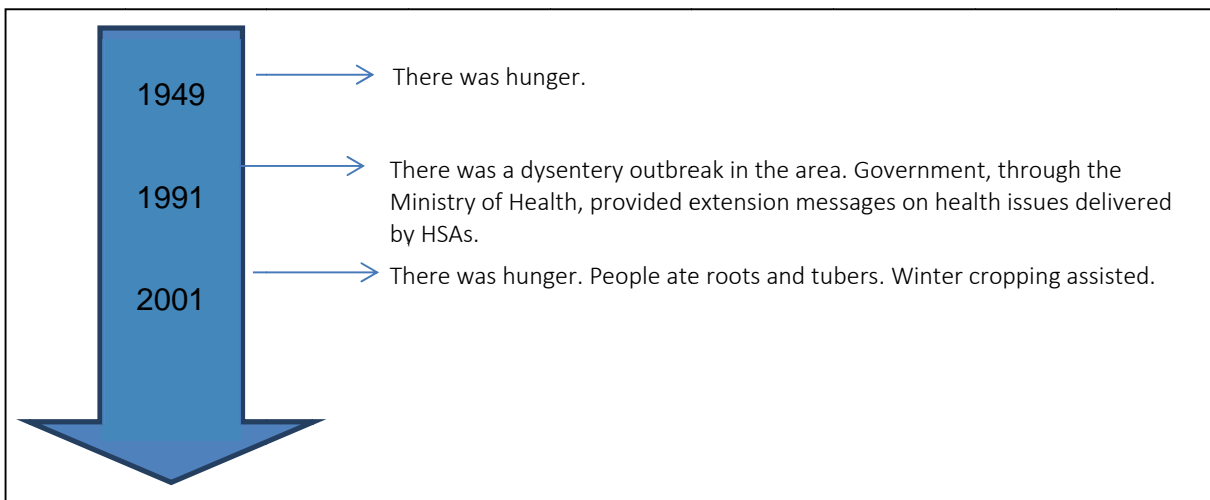
Livestock graze along the Diamphwe River.

The community has been involved in a community development project through which they collect sand and stones, mould bricks used for school blocks, teachers' houses and a health facility. They also indicated that they have been involved in tree nurseries and tree planting, road repair and maintenance and group farming (clubs).

It was also indicated that crocodiles in the area had killed people, and were a concern for the community.

Historical Mapping

The group came up with events that have happened to the community and it is part of their history in the area. This is depicted in the time line below.



Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													
Food lean period													
Income earning period													
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Holidays													Sundays are assumed to be holidays.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: irrigation farming, drinking water, fishing and tourism.

The group identified that the youth will benefit more from the development from employment at the dam site during construction.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; must be compensated. They would like to resettle close to the project site, with sufficient land to continue economic activities as before.
- Lack of portable water for home use; boreholes must be sunk in order to access portable water.

- Loss of grazing land; must be compensation.
- Loss of graveyards; must be compensation. The remains (content of the graveyard) will have to be exhumed and buried in the resettled area.
- Loss of bamboo, trees and fruit trees; must be compensated.
- Affect gule wa mkulu grounds
- Fear of not being allowed to fish; must be compensated.
- Roads and bridges will be affected; government should construct new infrastructure.

The participants emphasized that they would like to be resettled close to the project area.



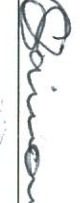




In addition to this, the group identified the aged, orphans and female-headed households as vulnerable groups, in that order.

ACT KANEMANT
SGD CHIEFS & SUBS

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
STAN MUMMANTSA	RAF SPEAKER	SMEC		0993879876	
Bisaka Bessie	farmer	Machumak		0778182870	
Chikobak Simon	farmer	Phyats		0995521532	
Bason William	farmer	Baselmans		—	
Chilibis Boface	farmer	Baselmans		—	
Melondo Harrison	member	Kaselmans		0995134364	
Johna Baulni	farmer	Chinkobak		—	

Kaunthana Village

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/15				
NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE
Falkson Jigms	referee	Phyats		095 220 6639
Sungani Janti	Ubc Chris (vis)	Danselams		095 8076 555
Ronald Alsus	Chief	moschimsa		-
Wilson Stepe	Chief	Chinikhtake		095 586 5501
Petel Banks	member	Danselams		-
Dominik Samson	Chief	Danselams		-
Thobani Mpenda	farmer	Danselams		-

G. SITE PE

Dominik




Landers De

KANIKAWA CHIEF

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/18

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Matthews Chibong	USC Secretary	Physists		0753898158	
Spence Edward	Farmer	Chumkhatumba		-	S. PURING
Cosmos Mangstunde	member	Quakumba		-	Cosmos
Reliance Pandengela	member	Quakumba		-	
Timothy Nindiki	Brick	Dome		0951673284	
Khusile Dimon	Farmer	Quakumba		-	KHAROTCHAU

Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 17 Report

Date: 8 October, 2015

1. Village: Kanthukena
2. Facilitator: John Mwalwanda
3. Notetaker: John Mwalwanda
4. Interest group: Farmers along pipeline

The SGD took place at **Kanthukena** Village Head.

Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													Agricultural /farming activities
Food lean period													
Income earning period													After selling agricultural produce
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													
Season for additional activities													

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: potable water, and irrigation farming and fishing - that will spur business and job opportunities - during and after the dam construction.

The group identified that economically active individuals (both men and women) will benefit from the development because they are able to engage in agricultural-based activities, such as irrigation farming and fishing. The youth will also benefit from job opportunities. Overall they anticipate that everyone will benefit equally from access to portable water.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing and farming
- Loss of trees
- Affected electricity poles
- Affected roads

The group was not willing to share possible mitigation measures, as they need to discuss first amongst themselves and provide feedback at a later time.

The group also was not ready to share a location for resettlement.

In addition to this, the group identified the aged as being a vulnerable group, specifically in terms of loss of land and housing. The aged are unable to work and are not economically active.

SGAs FARMER KANTH KITHA

P1 P5 U N E

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

8/12/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
STANLEY MURIMAMBA	RAP SECRETARY	SMIZ		0993514892	Bony
E. STASI,	FARMER	MITHA		0999 161717	E. R. DONZI
T. Chilanda	FARMER	TAKITUKA			T. Chilanda
AIVE	farmer	Nasoni			AIVE
AGNESS	farmer	Nasoni			AGNESS
Enelesi. Kainde	farmer	Nasoni		0998443500	E. Kainde
VH. NASONI	VH. Nasoni	Nasoni		0991977668	VH. Nasoni

KANITHA KENYA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Uth Kantumbens	farmer	Kantumbens		099 4052352	KANTHAKENA
mother's Band	farmer	Kantumbens		—	
VH Mphate	farmer	mphate		—	VUTHPHWE
Binta Namusiyi	member	Kantumbens		—	
Betha Band	farmer	mother's		—	DOROTHY
Irene Patrick	farmer	mother's		0994326426	ZIONE
Chibond's Poligas	farmer	mother's		—	CHIKONDI

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 8/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Don Lewis	former	mtlids		-	AnnE
Gracia Valinde	former	Jason's		-	G. Valinde
Geoffrey Pasquero	former	Ranthulkins		-	Geoffrey Pasquero
Telís Rajich	former	mtlids		-	
Mary Timofe	member	Ranthulkins		-	
Aless Matayo	former	Ranthulkins		-	
Samuel Luis Binton	former	Ranthulkins		-	

12th Epsn

James

Vanthuis

— Tabula Edisoni

Mary Kenneth

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James

Ernst

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Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 18 Report

Date: 8 October, 2015

1. Village Names:
 - o Mthiko
 - o Nasoni
 - o Kanthukena
 - o Mphete
 - o Mzinga
2. Facilitator: John Mwalwanda
3. Notetaker: Connex Makuya
4. Interest group: Youth Pipeline

Social Mapping

The SGD took place at **Mthiko** Village Head.

The members present drew a map on which their villages were located. Villages were drawn in relation to social structures and institutions in the area.

The estimated number of households has been increasing.

The area is inhabited by Chewas.

There are a number of religious groups, including: African Isaac and Roman Catholic.

Resource Mapping

The following natural resources were reported to be found in abundance, in order: trees, livestock, bananas, elephant grass and bamboo.

Wild game was reported to be a scarce resource.

The community indicated that everyone has equal access to land, and that includes women and the poor. The chiefs allocate land to the families in the area.

Usually women collect water from shallow wells and boreholes.

The women collect firewood from the fields and Batha mountain.

Livestock graze along the M1 road, Batha Mountain and the Diamphwe River during the rainy season and on agricultural land during the dry season.

The community has been involved in a community development project through which they mould bricks used for school blocks, teachers' houses and a health facility. They also have been involved in maintenance of roads and community fund raising activities.

[illegible]

Non-Agricultural activities												
Season for additional activities												They have less farming activities

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: employment, irrigation farming, fishing, electricity opportunity, knowledge sharing and tourism.

The group identified that youth will benefit more from the development due to the time frame of the project.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing, farming and grazing – there will be quarry site; must be compensation as quarry activities will disrupt farming activities.
- Fear of flooding; dam should have provision for controlling floods
- Population increase in area due to affected people moving upstream; people should be sold land.
- HIV/AIDS due to workers at dam site; more sensitisation in the communities about HIV/AIDS and should be a behavioural change.
- Loss of graveyard
- Loss of natural resources

In addition to this, the group identified the aged as being a vulnerable group.

Pipeline

2018 Yearly KANIKENAT

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Xome Renard		Kanthurken			Delia
Derla Chilanda	Student	Kanthurken			Magaziso
Magaziso Inndi	Farmer	Kanthurken		0993534421	
Fashion Jasten	Student	Kanthurken		0991318042	Robert
Chibumbulutsi Stanley	Student	Kanthurken			Chibumbulutsi
Chisinsi Vega	Farmer	Kanthurken			Chisinsi
Conner Makuya	Junior RAP SPECIALIST	SMEC		0996244218	

Kanithuleenat 402175

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Likisina Chitedza	Student	Kanthukena		0993024857	J Chitedza
Memory Davide	Student	Kanthukena		0993024857	M memory
Maryse Muswandi	Farmer	Bokonega akungu			MARYSE
Muidebani Tokane	Farmer	Bokonega Anzani			Muidebani
Chipangano Mike	Business	Mthiko		0994415611	MIKE
Alex Kaludzu	Student	Mthiko		0994671571	Alex
Marko Kanyoza	Business	Nasani		0998024595	Marko

LEAN IN THE SOUTH

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Leseni Malikesi	Farmer	Mzinga	lesseni	—	lesseni
Jesse Kachoga	Student	Mzinga	—	—	Jessy
Alick Timothy	The Student	Kachukwana	—	—	Alick
Fischer Ntswale	school leaver	Mzinga	—	0998901658	FA
Disimasi Gosofa	Farmer	Kachukwana	—	—	—
Yauikani Clitche	School leaver	Mzinga	—	0996137529	FE

Small Group Discussion 19 Report

Date: 9 October, 2015

1. Village: Chemboga
2. Facilitator: John Mwalwanda
3. Notetaker: Connex Makuya
4. Interest group: Villagers at tank site

Social Mapping

The SGD took place at **Chemboga** village head.

The people belong to the Chewa ethnic tribe.

A number of religious denominations include: Seventh Day Adventist (SDA), CCAP, African Abraham, New Apostolic, Chisomo, Rainbow Covenant and Zion.

The village has a borehole where women fetch water; some fetch water from the Diamphwe River.

The court issues are handled based on the country court system, from Group Village Head to Group Village Head, Traditional Authorities, and then the police.

Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													Agricultural or farming activities
Food lean period													
Income earning period													Income is earned from crop sales after harvesting in April
Expenditure													
Rainfall season													
Water availability for the year													

Livestock Forage availability													The livestock are tethered during these months to avoid eating other people's crops
Credit availability													
Non-Agricultural activities													
Season for additional activities													

Participants were able to connect activities within the calendar; for example, more income is realised from crop sales when there is reliable and adequate rainfall.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts of the dam project, in the order of importance: safe piped water, irrigation farming, employment, fish supply from the dam, and electricity.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for farming and housing; must be compensated.
- Loss of trees at tank site and along pipeline to tank; must be compensated.
- Loss of graveyard; must be compensated.

The participants emphasised that those that will be affected should relocate within village.

Shts

(THE MBOGA

MGN 3/2015)

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

9/16/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
STHND	RAP	SMEC		0993514876	[Signature]
MURTHUWANA	SENIOR	SMEC		0996244218	[Signature]
Donex Mokoza	RAP SPECIALIST	SMEC			[Signature]
Imsteli Kofind	Director	SMEC		0991873284	[Signature]
Alfred Chingosund	Farmer	Chenabogs		—	[Signature]
Brighton Chindlin	Farmer	Chenabogs		0992843619	[Signature]
Dassus Joffe	Farmer	Chenabogs		—	[Signature]
Alfred Chindlin	Farmer	Chenabogs		0993690214	[Signature]

(115 MBOLEA VGS
MBS & WOMBU)

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 9/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
NELIE CHIRAMBO	farmer	Chembogs		0997 540346	N. Chirambho
EMELESU MAPONDERA	farmer	Chembogs		08844455787	Mapondora
INESU MAPONDERA	farmer	Chembogs		08844445789	Inesi
Kanyanda Phiri	farmer	Chembogs		0997 2039881	Phiri
Loyed Gwangu	farmer	Chembogs		—	Gwangu
Clara Bwanda	farmer	Chembogs		0999 045810	CB
Jh Chinganda	farmer	Chembogs		—	Chinganda

CHS mbaraka VETA

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 9/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Stel Oostsk	farmer	Chemboys		-	E mataba
Khale Chundlu	farmer	Chemboys		-	A chinhu
Gnadesi Gasegas	farmer	Chemboys		0992062977	G. Gwangwa
St. Gasegas	farmer	Chemboys		0978 488 255	St. Gasegas

Date: 9 October, 2015

[illegible]

Livestock Forage availability													Livestock feeds along the M1 road.
Credit availability													
Non-Agricultural activities													
Season for additional activities													

Generally the participants linked the activities in the area to the calendar activities; for instance, good rains result in more produce, which leads to more income, ultimately leading to more cultural activities.

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: Irrigation, safe drinking water, fishing and finally employment.

All groups will benefit from the development, but the youth will benefit more as they are economically active, and are always in search of job opportunities.

The group considered female-headed households, the aged and orphans to be affected more than other groups of the community.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Affect housing when laying pipes
- Fear of leaking pipes, which may impact houses, fences and trees
- Must be compensated for trees.

In terms of mitigation, the group indicated that there are existing laws that should be followed by the government for structures (houses, fences) that fall within the road reserve boundary.

MKANDA Vg. Matapila Turn/off PRELIM

S G A S ~~MEMBER~~ MEMBER

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 9/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
SONI MATHEMBA	RAF Specialist	SMEC		0993514837	
Simphile Khayisa	farmer	Mkhawazi		0999 670 390	S. Khawazi
Kondon Kachisi	farmer	Mkhawazi		0999 421 9421	B. Kachisi
Chapinssi Legend	farmer	Mkhawazi		0999 129918	Chapinssi Legend
Dmella Mubanza	farmer	Mkhawazi		0994545673	O. Mubanza
Edina Tsinge	farmer	Mkhawazi			
Ester Phiri	farmer	Malangq		0999 675204	E. Phiri

Courex Makhaya
Junior RAF Specialist

0996344218



Timothy D. Smiths
Senior SMEC

0999 1873 284



WILKINSON
MARTIN
MARTIN & WILKINSON

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
LUSIZA KAUETA	Farmer	Makaba		0999821101	L. Kaueta
SISIRIYA PANGANANI	farmer	Mkuwazi			S. Panganani
Georgina kachisi	farmer	Malenga		0996038706	G. kachisi
Patirisha Gastino	Farmer	Bango		0995194635	P. Gastino
Lucy M. Sheek	Farmer	Malenga		0997940159	L. M. Sheek
Vestie Boniface	Farmer	Malenga		0998766308	V. Boniface
Meda Chidzaye	Farmer	Chimjimu			M. Chidzaye

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Saiki mdima	V.H Mtshige	Ulimi		0992120661	Saiki mdima
Mabvuto Chapiro	V.H. Nkomozi	Ulimi		0995527643	Mabvuto Chapiro
Madzi Kapita	MASENI	Ulimi		0995527642	
Josiah	Genani	Bisness		0993126038	J. Genani
Masauliso Chapangasa				0996770020	M. Ch.
Felisiyano	Feniyele			0995156417	
Samuel	Kachisi	Ulimi			Samuel

Piyasani

512050

51101

CP 892350 P. 0503

Pring Sani, Jember

Ames

2/2/2020

James Earl Ray

Stenys pusilla

Forrest

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Project: Diamphwe Multipurpose Dam ESIA & RAP Consultancy -Social Aspects

Small Group Discussion 21 Report

Date: 10 October, 2015

1. Village: Chaponda
2. Facilitator and Notetaker: John Mwalwanda
3. Reporter: Connex Makuya
4. Interest group: Farmers (Men and Women)

The SGD took place at **Chaponda** Village Head.

Seasonal Calendar

Activity	Month												Comments
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Busiest month													Agriculture/ farming activities
Food lean period													Crops are in the field and not yet mature
Income earning period													Most income is realised from crop sales after harvesting
Expenditure													
Rainfall season													
Water availability for the year													
Livestock Forage availability													
Credit availability													
Non-Agricultural activities													

Project Positive Impact and Enhancement

The community indicated the following as positive impacts of the laying of pipes, in the order of importance: safe piped water to the community and employment.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance, as follows:

- Loss of land for housing; must be compensation.
- Loss of trees along pipeline; must be compensation.
- Fear of burst pipes which may impact assets and electricity poles.

The participants emphasised that they would like to be resettled within the village.

PRESENCE CHAIRMAN UNGA
 SGA MEMBERS

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 10/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
TESTA MURKINATA	RAP SECRETARY	SMEC		09935748 76	TESTA
Belton des	farmer	Chaponda		—	DES
Emmanuel Lindi	farmer	Chaponda		—	lindi
Alex mkuwa	farmer	Chaponda		—	Alexmwa
Sydney Julius	farmer	Chaponda		—	Nyadani
U.H. Chaponda	farmer	Chaponda		—	Chaponda
inphato mkuwa	farmer	Chaponda		0991695385	M.MUKWERA

PROFANE

CHIEF MGR OFFICE
MATH & WINTER

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Kelley's maschumba	farmer	Chapda		099 7746145	for
Charity Luellen	farmer	Chaponds		—	charity
Carlina masleng	farmer	Chaponds		—	retiring
Ester Bilgon	farmer	Chaponds		—	Ester
Ellens Daniel	farmer	Chaponds		—	Ellens
Ismae Daniel	farmer	Chaponds		—	
Rick's Daniel	farmer	Chaponds		—	

14 Strands

Brdu

8 mce

0991878284

~~for~~

THE MEKOTA AHS
 MEV h woman

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Delmelle Dickson	Farmer	Chaponda		—	Dickson
Emile Francisco	Farmer	Chaponda		—	Emile
Eda Kamugano	Farmer	Chaponda		—	Eda
Emus Patrick	Farmer	Chaponda		095 8095188	Emus
Masineu Dauda	Farmer	Chaponda		—	Dauda
Monice Tofali	Farmer	Chaponda			M. Tofali
St. Sienis	Farmer	Chaponda		099 6771535	C. Chaponda

Elmda Joseph Farmer Chaponda — E. Joseph
 Alice Kwelisi Farmer Chaponda 099 80 19 037 A. Kwelisi

Small Group Discussion 22 Report

Date: 10 October 2015

1. Village Name: Chaponda
2. Facilitator and Notetaker Name: Connex Makuya
3. Interest group: Youth along pipeline

The SGD took place and **Chaponda** Village Head.

The people belong to the Chewa ethnic group.

Seasonal Calendar

[illegible]

Project Positive Impact and Enhancement

The community indicated the following as positive impacts, in the order of importance: safe piped water to the community, irrigation farming to those that are close to the Dam and fish supply for food.

Project Negative Impact and Mitigation Measures

The community ranked the negative impacts in order of significance especially for those that are close to the road, as follows:

- Loss of land for housing and farming; must be compensation
- Loss of trees along pipeline; must be given seedlings to plant and compensation as well
- Affect electricity poles; move the electricity poles to a different place
- Loss of soil and creation of pits on the land; refill the pits




The participants emphasised that they would like to be resettled within the village.

PIPELINE
KATHUKONGA
CHAPANDA Village T/A MAZENGERA
SKA Youth

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date: 10/10/15

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Conner Makaya	Former RAP Specialist	SMEC		0996244218	
Ernest Khushukwa		Chapanda			E. Khushukwa
Noel Jason		Chapanda		0998137807	N. Jason
Lucius Chionete		Chapanda			L. Chionete
Fred Khenko	Student	Chapanda		0996444645	
Xiusalani Jamisoni		Chapanda		0885015411	
Chrisna Khenko	Student	Chapanda			C.N
Zakeyo Damiano	Student	Chapanda			Za

Handwritten signature

Chaponda Vge
Katnikena

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Frederick Pendula	—	Chaponda			<i>[Signature]</i>
Stephen Fidelis	—	Chaponda			<i>[Signature]</i>
Recius Kamvwa	Student	Chaponda			<i>[Signature]</i>
Alex Banda	Student	Chaponda			<i>[Signature]</i>
Francisco Antonio	Student	Chaponda			<i>[Signature]</i>
Mthimngwe Banda	Student	Chaponda		0885650539	M. Banda
Veronica Kapalegala	—	Chaponda		0885647492	V. K

Revised
Chaponda Vge North
Kdm thumkani

ATTENDANCE REGISTER

Diamphwe Multipurpose Dam ESIA & Rap

Date:

NAME (PRINT)	POSITION	ORGANISATION	EMAIL	MOBILE	SIGNATURE
Charity Chidaya	Student	Chaponda		0882599950	C. Chidaya
Lorens Mbeure	Student	Chaponda		—	L. Mbeure
Flora Malenga	Student	Chaponda		0888579509	F. Malenga
Asiyatu Ladson	Student	Chaponda		—	Asiyatu Ladson
Elemina Rilad	Student	Chaponda		0995408913	elemina R.
Mageo Banda	—	Chaponda		—	mageo Banda
Mary Alick	—	Chaponda		—	

Stoksa Band — Chaponda Gvdy Banda

APPENDIX 10. ESMP ANNEXES

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ESMP ANNEXES

10.1 List of Annexes

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10.2 Job Descriptions of ESHS Unit Staffs

LILONGWE WATER BOARD

JOB DESCRIPTION

POST HOLDER:	POST No. 1
1. JOB TITLE:	2. DEPARTMENT:
Environment, Social, Health, and Safety Officer	Technical Services
3. SUBSTANTIVE GRADE	4. SECTION/ UNIT:
8	Environment, Social, Health, and Safety
5. LOCATION:	6. DATE COMPLETED:
Head Office	

STATEMENT OF MAIN PURPOSE OF JOB

Manage Environment, Social, Health, and Safety section and coordinating environmental, social, health, and safety issues of the Board to ensure Environmental, Social, Health, and Safety standards of board activities and delivery of potable water to customers.

Develop environmental and safety policy of the Board and time-to-time revision and updates.

SUPERVISION EXERCISED

DIRECT

Environmental Safeguard Officer

Social Safeguard Officer

Occupational, Health, and Safety Officer

Senior Laboratory Technician

Laboratory Technician

INDIRECT

Sr. Laboratory Technician (H/Office)

Laboratory Assistant

SUPERVISION RECEIVED

DIRECT

Director of Technical Services

INDIRECT

Chief Executive

CONTACTS WITH OTHER DEPARTMENTS AND EXTERNAL ORGANISATIONS

All Departments of the board.

Other stakeholders in environmental, Social, Health, and Safety sector.

PRINCIPAL DUTIES AND RESPONSIBILITIES

- Initiate the development of Board's environmental and Safety Policies.
- Ensure that all water quality and water treatment activities are carried out in accordance with set standards
- Ensure that all water treatment chemicals and other laboratory consumables are kept in adequate stocks.
- Manage environmental and social impact assessments of all Board's and donor funded projects.
- Supervise Board's work on social development, including land acquisition, resettlement, livelihood restoration, and gender issues in all Board's and donor funded projects.
- Manage health, safety, and welfare of Board's employees at work, contractors at project site, and of others who may be affected by the Boards operation by ensuring that premises are in compliance with health, safety, and hygiene regulations set out by law.
- Resolve complex issues arising from compensation disputes, attend high-level consultation meetings, and supervise communication strategy.
- Prepare, implement, monitor and control annual budget for the section.
- Implement catchment management and protection activities.
- Ensure pollution control through monitoring of water sources.
- Production of section reports.
- Make recommendations concerning staffing levels, training and appointments.
- Performing any other relevant and lawful duties as assigned by Water Quality and Environmental Control Officer from time to time.

SIGNATURE OF POST HOLDER SIGNATURE OF DEPARTMENTAL HEAD

PERSONAL SPECIFICATION

JOB TITLE

POST NO.

Environmental, Social, Health, and Safety Officer

KNOWLEDGE AND GENERAL-WORK-EXPERIENCE REQUIRED

- Knowledge in Environmental and Social laws of Malawi and safeguard policies of development banks, Health and Safety standards of Malawi and international organization, and Corporate Social Responsibility.
- Wide Knowledge of industrial laboratory practices.
- Knowledge in ISO 9001: Quality Assurance and Quality Control, ISO 14001: Environmental Management System (EMS), OHSAS 18000: Occupational Health and Safety (OHS), and SA 8000: Social Accountability.
- At least 10 years of experience in donor funded projects and 3 years of experience working within a major industrial laboratory.
- Should have undergone training in environmental and social impact assessments, and occupational health and safety.

MINIMUM AGE FOR POST HOLDER

30 Years

EDUCATION AND PROFESSIONAL QUALIFICATIONS

Bachelor of Science in Environmental Engineering/ Science/ Technology

MINIMUM POST QUALIFICATION PERIOD

5 Years.

ANY OTHER REQUIREMENTS

Self-starter, responsible, smart, good communication skills and able to organise and manage professional staff and skilled labour.

WORKING CONDITIONS

Mostly office environment with normal temperatures, humidity or noise. May be subjected to hazardous conditions while working with treatment chemicals and reagents. Occasional field trips to project site and W/Ferry existing treatment plant.

SIGNATURE OF MANAGER COMPLETING SPECIFICATION

DATE:

LILONGWE WATER BOARD

JOB DESCRIPTION

POST HOLDER:	POST No.
JOB TITLE:	DEPARTMENT:
Environmental Safeguard Officer	Technical Services
SUBSTANTIVE GRADE	SECTION/ UNIT:
7	Environment, Social, Health, and Safety
LOCATION:	DATE COMPLETED:
Head Office	

STATEMENT OF MAIN PURPOSE OF JOB

- Maintain environmental safeguards of Board's operation and planning, designing, and implementation of development projects and ensure environmental quality standards of potable water delivered to customers and mitigation and compensation measures during project implementation.
- Monitor environmental aspects of the contractors' worksite as per project Environmental and Social Management Plan (ESMP) and Environmental Code of Practices (ECPs).

SUPERVISION EXERCISED

DIRECT

Sr. Lab Technician (Head Office)

Lab Assistant (Head Office)

INDIRECT

Laboratory Technicians (W/Ferry)

SUPERVISION RECEIVED

DIRECT

Environment, Social, Health, and Safety Officer

INDIRECT

Director of Technical Services

CONTACTS WITH OTHER DEPARTMENTS AND EXTERNAL ORGANISATIONS

All Departments of the board

Environmental Affairs Division

Environmental Officer of the District Commissioner

Other stakeholders in environmental and water sector

PRINCIPAL DUTIES AND RESPONSIBILITIES

- Timely implement water quality monitoring activities in accordance with set standards.
- Ensure that laboratory equipment is well-calibrated and maintained.
- Determine annual and daily requirements of water treatment chemicals and other laboratory consumables.
- Initiates medical checkups for water treatment plant personnel.
- Conduct environmental screening and scoping and assist in environmental impact assessments of all Board's and donor funded projects.
- Monitor environmental mitigation and compensation measures carried out by the contractors along with the consultants as outlined in the project's ESMP.
- Conduct periodic consultations with various stakeholders, focus group discussions, and community consultation to monitor the progress of pilot program on catchment conservation and other initiatives taken by the Board as part of the corporate social responsibility.
- Conduct periodic walkover visits along the wayleave to consult with communities and leaders to create awareness about the possible danger and hazards of encroachments.
- Participate in grievance redress committee and resolve issues related to environmental concerns raised by the communities.
- Assists in the preparation, implementation, monitoring and controlling of annual budget for the section.
- Review quarterly and annual environmental monitoring reports and submit them to Board Management and development partners.
- Assists in implementation catchment management and protection activities.
- Perform any other relevant and lawful duties as assigned by Water Quality and Environmental Control Officer from time to time.

SIGNATURE OF POST HOLDER SIGNATURE OF DEPARTMENTAL HEAD

PERSONAL SPECIFICATION

JOB TITLE

Environmental Safeguard Officer

POST NO.

KNOWLEDGE AND GENERAL-WORK-EXPERIENCE REQUIRED

- Extensive knowledge in environmental laws and regulations of the Government and environmental policies of the development partners to identify issues and risks.
- Solid experience in conducting public consultations and resolve disputes.
- Knowledge in ISO 14001: Environmental Management System (EMS) and SA 8000: Social Accountability.
- Wide Knowledge of industrial laboratory practices.
- At least 3 years of experience working within a major industrial laboratory.
- Should have undergone training in environmental and social impact assessments.

MINIMUM AGE FOR POST HOLDER

25 Years

EDUCATION AND PROFESSIONAL QUALIFICATIONS

Bachelor of Science in Chemistry or Environmental Engineering/Science/ Technology

MINIMUM POST QUALIFICATION PERIOD

3 Years.

ANY OTHER REQUIREMENTS

Self-starter, responsible, smart, good communication skills and able to organize and manage professional staff and skilled labor. Self-starter, responsible, smart, good communication skills and able to organize and manage professional staff and skilled labor.

WORKING CONDITIONS

Mostly office environment with normal temperatures, humidity or noise. May be subjected to hazardous conditions while working with treatment chemicals and reagents. Occasional field trips to project site and W/Ferry existing treatment plant.

SIGNATURE OF MANAGER COMPLETING SPECIFICATION DATE:

LILONGWE WATER BOARD

JOB DESCRIPTION

POST HOLDER	POST NO
JOB TITLE	DEPARTMENT
Social Safeguard Officer	Technical Services
SUBSTANTIVE GRADE	SECTION/UNIT
7	Environment, Social, Health, and Safety
LOCATION	DATE COMPLETED
Head office	

STATEMENT OF MAIN PURPOSE OF JOB

- Ensure that social development issues are properly considered and addressed, and that Board-supported operations comply with the development partners' safeguard policies during project design and implementation;
- Assist the Board's work on social development, including land acquisition, resettlement, livelihood restoration, and gender issues, specifically focusing on strengthening institutional capacity, governance and poverty work, community driven development, consultation, conflict, corporate social accountability and responsibility, civil society engagement and proper compensation.
- Monitor social aspects as per project Environmental and Social Management Plan (ESMP).

SUPERVISION EXERCISED

DIRECT

None

INDIRECT

None

SUPERVISION RECEIVED DIRECT

DIRECT

Environment, Social, Health, and Safety Officer

INDIRECT

Director of Technical Services

CONTACTS WITH OTHER DEPARTMENTS AND EXTERNAL ORGANISATION

- Contact with all sections of the Board on social, land acquisition, compensation, and gender issues.

-
- Coordinate with Admin Assistant of Human Resources and Administration on the land acquisition and compensation issues.
 - Coordinate with Government-Land Department at DC's Office, Ministry of Labor.
-

PRINCIPAL DUTIES AND RESPONSIBILITIES

- Participate as lead team member in Board's land acquisition and compensation, advising on social development approaches, policies, and technical issues including safeguard issues during project preparation and supervision.
- Monitor social mitigation and compensation measures carried out by the contractors along with the consultants as outlined in the project's ESMP.
- Work proactively with development partners, DC's Office, TAs, (G)VH to improve the performance of the project with regard to social safeguards and social development outcomes, by providing technical guidance and training.
- Support corporate social responsibility and livelihood restoration program financed by the Board, or other sources including program identification, preparation, processing, and supervision.
- In coordination with Unit Manager, undertake safeguard reviews and gender mainstreaming of projects, prepare reports, and disseminate lessons learned.
- Coordinate with Patrol Men and Pipeline Community Policing Forum to identify encroachments of watermain wayleave. Resolve such encroachments at the early stages so that no permanent structures are built along the wayleave.
- Conduct periodic walkover visits along the wayleave to consult with communities and leaders about social issues and create awareness about the possible loss of assets due to encroachments.
- Participate in periodic consultations with various stakeholders, focus group discussions, and community consultation to monitor the progress of pilot program on catchment conservation and other initiatives taken by the Board as part of the corporate social responsibility
- Oversee and provide advice on Board's operations in support of gender equality and women's empowerment.
- Lead grievance redress committees during the construction of Board projects and resolve conflicts in an amicable manner in coordination with other committee members.
- Design and carry out communications strategy to build broad support for the Board's engagement.
- Review quarterly and annual monitoring and evaluation reports and submit them to Board Management and development partners.

SIGNATURE OF POST HOLDER

SIGNATURE OF DEPARTMENTAL HEAD

PERSONAL SPECIFICATION

JOB TITLE

POST NO.

Social Safeguard Officer

KNOWLEDGE AND GENERAL-WORK-EXPERIENCE REQUIRED

- Extensive knowledge in social safeguard policies of the development partners and Malawi Government and identify issues and risks.
 - Solid experience in conducting social development consultative and participatory approaches, and applying the approaches in the course of an operation.
 - Knowledge in SA 8000: Social Accountability.
 - Must have strong analytical skills
 - Computer knowledge
 - Ability to exercise own initiative.
 - Should have good organization and planning skills.
 - Team player with consistent ethical attitude.
-

MINIMUM AGE FOR POST HOLDER

25 Years

EDUCATION AND QUALIFICATIONS

Master degree in anthropology, sociology, development economics or other relevant social science.

MINIMUM POST QUALIFICATION PERIOD

5 years of relevant experience in the field of social development issues, including social assessment of development projects and resettlement planning for the infrastructure projects funded by international organization (AfDB, WB)

ANY OTHER REQUIREMENTS

- Good interpersonal skills
 - Effective communication and decision making skills
 - Female candidates will be given preference over male
-

SIGNATURE OF MANAGER COMPLETING SPECIFICATION

LILONGWE WATER BOARD

JOB DESCRIPTION

POST HOLDER	POST NO
JOB TITLE	DEPARTMENT
Occupational Health and Safety Officer	Technical Services
SUBSTANTIVE GRADE	SECTION/UNIT
7	Environment, Social, Health, and Safety
LOCATION	DATE COMPLETED
Head office	

STATEMENT OF MAIN PURPOSE OF JOB

- Ensure the health, safety and welfare of Boards employees at work and of others who may be affected by the Boards operation by ensuring that premises are in compliance with health, safety, and hygiene regulations set out by law.
- Monitor health and safety aspects of the contractors' worksite as per project Environmental and Social Management Plan (ESMP) and Environmental Code of Practices (ECPs).

SUPERVISION EXERCISED

DIRECT

None

INDIRECT

None

SUPERVISION RECEIVED DIRECT

DIRECT

Environment, Social, Health, and Safety Officer

INDIRECT

Director of Technical Services

CONTACTS WITH OTHER DEPARTMENTS AND EXTERNAL AND EXTERNAL ORGANISATION

- Contact with all sections of the Board on occupational health and safety issues.
- Coordinate with clinical officer of Human Resources and Administration on the social aspects of HIV/AIDS, STIs, and Malaria
- Coordinate with Government-HIV/AIDS Coordinator at DC's Office, Ministry of Health, National AIDS Commission, TAs, (G)VH, and Health Surveillance Assistants for latest updates and social management of the diseases.
- Contact with NGOs/training institutions – Partners in Hope, University of Malawi and

others for possible training.

PRINCIPAL DUTIES AND RESPONSIBILITIES

- Review existing safety procedures and risk assessments for work activities conducted by employees, contractors and others to ensure adherence with internal standards and project's ESMP and to promote worker/contractor safety; identifies non-compliant, incomplete or substandard procedures, revises existing procedures or develops new procedures for activities involving employees and contractors where sound practical knowledge of occupational safety is required.
 - Ensure a safe and healthy working environment and systems of work through sensitizing employees on occupation health and safety.
 - Monitor all health and safety activities carried out by the contractors along with the consultants as outlined in the project's ESMP.
 - Screen all new projects under preparation to determine whether an HIV/AIDS, STI, Malaria prevention component is mainstreamed into the project design.
 - Keep the provision of seed money to each project's ESMP budget for HIV prevention, this involves contacting the relevant Ministry, National AIDS Commission, TAs, (G)VH, and Health Surveillance Assistants during project preparation and implementation.
 - Make periodic visits to all project sites especially construction camp and yards to monitor health and safety standards and hygiene conditions.
 - Conduct, arrange and report periodic inspections of all installations/ workshops to identify risks and safeguard of all persons from death or injury.
 - Provide personal protective equipment (PPE) to operation sections where necessary and monitor the adequacy of contractor's PPE at construction site.
 - Carry out fire safety assessment on all LWB buildings to ensure that facilities are compliant with safety rules and ensure that appropriate procedures to minimize risks are in place.
 - Disseminate information about HIV/AIDS and STI prevention. Awareness campaigns should deliver appropriate information by targeting champions within each vulnerable group. Information on HIV/AIDS and STI should be more specific and less ambiguous regarding the modes of transmission and the methods of protection.
 - Conform to changing attitudes and practices among high risk groups. This includes targeting truck and equipment drivers at construction sites, migrant laborers, and sex workers by promoting condoms at all offices and camps and on construction sites, and by setting up more convenient locations for condom purchase.
 - Prepare monthly and quarterly reports on occupational health and safety and providing updates on health and safety issues.
 - Perform any other relevant and lawful duties as may be reasonably assigned.
-

SIGNATURE OF POST HOLDER

SIGNATURE OF DEPARTMENTAL HEAD

PERSONAL SPECIFICATION

JOB TITLE

POST NO.

Occupational Health and safety Officer

KNOWLEDGE AND GENERAL-WORK-EXPERIENCE REQUIRED

- Extensive knowledge in monitoring health and safety standards of construction work.
 - Knowledge in OHSAH 18000: Occupational Health and Safety (OHS).
 - Must have strong analytical skills
 - Computer knowledge
 - Ability to exercise own initiative.
 - Should have good organization and planning skills.
 - Team player with consistent ethical attitude.
-

MINIMUM AGE FOR POST HOLDER

25 Years

EDUCATION AND QUALIFICATIONS

- Master Degree in Environmental Science/Civil Engineering
 - Registered Member of the National Construction Industry Council-Malawi (NCIC)
-

MINIMUM POST QUALIFICATION PERIOD

5 years of relevant experience in the field of environment, health and safety for the infrastructure projects funded by international organization (AfDB, WB)

ANY OTHER REQUIREMENTS

1. Good interpersonal skills
 2. Effective communication and decision making skills
-

SIGNATURE OF MANAGER COMPLETING SPECIFICATION

10.2 TERMS OF REFERENCE OF CONSTRUCTION SUPERVISION CONSULTANT (CSC)

A. Objective

The primary objectives of the consulting services under environmental and social management are to:

- ensure that the construction methods as proposed by the contractor for carrying out the works are satisfactory, with particular references to the technical requirements of sound environmental standards on the basis of safeguard requirements (proposed in the EIA, this includes Government and the World Bank environmental guidelines), inspection of contractors' construction equipment, review contractor's health, and safety standards, inspect construction yards and work camps, interview contractors' personnel and general public;
- ensure that the recommendations of the environmental and social management plan (ESMP), environmental and social monitoring plan and environmental code of practices (ECPs) are strictly followed by the contractors;
- prepare quarterly environmental and social monitoring and annual report of implementing these plans as part of project implementation report, and carry out environmental management seminars for contractors and LWB staffs; and
- monitor the implementation of the health and safety program at work site including the information and education campaign on sexually-transmitted diseases and HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome) as required by the civil works contracts

B. Resources

The Environment, Social, Health and Safety Unit will be headed by a Unit Officer, who will be responsible for overall management of the environmental and social work.

C. International Consultants

1. Unit Leader/Environmental Specialist

Responsibilities

The duties of the Consultant shall include, but not limited to:

- update the ESMP prepared by design consultant;
- ensure that the construction methods as proposed by the contractor for carrying out the works are satisfactory, with particular references to the technical requirements of sound environmental and social safeguard standards on the basis of the ESIA;
- carry out environmental and social management seminars for contractors and LWB staffs;
- prepare quarterly environmental and social monitoring and annual reports of implementing the ESMP as part of project implementation report;
- monitor the implementation of the health and safety program at work sites including the information and education campaign on sexually-transmitted

diseases and HIV/AIDS (human immunodeficiency virus/acquired immunodeficiency syndrome) as required by the civil works contracts.

D. National Consultants

1. Environmental, Occupational Health, and Safety Specialist

Responsibilities

The duties of the Consultant shall include, but not limited to:

- Assist international environmental specialists in ensuring that the construction methods as proposed by the contractor for carrying out the works are satisfactory, with particular references to the technical requirements of sound environmental standards on the basis of ESMP;
- Assist international environmental specialists in preparing quarterly environmental monitoring and annual report of implementing this plan as part of project implementation report, and carry out environmental management seminars for contractors and LWB staff;
- Assist in plantation and community forest development work along the Rawwater transmission main corridor, community woodlots, and other project site as proposed in the ESMP;
- Ensure worksite health and safety aspects of the contractors' work as per ESMP and ECPs;
- Ensure that the contractors do not damage the existing plantations.

2. Social Specialist

The social specialist will be responsible for the following:

- Reviewing the environmental and social management plan (ESMP) including mitigation and monitoring plan, enhancement plan pertaining to social and gender aspects;
- Monitoring the aspects of resettlement, livelihood restoration and compensation action plan.
- Monitor the progress of plantation programs.
- Ensure that gender aspects are adequately covered as per the ESMP.
- provide inputs to the quarterly and annual reports;

3. National Ecologist

Responsibilities

The Ecologist will be responsible for:

- Monitoring sections on ecological aspects in the documents pertaining to the ESIA study of the project;
- Reviewing the environmental and social management plan (ESMP) including mitigation and monitoring plan, enhancement plan pertaining to ecological aspects;
- provide inputs to the quarterly and annual reports;
- Monitoring the impacts of the project on the flora and fauna using indicators

selected in the ESMP and ecological and fisheries baseline report.

4. HIV/AIDS Specialist

Responsibilities

The HIV/AIDS Specialist will be responsible for:

- ensure worksite health and safety aspects of the contractors' work as per ESMP and ECPs;
- assist international environmental specialist in creating awareness on HIV/AIDS among the construction workers and local community;
- Coordinate with Contractor's HIV/AIDS Unit for proper implementation of the program;
- provide inputs to the quarterly and annual reports;
- draft a leaflet in Chichewa for distribution to local community on HIV/AIDS and STD.

5. Field Surveyors (2)

Responsibilities

The Field Surveyors will be responsible for:

- Work under the guidance of the team to collect data and monitor ecological resources, HIV/AIDS program, plantation program in bi-monthly basis as recommended in the ESIA through various defined methodologies such as technical sampling, planting activities, etc.
- Exclusively engaged in the project site and influence area and responsible for collecting secondary data from the concerned agencies.
- Exclusively engaged to work in close association with the local government institutions, NGOs and maintaining all sorts of liaisons with different institutions and officials.

10.3 TERMS OF REFERENCE OF MONITORING AND EVALUATION CONSULTANT

A. Background

The implementation of all environmental and social activities (in regards to environmental quality, biodiversity, resettlement, livelihoods restoration and compensation implementation) needs to be monitored and evaluated by an independent third party monitoring agency called monitoring and evaluation consultant (MEC) to assess the process of implementation of programs recommended in the ESMP. Their main objectives will be to monitor on a quarterly basis the physical and progress of the project implementation. The MEC will also evaluate all inclusive target achievements and performance (against the indicators listed in the monitoring plan) during three years of operational stage.

The MEC will be engaged over the three years of project implementation and three years of operation stages. Thus, the MEC will be engaged for a sum total of six years for carrying out monitoring and evaluation activities. However, the period of engagement is not envisaged as continuous, instead it will be intermittent over 72 months.

B. Objectives of the Services

The objectives of the MEC have been envisaged as follows:

- a. To monitor the environmental quality, biodiversity, plantation and community forest development, afforestation, and soil erosion and silt contents in Shire River.
- b. To monitor all project activities regarding resettlement and rehabilitation, livelihoods restoration, disbursement of all entitlements to PAPs, implementation of HIV/AIDS protection and control programs and any other unforeseen issues concerning adverse social impacts of the project.
- c. To carry out monitoring and evaluation activities on a pre-planned framework for the whole period of project implementation and operational stages, i.e., over 6 years.
- d. Carry out regular quarterly monitoring of physical and financial targets of program implementation.
- e. Carry out evaluation of achievements at the end of each year of implementation of the project and prepare annual reports including suggestions of modifications of the process of implementation to retract targets in case these are not achieved following the proposed implementation program.
- f. To ensure evaluating the GRM process in place to register and resolve cases of objections of acquisition of affected properties, cases of dissatisfaction on compensation amounts and payment disbursements.
- g. To assess the performance of the ESHSU in implementing ESMP during project implementation and operation stages.
- h. Suggest measures of rectification of procedures in meeting up objectives of the implementation of RLRCAP.

C. Scope of Work

1. The MEC's primary task is to perform the activities of monitoring and evaluation of implementation of proposed ESMP, RLRCAP.
2. Carry out situational analyses for monitoring, evaluating and suggesting modifications in the process if required to meet necessary targets scheduled over defined time scale.
3. The MEC should produce quarterly progress reports (QPR) on monitoring physical, biological, and financial targets and achievements of ESMP implementation.
4. After completion of each year of program implementation, the MEC will prepare annual monitoring and evaluation reports (AM&ER) to assess the achievements of the ESMP implementation, highlight failures of the ESMP against the target, and suggest modification of the monitoring indicator and process in order to bring the implementation on track, if it would deviate from originally proposed program.

D. Organization and Staffing

The services of the MEC are expected to be provided for 30 months over 72 months, during the period of project implementation and operation stages. The team will comprise of one Senior Monitoring and Evaluation Specialist / Team Leader, one Social Development Specialist (including HIV/AIDS), one Environmental Specialist (including biodiversity), and one Documentation and Reporting Staff.

E. Details on Staff Qualifications

- i. Senior Monitoring and Evaluation Specialist / Team Leader

The TL must have qualification at Master's Degree level with experience of working as MEC for more than 10 years. He must have working experience of carrying out M&E activities of implementing resettlement programmes in infrastructure development projects in the country at least for 5 years as the team leader. He should be conversant with monitoring of financial and physical progress of project implementation.

- ii. Social Development Specialist (including HIV/AIDS)

The social development specialist must be a graduate with 5 years of working experience M&E projects. Experience of program implementation of resettlement plans, livelihoods restoration, HIV/AIDS, etc. will be a necessary.

- iii. Environmental Specialist

The environmental specialist must be a graduate with 5 years of working experience in M&E projects. Experience of program implementation in environmental management plans, including biodiversity management will be a necessary.

- iv. Documentation and Reporting Staff

The reporting staff must be a graduate. He/she should have experience of documentation of project implementation progress and also for keeping day-to-day accountabilities.

F. Supervision

The team will work in association with the PO, reporting to the project manager of the PO on a day-to-day basis. Overall supervision will be done by the ESHSU.

G. Outputs

- An Inception Report at the end of 4 weeks of project mobilization stating the work program and any deviation from the original plan.
- Quarterly monitoring and evaluation report.
- Annual monitoring and evaluation report

10.4 PROJECT PLAN FRAMEWORKS

1. Soil Erosion and Sediment Management Plan Framework
2. Biodiversity Management Plan Framework
3. Mitigation Plan Framework
4. HIV/AIDS Management Plan: Livelihood Restoration Plan Framework
5. Livelihood Restoration/Improvement Plan Framework
6. Communication Plan Framework

10.4.1 Soil Erosion and Sediment Management Plan

ESMP-Subplan 1: Soil Erosion and Sediment Management Plan					
Objective	<ul style="list-style-type: none"> To reduce soil erosion and deforestation in the catchment and reduce sedimentation of waterways. To establish a good example of catchment protection for replication in other catchments and areas in the country; and To provide capacity building and training to affected communities in maintaining saplings, sustainable forest management, and in land husbandry. 				
Performance criteria	<ul style="list-style-type: none"> Reduction in the tonnage of soil washed down from the catchment area into the Diamphwe and Linthipe Rivers. Area of forest cover. Number of trees that survive in comparison with the total number of saplings planted. Number of functional Village Natural Resources Management Committees (VNRMCs) formed and operational in the catchment. Number of training sessions conducted. 				
Targets	<ul style="list-style-type: none"> Reduction in levels of soil erosion. Reduction in silt content in waterways and eventually less operation costs for WTW; Reduced number of gullies. Improved soil and water conservation. Increased area of forests. Reduced charcoal production; and Improve the capacity of VNRMC. 				
Impact/Issue	Mitigation/ Enhancement Measures/ Actions	Responsibility for implementation	Responsibility for Supervision	Timing	Monitoring
Aggravated soil erosion due to poor catchment conservation in	<ul style="list-style-type: none"> Rehabilitate disturbed areas with suitable ground and tree species. Distribute fruit and wood saplings of indigenous species to the landowners and provide trainings in maintenance of saplings 	Forest Research Institute of Malawi (FRIM) and the local community in	CSC/ ESHSU-LWB	Construction	Details of plans to be formalized and

ESMP-Subplan 1: Soil Erosion and Sediment Management Plan					
the Diamphwe River Catchment including the project area.	<ul style="list-style-type: none"> and in land husbandry for soil conservation; Provide community training to maximise the use of the land for other crop production in the same land. Terms-of-reference of the Tree Plantation and Community Forest Development Plan is presented in Annex 7-6. 	collaboration with Village Natural Resources Management Committees (VNRMCs),			documented
Aggravated soil erosion in the catchment area with the construction of Project components.	<ul style="list-style-type: none"> Implement ECP 4: Drainage Management and ECP 6 Erosion and Sediment Control in the vicinity of construction works. Establish forest woodland buffer zone around the reservoir. Rehabilitate buffer areas around infrastructure components with ground cover. Rehabilitate temporary construction areas with pre-construction vegetation, including quarry and service pipeline areas. Ensure that the trenches are properly backfilled to avoid subsidence. 	Contractor and the local community in collaboration with the VNRMCs, Village Development Committees (VDCs), and Extension Staff from Government.	CSC/	Construction	Details of plans to be formalized and documented
Catchment Deforestation due to charcoal making	<ul style="list-style-type: none"> Implement afforestation and reforestation programs within the catchment. Provide resources to Dzalanyama Forest Reserve to manage illegal clearing and charcoal activities. Provide training to the VNRMCs and VDCs in the protection of natural resources, in importance of forest cover, and land husbandry 	Contractor and the local community in collaboration with the VNRMCs, VDCs, and Extension Staff from Government	ESHSU-LWB	Construction	Details of plans to be formalized and documented
Auditing	<ul style="list-style-type: none"> CSC and M&E to monitor on a regular basis the implementation of soil and water conservation measures within the catchment. Monitor soil loss. Monitor the implementation measures intended to arrest deforestation 				
Guidelines, Standards and	<ul style="list-style-type: none"> The Environment Management Act (1996) and EIA Guidelines (1997) 				

ESMP-Subplan 1: Soil Erosion and Sediment Management Plan		
Legislation	<ul style="list-style-type: none"> Malawi Forest Act (1997) Water Resources Act (1969) Land Act (1965) National Local Government Act (1998) 	
Potential Concern	Corrective Action	Responsibility
There is serious degradation of soils in the catchment area.	<ul style="list-style-type: none"> Put in place soil and water conservation measures. 	All stakeholders
The catchment area is heavily deforested.	<ul style="list-style-type: none"> Implement afforestation and reforestation programmes in the catchment area and allow natural forests to regenerate. 	All stakeholders
Reporting	<ul style="list-style-type: none"> Report changes in soil erosion on an annual basis Report changes in forest cover on an annual basis 	

10.4.2 Biodiversity Management Plan Framework

A. Objectives

This biodiversity management plan aims at putting in place monitoring and capacity building and training as an enhancement mechanism for project cumulative effects on terrestrial and aquatic biodiversity as proposed in the Environmental Management Plan. The specific objectives of the plan are to:

- (i) Set suitable parameters for monitoring during construction and operation stages;
- (ii) Monitor key species during construction and operation stages; and
- (iii) Train and create awareness among the construction workers and the communities regarding the protection of plants and wildlife.

B. Component 1: Monitoring and Assessments during Construction

Prepare an integrated reporting plan during construction to provide systematic monitoring and assessment of the progress/results of all components, identifying the content, format and timing of monitoring and assessment reports. The proposed reporting plan will be reviewed, commented on and approved by relevant stakeholders before commencement of monitoring activities.

C. Component 2: Capacity Building in Biodiversity Management

Design, conduct, and assess results of the following capacity building programs:

- Training of construction workers
- Training of local communities for community based wildlife monitoring including sensitization on species with conservation significance in the project impact area

D. Component 3: Follow-up Monitoring and Assessments during Operation

Prepare an integrated reporting plan during operation to provide systematic monitoring and assessment of the progress/results of all components, identifying the content, format and timing of monitoring and assessment reports. The proposed reporting plan will be reviewed, commented on and approved by relevant stakeholders before commencement of monitoring activities.

E. Time Frame

The consulting services for baseline monitoring will be a total of 42 months to cover the entire construction period, about 4 months for capacity building and training for the construction workers and communities, and follow-up monitoring for 3 years of operation.

F. Reporting Requirements/Deliverables

The Consultant will prepare and submit the following reports and deliverables during the course of the project:

- Half Yearly Monitoring/Progress Report – every six months (one for the rainy season and one for the dry season each year)
- Annual Monitoring Report
- Capacity Building and Training Plan
- Draft Final Report on Capacity Building and Training Plan
- Final Report Capacity Building and Training Plan

G. Institutional

It will be important that the Proponent and Contractor work closely with relevant district and national agencies and community representatives. This is to include the Fisheries Department, Forestry Department and National Parks and Wildlife

H. Staffing

The Biodiversity management Plan will be implemented by suitable national wildlife and aquatic ecology experts. It is anticipated that the following national staff will be required:

- National Staff:
 - a. Wildlife Biologist/Ecologist (Team Leader)
 - b. Aquatic Ecologist/Fisheries Expert
 - c. 2 Technicians (Wildlife and Fisheries)

Biodiversity Management Framework

ESMP-Subplan 3: Biodiversity Management Plan	
Objective	<ul style="list-style-type: none"> Establish mitigation measures where species of conservation significance, critical habitats, and, special biodiversity areas, are located within the project impact area for various seasons. Set suitable parameters for monitoring during construction and operation stages. Develop buffer zones within the project boundary, to support/protect nursing grounds of relevant animal species with conservation significance in the project area (supplemented by Subplan 1: Soil Erosion and Sediment Management Plan). Implement appropriate mitigation measures for the protection of flora and fauna during construction activities. Monitor key species during construction and operation stages. Train and create awareness among the construction workers and the communities regarding the protection of plants and wildlife with international and national conservation significance. Terms-of-reference of the Biodiversity Management Plan is presented in Annex 7-8.
Performance criteria	<ul style="list-style-type: none"> Increase in number of species of conservation significance, their habitats, and designated biodiversity areas. Designated buffer zones for species of conservation significance in the project area. Monitor the presence of key species during construction and operation stages. Low incidence of invasive species. Training on awareness among the construction workers and the communities regarding the protection of plants and wildlife with international and national conservation significance are delivered and number of people trained.
Targets	<ul style="list-style-type: none"> Reduction in number of poaching. Reduction in number of species killed. Increase in the area of critical habitats of species of conservation significance. Development of designated buffer zones for wildlife. Increased area of forests, and people trained in biodiversity management.
Establishment of 15 m wide Buffer Zone around reservoir perimeter.	<p>Establishment of the 15 m wide buffer zone will be a significant undertaking, requiring careful coordination and integration of a number of institutions and technical expertise. The buffer zone will comprise of forest woodland species endemic to the Diamphwe River catchment. Where practical Riparian dambo species will be planted along the reservoir foreshore.</p> <ul style="list-style-type: none"> The work will be supervised by the PIU with oversight from the Catchment Management Committee. Specialist advice and assistance will be provided by the Department of Forestry.

ESMP-Subplan 3: Biodiversity Management Plan

	<ul style="list-style-type: none"> ▪ Ongoing consultation with relevant stakeholders including Department of Fisheries, National Parks and Wildlife and TAs. ▪ Planting trials to be undertaken prior to construction to determine the optimum conditions for establishing forest woodland and riverine vegetation. ▪ The ESHSU will prepare a detailed planting and management Plan in accordance with advice from the Department of Forestry and rehabilitation specialist. This will include information on species composition, suitable areas for establishing riparian vegetation, a staged planting program, propagation requirements, security, plant maintenance and access provisions to the reservoir. ▪ Plant nurseries will be established with an emphasis on community involvement and local employment. ▪ At the beginning of construction the buffer zone to be delineated on the ground and clearly marked. ▪ Planting should commence at the beginning of construction and undertaken in accordance with the stage planting program. ▪ Monitoring and maintenance. ▪ Progress reports to be submitted on a quarterly basis to MoAIWD. 				
Impact/Issue	Mitigation/ Enhancement Measures/ Actions	Responsibility for implementation	Responsibility for Supervision	Timing	Monitoring
Survey	<ul style="list-style-type: none"> ▪ Prior to construction undertake additional fauna survey during the wet season to add to information collected during the ESIA. 	<ul style="list-style-type: none"> ▪ ESHSU-LWB 	PIU	Prior to construction	
Mammal Species with conservation significance <ul style="list-style-type: none"> ▪ Common duiker ▪ Jackal ▪ Spotted Hyena ▪ Clawless otter 	<ul style="list-style-type: none"> ▪ Avoid construction during the rainy season if possible. ▪ Restrict clearing of riverine vegetation especially reeds to the required area during construction. ▪ During operation, protect riverine vegetation (especially reeds) 	<ul style="list-style-type: none"> ▪ Site Engineer of the Contractor during construction. ▪ LWB and District Environmental Officer. 	CSC/ ESHSU-LWB	Construction and operation	<ul style="list-style-type: none"> ▪ Monitor that hippo paths are not obstructed by construction works. ▪ Prepare and submit monthly monitoring during

ESMP-Subplan 3: Biodiversity Management Plan

	<p>clearing along the river banks.</p> <ul style="list-style-type: none"> During construction avoid obstruction of animal paths and create suitable bypasses. Implement a capture and release procedure, if necessary. 				the rainy season and assessment reports stating hippos sited and mitigation measures taken.
<p>Bird Species with conservation significance</p> <ul style="list-style-type: none"> Little Sparrow Hawk Peregrine Falcon Broadbilled Roller Guinea fowls and Owls 	<ul style="list-style-type: none"> During construction restrict clearing of forests to areas needed. Relocate bird nests to nearby trees during construction or wait till hatching before clearing. Restrict clearing of forests/woodlands during operation stage. Implement a capture and release procedure, if necessary. 	<ul style="list-style-type: none"> Contractor and the local community in collaboration with the VNRMCS, Village Development Committees (VDCs), and District Environmental Officer. 	<ul style="list-style-type: none"> CSC/ESHU-LWB 	<ul style="list-style-type: none"> Construction and Operation 	<ul style="list-style-type: none"> Prepare and submit monthly monitoring during the rainy season and assessment reports stating nests sited and mitigation measures taken during the breeding season. Measures taken to protect riverine and forest woodland habitats.
<p>Reptile Species with conservation significance</p> <ul style="list-style-type: none"> Nile Crocodile Nile Monitor Lizard Python Mamba 	<ul style="list-style-type: none"> Avoid clearing of riverine vegetation during construction. Avoid activities within 5 to 10m from the river bank, where possible. Put in place wire mesh shields on unattended open trenches during construction to prevent trenches 	<ul style="list-style-type: none"> Site Engineer of the Contractor during construction LWB and District Environmental Officer during operation 	<ul style="list-style-type: none"> CSC/ESHU-LWB 	<ul style="list-style-type: none"> Construction and operation 	<ul style="list-style-type: none"> Monitor whether an animal screen has been erected over trenches by the contractor. Prepare and submit monthly monitoring during

ESMP-Subplan 3: Biodiversity Management Plan

	<ul style="list-style-type: none"> acting as pitfall traps. Provide training to the construction workers in the protection of wildlife. Implement a capture and release procedure, if necessary. 				the rainy season and assessment reports stating nesting sites sited and mitigation measures taken during the breeding season.
Amphibians, reptiles and small mammals	<ul style="list-style-type: none"> Avoid clearing of riverine vegetation during construction. Avoid activities within 5 to 10m from the river bank, where possible. Put in place wire mesh shields on unattended open trenches during construction to prevent trenches acting as pitfall traps. Provide training to the construction workers in the protection of wildlife. Implement a capture and release procedure, if necessary. 	<ul style="list-style-type: none"> Site Engineer of the Contractor during construction LWB and District Environmental Officer during operation 	<ul style="list-style-type: none"> CSC/ ESHS-LWB 	<ul style="list-style-type: none"> Construction and operation 	<ul style="list-style-type: none"> Monitor that screens have been erected to protect amphibians, reptiles and small mammals from falling into trenches
Fish and macro-invertebrates	<ul style="list-style-type: none"> Avoid clearance of vegetated river banks during construction. Avoid siltation of waterways during construction. Intake structures to be designed with screen/mesh to minimize entrainment or impingement. Velocity caps that produce 	<ul style="list-style-type: none"> Site Engineer of the Contractor during construction LWB and District Environmental Officer during operation 	<ul style="list-style-type: none"> CSC/ ESHS-LWB 	<ul style="list-style-type: none"> Construction and operation 	<ul style="list-style-type: none"> Monitor that vegetation along waterways is not being cleared. Monitor that there is no siltation into waterways during construction.

ESMP-Subplan 3: Biodiversity Management Plan

	horizontal intake/ discharge currents will be employed, and intake velocities across the intake screen will generally not exceed 0.15 m/s.				<ul style="list-style-type: none"> ▪ Monitor that fish fingerlings and fish are not being sucked in at the new water intake site. ▪ Monitor performance of the fish screen.
Management of Invasive pest species including aquatic weed (Red Fern) and introduced fish species.	<p>Do not allow introduction of non endemic species and ensure any pest species are quickly removed from the Dam.</p> <ul style="list-style-type: none"> ▪ Implement system to manage pest species including treating infestations as soon as they are noticed. ▪ People from the local community should be employed on a part time basis to patrol the dam and upstream areas, and any detection of pest species immediately reported to the Dam environmental representative. Local community can also be employed to clear weed infestations. Collected weed should be appropriately disposed of by burial or incineration. ▪ All boats and equipment used on 	LWB and District Environmental Officer during operation	<ul style="list-style-type: none"> ▪ CSC/ ▪ ESHS-LWB 	<ul style="list-style-type: none"> ▪ Construction and operation 	<ul style="list-style-type: none"> ▪ Daily visual monitoring for pest species. Employ local community to assist. ▪ Community, particularly fishers, encouraged to report pest species.

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	<p>the dam should be regularly inspected and cleared of weed fragments.</p> <ul style="list-style-type: none"> Education of the local community about how risk of contaminating the dam can be reduced, including the the risk and consequences of introducing pest flora and fauna species. In the event of extreme infestations of aquatic weed a herbicide (glyphosate) can be used, which is very effective, however a thorough risk assessment would need to be undertaken before any herbicides are used. Fishers to be trained in identifying potential pest species and encouraged to report their catches. 				
Auditing	<ul style="list-style-type: none"> In liaison with the contractor, VNRMCS, and ESHSU monitor on a regular basis the implementation of biodiversity conservation measures with the Project area. Monitor loss of nests. Monitor the implementation measures intended to arrest deforestation. 				
Guidelines, Standards and Legislation	<ul style="list-style-type: none"> The Environment Management Act (1996) and EIA Guidelines (1997) Malawi Forest Act (1997) National Parks and Wildlife (Amendment) Act of 2004 				

ESMP-Subplan 3: Biodiversity Management Plan		
Potential Concern	Corrective Action	Responsibility
<ul style="list-style-type: none"> Habitat degradation 	<ul style="list-style-type: none"> Habitat conservation measures by developing a buffer zone along the reservoir perimeter with a total area of approximately 156 ha. Develop community woodlots/forest for increasing the area of forest cover and hence improve the habitats for wildlife. 	All stakeholders
<ul style="list-style-type: none"> The impact on critical riverine habitat, nesting ground, and disrupt breeding and spawning grounds. 	<ul style="list-style-type: none"> Construction work in the riverine area will be restricted during breeding and spawning season to avoid hindrance or blockage of breeding and spawning. Restrict operations near waterways during the peak fish breeding season between November and March 	All stakeholders
Reporting	<ul style="list-style-type: none"> Baseline Monitoring Survey Report – 2nd month Report changes in biodiversity management on an annual basis Report changes in forest cover on an annual basis Capacity Building Plan – 1st Month 	

10.4.3 Mitigation Plan Framework

The mitigation plan given is organised around various project activities and includes actions identified under the mitigation measures discussed in Chapter 8, 9 and 10. The Plan defines responsibilities for implementation as well as monitoring of each action, and also indicates the timing of these actions. Should any changes to the Project design or methods of construction and operation take place, post this assessment stage, the impacts and monitoring/mitigation measures discussed may need to be revised to reflect such changes to allow the environmental and social implications of these changes to be addressed.

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
A. PRE-CONSTRUCTION STAGE				
A.1 Contractor's mobilization	If the contractor is made responsible to comply with ESMP, there will be several construction related impacts	<p>In order to make the Contractors fully aware of the implications of the ESMP and responsible for ensuring compliance, technical specifications in the tender documents will include compliance with mitigation measures proposed in the ESIA as well as IFC EHS guidelines. The Contractor must be made accountable through contract documents for the obligations regarding the environmental and social components of the project.</p> <p>Contractor need to prepare the following site specific construction environmental action plans to manage and mitigate/reverse potential adverse environmental impacts. All these plans are to be reviewed and approved by CSC and PO.</p> <ul style="list-style-type: none">▪ Erosion, sediment and drainage control plan▪ Pollution Prevention Plan▪ Waste Disposal and Effluent Management Plan▪ Traffic Management Plan▪ Borrow Area Management and Restoration Plan▪ Occupational Health and Safety Plan▪ Drinking Water Supply and Sanitation Plan▪ Construction Camp Management Plan▪ Fuel and Hazardous Substances Management Plan	Contractor	CSC, PO

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<ul style="list-style-type: none"> Emergency Preparedness Plan Communication Strategy Plan 		
A.2 Social Impacts during Pre-Construction				
A.2.1 Land acquisition	<ul style="list-style-type: none"> About 2,457.98 ha of agricultural land acquisition required including 2259.48 ha (Reservoir), & 198.5 ha (Infra.) Temporary loss of 60 ha of pipeline to Bunda Turnoff. 	<ul style="list-style-type: none"> Proper compensation to the affected households. Provide compensation in accordance with 'Resettlement, Livelihood Restoration and Compensation Action Plan' (RLRCAP) Engage DC and land department for implementation of RLRCAP Establish Monitoring Unit involving 3 parties (LWB, the World Bank and PAPs) for monitoring purposes. Demonstrate measures for changing cropping pattern to compensate the loss of crop production including development of demonstrating plots Provide training program for the farmers and technical support to them Bring fallow lands under agricultural cultivation 	DC offices, LWB	RPIT
	644 households & 89 businesses will be affected through loss of structures (housing, small shops, fences, driveways, sign posts, boundary walls, and other structures)	<ul style="list-style-type: none"> Create job opportunities for those who lose employment due to land acquisition in the construction and post construction O/M. Encourage women participation in construction works. 	DC offices, LWB	RPIT
	Loss of community assets: - 2 schools - 4 churches - 3 sports grounds	<ul style="list-style-type: none"> Provide compensation in accordance with 'Resettlement, Livelihood Restoration and Compensation Action Plan' (RLRCAP) Engage DC and land department for implementation of RLRCAP Establish Monitoring Unit involving 3 parties (LWB, the World Bank and PAPs) for monitoring purposes. 	DC offices, LWB	RPIT

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	Cultural sites <ul style="list-style-type: none"> 14 graveyards & two isolated grave sites will be affected in the reservoir area. 1 graveyard will be affected in the Balancing tank area 3 graveyards will potentially be affected 21 heritage sites will be affected in the reservoir area 	<ul style="list-style-type: none"> Manage affected cultural sites in accordance with the Cultural management Plan. Undertake further site investigations before construction in accordance with the Cultural management Plan. Provide cultural training awareness to all site personnel. 	DOH, DC offices, LWB	RPIT
	Temporary land acquisition by the contractor.	<ul style="list-style-type: none"> Compliance with the resettlement policy framework prepared by the LWB 	DC offices, LWB	RPIT
B. CONSTRUCTION PHASE				
Environmental Impacts During Construction Stage				
B.1. SITE PREPARATION & CLEARANCE (all project activities)				
B.1.1 Site clearance and vegetation clearance	Impact of vegetation clearance due to the felling of native and protected tree species and 4 species of	<ul style="list-style-type: none"> Avoid cutting down of tree species of conservation significance and those that are protected under the laws of Malawi, even those that act as nesting and breeding sites. Obtain approval from Department of Forestry for removing tree species of conservation significance. 	LWB, FRIM, DOF	ESHSU

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	conservation significance (Bleedwood teak, African mahogany, Coast Gold leaf, Yellow Wood). Trees will mostly be found in affected graveyards.	<ul style="list-style-type: none"> Restrict developments of contractor's workspace in critical habitats. Maintain buffer zones of plants and trees on river banks Include environmental management and awareness as part of training for employees during construction. 		
	Impact on critical habitats, breeding, and nesting sites for protected species (See Subplan 3: Biodiversity Management Plan).	<ul style="list-style-type: none"> Minimize and restrict clearing of riverine vegetation. Avoiding construction activities during important breeding season (November to March). 	Contractor	CSC
	Impact on species of conservation significance (See Subplan 3: Biodiversity Management Plan).	<ul style="list-style-type: none"> Monitor construction and adjoining areas to ensure no animals will be affected by activities. Scare any away if they are too close to the site by gradually increasing sound levels. Monitor vegetation before clearing. Capture and relocate any animals, if necessary. 	Contractor	CSC
	Impacts on indigenous trees	<ul style="list-style-type: none"> Vegetation clearance will be limited to the extent required for execution of works. Tree plantation consisting of 156 ha will be carried out around the reservoir to form a 15 m buffer zone. Plantation will be developed only with indigenous species. 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<ul style="list-style-type: none"> Contractor will follow ECPs 12: Protection of Flora while tree cutting 		
	Loss of faunal habitat in and around construction areas. Fragment and lead to loss of critical bird habitats and habitats for species that are protected or conservation significance including those that nest on the ground (See Subplan 3: Biodiversity Management Plan).	<ul style="list-style-type: none"> Avoid or minimise clearance of natural or riparian vegetation by aligning project from areas that are important habitats. Minimise construction in the critical habitats of riparian and forest woodland vegetation. Care should be taken to make nests are not destroyed. If there is no option available, rehabilitate them in other neighboring habitats. Protect and rehabilitate injured or orphaned animals. Use of existing access road and limit the width of new access roads to 5.5 m including the side drains. Compensatory planting of 166 ha (includes 10 ha for replacement graveyards) of native trees and aftercare. Implement ECP 13 Protection of Fauna for species with conservation significance. 	Contractor	CSC
	Contaminated areas	<ul style="list-style-type: none"> Contaminated areas could include existing solid waste dumps, pit latrines, or other potential sources of water contamination. These areas will be bio-remediated by digging them up, mixing with soil and then placed in soil banded areas to bio-remediated. It is estimated that suitable remediation would occur between three and six months, subject to ambient weather conditions. The areas will be monitored on a weekly basis and their remediation verified before reservoir filling. Any non remediated areas will be removed from the reservoir and suitably disposed of elsewhere. 		
B2. Construction Activities				
B. 2.1 Soil stripping	Impact on top soils that are required for	<ul style="list-style-type: none"> Strip the top soil to a depth of 35 cm and store in stockpiles of height not exceeding 2m. 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	plant growth or agricultural development.	<ul style="list-style-type: none"> Remove unwanted materials from top soil such as grass, roots of trees and others. Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilised for rehabilitating disturbed areas. Implement ECP 7: Top Soil Management 		
B.2.2 Impacts due to excavations and construction activities.	Impact on the loss of habitats especially the terrestrial invertebrates that live in the ground.	<ul style="list-style-type: none"> Avoid construction during the rainy season Minimize excavation and vegetation clearance to minimum required level. 	Contractor	CSC
	Fragment habitats for species in riverine and forest woodland vegetation	<ul style="list-style-type: none"> Where feasible undertake activities in such a way that it provides migration corridors between different habitats. Fence off trenches with nets to prevent small animals falling into them. Provide by-passes for people to have access to the river. 	Contractor	CSC
	Death of amphibians and reptiles due to falling into trenches, which may act as pitfall traps. Loss of temporary breeding pools and pans due to filling by construction materials.	<ul style="list-style-type: none"> Schedule major construction activities during the dry season to reduce impact since the amphibian populations will be low during non-breeding season. Fence off excavations with nets to prevent animals falling into the trap. Cover the excavations as soon as practicable. 	Contractor	CSC
	Disturbance/damage to unidentified cultural sites.	<ul style="list-style-type: none"> Manage affected cultural sites in accordance with the Cultural management Plan. Undertake further site investigations before construction in accordance with the Cultural management Plan. 	DOH, DC offices, LWB	RPIT

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<ul style="list-style-type: none"> Provide cultural training awareness to all site personnel. 		
	Emissions of dust and gases will be generated from excavation activities, operation of construction equipment and vehicles, material transport, and site clearance.	<ul style="list-style-type: none"> Implement ECP 10: Air Quality Management. Implement dust monitoring program. Schedule activities to avoid hot, dry and windy conditions. These are most likely to occur between September and October. Maintain a weather station onsite and cease any activities that may cause dust levels to exceed compliance limits (50 g/m³ for 24-hour average PM₁₀ for the Project considered alone; and 20 g/m³ for annual average PM₁₀ due to the Project and other sources). The main access road will be sealed. Internal construction roads will be regularly maintained and kept compacted to minimise dust mobilisation. Enforce vehicle speed limit on unsealed roads to 20 km/hr. Two watering trucks will be available full time on the project. Each truck will have a capacity of around 10,000 l and a spray rate of approximately 2,500 l per minute. A water tank and fixed water sprays will be located at the quarry and crushing area. The storage and handling of spoil, subsoil, topsoil and materials should be carefully managed to minimize the risk of wind-blown material and dust. Cover hauling vehicles carrying dusty materials moving outside the construction site. Burning of any waste on site is prohibited. Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. Limit the idling time of vehicles not more than 2 minutes; Regular and proper maintenance of vehicles and machinery. 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	Noise and vibration from quarry and excavation activities, operation of construction equipment and vehicles, material transport, and site clearance.	<ul style="list-style-type: none"> Implement ECP 11: Noise and Vibration Management. Objective noise level at nearest sensitive receptor is 55 $L_{Aeq,1hr}$ (dBA). Operating hours are 7 am to 6 pm, Monday to Saturday. Monitor noise levels at sensitive and implement additional mitigation measures if necessary. This may include: <ul style="list-style-type: none"> modifying activities or providing acoustic shielding for high noise emitting plant to reduce noise emission impacts on sensitive receivers, if necessary; implementing feasible and reasonable acoustical mitigation at receivers, if necessary; and negotiating or relocating sensitive receivers if noise attenuation measures are not effective or feasible. Select low noise plant and equipment where feasible. Incorporate breaks into construction activities likely to generate high noise levels. Periodically test the sound power levels of mobile mining equipment in accordance with ISO 6395: 1998. Modify or limit audible signals such as horns, whistles and bells, as safety permits. Maintain equipment in good working order. Limit delivery of equipment and consumables to between 7 am and 6 pm. Further refinement of on-site noise mitigation measures and site operating procedures, where practicable, including investigation of temporary noise barriers on the northern side of the access road. Prompt response to any community issues of concern or complaints. Undertake regular consultation with local government officials and community members about upcoming Project activities. Providing community members with a phone number to contact in the event of excessive noise 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<p>disturbance.</p> <ul style="list-style-type: none"> Include noise control and awareness training programs for site personnel. Noise and vibration awareness training for all construction workers including subcontractors as part of general site induction; 		
B.2.3 Coffer dams and river diversion	River diversion works could affect aquatic organisms, increase turbidity and sedimentation of nearby waters, degrade water quality, noise and substrate alterations.	<ul style="list-style-type: none"> Schedule works during low flow conditions. Schedule works outside of fish breeding season between November and March. Incorporate sedimentation controls (Subplan 1: Soil and Sedimentation Control Plan) during diversion works construction and around coffer dams and diversion channel for the duration of the construction. Minimise any downstream scouring of the river channel. Monitor for any animals (Subplan 3: Biodiversity Management Plan). 	Contractor	CSC
B.2.5 Traffic movements	Increased Traffic on the access road at the M1 Road and to the construction area could deteriorate safety (especially the school children and elderly people), spillage of fuels and chemicals, and damage to infrastructures and properties due to vibration.	<ul style="list-style-type: none"> Implement ECP 15: Road Transport and Road Traffic Management Include in the contractor's traffic management plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges, temporary diversions, necessary barricades, warning signs / lights, road signs, construction schedule etc. Provide signs at strategic locations of the roads complying with the schedules of signs contained in the National Traffic Regulations. Safety and security actions and procedures to protect local community. Restrict truck deliveries to working hours. Manage traffic queuing at the Main Road intersection. Restrict the transport of oversize loads. Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<ul style="list-style-type: none"> Enforce on-site speed limit, especially close to the sensitive receptors, schools, health centers, etc. Inspect structures within the close proximity of construction site and ensure that all affected persons are evacuated from the property before construction commences. 		
B.2.6 Accidental spills	Contamination of soil and water pollution due to the accidental spills and leakage of fuels and chemicals	<ul style="list-style-type: none"> Implement ECP 2: Fuels and Hazardous Goods Management Permanent and regular monitoring will be carried out. Contractor to confine any contaminants immediately after any accidental spillage. Contractor to collect contaminated soils and washouts containing and dispose of them appropriately. All areas intended for storage of hazardous materials to be quarantined and provided with adequate facilities to address any emergency situations. Storage should comply with relevant regulations. 	Contractor	CSC, PMO
B.2.7 Waste management		<ul style="list-style-type: none"> Implement ECP 1 Waste Management and ECP 2 Fuels and Hazardous Goods Management. 	Contractor	CSC, PO
	<i>General Solid Putrescible</i> Waste from accommodation and office areas.	<ul style="list-style-type: none"> Includes food scraps, waste wrappers, paper. Provide suitable enclosed bins onsite. Monitor bin capacities and keep surrounding area clean Regular removal of waste from site by appropriate waste contractor. 	Contractor	CSC, PO
	<i>General Solid Non-Putricible</i> Waste from construction activities	Waste that is not contaminated or mixed with any other type of waste and includes: <ul style="list-style-type: none"> - Concrete pour residues - Aggregates 	Contractor	CSC, PO

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	(non-liquid)	<ul style="list-style-type: none"> - Damaged & offcuts of PVC pipes - Rejected or defective precast concrete - Steel waste - Used Geotextile - Timber waste ▪ Recycle, reuse ▪ Removed from site by appropriate waste contractor 		
	<p><i>Potentially hazardous solid waste</i></p> <p>Waste from on-site maintenance and servicing of plant and equipment – note minor servicing only. Major servicing to be completed off site. (non-liquid)</p>	<ul style="list-style-type: none"> ▪ Includes: <ul style="list-style-type: none"> - Drained and crushed oil filters and grease tubes - Used and defective parts - Oil soaked rags - Used oil absorbent materials - batteries - Tyres ▪ Recycle, reuse ▪ Removed from site by appropriate waste contractor 	Contractor	CSC, PO
	<i>Potentially hazardous liquid waste</i>	<ul style="list-style-type: none"> ▪ Includes Relatively small quantities of: <ul style="list-style-type: none"> - Paints - Solvents - Spilt oil and fuel ▪ Removed from site by appropriate waste contractor. 	Contractor	CSC, PO
	<i>Sewage waste</i>	<ul style="list-style-type: none"> ▪ Includes Sanitary and wastewater ▪ Onsite treatment and disposal via engineered and approved septic disposal system. 	Contractor	CSC, PO

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
B.2.8 Borrow and quarry activities	Impact of borrow and quarry activities	<ul style="list-style-type: none"> Implement ECP 9: Quarry Areas Development and Management. Borrow/quarry areas will be developed in the designated area shown on the site plan. No private lands or agriculture lands will be used for borrowing. Minimize volume of borrow material as much as practicable. Prohibit the use of explosives. Control dust and noise (see B2.2) Photographs recorded of each borrow area showing pre-construction baseline for comparison with after rehabilitation 	Contractor	CSC
B.3 Occupational Health and Safety				
B.3.1 General construction works	Health and safety of staffs and adjacent communities	<ul style="list-style-type: none"> Contractor shall prepare and submit a Health and Safety plan to PMO for approval Inclusion of regular training of all staff in health and safety best practices in Contractor's training plan. Provision and enforcement of the use of personnel protection equipment (PPE, such as life jacket, safety harnesses, gloves, safety boots, hard hats, dust masks, ear protectors, safety goggles, personal protective clothing etc.) as per approved Health and Safety Plan. Measures for enforcement of use of PPE to be included in Health and Safety Plan. Contractor to submit accident reports to the Engineer following any accident on site. Report must detail actions to be taken to reduce risk of reoccurrence Qualified health and safety manager shall be appointed by contractor Contractor shall engage a full time doctor or paramedic on site. Provision of dispensary for treatment of staff. Dispensary to be stocked with appropriate medicines for likely incidents, diseases and ailments to occur on site. Stock to be replenished as necessary First aid facilities shall be provided at each work site on the project area 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<ul style="list-style-type: none"> The contractor shall include in the health and safety plan a procedure for the transfer of injured staff or community member insured as a result of his works from site to medical facilities, including transport and provision of medical treatment en-route. 		
B.4 Social Impacts during Construction				
B.4.1 Construction activities	Generation of employment	<ul style="list-style-type: none"> Employment for local workers and technicians Employment of unskilled labors from the affected communities. 	Contractor	CSC
	Increased economic activity	<ul style="list-style-type: none"> Establishment of new businesses and commercial enterprises and generate local employment 	Contractor	CSC
	Possible cultural conflicts between communities and workers	<ul style="list-style-type: none"> Awareness campaign and code of conduct for workers Grievance mechanism 	Contractor	CSC
	increased risk of accidents, unsafe working conditions and health risks for workforce	<ul style="list-style-type: none"> Occupational Health and Safety Plan to be implemented Emergency Preparedness Plan. Contractor follows IFC Performance Standards on Labor and Working Conditions; Safety training for workers 	Contractor	CSC
	Aggravated risks of HIV/AIDS and STI due to the flow of immigrant workers	<ul style="list-style-type: none"> Operationalize the HIV/AIDS Unit/Cell in the fold of responsive health facilities for workers' safety to be provided by the Contractor. Awareness creation on HIV/AIDS infection and diseases through a well-designed campaign implementation plan targeting all risk-prone groups. Adopting and carrying out BCC among target groups for promoting safe sex practices. 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
		<ul style="list-style-type: none"> Free distribution of condoms, condom promotion and social marketing of condoms. Put in place a referral healthcare facility to deal with medical aspects of HIV/AIDS treatment with specialized services. 		
	Increased cases of broken marriages due to the extra-marital affairs between migrant solitary male workers and community women, where women indulge due to poverty	<ul style="list-style-type: none"> Implement ECP 19: Construction and Operation Phase Security Creating jobs for women in construction activities would lessen the chances of extra-marital affairs and would save families from breaking. Extra-marital affairs with unsafe sex would increase spread of HIV/AIDS. Thus, holding regular HIV/AIDS awareness programs covering community women would restrict women from indulging in unsafe sex / extra-marital affairs. 	Contractor	CSC
B.4.2 Safety, security, and vandalism	Inadequate construction site security poses a significant risk to assets, construction materials and property. Theft/vandalism of assets, materials and property would increase construction costs and cause delays in project completion.	<ul style="list-style-type: none"> Continued consultations with the village and group village head and security personnel Security at the work sites and camps. Employ night watchman for periods of significant on-site storage or when the area necessitates. Ensure there is proper fencing around construction site perimeter, chain-link at least 2.4 m high and secured with a steel chain and lock. Pre-employment screening investigations should be used to verify the applicants relating to their employment, education and criminal history background. Identification cards to workers 	Contractor	CSC
	Improper security measures may pose security risk for	<ul style="list-style-type: none"> Prepare site specific security plan. Maintain register to keep track of number of persons present in the camp at any given time. 	Contractor	CSC

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	construction workers and especially foreign staff on construction sites.	<ul style="list-style-type: none"> Employ appropriate security personnel at job sites. Ensure proper fencing as mentioned above. Ensure controlled access points to job site as mentioned above. Ensure works have easily identified credentials as mentioned above. Ensure job sites are properly lighted at night. 		
B.4.3 Appointment of unskilled labor	Exploitation of local communities	<ul style="list-style-type: none"> Contractor shall not retain, nor allow any third party employer to recruit labors who are less than 14 years of age or pregnant women. Contractor shall not employ, nor allow a third party employer to recruit any child under the age of 18 years for hazardous tasks Neither contractor nor third party employers shall engage forced or bonded labor Contractor shall provide works with information regarding their rights relating to hours of work, wages, overtime and compensation, and ensure third party employers do the same. Contractor shall provide a grievance mechanism for staff to raise work place concerns and ensure third party employers also maintain a similar mechanism for grievances. The contractor shall not discriminate against any staff candidate on the basis of gender, race, nationality, ethnic, social and indigenous origin, religion or belief, disability, age, or sexual orientation, and ensure third party employers main the same standards. Contractor shall ensure workers receive notice of dismissal and severance payments as per national labor law. The contractor shall provide employment opportunities to members of the local community. 	Contractor	CSC
C1. Environmental impacts during Operation and Maintenance:				
C.1.1.	Catchment	<ul style="list-style-type: none"> Implement soil and water conservation measures around areas undergoing 	FRIM, LWB	ESHSU

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
Stockpile of materials	degradation and aggravated soil erosion	rehabilitation. <ul style="list-style-type: none"> Catchment management works, including monitoring and managing forest woodland buffer. Provide training to the land owners on sapling maintenance and land husbandry. 		
C.1.2 High silt content in Raw water	Grit and high silt content in the Raw water may affect the operation of water treatment works and quality of treated water.	<ul style="list-style-type: none"> The design has considered pre-sedimentation/ grit removal tanks. These will be designed to efficiently remove grit and other suspended solids from the raw water. Settled silt and grit will be appropriately disposed of. Ensure pre-sedimentation /grit removal tanks are operating effectively. 	LWB Operation Staff	ESHSU
C1.3 Handling of debris accumulated in raked screens	Impact of trash and floating debris on mechanical equipment	<ul style="list-style-type: none"> Ensure installed mechanical raked screens are working effectively. Observe for debris clogging at the raked screens. Regular clearing of the screens to protect from damage 	LWB Operation Staff	ESHSU
C.1.4 Mechanical abrasion in intake	Entrapment and impingement of juvenile and adult fish and invertebrates may result in immediate death due to mechanical abrasion and suffocation	<ul style="list-style-type: none"> Intake structures will be designed with screen/mesh to minimize entrainment or impingement. Velocity caps that produce horizontal intake/ discharge currents will be employed, and intake velocities across the intake screen will generally not exceed 0.15 m/s. Regular monitoring of entrainment and impingement. 	LWB Operation Staff	ESHSU
	Sludge from chemically assisted (coagulant)	<ul style="list-style-type: none"> The sludge produced from chemically assisted sedimentation will be stored in a lagoon to retain the sludge for extended period of settlement and 	LWB Operation	ESHSU

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
	sedimentation will impact on water quality	consolidation.	Staff	
	Deep abstraction of Raw water may contribute substrate alterations	<ul style="list-style-type: none"> Water will be taken from the appropriate layer to avoid sediment entrainment. 		
C.1.6 Rawwater abstraction	Abstraction of Rawwater will alter the natural flow rates and degrade riparian habitats, and alter aquatic community structure and diversity.	<ul style="list-style-type: none"> The proposed dam will therefore be operated to ensure a 90% percentile compensation flow (Q90), which is the flow that is available 90% of the time. 		
C.1.7 Dam siltation	Release of sediment to downstream waterways.	<ul style="list-style-type: none"> Dam design includes sufficient sediment storage volume for more than 47 years. 	LWB	ESHSU
C.1.8 Operational failure	Major shut-down of the plant due to careless operation and maintenance	<ul style="list-style-type: none"> Make all operations visible and easily accessible by the supervisors and management. 		
C2. Social impacts during Operation and Maintenance:				
Positive Impacts				
C.2.1 Sustainable water supply in the LWB service	Sustained water supply and reduction in waterborne disease in Lilongwe City	<ul style="list-style-type: none"> Significant change in lifestyle in Lilongwe City and surrounding areas of LWB's service area by providing uninterrupted supply of potable water. Alleviate the existing water shortages in the district. Sectoral goal will be achieved by decreasing the water borne diseases in the 	LWB	ESHSU

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
area		service area. <ul style="list-style-type: none"> Improved water supply services will contribute significantly on reduction to households and the Government spending on water borne diseases. 		
C.2.2 Water supply to affected communities	Supply of potable water to affected communities along the water transmission main corridor	<ul style="list-style-type: none"> Supply of potable water to communities currently using groundwater resources. 	LWB	ESHSU
C2.3 Employment	Employment opportunities	<ul style="list-style-type: none"> During Project planning. Construction: up to 300 persons. Operation: up to 50 persons. Catchment management: up to 200 persons. Business opportunities. 	LWB	ESHSU
C2.4 Utility services	Improved infrastructure	<ul style="list-style-type: none"> Water services. Community services – health and education. 	LWB	ESHSU
C2.4 Agriculture	Improved agricultural opportunities	<ul style="list-style-type: none"> Provision of irrigation to 1,000 ha of cropland. Provision of water to up to 50 community fish farms. 	LWB	ESHSU
C2.5 Catchment management	Improved biodiversity	<ul style="list-style-type: none"> Establishment of 156 ha buffer forest woodland area. Catchment management initiatives including soil erosion prevention works, tree planting and forest protection. 	LWB	ESHSU
C2.6 Dam management	Improved water management	<ul style="list-style-type: none"> Reduced flood peaks for major floods Increase flows during naturally occurring low river flow conditions. 	LWB	ESHSU
C2.7 Gender	Improved status of women	<ul style="list-style-type: none"> Sustainable water resource will improve health and generate business and employment opportunities. 		
C.2.5 HIV/AIDS	Better awareness	<ul style="list-style-type: none"> Promoting awareness on safe sex, use of condoms for restricting physical 	LWB HIV/AIDS	ESHSU

Project Activities	Environmental Impacts	Mitigation/Compensation/Enhancement Measures	Institutional Responsibilities	
			Implementation	Supervision
management	about HIV/AIDS	<p>contacts, roadside drama on adverse side of HIV/AIDS infections through the HIV/AIDS program would reduce the chances of the spread of HIV/AIDS in the region.</p> <ul style="list-style-type: none"> Women empowerment through employment in construction works. 	Workplace Committee	

10.4.4 HIV/AIDS Management Plan Framework

Background

When large scale development of infrastructure project take place in poverty stricken rural areas of any developing country, it has been observed that diseases and infections transmitted through sexual routes have been common across the globe. This mainly happens during the construction phases when workers from outside the region, who are mostly solitary males, come for working in the construction site. These workers, both unskilled and skilled, get close to host communities, especially with women for meeting their physical needs. On the other hand, some women from the poor host communities get easily allured by extra cash earnings and indulge in unprotected sex with these workers. This virtually causes a threat to both the partnering groups. STI or STDs spread this way. Also, physical contacts give rise to another critical ailment called Tuberculosis or TB. In addition, drug abuse is also another way of contracting severe diseases such as HIV/AIDS. Thus, while working on environmental management plans for keeping the environment safe from any degradation or in enhancing the environmental quality of the region where the project in view will be implemented, it is an important task in part of the consultant to promote ideas of managing the menaces of the spread of diseases like STI, TB and HIV/AIDS. Thus, in meeting this requirement, an effort has been made here to prepare the STD, TB and HIV/AIDS Management Plan.

The National Government of Malawi recognizes the importance of Gender, HIV and AIDS in development project. The National HIV and AIDS Action Framework embody a strategy to guide all stakeholders in the implementation of Gender and HIV and AIDS responsive programs and projects between 2012 and 2017. Though it has been developed for Agriculture Sector Wide Approach (ASWAp.), (Agriculture Sector Gender, HIV and AIDS Strategy 2012-2017, Ministry of Agriculture and Food Security, Government of Malawi), it has relevance in using this approach in development projects of other sectors as well.

The situation of HIV/AIDS prevalence is of concern in Malawi including LILONGWE district. Based on an estimate of UNAIDS in 2013, the number of people living with HIV is 1,000,000, with adults aged 15 to 49 prevalence rate is 10.2%, women aged 15 and up living with HIV 500,000, children aged 0 to 14 living with HIV 170,000, deaths due to AIDS is 48,000, and orphans due to AIDs aged 0 to 17 is 790,000. According to 1998 estimates by the National Aids Commission (NAC), LILONGWE district had 93,400 HIV infected adults with 69,600 HIV infected adults in the city and 23,800 adults in the rural areas. The total number of estimated adult AIDS cases was 4,549 with 4,093 deaths. It is further projected that by December 2005, the estimated adult HIV infections will rise to 141,221 with 10,282 AIDS cases and 9,964 AIDS deaths if the situation remains without effective interventions at all levels

In the rural areas along Shire River, that encompasses much of the present project region, absolute majority are engaged in agricultural production as the main stay of life. The poverty, gender bias and HIV/AIDS scenario exist predominantly. Infection of diseases such as HIV/AIDS lead to broken marriages, isolation from the family and community and in some instances leads to stigmatization as people at large do not discuss issues related to STDs, especially HIV/AIDS. There is a general avoidance observed among communities in this regard. However, while conducting public consultations and focus group discussions with different stakeholder groups, issues have been revealed which are linked to HIV/AIDS and sexually transmitted diseases

Due to the high prevalence of HIV/AIDS in the project area and potential risks of aggravating the situation, the need for developing an ESMP Sub-plan addressing HIV/AIDS and other sexually transmitted diseases was felt and this management plan has been prepared towards bringing in all-

inclusive social enhancement. While addressing issues of controlling the spread of STDs and TB are done through diagnose and direct medical treatments required for combating such diseases, addressing issues of HIV/AIDS fall much in the ambit of creating social awareness through provisioning efficient public campaign in main. Medical treatment of these diseases require extremely specialized facilities including critical patient tranLWBsporting facilities and through well designed governmental health services directed and supported by National AIDS Councils (NAC).

Objective

The overall objectives of this plan are (a) to control the spread of HIV / AIDS among the different population groups connected with the construction activities, constituting mainly the migrant labor force, truck and other heavy vehicle drivers and vendor personnel on one hand and on the other, local communities located along or close to the construction sites, and (b) to assist the LWB fight the spread of HIV/AIDS among its staff, family member, surrounding communities and service providers that do business with LWB. The present Management Plan has been prepared for the civil construction contractors and LWB HIV/AIDS Workplace Committee to implement 'Prevention and Control of HIV / AIDS' during project implementation.

The specific objectives of this HIV / AIDS Management Plan are provided below:

- a) to increase the level of awareness about prevention of HIV/AIDS among different stakeholder communities,
- b) to promote safe sex behavior through promotion of condom use,
- c) Developing referral awareness for medical care and treatment of HIV/AIDS,
- d) to develop capacities of various stakeholders in order to enable an effective behavior change among high-risk groups and vulnerable populations towards the prevention of HIV / AIDS,
- e) strengthen LWB clinics with ambulances to transport critical patients hospitals,
- f) to enhance delivery of HIV/AIDS services by LWB Workplace HIV/AIDS Committee by building its capacity, and
- g) to reduce HIV/AIDS related deaths by putting more people on ART.

Extent of the HIV/AIDS Sub-Plan

This ESMP has developed a two pronged approaches. One, it is in combating contagious common diseases through provisioning of medical facilities for diseases like STD/STI and TB. The other is in controlling spread of HIV/AIDS mainly through creating public awareness and training on how HIV/AIDS spreads, symptoms, safe sex practices, behavioral changes and referral to medical support.

With an understanding on the intensity of the problem and likelihood of the spread of HIV / AIDS in the construction phase of the project, strategies of intervention to be followed for addressing the issue of on prevention and control of the disease, etc. have been stated below:

- Awareness creation through organizing camps among target groups;
- Displaying IEC materials at strategic locations and maintaining them;
- Promoting behavior change communication (BCC);

- Condom promotion, social marketing and / or free distribution of condoms; and Referring people to treatments available for STD / HIV / AIDS at nearby Government / private hospitals / clinics.

Task 1: Formation of HIV/AIDS Unit / Cell of Contractor at Responsive Healthcare Facility in Construction Site Offices

A Unit / Cell has to be formed for addressing HIV/AIDS issues as part the Responsive Healthcare Facility for workers within each site offices by the Contractor as an integrated component of the site office as per the overall ESMP for taking care of HIV/AIDS and other health related issues. The Unit / Cell will consist of a team of expert professionals / consultants who will assist Resident Engineer / Site Manager of the Contractor in implementing and monitoring of HIV/AIDS program and coordinate with the Contractor's Environment, Occupational Health, and Safety Officer. The Unit / Cell will have expert professionals / consultants for the following positions:

- HIV/AIDS Program Coordinator – He/she should be a graduate from Social / Behavioral Science background with at least 5 years working experience in the field of HIV/AIDS program implementation. Preferably has worked with NAC recognized NGO / consulting firms with administrative exposure. Knowledge in local dialect / Chichewa is must.
- Field Program Coordinating Officers (3 positions) – They must have field based HIV/AIDS program implementation experience, especially awareness campaign and condom promotion.
- Unit Support Staff (3 positions) – Have experience in keeping and maintaining records of program implementation and accounts and field monitoring of indicators.

Task 2: Support to LWB HIV/AIDS Workplace Committee

LWB established an HIV/AIDS Workplace Committee to assist LWB fight the spread of HIV/AIDS among its staff, family member, surrounding communities and service providers that do business with LWB. The LWB HIV/AIDS Workplace Committee has a policy that was revised in May 2013 with main goal to help reduce the spread of HIV/AIDS among its staff members, families and surrounding communities. The Consultant met the committee and discuss the status of the committee's performance in delivering the delegated services and any critical issues that might require attention. The committee came-up with specific issues, which are hindering their service delivery to the required level of satisfaction. To attain a quality service delivery, provision of two ambulances (one each in Walkers Ferry and LWB Headquarter clinics) to transport critical patients, ART, support in home based care and nutrition, and prevention and public awareness among other interventions are highly desired. In addition, LWB HIV/AIDS Workplace committee will work closely with the HIV/AIDS unit of the contractor during project implementation.

A budget of **USD 146,280** (Table 7-8.2) has been proposed to facilitate the implementation of the activities of LWB HIV/AIDS Workplace committee which are:

- a) to build capacity of LWB HIV/AIDS Workplace Committee to deliver quality services,
- b) to prevent infection and re-infection of HIV/AIDS through public awareness activities; and distribution of condoms,

- c) to prolong life of HIV/AIDS clients through provision of ART and nutritional support, and
- d) To provide ambulance services to both clinics of LWB located in Headquarter and Walkers Ferry.

HIV/AIDS Management Framework

ESMP Sub-Plan 2: HIV/AIDS Management Plan	
Objective	<ul style="list-style-type: none"> ▪ To reduce the chances of spreading of sexually transmitted diseases (STD, STI) and TB. ▪ Create a strong awareness among likely affected people of the project area on HIV and AIDS, its health impacts and referral systems. ▪ To reduce the number of extra-marital affairs and eventually protect marriages. ▪ To put in place adequate healthcare facilities for the workers and also the host communities to curb spreading of STD and TB diseases as per an integrated clause in the Bid Document for the Contractor. ▪ To integrate referral healthcare system for critical cases of infection with Government Hospitals of the district tagging cases with provisions of National AIDS Council of Malawi as per an integrated clause in the Bid Document for the Contractor. ▪ To enhance delivery of HIV/AIDS services by LWB Workplace HIV/AIDS Committee through capacity building and adding logistics. ▪ To reduce HIV/AIDS related deaths by putting more people on ART.
Performance criteria	<ul style="list-style-type: none"> ▪ Reduction in the number of STD, TB, cases through treatment facilities available with the Contractor. ▪ Cases of likelihood of HIV cases and referring these cases to Governmental health facilities. ▪ Regular monitoring of the number of patients for treatment. ▪ Distribution of condoms for safe sex practices. ▪ Procurement of Ambulance for transporting HIV/AIDS patients to hospital and clinics. ▪ Regular awareness camps held among construction labourers, LWB Staff including display of message-ridden posters in this regard at strategic locations to suit wider publicity. ▪ Monitoring cases of child abuse by construction labourers, if any, and taking stringent actions against accused.
Targets	<ul style="list-style-type: none"> ▪ Reduce number of fresh cases of infection through unsafe sexual practices among workers and the surrounding host communities through healthcare initiatives of the Contractor as per their Terms of Reference (TOR). ▪ Reduce occurrence of TB infection cases among host population and workers. ▪ Create awareness of safe sex practices among surrounding communities and the workers in order to achieve no spread of HIV/AIDS infections. ▪ Increasing number of healthcare awareness camps hold at intervals during the project construction period to ensure communities and workers to follow preventive measures and thus curb spread of these diseases. ▪ Reduced number of hours for HIV/AIDS patients to reach clinics and hospitals through provision of an Ambulance. ▪ Reduced number of HIV/AIDS related deaths.

ESMP Sub-Plan 2: HIV/AIDS Management Plan					
Impact/Issue	Mitigation/ Enhancement Measures/ Actions	Responsibility for implementation	Responsibility for Supervision	Timing	Monitoring
Likelihood of spread of HIV/AIDS infection and diseases through interaction between migrant workers and community women during project implementation.	<ul style="list-style-type: none"> Operationalize the HIV/AIDS Unit/Cell in the fold of responsive health facilities for workers' safety to be provided by the Contractor. Awareness creation on HIV/AIDS infection and diseases through a well-designed campaign implementation plan targeting all risk-prone groups. Adopting and carrying out BCC among target groups for promoting safe sex practices. Free distribution of condoms, condom promotion and social marketing of condoms. Put in place a referral healthcare facility to deal with medical aspects of HIV/AIDS treatment with specialized services. Terms-of-reference of the HIV/AIDS Management program is presented in Annex 7-7. 	Contractor's HIV/AIDS Unit/Cell in the Responsive Healthcare Facility of the Construction Site Office.	CSC HIV/AIDS Specialist and LWB Social Specialist	Construction period.	Details of plans to be formalized and documented.
Likelihood of spread of STD/STI and TB infection and diseases through interaction between migrant workers and community women during	<ul style="list-style-type: none"> Diagnose and treat STD/STI and TB through in-house medical facility constituted by the Contractor for workers' safety to be provided by the Construction 	In-House physician/medical practitioner appointed by the Contractor.	CSC Social Specialist for overall supervision.	Construction period.	Details of plans to be formalized and documented.

ESMP Sub-Plan 2: HIV/AIDS Management Plan					
project implementation.	<p>Company/Companies.</p> <ul style="list-style-type: none"> Serious cases of infection may be referred to specialized treatment facilities of the region. 				
Increased cases of broken marriages due to the extra-marital affairs between migrant workers and community women	<ul style="list-style-type: none"> Empowering women through employment in the construction work. Unskilled and semi-skilled workers should be engaged from the affected communities or from Blantyre district so that they can be close proximity of their families reducing the risk of mixing with other gender. 	Contractor, RPIT	CSC Social Specialist for overall supervision.	Construction period.	Details of plans to be formalized and documented.
Likelihood of reduced man work hours for LWB staff due to HIV/AIDS related illnesses	<ul style="list-style-type: none"> Provision of ART and nutrition support to staff infected with HIV/AIDS Timely transportation of HIV/AIDS patients to hospitals and clinics with provision of Ambulance 	LWB HIV/AIDS Workplace Committee	LWB Physician, Chairperson of HIV/AIDS Workplace Committee	Construction period	Details of plans to be formalized and documented.
Likelihood of spread of HIV/AIDS infection and diseases through workplace interaction among LWB staffs and community during project implementation.	<ul style="list-style-type: none"> Awareness creation on HIV/AIDS infection and diseases through a well-designed campaign implementation plan targeting LWB Staff, community and construction workers. Free distribution of condoms, condom promotion and social marketing of condoms. 	LWB HIV/AIDS Workplace Committee	LWB Clinician, Chairperson of HIV/AIDS Workplace Committee	Construction period	Details of plans to be formalized and documented.

ESMP Sub-Plan 2: HIV/AIDS Management Plan					
	<ul style="list-style-type: none">Build capacity of LWB Clinics to provide quality HIV/AIDS services.				
Auditing	<ul style="list-style-type: none">HIV/AIDS Unit / Cell will monitor programme implementation on a monthly basis and evaluate these on quarterly basis.Prepare reports on monitoring and evaluation getting these approved by the Resident Engineer / Manager.Submit M&E reports to the Client (LWB) for their appraisal and recording.LWB HIV/AIDS Workplace Committee to prepare quarterly reports and submit to Steering Committee of LWB.				
Guidelines, Standards and Legislation	<ul style="list-style-type: none">National HIV and AIDS Impact Mitigation Conceptual Framework, NAC, Malawi Monitoring and Evaluation Report 2008-2009, Malawi Government, 2006				
Potential Concern	Corrective Action			Responsibility	
Increase in unsafe sexual practices among high-risk or risk-prone groups during project implementation.	<ul style="list-style-type: none">Implement awareness campaigns in regard to promoting safe sex practices. Condom promotion and free condom distribution.			Mainly with HIV/AIDS Unit / Cell, LWB HIV/AIDS Workplace Committee and all stakeholders. Optionally, Partnering NGOs	
Poverty driven risk behaviours may increase during project implementation.	<ul style="list-style-type: none">Implement awareness campaigns in regard to promoting safe sex practices. Condom promotion and free condom distribution.			Mainly with HIV/AIDS Unit / Cell, LWB HIV/AIDS Workplace Committee and all stakeholders. Optionally, Partnering NGOs	
Rise in STD/ STI and TB cases among risk-prone groups during project implementation	<ul style="list-style-type: none">Implement awareness campaigns in regard to promoting safe sex practices. Condom promotion and free condom distribution.			Mainly with HIV/AIDS Unit / Cell, LWB HIV/AIDS Workplace Committee and all stakeholders. Optionally, Partnering NGOs	
Disintegration of socio-cultural integrity at community level and familial values during project implementation	<ul style="list-style-type: none">Promote behaviour change and adopting restraint on multi-partner sexual behaviour via BCC strategy to workers and community groups in order to maintain social harmony and avoidance of disruption in socio-cultural integrity and familial values.			Mainly with HIV/AIDS Unit / Cell, LWB HIV/AIDS Workplace Committee and all stakeholders. Optionally, Partnering NGOs	
Reporting	<ul style="list-style-type: none">Documentation on number of patients treated by facilities created by the Contractor;Documentation on number of serious infection cases including probable HIV/AIDS cases referred to suitable / identified governmental healthcare systems;Overall reporting on monthly monitoring and quarterly programme implementation.				

10.4.5 Livelihood Restoration Plan Framework

ESMP-Subplan 4: Livelihoods Restoration Plan	
Objective	<ul style="list-style-type: none"> ▪ To reduce impacts on livelihoods that will be lost due to project implementation. ▪ To enhance income earning for PAPs losing livelihoods. ▪ To support women and vulnerable household's income earning. ▪ Provisioning support systems (training, seed, fertilizer, and pesticide distribution) for livelihoods restoration. ▪ Engagement of RWC to help restore livelihoods for affected communities with special attention to vulnerable households. ▪ To provide capacity building and training to affected communities in land husbandry, maintaining saplings and woodlots for villages.
Performance criteria	<ul style="list-style-type: none"> ▪ Compensation paid for losses of agricultural land parcels and commercial structures affected by the project. ▪ Compensation paid for loss of standing crops for 1 year to 3 years of yield, as the case may be. ▪ Re-instating top soil after the period of construction is over in case of temporary acquisition of agricultural land parcels. ▪ Training sessions provided, quantity of seeds, fertilizer, and pesticides distributed. ▪ Number of shops relocated / rebuilt with compensation paid. ▪ Actual area of woodlots established. ▪ Number of trees that survive in comparison with the total number of saplings planted in the woodlots. ▪ Introduction of sustainable forest management and continuing regeneration of woodlots. ▪ Number of women engaged in project related employment. ▪ Livelihoods of households restored especially number of vulnerable households.
Targets	<ul style="list-style-type: none"> ▪ Re-instating top soil in temporarily acquired land parcels after construction to restore agricultural production. ▪ Allocating community land for augmenting woodlots for each village. ▪ RPIT supported restoration of livelihoods for affected households losing income from loss of agricultural land resources and commercial. ▪ Employment creation for women in order to empower the poor village women.

ESMP-Subplan 4: Livelihoods Restoration Plan					
	<ul style="list-style-type: none"> Support provisions for vulnerable households for livelihoods enhancement. 				
Impact/Issue	Mitigation/ Enhancement Measures/ Actions	Responsibility for implementation	Responsibility for Supervision	Timing	Monitoring
Loss of livelihoods based on affected agricultural land resources.	<ul style="list-style-type: none"> Verification of valuation of properties and standing crops for current market price. Compensation to be paid before acquiring land for construction. 	LWB will engage Valuation Surveyors from Regional Lands Office to verify values of properties before project implementation. LWB will take support of DC's office for paying out compensation to affected households.	ESHSU-LWB / GRC	Pre-construction	Details of plans to be formalised and documented.
Loss of livelihoods based on affected commercial structures.	<ul style="list-style-type: none"> Verification of valuation of lands, structures, and livelihoods for current market price. Compensation to be paid before acquiring land for construction. 	LWB will engage valuers to verify values of properties before project implementation. LWB will take support of DC's office for paying out compensation to affected households.	ESHSU-LWB / GRC	Pre-construction	Details of plans to be formalized and documented.
Restoration of top soil immediately after construction in temporarily affected agricultural plots.	<ul style="list-style-type: none"> Preserving 35 cm top soil in some location to be reused for restoration of top soil after project activities. 	RPIT will assist affected Construction Contractors.	CSC / CSC / ESHSU-LWB	Pre-construction and Post-construction	Details of plans to be formalized and documented.
Creation of woodlots per village to provide supply of fuel wood and timber to	<ul style="list-style-type: none"> Identifying space for creating woodlots in each village from customary land with the help of TA / 	FRIM will assist affected villages to create wood	CSC / ESHSU-LWB	Construction	Details of plans to be formalized and

ESMP-Subplan 4: Livelihoods Restoration Plan

maintain livelihood.	<p>GHV / VH and planting saplings suitable for fuel wood and timber. This has been clubbed with Tree Plantation and Forest development Plan.</p> <ul style="list-style-type: none"> Training and capacity building of VNRMC in sustainable forest management. 	lots.			documented.
Women's empowerment through creating jobs in the project.	<ul style="list-style-type: none"> For unskilled worker's jobs women from affected households will be hired for project activities and this will form a clause in the bid document for the construction firms. 	LWB will include such clause in Bid Documents. RPIT will coordinate for implementing such provisions.	CSC/ESHSU-LWB	Construction / Operation	Details of plans to be formalized and documented.
Channelised marketing of agricultural products, kitchen garden products for capturing urban markets, especially for vulnerable households	<ul style="list-style-type: none"> Marketing channels for agricultural products will be established and support for operationalizing commercial Self Help Groups will be established. 	RPIT will study and establish agricultural product based marketing channel to capture urban demand situation.	ESHSU-LWB	Construction / Operation	Details of plans to be formalized and documented.
Provisioning / Outreaching Agriculture Extension Services	<ul style="list-style-type: none"> Providing technical know-how for enhancing production of indigenous crops. Introducing Government-accepted high yielding variety of crops and promoting / encouraging cultivation of such crops by providing adequate guidance in technical procedures. Providing good quality seeds, pesticides and fertilizers suiting to 	RPIT will coordinate all necessary activities.	ESHSU-LWB	Construction / Operation	Details of plans to be formalized and documented.

ESMP-Subplan 4: Livelihoods Restoration Plan

	<p>local environment.</p> <ul style="list-style-type: none"> ■ Promotion of crops that require less fertilizer such as beans, groundnuts, sorghum and promotion of organic manure. ■ Extending Government aided veterinary support services to affected households who practice domestication of cattle, goats, pigs, poultry birds, etc. ■ Provisioning accessibility to better animal feed by creating local extension sale counters with subsidized rates of feeds. ■ Try promoting design development for traditional reed based matt making and introduce alternative products as a commercial venture. 				
Auditing	<ul style="list-style-type: none"> ■ ESHSU-LWB will supervise implementation of all required activities. ■ GRC will take cognizance of issues raised by PAPs regarding compensation payment, find solutions for resolving issues, supervise timely disbursement of payments and take a stand to support smooth implementation of the plan. ■ Monitor payment of compensation as par schedule of activities for livelihoods restoration. ■ Evaluate implementation of programmes with the engagement of an External Evaluation Consultant in close coordination with ESHSU-LWB. 				
Guidelines, Standards and Legislation	<ul style="list-style-type: none"> ■ The Environment Management Act (1996) and EIA Guidelines (1997) ■ Malawi Forest Act (1997) ■ Land Act (1965) ■ National Local Government Act (1998) 				

ESMP-Subplan 4: Livelihoods Restoration Plan		
Potential Concern	Corrective Action	Responsibility
The livelihoods loss to affected households may lead to increase in poverty levels and add to more distress for these families, disturbing even the social equilibrium.	<ul style="list-style-type: none"> Put in place all necessary measures to restore livelihoods including payment of adequate compensation for losses, providing support activities in restoring livelihoods of affected families. 	<ul style="list-style-type: none"> All stakeholders
Reporting	<ul style="list-style-type: none"> Report based on monitoring payment of compensation and keeping track of payments to affected households following payment schedule. Report changes in income levels after introducing livelihoods restoration measures. Report on evaluation of success of implementation of livelihoods restoration programmes. Report on evaluation of levels of success of implementation of livelihoods restoration programs. 	

10.4.6 Communication Plan Structure

Stakeholder	Information/Message	Communication Means	Timing/Frequency	Responsibility
PAPs	Project awareness (general project information, implementation, etc.)	Consultations	Immediately after Draft RLRCAP is approved by LWB.	Project Implementation Unit (PIU),
	Employment opportunities	SMS, TV, radio, newspaper (English / Chichewa)	2 weeks before recruitment / job opening	ESHSU-PIU
	Implementation of RLRCAP	Consultations	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
Land owners affected by land acquisition	Project information & RLRCAP (legal enforcement in implementation)	Consultations, meetings, project brochures, copies of legal notices (English / Chichewa)	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
Structure owners affected by land acquisition	Project information & RLRCAP (legal enforcement in implementation)	Consultations, meetings, project brochures, copies of legal notices (English / Chichewa)	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
Tree owners affected by land acquisition	Project information & RLRCAP (legal enforcement in implementation)	Consultations, meetings, project brochures, copies of legal notices (English / Chichewa)	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
Farmers losing livelihoods resources	Project information & RLRCAP (legal enforcement in implementation)	Consultations, brochures, TV, radio, newspaper (English / Chichewa)	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
	Employment opportunities	TV, radio, newspaper (English / Chichewa)	2 weeks before opening	RPIT, supervised by ESHSU-PIU
Commercial Structure owners losing livelihoods	Project information & RLRCAP (legal enforcement in implementation)	Consultations, brochures, TV, radio, newspaper (English / Chichewa)	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
	Employment opportunities	TV, radio, newspaper (English / Chichewa)	2 weeks before opening	RPIT, supervised by ESHSU-PIU
Women and Vulnerable households	Project awareness (general information, operational disruption, RLRCAP, etc.)	Consultations, TV, radio (English / Chichewa), brochures with pictorial messages	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
	RLRCAP Cut-off date, Entitlement, grievance redress mechanism, etc.	Consultations	At the start of RLRCAP implementation	RPIT, supervised by ESHSU-PIU
General population (local)	Project awareness/ information (colony location, access, project benefits, etc.)	TV, radio, newspaper ((English / Chichewa)	Regularly	RPIT, supervised by ESHSU-PIU
	Traffic management (including maps of alternative routes)	TV, radio, newspaper, SMS for subscribers (English / Chichewa)	Daily (when there is traffic disruption)	RPIT, supervised by ESHSU-PIU
	Unskilled and semi-skilled employment opportunities	TV, radio, newspaper ((English / Chichewa)	One month before recruitment/job opening	RPIT, supervised by ESHSU-PIU

Environmental Codes of Practice

The objective of the Environmental Code of Practices (ECPs) is to address all potential and general construction related impacts during implementation of the Water Intake Works on Shire River, Water Treatment Works, Pump Stations, Pipelines and Reservoirs Project (the Project). The ECPs will provide guidelines for best operating practices and environmental management guidelines to be followed by the contractors for sustainable management of all environmental issues. These ECPs shall be annexed to the general conditions of all the contracts, including subcontracts, carried out under the Project.

The list of ECPs prepared for the Project is given below.

- ECP 1: Waste Management
- ECP 2: Fuels and Hazardous Goods Management
- ECP 3: Water Resources Management
- ECP 4: Drainage Management
- ECP 5: Soil Quality Management
- ECP 6: Erosion and Sediment Control
- ECP 7: Top Soil Management
- ECP 8: Topography and Landscaping
- ECP 9: Quarry Areas Development and Operation
- ECP 10: Air Quality Management
- ECP 11: Noise and Vibration Management
- ECP 12: Protection of Flora
- ECP 13: Protection of Fauna
- ECP 14: Protection of Fish
- ECP 15: Road Transport and Road Traffic Management
- ECP 16: Construction Camp Management
- ECP 17: Cultural and Religious Issues
- ECP 18: Worker Health and Safety
- ECP 19: Construction and Operation Phase Security

Contractors will prepare site specific management plans, namely Construction Environmental Management Plan (CEMP), in compliance with the World Bank and Malawi Environmental Assessment Guidelines of 1997 and based on the guidance given in the ECPs. The CEMP will form the part of the contract documents and will be used as monitoring tool for compliance. It is mandatory for the main contractors procured directly by the project to include these ECPs in their subcontracts. Violation of this requirements will be treated as non-compliance leading to the corrections or otherwise imposing penalty on the contractors.

ECP 1: Waste Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
General Waste	Soil and water pollution from the improper management of wastes and excess materials from the construction sites.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Develop site specific waste management plan for various waste streams (e.g., reusable waste, flammable waste, construction debris, food waste etc.) prior to commencing of construction and submit to supervision consultant for approval. • Organize disposal of all wastes generated during construction in the designated disposal sites approved by the Project authority. • Minimize the production of waste materials by 3R (Reduce, Recycle and Reuse) approach. • Segregate all wastes, wherever practical. • Vehicles transporting solid waste shall be totally confined within an enclosed vehicle or is fully covered with a tarp to prevent spilling waste along the route. • Tarp must be undamaged (not torn or frayed) properly secured to the body of the vehicle or trailer with ropes, chains, straps, or cords so that no waste is exposed. The edges of the tarps shall extend 12 inches over the permanent sides and back of the open top vehicle or trailer and must be secured to the permanent vehicle. All loads must be tarped from the point of origin of the waste to the tipping area of the final disposal/landfill. • Train and instruct all personnel in waste management practices & procedures as a component of the environmental induction process. • Provide refuse containers at each worksite. • Request suppliers to minimize packaging where practicable. • Place a high emphasis on good housekeeping practices. • Maintain all construction sites clean, tidy and safe and provide and maintain appropriate facilities as temporary storage of all wastes before transporting to final disposal. • Potable water should be supplied in bulk containers to reduce the quantity of plastic waste (plastic bins). Plastic bag use should be avoided.
Hazardous Waste	Health hazards and environmental impacts due to improper waste management practices	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Collect chemical wastes in 200 liter drums (or similar sealed container), appropriately labeled for safe transport to an approved chemical waste depot. • Store, transport and handle all chemicals avoiding potential environmental pollution. • Store all hazardous wastes appropriately in bunded areas away from water courses. • Make available all Material Safety Data Sheets (MSDS) for hazardous materials on-site during construction. • Collect hydrocarbon wastes, including lube oils, for safer transport off-site to reuse, recycle, treatment or disposal at approved locations. • Construct concrete or other impermeable hard-stand to prevent seepage in case of spills. • Keep sufficient stock of absorbents for generally used chemicals or for petrochemicals (e.g., dirt, sawdust, etc.) within the storage area to contain accidental spills.

ECP 2: Fuels and Hazardous Goods Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Fuels and hazardous goods.	Materials used in construction have a potential to be a source of contamination. Improper storage and handling of fuels, lubricants, chemicals, hazardous goods/materials on-site, wash down of plant and equipment, and potential spills may harm the environment or health of construction workers.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare spill control procedures and submit them for supervision consultant for approval. • Train the relevant construction personnel in handling of fuels and spill control procedures. • Refueling shall occur only within bunded areas. • Store dangerous goods in bunded areas on top of a sealed plastic sheet away from watercourses. Store all liquid fuels in fully bunded storage containers, with appropriate volumes, a roof, a collection point and appropriate filling/decanting point. • Store and use fuels in accordance with material safety data sheets (MSDS). Make available MSDS for chemicals and dangerous goods on-site. • Store hazardous materials at above flood level, determined for construction. • Make sure all containers, drums, and tanks that are used for storage are in good condition and are labeled with expiry date. Any container, drum, or tank that is dented, cracked, or rusted might eventually leak. Check for leakage regularly to identify potential problems before they occur. • Sit containers and drums in temporary storages in clearly marked areas, where they will not be run-over by vehicles or heavy machinery. The area shall preferably drain to a safe collection area in the event of a spill. • Take all precautionary measures when handling and storing fuels and lubricants, avoiding environmental pollution. • All machinery is to be stored and away from any water body, drainage inlets or natural drainage area, where practical. Environmental control measures such as appropriate barriers (i.e. bunding, sediment fence, etc.) will be considered and/or implemented to control runoff away from the machinery and prevent any washout in to adjacent water body, drainage inlets or natural drainage area. • Transport waste of dangerous goods, which cannot be recycled, to an approved waste disposal facility. Safe transport of fuel or other hazardous liquids to and from the storage container will be facilitated through the provision detailed within the Material Safety Data Sheets (MSDS). • Wash down of plant and equipment and vehicle servicing will be performed only in isolated impervious areas away from drainage inlets, connecting the drainage with an oil interceptor. Pits/bunds located away from waterways will be provided for concrete wash near construction areas. The contractor's environmental officer with assistance from supervisors is to ensure that pits/bunds are available, maintained at capacity and drivers instructed regarding the location and required procedures. • Keep stock of absorbent and containment material (e.g., absorbent matting, dirt, sawdust, etc.) where hazardous material are used and stored; and ensure staffs are trained in their correct use. • Oil and chemical spills and washouts shall be cleaned up and collected immediately, where safety permits. Disposal of

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>remediated / cleanup/ washout materials shall be to an approved waste disposal facility. Materials shall be transported by an approved / licensed transporter. Contaminated Material to be removed from site as soon as reasonably practical after the incident.</p> <ul style="list-style-type: none"> • Provide appropriate personal protective equipment (protective clothing, safety boots, helmets, masks, gloves, goggles, etc.) to the construction personnel, depending on the materials handled. • Avoid the use of material with greater potential for contamination by substituting them with more environmentally friendly materials.

ECP 3: Water Resources Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Hazardous material and Waste	Water pollution from the storage, handling and disposal of hazardous materials and general construction waste, and accidental spillage	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Follow the management guidelines proposed in Error! Not a valid result for table. and ECP 2: Fuels and Hazardous Goods Management. • Minimize the generation of spoils, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems.
Discharge from construction sites	Construction activities, sewerages from construction sites and work camps may effect the surface water quality. The construction works will modify groundcover and topography, changing the surface water drainage patterns of the area. These changes in hydrological regime lead to increased rate of runoff, increase in sediment and contaminant loading, increased flooding, and effect habitat of fish and other aquatic biology.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Install temporary drainage works (channels and check dams) in areas required for sediment and erosion control and around storage areas for construction materials. • Install temporary sediment lagoons, where appropriate, to capture sediment-laden run-off from work site. • Divert runoff from undisturbed areas around the construction site. • Stockpile materials away from drainage lines. • Prevent all solid and liquid wastes entering waterways by collecting spoils, oils, chemicals, bitumen spray waste and wastewaters from brick, concrete and asphalt cutting where possible and transport to an approved waste disposal site or recycling depot. • Wash out ready-mix concrete agitators and concrete handling equipment at washing facilities off site or into approved bunded areas on site. Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil erosion and siltation	Soil erosion and dust from the material	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Stabilize the cleared areas not used for construction activities

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	stockpiles will increase the sediment and contaminant loading of surface water bodies.	<p>with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion.</p> <ul style="list-style-type: none"> • Ensure that roads used by construction vehicles are swept regularly to remove dust and sediment. • Water the loose material stockpiles, access roads and bare soils on an as needed basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).
Construction activities in water bodies	Dredging/ excavation activities associated with construction of pipelines, bulkheads and river training works, and buildings for a facility can cause turbidity and sedimentation in nearby waters, degraded water quality, and substrate alterations.	<p>The Contractor Shall</p> <ul style="list-style-type: none"> • Dewater sites by pumping water to a sediment basin prior to release off site – do not pump directly off site. • Monitor the water quality in the runoff from the site or areas affected by dredge/excavation plumes, and improve work practices as necessary. • Protect water bodies from sediment loads by silt screen or other barriers. • Minimize the generation of sediment, oil and grease, excess nutrients, organic matter, litter, debris and any form of waste (particularly petroleum and chemical wastes). These substances must not enter waterways or storm water systems. • Do not discharge cement and water curing used for cement concrete directly into water courses and drainage inlets.
	Highly motile adult and juvenile life stages of most fishes could flee when construction is ongoing, however, egg and larval stages as well as non-motile benthic organisms will likely not be able to avoid impacts. As a general rule, the severity of adverse effects tends to be greatest for early life stages and for adults of some highly sensitive species.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Avoid dredged material disposal activities in areas containing sensitive or unique benthic habitats (e.g., spawning and feeding sites). • Restrict construction during October-March when appropriate to avoid temporary impacts to habitat during critical life history stages (e.g., spawning, egg and embryo development, and juvenile growth).
Drinking water	Untreated surface water is not suitable for drinking purposes due to presence of suspended solids and ecoli.	<p>The Contractor Shall</p> <ul style="list-style-type: none"> • Provide drinking water that meets National and WHO Drinking Water standards. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time.

ECP 4: Drainage Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Excavation and earth works, and construction yards	Lack of proper drainage for rainwater/liquid waste or wastewater owing to the construction activities harms environment in terms of water and soil contamination, and mosquito growth.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare drainage management procedures and submit them for supervision consultant for approval. • Prepare a program to prevent/avoid standing waters, which supervision consultant will verify in advance and confirm during implementation. • Provide alternative drainage for rainwater if the construction works/earth-fillings cut the established drainage line. • Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there. • Rehabilitate road drainage structures immediately if damaged by contractors' road transports. • Build new drainage lines as appropriate and required for wastewater from construction yards connecting to the available nearby recipient water bodies. Ensure wastewater quality conforms to National Standards, before it is being discharged into the recipient water bodies. • Ensure that there will be no water stagnation at the construction sites and camps. • Provide appropriate silt collector and silt screen at the inlet and manholes and periodically clean the drainage system to avoid drainage congestion. • Protect natural slopes of drainage channels to ensure adequate storm water drains. • Regularly inspect and maintain all drainage channels to assess and alleviate any drainage congestion problem.
Ponding of water	Health hazards due to mosquito breeding	<ul style="list-style-type: none"> • Do not allow ponding of water especially near the waste storage areas and construction camps. • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position.

ECP 5: Soil Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Storage of hazardous and toxic chemicals	Spillage of hazardous and toxic chemicals will contaminate the soils	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Strictly manage the wastes management plans proposed in Error! Not a valid result for table. and storage of materials and ECP 2: Fuels and Hazardous Goods Management. • Construct appropriate spill containment facilities for all fuel storage areas. • Establish and maintain a hazardous material register detailing the location and quantities of hazardous substances including the storage, and their disposals. • Train personnel and implement safe work practices for minimizing the risk of spillage. • Identify the cause of contamination, if it is reported, and contain

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>the area of contamination. The impact may be contained by isolating the source or implementing controls around the affected site.</p> <ul style="list-style-type: none"> Remediate the contaminated land using the most appropriate available method.
Construction material stock piles	Erosion from construction material stockpiles may contaminate the soils	<p>The Contractor shall</p> <ul style="list-style-type: none"> Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds.

ECP 6: Erosion and Sediment Control

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Clearing of construction sites	Cleared areas and slopes are susceptible for erosion of top soils, which affects the growth of vegetation and causes ecological imbalance.	<p>The Contractor shall</p> <ul style="list-style-type: none"> Prepare site specific erosion and sediment control measures and submit them for supervision consultant for approval. Reinstate and protect cleared areas as soon as possible. Cover unused area of disturbed or exposed surfaces immediately with mulch/grass turf/tree plantations.
Construction activities and material stockpiles	The impact of soil erosion are (i) Increased run off and sedimentation causing a greater flood hazard to the downstream and silt accumulation at Nkula barrage and (ii) destruction of aquatic environment by erosion and/or deposition of sediment damaging the spawning grounds of fish	<p>The Contractor shall</p> <ul style="list-style-type: none"> Locate stockpiles away from drainage lines. Protect the toe of all stockpiles, where erosion is likely to occur, with silt fences, straw bales or bunds. Remove debris from drainage paths and sediment control structures. Cover the loose sediments of construction material and water them if required. Divert natural runoff around construction areas prior to any site disturbance. Install protective measures on site prior to construction, for example, sediment traps. Install 'cut off drains' on large cut/fill batter slopes to control water runoff speed and hence erosion. Observe the performance of drainage structures and erosion controls during rain and modify as required. Restrict construction during October-March when appropriate to avoid temporary impacts to habitat during critical life history stages (e.g., spawning, egg and embryo development, and juvenile growth).
Soil erosion and siltation	Soil erosion and dust from the material stockpiles will increase the sediment and contaminant loading of surface water	<p>The Contractor shall</p> <ul style="list-style-type: none"> Stabilize the cleared areas not used for construction activities with vegetation or appropriate surface water treatments as soon as practicable following earthwork to minimize erosion. Ensure that roads used by construction vehicles are swept regularly to remove sediment. Water the material stockpiles, access roads and bare soils on an

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	bodies.	as required basis to minimize dust. Increase the watering frequency during periods of high risk (e.g. high winds).

ECP 7: Top Soil Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Earthworks will impact the fertile top soils that are enriched with nutrients required for plant growth or agricultural development.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Strip the top soil to a depth of 35 cm and store in stock piles of height not exceeding 2m. • Remove unwanted materials from top soil like grass, roots of trees and others. • The stockpiles will be done in slopes of 2:1 to reduce surface runoff and enhance percolation through the mass of stored soil. • Locate topsoil stockpiles in areas outside drainage lines and protect from erosion. • Construct diversion channels and silt fences around the topsoil stockpiles to prevent erosion and loss of topsoil. • Spread the topsoil to maintain the physico-chemical and biological activity of the soil. The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites. • Prior to the re-spreading of topsoil, the ground surface will be ripped to assist the bunding of the soil layers, water penetration and revegetation
Transport	Vehicular movement outside ROW or temporary access roads will affect the soil fertility of the agricultural lands	<ul style="list-style-type: none"> • Limit equipment and vehicular movements to within the approved construction zone. • Plan construction access to make use, if possible, of the final road alignment.

ECP 8: Topography and Landscaping

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Land clearing and earth works	Construction activities especially earthworks will change topography and disturb the natural rainwater/flood water drainage as well as change the local landscape.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare landscaping and plantation plan and submit the plan to supervision consultant for approval. • Ensure the topography of the final surface of all raised lands (construction yards, approach roads, access roads, etc.) are conducive to enhance natural draining of rainwater/flood water. • Keep the final or finished surface of all the raised lands free from any kind of depression that causes water logging. • Undertake mitigation measures for erosion control/prevention by grass-turfing and tree plantation, where there is a possibility of rain-cut that will change the shape of topography. • Cover immediately the uncovered open surface that has no use

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>of construction activities with grass-cover and tree plantation to prevent soil erosion and better landscaping.</p> <ul style="list-style-type: none"> • Reinstatement of the natural landscape of the ancillary construction sites after completion of works.

ECP 9: Quarry Areas Development and Operation

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Development and operation of borrow areas	Borrow areas will have impacts on local topography, landscaping and natural drainage.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare borrow/quarry area management plan and submit the plan for supervision consultant approval. • Use only approved quarry and borrow sites. • Identify new borrow and quarry areas in consultation with the client, if required. • Reuse excavated or disposed material available in the project to the maximum extent possible. • Store top soil for reinstatement and landscaping. • Develop surface water collection and drainage systems, anti-erosion measures (berms, revegetation etc.) and retaining walls and gabions where required. Implement mitigation measures in ECP 3: Water Resources Management, ECP 6: Erosion and Sediment Control • The use of explosive should be used as low as possible to reduce noise, vibration, and dust. • Control dust and air pollution by application of watering and implementing mitigation measures proposed in ECP 10: Air Quality Management • Noise and vibration control by ECP 11: Noise and Vibration Management.

ECP 10: Air Quality Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Air quality can be adversely affected by vehicle exhaust emissions and combustion of fuels.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare air quality management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Fit vehicles with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition. • Operate the vehicles in a fuel efficient manner. • Cover hauling vehicles carrying dusty materials moving outside the construction site. • Impose speed limits on all vehicle movement at the worksite to reduce dust emissions.

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<ul style="list-style-type: none"> Control the movement of construction traffic. Water construction materials prior to loading and transport. Service all vehicles regularly to minimize emissions. Limit the idling time of vehicles not more than 2 minutes.
Construction machinery	Air quality can be adversely affected by emissions from machinery and combustion of fuels.	<p>The Contractor shall</p> <ul style="list-style-type: none"> Fit machinery with appropriate exhaust systems and emission control devices. Maintain these devices in good working condition in accordance with the specifications defined by their manufacturers to maximize combustion efficiency and minimize the contaminant emissions. Proof of maintenance register shall be required by the equipment suppliers and contractors/subcontractors. Pay special attention to control emissions from fuel generators. Machinery causing excessive pollution (e.g., visible smoke) will be banned from construction sites. Service all equipment regularly to minimize emissions. Provide filtering systems, dust collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all stages, including unloading, collection, aggregate handling, cement application, circulation of trucks and machinery inside the installations.
Construction activities	Dust generation from construction sites, material stockpiles and access roads is a nuisance in the environment and can be a health hazard, and also can affect the local crops	<p>The Contractor shall</p> <ul style="list-style-type: none"> Water the material stockpiles, access roads and bare soils on an as needed basis to minimize the potential for environmental nuisance due to dust. Increase the watering frequency during periods of high risk (e.g. high winds). Stored materials such as gravel and sand shall be covered and confined to avoid their being wind-drifted. Minimize the extent and period of exposure of the bare surfaces. Restore disturbed areas as soon as practicable by vegetation/grass-turfing. Store the cement in silos and minimize the emissions from silos by equipping them with filters. Establish adequate locations for storage, mixing and loading of construction materials, in a way that dust generation is minimized during such operations. Not use water as dust suppression on potentially contaminated areas, to prevent generation of liquid waste stream. Crushing of rock and aggregate materials shall be wet-crushed, or performed with particle emission control systems. Not permit the burning of solid waste.

ECP 11: Noise and Vibration Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Noise quality will be deteriorated due to vehicular traffic	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare a noise and vibration management plan (under the Pollution Prevention Plan) and submit the plan for supervision consultant approval. • Maintain all vehicles in order to keep it in good working condition in accordance with manufactures maintenance procedures. • Make sure all drivers will comply with the traffic codes concerning maximum speed limit, driving hours, etc. • Perform the loading and unloading of trucks, and handling operations minimizing construction noise on the work site.
Construction machinery	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Appropriately organize all noise generating activities to avoid noise pollution to local residents. • Use the quietest available plant and equipment in construction work. • Maintain all equipment in order to keep them in good working order in accordance with manufactures maintenance procedures. Equipment suppliers and contractors shall present proof of maintenance register of their equipment. • Install acoustic enclosures around generators to reduce noise levels. • Fit high efficiency mufflers to appropriate construction equipment. • Avoid unnecessary use of alarms, horns and sirens.
Construction activity	Noise and vibration may have an impact on people, property, fauna, livestock and the natural environment.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Notify adjacent landholders prior to typical noise events outside of daylight hours. • Educate the operators of construction equipment on potential noise problems and the techniques to minimize noise emissions. • Employ best available work practices on-site to minimize occupational noise levels. • Install temporary noise control barriers where appropriate. • Notify affected people if major noisy activities will be undertaken, e.g. blasting. • Plan activities on site and deliveries to and from site to minimize impact. • Monitor and analyze noise and vibration results and adjust construction practices as required. • Avoid undertaking the noisiest activities, where possible, when working at night near the residential areas.

ECP 12: Protection of Flora

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Vegetation clearance	Local flora are important habitats for birds, provide fruit harvest, timber/fire wood, protect soil from erosion and overall keep the natural balance for human-living. As such damage to flora has wide range of adverse environmental impacts.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare a plan to protect flora and submit the plan for supervision consultant approval. • Minimize disturbance to surrounding vegetation. • Use appropriate type and minimum size of machine to avoid disturbance to adjacent vegetation. • Get approval from supervision consultant for clearance of vegetation. • Make selective and careful pruning of trees where possible to reduce need of tree removal. • Control noxious weeds by disposing of at designated dump site or burn on site. • Clear only the vegetation that needs to be cleared in accordance with the engineering plans and designs. These measures are applicable to both the construction areas as well as to any associated activities such as sites for stockpiles, disposal of fill, etc. • Not burn off cleared vegetation – where feasible, chip or mulch and reuse it for the rehabilitation of affected areas, temporary watermain and valve access or landscaping. Mulch provides a seed source, can limit embankment erosion, retains soil moisture and nutrients, and encourages re-growth and protection from weeds. • Return topsoil and mulched vegetation (in areas of native vegetation) to approximately the same location from where it came from. • Avoid work within the drip-line of trees to prevent damage to the tree roots and compacting the soil. • Minimize the length of time the ground is exposed or excavation left open by clearing and re-vegetate the area at the earliest practically possible. • Ensure excavation works occur progressively and re-vegetation done at the earliest. • Provide adequate knowledge to the workers regarding nature protection and the need of avoid felling trees during construction • Supply appropriate fuel in the work camps to prevent fuel wood collection.

ECP 13: Protection of Fauna

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities	The location of construction activities can result in the loss of wild life habitat and habitat quality,	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare a plan for protection of fauna and submit the plan for supervision consultant approval. • Limit the construction works within the designated sites allocated to the contractors. • Check the site (especially trenches) for trapped animals, and rescue them by the help of a qualified person. • Provide temporary access to the animals to cross the trenches.
	Impact on local and migratory birds, their habitats and active nests	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Not be permitted to destruct active nests or eggs of birds. • Minimize the tree removal during the bird breeding season. If works must be continued during the bird breeding season, a nest survey will be conducted by a qualified biologist prior to commence of works to identify and locate active nests. • If bird nests are located/ detected within the right-of-way and roadside embankments then those areas should be avoided. • Petroleum products should not come in contact with the natural and sensitive ecosystems. Contractor must minimize the release of oil, oil wastes or any other substances harmful to migratory birds' habitats, to any waters, wetlands or any areas frequented by migratory birds.
Vegetation clearance	Clearance of vegetation may impact shelter, feeding and/or breeding and/or physical destruction and severing of habitat areas	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Restrict the tree removal to the minimum numbers required. • Relocate hollows, where appropriate. • Fell the hollow bearing trees in a manner which reduces the potential for fauna mortality. Felled trees will be inspected after felling for fauna and if identified and readily accessible will be removed and relocated or rendered assistance if injured. After felling, hollow bearing trees will remain unmoved overnight to allow animals to move of their own volition. Care should be taken to make sure bird habitats are not destroyed. If there is no option available, rehabilitate them in other neighboring trees. Also protect and rehabilitate injured or orphaned birds.
Night time lighting	Lighting from construction sites and construction camps may affect the visibility of night time migratory birds that use the moon and stars for navigation during their migrations.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Use lower wattage flat lens fixtures that direct light down and reduce glare, thus reducing light pollution, • Avoid flood lights unless they are absolutely required. • Use motion sensitive lighting to minimize unneeded lighting. • Use, if possible, green lights that are considered as bird's friendly lighting instead of white or red colored lights. • Install light shades or plan the direction of lights to reduce light spilling outside the construction area.
Construction camps	Illegal poaching	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Provide adequate knowledge to the workers regarding protection of flora and fauna, and relevant government regulations and punishments for illegal poaching. • Ensure that staff and Subcontractors are trained and empowered to identify, address and report potential environmental problems. • Provide sufficient food allowance to the workers so that they

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		don't engage in illegal poaching or hunting.

ECP 14: Protection of Fish

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities in River	The main potential impacts to fisheries are dredging, hydrocarbon spills and leaks from riverine transport, and disposal of wastes into the river.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare procedures for protection of fish and submit them for supervision consultant approval. • Restrict dredging and piling in the intake area during fish breeding and spawning season to avoid hindrance or blockage of fish breeding and spawning. • Ensure the construction equipment used in the river are well maintained and do not have oil leakage to contaminate river water. • Contain oil immediately on river in case of accidental spillage from equipment; make an emergency oil spill containment plan (under the Fuels and Hazardous Substances Management Plan) to be supported with enough equipment, materials and human resources. • Do not dump wastes, be it hazardous or non-hazardous into the nearby water bodies or in the river.
Construction activities on the land	The main potential impacts on river are increased suspended solids from earthworks erosion, sanitary discharge from work camps, and hydrocarbon spills	<p>The Contractor shall</p> <ul style="list-style-type: none"> • follow mitigation measures proposed ECP 3: Water Resources Management and ECP 4: Drainage Management.

ECP 15: Road Transport and Road Traffic Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction vehicular traffic	Increased traffic use of road by construction vehicles will affect the movement of normal road traffics and the safety of the road-users.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare a traffic management plan and submit the plan for supervision consultant approval. • Strictly follow the Project's 'Traffic Management Plan' and work with close coordination with the Traffic Management Unit. • Prepare and submit additional traffic plan, if any of his traffic routes are not covered in the Project's Traffic Management Plan, and requires traffic diversion and management. • Include in the traffic plan to ensure uninterrupted traffic movement during construction: detailed drawings of traffic arrangements showing all detours, temporary road, temporary bridges, temporary diversions, necessary

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>barricades, warning signs / lights, road signs, construction schedule etc.</p> <ul style="list-style-type: none"> • Provide signs at strategic locations of the roads complying with the schedules of signs contained in the National Traffic Regulations.
	Accidents and spillage of fuels and chemicals	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Restrict truck deliveries, where practicable, to day time working hours. • Restrict the transport of oversize loads. • Operate vehicles, if possible, to non-peak periods to minimize traffic disruptions. • Enforce on-site speed limit, especially close to the sensitive receptors, schools, health centers, etc.

ECP 16: Construction Camp Management

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Siting and Location of construction camps	Campsites for construction workers are the important locations that have significant impacts such as health and safety hazards on local resources and infrastructure of nearby communities.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare a construction camp management plan and submit the plan to supervision consultant for approval. • Locate the construction camps within the designated sites or at areas which are acceptable from environmental, cultural or social point of view and approved by the supervision consultant or the Client. • Conduct consultation with communities including local bodies (Village Head and Group Village Head) prior to set-up the camp. • Consider the location of construction camps away from communities in order to avoid social conflict in using the natural resources such as water or to avoid the possible adverse impacts of the construction camps on the surrounding communities. • Submit to the supervision consultant for approval a detailed layout plan for the development of the construction camp showing the relative locations of all temporary buildings and facilities that are to be constructed together with the location of access roads, fuel storage areas (for use in power supply generators), solid waste management and dumping locations, and drainage facilities, prior to the development of the camps. • Local authorities responsible for health, religious and security shall be duly informed on the set up of camp facilities so as to maintain effective surveillance over public health, social, and security matters.
Construction Camp Facilities	Lack of proper infrastructure facilities, such as housing, water supply, and sanitation facilities will increase pressure on the local	<p>Contractor shall provide the following facilities in the campsites</p> <ul style="list-style-type: none"> • Adequate housing for all workers. • Safe and reliable water supply, which should meet national/WHO standards. Drinking water to be chlorinated at source, and ensure presence of residual chlorine 0.1 ~ 0.25 ppm as minimum after 30 minutes of chlorine contact time (WHO guideline). • Hygienic sanitary facilities and sewerage system. The toilets and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	services and generate substandard living standards and health hazards.	<p>domestic waste water will be collected through a common sewerage. Provide separate latrines and bathing places for males and females with total isolation by location. The minimum number of toilet facilities required is one toilet for every ten persons.</p> <ul style="list-style-type: none"> • Treatment facilities for sewerage of toilet and domestic wastes. • Storm water drainage facilities. • Paved internal roads. • Provide in-house community/common entertainment facilities. Dependence of local entertainment outlets by the construction camps to be discouraged/prohibited to the extent possible.
Disposal of waste	Management of wastes is crucial to minimize impacts on the environment	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Ensure proper collection and disposal of solid wastes within the construction camps. • Insist waste separation by source; organic wastes in one container and inorganic wastes in another container at household level. • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. Establish waste collection, transportation and disposal systems with the manpower and equipment/vehicles needed. • Do not establish site specific landfill sites. All solid waste will be collected and removed from the work camps and disposed in approved waste disposal sites.
Fuel supplies for cooking purposes	Illegal sourcing of fuel wood by construction workers will impact the natural flora and fauna	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Provide fuel to the construction camps for their domestic purpose, in order to discourage them to use fuel wood or other biomass. • Made available alternative fuels like kerosene on ration to the workforce to prevent them using biomass for cooking. • Conduct awareness campaigns to educate workers on preserving the protection of biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection.
Health and Hygiene	There will be a potential for diseases to be transmitted including malaria, exacerbated by inadequate health and safety practices. There will be an increased risk of work crews spreading sexually transmitted infections and HIV/AIDS.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Provide adequate health care facilities within construction sites. • Provide first aid facility round the clock. Maintain stock of medicines in the facility and appoint fulltime designated first aider or nurse. • Provide ambulance facility for the laborers during emergency to be transported to nearest hospitals. • Initial health screening of the laborers coming from outside areas. • Train all construction workers in basic sanitation and health care issues and safety matters, and on the specific hazards of their work. • Provide HIV awareness programming, including STI (sexually transmitted infections) and HIV information, education and communication for all workers on regular basis. • Provide adequate drainage facilities throughout the camps to ensure that disease vectors such as stagnant water bodies and

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		<p>puddles do not form. Regular mosquito repellent sprays during rainy season in offices and construction camps and yards.</p> <ul style="list-style-type: none"> • Not dispose food waste openly as that will attract rats and stray dogs. • Carryout short training sessions on best hygiene practices to be mandatorily participated by all workers. Place display boards at strategic locations within the camps containing messages on best hygiene practices.
Security and Safety	Inadequate security and safety provision in construction camps may create security and safety problems of workforces and assets and fire hazards	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Provide appropriate security personnel (police or private security guards) and enclosures to prevent unauthorized entry in to the camp area. • Maintain register to keep a track on a head count of persons present in the camp at any given time. • Encourage use of flameproof material for the construction of labor housing / site office. Also, ensure that these houses/rooms are of sound construction and capable of withstanding wind storms/cyclones. • Provide appropriate type of firefighting equipment suitable for the construction camps. • All construction material storage should be sit a visible location secured with fence or solid walls with locks to avoid theft and vandalism. • Display emergency contact numbers clearly and prominently at strategic places in camps. • Communicate the roles and responsibilities of laborers in case of emergency in the monthly meetings with contractors.
Site Restoration	Restoration of the construction camps to original condition requires demolition of construction camps.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Dismantle and remove from the site all facilities established within the construction camp including the perimeter fence and lockable gates at the completion of the construction work. • Dismantle camps in phases and as the work gets decreased and not wait for the entire work to be completed. • Give prior notice to the laborers before demolishing their camps/units. • Maintain the noise levels within the national standards during demolition activities. • Different contractors should be hired to demolish different structures to promote recycling or reuse of demolished material. • Reuse the demolition debris to a maximum extent. Dispose remaining debris at the designated waste disposal site. • Handover the construction camps with all built facilities as it is if agreement between both parties (contractor and land-owner) has been made so. • Restore the site to its condition prior to commencement of the works or to an agreed condition with the landowner.

ECP 17: Cultural and Religious Issues

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Construction activities near religious and cultural sites	Disturbance from construction works to the cultural and religious sites, and contractors lack of knowledge on cultural issues cause social disturbances.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Communicate to the public through community consultation regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restriction. • Not block access to cultural and religious sites, wherever possible. • Restrict all construction activities within the foot prints of the construction sites. • Stop construction works that produce noise (particularly during prayer time) should there be any church/mosque/religious/ educational institutions and health center close to the construction sites and users make objections. • Take special care and use appropriate equipment when working next to a cultural/religious center. • Stop work immediately and notify the site manager, if during construction, an archaeological or burial site is discovered. It is an offence to recommence work in the vicinity of the site until 'approval to continue' is obtained by the archaeological authority. • Provide independent prayer facilities to the construction workers. • Show appropriate behavior with all construction workers especially women and elderly people. • Allow the workers to participate in praying during construction time, if there is a request. • Resolve cultural issues in consultation with local leaders and supervision consultants. • Establish a mechanism that allows local people to raise grievances arising from the construction process. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works so as to maintain effective surveillance over public health, social, and security matters.

ECP 18: Worker Health and Safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
Best practices	Construction works may pose health and safety risks to the construction workers and site visitors leading to severe injuries and deaths. The population in the proximity of the	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Prepare an Occupational Health and Safety plan and submit the plan for supervision consultant's approval. • Implement suitable safety standards for all workers and site visitors, with sufficient provisions to comply with international standards (e.g. International Labor Office guideline on 'Safety and Health in Construction; World Bank Group's 'Environmental Health and Safety Guidelines') and contractor's own safety

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	construction site and the construction workers will be exposed to a number of (i) biophysical health risk factors, (e.g., noise, dust, chemicals, construction material, solid waste, waste water, vector transmitted diseases, etc.), (ii) risk factors resulting from human behavior (e.g., STD, HIV/AIDS, etc.) and (iii) road accidents from construction traffic.	<p>standards, in addition to complying with national standards.</p> <ul style="list-style-type: none"> • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas. • Provide personal protective equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full-face eye shields, and ear protection. Maintain the PPE properly by cleaning dirty ones and replacing the damaged ones. • Safety procedures include provision of information, training and protective clothing to workers involved in hazardous operations and proper performance of their job. • Appoint an environment, health and safety manager to look after the health and safety of the workers. • Inform the local authorities responsible for health, religious and security duly informed before commencement of civil works and establishment of construction camps so as to maintain effective surveillance over public health, social and security matters.
	Child and pregnant labor	<p>The Contractor shall</p> <ul style="list-style-type: none"> • not hire children of less than 14 years of age and pregnant women or women who delivered a child within 8 preceding weeks.
Accidents	Lack of first aid facilities and health care facilities in the immediate vicinity will aggravate the health conditions of the victims	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Ensure health care facilities and first aid facilities are readily available. Appropriately equipped first-aid stations should be easily accessible throughout the place of work. • Document and report occupational accidents, diseases, and incidents. • Prevent accidents, injury, and disease arising from, associated with, or occurring in the course of work by minimizing, so far as reasonably practicable, the causes of hazards, in a manner consistent with good international industry practice. • Identify potential hazards to workers, particularly those that may be life-threatening and provide necessary preventive and protective measures. • Provide awareness to the construction drivers to strictly follow the driving rules. • Provide adequate lighting in the construction area, inside the tunnels, inside the powerhouse cavern and along the roads.
Construction Camps	Lack of proper infrastructure facilities, such as housing, water supply and sanitation	<p>The Contractor shall provide the following facilities in the campsites to improve health and hygienic conditions as mentioned in ECP 16: Construction Camp Management:</p> <ul style="list-style-type: none"> • Adequate ventilation facilities

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
	facilities will increase pressure on the local services and generate substandard living standards and health hazards.	<ul style="list-style-type: none"> • Safe and reliable water supply. • Hygienic sanitary facilities and sewerage system. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • Recreational and social facilities • Safe storage facilities for petroleum and other chemicals in accordance with ECP 2 • Solid waste collection and disposal system in accordance with ECP1. • Arrangement for trainings • Paved internal roads. • Security fence at least 2 m height and security guards at entrances and every corner of the facility. • Sick bay and first aid facilities
Water and sanitation facilities at the construction sites	Lack of Water sanitation facilities at construction sites cause inconvenience to the construction workers and affect their personal hygiene.	<p>The contractor shall</p> <ul style="list-style-type: none"> • Provide portable toilets at the construction sites with workforce size 25 people or more, work the whole day for a month. Location of portable facilities should be at least 6 m away from storm drain system and surface waters. These portable toilets should be cleaned once a day and all the sewerage should be pumped from the collection tank once a day and should be brought to the common septic tank for further treatment. • Provide safe drinking water facilities to the construction workers at all the construction sites.
Other ECPs	Potential risks on health and hygiene of construction workers and general public	<p>The Contractor shall follow the following ECPs to reduce health risks to the construction workers and nearby community</p> <ul style="list-style-type: none"> • ECP 2: Fuels and Hazardous Goods Management • ECP 4: Drainage Management • ECP 10: Air Quality Management • ECP 11: Noise and Vibration Management • ECP 15: Road Transport and Road Traffic Management
Trainings	Lack of awareness and basic knowledge in health care among the construction workforce, make them susceptible to potential diseases.	<p>The Contractor shall</p> <ul style="list-style-type: none"> • Train all construction workers in basic sanitation and health care issues (e.g., how to avoid malaria, transmission of sexually transmitted infections (STI), and HIV/AIDS. • Train all construction workers in general health and safety matters, and on the specific hazards of their work. Training should consist of basic hazard awareness, site specific hazards, safe work practices, and emergency procedures for fire, evacuation, and natural disaster, as appropriate. • Implement malaria, HIV/AIDS and STI education campaign

Project Activity/ Impact Source	Environmental Impacts	Mitigation Measures/ Management Guidelines
		targeting all workers hired, international and national, female and male, skilled, semi- and unskilled workforces, at the time of recruitment and thereafter pursued throughout the construction phase on ongoing and regular basis. This should be complemented by easy access to condoms at the workplace as well as to voluntary counseling and testing.

ECP 19: Construction and Operation Phase Security

Project Activity/ Impact Source	Impacts /Concerns	Mitigation Measures/ Management Guidelines
Construction Phase	Inadequate construction site security poses a significant risk to assets, construction materials and property. Theft/vandalism of assets, materials and property would increase construction costs and cause delays in project completion.	<p>The Contractor shall:</p> <ul style="list-style-type: none"> • Provide appropriate security personnel (i.e. security guards) to prevent unauthorized entry into the camp area. • Employ night watchman for periods of significant on-site storage or when the area necessitates. • Ensure all assets (i.e., tools, equipment, etc.) and construction materials at construction site are identified, inventoried and tracked as closely as possible. All assets should be clearly labeled and marked. Keep records of tool serial numbers and check inventory on a regular basis. • All tools and equipment should have a check out/in system, if not in use should be secured and stored in a proper place to prevent theft or loss. Provide storage sheds for the secure storage of equipment and tools when not in use. • Ensure there is proper fencing around construction site perimeter. Fencing should be chain-link at least 2.4 m high and secured with a steel chain and lock. If possible the entire site should be fenced; if this is not possible, make sure construction trailer and any equipment storage areas are fenced. • Ensure construction site has controlled access points (one or two entry points at most), allowing for close monitoring of comings and goings from the site. • Workers should be easily identified and have credentials that indicate site access. • No trespassing signs should be posted in conspicuous areas throughout the job site. • List of employees who have after hour access to the property should be available to the BWB and local authorities. • Ensure job site is properly lighted at night. Well-lit areas should include any office trailers and equipment storage trailers. Floodlights operated by sensors should also be installed where appropriate. • Pre-employment screening investigations should be used to verify the applicants relating to their employment, education and criminal history background.
	Improper security measures may pose security risk for construction workers	<p>The Contractor shall:</p> <ul style="list-style-type: none"> • Prepare site specific security plan. • Maintain register to keep track of number of persons present in

Project Activity/ Impact Source	Impacts /Concerns	Mitigation Measures/ Management Guidelines
	and especially foreign staff on construction sites.	<p>the camp at any given time.</p> <ul style="list-style-type: none"> • Provide appropriate security personnel at job sites as mentioned above. • Ensure proper fencing as mentioned above. • Ensure controlled access points to job site as mentioned above. • Ensure works have easily identified credentials as mentioned above. • Ensure job sites are properly lighted at night, as mentioned above.
Operation Phase	Vandalism/damage (including use of explosives) of water transmission mains, transfer stations, control stations and storage reservoirs. Theft of infrastructure (i.e. metals and etc.) is also of concern.	<ul style="list-style-type: none"> • Patrol Men and Pipeline Community Policing Forum shall routinely conduct patrols and inspections of transmission mains and facilities. • They shall monitor suspicious activity and notify local authorities and BWB along with VH/GVH/TA's in event of any such occurrence/incident. • Ensure strategic infrastructure sites such as reservoirs and transfer stations are secure and fenced with controlled access points. Fencing should be chain-link at least 2.4 m high and secured with a steel chain and lock.
	People building structures on top of transmission main and encroachment of transmission main way-leave poses a significant threat to both the people and to the BWB. This becomes an inconvenience to BWB when building new pipelines following the existing routes.	<ul style="list-style-type: none"> • BWB should engage in consultations with communities along with the VH/GVH/TAs to prevent building on top of transmission line and permanent use of the way-leave. Any such incidence can be avoided prior to the commencement. • BWB will employ Patrol Men and Pipeline Community Policing Forum to routinely monitor the transmission mains. • They should notify BWB in the event of such occurrence. BWB in coordination with VH/GVH/TAs will prevent people/landowners from building permanent structures on top of transmission main/way-leave.
	Inadequate monitoring/security measures may lead to people stealing water from transfer stations. People may also steal water from the transmission main.	<ul style="list-style-type: none"> • Transfer stations should be fenced and secured with a steel chain and hardened lock. Only authorized personal shall have access to transfer stations. • No trespassing signs should be posted in and around entry points to the transfer station. • Patrol Men and Pipeline Community Policing Forum shall routinely monitor/inspect transmission main and transfer stations. Notify BWB along with VH/GVH/TA's in event of any such occurrence/incident. • Installation of bulk flow meters/sensors for all major supply zones to measure production of water, monitor flows, distribution and leakage on the transmission network. • Routinely conducting consumer/usage census to identify legal, illegal, and potential connections, and category (domestic/non-domestic). • Training staff on leak detection equipment and surveys, system mapping, creating consumer data.

10.6 LWB Capacity Building Training

B. Objectives of the Services

The objectives of the services are: (a) to make ESHSU personnel familiar with environmental issues and impacts related to the project and to improve their skills in management and evaluation of the ESMP (b) to develop and deliver training programs on social impacts and management; (c) to develop and deliver training on biodiversity management, and (d) to develop and deliver training on environmental and social monitoring, evaluation, and reporting.

C. Scope of Work

Task 1: Preparation of Training Modules on Environmental and Social Management and Monitoring:

The purpose of this task is to develop training modules on (i) environmental issues and impacts related to the project, (ii) social issues and impact in the project, (iii) biodiversity management in the project, and (iv) environmental and social monitoring, evaluation, and reporting.

- a. Training in Module 1 on environmental issues and impacts will broadly include:
 - Fundamentals of Environmental Impact Assessment and the EIA Process at DoE and at the World Bank
 - Typical Environmental Issues in water supply projects
 - Analyses of Alternatives and Identification of Preferred Option
 - Case studies on Scoping of Issues and Assessment of Alternatives for water supply Projects
 - Identification and Prioritization of Issues
 - Conducting Baseline Environmental and Socio-economic Information
 - Case studies on Collection of Baseline Information in EIA of water supply Projects
 - Prediction and Assessment of Impacts – Tools and Case studies
 - Conducting cumulative impacts and climate change assessments
 - Building an Environmental Management Plan
 - How to Review an EIA Report?
 - Public Consultation and Information Disclosure – The process with case studies
- b. Training in Module 2 on social issues and impact assessment will broadly include:
 - Fundamentals of social Impacts, compensation and livelihood restoration and the land acquisition and compensation Process at Ministry of Land and at the World Bank
 - Harmonization of policies and guidelines between government and the World Bank
 - Typical Social Issues in water supply projects
 - Conducting Baseline Socio-economic and census Information
 - Field survey using GPS and data processing
 - Data compilation and presentation using GIS

- Prepare compensation and replacement value
 - Assessing the impacts on livelihood and prepare a livelihood restoration plan
 - HIV/AIDS and other STD management
 - Mainstreaming gender in the project planning
- c. Training in Module 3 on biodiversity management in the project will broadly include:
- Components of biodiversity
 - Threats to biodiversity
 - Tools for assessing biodiversity (survey) and socioeconomic elements for conservation
 - Biodiversity in the project area and potential impacts due to project implementation
 - Biodiversity conservation approaches - past to present
 - Development of buffer zones and Protected areas and reserves
- d. Training in Module 4 on monitoring, evaluation, and reporting will broadly include:
- Monitoring techniques and methods for various components of ESMP
 - Environmental and Social Monitoring Plan and Institutional Arrangements
 - Identify parameters to be monitored
 - Collection and analysis of environmental quality data, and Interpretation of monitoring parameters
 - Internal and external monitoring needs during construction and operation
 - Organizational responsibilities and implementation schedules
 - Reporting requirements of monitoring

Task 2: Deliver Training Programs on Environmental Management and Monitoring:

- a. The purpose of this task is to deliver a series of training programs for all the activities proposed in Task 1 to all the implementing agencies of the Project (MoAIWD, LWB, DC, Land Department).
- b. Based on the above scope of works, the consultant will carry out the following activities:
- Undertake training need assessment for stakeholders including the implementation / construction personnel.
 - Devise training programs based on ESIA report and site visits to the Project area
 - Prepare a staff training plan and associated materials (modules).
 - Evaluate the trainings.
 - Modify the training modules as necessary.
 - Hand over the final training modules to the LWB for use in future training.
 - Prepare training reports.

D. Organization and Staffing

The services are expected to be provided over a 2 months period by a team comprising one

environmental specialist/team leader, one social specialist, and one ecologist.

E. Supervision

The team will work in association with the PO, reporting to the project manager of the PO on a day-to-day basis. Overall supervision will be done by the ESHSU.

F. Outputs

- a. The team's outputs will include: (i) an inception report after one week of mobilization, (ii) a draft final report at the end of 6th week, containing a description of achievements, details of the training services provided, including all materials, an assessment of their effectiveness in meeting objectives, and recommendations for further training assistance, (iii) and a final report at the end of assignment. All reports will be submitted both in English
- b. In addition, the team will prepare training materials for both training programs. Each training program will consist of about 6 modules including some case studies and worked out examples. The draft training modules should be submitted to the ESHSU before conducting training programs for evaluation and final training modules will be presented at the end of assignment.

10.7 ESMP Budget Estimate

Detailed Budget for the Implementation of the ESMP for the Diamphwe Multipurpose Dam

#	Item Description	Unit of Measurement	During Construction			Post-Construction, Amount per Year, USD	Remarks and Cost Assumptions
			Quantity	Unit Rate, USD	Amount, USD		
1	Staff and Consultancy Costs						
1.1	<i>The PCC (Program Coordination)</i>						
	Program Coordinator	Man-months	42	7,000	294,000		Local Expert and full time input
	Communications Specialist	Man-months	42	5,000	210,000		Local Expert and full time input
	Monitoring and Evaluation Specialist	Man-months	42	5,000	210,000		Local Expert and full time input
	Administrative Assistant	Man-months	42	1,000	42,000		Local and full time input
	Support Staff (1 Driver & 1 Office Assistant)	Man-months	84	120	10,100		Local and full time input
1.2	<i>PIU - The Environmental, Social, Health & Safety Unit (ESHSU)</i>						
	Environmental, Social, Health, & Safety Officer (Unit Leader)	Man-months	42	7,000	294,000		Local Expert and full time input
	Assistant Water Quality & Environmental Officer	Man-months	42	5,000	210,000		Local Expert and full time input
	Social Safeguard Officer	Man-months	42	5,000	210,000		Local Expert and full time input
	Environmental, Health & Safety Officer	Man-months	42	5,000	210,000		Local Expert and full time input
	Laboratory Technicians (2 No)	Man-months	84	1,000	84,000		Local & full time input
1.3	<i>PIU - The Community Liaison & Participation Office (CLPO)</i>						
	The Community Liaison & Participation Officer (CLPO)	Man-months	42	6,000	252,000		Local Expert and full time input during the construction period
	Consultation Officers (4 No. COs)	Man-months	84	4,000	336,000		Local personnel and full time input during the construction period
	Land Surveyors (2 NO.)	Man-months	42	1,000	42,000		Local personnel and full time input during the construction period
1.4	<i>PIU - The Grievance Mechanism Office (GM)</i>						
	Grievance Officer (GO)	Man-months	42	6,000	252,000		Local Expert and full time input during the construction period
	GIS Officer	Man-months	42	4,000	168,000		Local expert and full time input during the construction period
	Assistant Grievance Officers (2 NO.)	Man-months	42	1,000	42,000		Local personnel and full time input during the construction period
1.5	<i>The Construction Supervision Consultants (CSC) - Site Management</i>						
	Unit Leader/Environmental Specialist	Man-months	10	25,000	250,000		International Expert & 1/2 input
	Environmental, Occupational Health & Safety Specialist	Man-months	42	5,000	210,000		Local Expert and full time input
	Social Specialist	Man-months	42	5,000	210,000		Local Expert and full time input
	Ecologist	Man-months	42	5,000	210,000		Local Expert and full time input
	HIV/AIDS Specialist	Man-months	42	5,000	210,000		Local Expert and full time input
	Field Surveyor	Man-months	84	1,000	84,000		Local Expert and full time input
	International Travel - Airfare	Round-Trips	10	4,000	40,000		
1.6	<i>The Monitoring and Evaluation Consultant (MEC) - Auditing</i>						
	Environmental Expert - International	Man-months	14	25,000	350,000	100,000	International Expert & intermittent input of 4 months/year for 6.5 yrs
	Social Expert - International	Man-months	14	25,000	350,000	100,000	International Expert & intermittent input of 4 months/year for 6.5 yrs
	Environmental Expert - National	Man-months	18	5,000	90,000	20,000	Intermittent input of 5 mnths/yr during construction & then 4 mths/yr post construction for a total of 6.5 years
	Social Expert - National	Man-months	18	5,000	90,000	20,000	Intermittent input of 5 mnths/yr during construction & then 4 mths/yr post construction for a total of 6.5 years
	International Travel - Airfare	Round-Trips	26	4,000	104,000	16,000	2No. travels per year for international experts for 6.5 years
1.7	<i>The Contractor's Environmental Staff costs - Contractor's Responsibility</i>						
	EHS Coordinator	Man-months	24		0		Cost shall be Contractor's responsibility
	Ecologist	Man-months	42		0		Cost shall be Contractor's responsibility
	Rehabilitation Specialist	Man-months	42		0		Cost shall be Contractor's responsibility
	Environmental Scientist (3 No)	Man-months	126		0		Cost shall be Contractor's responsibility
	HIV/AIDS Program Coordinator	Man-months	42		0		Cost shall be Contractor's responsibility
	HIV/AIDS Field Coordinating Officers (3 No)	Man-months	126		0		Cost shall be Contractor's responsibility
	HIV/AIDS Support Staff (3 No)	Man-months	126		0		Cost shall be Contractor's responsibility
	Social/Community Liaison Officer	Man-months	42		0		Cost shall be Contractor's responsibility
	Human Resources Officer	Man-months	42		0		Cost shall be Contractor's responsibility
	Sub-Total				5,064,100	256,000	



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#	Item Description	Unit of Measurement	During Construction			Post-Construction, Amount per Year, USD
			Quantity	Unit Rate, USD	Amount, USD	
2	Rehabilitation Works					
	Rehabilitation of dam buffer zone forest woodland	ha	156	3,500	546,000	60,000
	Rehabilitation of buffer infrastructure area	ha	124	950	117,800	
	Rehabilitation of temporary construction area	ha	22	950	20,900	
	Rehabilitation of temporary pipeline construction area	Lump-sum	1	50,000	50,000	
	Sub-Total				734,700	60,000
3	Development of Plans					
	Erosion Sediment and Drainage Control Plan	Lump-sum	1	10,000	10,000	
	Pollution Prevention Plan	Lump-sum	1	10,000	10,000	
	Waste Disposal and Effluent Management Plan	Lump-sum	1	10,000	10,000	
	Traffic Management Plan	Lump-sum	1	10,000	10,000	
	Quarry Area Management and Restoration Plan	Lump-sum	1	10,000	10,000	
	Occupational Health and Safety Plan	Lump-sum	1	10,000	10,000	
	Drinking Water Supply and Sanitation Plan	Lump-sum	1	10,000	10,000	
	Construction Camp Management Plan	Lump-sum	1	10,000	10,000	
	Fuel and Hazardous Substances Management Plan	Lump-sum	1	10,000	10,000	
	Emergency Preparedness Plan	Lump-sum	1	10,000	10,000	
	Communication Plan	Lump-sum	1	10,000	10,000	
	HIV/AIDS Management Plan	Lump-sum	1	10,000	10,000	
	Biodiversity Management Plan (excl. rehabilitation)	Lump-sum	1	10,000	10,000	
	Livelihood Restoration Plan (covered under the RAP)	cost in the RAP			-	
	Sub-Total				130,000	-
Remarks and Cost Assumptions						
Includes US\$25 for seed & tools & US\$ 20/person/mnth (based on LDF Rates) for 5 persons per ha; for 10 mnths participation in planting and maintenance of trees for 3.5 yrs and then only 6 months later on						
Based on US\$ 620 equipment+labour hiring cost & cost of Diesel per ha plus Contingency of US\$320 per ha						
Based on US\$ 620 equipment+labour hiring cost & cost of Diesel per ha plus Contingency of US\$320 per ha						
No major rehabilitation anticipated, But a contingency amount is provided to cater for any unforeseen need						
Plan to be developed by Contractor, this cost is for reviews by PIU & PCC						
Plan to be developed by Contractor, this cost is for reviews by PIU & PCC						
Plan to be developed by Contractor, this cost is for reviews by PIU & PCC						
Plan to be developed by Contractor, this cost is for reviews by PIU & PCC						
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Plan to be developed by Contractor, this cost is for reviews by PIU & PCC						
Plan to be developed by Contractor, this cost is for reviews by PIU & PCC						

#	Item Description	Unit of Measurement	During Construction			Post-Construction, Amount per Year, USD	Remarks and Cost Assumptions
			Quantity	Unit Rate, USD	Amount, USD		
4	Implementation of Plans						
	Erosion Sediment and Drainage Control Plan	Annual	3.5	50,000	175,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Pollution Prevention Plan	Annual	3.5	20,000	70,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Waste Disposal and Effluent Management Plan	Annual	3.5	20,000	70,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Traffic Management Plan	Annual	3.5	20,000	70,000	5,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Quarry Area Management and Restoration Plan	Annual	3.5	30,000	105,000	0	Lumpsum annual provision during & no implementation after construction
	Occupational Health and Safety Plan	Annual	3.5	50,000	175,000	50,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Drinking Water Supply and Sanitation Plan	Annual	3.5	20,000	70,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Construction Camp Management Plan	Annual	3.5	10,000	35,000	0	Lumpsum annual provision during & no implementation after construction
	Fuel and Hazardous Substances Management Plan	Annual	3.5	10,000	35,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Emergency Preparedness Plan	Annual	3.5	10,000	35,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Communication Plan	Annual	3.5	20,000	70,000	20,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	HIV/AIDS Management Plan	Annual	3.5	20,000	70,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Biodiversity Management Plan (excl. rehabilitation)	Annual	3.5	30,000	105,000	10,000	Personnel costs already covered under staff costs. This provision will cater for monitoring, tests, supplies, etc
	Livelihood Restoration Plan (covered in the RAP)	cost in the RAP			-		
	Resettlement Action Plan	Lump-sum			-		
	Sub-Total				1,085,000	155,000	
5	Other Operational and Capacity Building Costs						
	Environmental Specialist	Annual			-	60,000	at US\$5,000/month for the rest of the lifespan of the Dam
	Laboratory Technicians (2No.)	Annual			-	24,000	at US\$1,000/month/Technician for the rest of the lifespan of the Dam
	Security guards for the woodlot & other structures (4No)	Annual	42	200	8,400	2,400	at US\$50/month/Guard from start of Project through the rest of the lifespan of the Dam to provide security to the rehabilitation works
	Equipment items for dam operation/management	Lump-sum	1	50,000	50,000	10,000	Lumpsum for purchase of equipment and annual provision of US\$5,000/yr for on-going maintenance
	Consultancy for the on-going monitoring of the rehabilitation	Annual			-	100,000	
	Operational Cost for the Resettlement Working Committee	Annual	3.5	50,000	175,000		
	Operational Costs for the PCC	Annual	3.5	10,000	35,000		Lumpsum provision per annum for office expenses and meetings
	Operational Costs for the RLRCAP Implementation Team	Annual	3.5	20,000	70,000		Lumpsum provision per annum for office expenses and meetings
	Capacity building for the PIU	Annual	3.5	30,000	105,000		Lumpsum provision per annum for office expenses and training
	Operational Costs for the Dam Catchment Committee	Annual	3.5	10,000	35,000		Lumpsum provision per annum for office expenses and meetings
	Catchment management works	Annual	3.5	50,000	175,000	100,000	Lumpsum provision to support implementation of parallel catchment management activities
	Sub-Total				653,400	296,400	
	Total				7,667,200	767,400	

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APPENDIX 11. FIELD PHOTOGRAPHS

Cropland: Location & Field Photos

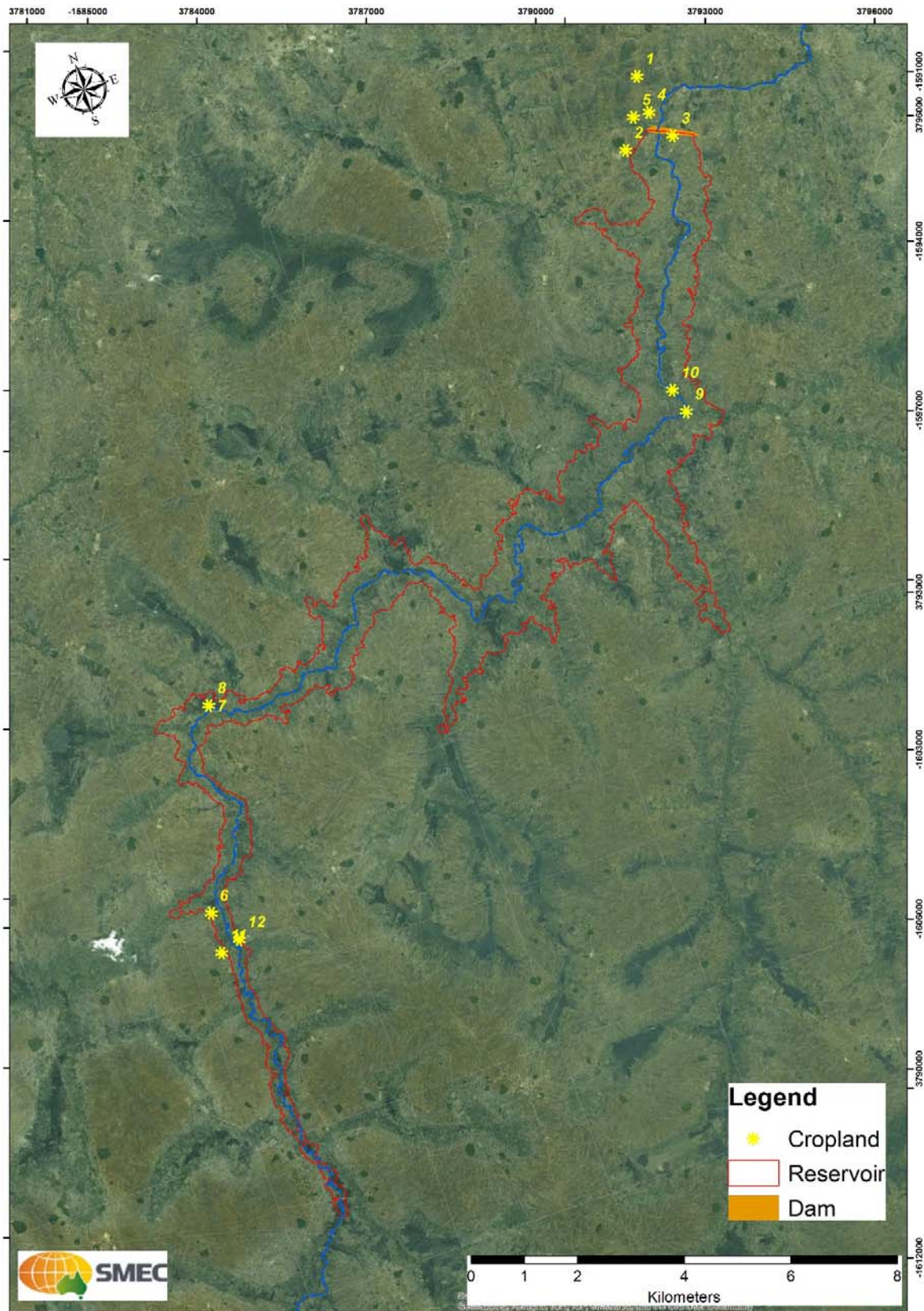






Photo9



Photo10



Photo11



Photo12



Photo13



Photo14



Photo15



Photo16

Cultivated Dambo: Location & Field Photos

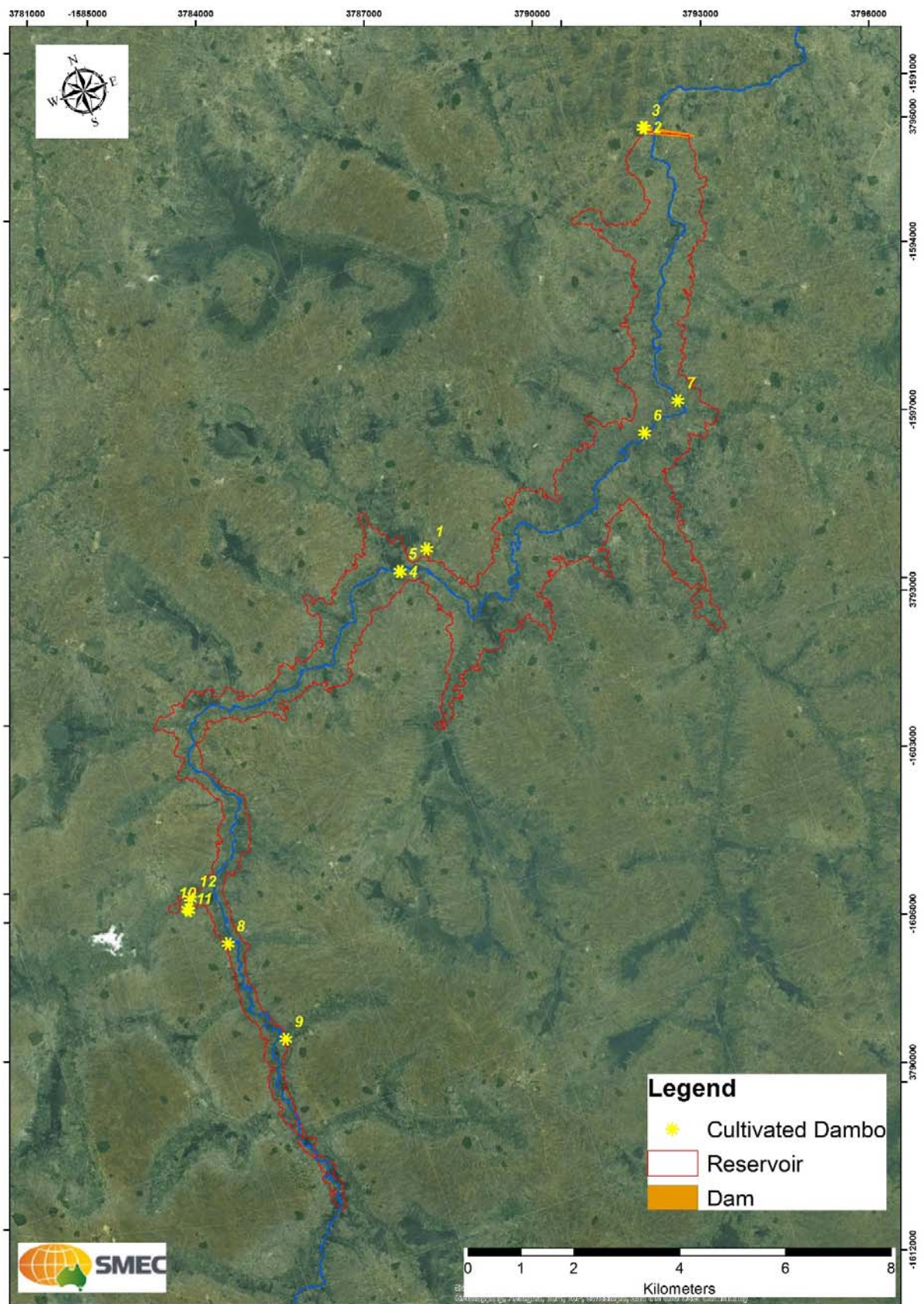




Photo1



Photo2



Photo3



Photo4



Photo5



Photo6



Photo7



Photo8



Grassland Dambo/Riparian Vegetation: Location & Field Photos

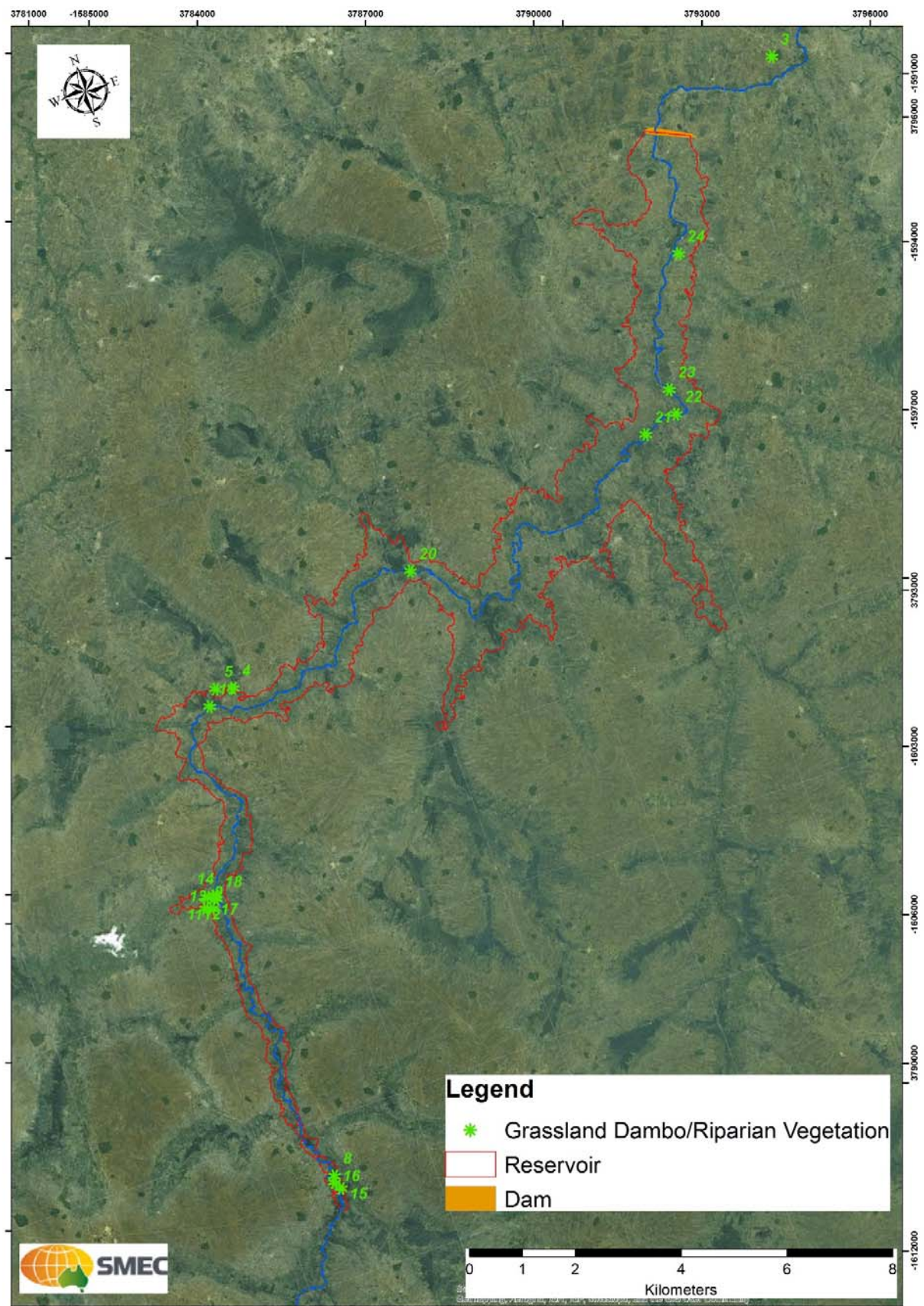






Photo9



Photo10



Photo11



Photo12



Photo13



Photo14



Photo15



Photo16



Photo17



Photo18



Photo19



Photo20



Photo21



Photo22



Photo23



Photo24

Forest/Natural Vegetation: Location & Field Photos

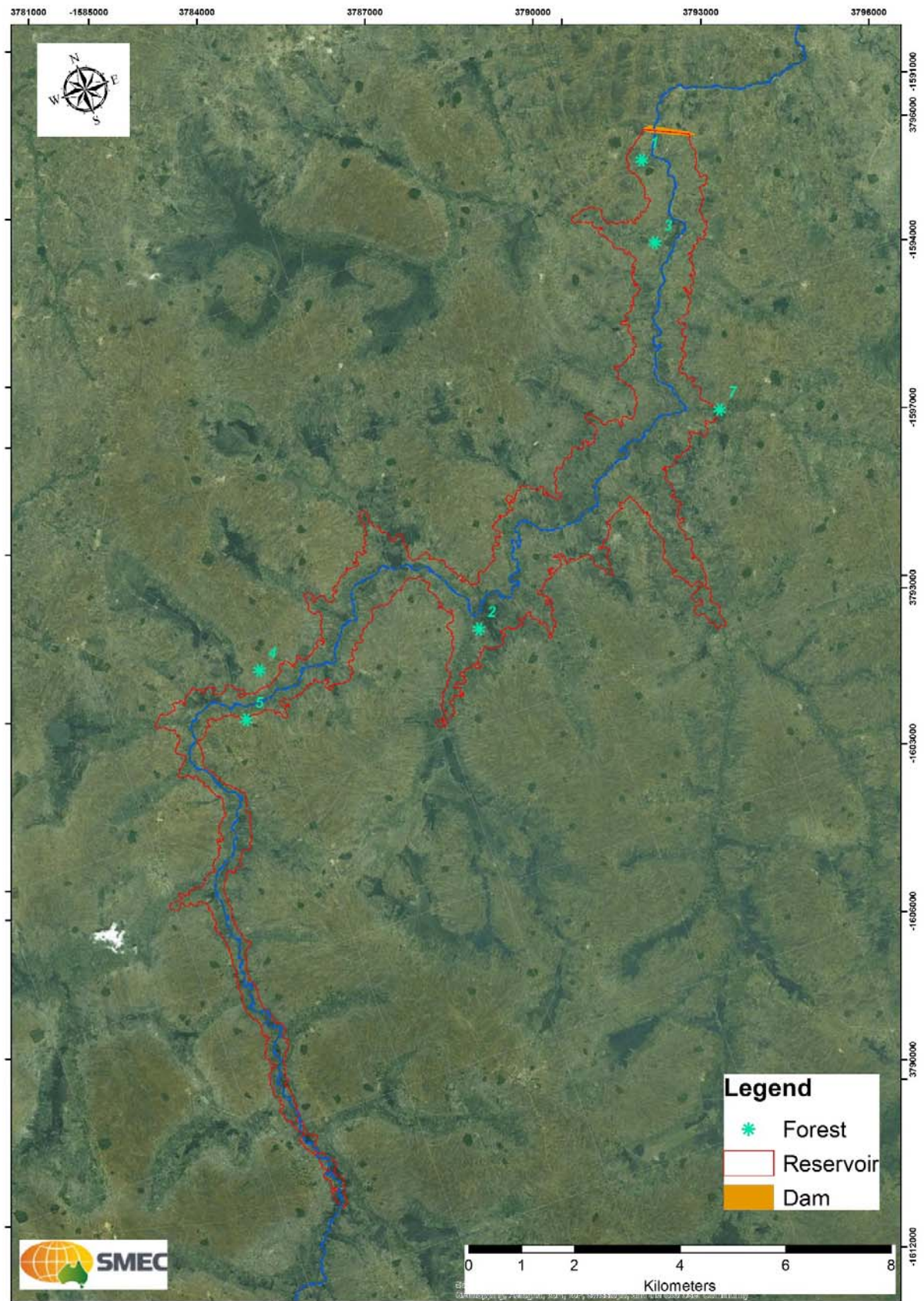




Photo1



Photo2



Photo3



Photo4

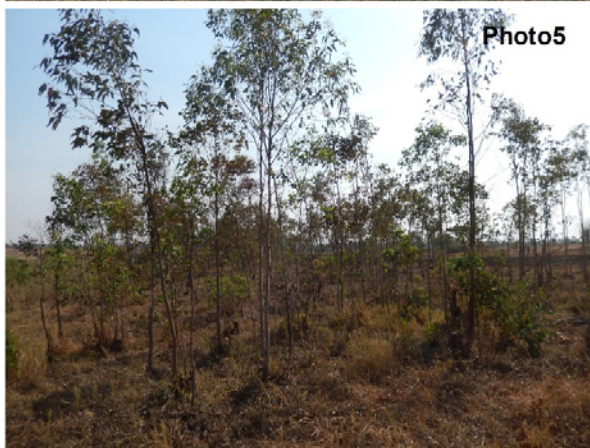


Photo5



Photo6



Photo7



Photo8

Settlements: Location & Field Photos

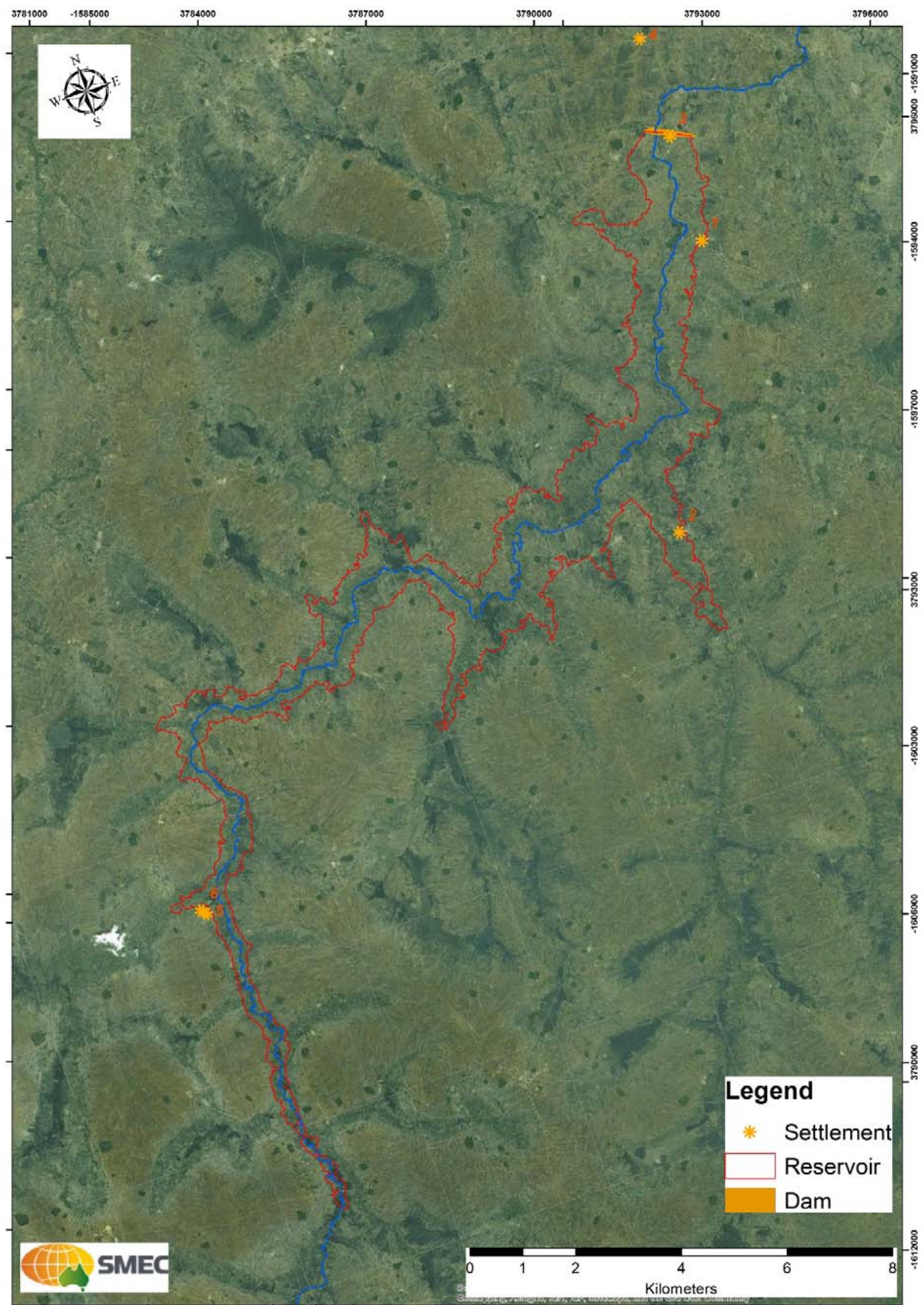




Photo1



Photo2



Photo3



Photo4



Photo5



Photo6