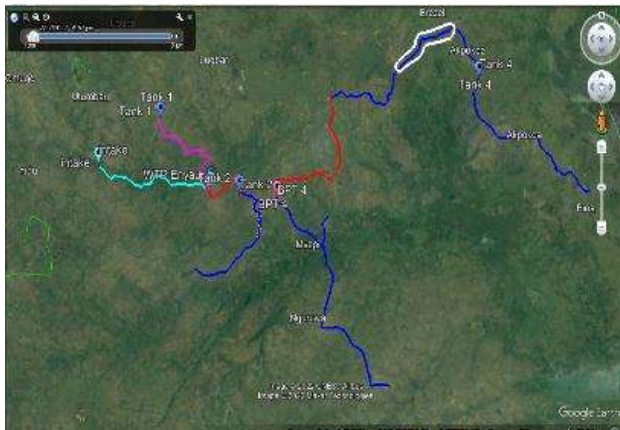




**MINISTRY OF WATER AND ENVIRONMENT  
 INTERGRATED WATER MANAGEMENT AND DEVELOPMENT  
 PROJECT**

**ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT REPORT FOR  
 ENYAU WATER SUPPLY SYSTEM  
 IN TEREGO & YUMBE DISTRICT**



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## CERTIFICATION

We the undersigned certify that this Environmental and Social Impact Assessment Report for the proposed Enyau Water Supply System (WSS) in Terego and Yumbe district was conducted under our direction, supervision and based on the Terms of Reference provided to us by Ministry of Water and Environment. We hereby certify that the particulars given in this report are correct and true to the best of our knowledge and as at the time of the study.

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### Developer's obligation

I certify that I have read and understood the contents of this Environmental and Social Impact Assessment report for the proposed Enyau Water Supply System in Terego & Yumbe districts. I agree to undertake all the recommended mitigation measures and all aspects of monitoring in order to protect the environment from any form of pollution and degradation.  
Signed

\_\_\_\_\_  
**Project Manager/Coordinator**  
**Ministry of Water and Environment**

## TABLE OF CONTENTS

|  |                 |
|--|-----------------|
| CERTIFICATION .....  | II              |
| TABLE OF CONTENTS .....  | III             |
| LIST OF FIGURES .....  | X               |
| LIST OF TABLES.....  | X               |
| LIST OF ACRONYMS .....   | XI              |
| MEASURES AND UNITS .....   | XV              |
| DEFINITION OF KEY WORDS AND TERMINOLOGIES USED .....                         | XVI             |
| EXECUTIVE SUMMARY .....  | XVII            |
| <b>1 INTRODUCTION .....</b>  | <b>1</b>        |
| 1.1 OVER VIEW .....  | 1               |
| 1.2 PROJECT LOCATION .....   | <del>24</del>   |
| 1.2.1 Intake .....   | <del>32</del>   |
| 1.2.2 Water Treatment Plant (WTP).....                                       | <del>54</del>   |
| 1.2.3 Tank 1 .....   | <del>65</del>   |
| 1.2.4 Existing tank in Imvepi Refugee Settlement .....                       | <del>65</del>   |
| 1.2.5 Tank 2.....  | <del>76</del>   |
| 1.2.6 Brake Pressure Tank (BPT) .....  | <del>76</del>   |
| 1.2.7 Tank 3.....  | <del>87</del>   |
| 1.2.8 Tank 4.....  | <del>98</del>   |
| 1.3 PROJECT JUSTIFICATION.....   | <del>98</del>   |
| 1.4 THE NEED FOR ENVIRONMENTAL IMPACT ASSESSMENT.....                        | <del>109</del>  |
| 1.4.1 Purpose of the ESIA.....   | <del>1140</del> |
| 1.5 APPROACH AND METHODOLOGY.....  | <del>1140</del> |
| 1.5.1 Overview .....   | <del>1140</del> |
| 1.5.2 Literature Review .....  | <del>1140</del> |
| 1.5.3 Stakeholders' consultations.....                                       | <del>1140</del> |
| 1.5.4 Social economic baseline studies.....                                  | <del>1342</del> |
| 1.5.5 Physical measurement and assessment of environmental parameters .....  | <del>1948</del> |
| 1.5.6 Baseline noise and air quality measurement .....                       | <del>1948</del> |
| 1.5.7 Biodiversity inventories.....  | <del>2049</del> |
| 1.5.8 Mapping and Photography .....  | <del>2049</del> |
| 1.5.9 Visual Observation .....   | <del>2120</del> |
| 1.5.10 Impact screening.....   | <del>2120</del> |
| 1.5.11 Assessment, evaluation and analysis of potential adverse impacts..... | <del>2120</del> |
| 1.5.12 Report writing .....  | <del>2120</del> |

|           |  |             |
|-----------|--|-------------|
| 1.5.13    | Structure of the Environmental Impact Statement .....  | 2120        |
| <b>2</b>  | <b>PROJECT DESCRIPTION .....</b>   | <b>2224</b> |
| 2.1       | INTRODUCTION .....   | 2224        |
| 2.2       | DESIGN OVERVIEW – WATER SUPPLY .....   | 2322        |
| 2.2.1     | Treated water primary distribution network.....  | 2423        |
| 2.2.2     | Storage tanks.....   | 2423        |
| 2.2.3     | Proposed Sanitation/Public Toilet Facilities/Water Office .....                                | 2524        |
| 2.3       | DETAILED DESIGN OF THE INTAKE AND TREATMENT PLANT .....  | 2524        |
| 2.4       | PROJECT ACTIVITIES .....   | 2726        |
| 2.4.1     | Detailed design stage.....   | 2726        |
| 2.4.2     | Construction stage .....   | 2827        |
| 2.5       | OTHER CONSIDERATIONS FOR THE ENYAU WSS .....   | 2928        |
| 2.5.1     | Service connections .....  | 2928        |
| 2.5.2     | Land requirements .....  | 2928        |
| 2.5.3     | Energy requirements .....  | 3029        |
| 2.5.4     | Labour requirements .....  | 3029        |
| 2.5.5     | Other facilities .....   | 3029        |
| 2.5.6     | Office and storage building.....   | 3130        |
| 2.5.7     | General access roads to the water transmission and distribution routes ....                    | 3231        |
| 2.5.8     | Other works and project details.....   | 3433        |
| <b>3.</b> | <b>POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK.....</b>  | <b>3534</b> |
| 3.1       | INTRODUCTION .....   | 3534        |
| 3.2       | OVERVIEW OF THE NATIONAL POLICIES AND LAWS ON ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ..... | 3534        |
| 3.2.1     | Policies.....  | 3534        |
| 3.2.2     | Guidelines .....   | 3534        |
| 3.2.3     | Laws.....  | 3635        |
| 3.2.4     | Regulations .....  | 3635        |
| 3.3       | KEY PROVISIONS OF THE ENVIRONMENTAL POLICIES AND LAWS .....                                    | 3736        |
| 3.3.1     | Policies.....  | 3736        |
| 3.3.2     | Laws and guidelines.....   | 3837        |
| 3.4       | KEY PROVISIONS OF SOCIAL POLICIES LAWS AND GUIDELINES .....                                    | 4039        |
| 3.4.1     | Policies.....  | 4140        |
| 3.4.2     | Laws.....  | 4241        |
| 3.5       | LEGAL, POLICY AND REGULATORY FRAMEWORK FOR RESETTLEMENT IN UGANDA .....                        | 4443        |
| 3.5.1     | Customary Land.....  | 4443        |
| 3.5.2     | Freehold Land.....   | 4544        |
| 3.5.3     | Public land.....   | 4544        |
| 3.6       | KEY INTERNATIONAL ENVIRONMENTAL AND SOCIAL LAWS.....   | 4544        |
| 3.6.1     | International Protocols and Conventions .....  | 4544        |
| 3.6.2     | World Bank Operational Policies .....  | 4645        |

|           |  |                    |
|-----------|--|--------------------|
| 3.6.3     | <i>The World Bank Group Environmental, Health and Safety Guidelines for water and sanitation project</i> ..... | <u>4847</u>        |
| 3.7       | PERMITS AND LICENSES .....   | <u>4948</u>        |
| 3.8       | INSTITUTIONAL FRAMEWORK.....   | <u>5049</u>        |
| 3.8.1     | <i>Ministry of Water and Environment</i> .....   | <u>5049</u>        |
| 3.8.2     | <i>National Environment Management Authority</i> .....   | <u>5150</u>        |
| 3.8.3     | <i>National Forestry Authority</i> .....   | <u>5150</u>        |
| 3.8.4     | <i>Uganda Wildlife Authority</i> .....   | <u>5150</u>        |
| 3.8.5     | <i>Wetlands Management Department</i> .....  | <u>5150</u>        |
| 3.8.6     | <i>Directorate of Water Resources Management</i> .....   | <u>5150</u>        |
| 3.8.7     | <i>Ministry of Lands, Housing and Urban Development</i> .....  | <u>5251</u>        |
| 3.8.8     | <i>Uganda National Roads Authority</i> .....   | <u>5251</u>        |
| 3.8.9     | <i>Ministry of Local Government</i> .....  | <u>5251</u>        |
| 3.8.10    | <i>The Ministry of Finance, Planning and Economic Development</i> .....  | <u>5251</u>        |
| 3.8.11    | <i>Ministry of Gender, Labour and Social Development</i> .....   | <u>5352</u>        |
| 3.8.12    | <i>The Equal Opportunities Commission (EOC)</i> .....  | <u>5352</u>        |
| 3.8.13    | <i>Terego and Yumbe District Local Governments</i> .....   | <u>5352</u>        |
| 3.8.14    | <i>Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)</i> .....                                    | <u>5453</u>        |
| <b>4.</b> | <b>BASELINE BIOPHYSICAL ENVIRONMENT .....</b>  | <b><u>5554</u></b> |
| 4.1       | PHYSICAL ENVIRONMENT.....  | <u>5554</u>        |
| 4.1.1     | <i>Overview of physical characteristics of the transmission and treated water distribution routes</i> .....    | <u>5554</u>        |
| 4.1.2     | <i>Topography of the Project Area</i> .....  | <u>5857</u>        |
| 4.1.3     | <i>Geology</i> .....   | <u>5958</u>        |
| 4.1.4     | <i>Soils along the project area</i> .....  | <u>6059</u>        |
| 4.1.5     | <i>Climate</i> .....   | <u>6160</u>        |
| 4.1.6     | <i>Noise</i> .....   | <u>6261</u>        |
| 4.1.7     | <i>Drainage and water resources</i> .....  | <u>6564</u>        |
| 4.1.8     | <i>Air quality</i> .....   | <u>6766</u>        |
| 4.2       | BIOLOGICAL ENVIRONMENTAL.....  | <u>6867</u>        |
| 4.2.1     | <i>Flora</i> .....   | <u>6867</u>        |
| 4.2.2     | <i>Herpetofauna</i> .....  | <u>7069</u>        |
| 4.2.3     | <i>Mammals</i> .....   | <u>7675</u>        |
| 4.2.4     | <i>Birds</i> .....   | <u>7776</u>        |
| 4.2.5     | <i>Butterflies</i> .....   | <u>8180</u>        |
| 4.2.6     | <i>Aquatic biodiversity</i> .....  | <u>8281</u>        |
| <b>5.</b> | <b>SOCIAL ECONOMIC BASELINE ENVIRONMENT .....</b>  | <b><u>9190</u></b> |
| 5.1       | OVERVIEW .....   | <u>9190</u>        |
| 5.2       | SOCIAL ECONOMIC BASELINE .....   | <u>9190</u>        |
| 5.2.1     | <i>Demographic Information</i> .....   | <u>9190</u>        |
| 5.2.2     | <i>Population</i> .....  | <u>9493</u>        |

|           |  |               |
|-----------|--|---------------|
| 5.2.3     | Settlement patterns & housing .....                    | 9695          |
| 5.2.4     | Ethnicity and religion .....                           | 9796          |
| 5.2.5     | Economic status .....                                  | 9897          |
| 5.2.6     | Water Sources .....                                    | 102404        |
| 5.2.7     | Household Income .....                                 | 104403        |
| 5.2.8     | Main area of expenditure.....                          | 104403        |
| 5.2.9     | Sanitation .....                                       | 105404        |
| 5.2.10    | Transport.....   | 106405        |
| 5.2.11    | Health.....  | 107406        |
| 5.2.12    | Educational Institutions .....                         | 109408        |
| 5.2.13    | Power/ Electricity.....                                | 110409        |
| 5.2.14    | Physical Cultural Resources (PCR).....                 | 111410        |
| 5.2.15    | Communication .....                                    | 112411        |
| 5.2.16    | Poverty.....   | 112411        |
| 5.2.17    | Land tenure .....                                      | 112411        |
| 5.2.18    | Gender.....  | 113412        |
| 5.2.19    | Water and sanitation related diseases.....             | 115414        |
| 5.2.20    | Gender Based Violence and Violence against Women ..... | 115414        |
| <b>6.</b> | <b>STAKEHOLDER CONSULTATION AND DISCLOSURE .....</b>   | <b>116415</b> |
| 6.1       | INTRODUCTION .....                                     | 116415        |
| 6.2       | PUBLIC PARTICIPATION OBJECTIVES .....                  | 116415        |
| 6.3       | STAKEHOLDER IDENTIFICATION.....                        | 117416        |
| 6.4       | STAKEHOLDER MOBILIZATION .....                         | 117416        |
| 6.5       | METHODS OF ENGAGEMENT .....                            | 121420        |
| 6.6       | STAKEHOLDER CONSULTATION FINDINGS .....                | 122421        |
| 6.6.1     | Community Findings.....                                | 156455        |
| <b>7.</b> | <b>ANALYSIS OF ALTERNATIVES .....</b>                  | <b>160459</b> |
| 7.1       | INTRODUCTION .....                                     | 160459        |
| 7.2       | SOURCES OF WATER .....                                 | 160459        |
| 7.2.1     | Ground Water Sources.....                              | 160459        |
| 7.2.2     | Surface Water Sources .....                            | 161460        |
| 7.3       | SANITATION OPTIONS .....                               | 161460        |
| 7.3.1     | Sewerage system.....                                   | 161460        |
| 7.3.2     | Public toilets.....                                    | 161460        |
| 7.4       | WATER TRANSMISSION AND DISTRIBUTION OPTIONS.....       | 161460        |
| 7.5       | WTP TECHNOLOGY SELECTION ALTERNATIVES .....            | 162461        |
| 7.5.1     | Coagulation/Flocculation .....                         | 162461        |
| 7.5.2     | Filtration .....                                       | 163462        |
| 7.5.3     | Disinfection.....                                      | 164463        |
| 7.6       | PROJECT OPTION VS NO PROJECT OPTION .....              | 165464        |
| 7.6.1     | No project option .....                                | 165464        |

|           |   |                      |
|-----------|---|----------------------|
| 7.6.2     | Project Option .....  | <u>166465</u>        |
| 7.6.3     | Conclusion on the 'No Project' Option .....                     | <u>167466</u>        |
| <b>8.</b> | <b>IMPACT AND MITIGATION .....</b>                              | <b><u>168467</u></b> |
| 8.1       | IMPACT EVALUATION AND ANALYSIS.....                             | <u>168467</u>        |
| 8.1.1     | Impact evaluation and analysis .....                            | <u>168467</u>        |
| 8.1.2     | Other considerations in impact analysis .....                   | <u>171470</u>        |
| 8.2       | CONSTRUCTION PHASE ENVIRONMENTAL AND SOCIAL IMPACTS .....       | <u>171470</u>        |
| 8.2.1     | Topography (Aesthetics pollution) .....                         | <u>171470</u>        |
| 8.2.2     | Susceptibility to soil erosion .....                            | <u>172471</u>        |
| 8.2.3     | Exposure to high noise levels.....                              | <u>173472</u>        |
| 8.2.4     | Impact on drainage, wetlands and water resources .....          | <u>173472</u>        |
| 8.2.5     | Potential air pollution .....                                   | <u>174473</u>        |
| 8.2.6     | Flora (Loss of vegetation and destruction of crops).....        | <u>175474</u>        |
| 8.2.7     | Fauna (Loss of wildlife, invertebrates, birds, etc.).....       | <u>177476</u>        |
| 8.2.8     | Impacts on aquatic biodiversity .....                           | <u>178477</u>        |
| 8.2.9     | Impact on Houses/structures and or settlement patterns.....     | <u>180479</u>        |
| 8.2.10    | Impact on the economy.....                                      | <u>181480</u>        |
| 8.2.11    | Water and Sanitation impacts.....                               | <u>181480</u>        |
| 8.2.12    | Impacts due to solid waste .....                                | <u>182481</u>        |
| 8.2.13    | Transport – Traffic and road safety .....                       | <u>183482</u>        |
| 8.2.14    | Social ills of Influx of construction labour.....               | <u>185484</u>        |
| 8.2.15    | Exposure to high noise levels.....                              | <u>187486</u>        |
| 8.2.16    | Impacts on Education.....                                       | <u>188487</u>        |
| 8.2.17    | Physical Cultural Resources impacts .....                       | <u>189488</u>        |
| 8.2.18    | Land take .....   | <u>190489</u>        |
| 8.2.19    | Gender and vulnerable groups .....                              | <u>191490</u>        |
| 8.3       | OPERATION PHASE IMPACTS ENVIRONMENTAL AND SOCIAL IMPACTS        |                      |
|           | <u>196495</u>   |                      |
| 8.3.1     | Overview .....  | <u>196495</u>        |
| 8.3.2     | Exposure to high noise levels.....                              | <u>197496</u>        |
| 8.3.3     | Impact on water quality and quantity due to WTP operations..... | <u>197496</u>        |
| 8.3.4     | Fauna (fisheries) .....   | <u>200499</u>        |
| 8.3.5     | Economy .....   | <u>201200</u>        |
| 8.3.6     | Water and Sanitation.....                                       | <u>202201</u>        |
| 8.3.7     | Solid waste.....  | <u>204203</u>        |
| 8.3.8     | Chemicals management.....                                       | <u>204203</u>        |
| 8.3.9     | Risk of fire from offices.....                                  | <u>206205</u>        |
| 8.3.10    | Transport – Traffic and road safety .....                       | <u>206205</u>        |
| 8.3.11    | Health.....   | <u>207206</u>        |
| 8.3.12    | Education .....   | <u>210209</u>        |
| 8.3.13    | Gender and vulnerable groups .....                              | <u>211210</u>        |

|           |   |                      |
|-----------|---|----------------------|
| 8.4       | DECOMMISSIONING PHASE IMPACTS .....   | <u>211240</u>        |
| 8.4.1     | Overview .....  | <u>211240</u>        |
| 8.4.2     | Positive impacts of decommissioning .....   | <u>212241</u>        |
| 8.4.3     | Negative impacts of decommissioning .....   | <u>213242</u>        |
| 8.5       | CROSS CUTTING IMPACTS .....   | <u>214243</u>        |
| 8.5.1     | Health & safety (Accidents and Injuries) .....                                      | <u>214243</u>        |
| 8.5.2     | Labour influx impacts .....   | <u>215244</u>        |
| <b>9</b>  | <b>SOCIAL AND ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN</b> <b><u>217246</u></b> |                      |
| 9.1       | GENERAL CONSIDERATIONS .....  | <u>217246</u>        |
| 9.2       | ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN<br>MATRIX .....             | <u>218247</u>        |
| 9.3       | PENALTIES FOR NON-COMPLIANCE .....  | <u>242244</u>        |
| 9.4       | E&S ACTION PLANS AND METHOD STATEMENTS .....  | <u>242244</u>        |
| 9.5       | INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS .....                                 | <u>249247</u>        |
| 9.5.1     | Stakeholders to be involved in the implementation .....                             | <u>249247</u>        |
| 9.5.2     | Roles and Responsibilities in the ESMP Implementation .....                         | <u>250248</u>        |
| 9.5.3     | Capacity Building in Environmental & Social Aspects of the Project .....            | <u>252250</u>        |
| 9.5.4     | Roles of the Contractors during Project Implementation .....                        | <u>253251</u>        |
| 9.6       | ENVIRONMENTAL MONITORING PROGRAMME .....  | <u>254252</u>        |
| 9.6.1     | Overview .....  | <u>254252</u>        |
| 9.6.2     | Monitoring Team .....   | <u>255253</u>        |
| 9.6.3     | Water Source Protection .....   | <u>255253</u>        |
| 9.7       | GRIEVANCE REDRESS MECHANISM .....   | <u>258256</u>        |
| 9.7.1     | Village and District Grievances Redress Committees .....                            | <u>259257</u>        |
| 9.7.2     | Site Grievance Redress Committee for Community Grievances .....                     | <u>259258</u>        |
| 9.7.3     | Project Workers Grievances Redress Committees .....                                 | <u>260258</u>        |
| 9.7.4     | Roles of Workers Grievance Redress Committees .....                                 | <u>260258</u>        |
| 9.7.5     | MWE'S Internal Grievance Redress Committee .....                                    | <u>261259</u>        |
| 9.7.6     | Process of handling grievances .....  | <u>261260</u>        |
| 9.7.7     | The World Bank's Grievance Redress Service (GRS) .....                              | <u>263261</u>        |
| 9.7.8     | Establishment and Composition of the GRCs at village level .....                    | <u>263261</u>        |
| 9.7.9     | Publicity of the GRM and GRCs .....   | <u>264262</u>        |
| 9.7.10    | Terms of Reference for the GRCs .....   | <u>267263</u>        |
| 9.7.11    | Training of the GRCs .....  | <u>267263</u>        |
| 9.7.12    | Facilitation of the GRCs .....  | <u>268264</u>        |
| 9.7.13    | Monitoring and Evaluation of the GRCs .....   | <u>268264</u>        |
| <b>10</b> | <b>CONCLUSION AND RECOMMENDATIONS</b> .....   | <b><u>270266</u></b> |
| 10.1      | RECOMMENDATIONS .....   | <u>270266</u>        |
| 10.2      | CONCLUSION.....   | <u>271267</u>        |
| <b>11</b> | <b>REFERENCES</b> .....   | <b><u>272268</u></b> |



|   |                      |
|---|----------------------|
| <b>12 ANNEXES .....</b>   | <b><u>275274</u></b> |
| ANNEX 1: DETAILS OF STAKEHOLDER CONSULTATION .....  | <u>276272</u>        |
| ANNEX 2: WATER TEST RESULTS .....   | <u>317343</u>        |
| ANNEX 3: DAILY VEHICLE INSPECTION FORM .....  | <u>321347</u>        |
| ANNEX 4: LIST OF PLANT SPECIES IDENTIFIED IN THE PROJECT AREA .....                                 | <u>323349</u>        |
| ANNEX 5: AMPHIBIAN AND REPTILIA SPECIES IDENTIFIED IN THE PROJECT AREA .....                        | <u>329326</u>        |
| ANNEX 6: LIST OF BIRD'S SPECIES IDENTIFIED IN THE PROJECT AREA .....                                | <u>331327</u>        |
| <b>ANNEX 6(A): LIST OF BIRD'S SPECIES AS IDENTIFIED DURING ASSESSMENT IN THE PROJECT AREA .....</b> | <b><u>331327</u></b> |
| <b>ANNEX 6(B): LIST OF BIRD'S SPECIES IDENTIFIED IN THE PROJECT AREA .....</b>                      | <b><u>332328</u></b> |
| ANNEX 7: LIST OF BUTTERFLIES' SPECIES IDENTIFIED IN THE PROJECT AREA .....                          | <u>335331</u>        |
| ANNEX 8: LIST OF MAPS .....   | <u>338334</u>        |
| ANNEX 9: NEMA APPROVED TORS .....   | <u>346342</u>        |
| ANNEX 10: HANDLING OF CHEMICALS AND OTHER POTENTIALLY HARMFUL MATERIALS .....                       | <u>350346</u>        |
| <i>Design and Management of Chlorination Storage and Dosing Areas .....</i>                         | <i><u>350346</u></i> |
| <i>Handling of Chlorine during Operation .....</i>  | <i><u>350346</u></i> |
| <i>Storage and Handling of Alum during Operation .....</i>  | <i><u>351347</u></i> |
| <i>Storage and Handling of Lime during Operation .....</i>  | <i><u>351347</u></i> |
| <i>Storage and Handling of Polyelectrolytes during Operation .....</i>                              | <i><u>352348</u></i> |
| ANNEX 11: CHANCE FIND PROCEDURE .....   | <u>353349</u>        |
| <i>Initial Identification and/or Exposure .....</i>   | <i><u>353349</u></i> |
| <i>Rescue Excavation .....</i>  | <i><u>353349</u></i> |
| <i>Major Finds .....</i>  | <i><u>354350</u></i> |
| <i>Exposure of Fossil Shell Beds .....</i>  | <i><u>354350</u></i> |
| <i>Exposure of Fossil Wood and Peats .....</i>  | <i><u>355351</u></i> |
| <i>Monitoring for Fossils .....</i>   | <i><u>355351</u></i> |
| <i>Chance Find Procedures (Burial Ground and Grave-BGG) .....</i>                                   | <i><u>356352</u></i> |
| <i>Major institutions to contact while dealing with Chance Finds .....</i>                          | <i><u>356352</u></i> |
| ANNEX 12: SITE DISCIPLINARY COMMITTEE (SDC) .....   | <u>358354</u>        |
| ANNEX 13: PRIMARY SURVEY QUESTIONNAIRE SAMPLE .....   | <u>359355</u>        |

## LIST OF FIGURES

|  |      |
|--|------|
| Figure 4.1: General land cover characteristics along Enyau Water Supply System ..... | 5857 |
| Figure 4.6: The topography of Enyau Water Supply System project area.....            | 5958 |
| Figure 4.7: Geology of the project area.....   | 6059 |
| Figure 4.8: Nature of soil types with in the Enyau WSS project area .....            | 6160 |
| Figure 4.9: Average annual rainfall patterns in the project area.....                | 6264 |
| Figure 5.1: Age structure in Arua and Yumbe district.....                            | 9594 |

## LIST OF TABLES

|  |        |
|--|--------|
| Table 2.2(a): Reservoirs for River Enyau Water Supply System.....                                | 2423   |
| Table 2.2(b): Coordinates of the key project sites and features .....                            | 2423   |
| Table 2.3: Land requirements for Enyau WSS.....  | 2928   |
| Table 4.1 Noise levels recorded along the Enyau WSS project area .....                           | 6362   |
| Table 4.2: National Standards for Maximum Permissible Noise Levels for various environments..... | 6362   |
| Table 4.7: Air quality results recorded at selected sites within Enyau WSS project area          | 6867   |
| Table 4.11: Description of the sites surveyed .....  | 6968   |
| Table 5.1: Population of affected sub counties at 2014 .....                                     | 9493   |
| Table 5.2: List of roads crossed by the proposed Enyau WSS .....                                 | 107406 |
| Table 7.1: Technology analysis of coagulants/flocculants .....                                   | 162464 |
| Table 7.2: Technology analysis of filter types .....   | 163462 |
| Table 7.3: Technology analysis of disinfection types .....                                       | 164463 |
| Table 8.1: Likelihood of occurrence classification .....   | 168467 |
| Table 8.2: Criteria for rating overall impact severity (environment parameters) .....            | 169468 |
| Table 8.3: Criteria for rating overall impact severity (Social and economic parameters)          |        |
| .....  | 170469 |
| Table 9.2: Proposed source protection interventions.....   | 256254 |

## LIST OF ACRONYMS

|       |   |
|-------|---|
| AC    | Alternating Current                                     |
| AIDS  | Acquired Immune-Deficiency Syndrome                     |
| AOI   | Area of Influence                                       |
| AP    | Angle Point   |
| BDL   | Below Detectable Level                                  |
| BOD   | Bio-chemical Oxygen Demand                              |
| BOT   | Build Operate and Transfer                              |
| BPT   | Brake Pressure Tank                                     |
| CAO   | Chief Administrative officer                            |
| CBD   | Convention on Biological Diversity                      |
| CBOs  | Community Based Organisations                           |
| CCO   | Certificate of Customarily Ownership                    |
| CDAP  | Community Development Action Plan                       |
| CDO   | Community Development Officer                           |
| CFU   | Colony Forming Units                                    |
| CGV   | Chief Government Valuer                                 |
| CITES | Convention on International Trade in Endangered Species |
| CMS   | Conservation of Migratory Species of Wild Animals       |
| CPA   | Comprehensive Peace Agreement                           |
| CR    | Critical (Globally (G-CR) or Regionally (R-CR)          |
| CSEAP | Construction Social and Environmental Action Plan       |
| dBA   | Decibel Amperes   |
| DC    | Direct Current  |
| DCA   | Danish Church Aid                                       |
| DD    | Data deficient  |
| DDP   | District Development Plan                               |
| DEA   | Directorate of Environmental Affairs                    |
| DEO   | District Environment Officer                            |
| DLGs  | District Local Governments                              |
| DN    | Diameter Nominal  |
| DNRO  | District Natural Resource Officer                       |
| DO    | Dissolved Oxygen  |
| DOSH  | Department of Occupational Safety and Health            |
| DWRM  | Directorate of Water Resources Management               |
| E     | Easting   |
| EA    | Environmental Assessments.                              |
| EAC   | East African Community                                  |
| EC    | Environmental Consultant                                |
| EHS   | Environment Health and Safety                           |
| EI    | Environmental Inspector                                 |
| EIA   | Environmental Impact Assessment                         |
| EIS   | Environmental Impact Statement                          |
| EMF   | Electro-Magnetic Fields                                 |

|        |   |
|--------|---|
| EMMP   | Environmental Mitigation and Monitoring Plan                  |
| EMP    | Environmental Management Plan                                 |
| EN     | Endangered  |
| ENR    | Environment and Natural Resources                             |
| EO     | Environmental Officer   |
| EOC    | Equal Opportunities Commission                                |
| EPA    | Environmental Protection Agency                               |
| EPC    | Engineering, Procurement and Construction                     |
| ERP    | Emergency Response Plan                                       |
| ESIA   | Environmental and Social Impact Assessments                   |
| ESIS   | Environmental and Social Impact Statement                     |
| ESMF   | Environment and Social Management Framework                   |
| ESMP   | Environmental and Social Management Plan                      |
| FSTP   | Faecal Sludge Treatment Plant                                 |
| GBV    | Gender Based Violence   |
| GFS    | Gravity Flow Scheme   |
| GIIP   | Good International Industry Practice                          |
| GIS    | Geographical Information System                               |
| GOU    | Government of Uganda  |
| GPS    | Global Positioning System                                     |
| GRC    | Grievance Redress Committee                                   |
| H      | Height Above Sea Level  |
| HAZID  | Hazard Identification   |
| HC     | Health Centre   |
| HDPE   | High Density Polyethylene                                     |
| HMMP   | Hazardous Material Management Plan                            |
| HRM    | Human Resource Manager  |
| HS&E   | Health, Safety and Environment                                |
| HSMP   | Health and Safety Management Plan                             |
| HVTG   | High Voltage Transmission Grid                                |
| ICNIRP | International Commission on Non-Ionizing Radiation Protection |
| ICSS   | Interim National Constitution of South Sudan                  |
| IDP    | Internally Displace People's camps                            |
| IFC    | International Finance Corporation                             |
| ISS    | Integrated Safeguards Policy Statements                       |
| IUCN   | International Union for the Conservation of Nature            |
| IWRM   | Integrated Water Resources Management                         |
| Km     | Kilometres  |
| KPI    | Key Performance Indicator                                     |
| kV     | Kilo Volt   |
| LC     | Least Concern   |
| LFMP   | Labour Force Management Plan                                  |
| LG     | Local Government  |
| LR     | Lower Risk  |
| LRA    | Lord's Resistance Army  |

|        |  |
|--------|--|
| MAAIF  | Ministry of Agriculture, Animal Industry and Fisheries |
| MED    | Ministry Energy and Dams                               |
| MEMD   | Ministry of Energy and Mineral Development             |
| MoGLSD | Ministry of Gender, Labour and Social Development      |
| MoLUD  | Ministry of Lands and Urban Development                |
| MOU    | Memorandum of Understanding                            |
| MRI    | Magnetic Resonance Imaging                             |
| MSDS   | Material Safety Data Sheets                            |
| MTWA   | Ministry of Tourism Wildlife and Antiquities           |
| MUH    | Makerere University Herbarium                          |
| MW     | Mega Watts   |
| MWE    | Ministry of Water and Environment                      |
| N      | Nothing  |
| NBI    | Nile Basin Initiative                                  |
| NDP    | National Development Plan                              |
| NE     | Near Endangered  |
| NEA    | National Environment Act                               |
| NELSAP | Nile Equatorial Lakes Subsidiary Action Program        |
| NEMA   | National Environment Management Authority              |
| NFA    | National Forestry Authority                            |
| NGO    | Non-Governmental Organisation                          |
| NHPC   | National Housing and Population Census                 |
| NP     | National Park  |
| NPHC   | National Population and Housing Census                 |
| NT     | Near-Threatened  |
| NTU    | Nephelometric Turbidity unit                           |
| NWSC   | National Water and Sewerage Corporation                |
| O&M    | Operation and Maintenance                              |
| OD     | Outer Diameter   |
| OP     | World Bank Operation Policy                            |
| OS     | Operational Safeguard                                  |
| OSH    | Occupational Safety and Health                         |
| OSHA   | Occupational Safety and Health Administration          |
| PAH    | Project Affected Household                             |
| PAP    | Project Affected Person                                |
| PCR    | Physical Cultural Resources                            |
| PCRM   | Physical Cultural Resource Management Plan             |
| PE     | Person Equivalent                                      |
| PEL    | Permissible Exposure Level                             |
| PFD    | Personal Floatation Device                             |
| PIU    | Project Implementation Unit                            |
| PM     | Particulate Matter                                     |
| POPs   | Persistent Organic Pollutants                          |
| PPE    | Personal Protective Equipment                          |
| PSCP   | Pollutant Spill Contingency Plan                       |

|        |  |
|--------|--|
| RA     | Risk Assessment  |
| RAP    | Resettlement Action Plan   |
| RCDAP  | Resettlement and Community Development Action Plan               |
| RDC    | Resident District Commissioner                                   |
| RE     | Resident Engineer  |
| ROW    | Right of Way   |
| RSPM   | Respirable Suspended Particulate Matter                          |
| SCADA  | Supervisory Control and Data Acquisition                         |
| SDC    | Site Disciplinary Committee                                      |
| SE     | Supervising Engineer   |
| SEA    | Sexual Exploitation and Abuse                                    |
| SEAP   | Social and Environment Action Plan                               |
| SEM    | Site Environmental Manager                                       |
| SI     | Safety Inspector   |
| SMEC   | SMEC International Pty Ltd                                       |
| SO     | Safety Officer   |
| SOW    | Scope of Work  |
| SPM    | Suspended Particulate Matter                                     |
| SSM    | Site Safety Manager  |
| SSP    | Source Protection Plan   |
| TASO   | The Aids Support Organisation                                    |
| TCRSS  | Transitional Constitution of the Republic of South Sudan         |
| TDS    | Total Dissolved Solids   |
| TMP    | Traffic Management Plan  |
| TOR    | Terms of Reference   |
| TSC    | Timed Species Count  |
| TSS    | Total Suspended Solids   |
| UBOS   | Uganda Bureau of Standards                                       |
| UN     | United Nations   |
| UNCCD  | United Nations Convention to Combat Desertification              |
| UNESCO | United Nations Educational, Scientific and Cultural Organisation |
| UNFCCC | United Nations Framework Convention on Climate Change            |
| UNICEF | United Nations International Children's Emergency Fund           |
| UNRA   | Uganda National Roads Authority                                  |
| US     | United States  |
| USAID  | United States Aid for International Development                  |
| USD    | United States Dollars  |
| UTM    | Universal Transmecater   |
| UV     | Ultra Violet   |
| UWA    | Uganda Wild Authority  |
| VAT    | Value Added Tax  |
| VAT    | Value Added Tax  |
| VAWG   | Violence Against Women and Girls                                 |
| VCT    | Voluntary Counselling and Testing                                |
| VES    | Visual Encounter Surveys   |

|       |   |
|-------|---|
| VHT   | Village Health Team                         |
| VOC   | Volatile Organic Compounds                  |
| VOCs  | Volatile Organic Compounds                  |
| VU    | Vulnerable                                  |
| WB    | World Bank                                  |
| WBG   | World Bank Group                            |
| WCS   | Wild Life Conservation Society              |
| WGS   | World Geographical System                   |
| WHO   | World Health Organisation                   |
| WMD   | Water Management Department                 |
| WMP   | Waste Management Plan                       |
| WMZs  | Water Management Zones                      |
| WSDFs | Water and Sanitation Development Facilities |
| WSS   | Water Supply System                         |
| WTP   | Water Treatment Plant                       |

#### **MEASURES AND UNITS**

|       |                                      |
|-------|--------------------------------------|
| A     | Ampere (a unit of current)           |
| d(BA) | Decibel                              |
| g     | gram                                 |
| Ha    | Hectare (= 10 000 square metres)     |
| kg    | Kilogram (= 1 000 g)                 |
| km    | Kilometer (= 1 000 metres)           |
| kV    | Kilovolt (103 volt)                  |
| kVA   | Kilovolt-ampere (103 volt-ampere)    |
| kWh   | Kilowatt-hour (103 watt-hour)        |
| m     | Meters                               |
| MVA   | Mega volt-ampere (= 106 volt-ampere) |
| MWh   | Megawatt-hour (= 106 watt-hour)      |
| MW    | Megawatt (= 106 watt)                |

## DEFINITION OF KEY WORDS AND TERMINOLOGIES USED

**Project** means the proposed Enyau Water Supply system and associated components.

**Compensation** means cash or in-kind payments at replacement value for an asset or a resource acquired or affected by the Project at the time the asset is replaced.

**Project-Affected Person (PAP)** means any person who, as a result of the implementation of the Project, loses the right to own, use, or otherwise benefit from a built structure, land (residential, agricultural, pasture or undeveloped/unused land), annual or perennial crops and trees, or any other fixed or moveable asset, either in full or in part, permanently or temporarily. PAPs may include:

- Physically Displaced People, i.e. people subject to Physical Displacement as defined hereunder,
- Economically Displaced People, i.e. people subject to Economic Displacement as defined hereunder.

**Physical Displacement** means loss of shelter and assets resulting from the acquisition of land associated with the Project that requires the affected person(s) to move to another location.

**Economic Displacement** means loss of income streams or means of livelihood resulting from land acquisition or obstructed access to resources (land, water or forest) caused by the construction or operation of the Project or its associated facilities.

**Project-Affected Household (PAH)** means a household that includes one or several Project-Affected Persons as defined above. A PAH will usually include a head of household, his/her spouse and their children, but may also include other dependents living in the same dwelling or set of dwellings, like close relatives such as parents and grandchildren.

**Project-Affected Area** means an area, which is subject to a change in use because of the construction or operation of the Project.

**Transmission & Distribution Corridor** means area measuring up to 3 meters in width and Approximately 87.6 km in length that will be acquired for the establishment of the Enyau Water Supply System in both Terego and Yumbe districts.

**Access roads** mean all existing and newly established roads and tracks, and areas cleared or driven over to provide access to and from the construction areas, and for the transportation of the construction workforce, equipment and materials.

**Authenticity of photos used:** Unless specified as file photo, all photos presented in this ESIA report were taken by the ESIA consultants at the time of conducting ESIA studies in the month of October-December 2022.

**Coordinates used:** Unless specified, all coordinates used in this ESIA report are captured in UTM-WGS 84 coordinate system.



## EXECUTIVE SUMMARY

### Introduction

Government of Uganda (GoU) through the Ministry of Water and Environment (MWE), with financial support from the World Bank, under the Integrated Water Management and Development Project (IWMDP) is undertaking Water and Sanitation sub-projects in small towns and rural growth centres. The Project focusses on three strategic areas: (i) delivering necessary Water and Sanitation Services (WSS) infrastructure and catchment management measures in targeted areas; (ii) supporting water related institutions (MWE, local government, and service providers) to establish and consolidate operational efficiency and service quality in small towns and rural areas; and (iii) strengthening national and regional capacity to improve Integrated Water Resource Management (IWRM). The Project comprises of four components: Component 1–WSS in Small Town & Rural Growth Centers which cover Support to Small Town & Rural Growth Centres and Support to Refugee & Host Communities; Component 2–WSS in Urban Large Towns; Component 3–Water Resource Management and, Component 4–Project Implementation & Sector Support. Sub-components. The proposed project that this ESIA focuses on falls under component-1 and specifically Support to Refugee & Host Communities. The project will be implemented by MWE at central level through the Rural Water Supply and Sanitation Department, with close collaboration with Rural Water Supply and Sanitation Regional center- based in Lira as well as district local governments. Under this project, the Ministry of Water and Environment identified the Ora - Ala Water Supply System, as one of the interventions in raising the safe water access in refugee hosting communities and settlements in northern Uganda. The Ora - Ala water supply and sanitation system comprises two separate surface Water Supply Systems with water sources from River Enyau and Nyagak. For purposes of this report, the environmental and social aspects presented are for Enyau Water Supply System only.

Enyau Water Supply System shall be executed in the districts of Terego and Yumbe. The project area is approximately 678km<sup>2</sup> covering Udupi, Omugo and Uriama sub counties in Terego district and Ariwa subcounty in Yumbe district. R. Enyau was established to have adequate water to meet the water requirement for the projected population of 107,922 in the ultimate year 2043. Assuming an average house hold population of 4.6 individuals, this translates to 23,461 households expected to benefit at the maximum supply capacity of the water scheme.

Raw water will be abstracted from River Enyau at rate of 2,977m<sup>3</sup>/d in Terego district and treated at a facility about 7.4km downstream of the intake through a transmission system (pipes). Treated water will then be distributed to the benefiting centers downstream along a transmission network of about 45,215meters. The design consideration for Enyau Water Supply System will consist of four storage tanks targeting sub-counties of Udupi, Uriama, Omugo and Ariwa.

The sanitation component of the project has provided for a two 9-stance water borne toilets that shall be constructed. The toilet facilities shall have a section for female users and a section for male users. The section for female users shall comprise 3 stances plus 1 stance for persons with disabilities while the section for male users shall comprise 2 stances plus 1 stance for persons with disabilities plus urinals. In addition, the project shall construct a water office which will be used for managing the WSS.

### **Need for ESIA**

The implementation of the Enyau WSS Project will result in a number of environmental impacts that require an Environmental and Social Impact Assessment (ESIA). Furthermore, the fifth schedule of the National Environment Act No. 5 of 2019 as amended, lists such projects (Construction of large-scale gravitational water schemes of more than 1000 m<sup>3</sup>/day or where the ecosystem is fragile and sensitive in section 4(j) among those to be considered for environmental impact assessment.

Section 19 (3) of the National Environment Act No. 5 of 2019 as amended made an Environmental and social Impact Assessment mandatory for all projects or policies that may, are likely to or will have significant impacts on the environment so that adverse impacts can be identified, Avoided, reduced, mitigated or compensated for based on the mitigation hierarchy. Furthermore, the World Bank's OP 4.01 Environmental Assessment requires ESIA/ESMP to be undertaken for projects that are considered to pose negative environmental and social impacts. Since the proposed project activities are likely to pose site specific environmental and social risks and impacts, ESIA is required as per OP 4.01 policy requirements. Therefore, this ESIA study seeks to ensure compliance of the project with applicable national and World Bank environmental and social safeguard policies, while also providing the overall framework for addressing social and environmental risks.

### **Purpose of the ESIA**

- To investigate the likely impacts of the proposed project on the biophysical and social-economic environment and propose appropriate mitigation measures to avert or reduce such impacts.
- To promote environmental sustainability through identifying and implementing appropriate mitigation measures.
- To facilitate informed decision making by the Ministry of Water and Environment (Project Proponent), National Environment Management Authority (NEMA) and other Lead agencies and to set terms and conditions for the implementation of the water and sanitation project.
- To involve and engage stakeholders including communities in the project area in the decision-making process and also make them part of the project

## Project location

Enyau WSS will be located in 4 sub-counties, 10 parishes and 25 villages in the affected districts of Terego and Yumbe.

## Project description

The scheme components shall include; an intake, raw water main, water treatment plant, transmission mains, reservoirs and distribution networks. The scheme shall also include water office and sanitation facilities. The design for each component is described as follows;

The design for each component is described as follows;

- Intake with a diversion weir length of approximately 26.06 m intake chamber of 1m, depth of overflow weir of 0.03m while inlet chamber weir depth shall be 0.13m and 0.066m<sup>3</sup>/s will be abstracted.
- Intake chamber of 1m width and settling length 3.1m
- Coarse and fine screens of spacing 30mm and 10mm between bars, respectively
- 7.4km transmission main of 400mm pipe size
- Two baffled flocculation tanks with 5 compartments each of 1.1m width, effective depth 2.7m and length 3.4m
- Two horizontal flow tanks each of width 5.6m and length 16.8m
- Two filter beds each 3.7x3.7m
- Backwash water pumped from a clear well to the elevated tank of capacity 120m<sup>3</sup>
- A clear tank 5.3m wide, 2m deep and 7.95m long
- Chlorine dosing done through OD 20mm pipe into the tank while alum dosing will be located to the flocculators
- 15km of DN 250mm gravity mains starting from the clear water well at the water treatment plant to reservoirs
- 45 kms of primary distribution mains table 2 (Mvepi Zone 3 - 4.3kms, Mvepi Zone 2 and 3 – 13.5kms and Mvepi Zone 1 and 2, Ariwa Sub County and Bidi Zone 5 – 27.4kms).
- Four reservoir tanks.

## ESIA methodology and approach

The study was preceded by internalization of the Terms of Reference and formulation of appropriate data collection tools. It assessed each of the activities of the project covering physical, biological, socio-economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for negative/adverse impacts. The methodology used included; Literature review, Stakeholder consultations, key stakeholders' investigations/engagements, survey of social economic activities, Water resources assessment, Biodiversity studies on

flora and fauna, Baseline noise assessment, Mapping and photography, Visual observations, Impact screening, Impact assessment, evaluation and analysis.

The EIA study was based on data collected along the proposed project route (project sites) as well as review of documents provided by the Developer and those from other sources such as, Feasibility study reports, Environmental and Social Management Framework (ESMF), World Bank Safeguards policies, IFC Environmental Health and Safety Guidelines for Water and Sanitation Projects, and other documents provided by district staff on project location such as District Development Plans, district state of environment and health reports, among others. Other documents reviewed include relevant National Household survey reports, policies, regulations, legal framework impacting on the water and sanitation sector. Consultations with stakeholders constituted a major part of the ESIA methodology in information gathering. Stakeholder perceptions, views and concerns were collected through focus group discussions, meetings and personal interviews with the target audience including but not limited to all communities in Terego & Yumbe District Local Government, NGOs among others.

Emphasis was laid on environmental concerns expected from construction of the abstraction structures, sanitation facilities, and storage facilities and laying of water transmission and distribution pipes within the rest of project area, obligations of the various parties in mitigating the anticipated impacts and the procedure for operating the water and sanitation project among others. Concerns were analyzed, documented, and addressed in the Environmental and Social Management Plan (ESMP).

### **Policy, Legislation and Regulations**

Two frameworks in regard to policy, legislation and regulations have been reviewed i.e. World Bank Environmental and Social safeguard policies and Uganda national policy, legal and institutional framework. The following World Bank Environmental and Social safeguard policies are triggered by the project: Environmental Assessment OP/BP 4.01 because of the likely negative environmental and social impacts arising from the construction and operational activities of the proposed project; Natural Habitats OP/BP 4.04 because the intake is located in a wetland and along the river banks; Physical Cultural Resources OP/BP 4.11 because construction excavations may unearth chance finds; and Involuntary Resettlement OP/BP 4.12 as a result of land intake and likely impact on livelihoods and economic displacement.

The main Ugandan national policies, laws and regulations that the project will guide project development and implementation are those that deal with water, environment, land, labour, child-abuse and gender aspects. These include but not limited to: - the Water Act Cap 152; the National Environment Act No.5 of 2019; the Land Act Cap 227; the Land Acquisition Act Cap 226; the Occupational Safety and Health Act No. 9, 2006; Employment Act, 2006; Workers' Compensation Act 2000 and Children Act Cap 59.

### **Baseline environment of the project area**

The proposed Enyau Water Supply Scheme will traverse 25 villages and 10 sub-counties in the two districts of Terego and Yumbe. Both the raw water main transmission and treated water distribution networks traverse mainly refugee settlements of Imvepi and Bidi bidi which is characterized by private farmlands and settlements and does not affect any protected areas.

**Physical environment:** The project traverses majorly wooded savannah grasslands and some sections of the Enyau water supply network follow majorly existing road networks along subsistence farmlands and clustered settlements with in Imvepi and Bidi bidi refugee settlements. The project area is relatively flat but descends gradually towards the Nile. The highest point above sea level is at about 904 m in Opiraa village, Odupi sub-county around the intake and the lowest point is at the Nile at 618m above sea level in Yumbe district. Rainfall patterns of the project area fluctuates between 1250-2000mm annually with a two seasonal rainfall and the wettest months are usually August - September with >120 mm/month. The project will traverse two seasonal and one permanent wetland which had not been greatly modified by human activities.

**Biological environment:** A total of 196 plant species belonging to 148 genera were recorded from the surveyed project area. Of these, five plant species of conservation concern in the sense of threat in IUCN and National context were recorded. These were (*Khaya grandifolia*, *K. senegalensis*, *Azelia africana* IUCN VU; National EN), (*Vitellaria paradoxa* IUCN VU& National VU) (*Milicia excelsa* IUCN NT & National EN, (*Tamarindus indica* IUCN NE & National VU). Twenty-two amphibian species belonging to one Order Anura, 10 families and 13 genera were recorded were of no conservation concern. A total of 25 reptilian species belonging to two Orders – Chelonia and Squamata, 12 families and 16 genera were recorded in the project area. Only two species (*Knixys belliana* - Bell's Hinge-back Tortoise and *Python sebae* – the African Rock Python) are of conservation concern. All the mammal species encountered are not vulnerable, endangered or near threatened. Forty-Seven (47) bird species were encountered and none of them was of conservation concern. River Enyau is rich in aquatic fauna but according to the IUCN red list status, none of the aquatic species encountered were of critical conservation concern.

**Social economic baseline:** The project area has a population of more than 680,000 people with an average household size of 5.85 which much higher than the national average household size of 4.7. Terego and Yumbe districts generally had a young population with 59.6% and 68.2% of its population aged 19 and below respectively while the elderly constituted only 3.9% and 3.2 for the same districts. The Settlement in the project host community was observed to be sparse with mild concentration around trading centres. The primary economic activity in the project area is farming which employs 93%, while trading and casual labour represented 3 and 2% each. Other activities such as carpentry, saloon, restaurants and boda-boda contributed to the remaining 2%. Fifty-four percent (54%) of

households in the area use water from boreholes, 29% get water from public piped water stands, 9% from protected wells and the remaining 8% reported getting water from open sources such as rivers and swamps. It was also noted that rain water harvesting is not widely embraced in the area as majority of the households did not have provisions for harvesting and the many were grass thatched which made difficult to harvest. The distances to the nearest water sources ranged from 1km to 4km. Sixty-six percent (66%) of households had sanitary waste management facilities and most of them were ordinary pit latrines representing 84% while pit latrines with a concrete slab represented 16%. Lack of human waste disposal facilities was considered a threat to water quality given that the source (R. Enyau) is open. It is estimated that 75% of the overall disease burden in the project area derives from inadequate sanitation and hygiene and about 90% of the deaths are directly attributable to inadequate water, poor sanitation and unhygienic practices. With estimates indicating that only 12% of healthcare facilities have basic sanitation services, the need to provide Water, Sanitation and Hygiene (WASH) services is acute, especially in maternity and primary-care environments. In schools, the lack of proper WASH facilities leads to absenteeism and dropouts of adolescent girls. Of concern is the absence of means for girls to manage menstruation, which deters them from attending classes. Similarly, inadequate sanitation and hygiene facilities in the workplace mean that women are unable to manage menstruation, risking work absenteeism and depriving society of their full participation.

## **Project Impacts**

The purpose of this project is to increase sustainable access to safe water and basic sanitation in the targeted sub-counties of Terego and Yumbe district.

### **1. Positive Impacts**

The following positive benefits are expected to accrue from this project;

- **Reduction in diseases prevalence**

The proposed Enyau Water Supply and Sanitation Project will contribute towards reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhea. This expected since the refugees and refugee host communities will access clean water for drinking and domestic activities. The project would have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced. This positive impact will be enhanced if the following are done:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that operations and maintenance are properly done to avoid issues of water contamination
3. Ensuring that water is affordable and available all the time.

The improved health conditions will significantly result in a reduction in health costs and time for collecting water which translates into substantial savings for rural households.

- **Easing of the water fetching burden**

One of the major positive impacts of this project will be the easing of the burden of fetching water, which is one of the most arduous tasks for women and young girls in the rural areas. Therefore, the time which has always been wasted on water fetching can be invested into the development of income-generating activities especially for the women. This impact will be enhanced if the following are done:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

- **Improved livelihoods of the local people**

The proposed project would result in increase of volume of water for production, which could result in improved livelihoods of the local people. The project would, therefore increase productive activities through reduced sick days and time saved in fetching water. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time
3. The project should put initiatives in place to promote productive use of water

- **Improved service delivery**

The proposed project would result in bringing improved water and sanitation services closer to the people. This impact will be enhanced through:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that operations and maintenance are properly done to avoid issues of water contamination
3. Ensuring that water is affordable and available all the time

- **Reduction of child mortality**

Safe drinking water, personal/household hygiene and improved sanitation would reduce infant/child morbidity and mortality; improve their nutritional status and their ability to perform better in schools. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

- **Improved maternal health**

The Project would result in reduced physical stress and improved health status of pregnant women, thereby reducing miscarriages, maternal deaths, and adverse impacts on fetuses and new-borne. This impact will be enhanced through the following:

1. Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
2. Ensuring that water is affordable and available all the time

- **Promotion of gender equality and empowerment of women and the girl child**

The proposed project would free women and girls of the burden of having to spend a lot of their time collecting and carrying water almost on a daily basis often from sources distant from their houses. This reduction in burden would allow women and girls time for other activities including involvement in economic ventures that could contribute to reducing poverty and furthering their education (thus increasing school enrolment). This impact will be enhanced through:

1. ensuring that women and girls are given priority while recruiting personnel for the project
2. Ensuring the all the households within the project footprint are either are connected or have access to clean and safe water.

- **Increase in investment in the area**

The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water. This impact will be enhanced through:

1. Ensuring that the project uses locally produced materials where possible.
2. The water distribution network connections should target SMEs
3. The project should have an initiative of promoting productive use of water

- **Human capacity building and creation of jobs**

Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled labourers. During construction, about 100-150 people will be employed and about 10-20 people will get jobs during operation phase. More employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services. This will be enhanced through giving priority to local communities while recruiting workers for the project. This will not only enhance skills development in water construction but also environmental and social sustainability.



- **Increased Revenue to the government**

This water supply and sanitation project will generate revenue to the districts and the country in general. This will be in form of VAT on water supply and other taxes associated with extension such as expanded and improved business opportunities in the project areas. This will be enhanced by putting in place an efficient mechanism for revenue collection.

## **2. Negative impacts and mitigation measures**

The major negative risks and impacts associated with the Enyau water and sanitation are summarised in the impact/risk-mitigation –responsibility matrix (ESMP) under section 9.2. The analysis of the full range of the impacts assessed are contained in Section 8 of this report. The most significant environmental and social impacts, rated as of medium significance and higher, are:

1. The influx of people and the increase in social disruption and human health issues, related specifically to GBV and Child abuse, the influx of people and HIV/AIDS, with which specific management is required to guide social interaction during the construction period
2. The loss of crops on the RoW, when it deviates from the road reserve
3. The construction activities like excavations and vehicle movements during construction are likely to generate noise levels beyond the current levels. Exposure of communities and workers to high noise levels can be a health concern.
4. The project activities like excavations and waste management may increase sediments in water sources and/or pollute them with contaminants
5. The construction works may negatively impact water quantity and quality of streams, water bodies, and ground water resulting in seasonal hydrologic changes and potential negative impacts on downstream river biota and communities.
6. Excavations, construction activities, transportation of workers and equipment may pose occupational and community safety risks.

The mitigation measures for the above listed potential impacts include: Proper containment and re-use of cut and spoil/excavated soils for backfilling the excavated pits, hoarding off of key construction sites, provision and enforcement of adequate and appropriate personal protective wear, construction of suspended water pipes across streams and wetlands on concrete pillars to ensure future disturbance during repairs will not result into further interface with the water resources in these ecosystems, proper and appropriate construction and sanitary waste management, sprinkling of water on dusty sections of the construction sites and limiting speed of project vehicles to 30km/hr in the project area. The affected property and crops/trees shall be compensated in line with the approved RAP, Communities in the project area should be engaged and sensitised about all the components and requirements of the project. After construction, there should be landscaping and then grass left to recolonize the disturbed area naturally. MWE in collaboration with the local authorities shall undertake

catchment management activities to support local environmental protection programs including support to afforestation initiatives to enhance tree cover areas as a way of reducing project footprint. Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads to avoid unintended damages to fauna. The affected sites should be restored to almost its original position. Trenching, pipework laying as well as backfilling will be done concurrently. For open pits the contractor shall ensure that every evening, they are covered with timber while being secured with a warning tape. Following construction, rehabilitation of all areas disturbed during construction phase and that are not required for regular maintenance operations shall be undertaken to desired ecological conditions and all exposed areas shall be re-vegetated using indigenous species. To minimize interference with traffic, digging trenches and piping across roads shall be conducted in hours with less traffic preferably on weekends and the contractor shall develop and implement a traffic management plan. To mitigate social impacts, workers shall as much as possible be recruited from the project area, develop and implement a comprehensive stakeholder management and engagement plan, Structures like shrines and graves should be avoided as much as possible, all public institutions like schools and health centers in the project footprint should be connected to the water supply and requirements for vulnerable groups (like child protection and prevention of GBV) should be mainstreamed and integrated in project activities.

#### **Monitoring of ESMP implementation**

The ESMP provides a summary of activities, their related potential impacts and the corresponding recommended mitigation measures to be carried out during the pre-construction, construction, operation and decommissioning phases of the Project. It details active remedial and mitigation measures to be continuously carried out to prevent or minimize impacts on the bio-physical and socio-cultural environments as well as to promote occupational safety and health of employees. It also seeks to identify the various institutional responsibilities to manage the environmental aspect of the Project as well as the cost involved.

The Contractor will be required to prepare standalone safeguards management plans as part of the Contractor's Environment and Social Management Plan. Reference should always be made to the Contractor's Environmental and Social Management Plan as the overarching document that contains general Control Statements for management of various impacts such as air quality, solid waste, and hazardous materials, water quality and ecosystems, noise and vibration control, erosion control, waste excavation and disposal and occupational health and safety, sexual exploitation and abuse, sexual harassment, traffic, labour force, grievance redress and so on. In addition to the Management Plans, the Contractor should prepare Method Statements for specific activities such as earthworks and submit for the Supervision Engineer's review and comments before commencement of works. If the Consultant/Engineer notifies the Contractor that a specific method statement has failed to provide adequate mitigations, such a statement should be revised and approved by the Client/MWE/or their representative – Supervision Consultant/Engineer.

Several statutory and contractual approvals and licenses will be required before commencement of certain construction activities. Securing of approvals requires preparation of the relevant documentation and/or payment of fees. This needs to be done during mobilization to ensure that all approvals are secured in a timely manner to avoid construction delays. It is important to ensure that all materials (sand and aggregates etc) are sourced from sites that are approved by NEMA and compliant with environmental laws. Permits for water abstraction and construction on surface water will be obtained during the mobilization period. Where relocation of utilities is to occur, the contractor will obtain permission from relevant service providers during the mobilization period to avoid delays. For all new materials sites to be opened up and operated by the Project, NEMA approval must be secured while all existing sites should undertake/provide proof of having valid approvals and/or having environmental compliance agreements with NEMA.

Routine inspections will be carried out to cover all aspects of environmental and social management on the site. Either a standalone Monthly Environment Report shall be prepared, or safeguards shall be sufficiently covered in the Contractor's Monthly Progress Report in fulfillment of the Contractor's contractual reporting obligations. The report will highlight different activities undertaken to manage environmental and social aspects of the project in line with contract specifications, laws, standards, policies, and plans of Uganda and World Bank safeguards policies. MWE will take the responsibility to fulfil the requirements for conduct of periodic environmental and social audits in line with the National Environment Act 2019. Implementation of ESMP activities will be approved by MWE and safeguards compliance will be one of the bases for payment. Final payment for the contractor shall be tagged to successful restoration of all disturbed areas and clean-up of all construction sites.

MWE has on behalf of Government of Uganda committed to provide human and financial resources to implement several safeguards aspects of this project as required. MWE will hold all project implementers accountable for putting in place adequate material measures and actions to mitigate the Project's potential environmental and social risks and impacts. It is strongly recommended that MWE reviews and updates its environmental and social management processes before commencement of the civil works.

**Staffing** – The human resource equation for the delivery of environmental and social safeguards compliance oversight by environment and social safeguards experts of the Ministry has been reinforced with the recruitment of the Project Social Development Specialist and Environmental Specialist. Hence the Ministry has adequate capacity to monitor the implementation of the safeguards requirements of the project.

**Equipment** – In execution of supervisory and monitoring role, Ministry relies largely on physical site inspections, interviews and review of records without going into some in situ measurements of some physical and ecological parameters. The approach can be exploited by fraudulent contractors since they will have known that, there will be measures for on-site physical verifications. It is therefore important that the Ministry obtains some in-house equipment for rapid verification of noise, air quality, vibrations and water, and the results may

be used to inform resolution of related complaints. In the same vein, there should be readily available logistics in terms of vehicles for the environment and social personnel of the Ministry to rapidly respond to environmental and social safeguards emergencies in the projects as they happen.

### **Responsibility and capacity of stakeholders for ESMP implementation and monitoring**

The management and supervision of the ESMP is strictly the responsibility of the Ministry of Water and Environment as the Developer. During construction, the Contractor will be responsible for the day-to-day implementation of the ESMP while the Operator will be responsible for the implementation of the ESMP during operations phase.

At the local level, the community, Terego & Yumbe districts will be responsible for the day-to-day monitoring of the ESMP in their areas of jurisdiction while at National level, the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSH) of the Ministry of Gender, Labour and Social Development will undertake environmental and social/health and safety monitoring respectively.

The Contractor shall hire the following key staff to undertake project implementation: Project Manager, Environmental Specialist, Sociologist, Health and Safety Officer. MoGLSD, MWE and NEMA have safeguards personnel that have capacity in terms of equipment and training in environmental and social management and monitoring. However, the beneficiary communities and District Local Governments will need capacity building to enhance their ability to monitor E&S implementation progress of the project. The contractor may also need awareness and training in the environmental and social aspects of the project. MoGLSD, MWE and NEMA staff need refresher training in environmental monitoring, RAP implementation, reporting and modeling as well as catchment management approaches.

### **Management of Grievances**

The project has a Grievance Redress Mechanism that will address any grievance or complaint by the PAPs promptly and fairly in a manner acceptable to all parties concerned. Committees with composition that includes among others representative of vulnerable and women shall be established at village and district levels. The Mechanism also has a referral system to the courts of laws. The Committee members shall be trained and facilitated to effectively undertake their activities. The GRCs will be responsible for receiving and logging complaints and resolving disputes. The GRCs will work with the MWE to resolve each grievance or dispute to ensure that redress actions are implemented. If affected persons are not satisfied with the grievance redress structures, they will be entitled to seek redress from the district committee and Courts of Law. The GRM spells out the process involved from lodging a complaint to its resolution.

The Contractor shall also be required to establish a committee to handle workers' grievance. The committee will comprise the Project Manager, Foreman and the social and environment safeguards personnel and the representative of the Supervising Engineer.

### **Cost of implementing the ESMP**

It is estimated that the implementation of the ESMP including the management of associated environmental and social aspects of the project, training and capacity building will cost approximately USD 416,000. It is recommended that this should be provided for under the provisional sum in the bidding documents.

### **Conclusions and Recommendations**

Access to clean water is one of the primary constraints to the Ugandan rural communities, providing such access unlocks health, social and economic opportunity. In the context of the proposed project, such opportunity would most likely be taken up by women and children since traditionally, the positive impacts from this project will result in local economic, social and health improvement in the Project Area in various parts of Yumbe and Districts.

Through effective implementation of the mitigation measures, stipulated in the Environmental and Social Management Plan (ESMP), the probable risks of this project can be adequately managed and mitigated. It is critical to realise that the project must be implemented within the suggested ESMP guidelines, to avoid significant negative impacts, like the spread of HIV/AIDS, gender inequality, gender-based violence, the abuse of children and exclusion of vulnerable groups. Of primary importance, is for the final design stage to now be focussed on site specific issues and opening discussions directly with relevant landowners, as can be facilitated through the implementation of the Resettlement Action Plan (RAP) process.

Recommendation is made for the consideration of approval of the project, based on conditions that the proposed mitigation measures are effectively implemented; proof of which must be made available regularly to relevant authorities and stakeholders and be submitted upon completion of the construction phase through the submission of a final environmental and social audit.

The following specific recommendations are made:

1. The proposed route be more closely aligned with the road reserve, as there seem to be no reasons for the predominant deviation from the road reserve;
2. The final location of the proposed route and other infrastructure, be specifically designed during the final design stage, to avoid the identified environmental and social impacts, as far as is possible;

3. MWE should consider the needs of institutions such as churches, schools and health centres, and rural growth centres that fall outside the proposed routing, for possible further inclusion into the revised designs for the project.
4. Labour and recruitment – MWE should give priority consideration to recruitment of unskilled local labour on the project. Gender considerations should also be given due attention during project implementation;
5. Should there be a need to change the alignment and the design from the current, MWE should endeavour to include sociologists in the final design and construction teams to overcome the biases and gaps that are often overlooked by teams that are predominantly engineering professionals;
6. Communication and feedback - MWE is requested to ensure that reports or outcomes of the on-going assessment are shared with the relevant Districts, as soon as they are available – in the interest of transparency and accountability;
7. Necessary training regarding safety aspects to the personnel working on the project will be provided by the Contractor. Personal protective equipment, like safety gloves, helmet, mufflers etc., should be provided during the construction period and during the maintenance work and according to national and international Occupational Health and Safety good practice standards;
8. Strict Contractor adherence from the work force regarding zero tolerance to disturbances on the local community, surrounding habitats, flora and fauna, to be maintained at all times;
9. Selection of approved locations for material storage yards and construction yards away from wetland and low-lying areas, as well as away from other sensitive environmental areas, must be ensured;
10. Continued sensitisation of the affected community must be done, together with planning with local political and civil authorities and involving District Environment Officers and Community Development Offices;
11. The project should at all times ensure health and safety for both workers and the public, during all stages of the project; and
12. MWE will need to work extensively and more regularly with local leaders, to help sensitise the general public to better manage local community expectations regarding compensation for loss of crops, woodlots and/or property

## 1 INTRODUCTION

### 1.1 Over view

Government of Uganda (GoU) through the Ministry of Water and Environment (MWE), with financial support from the World Bank, under the Integrated Water Management and Development Project (IWMDP) is undertaking Water and Sanitation sub-projects in small towns and rural growth centres. The Project focusses on three strategic areas: (i) delivering necessary Water and Sanitation Services (WSS) infrastructure and catchment management measures in targeted areas; (ii) supporting water related institutions (MWE, local government, and service providers) to establish and consolidate operational efficiency and service quality in small towns and rural areas; and (iii) strengthening national and regional capacity to improve Integrated Water Resource Management (IWRM). The Project comprises of four components: Component 1–WSS in Small Town & Rural Growth Centers which cover Support to Small Town & Rural Growth Centres and Support to Refugee & Host Communities; Component 2–WSS in Urban Large Towns; Component 3–Water Resource Management and, Component 4–Project Implementation & Sector Support. Sub-components. The proposed project that this ESIA focuses on falls under component-1 and specifically Support to Refugee & Host Communities. The project will be implemented by MWE at central level through the Rural Water Supply and Sanitation Department, with close collaboration with Rural Water Supply and Sanitation Regional center- based in Lira as well as district local governments. Under this project, the Ministry of Water and Environment (MWE) identified the Ora - Ala Water Supply System, as one of the interventions in raising the safe water access in refugee hosting communities and settlements in northern Uganda. The Ora - Ala water supply and sanitation system comprises two separate surface Water Supply Systems with water sources from River Enyau and Nyagak. For purposes of this report, the environmental and social aspects presented are for Enyau Water Supply System only.

Enyau Water Supply System shall be executed in the districts of Terego and Yumbe. The project area is approximately 678 km<sup>2</sup> covering Udupi, Omugo and Uriama sub counties in Terego district and Ariwa subcounty in Yumbe district. R. Enyau was established to have adequate water to meet the water requirement for the projected population of 107,922 in the ultimate year 2043. Assuming an average house hold population of 4.6 individuals, this translates to 23,461 households expected to benefit at the maximum supply capacity of the water scheme.

Raw water will be abstracted from River Enyau at rate of 2,977 m<sup>3</sup>/d in Terego district and treated at a facility about 7.4km downstream of the intake through a transmission system (pipes). Treated water will then be distributed to the benefiting centers downstream along a transmission network of about 45,215meters. The design consideration for Enyau Water Supply System will consist of four storage tanks targeting sub-counties of Udupi, Uriama, Omugo and Ariwa.

The sanitation component of the project has provided for a two 9-stance water borne toilets that shall be constructed. The toilet facilities shall have a section for female users and a section for male users. The section for female users shall comprise 3 stances plus 1 stance for persons with disabilities while the section for male users shall comprise 2 stances plus 1 stance for persons with disabilities plus urinals. In addition, the project shall construct a water office which will be used for managing the WSS.

## **1.2 Project location**

Enyau WSS will be located in 4 sub-counties, 10 parishes and 25 villages in the affected districts of Terego and Yumbe. Table 1.1 below presents a summary of the various administrative units crossed by the Enyau WSS. Figure 1.1 presents an overview of the project area as impacted by the project.



Table 1.1: Administrative units crossed by the Enyau Water Supply System

|              | District | Subcounty | Parish    | Village      |
|--------------|----------|-----------|-----------|--------------|
|              | Terego   | Omugo     | Ndaapi    | Obiya        |
|              | Terego   | Omugo     | Ndaapi    | Etiyo        |
|              | Terego   | Omugo     | Ndaapi    | Widi         |
|              | Terego   | Odupi     | Imvepi    | Ajusia Budre |
|              | Terego   | Odupi     | Imvepi    | Ngulungulu   |
|              | Terego   | Odupi     | Imvepi    | Ariwa        |
|              | Terego   | Odupi     | Imvepi    | Ongurua      |
|              | Terego   | Odupi     | Imvepi    | Amia         |
|              | Terego   | Odupi     | Imvepi    | Siripi       |
|              | Terego   | Odupi     | Imvepi    | Ediofe       |
|              | Terego   | Odupi     | Imvepi    | Jue          |
|              | Terego   | Odupi     | Lugbari   | Yinga        |
|              | Terego   | Odupi     | Otumbari  | Opiraa       |
|              | Terego   | Odupi     | Lugbari   | Olua         |
|              | Terego   | Odupi     | Azapi     | Opira        |
|              | Terego   | Odupi     | Azapi     | Andiku       |
|              | Terego   | Odupi     | Azapi     | Nyaranga A   |
|              | Terego   | Uriama    | Katiku    | Payiofe      |
|              | Terego   | Uriama    | Maraju    | Osia         |
|              | Yumbe    | Ariwa     | Okuyo     | Loli         |
|              | Yumbe    | Ariwa     | Okuyo     | Okuyo Centre |
|              | Yumbe    | Ariwa     | Okuyo     | Ombeci       |
|              | Yumbe    | Ariwa     | Rigbonga  | Ayivu        |
|              | Yumbe    | Ariwa     | Rigbonga  | Kiranga      |
|              | Yumbe    | Ariwa     | Rigbonga  | Okubani      |
| <b>Total</b> | <b>2</b> | <b>4</b>  | <b>10</b> | <b>25</b>    |

### 1.2.1 Intake

The intake will be located Azapi village, Odupi subcounty, Terego district at E: 357782, N: 357782, H: 854 m. The river bank is loosely vegetated with grasses with evidence of cultivation up to the water mark. Gardens of maize and bananas were observed on either side of the river. Access to the intake is currently via a foot path within Azapi village of about 460 meters.

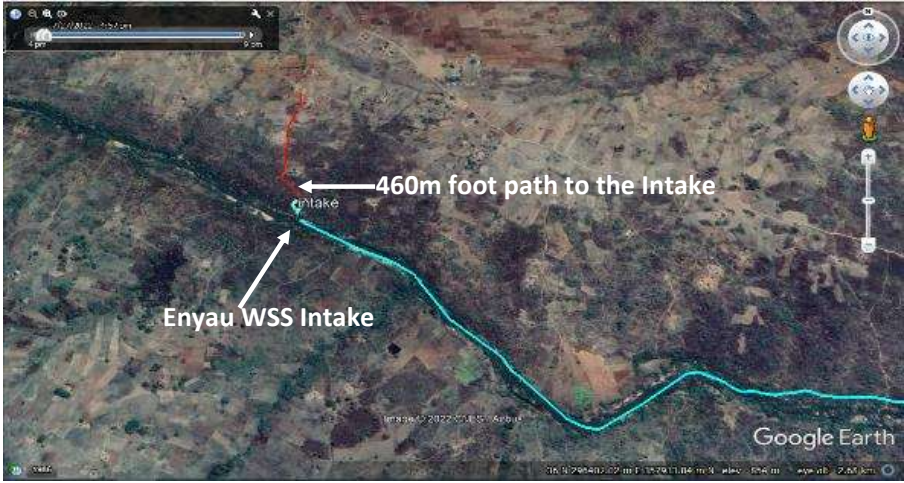


Figure 1-1 : Google Earth image showing the location of Enyau WSS and the 280m footpath access to the intake



Figure 1-2 : Physical appearance of Enyau WSS intake and its surroundings



## 1.2.2 Water Treatment Plant (WTP)

The Enyau water treatment plant (WTP) will be located at E: 356577, N: 301311, H:820 m in Nyaranga village, Odupi subcounty, Terego district. The site is within Imvepi refuge settlement also designated as Block 6, Zone 4, and Jakisa village. At the time of conducting the ESIA, the site had been cleared and planted with teak trees (*Tectona grandis*). The tree planting was conducted by refugees funded by Danish Church Aid (DCA). The surrounding environment are patches of gardens of maize, sorghum and cassava planted and owned by refugees. Access to the site would require that a fresh road of about 490 meters be opened.

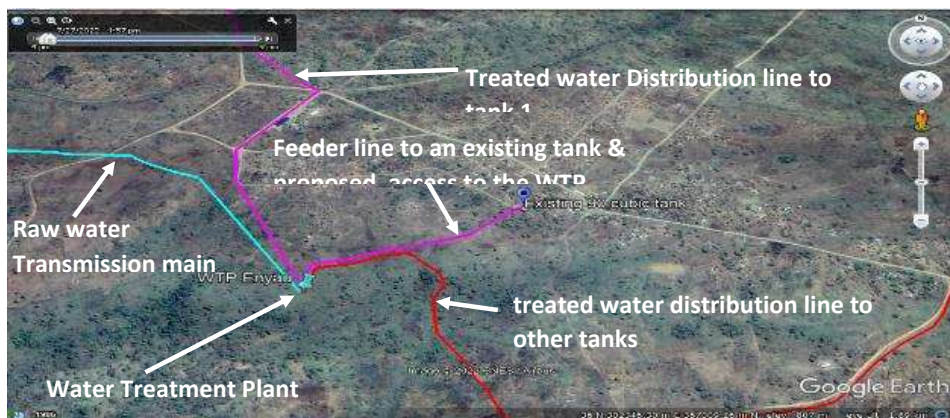


Figure 1-3 : The incoming and outgoing network at the proposed water treatment plant



Figure 1-4 : Physical appearance of the proposed water treatment plant site

### 1.2.3 Tank 1

Tank 1 will be located in at E: 360027, N: 2986 and at 893m above sea level in Opira village, Odupi subcounty, Terego district. At the time of conducting ESIA, the site was a garden of sorghum and partly land under farrow. The surrounding is a grassland of *Hyperhenia rufa* and scattered trees of *acacia spp* and fruit trees of oranges, mangoes. The site is owned by Mr. Ajuma Luke and has no land dispute. According to the Vice LCI chairman Mr Dranuke Samuel (Tel Contact -0777187608, 0760193668), the project is highly welcome. Access to the site will require that an access road of about 100meters be created from the existing motorable road.



Figure 1-5 : ESIA Team at the project site with LC1 Chairman (A) and the Land owner (B)

### 1.2.4 Existing tank in Imvepi Refugee Settlement

The project intends to supply water to an existing tank in Imvepi refugee settlement. This tank is currently supplied from a production borehole. The specific location is at E: 301622 N: 356768 in Nyaranga village, Udupi subcounty, Terego district. It is in zone 4, Block 5 of the refugee settlement. The land owner where the tank is located was identified as Mr Agule.

The vegetation around the site indicates that the site used to be a wooded grassland but has been converted into patches of gardens owned by the refugees. This tank is about 490meters from the Water Treatment Plant. The purpose of supplying water to this tank is to increase reliability of fresh and clean drinking water to the refugee population because the existing production bore hole being used at the moment is not reliable.



Figure 1-6 : Existing tank at Invepi Refugee Settlement in Nyaranga Village

### 1.2.5 Tank 2

Tank 2 will be located at E: 356373, N: 303304, H: 778m Site in Olua village, Odupi subcounty, Terego district. Originally was a farmland but is slowly recovering to become a woodland of acacia combretum. The land Owner was not identified although the zone is part of Invepi refugee settlement. Access to the site will require opening up of a fresh access road from the existing motorable road at the playground of about 143m.



Figure 1-7 : Physical appearance of Tank 2 project site

### 1.2.6 Brake Pressure Tank (BPT)

The brake pressure tank (BPT) will be located in Amia village, Odupi subcounty, Terego district at E: 356098, N: 305566, H: 722m. At the time of conducting ESIA, the site was a garden of Simsim belonging to a refugee called Ms Mary Koropo. The original land owner could not be established since this is currently taken as government land. According to Mr Asega Yoram (VHT) and Mr. Walter Jospheh (Community based worker under Care NGO), the proposed site is also known as village 1, zone 3, Block A under the refugee system of administration & nomenclature. The site is close (about 30 meters) to the existing motorable road and will not require construction of fresh access road.



Figure 1-8 : Project site for BPT(A) and land oner for the site (B)

### 1.2.7 Tank 3

Tank 3 will be located in Yinga village, Odupi subcounty, Terego district at E: 361365, N: 308747, H: 799m. According to Mr. Kemis Kennedy (Acting Block Leader and area leader church of Emmanuel one), the project site was owned by a refugee called Iddi Lawrence but no longer stays in the camp. It is said the plot owner returned to Juba (South Sudan). The project site which is well accessed was a garden of sweet potatoes at the time of conducting this ESIA. According to the refugee system of administration, the project site is located in village 2, Zone 1, Block A, Yinga LCI.

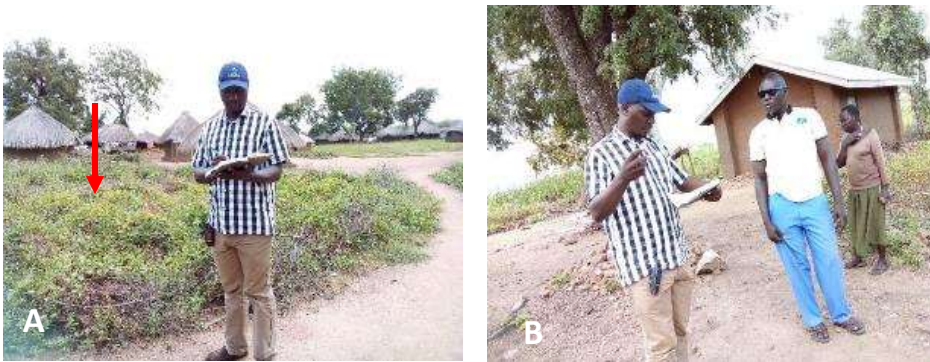


Figure 1-9 : ESIA team at the proposed site for the tank (A) and the Block Leader (B)

### 1.2.8 Tank 4

The location site for tank 4 is at the confluence of the main road (Yumbe-Obongi road) and a local path in Ayivu village, Ariwa subcounty, Yumbe district at E: 362096, N: 317662, H:724 m. The site is currently a garden of Maize belonging to Mr. Draci Swayibu. The site is accessible and will not require any further access road construction. The current location is not appropriate and needs to be shifted at least 30 meters' east wards because it's in a road reserve.



Figure 1-10: ESIA team at tank 4 site with community members

### 1.3 Project justification

The purpose of this project is to increase sustainable access to safe water and basic sanitation in the benefiting districts especially those areas (villages and trading centers) along the proposed water network. The following benefits are expected to accrue from this project;

- i. Reduction in the prevalence rates of waterborne diseases, especially cholera, dysentery and diarrhea;
- ii. A significant reduction in health costs and time for collecting water which translate into substantial savings for rural households;
- iii. The easing of the burden of fetching water which is one of the most arduous tasks for women and young girls in the rural areas;
- iv. The development of income-generating activities for women given the free time accruing from the reduced burden of fetching water;
- v. An increase in the enrolment ratio, especially for girls, and in the female literacy rate;
- vi. The reduction in social conflicts related to water use;
- vii. The promotion of local governance and decentralization;
- viii. The efficient management and maintenance of water supply and sanitation facilities; and

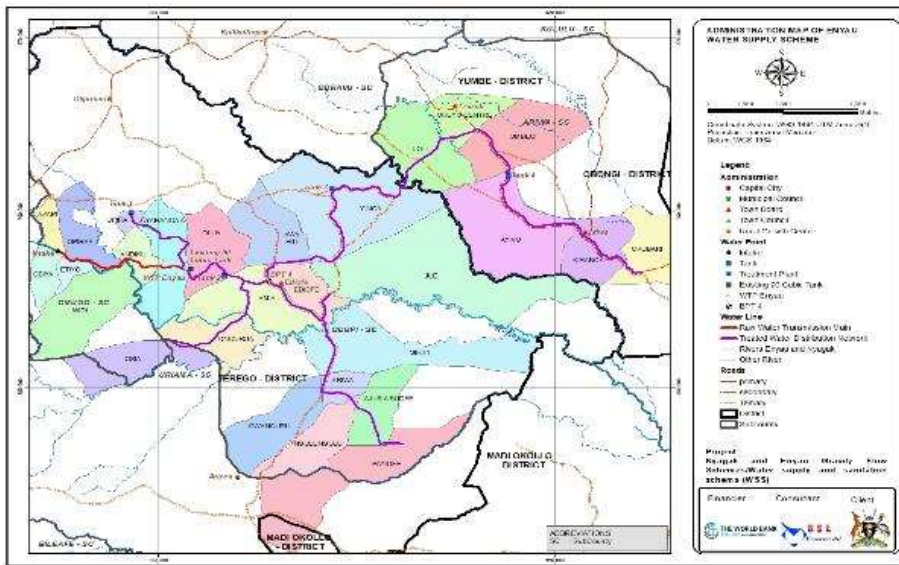


Figure 1.1: Administrative units affected by the Enyau WSS

#### 1.4 The need for Environmental Impact Assessment

The implementation of the Enyau WSS Project will result in a number of environmental impacts that require an Environmental and Social Impact Assessment (ESIA). Furthermore, the fifth schedule of the National Environment Act No. 5 of 2019 as amended, lists such projects (Construction of large-scale gravitational water schemes of more than 1000 m<sup>3</sup>/day or where the ecosystem is fragile and sensitive in section 4(j) among those to be considered for environmental impact assessment.

Section 19 (3) of the National Environment Act No. 5 of 2019 as amended made an Environmental and social Impact Assessment mandatory for all projects or policies that may, are likely to or will have significant impacts on the environment so that adverse impacts can be identified, Avoided, reduced, mitigated or compensated for based on the mitigation hierarchy. Furthermore, the World Bank's OP 4.01 Environmental Assessment requires ESIA/ESMP to be undertaken for projects that are considered to pose negative environmental and social impacts. Since the proposed project activities are likely to pose site specific environmental and social risks and impacts, ESIA is required as per OP 4.01 policy requirements. Therefore, this ESIA study seeks to ensure compliance of the project with applicable national and World Bank environmental and social safeguard policies, while also providing the overall framework for addressing social and environmental risks.



#### **1.4.1 Purpose of the ESIA**

- To investigate the likely impacts of the proposed project on the biophysical and social-economic environment and propose appropriate mitigation measures to avert or reduce such impacts.
- To promote environmental sustainability through identifying and implementing appropriate mitigation measures.
- To facilitate informed decision making by the Ministry of Water and Environment (Project Proponent), National Environment Management Authority (NEMA) and other Lead agencies and to set terms and conditions for the implementation of the water and sanitation project.
- To involve and engage stakeholders including communities in the project area in the decision-making process and also make them part of the project

### **1.5 Approach and Methodology**

#### **1.5.1 Overview**

The study was preceded by internalization of the Terms of Reference and formulation of appropriate data collection tools. It assessed each of the activities of the project covering physical, biological, socio-economic (including occupation health and safety); and socio-cultural environment as detailed herein. It determined and listed potential direct and indirect environmental impacts for each of the planned activities; evaluated and recommended mitigation measures for negative/adverse effects and enhancement measures for the positive impacts

#### **1.5.2 Literature Review**

The ESIA study was partly undertaken by literature review of documents provided by the Developer and those from other sources such as, Feasibility study reports(MWE, 2022), Environmental and Social Management Framework (ESMF) for the Integrated Water Management and Development Project(MWE,2018) World Bank Safeguards policies, IFC Environmental Health and Safety Guidelines for Water and Sanitation Projects(WB, 2018), and other documents provided by the host district staffs such as District Development Plans for 2021, District State of Environment and Health Reports among others. Other documents reviewed include relevant National Household survey reports (UBOS, 2020), policies, regulations, legal framework relevant to the water and sanitation sector.

#### **1.5.3 Stakeholders' consultations**

Consultations with stakeholders constituted a major part of the ESIA methodology in information gathering. Rational data collection instruments were designed and centered mainly on the proposed water and sanitation project and other associated systems. Data on

the potential environmental and social impacts and stakeholder perceptions, views and concerns were collected through focus group discussions (Plate 1.1), meetings and personal interviews with the target audience including but not limited to all communities in all the benefiting trading centres and villages along the Enyau WSS in Terego and Yumbe district. Emphasis was laid on environmental and social concerns expected in the process of laying transmission and distribution water pipes within the rest of project area, obligations of the various parties in mitigating the various impacts anticipated and the procedure for operating the water and sanitation project among others. Concerns were documented and analysed in chapter 5 and other details in Annex 1. All concerns and issues raised have been addressed in the environmental and social management plan.



Plate 1.1: ESIA team consulting PAPs along the project area

## **1.5.4 Social economic baseline studies**

### **1.5.4.1 Review of Literature**

Prior to commencement of the study, was the review of literature and desk study of available baseline information from studies earlier collected and reviewed from the project area; including but not limited to relevant legal frameworks, project-specific information from MWE and the current district development plans and categorical reports. More particularly, this involved the review of the categories of literature;

- a) District information (District Development Plans) for 2021,
- b) District statistics on population, health, literacy and poverty levels, 2020
- c) Uganda National Population and Housing census 2014
- d) The National Environment Act No.5, 2019
- e) The National Environment (Impact Assessment) Regulations, 2020

### **1.5.4.2 Field Surveys and photographic records**

After the review of relevant literature, field surveys were undertaken with the intention of getting acquainted with the project area, conducting stakeholder meetings with district and sub county officials and community members. This would eventually help to ground truth some of the information initially collected from secondary literature. Field surveys helped in correlating the information obtained from secondary sources and stakeholder consultation such as settlement patterns, housing typology, economic activities and transport. During field surveys, information obtained through household surveys, interviews and focus group meetings was verified through direct observation by the study team. Observation was specifically aimed at assessing physical assets of people in affected areas, living conditions, settlement patterns, and capacity to diversify income, and social and economic networks. Where possible, observations were backed up by photographic records.

### **1.5.4.3 Questionnaire surveys**

Questionnaire/socio-economic survey or household survey was considered a convenient method for collecting large amounts of data from respondents. This generated primary data which together with secondary data has been used to form the socioeconomic baseline

### **1.5.4.4 Study design**

The study employed a cross-sectional study design. The main method of socioeconomic data collection was the questionnaire. A number of variables were assessed within the questionnaire which were clustered under major themes that included; household income, expenditure, access to water, health services, social networks, food and nutrition energy sources, housing conditions, transport, vulnerability and land ownership.

#### 1.5.4.5 Selection of the sample size

The areas traversed by the project are generally sparsely populated save for trading centers such as Opira, Nyaranga, Amia, Jue, Yinga in Terego and Ombechi and Okubani in Yumbe district.

The simple random sampling technique was used which accorded all households along the line equal chances of being selected. Household heads were selected as the major respondents in this survey since they have sufficient and required information. In cases where the Household (HH) head was absent, their spouses were considered. In instances where both the household head and spouse were not available, then any other adult household member was selected.

Based on the 2014 NPHC all the eight directly and indirectly affected sub counties (Odupi, Ariama, Omugo and Ariwa) had a population of 132,767 and an average household size of 6 which translated into 22,054 households

The Raosoft (2004) formula for sample size calculation was used to estimate the household sample size for the study. With the total household of 22,054 along the water transmission line, the formula recommends a minimum sample size of 378 households, for a confidence level of 95 percent and a margin of error of 5%. The sample size  $n$  and the margin of error  $E$  are derived by:

$$X = Z \left( \frac{C}{100} \right)^2 r(100 - r)$$
$$n = \frac{Nx}{((N - 1)E^2 + x)}$$
$$E = \sqrt{\left[ \frac{(N - n)x}{n(N - 1)} \right]}$$

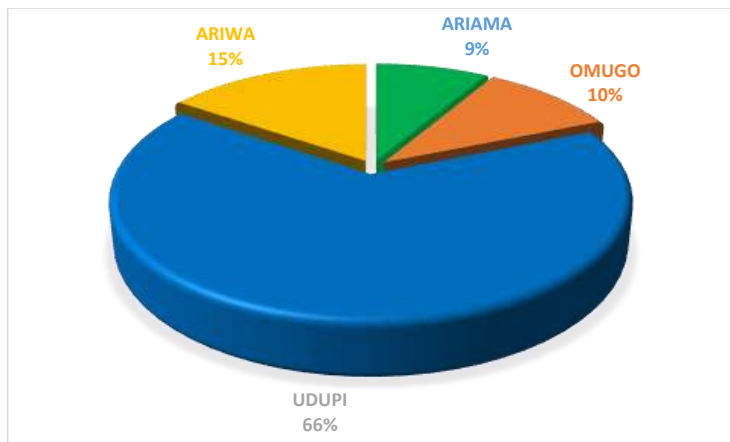
Where

$N$  is the population size (22,054),

$r$  is the fraction of the responses of interest, and

$Z =$  is the critical value for the confidence level  $c$ .

A total of 270 respondents were administered with a structured questionnaire in four sub counties affected by the project. This represented a 71% response rate, which was considered sufficient because the population from which the sample was drawn considered the respective sub county total population though not entire populations within these sub counties were likely to be affected. Villages along the water lines in these sub counties were selected using the lottery method but their number was limited to two villages for each of these sub counties.



**Figure 1-11: Showing Distribution of Respondents By Sub county (n=270)**

#### 1.5.4.6 Sampling procedure for Qualitative data collection

Purposive sampling was used to select participants with relevant information to this study. Purposive sampling was the method of choice because it allows a selection of relevant information-rich participants.

Table 1: Categories and sizes of the samples selected

| Hierarchy        | Category of Respondents                     | Details of Stakeholders   | Sampling method        | Sample size |
|------------------|---|---|------------------------|-------------|
| National Level   | Lead Agencies                               | NEMA, UWA, NFA, MWE, OPM MGLSD and DWRM,  | Purposive              | 6           |
| District Level   | Terego and Yumbe Districts Local Government | Different Departments of the respective District Local Government (District Chief Administrative Officer (CAO) District Environment Officer (DEO), District Natural Resource Officer (DNRO), District Physical Planner (DPP), District Community Development Officer (DCDO).) | Purposive              | 2           |
| Sub county level | Odupi, Ariama, Ariwa and Omugo              | Sub-county Chiefs, Community Development Officers, Parish chiefs and LC III Chairpersons and area council representatives   | Purposive              | 4           |
| Local            | Households                                  | Households in the sub counties with project infrastructure.   | Simple random sampling | 270         |

#### **1.5.4.7 Methods of data collection**

##### **1.5.4.7.1 Key Informant Interviews**

Key informant interviews were conducted to gather information from local government leaders at National, District, Sub-county levels and community. The sample at the district level included; Chief Administrative Officers, LCV Chairperson, District Natural Resources Officers, District Environment Officers, District Community Development Officers, District Land Officers, District Engineers, District Physical Planners and District Water Officers.

##### **1.5.4.7.2 Focus Group Discussion**

This technique involved a small group of respondents (usually 6-10 respondents) who were interviewed together in a common location. The interviewer led the discussion and ensured that every person had an opportunity to respond. Focus groups allow deeper examination of complex issues than other forms of survey methods. Four focus group discussions were held with sub county leaders each involving an average of 7 people making a total of about 28 FGD participants. Focus group discussions were held with sub counties of Odupi, Ariwa, Omugo and Ariama. The sub-county sample included: Sub-county Chiefs, Community Development Officers, Parish chiefs, LC III Chairpersons and area council representatives of parishes traversed by the water pipes.

##### **1.5.4.7.3 Structured interviews**

Primary data was being collected by interviewing sampled members of the study population. The structured interview method was used to collect household data with the aid of a semi-structured questionnaire.

##### **1.5.4.7.4 Stakeholder consultations and Disclosure**

Consultation with key stakeholders is a continuous process that will be carried out throughout the ESIA process. During the scoping phase a stakeholder mapping exercise was undertaken to identify Interested and Affected Parties (I&APs) to the project. Each individual stakeholder or group of stakeholders identified had particular sets of priorities and objectives specific to the project.

Relevant and adequate project information was provided to stakeholders to enable them to understand project risks, impacts and opportunities. Stakeholder consultation aimed at:

- Generating understanding of the project
- Understanding local expectations of the project
- Characterizing potential environmental, socio-economic impacts
- Obtaining consensus on mitigation options

To plan stakeholder involvement, it was essential to begin with a master list of people/groups that could possibly have an interest in the project. A list of stakeholders to be consulted was

developed and will be updated, as required at each stage of the study, to reflect changing developments and the possibility of identifying new stakeholders. Therefore, stakeholder consultations were very significant in highlighting the environmental, safety concerns and potential socio-economic impacts that could be associated with the implementation of the proposed Enyau gravity flow water scheme project. The consultations were also important in determining the appropriate mitigation measures and views raised were considered and incorporated into the ESIA report.

Consultations were conducted with the Terego and Yumbe district local governments, Ariama, Ariwa, Odupi and Omugo sub counties. Consultations were also held with all the 27 affected villages. In these meetings, key environmental and social issues to consider while choosing project location were highlighted from each stakeholder's point of view.

#### **1.5.4.7.5 Direct observation**

Participant observation was vital in directly corroborating the information. Most importantly, direct observation was vital in verifying people's livelihood (e.g. livelihood activities), nature of structure and mode of transport and evidence of social economic activities carried out by people in the district. This method draws on the direct evidence of the eye to witness events at first hand. Moreover, it is based on the premise that, for certain purposes, it is best to observe what actually happens. Direct observation method too, was complimented by photography through which observed events and features were recorded. Photographs provided the qualitative physical evidence of what actually exists.

#### **1.5.4.8 Data quality control measures**

The sociologist coordinated and supervised the entire process of the socio-economic survey by guiding the data collection process. Recruitment and selection of the research assistant and field assistants was done emphasizing minimum academic qualifications, experience, socio-cultural compatibility and gender balance. The RA and field assistants were recruited targeting social scientists with knowledge and experience in conducting socio-economic and behavioural studies with ability to use both qualitative and quantitative methods as well as able to speak the local languages. Lugbara was the main language in the project area. The research team met on a daily basis to review the day's field performance, compare notes and to plan for the next day. This was aimed at enhancing reliability and consistency of the collected data.

#### **1.5.4.9 Data analysis**

##### **1.5.4.9.1 Quantitative Data**

Data was regularly cleaned before entry. Quantitative data was entered and analysed using Microsoft excel software where frequency and percentage tables as well as bar charts were generated and used to present the quantitative results.

#### **1.5.4.9.2 Qualitative Data**

Qualitative data was transcribed and arranged according to existing and emerging themes through content analysis methods. The qualitative analysis largely followed the questions and themes of the study within the interviews and FGD guide.

#### **1.5.4.10 Ethical considerations**

Consent to conduct the ESIS in the respective districts was sought from relevant district, sub county and community leaders. All respondents in the study were informed that participation in the study was voluntary and all information collected would be used to strictly inform the planning process of the proposed project. Though the respondents were informed about anonymity, none of them preferred to be anonymous.

#### **1.5.4.3 Stakeholder identification, consultations and Disclosure**

Consultation with key stakeholders is a continuous process that was carried out throughout the ESIA process. During the scoping phase a stakeholder mapping exercise was undertaken to identify Interested and Affected Parties (I&APs) to the project. Each individual stakeholder or group of stakeholders identified had particular sets of priorities and objectives specific to the project.

Relevant and adequate project information was provided to stakeholders to enable them to understand project risks, impacts and opportunities. Stakeholder consultation aimed at:

- Generating understanding of the project
- Understanding local expectations of the project
- Characterizing potential environmental, socio-economic impacts
- Obtaining consensus on mitigation options

To plan stakeholder involvement, it was essential to begin with a master list of people/groups that could possibly have an interest in the project. A list of stakeholders consulted was developed and updated, as required at each stage of the study, to reflect changing developments and the possibility of identifying new stakeholders. Therefore, stakeholder consultations were very significant in highlighting the environmental, safety and potential socio-economic concerns/impacts that could be associated with the implementation of the proposed Enyau gravity flow water scheme project. The consultations were also important in determining the appropriate mitigation measures and views raised were considered and incorporated into the ESIA report.

Consultations were conducted with the Terego and Yumbe district local government, Udupi, Omugo, Uriama and Odravu. Consultations were also held with all the 44 affected villages. Based on proposed wayleave corridor, the PAPs were identified with the assistance of the Chairpersons Local Council one (LC-1). At national level, consultations were conducted with the National Environment Management Authority, Uganda Wildlife Authority, National



Forestry Authority, Ministry of Gender, Labour and Social Development, Ministry of Water and Environment as well as the Office of the Prime Minister, NGOs like Water mission, UNHCR and World Vision. In these meetings, key environmental and social issues to consider while choosing project location were highlighted from each stakeholder's point of view. Data on stakeholder perceptions, views and concerns was collected through focus group discussions, meetings and personal interviews with the target audience/communities that likely to be affected by the water and sanitation project in all the villages of the proposed project areas. Emphasis during engagements was laid on environmental and social concerns expected from project activities, obligations of the various parties in mitigating the various impacts anticipated and the procedure for operating the water and sanitation project among others. This was aimed at ensuring that the communities give their views from an informed point. Concerns raised were documented, analysed, and addressed in the environment management plan.

#### **1.5.4.4 Direct observation**

Participant observation was vital in directly corroborating the information. Most importantly, direct observation was vital in verifying people's livelihood (e.g. livelihood activities), nature of structures, and mode of transport and evidence of social economic activities carried out by people in the district. This method draws on the direct evidence of the eye to witness events at first hand. And it is based on the premise that, for certain purposes, it is best to observe what actually happens (Denscombe, 1998). Direct observation method too, was complimented by photography through which observed events and features were recorded. Photographs provided the qualitative physical evidence of what actually exists.

Adhoc and unstructured observations were made throughout the data collection exercise during the visits to the project areas. Observations of social - economic activities in the project area, physical environmental set up of the project area were done to get first-hand information to prompt additional probing for more information on the physical, social-economic dynamics of the project area.

#### **1.5.5 Physical measurement and assessment of environmental parameters**

The ESIA team gathered relevant baseline data on biophysical and socio-economic environmental parameters that are in the project area. The objective was to record empirical evidence on the status quo so as to facilitate future monitoring of project activities on the environment. Below are some of the parameters that were investigated;

#### **1.5.6 Baseline noise and air quality measurement**

Baseline noise conditions were investigated at various sections of the project site using an Extech 407730 Sound Level Meter. The current noise conditions are necessary for monitoring future impacts of the project activities on the neighboring communities, the safety and health

of the workers and the environment as a whole. Findings on noise and air quality are presented in sections 4.1.7 and 4.1.9 respectively.



Plate 1.2: ESIS team conducting a baseline noise assessment along sections of the project sites

### 1.5.7 Biodiversity inventories

The ESIA team conducted biodiversity inventories and documented the conservation status of flora and fauna within the project site and project area (farmlands, forest reserves and homesteads) and details are presented in chapter 4.



Plate 1.3: ESIA team conducting inventory on flora at various project sites

### 1.5.8 Mapping and Photography

Data in respect of the project site was captured using Global Positioning Systems (GPS), and maps were processed and generated using Geographic Information Systems (GIS). Photographs of vital importance and concern on the site's status quo, stakeholders' meetings

and the surrounding environment were taken using digital cameras to record empirical evidence as presented in the various sections of the report.

#### **1.5.9 Visual Observation**

The consultant's visual and intellectual judgment was also used to influence the kind of mitigation measures that have been suggested in this report.

#### **1.5.10 Impact screening**

Checklists structured on the basis of environmental components in the case of the biophysical environment, and of socio-economic concerns in the case of activities, man-made structures, institutions or likely demographic-economic changes by the proposed project were used for the preliminary screening of the major impacts. Both National (As presented by NEMA) and international EIA checklist were used. Major impacts were defined for the selected aspects of the biophysical and socio-economic environment.

#### **1.5.11 Assessment, evaluation and analysis of potential adverse impacts**

Assessment of direct and indirect; immediate and long term; permanent and temporary impacts of the project was done according to their nature and availability of adequate data to enable predictive analysis. The assessment sought to:

- Distinguish between impacts that are of most concern (and therefore need to be avoided, mitigated or compensated) and those that are considered less important;
- Organize measures of significance in a way that allows a comparison of alternative project sitting/locations, and
- Facilitate communication of results to the concerned stakeholders and the Developer for appropriate decisions and implementation strategy.

#### **1.5.12 Report writing**

Findings of the study, discussion and recommendations were then compiled and presented in this report.

#### **1.5.13 Structure of the Environmental Impact Statement**

The structure of this EIS was derived from the TOR for EIA presented and approved by NEMA. The main sections are: Executive Summary; Introduction; Project description; Policy, Legal and Institutional Framework; Description of the environment (Bio-physical and Social economic); Public Consultation and Disclosure, Analyses of alternatives; Environmental impacts & mitigation measures; Environmental Management Plan; Recommendations & Summary conclusions; and Appendices

## 2 PROJECT DESCRIPTION

### 2.1 Introduction

The Ministry of Water & Environment through The Rural Water Supply and Sanitation sub-sector intends to undertake water supply and sanitation systems to improve the prevailing undesired water supply situation in selected areas of Terego and Yumbe districts using water from River Enyau.

The proposed WSS under project shall comprise of surface water abstraction, treatment, transmission main to storage reservoir, primary and secondary distribution systems as well as yard connections. Figure 2.1 presents the process flow of Enyau GFS water supply system. The project will also support solar power system for the scheme. The scheme shall also have public sanitation facilities and a water office. During the construction phase, auxiliary facilities such as workers camp, and materials storage yards shall also be established. In addition, the project shall support water source/catchment protection activities to preserve the quantity and quality of the water at the planned water sources.

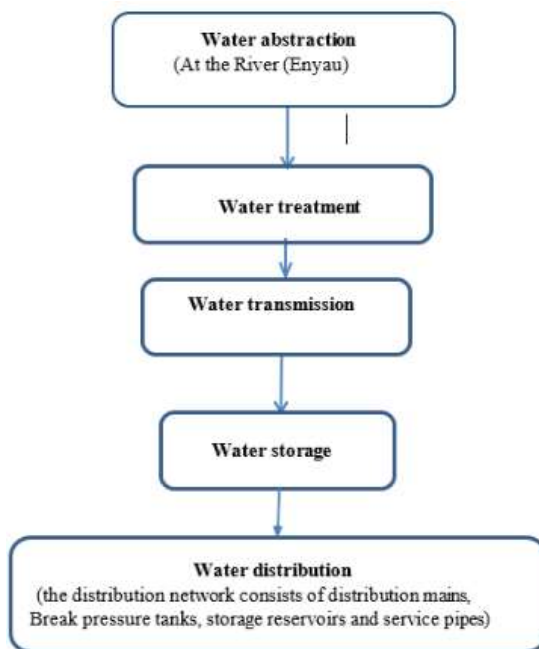


Figure 2.1: The Schematic process diagram of Enyau GFS Water Supply System

## 2.2 Design Overview – Water Supply

The current designed Water Supply System is entirely gravity fed comprising an intake on River Enyau abstracting 2,977m<sup>3</sup>/day which translates to 0.0345 m<sup>3</sup>/s. According to the feasibility study report prepared by Alliance Consultants Ltd, the design considered the technical, social, water resources, environmental and financial considerations.

The flows for Enyau River are as follows;

- R. Enyau - Q95 flow – 0.09 m<sup>3</sup>/s
- Mean discharge – 10.32 m<sup>3</sup>/s
  - Minimum discharge – 1.67 m<sup>3</sup>/s
  - Maximum discharge – 26.06 m<sup>3</sup>/s

The scheme components shall include; an intake, raw water main, water treatment plant, transmission mains, reservoirs and distribution networks. The scheme shall also include water office and sanitation facilities. The design for each component is described as follows;

The design for each component is described as follows;

- Intake with a diversion weir length of approximately 26.06 m intake chamber of 1m, depth of overflow weir of 0.03 m while inlet chamber weir depth shall be 0.13m and 0.066m<sup>3</sup>/s will be abstracted.
- Intake chamber of 1m width and settling length 3.1 m
- Coarse and fine screens of spacing 30 mm and 10 mm between bars, respectively
- 7.4 km transmission main of 400 mm pipe size
- Two baffled flocculation tanks with 5 compartments each of 1.1 m width, effective depth 2.7 m and length 3.4 m
- Two horizontal flow tanks each of width 5.6 m and length 16.8 m
- Two filter beds each 3.7x3.7 m
- Backwash water pumped from a clear well to the elevated tank of capacity 120m<sup>3</sup>
- A clear tank 5.3 m wide, 2 m deep and 7.95 m long
- Chlorine dosing done through OD 20 mm pipe into the tank while alum dosing will be located to the flocculators
- 15km of DN 250 mm gravity mains starting from the clear water well at the water treatment plant to reservoirs
- 45 kms of primary distribution mains table 2.1 (Mvepi Zone 3 - 4.3 kms, Mvepi Zone 2 and 3 – 13.5 kms and Mvepi Zone 1 and 2, Ariwa Sub County and Bidi Bidi Zone 5 – 27.4 kms).
- 4 reservoir tanks as in presented in table 2.2 below.

### 2.2.1 Treated water primary distribution network

The total length of the treated water primary distribution network for Enyau Water Supply System was approximated at 45,215 meters as presented in table 2.1 below.

Table 2.1: Summary of treated water primary distribution network for Enyau WSS

|   |               |
|---|---------------|
| Mvepi Zone 3, Pipe Size (mm)  | Length (M)    |
| OD 75   | 3,280         |
| OD 50   | 1,024         |
| TOTAL   | 4,304         |
| Mvepi Zone 2 and 3 Distribution Network, Pipe Size (mm)                     | Length (m)    |
| OD 200  | 8,060         |
| OD 90   | 3,861         |
| OD 75   | 1,610         |
| TOTAL   | 13,531        |
| Mvepi Zone 1 and 2, Ariwa Sub County and Bidi Bidi Zone 5<br>Pipe Size (mm) | Length (m)    |
| OD 250  | 17,200        |
| OD 200  | 3,140         |
| OD 160  | 7,040         |
| TOTAL   | 27,380        |
| <b>Grand total</b>  | <b>45,215</b> |

### 2.2.2 Storage tanks

The design consideration for Enyau Water Supply System consists of 4 storage tanks targeting sub-counties of Udupi, Omugo & Uriama in Terego district and Ariwa in Yumbe district as presented in table 2.2 below. Reservoir capacities shall be 30% of the maximum day water demand (6pm to 6am) considering ideal consumption patterns in areas where piped Water Supply Systems exist and the operational time of 24 hours.

Table 2.2(a): Reservoirs for River Enyau Water Supply System

| No | Reservoir details   |
|----|---|
| 1  | 30m3 (Ground reinforced concrete) to supply part of Mvepi Zone 3        |
| 2  | 200m3 (Ground reinforced concrete) to supply part of Mvepi Zone 2 and 3 |
| 3  | 653m3 (Steel tank) to supply part of Mvepi Zone 1 and 2                 |
| 4  | Ariwa sub county and Bidi Bidi zone 5                                   |

The coordinates of key project features are presented in table 2.3 below

Table 2.2(b): Coordinates of the key project sites and features

| S/No | Project Feature       | Coordinates in UTM-WGS 84 |                   |
|------|-----------------------|---------------------------|-------------------|
|      |                       | Easting (meters)          | Northing (Metres) |
| 1    | Intake Point          | 357783                    | 294921            |
| 2    | Water Treatment Plant | 356578                    | 301311            |

|   |        |        |        |
|---|--------|--------|--------|
| 3 | Tank 1 | 360026 | 298624 |
| 4 | Tank 2 | 356373 | 303303 |
| 5 | Tank 3 | 361364 | 308748 |
| 6 | Tank 4 | 362095 | 317661 |

### 2.2.3 Proposed Sanitation/Public Toilet Facilities/Water Office

Under Enyau Water Supply Systems, two 9-stance public water borne toilets shall be constructed at markets/parks, one in each of the project host districts. Yumbe district authorities identified Okuban Market as a suitable candidate to host the proposed public toilet. Terego district administration was not able to agree on a specific location but promised to discuss this further and would revert to MWE at later date on where to locate the public toilet.

The toilet facilities shall have a section for female users and a section for male users. The section for female users shall comprise 3 stances plus 1 stance for persons with disabilities while the section for male users shall comprise 2 stances plus 1 stance for persons with disabilities plus urinals. In addition, the project shall construct a water office which will be used for managing the WSS. The location of the water office has not been determined yet.

### 2.3 Detailed Design of the Intake and Treatment Plant

The proposed water treatment plant will have a conventional design. It will consist of several treatment processes. These include: (1) Collection; (2) Screening; (3) Chemical Addition; (4) Coagulation and Flocculation; (5) Sedimentation and Clarification; (6) Filtration; (7) Disinfection; (8) Storage; (9) and Distribution.

**Collection** – The source water for the water treatment plant is River Enyau. An intake wire will divert some of the river water through coarse and fine screens to a water pipeline which will transport the water to the treatment plant.

**Screening and Straining**– Water from an open source like Enyau river contains varying amounts of suspended and dissolved materials. This material may include turbidity, colour, fish, plants, trash, etc. The material may be organic or inorganic, suspended or dissolved, inert or biologically active, and vary in size from colloidal to a tree trunk. Some of these larger items can impede equipment in the treatment process, such as a tree limb getting stuck in a water pump impeller. Therefore, the first process in conventional water treatment is to screen or strain out the larger items. This is accomplished using a large metal screen called a bar-screen, which is placed in front of the water source intake. Large items are trapped on the screen as the water passes through it. These screens shall routinely be raked or cleaned off.

**Chemical Addition**– Once the pre-screened source water is received into the treatment plant, chemicals are added to help make the suspended particles that are floating in the water

clump together to form a heavier and larger gelatinous particle called floc. In this process, a chemical is added that reacts with the natural alkalinity in solution to form an insoluble precipitate. These chemicals are called coagulants. The coagulants that will be used for this project is alum.

**Coagulation and Flocculation-** A rapid mix unit shall be used where the coagulant is added to the water to provide a very quick and thorough mixing. The water mixing is then slowed to allow the water to come in contact with the forming floc and allow it to increase in size. The continued mixing must be gentle to allow the floc to grow and gain weight, but fast enough to keep it in suspension until you are ready for it to settle in the clarifiers. The process of adding a chemical to cause the suspended material to “clump” into larger particles is called flocculation or coagulation. The treatment unit where coagulation and flocculation are performed is called the “flocculator”.

**Sedimentation and Clarification-** Once the flocculation process is complete, the water then passes over the weir in the flocculator and travels to the centre of the clarifier, or sedimentation basin. Here, the water makes its way from the centre of the clarifier to the saw tooth weir at the perimeter of the unit. As the water makes its way towards the weir, the large floc particles are allowed to settle out to the bottom of the clarifier. The reason clarification occurs before filtration is so the majority of suspended material can be removed prior to filtration, which avoids overloading the filters and thus allowing much more water to be filtered before the filters must be backwashed.

**Filtration** – Clarified water enters the filters from the top. Gravity pulls the water down through the filters where it is collected in a drain system at the bottom of the unit. There are many different types of materials (media) used in filters. The most common being sand and gravel.

**Disinfection** – Once the water has gone through the filtration process, it is about as clear and clean as it can get. However, there may still be bacteria and viruses remaining. To ensure these are destroyed, there must be a disinfection process employed. The disinfection process to be used for this project is chlorination. Chlorine is added to the water in an amount to ensure all microorganisms are destroyed.

**Storage** – Once the disinfection process is complete, the water is stored. Elevated storage tanks that provide adequate water availability in the event of emergencies shall be used.

Figure 2.2 below shows a schematic diagram of a conventional surface convention water treatment plant



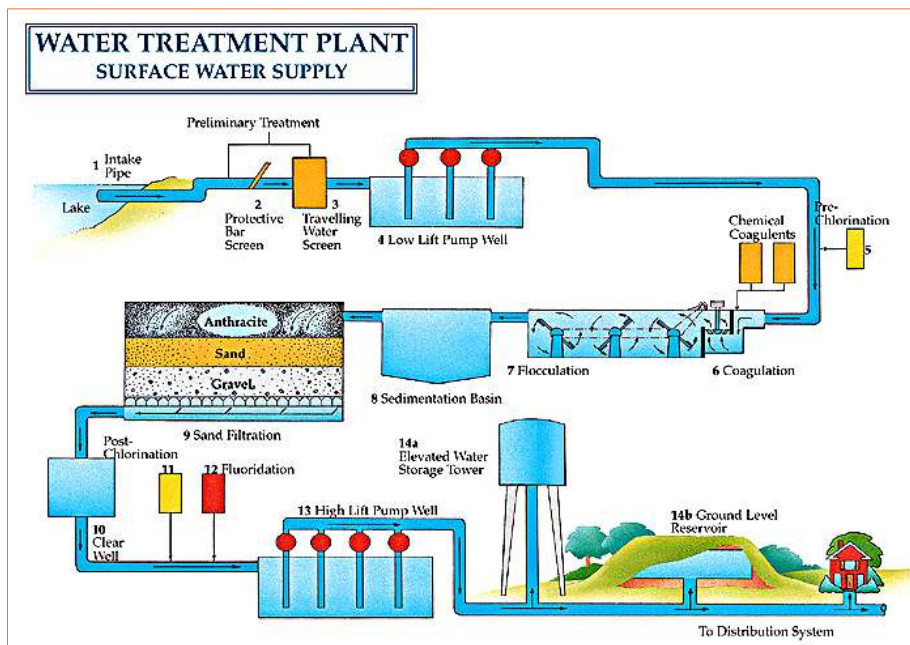


Figure 2.2: Schematic flow of a typical conventional surface water treatment plant

## 2.4 Project activities

### 2.4.1 Detailed design stage

The detailed design will inform the specific construction requirements for the project infrastructure. The specific activities will include but not limited to the ones outlined below;

- Detailed analysis of the project drawings and document review from the feasibility study;
- Surveying the intake point and the specific features in the catchment area and ensuring all controls are in place.
- Survey of the water treatment plant site, the topography, elevation and specific environmental features and ensuring all land requirements are available.
- Survey of the transmission and distribution lines and ensuring all sites are available and usable.
- Survey of sites of the reservoir tanks and break pressure tanks and ensuring all sites are available and usable.
- Survey of sanitary facilities sites in institutions and selected sites for public sanitary facilities and ensuring all stakeholders are in the know.

- Identification and involvement of all Project Affected Persons and beneficiaries along the project lines.
- Stakeholder involvement and consultation about the project works with both government institutions, NGOs and private sector and ensuring all parties are on board.

#### **2.4.2 Construction stage**

The construction phase will aim to put in place the following infrastructure or project components;

- Intake weir
- Raw water main
- Treatment plant site works (clearing, excavation and leveling)
- Water Treatment plant components (flocculators, clarifiers, Rapid Sand filters, clear water well, Sludge Drying Beds, Chemical house, backwash Pumping house, Backwash tank, Plant attendants house, Staff Quarters)
- Solar power system at the treatment plant
- Main water transmission lines
- Primary Distribution lines
- Six Reservoir tanks
- Two public toilets
- A water office

Construction and setting up of the above project components shall involve processes such as site clearing, Site excavation, water diversion at the intake, building of project structures (civil works), fencing of project structures, manhole constructions, pipe laying, and any other related activities. The materials and requirements for project construction will include but not limited to the following;

- Manual excavation equipment
- Site clearing and excavation machinery (bull dozers, excavators, compactor)
- Concrete and its ancillaries
- Iron pipes (steel pipes with spigot and socket type flexible joints) of various nominal diameters
- Valves and penstocks
- Plastic pipes and their specified nominal diameter
- Pipework fittings (steel fittings, bends, junctions, adaptors, tapers)
- Fencing of scheme structures (Angle Iron post and Wire galvanized chain-link fence)
- Painting (High gloss oil paint and emulsion paint)
- Damp proof (damp proof, rendering, roofing, protective layers)

- Solar power system (Solar panels, Inverter charger, Smart solar Maximum Power Point Tracking, Gel type lead acid maintenance free batteries, Solar charge controller, Battery storage rack, Combiner box, solar AC fuses, Solar DC fuses, Switches)
- Steel tanks and their specified volumes (for the backwash tank and reservoir tanks)

## 2.5 Other considerations for the Enyau WSS

### 2.5.1 Service connections

The project shall be executed in the districts of Terego and Yumbe. Enyau project area is approximately 678km<sup>2</sup> in the sub counties of Ariwa in Yumbe District and Udupi, Omugo and Uriama in Terego District which was also carved out of Arua District. R. Enyau was established to have adequate water to meet the water requirement for the projected population of 107,922 in the ultimate year 2043. Assuming an average house hold population of 4.6 individuals, this translates to 23,461 households expected to benefit at the maximum supply capacity of the water scheme.

### 2.5.2 Land requirements

The project will require land to host project infrastructure. According to the design consultant, pipelines are to be laid along roads and within road reserves. A working corridor of 3 m along the pipelines is anticipated. Working corridors will be restored after completion of work, repossessed by the respective owners. Although MWE and the design consultant do not anticipate land take for pipelines, it's better to assume that land take will be mandatory for the entire water transmission/distribution pipeline. Total land requirements for the Enyau WSS have been estimated at **68.25 acres**. However, the project case scenario is that the treated water transmission main and primary distribution network will follow road reserve hence actual land required for the project is **9.0acres**. This excludes land requirements for access road construction which will be determined by the contractor and based on his approach to the assignment. Details of various land takes are presented in table 2.3 below.

Table 2.3: Land requirements for Enyau WSS

| Scheme  | Component       | Dimensions |       | AREA           |              |               |
|---|-----------------|------------|-------|----------------|--------------|---------------|
|   |                 | Length     | Width | m <sup>2</sup> | Acres        | Hectares      |
| Enyau   | Intake Works    |            |       | 1750           | 0.432        | 0.175         |
|   | Treatment Plant |            |       | 10550          | 2.61         | 1.055         |
|   | Tank 1          | 10         | 10    | 100            | 0.025        | 0.01          |
|   | Tank2           | 20         | 15    | 300            | 0.074        | 0.03          |
|   | Tank 3          | 20         | 20    | 400            | 0.1          | 0.04          |
|   | Tank 4          | 20         | 20    | 400            | 0.1          | 0.04          |
|   | <b>Total</b>    |            |       | <b>13925</b>   | <b>3.447</b> | <b>1.3925</b> |
| Land requirements for the raw water mains, transmission and primary distribution assuming a width of 3 meters |                 |            |       |                |              |               |

| Scheme  | Component                  | Details         | Length, km | Land need (acres) |
|---|----------------------------|-----------------|------------|-------------------|
| Enyau   | Raw Water Mains            | DN 300          | 7.6        | 5.6               |
|   | Transmission Mains         | DN 300 – OD 160 | 30         | 22.2              |
|   | Primary Distribution Mains | OD 250 – OD 110 | 50         | 37                |
|   | <b>Total</b>               |                 |            | <b>64.8</b>       |
| <b>Grand total land requirements for all infrastructure (acres)</b> |                            |                 |            | <b>68.25</b>      |

Note: Transmission mains and primary distribution mains to follow road reserve hence no need for land acquisition since its public land. Therefore, actual land to be acquired is approximately 9.0467 acres.

### 2.5.3 Energy requirements

The daily energy needs for the Enyau Water Supply System has been estimated at 80 kWh. This power will be consumed mainly at the Water treatment plant to run the water treatment processes and pumping water. The major source of power will be solar systems which will be installed as part of the project but may be supplemented by a standby generator on site. In future, it may be more reliable to extend hydroelectricity power to the site.

### 2.5.4 Labour requirements

For the proposed Enyau water and sanitation project, the number of staffs required during construction could include; project managers, supervisors, and other technical categories and unskilled workers who shall be recruited locally. Semi-skilled and unskilled workers will be trained by supervisors prior to the commencement of construction. Local people will be recruited mainly as unskilled labourers from the villages traversed by the water transmission and distribution-line, where possible. On average, an estimated 50-100 people are anticipated to constitute the workforce on the project. While in many cases the workers will arrive at the site on foot, some pool transport can be provided as necessary to bring workers to the project sites. Expatriate staff will be housed in existing accommodation preferably, modest private houses which can be rented by the expatriates within the nearby towns or trading centres in the project areas of Terego town, Loli trading Centre, and Yumbe Town Council. The entire recruitment process for the workers will be managed by the contractors in accordance with Ugandan labor laws.

### 2.5.5 Other facilities

The projects implementation will be supported by auxiliary facilities. The location of the auxiliary facilities has not been known at this stage because they are supposed to be identified by the contractor. Therefore, this ESIA report does not cover the auxiliary facilities in details. The Contractor shall be required to undertake individual ESIA's for the auxiliary facilities and acquire approvals from NEMA and clearance from MWE before construction activities begin.

### **2.5.5.1 Worker's accommodation**

Since the majority of the workers will be casual labourers and who will be recruited from along project sites and hence commuting from home, the project will not require construction of workers camps. However, few technical workers (10-20 people) will be housed in rented houses in the project areas. However, should the contractor prefer to construct a workers' camps, s/he shall acquire land in accordance with the national laws and secure all relevant permits.

The Contractor shall also prepare site specific Environmental and Social Impact Assessments that will be approved by the client and subsequently by NEMA. The selection of the workers' camp location shall be in line with the national environmental and social impact management laws as well as the World Bank safeguards requirements. The proposed site shall be subjected to environmental and social screening and impact assessment. The contractor shall consider the following factors while selecting a site for the workers' camp

- a) The land use of the area: The Contractor should select a site that is not in a built-up area, off the fragile eco-systems, off the protected areas, off the social gathering points like churches, schools, market etc.; and the site must not be on land that is under cultivation.
- b) Camps will be located at least 500 m from any residential clusters or houses.
- c) Access: The site should be easily accessed so that it negates the need to construct access roads.
- d) The safety and security of the personnel and materials
- e) Topography: The site should be on a gentle hilly or relatively flat area. The site should never be in a valley which might interfere with run-off flow.
- f) The site must be in proximity of the project area.

### **2.5.5.2 Equipment and Materials storage yard & other auxiliary facilities**

The project will require a storage yard for both materials and the equipment. The yard shall be put in a place that is secure with barren land where possible. Other auxiliary facilities may include burrow pits for marram extraction especially during access road construction (see section 2.5.7). The selection of such areas will be done in close collaboration with the local leadership. The location of the auxiliary facilities has not been known at this stage because they are supposed to be identified by the contractor. Therefore, this ESIA report does not cover the auxiliary facilities in details. The Contractor shall be required to undertake individual ESIA's for the auxiliary facilities and acquire approvals from NEMA and clearance from MWE before construction activities begin.

### **2.5.6 Office and storage building**

A building to house offices, general stores, chemical (Coagulants/flocculants -Aluminum Sulphate and disinfectants -Chlorine) stores, chemical mixing and dosing tanks as well as a

water quality analysis laboratory will be constructed. The location will be identified later during design stage. Equipment and tools that are expected to be supplied for the running of the Water Treatment Plant (WTP) as well as equipping the water office include the following;

- WTP office equipment
- Town water office equipment
- Workshop Equipment
- Laboratory Equipment
- M&E tools
- Chemical equipment and Chemicals

#### **2.5.7 General access roads to the water transmission and distribution routes**

Generally, Enyau WSS is accessible in terms of access road network within the project site. However, the construction and installation of the entire 7.4 km raw water transmission main infrastructure will require establishment of fresh access roads to these sites. Similarly, fresh access roads will have to be opened in some sections of the project site especially between E: 362997, N: 313209 in Loli village and E: 364768, N: 315993 in Okuyo Centre village, Ariwa subcounty, Yumbe district. The total length of fresh access road to be opened is approximately 3.7km. While some of the existing roads are motorable, some sections will have to be rehabilitated through expansion and stabilization to facilitate transportation of water distribution equipment and other tools to be used by the contractor.

Notably is the road segment (about 1km) from E: 355259, N: 304473 to E: 354253, N: 304448 (at Enyau river) in Omia village, Odupi subcounty, Terego district. The remaining segments of the water distribution network of about 55.5km will follow already existing and motorable access roads with in Terego and Yumbe district.



Figure 2.3: Enyau WSS infrastructure routes with poor road infrastructure (access road requiring rehabilitation)



Figure 2.4: Enyau WSS infrastructure routes with poor road infrastructure (fresh access road to be opened)

### **2.5.8 Other works and project details**

Other works and project details such as water treatment technologies, reservoir structures, details of the water distribution system and others are presented in the feasibility study report which is a separate document prepared by another consultant.



### **3. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK**

#### **3.1 Introduction**

This Chapter provides analysis of the policy, legal and institutional framework within which the proposed Enyau water and sanitation project is expected to operate. This Chapter covers relevant Ugandan and Development Partner policies, legislations and guidelines. Key Ugandan legislations governing the conduct of Environmental Impact Assessment (EIA) are the National Environmental Act No.5 of 2019 and the National Environment (Impact Assessment) Regulations (2020). The National Environmental Act established the National Environment Management Authority (NEMA), and entrusts it with responsibility to ensure compliance with the EIA process in planning and execution of development projects.

#### **3.2 Overview of the national policies and laws on environmental and social impact assessment**

Several environmental and social policies and laws will apply to the proposed Enyau WSS. A list below provides applicable policies, laws and guidelines include: -

##### **3.2.1 Policies**

- a. The National Environment Management Policy, 1994
- b. The Uganda's Vision 2040
- c. The Land Policy
- d. National Gender Policy, 1997
- e. HIV/AIDS Policy, 1992
- f. Wetlands Policy
- g. National Development Plan III
- h. National Water Policy, 1999
- i. The National Children Policy
- j. The National Climate Change Policy
- k. National Health Policy, 1999
- l. The National Policy for the Conservation and Management of Wetlands Resources, 1995
- m. Occupational Health and Safety (OHS) Policy

##### **3.2.2 Guidelines**

- a. Environmental Impact Assessment Guidelines, 1997
- b. Environmental Impact Assessment Guidelines for water resources related projects, 2011
- c. The Environmental Audit Guidelines for Uganda, 1999

- d. The Guidelines for Occupational Safety and Health, Including HIV in the Health Services Sector 2008

### **3.2.3 Laws**

- a. The 1995 Constitution of Uganda (as amended)
- b. The National Environment Act No. 5 of 2019 as amended
- c. The Water Act, Cap 152
- d. The Land Act, Cap 227
- e. The Land Acquisition Act, Cap 226
- f. The National Forestry and Tree Planting Act, 2003
- g. The Uganda Wildlife Act Cap 200
- h. The Public Health Act Cap 281
- i. The Occupational Safety and Health Act No. 9, 2006
- j. The Physical Planning Act, 2020(as amended)
- k. The Local Governments Act, Cap 243
- l. The Employment Act, 2006
- m. The Workers' Compensation Act 2000
- n. The Children Act Cap 59
- o. The Prevention of Trafficking in Persons Act, 2009
- p. The Penal Code Act Cap 120
- q. Historical Monuments Act, 1967
- r. The Mining Act, Cap. 148 2003

### **3.2.4 Regulations**

- a. The Water Resources Regulations, 1998
- b. Water (Waste Discharge) Regulations, 1998
- c. The Water Supply Regulations, 1999
- d. The Sewerage Regulations, 1999
- e. The Environment Impact Assessment Regulations, 2020
- f. The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, 2000
- g. The National Environment (Waste Management) Regulations, 2020
- h. The National Environment (Delegation of Waste Water Discharge Functions) Instrument, 1999
- i. The National Environment (Standards for Discharge of Effluents into Water or on Land) Regulations, 1999
- j. The National Environment (Noise Standards and Control) Control of Noise Regulations, 2003
- k. The Employment (Employment of Children) Regulations of 2012
- l. Draft National Air Quality Standards, 2006
- m. National Environment (Audit) Regulations, 2020

n. Uganda National Roads Authority (General) Regulations, 2017

### 3.3 Key provisions of the environmental policies and laws

The following laws will apply and guide project construction and operation phases.

#### 3.3.1 Policies

| Uganda policies                                    | Key provisions and Relevancy   |
|--|--|
| The National Environmental Management Policy, 1994 | <p>The framework points out cross-sectoral guiding principles and strategies to achieve sustainable socio-economic development. The policy sets a guiding principle that Environmental Impact Assessment should be required for any activities, which cause significant impact on the environment.</p> <p>The National Environment Management Policy 1994 supports and promotes the proposed water and sanitation project under key principle 1 which provides for a clean, safe and productive environment.</p>   |
| Wetlands Management Policy, 1995                   | <p>The national policy on conservation and management of wetlands aims at curtailing loss of these resources and ensuring that their benefits are equitably distributed to all people of Uganda. The wetlands policy provides for:</p> <ul style="list-style-type: none"> <li>(i) Sustainable utilization of wetland resources</li> <li>(ii) Environmentally sound management of wetlands to ensure that other aspects of the environment are not adversely affected;</li> <li>(iii) Application of environmental impact assessment procedures on all activities to be carried out in a wetland to ensure that wetland development is well planned and managed.</li> </ul> |
| Land Policy 2012                                   | <p>The Policy has two major objectives: (1) to re-orient the land sector in national development by articulating management co-ordination between the land sector and other productive sectors in the economy; and (2) enhancing the contribution of the land sector to the social and economic development of the country.</p>  |
| National Climate Change Policy, 2012               | <p>The goal of the policy is to ensure a harmonized and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda. The overarching objective of the policy is to ensure that all stakeholders address climate change impacts and their causes through appropriate measures, while promoting sustainable development and a green economy</p>   |
| National water policy 1999                         | <p>The goal of this policy is to provide guidance on development and management of the water resources of Uganda in an integrated and sustainable manner, so as to secure and provide water of adequate quantity and quality for all social and economic needs, with full participation of all stakeholders and mindful of the needs of future generations</p>   |
| National Development Plan III                      | <p>NDP III (2020/21 -2024/25) is the second third in a series of five-year plans tailored to achieving Uganda Vision 2040, whose goal is to transform Uganda into an upper middle-income country. The Vision of the Plan is “A Transformed Ugandan Society from a Peasant to a Modern and Prosperous Country within 30 years” and is being implemented under the theme “Sustainable Industrialization for inclusive growth, employment and wealth creation”. As such, NDP III focuses</p>  |

| Uganda policies              | Key provisions and Relevancy   |
|------------------------------|--|
|                              | on 18 programmes among which is Human Capital Development Programme. The Programme aims to increase productivity of the population for increased competitiveness and better quality of life for all. Key expected results include among others increased access to safe and clean water and sanitation; and increased access by population to social protection. Therefore, the proposed project is inline with the NDP III.   |
| National Health Policy, 2010 | The policy aims at promoting people's health to enhance socio-economic Development. The national policy on health is guided by; primary health care, decentralization, evidence-based and forward-looking strategy, Gender-sensitive and responsive health care, Pro-poor and sustainability and Partnerships.   |
| Uganda Forestry Policy, 2001 | The policy aims at maintaining a sufficiently forested, ecologically stable and economically prosperous Uganda. Maintaining forest cover will help to conserve biodiversity and provide vital ecological services, such as soil and water protection. The government is fostering a common interest in all its developments and a sense of inclusion across all groups and localities by addressing the ways that forestry can benefit people throughout Uganda,                           |
| HIV/AIDS Policy, 1992        | The goal of the national HIV policy is to provide a framework for prevention of further spread of HIV and mitigation of the socio-economic impact of HIV/AIDS within the world of work in Uganda. It sets out 6 guiding principles that are aimed at achieving this goal and these are; non-discrimination, confidentiality, HIV testing, involvement of people living with the disease, Promotion of Prevention, Treatment, Care and Support and the gender concerns in the world of work |

### 3.3.2 Laws and guidelines

| Law/Regulation/ Guideline                         | Key provisions and Relevancy  |
|---|---|
| The Constitution of the Republic of Uganda, 1995. | The implementation of the project will take into consideration of the Constitution that provides for, <i>inter alia</i> , matters pertaining to land, natural resources (such as swamps, rivers and lakes) and clean environment. Principle XXVII of the Constitution declares that:<br>a) Utilization of natural resources shall be managed in such a way as to meet the development and environmental needs of the present and future generations of Uganda, particularly taking all measures to prevent or minimize damage and destruction to land, air, and water resources resulting from pollution or any other kind of natural resource degradation.<br>b) The state shall promote sustainable development and public awareness of the need to manage natural resources and to ensure that the utilization of the natural resources of Uganda shall be managed in such a way as to meet the needs of Present and future generations. |
| The Land Act Cap 227                              | The Act requires a person who owns or occupies land to manage and utilize the land in accordance with the environmental laws and other laws listed in Section 43 including the Water Act and National Environment Act.  |

| Law/Regulation/<br>Guideline  | Key provisions and Relevancy   |
|---|--|
| The National Environment Act No. 5 of 2019 as amended                                     | This act provides for the management of the environment for sustainable development, provides for emerging environmental issues including climate change, management of hazardous chemicals and biodiversity, and provides for strategic environmental and social assessment to address environmental and social concerns for any developments of such magnitude.<br>Schedule 5, part 4 of the National Environment Act lists projects for Utilization of water resources and water supply under those for which environmental and social impact assessments are mandatory.  |
| The Environment Impact Assessment Regulations, 2020                                       | Regulations provide that no developer shall implement a project for which environmental and social impact assessment is required under the Act and under these Regulations unless the environmental and social impact assessment has been concluded in accordance with these Regulations.  |
| The EIA guidelines of 1997  | The guidelines establish three major phases through which the EIA should be conducted namely; the Screening phase, the environmental impact study phase and thirdly, the decision-making phase.  |
| The Environmental Impact Assessment Guidelines for water resources related projects, 2011 | The guidelines under Section 3.4.1 requires that in order to avoid excessive abstraction or pollution of the available ground water resources, an assessment be carried out for water use projects that are likely to impact on such groundwater resources. ESIA for this project has been conducted based on the above provisions of the Act, the EIA regulations and the <a href="#">guidelines.NEMAguidelines. NEMA</a> will issue an ESIA certificate for the Enyau WSS after reviewing and approving the updated ESIA.  |
| The Physical Planning Act, 2020(As amended)   | The Act regulates the approval of physical development plans and applications for development permission. Section 37 requires an applicant of a development permit to acquire environmental impact assessment certificate in accordance with the National Environment Act before he or she can be granted full approval to develop.<br>Therefore, the development of the Enyau WSS is subject to the control of Physical Planning Authority of the respective Municipal Councils as mandated under S.12 of the Act.  |
| The Water (Waste Discharge) Regulations (1998)  | Regulation 4 (1) require a person who wishes to discharge effluent or waste on land or into aquatic environment to apply for a waste discharge permit.   |
| The Waste Management Regulations of 2020  | The Regulations require waste disposal in a way that would not contaminate water, soil, and air or impact public health.<br>Regulations requires a person who owns or controls a facility or premises, which generate waste to minimize the waste generated by adopting the cleaner production methods. These provisions apply to the proposed Enyau Water Supply and Sanitation Project in respect of the construction process, domestic waste and construction waste. The contractor and other institutions responsible for the generation of this waste shall comply with provisions of this regulatory standard. |
| The Local Government Act Cap 243  | Under Part 4 of the second schedule of the Act, the local government is mandated to ensure the protection of Wetlands, the protection and maintenance of local water resources inter alia.   |

| Law/Regulation/<br>Guideline                   | Key provisions and Relevancy   |
|--|--|
|  | The Natural Resources/Environmental Officers shall in this respect monitor the project implementation to ensure that the project meets the environmental standards.  |
| The Wildlife Act Cap 2000                      | The Act provides for sustainable management of wildlife. Section 15 of the Act states that any Developer desiring to undertake any project, which may have a significant effect on any wildlife species, or community, shall undertake an environmental impact assessment in accordance with the National Environmental Act. This ESIA is carried out in line with this provision. Considering that much of the water pipe will go through remote section of the countryside involving clearing of vegetation, and excavation of land to create holes etc. that may affect wildlife, this Act is quite relevant, and relevant provisions should be complied with.  |
| The Public Health Act Cap 281                  | Regulation 6 established permissible noise levels for a facility. Regulation 12 requires that any owner or occupier of premises whose works or activities are likely to emit noise in excess of the permissible noise levels shall apply to the Executive Director of NEMA for a license to emit noise in excess of the permissible levels.  |
| Historical Monuments Act, cap 46 1968          | This act provides for the preservation and protection of historical monuments and objects of archaeological, paleontological, ethnographical and traditional interest and for other matters connected therewith.   |
| National Environment (Audit) Regulations, 2006 | These regulations apply to: <ul style="list-style-type: none"> <li>• A developer of a project listed in Schedule 5 and 10 of the NEA 5 of 2019</li> <li>• The enforcement of the schedule 126 of part XII of the National Environment Act 5 of 2019 making a requirement for Environmental Audits to any project that has or may have adverse impacts on human health or the environment;</li> <li>• Environmental Audit requirements by the National Environment (Environmental Impact Assessment) Regulations in section 31 where annual environmental audits of projects are mandatory;</li> <li>• Voluntary Environmental Audits; and</li> </ul> An environmental Audit shall be carried out by persons certified and registered in accordance with the National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003. |

### 3.4 Key provisions of Social Policies Laws and Guidelines

The construction will require both unskilled and skilled labor. The project will be implemented within settlements. This requires good social, Health and Safety safeguards systems to be put in place. Such Health and Safety issues of workers and the general public will trigger the following policies, laws and guidelines.

### 3.4.1 Policies

| No. | Name  | Purpose  |
|-----|---|--|
| 1.  | Vision 2040                                 | Uganda's Vision is to have "A transformed Ugandan society from a peasant to a modern and prosperous Country within 30 years", from 2010. This involves changing from a predominantly low income to a competitive upper middle-income country within 30 years. It is envisaged that the country will graduate to the middle-income segment by 2017 and reach a per capita of USD 9,500 by 2040. For the country to achieve its Vision 2040, it is necessary to increase access to appropriate and adequate sanitation as well clean and safe water.   |
| 2.  | National Cultural Policy, 2006              | The policy is put in place to protect Ugandan heritage and culture, as well as recognize specific heritage sites of national and global importance. This policy protects and conserves cultural heritage in Uganda, both tangible and intangible heritage.   |
| 3.  | National Land Use Policy, 2006              | This policy aims to achieve coordination, sustainability and optimal land utilization for socio-economic development.  |
| 4.  | National Employment Policy 2011,            | The policy will stimulate Government objectives and processes for generating jobs and ensuring a better employment environment for all workers. The Employment Policy also makes mention of vulnerable groups and recognizes the importance of and need for special considerations towards enhancing their employability. These groups include persons with disability and this aspect is important because of the number of young people who are disabled and continue to face numerous challenges when it comes to accessing employment opportunities.   |
| 5.  | National Gender Policy, 1997                | This primary policy is in the current debates at a national level, and aims to guide and direct the planning, resource allocation and implementation of development programs with a gender perspective in all sectors of the economy.  |
| 6.  | National HIV/AIDS Policy, 2004              | This essential health policy aims to provide a framework for a multi-sectoral response to HIV/AIDS in Ugandan's world of work and applies to all current and prospective employees and workers in the public and private sectors.  |
| 7.  | Occupational Health and Safety (OHS) Policy | <p>This policy seeks to:</p> <ul style="list-style-type: none"> <li>• Provide and maintain a healthy working environment;</li> <li>• Institutionalize OHS in the water-sector policies, programs and plans;</li> <li>• Contribute towards safeguarding the physical environment; and</li> <li>• The OHS Policy Statement is guided by the Constitution of the Republic of Uganda and other global, national and sectoral regulations and policies.</li> </ul> <p>The OHS Policy also takes into recognition the Water Policy and the Health Sector Strategic Plan, all of which aim to improve the quality of life for all Ugandans in their living and working environment.</p> |
| 8.  | Uganda Resettlement/                        | Regarding compensation and resettlement issues, the leading legislation is the Constitution of Republic of Uganda and the Land Act, both of which require that:  |

| No. | Name                                     | Purpose   |
|-----|--|---|
|     | Land Acquisition Policy Framework (2002) | <ul style="list-style-type: none"> <li>• Compensation should be aimed at minimizing social disruption and assist those who have lost assets as a result of the project, in order to maintain their livelihoods; and</li> <li>• Community infrastructure must be replaced and ideally be improved in situations where it was deficient.</li> </ul> |

### 3.4.2 Laws

| Law/Regulation                               | Key provisions and Relevancy   |
|--|--|
| The Employment Act No 6, 2006                | <p>The Act makes provisions for governing legal statutory instrument for the recruitment, contracting, deployment, remuneration, Management and compensation of workers.</p> <p>It mandates Labour Officers to regularly inspect the working conditions of workers to ascertain that the rights of workers and Basic provisions are provided and workers' welfare is attended to. Further, it has provisions prohibiting forced labor, discrimination and sexual harassment at workplaces (Part II; Part IV), Providing for labor inspection by the relevant Ministry (Part III) and stipulating rights and duties in employment (weekly rest, working hours, annual leave, maternity and paternity leaves, sick pay, etc. (Part VI). The Developer shall be required to treat workers with fairness and</p> <p>Without discrimination and in addition, District Labour officers in the host's districts shall regularly monitor the Contractor's compliance.</p>  |
| The Occupational Safety and Health Act, 2006 | <p>The Occupational Safety and Health Act, 2006 provides for, general duties, obligations and responsibilities of employers, rights and responsibilities of workers and general safety requirements.</p> <p>Section 13 (1) a stipulates that it's the responsibility of the employer to take, as far as is reasonably practical all measures for the protection of his or her workers and the general public from the dangerous aspects of the employer's undertaking at his or her own cost. The employer should ensure, as far as is reasonably practical, that the working environment is kept free from any hazard due to pollution.</p> <p>Section 19 requires an employer to provide adequate and suitable protective clothing and protective equipment to the workers of his or her undertaking. The Enyau WSS should adhere to occupational safety and health rules according to the mitigation measures suggested in this report such as workers be trained in health safety, given the PPEs and given access to a first aid kit.</p> |

The project area has a number of both out of school and school going children. The project may have risk of using child labor at construction sites and therefore the underlying provisions have to be complied with. The following laws relating to protection from child labor will be applicable.



| Law/Regulation                                 | Key provisions and Relevancy  |
|--|---|
| The 1995 Constitution of Uganda (as amended)   | <p>Article 257 defines a child as any person below the age of 18 years. (Also, Section 2 of the Children Act Cap 59 and the Prevention of Trafficking in Persons Act 2009)</p> <p>Article 34 (4) of the Constitution provides that Children are entitled to be protected from social and economic exploitation and shall not be employed in or required to perform work that is likely to be hazardous or to interfere with their education, to be harmful to their health or physical, mental, spiritual, moral and or social development.</p>   |
| The Employment Act 2006                        | <p>Section 32 prohibits employment of a child under the age of twelve years to be employed in any business, undertaking or work place.</p> <p>The Act permits a child of under the age of fourteen years to be employed on condition that work is light work and carried out under supervision of an adult aged over eighteen years and does not affect the child's education.</p> <p>It also requires that the child is not employed in any employment or work which is injurious to his or her health, dangerous or hazardous or otherwise unsuitable and that a child does not work between the hours of 7 p.m. and 7 a.m.</p> <p>The person who employs such a child has to notify a labor officer in writing that the employment or work complies with the above conditions.</p>           |
| The Employment of Children Regulations of 2012 | <p>The Regulations also emphasize that a child employed under the age of fourteen years shall not be employed in any business undertaking or workplace, except for light work carried out under the supervision of an adult and where the work does not exceed fourteen hours per week. They prohibit employment of a child to do work which is injurious, dangerous, and hazardous or in the worst forms of child labor.</p> <p>Overtime work is prohibited for a child aged between fifteen to seventeen years and a child shall not be employed at night between the hours of 7.00 p.m. and 7.00 a.m. The Ministry of Water and Environment will work with the Ministry of Gender, Labour and Social Development to ensure prohibition of child labor by the contractors of the project.</p> |

Women and child sexual abuse by contractors' workers is a risk that needs to be managed especially at construction sites. Protection ought to be given to Children and women against sexual abuse and therefore the laws below will be applicable.

| Law/Regulation             | Key provisions and Relevancy  |
|----------------------------|---|
| The Penal Code Act Cap 120 | <p>Section 129 stipulates that any person who has sexual intercourse with a girl under the age of 18 is guilty of an offence and is liable to suffer death and also stipulates that any person who unlawfully and indecently assaults a boy under the age of 18 is guilty of felony. Section 131 prohibits procurement or attempting to procure a girl for the purpose of commercial sexual exploitation. (Also, Regulation 5 of the Employment of Children Regulations 2012)</p> <p>Section 123 makes it an offence to have sexual intercourse with a woman without her consent and Section 132 prohibits procuring defilement of women and girls by threats or intimidation or false pretenses or false representations or administration of drug, matter or thing with intent to stupefy or overpower.</p> |

| Law/Regulation                                    | Key provisions and Relevancy  |
|---|---|
| The Prevention of Trafficking in Persons Act 2009 | Section 8 prohibits recruiting a person below 16 years in any form of employment for the purposes of exploitation or introducing or matching any person to another for purposes of sexual exploitation. In Implementation of the project, the Ministry of Water and Environment will work with the Ministry of Gender, Labour, and Social Development to make sure that the women and children are not sexually exploited by the contractors. The District Labour officers in the host districts have a key role in monitoring compliance of the contractors. |

### 3.5 Legal, Policy and Regulatory Framework for Resettlement in Uganda

The project involves construction of sanitation facilities and water distribution network that required acquisition of land. This implied that the Central Government and Local Government had the responsibility to acquire land for the construction of the different project facilities which means compensation of Project Affected Persons (PAPs) in line with OP 4.12 and GoU compensation requirements. The difference between the national resettlement policy in Uganda and the World Bank resettlement policy OP 4.12 is that the former requires compensation to be based on the market value while OP 4.12 recommends compensation at a replacement cost in order to leave the PAPs at or better than the prevailing status.

The different types of land tenure and the acquisition processes, under Uganda laws are given below.

#### 3.5.1 Customary Land

Most of the proposed land for the project in the project area is held under customary tenure. Land ownership is vested in the lineage and is allocated by a father to his sons, who in turn assign it to their wives and children for cultivation. The situation indicates that the youth and the women only have a user-right to the land and not ownership, which disadvantages a vulnerable group. Therefore, there is need to involve the owners of land where the project is going to be implemented during the entire cycle of the project.

| Law/Regulation        | Key provisions and Relevancy   |
|-----------------------|--|
| The 1995 Constitution | The Constitution restored recognition of the rights of those who held customary land (Article. 237 (3) (a) and (4)).   |
| The Land Act Cap 227  | Section 3 (1) of the Act explicitly recognized that customary law should regulate this form of land tenure. It states that customary land tenure shall be governed by rules generally accepted as binding by the particular community. Anyone who acquires land in that community shall also be bound by the same rules except where such rules are repugnant to natural justice, equity and good conscience. The required land therefore shall be acquired as per the customary rules in the respective areas with the involvement of Local Council 1 chairpersons to verify ownership and women and the youths' due their vulnerability. |

### 3.5.2 Freehold Land

| Law/Regulation                  | Key provisions and Relevancy   |
|---------------------------------|--|
| The 1995 Constitution of Uganda | Article 237 (3) (b) provides that land in Uganda belongs to the citizens of Uganda and shall vest in them in accordance with the land tenure systems provided for in there under including freehold tenure   |
| The Land Act Cap 227            | Section 2 provides for the different tenures of land including freehold. According to S.3 (2), the freehold tenure may involve either a grant of land in perpetuity, or for a lesser specified time period. The Act specifies that the holder freehold land has full power of ownership of it and as such, he may use it for any lawful purpose, dispose of it by will or transact it in any other way as he or she sees fit upon negotiation with the project developer. A search has to be done with the District Land Board to certify title to the required land for the Water intake and the WTP as under the Registration of Titles Act Cap 230 S.101. |

### 3.5.3 Public land

The water transmission and distribution pipes will be laid mainly along the road reserve. This is public land, which shall require public use by the water project. It requires the involvement into discussions by the MWE and the Ministry of Justice and constitutional affairs, and District Local Governments of Terego & Yumbe. Where a government institution wants land that belongs to another government institution an application should be made to the Uganda Land Commission for change of use or shared use. For utilization of the lakeshore, a Wetland, Riverbank and Lakeshore User Permit shall be obtained from NEMA.

## 3.6 Key international environmental and social laws

### 3.6.1 International Protocols and Conventions

The relevant international protocol and conventions which Uganda is a signatory to are presented below;

| No. | Name   | Purpose  |
|-----|--|--|
| 1.  | African Convention on the Conservation of Nature, 1968               | Encourages individual and joint action for the conservation, utilization and development of soil, water, flora and fauna for the present and future welfare of mankind, from an economic, nutritional, scientific, educational, cultural and aesthetic point of view.  |
| 2.  | United Nations Framework Convention on Climate Change (UNFCCC), 1992 | The Convention requires parties to avoid adverse effects on the environment and adopt measures and policies to control carbon dioxide emissions in technologies, considering their common, yet differentiated responsibilities, as well as their specific national and regional development priorities, objectives and circumstances. They are required to take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on |

| No. | Name  | Purpose  |
|-----|---|--|
|     |   | the quality of the environment of projects or measures undertaken by them to mitigate or adapt to climate change.  |
| 3.  | United Nations Convention to Combat Desertification (UNCCD), 1994 | Binding international agreement linking environment and development to sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the drylands, where some of the most vulnerable ecosystems and peoples can be found. In the 10-Year Strategy of the UNCCD (2008-2018) that was adopted in 2007 with a view to <i>forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas to support poverty reduction and environmental sustainability.</i>  |
| 4.  | Montreal Protocol for the Protection of the Ozone Layer, 1987     | The protocol was designed to protect the <u>ozone layer</u> by phasing out the production of numerous substances that are responsible for <u>ozone depletion</u> . All of the ozone depleting substances controlled by the Montreal Protocol contain either chlorine or bromine (substances containing only <u>fluorine</u> do not harm the ozone layer). The provisions of the Protocol include the requirement that the Parties to the Protocol base their future decisions on the current scientific, environmental, technical, and economic information that is assessed through panels drawn from the worldwide expert communities. |
| 5.  | Stockholm Convention on Persistent Organic Pollutants, 2001       | Protects human health and environment from Persistent Organic Pollutants that remain intact in the environment for long periods and can become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife, which can lead to serious health effects.  |
| 6.  | Strategic Approach to International Chemicals Management, 2006    | Fosters sound management of chemicals and to ensure that by the year 2020, chemicals are produced and used in ways that minimize significant adverse impacts on the environment and human health.  |
| 7.  | International Labour Organization Convention, 1998                | Sets out basic principles and labor rights at work, based on international best practice.  |

### 3.6.2 World Bank Operational Policies

The Operational Policies provide basis on which the World Bank screens proposed projects to determine the appropriate extent and type of Environmental Assessment to be undertaken. The Bank classifies proposed projects as Class A, B, C or F1 depending on the type, location, sensitivity, and scale of the project and the nature and magnitude of its potential environmental impacts. The categorization of projects is based on an assessment of their likely environmental and social impacts. Below is a brief description of different categories:

- **Category A Project:** which may have potentially significant adverse social or environmental impacts that are diverse, irreversible, or unprecedented;

- **Category B Project:** may have potentially limited adverse social or environmental impacts that are few in number, generally site specific, largely reversible, and readily addressed through mitigation measures;
- **Category C Project:** likely to have minimal or no adverse social or environmental impacts, including certain financial intermediary projects with minimal or no adverse risks; and
- **Category FI Project:** Assigned to business activities undertaken by Financial Intermediaries or through delivery mechanisms involving financial intermediation. The table below summarizes safeguards' policies that were triggered by the project.

| OP No.  | World Bank Safeguards Operational Policies triggered by the project | Key provisions and Relevance   |
|---------|---|--|
| OP 4.01 | Environmental Assessment  | In general, the project falls under Category B of the World Bank's classification of projects requiring an ESIA/ESMP given that its potential adverse environmental and social impacts will be site specific, few if any are irreversible, and in most cases mitigation measures can be readily designed. Additionally, the World Bank Environment Health and Safety Guidelines (EHSGs), with specific reference to the EHSGs for water and sanitation projects, applies to the project.   |
| OP 4.04 | Natural Habitat   | The Bank supports the protection, maintenance, and rehabilitation of natural habitats and their functions. The conservation of natural habitats is essential for long term sustainable development.<br><br>The project will pass through some wetlands and bushes and therefore OP 4.04 is triggered due to potential loss or degradation of natural habitats as a result of <del>physical</del> <u>physical</u> project activities  |
| OP 4.12 | Involuntary Resettlement  | This is the guiding policy when a project results in involuntary resettlement. OP 4.12 describes the detail and elements that a resettlement plan should include. These include objectives, potential impacts, socio economic studies, legal and institutional framework, eligibility, valuation and compensation of losses, resettlement measures, relocation planning, community participation, and grievance redress procedures, implementation schedule, costs and budgets, and monitoring and evaluation. This report conforms to the WB policy requirement on contents and structure. OP 4.12 is triggered due to land acquisition at the water intake, WTP and water storage tanks. |
| OP 4.11 | Physical Cultural Resources   | This policy gives guidelines for the preservation of cultural property and seeks to avoid their elimination, otherwise mitigation activities be undertaken to limit the adverse impacts as far as possible. Whereas there are no serious cultural properties along the proposed water transmission and distribution corridors, chance finds could be encountered during construction especially while trenching channels for the water transmission pipes. Detailed in the EMP are measures  |

| OP No.  | World Bank Safeguards Operational Policies triggered by the project | Key provisions and Relevance   |
|---------|---|--|
|         |   | <p>to mitigate impacts on cultural properties. When RAP studies are carried out, any physical cultural resources in the water transmission corridor will be enumerated as structures and all affected PAPs will be compensated for such structures to ensure that they are relocated in accordance with cultural norms of the affected people and society.</p> <p>So far in this ESIA no PCRs like graves, shrines have been found above ground along the project corridor. However, with excavations chance finds of archaeological / paleontological value may be found. Hence a chance finds procedure has been developed for this project;</p> |
| OP 4.36 | Forests   | The objective of this policy is to assist borrowers to harness the potential of forests to reduce poverty in a sustainable manner, integrate forests effectively into sustainable economic development, and protect the vital local and global environmental services. Although no forest will be affected, the project will put in place measures that enhance the tree cover in the project area in line with the National forestry and tree planting guidelines.  |
|         | World Bank Policy on Access to Information (July 1, 2010)           | This policy is triggered since there is need for disclosure of information to all the stakeholders. There is need for disclosure of information to all the stakeholders. Compliance shall be ensured by disclosing the information to all the stakeholders such as district technocrats, Municipal and Local council leaders, and communities among others during the consultation process and the information is accessible.  |

### 3.6.3 The World Bank Group Environmental, Health and Safety Guidelines for water and sanitation project

The EHS Guidelines for water and sanitation project include information relevant information relevant to the operation and maintenance of (i) potable water treatment and distribution systems, and (ii) collection of sewage in centralized systems (such as piped sewer collection networks) or decentralized systems (such as septic tanks subsequently serviced by pump trucks) and treatment of collected sewage at centralized facilities. The document lists environmental issues, occupational health and safety concerns and community health and safety impacts which are associated with water and sanitation projects. All the issues presented in these guidelines were either taken care of at design stage or are discussed and mitigated as part of this report.

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP). When one or more members of the World Bank Group are involved in a project, the EHS

Guidelines are applied as required by their respective policies and standards. The industry sector EHS guidelines are designed to be used together with the General EHS Guidelines document, which provides guidance to users on common EHS issues potentially applicable to all industry sectors.

The guidelines shall govern both workers' (occupational) safety and public safety. The applicability of the EHS Guidelines are tailored to the hazards and risks established for each project based on the results of an environmental assessment in which site-specific factors are considered.

The guidelines provide for effective management of environmental, health, and safety (EHS) issues entails the inclusion of EHS considerations in the project activities through:

- 1) Identifying project hazards and associated risks as early as possible;
- 2) Involving EHS professionals, who have the experience, competence, and training necessary to assess and manage EHS impacts and risks, and carry out specialized environmental management functions
- 3) Understanding the likelihood and magnitude of the risks
- 4) Prioritizing risk management strategies with the objective of achieving an overall reduction of risk to human health and the environment;
- 5) Favoring strategies that eliminate the cause of the hazard at its source;
- 6) Incorporating engineering and management controls to reduce or minimize the possibility and magnitude of undesired consequences;
- 7) Preparing workers and nearby communities to respond to accidents;
- 8) Improving EHS performance through a combination of ongoing monitoring of facility performance and effective accountability.

The following has been considered when assessing the potential risks related to health and safety

- 1) Infrastructure and Equipment Safety
- 2) Hazardous Materials Safety
- 3) Environmental and Natural Resource Issues;
- 4) Community safety and exposure to project related risks
- 5) Emergency Preparedness and Response.

### 3.7 Permits and Licenses

The following Consents and Permits will be required for the Contractor to achieve legal compliance with Environment and Social requirements

| Consent/Permit required                               | Issuing Agency | Applicable law                        |
|---|----------------|---------------------------------------|
| ESIA certificate for project and auxiliary facilities | NEMA           | National Environment Act No.5 of 2019 |
| RAP approval conditions for this project              | CGV            | The Land Act Cap 227                  |

| Consent/Permit required   | Issuing Agency    | Applicable law  |
|---|-------------------|---|
| Wetland Permit to carry out a regulated activity in a wetland/River Bank /Lakeshore | NEMA              | The National Environment (Wetlands, River Banks and Lake Shores Management) Regulations, No. 3/2000 |
| Work Place Registration Certificate   | Molds             | The Occupational Safety and Health Act, 2006  |
| Traffic Diversions consent  | Uganda Police     | Traffic and Road Safety Act 1998  |
| Water Abstraction Permit(s)   | DWRM              | The Water Act, Cap 152  |
| Construction Permit over water body   | DWRM              | The Water Act, Cap 152  |
| Occupation Permit   | Local Governments | Build Control Act, 2013   |

### 3.8 Institutional framework

The Project will be implemented by Ministry of Water and Environment (MWE) and the host District Local Governments of Terego and Yumbe with support of regional entities (WMZs, WSDFs). Ministry of Water and Environment as the Developer is responsible for the management, coordination and supervision of project activities including the implementation of environmental and social safeguards requirements as detailed out in the ESMP.

However, during construction, the Contractor will be responsible for the day-to-day implementation of the ESMP but under the direct supervision of the MWE. Legally, the e host district local governments are responsible for day-to-day monitoring of the environmental and social aspects of the project while at the National level, the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSHS) of the Ministry of Gender, Labour and Social Development are responsible for monitoring of environmental, social and safety aspects of the project. This section mainly sets out the roles and responsibilities for the management of the project's safeguards aspects by different government institutions.

#### 3.8.1 Ministry of Water and Environment

The Ministry of Water and Environment (MoWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MWE regulates water resources utilization and wetlands management through DWRM and DEA respectively. In addition to regulatory functions, MWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.



### **3.8.2 National Environment Management Authority**

National Environment Management Authority (NEMA) was established under the National Environment Act No.5 of 2019 as the principal agency in Uganda charged with the responsibility of coordinating, monitoring, regulating and supervising environmental management in Uganda. In this context, NEMA will be responsible for review and approval of this environmental impact assessment, ensuring proposed mitigation measures are implemented, monitoring compliance with approval conditions, and ensuring any other impacts that may arise are mitigated.

### **3.8.3 National Forestry Authority**

The National Forestry Authority (NFA) is a government statutory entity responsible for the management of Central Forest Reserves (CFRs) on a sustainable basis, as well as, to supply high quality forestry-related products and services in Uganda. Although there was no natural forest within the project area, there were pockets of planted forests mainly comprising of teak trees along the water transmission and distribution network, there were NFA will be interested in ensuring tree clearance of the plantation forests is minimized. Under catchment management, there is a component of tree planting and NFA would come in to provide training on the best practices for tree planting while also supplying high quality seedlings.

### **3.8.4 Uganda Wildlife Authority**

UWA is mandated to ensure sustainable management of wildlife resources and supervise wildlife activities in Uganda both within and outside the protected areas. Considering that some wild animals that require UWA intervention can be encountered, UWA is a key lead agency to guide the project activities in the wilderless.

### **3.8.5 Wetlands Management Department**

Wetlands Management Department (WMD) is mandated to manage wetland resources and its goal is to sustain the biophysical and socio-economic values of the wetlands in Uganda for present and future generations. The Wetlands Management Department is a key stakeholder of the project because some key project components are located in wetlands. For example, the intake is located in a wetland and along the river banks;

### **3.8.6 Directorate of Water Resources Management**

The Directorate of Water Resources Management (DWRM) is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating

Uganda's participation in joint management of transboundary waters resources and peaceful cooperation with Nile Basin riparian countries.

### **3.8.7 Ministry of Lands, Housing and Urban Development**

The Mandate is “To ensure a rational: sustainable and effective use and management of land and orderly development of urban and rural areas as well as safe, planned and adequate housing for socio-economic development”. The MoLHUD, through the Office of the Chief Government Valuer, and the District Land Boards, will provide guidance on land acquisition and property valuation, where required.

### **3.8.8 Uganda National Roads Authority**

The mandate of UNRA is to develop and maintain the national roads network, advise Government on general roads policy and contribute to addressing of transport concerns, among others. Some of UNRA responsibilities include: management of the National Roads Network; maintenance and development of the national roads network; and establishing and maintaining road reserves among others. UNRA is a key stakeholder under the project because the distribution lines components largely run along the road reserves.

### **3.8.9 Ministry of Local Government**

The 1997 Local Government Act provides for decentralization and devolution of government functions, powers and services from the central to Local Governments and sets up the political and administrative functions of local governments. The Local Governments are responsible for the protection of the environment in their respective areas of jurisdiction. Local Governments shall be consulted on projects to be located within their jurisdiction and on matters that affect their environment. At the District Level, the District Environmental Officers, District Engineer and Community Development Officers in the respective areas of project implementation will participate in monitoring the projects to ensure that mitigation measures are adequate and advice or point out additional compliance requirements following their inspections. The District Land Boards and Lands Officers will provide guidance on issues of compensation or land acquisition.

### **3.8.10 The Ministry of Finance, Planning and Economic Development**

- a) The mandate of the Ministry is to:
- b) To Formulate policies that enhance stability and development
- c) To mobilize local and external financial resources for public expenditure
- d) To regulate financial management and ensure efficiency in public expenditure.
- e) To oversee national planning and strategic development initiatives for economic growth

### **3.8.11 Ministry of Gender, Labour and Social Development**

Ministry of Gender Labour and Social Development is a Government Ministry with a responsibility to empower communities in diverse areas. The Ministry came into being by a constitutional requirement of the 1995 Constitution, Chapters 4 and 16 which mandates government to: “empower communities to harness their potential through skills development, labour productivity and cultural growth. The Ministry promotes cultural growth, skills development and labour productivity while promoting gender equality, labour administration, social protection and transformation of communities. This Ministry has one of its major tasks to ensure that all Ugandans enjoy better standards of living, especially the disadvantages and vulnerable groups.” The Directorate of Labor, Employment and Occupational Safety and the Directorate of Gender and Community Development in the Ministry are responsible for inspection of workplace environment to safeguard occupational safety, rights of workers and gender equity. Specifically, DOSH Activities in ensuring enforcement of OSH at workplaces, it carries out the following activities: i) Developing/reviewing occupational safety and health policy, laws, regulations, technical standards, strategy, guidelines, code of conduct and manuals. ii) Registering all workplaces in the country. This assessment recognises key gender health and safety and social issues, as emerging from stakeholder consultation and places emphasis on the management of such in the ESMP.

### **3.8.12 The Equal Opportunities Commission (EOC)**

The Equal Opportunities Commission (EOC), was established by the Equal Opportunities Act 2007. The Commission is mandated to provide a framework for redressing imbalances, which exist among the marginalized groups while promoting equality and fairness to all. The Commission was established pursuant to article 32 (3 – 4) of the Constitution and is a body corporate with perpetual succession and a common seal and may sue or be sued in its corporate name and, may do, enjoy or suffer anything that bodies corporate lawfully do, enjoy or suffer. The Commission gives effect to the State’s constitutional mandate to eliminate discrimination and inequalities against any individual or group of persons on the ground of sex, age, race, colour, ethnic origin, tribe, birth, creed or religion, health status, social or economic standing, political opinion or disability, and take affirmative action in favor of groups marginalized on the basis of gender, age, disability or any other reason created by history, tradition or custom for the purpose of redressing imbalances which exist against them; and to provide for other related matters.

### **3.8.13 Terego and Yumbe District Local Governments**

Terego and Yumbe district local governments are mandated under the Local Government Act and the National Environmental Act to ensure that all project activities are implemented in accordance with the national legal and policy framework. The district, is responsible for major functions and services previously carried out by the central government i.e. land administration and surveying; the construction and maintenance of feeder roads, and; the

provision and maintenance of water supplies. Therefore, these District Local Governments are a key stakeholder for the project.

#### **3.8.14 Ministry of Agriculture, Animal Industry and Fisheries (MAAIF)**

Ministry of Agriculture, Animal Industry and Fisheries is mandated to formulate, and review national policies, plans, legislation, standards and programs relating to fisheries and agricultural sector as well as control and manage crop and animal epidemic diseases affecting production. The project may have an impact on fisheries activities and therefore Ministry of Agriculture, Animal Industry and Fisheries is a key stakeholder of the project.

## 4. BASELINE BIOPHYSICAL ENVIRONMENT

### 4.1 Physical Environment

This section presents the physical characteristics of the project area. It starts with an overview of the project area and then the specific physical components follow.

#### 4.1.1 Overview of physical characteristics of the transmission and treated water distribution routes

The proposed Enyau Water Supply Scheme will traverse 25 villages and 10 sub-counties in the two districts of Terego and Yumbe. The total length of both raw water transmissions main and treated water distribution network is 87.6km. In terms of district coverage, about 73% of the scheme will be in Terego while 33% will be in Yumbe. Both the raw water transmission main and treated water distribution network traverse mainly refugee settlements of Imvepi and Bidi bidi which is characterized by private farmlands and settlements. Enyau WSS does not affect any protected areas (Central Forest Reserves, Local Forest Reserves or Wild Life Reserves).

In terms of land cover, the raw water transmission main (7.4km) traverses majorly wooded savannah grasslands in the villages of Azapi, Opiraa, Etiyo, Andiku and Nyarangaa in Odupi subcounty, Terego district. The remaining sections of the Enyau water supply network are said to follow majorly existing road networks along subsistence farmlands and clustered settlements with in Imvepi and Bidi bidi refugee settlements. Figure 4.1 below presents the land cover characteristics of the area as affected by the proposed Enyau Water Supply System. Plates 4.1-4.4 present the physical aspects of the project sites as at the time of conducting the ESIA studies.



Plate 4.1: Sorghum cultivation along the distribution corridor and a refugee settlement (Imvepi) in Nyarangaa village, Odupi subcounty, Terego district



Plate 4.2: Wooded grasslands almost cleared for settlements by refugees in Imvepi refugee settlement



Plate 4.3: Grassland in Amia village towards the river crossing (A) and land under farrow in Imvepi refugee settlement



Plate 4.4: Typical nature of homesteads and settlements along project sites in Imvepi refugee settlement

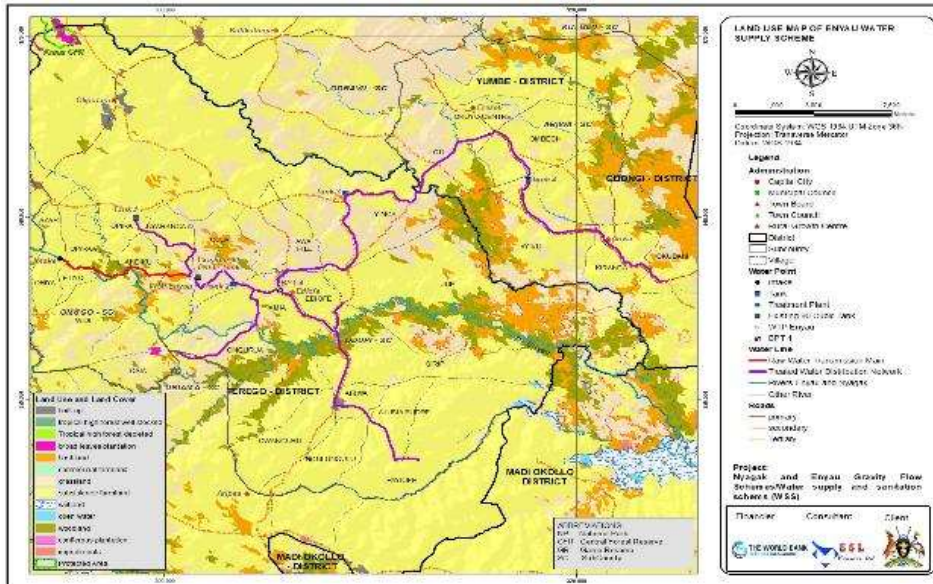


Figure 4.1: General land cover characteristics along Enyau Water Supply System

#### 4.1.2 Topography of the Project Area

The topography of the project area is in such a way that the land scape gently slopes east wards enabling gravity flow of water from the intake (raised section of Terego district) to the lower areas and finally to Yumbe and possibly Obongi district. In terms of elevation, the highest point is around the intake (Azapi and Obiya villages in Odupi subcounty) at about 880m above sea level and the lowest area is at the end point of the treated water primary distribution network in Okuban village, Ariwa subcounty, Yumbe district. In between, there exists some isolated and slightly elevated areas such as those chosen to host the storage tanks. It's the reason such elevated areas were identified to host some of the water distribution tanks within the project area. Figure 4.6 below presents a map showing the topography of the project area.



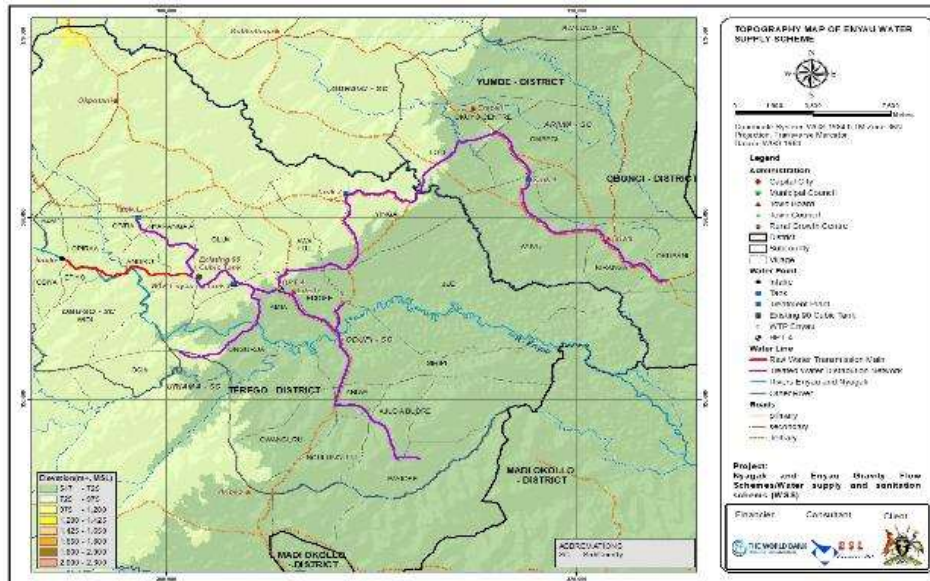


Figure 4.6: The topography of Enyau Water Supply System project area

### 4.1.3 Geology

Nebbi, Arua, Terego and Yumbe districts are underlain by the Precambrian rocks of basement complex. The rocks are composed largely of granulite facies grade rocks which generally form enclaves in the gneiss complex. On hill tops grey granite and gneiss are left exposed in many places. These granites and gneiss are intensively metamorphosed and deformed. Figure 4.7: below presents the geological overview of the project area.

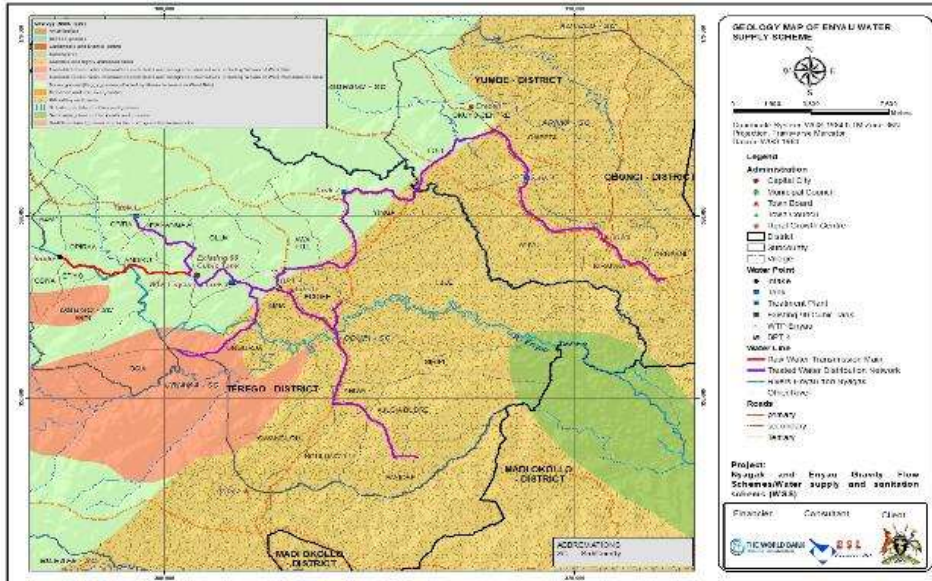


Figure 4.7: Geology of the project area

#### 4.1.4 Soils along the project area

Yumbe and Terego district are underlain by the Precambrian rocks of basement complex. The rocks are composed largely of granulite facies grade rocks which generally form enclaves in the gneiss complex. On hill tops grey granite and gneiss are left exposed in many places. These granites and gneiss are intensively metamorphosed and deformed. Soil is fairly fertile especially along valleys. Some alluvial deposits found on the lower portions of the slopes are relatively more fertile. Predominant soils are ferralitic and sand loams are soil types most widely spread covering large areas.

These soils are fine textured with loose structure erodible and easily leached. Most soils are acidic. Vertisols are found in the north western parts of Terego District. These soils have poor drainage and thus easily become water logged. There is a lateritic layer in most soils. This reduces the rooting depth and moisture conditions where it is close to the surface, making the land difficult to cultivate. Sub-soils lack minerals except for building /construction purposes soil types. Yellow-red sandy, clay, loams, latosols varying from dark grey to dark brown and are slightly acidic mainly derived from granite, gneissic and sedimentary rocks.

They occur on gently undulating - hilly topography. Brown-yellow clay loams with laterite horizon with variation of dark brown to dark greyish brown and slightly acidic. These occur

on flat ridge tops or on top of undulating topography. Figure 4.8 below presents an overview and distribution of various soil types in the project area.

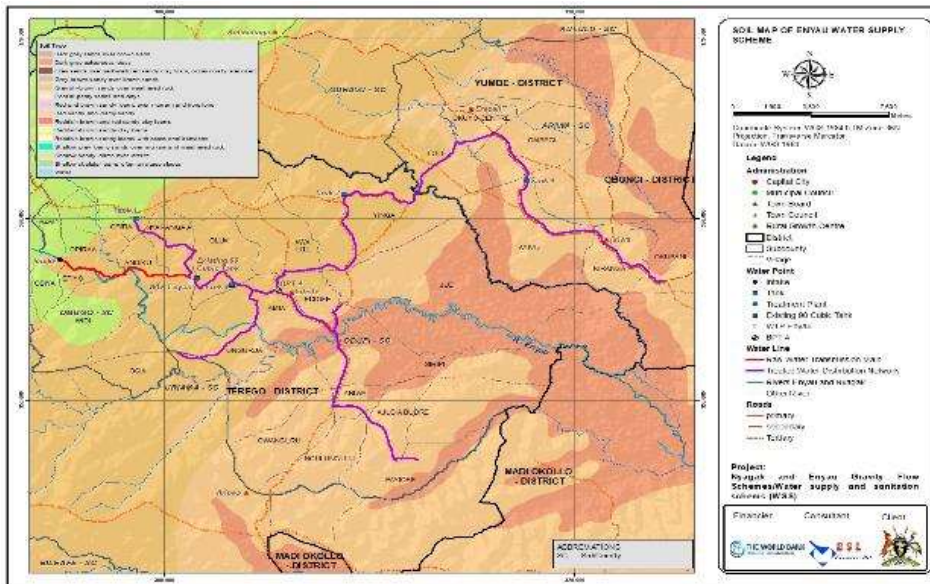


Figure 4.8: Nature of soil types with in the Enyau WSS project area

#### 4.1.5 Climate

Rainfall patterns in Terago and Yumbe districts fluctuate between 1250-2000mm annually. The area experiences a two seasonal rainfall, light rains between April and October. The wettest months are usually August - September with >120 mm/month. The period December - February is dry with less than 60mm/month. The rain is associated with the northern and southern movements of the inter-tropical front. Mean monthly evaporation ranges from 130 mm - 180 mm. The prevailing wind is from the east to the west with frequent windstorms during the dry season. Temperatures are generally low during the nights of dry seasons (Dec - Mar) and high during day hours whereas during wet seasons temperatures remain high throughout. Figure 4.9, present a rainfall map of the project.

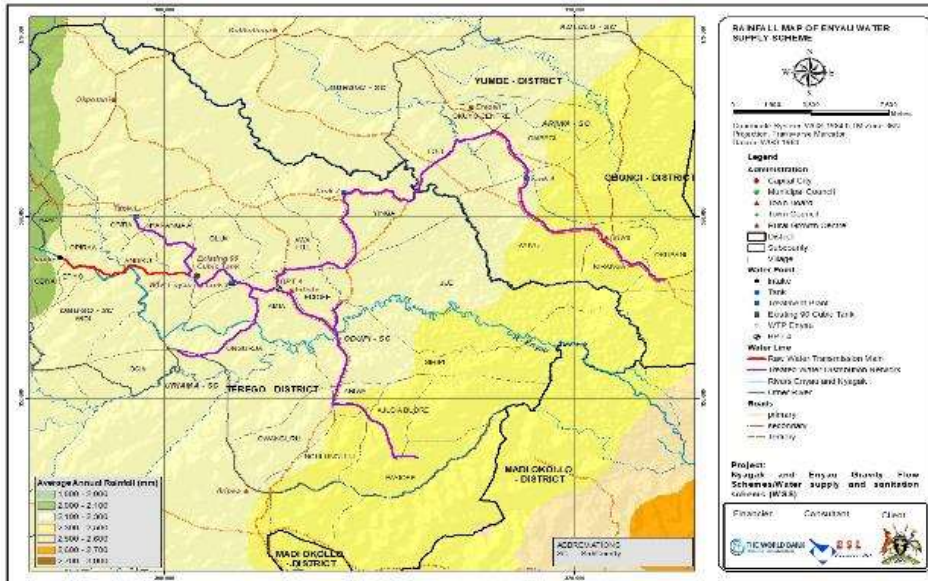


Figure 4.9: Average annual rainfall patterns in the project area

#### 4.1.6 Noise

Baseline noise conditions were investigated along various segments of the proposed Enyau water supply infrastructural routes using an Exttech 407730 Sound Level Meter. Generally average noise levels along the entire project area are low and within the acceptable limits for both areas defined as commercial or residential. This is because the proposed water distribution routes are rural, sparsely populated and with low human activities. Both the Raw water transmission main and treated water distribution network pass through refugee camps where majority of economic activities are subsistence farming.

The clustered trading centres in the refugee settlements are also generally quiet with very low traffic and surrounded with bushes, thickets and gardens. Several parts of the corridor are either gardens or land under fallow. Therefore, most of the baseline noise levels along the water distribution corridor are between 40-50 dB (A). Table 4.1 below presents some of the baseline noise levels taken at some selected points along the project sites and Table 4.2 shows the Standards for Maximum Permissible Noise Levels for various environments.

Table 4.1 Noise levels recorded along the Enyau WSS project area

| Area Sampled   | Minimum (dBA) | Maximum (dBA) | Average (dBA) | Source of baseline noise conditions                    | Coordinates            | Nema Standard (dBA) | Comments            | Overall rating |
|--|---------------|---------------|---------------|--|------------------------|---------------------|---------------------|----------------|
| Intake Azapi village, Odupi subcounty Terego district                    | 43.4          | 48.3.1        |               | Wind and background noise from the water flows         | E: 357783<br>N: 294935 | 60                  | Normal              | Low            |
| Water treatment plant Nyarangaa village, Odupi subcounty Terego district | Lo            | 41.1          |               | Natural process such as wind                           | E: 356609<br>N: 301326 | 60                  | Normal              | Very low       |
| Near tank 2, at the play ground In Olua village, Odupi subcounty         | Lo            | 40.3          |               | Natural process such as wind                           | E: 356524<br>N: 303356 | 60                  | Normal              | Very Low       |
| At Tank 3 Yinga village, odupi subcounty                                 | 44.3          | 48.2          |               | Natural process such as wind and traffic from the road | E: 361363<br>N: 308750 | 60                  | Normal              | Low            |
| At Yinga village, near the river   | Lo            | 41.4          |               | Natural process such as wind                           | E: 361442<br>N: 312180 | 60                  | Normal              | Low            |
| At Ombeci village Ariwa subcounty, Yumbe district along the road         | Lo            | Lo            |               | Natural process  | E: 362646<br>N: 317672 | 60                  | Normal              | Very low       |
| At Tank 4  | Lo            | 41.5          |               | Natural processes such as wind and birds               | E: 362089<br>N: 317664 | 60                  | Out of normal range | Very low       |
| At Loli trading centre   | 48.2          | 51.3          |               | Traffic from the road especially motorcycles           | E: 362993<br>N: 312631 | 60                  | Normal              | Low            |

NB. Noise reading of Lo indicates it was below 40decibels and could not be taken by the machine used

Table 4.2: National Standards for Maximum Permissible Noise Levels for various environments

| <b>For General Environment</b>   |   |                             |
|--|---|-----------------------------|
| <b>Facility</b>  | <b>Noise Limits dB(A)</b>   |                             |
|  | <b>Day</b>  | <b>Night</b>                |
| A. Any building used as hospital, convalescence home, home for the aged, sanatorium and institutes for higher learning, conference rooms, public library, environment or recreational site | 45  | 35                          |
| B. Residential building  | 50  | 35                          |
| C. Mixed residential (with some commercial and entertainment)  | 55  | 45                          |
| D. Residential + Industry or small scale production + Commerce   | 60  | 55                          |
| E. Industrial  | 70  | 60                          |
| <b>Construction site</b>   |   |                             |
| (i) Hospitals, schools, institutions for higher learning, homes for the disabled, etc.   | 60  | 50                          |
| (ii) Buildings other than those prescribed in (i)  |   |                             |
| <b>From a factory or workshop</b>  |   |                             |
| <b>Acceptable noise limit dB(A)</b>  | <b>Duration (Daily)</b>   | <b>Duration (weekly)</b>    |
| 85   | 8 Hours   | 40 Hours                    |
| 88   | 4 Hours   | 20 Hours                    |
| 91   | 2 Hours   | 10 Hours                    |
| 94   | 1 Hours   | 5 Hours                     |
| 97   | 30 Hours  | 2.5 Hours                   |
| 100  | 15 Hours  | 1.25 Hours                  |
| 103  | 7.5 Minutes   | 37.5 Minutes                |
| 106  | 3.75 Minutes  | 18.75 Minutes               |
| 109  | 1.875 Minutes   | 9.375 Minutes               |
| <b>Accelerating vehicles</b>   |   |                             |
|  | <b>Vehicle Category in dB(A)</b>  | <b>Maximum sound level</b>  |
| 1  | Vehicles intended for carriage of passengers and equipped with not more than nine seats, including the driver's seat  | 78                          |
| 2  | Vehicles intended for carriage of passengers and equipped with not more than nine seat including the driver's seat and having maximum permissible mass of more than 3.5 tones-<br>(a) With an engine power of more than 150KW<br>(b) With an engine power of less than 150KW                        | 80<br>83                    |
| 3  | Vehicles intended for carriage of passengers and equipped with more than nine seats including driver's seat: Vehicles intended for carriage of goods-<br>(a) With maximum permissible mass not exceeding 2 tones<br>(b) With maximum permissible mass exceeding 2 tones but not exceeding 3.5 tones | 79<br>80                    |
| 4  | Vehicles intended for the carriage of goods and having a maximum permissible mass exceeding 3.5 tones-<br>(a) With an engine power of less than 75KW<br>(b) With an engine power of not less than 75KW but less than 150KW<br>(c) With an engine power of less than 150KW                           | 81<br>83<br>84              |
| <b>Mines and quarries</b>  |   |                             |
|  | <b>Facility</b>   | <b>Limit value in dB(C)</b> |
| 1  | For any buildings used as a hospital, school, convalescent home, old age home or residential building   | 109 dB(C)                   |
| 2  | For any building in area used for residential and one or more of the following purposes:  |                             |

| For General Environment   |                    |         |
|---|--------------------|---------|
| Facility  | Noise Limits dB(A) |         |
|   | Day                | Night   |
| Commerce, small scale production, entertainment, or any residential apartment in area that is used for purposes of industry, commerce, or small scale production, or any building used for the purpose of industry, commerce or small scale production. |                    | 14dB(C) |

Time frame:

Day 6.00am - 10.00pm  
Night 10.00pm - 6.00am

Source: *The National Environment (Noise Standards and Control) Regulations, 2003*

#### 4.1.7 Drainage and water resources

##### 4.1.7.1 Drainage and hydrology

The entire project area along the Enyau WSS drains either east wards or south wards in both Terego and Yumbe district and all water is finally discharged into River Nile. The project area is relatively flat but descends gradually towards the Nile. The highest point above sea level is at about 904 m in Opiraa village, Odupi sub-county around the intake and the lowest point is at the Nile at 618m above sea level in Yumbe district. The various segments of Enyau WSS cut across 6 rivers/streams most of which are permanent in nature.

All these streams are part of the wider catchment of the Albert Nile in both Arua, Terego, Yumbe and Obongi districts. Some of these are narrow with a riparian width of not more than 30 meters, while others are wide such as the crossing of Enyau river at E: 354223, N:304447 which is 121 meters. During construction, the contractor will have to ensure civil works across such streams don't interfere with the integrity of the water resources. Table 4.3 below presents a list and other details of all stream crossings.

Table 4.3: List of streams intercepted by the Enyau WSS network

| Crossing Point | River Name | Coordinates of Crossing |          | Length of Crossing | Administration |            |          |
|----------------|------------|-------------------------|----------|--------------------|----------------|------------|----------|
|                |            | Centre_X                | Centre_Y |                    | Village        | Sub County | District |
| 1              | Mvetrei    | 298155                  | 357153   | 32.00              | Andiku         | Odupi      | Terego   |
| 2              | Enyau      | 304440                  | 354190   | 28.00              | Ongurua        | Odupi      | Terego   |
| 3              | Enyau      | 308374                  | 353640   | 121.60             | Amia           | Odupi      | Terego   |
| 4              | Enyau      | 308377                  | 353642   | 51                 | Amia           | Odupi      | Terego   |
| 5              | Ore        | 312385                  | 361430   | 44.00              | Yinga          | Odupi      | Terego   |
| 6              | Odra       | 314257                  | 364195   | 38.00              | Okuyo Centre   | Ariwa      | Yumbe    |

#### 4.1.7.2 Wetlands and riparian habitats

Enyau WSS will also affect some wetlands although majority of them will be riparian habitats along the affected streams identified under table 4.3 above. Therefore, these wetlands can be classified as open streams, seasonal and permanent wetlands. The wetlands traversed by the project had not been greatly modified by human activities. Plant species of seasonal wetlands included *Echinochloa pyramidalis* Least Concern (LC), *Loudetia simplex*-Not Evaluated (NE), *Cyperus* spp., *Fimbristylis dichotoma* (LC), *Cissampelos mucronata* (NE), *Leersia hexandra* (LC) and *Polygonum salicifolium* (LC). *Cyperus papyrus* (LC), *Phragmites mauritiana* (LC), *Phoenix reclinata* (LC) were among the many species of permanent wetlands. In these wetland areas were also found patches of swamp forest vegetation and the species here included *Phoenix reclinata* (LC), *Albizia zygia* (LC), *Maesopsis eminii* (LC), *Macaranga schweinfurthii* (LC) and *Alchornea cordifolia* (LC) (Plate 4.16). Swamp forest species were *Phoenix reclinata* (LC), *Acacia polyacantha* (NE), *Blighia unijugata* (LC), *Albizia grandibracteata* (LC) and others. Table 4.4 below present a list of wetlands affected by the Enyau water scheme.

Table 4.4: Some of the wetland resources identified along the Enyau WSS project area

| Name of wetland | Type of wetland | Coordinates of Crossing |         | Distance crossed | Administration |            |          |
|-----------------|-----------------|-------------------------|---------|------------------|----------------|------------|----------|
|                 |                 | Start_X                 | Start_Y | Distance (m)     | Village        | Sub County | District |
| Amia            | Seasonal        | 304448                  | 354240  | 32               | Amia           | Odupi      | Terego   |
| Siripi          | Permanent       | 308507                  | 353204  | 1084             | Siripi         | Odupi      | Terego   |
| Okubani         | Seasonal        | 323525                  | 357139  | 91               | Okubani        | Ariwa      | Yumbe    |

#### 4.1.7.3 Water quality characteristics of selected points on river Enyau

In order to understand the characteristics of the existing water sources in river Enyau, the, the ESIA team assessed its baseline water quality on two selected water points (Upstream and downstream). Baseline water quality was analysed at National Water and Sewerage Corporation (NWSC) to determine the physio-chemical and bacteriological characteristics of the sources. Specifically, the samples were analysed for the parameters as presented in table 4.5 below. Table 4.6 below presents a summary of the results. Detailed results of the laboratory tests for each sample and parameters tested is presented in Annex 3 against permissible standards.

Table 4.5: Maximum permissible standards for selected parameters for potable water

| Parameter | Units | National Standards for untreated Portable water (Maximum permissible) |
|-----------|-------|---|
| Turbidity | NTU   | 25  |
| PH        | -     | 6.5-8.5   |



| Parameter                              | Units     | National Standards for untreated Portable water (Maximum permissible) |
|--|-----------|---|
| Alkalinity: Total as CaCO <sub>3</sub> | mg/L      | 500   |
| COD                                    | Mg/l      | Not specified   |
| Electrical Conductivity (EC)           | uS/cm     | 2500  |
| Hardness: Total as CaCO <sub>3</sub>   | mg/L      | 600   |
| Total Dissolved Solids (TDS)           | mg/L      | 1500  |
| Total Suspended Solids (TSS)           | mg/L      | 0   |
| Bacteria: Faecal coliforms             | CFU/100mL | 0   |

Table 4.6: Water quality assessment for River Enyau

| Name of sample           | Coordinates at which sample was taken | Hydrological and or key particulars of the water source  | Water quality results   |
|--------------------------|---------------------------------------|--|---|
| Enyau river (upstream)   | E: 294922<br>N: 357795                | Sample was taken about from River Enyau about 100 meters upstream of the intake in azapi village, Odupi subcounty, Terego district | The water sample showed complying physical chemical characteristics with exception of TSS and turbidity as provided for by National Standards for Untreated Portable Water.<br><br>The water sample showed uncompliant bacteriological characteristics as provided for by the National Standards for untreated Portable Water |
| Enyau river (downstream) | E:304437<br>N:354185                  | Sample was taken from River Enyau about 10km downstream of the intake in Amia village, Odupi subcounty, Terego district            | The water sample showed complying physical chemical characteristics with exception of TSS and turbidity as provided for by National Standards for Untreated Portable Water.<br><br>The water sample showed uncompliant bacteriological characteristics as provided for by the National Standards for untreated Portable Water |

#### 4.1.8 Air quality

The ESIA team carried out air quality assessment at selected points along the transmission corridor to benchmark baseline air quality conditions prior to the implementation of the project. Below are tables showing the results of baseline air quality assessments.

Table 4.7: Air quality results recorded at selected sites within Enyau WSS project area

| National Environment (Draft Air Quality Standard) for Ambient Air | Carbon Monoxide CO (PPM) 9.0 | Carbon Dioxide CO2 (%) * | Sulphur dioxide SO <sub>2</sub> 10 mins - 500 µg/m <sup>3</sup> | Nitrogen Oxide NO <sub>x</sub> (40 µg) | Hydrogen Sulphide (Ppm) | PM2.5 (ug/m <sup>3</sup> ) | PM10 (ug/m <sup>3</sup> ) |
|---|------------------------------|--------------------------|---|--|-------------------------|----------------------------|---------------------------|
| Sample Location   |                              |                          |   |  |                         |                            |                           |
| Intake<br>N 3.23531<br>E 31.15446                                 | ND                           | 0.03                     | ND  | ND                                     | ND                      | 19.4                       | 22.4                      |
| Water Treatment Plant<br>N 2°33'5.442<br>E 31°0'8.052"            | ND                           | 0.03                     | ND  | ND                                     | ND                      | 19.8                       | 24.6                      |
| Tank 2 (Amia)<br>N 3.25646<br>E 31.18688                          | ND                           | 0.03                     | ND  | 0.01                                   | ND                      | 20.3                       | 30.8                      |
| Water tank (IMVEPI)<br>N 3.22602<br>E 31.21483                    | ND                           | 0.03                     | ND  | 0.01                                   | ND                      | 20.1                       | 30.2                      |
| Nyaranga A<br>N 3.22446<br>E 31.212                               | ND                           | 0.04                     | ND  | 0.05                                   | ND                      | 20.1                       | 29.7                      |

## 4.2 Biological environmental

### 4.2.1 Flora

#### 4.2.1.1 Overview of the general vegetation description

The original general vegetation was described by Langdale-Brown et al (1964) as post cultivation communities described as Combretum-Acacia-Hyparrhenia savanna consisting of mixed deciduous trees and both annual and perennial grasses.

#### 4.2.1.2 Data collection methods

##### Literature search

Desk reviews of relevant literature were done before the field surveys. Information relevant to vegetation and flora was sought to identify conservation issues. These included presence of unique, threatened, rare and species of conservation concern and habitats known to occur in and around the study site. The vegetation classification as described by Langdale-Brown et al. (1964) was also reviewed.

## Sampling

Imaginary belt transects were laid to cover areas of the proposed construction of the R. Enyau intake, treatment plant and reservoir tanks. The piping will be covered in the general habitat description of the area. Opportunistic sampling was also used to capture as many species. The generated species checklist was checked against lists of species of conservation concern. The IUCN and National threatened species lists were checked but with caution because not all Ugandan species have been assessed for red listing. Table 4.11 below presents a description of the sites surveyed

Table 4.11: Description of the sites surveyed

| R. Enyau Water Supply System |                          |          |  |   |
|------------------------------|--------------------------|----------|--|---|
| Way Point                    | UTM                      | Altitude | Description  | Common species  |
| 366                          | 36 N<br>294885<br>357786 | 884 m    | Water Intake, Alternative A in Dondi, Otumbari Parish, Odupi SubCounty. (Wooded grassland)   | <i>Terminalia brownii</i> , <i>Tamarindus indica</i> , <i>Pennisetum purpureum</i> , <i>Pennisetum polystachyon</i> , <i>Chromolaena odorata</i>                      |
| 367                          | 36 N<br>294932<br>357784 | 838 m    | Water Intake, Alternative B  | <i>Gmelina arborea</i> , <i>Acacia sieberiana</i> , <i>Tamarindus indica</i> , <i>Pennisetum purpureum</i> , <i>Chromolaena odorata</i>                               |
| 369                          | 36 N<br>298510<br>360120 | 900 m    | Tank 1 – Azapi, Odupi, Terego Subcounty with small trading centers,  | <i>Khaya s</i> <i>Gmelina arborea</i> , <i>Ficus mucoso</i> , <i>Balanites aegyptiaca</i> , <i>Loudetia arundinacea</i>   |
| 371                          | 36 N<br>301622<br>356768 | 830 m    | Tank 1A – Invempi Refugee Settlement, Jakisa Village1, Zone 4, Block 5   | <i>Combretum molle</i> , <i>Grewia trichocarpa</i> , <i>Sorghum vulgare</i> , <i>Okra</i> , <i>Loudetia arundinacea</i>   |
| 374                          | 36 N<br>301322<br>356588 | 827 m    | Water Treatment Plant (Jakisa village) Planted Formerly wooded grassland savanna   | <i>Tectona grandis</i> , <i>Sclerocarya birrea</i> , <i>Kigelia africana</i> , <i>Lannea</i> (3), <i>Combretum collinum</i> , <i>Loudetia arundinacea</i> ,           |
| 378                          | 36 N<br>303302<br>356437 | 782 m    | Tank 2 – formerly wooded savanna. Now grassland with scattered trees. Next to a football ground and dilapidated grass thatched school/church | <i>Tectona grandis</i> , <i>Combretum collinum</i> , <i>Vachellia hockii</i> , <i>Hyparrhenia dissoluta</i>   |
| 384                          | 36 N<br>306699<br>354713 | 671 m    | Tank 3, Amia Village, Invepi (Settlement)  | <i>Tamarindus indica</i> , <i>Balanites aegyptiaca</i> , <i>Lannea schweinfurthii</i> , <i>Vichellia hockii</i> , <i>Sorghum arundinacea</i> , <i>Sorghum vulgare</i> |
| 386                          | 36 N<br>305081<br>355926 | 705 m    | River Ibiro. Crossing point on Road from Tank 2 to Tank 3 –  | Cultivation and Settlements<br><i>Sorghum vulgare</i> , <i>Sesame indica</i>  |

## Species classification

Some of the plants were identified in the field sport on plus using field guide books and some that were not identified in the field were collected for identification at the Makerere University Herbarium (MHU).

#### 4.2.1.3 Results and discussion

A total of 196 plant species belonging to 148 genera were recorded from the surveyed project area. The most frequent species that were almost in all plots were: *Acacia hockii*, *Combretum molle*, *Vitellaria paradoxa* and *Terminalia browni*, *Sclerocarya barrea*, *Lannea* spp were woody and *Hyparrhenia dissoluta*, *Hyparrhenia filipendula*, *Chromolaena odorata* were the most common herbs. Five plant species of conservation concern in the sense of threat in IUCN and National context were recorded. These were (*Khaya grandifolia*, *K. senegalensis*, *Azelia africana* IUCN VU; National EN), (*Vitellaria paradoxa* IUCN VU& National VU) (*Milicia excelsa* IUCN NT & National EN, (*Tamarindus indica* IUCN NE & National VU). A species list of all flora encountered indicating their frequency at project sites is presented under Annex 5.

#### 4.2.2 Herpetofauna

##### 4.2.2.1 Overview

The study area was at selected points representing the proposed project infrastructure These include Water Intake area, Water Treatment Plant for raw water, Water Tanks to supply surrounding communities and along the pipeline routes with their immediate surroundings.

##### 4.2.2.2 Data collection methods

###### Visual Encounter Surveys (VES) Day Surveys

Visual Encounter Surveys are a well-known and robust method for surveying herpetofauna. VES is similar to the Timed Constrained Count (TCC) method described by Heyer et al., (1994). VES are used to document presence of amphibians and are effective in most habitats and for most species that tend to breed in lentic habitats. They generate encounter rates of species in their habitats in a unit hour. The method comprises moving through a habitat, turning logs or stones, inspecting retreats and watching out for and recording surface-active species. The data gathered using this procedure provide information on species richness of the habitat. This was the main method used throughout the survey.

###### Dip-net sampling

A standardized dip-net (Fig. 1.3) was used to scoop through aquatic habitats to sample for aquatic species and for tadpoles. Specimens of aquatic species or tadpoles caught by this method, if not identifiable in the field were preserved for later identification.



Plate 4.14: Dip-net used for sampling aquatic herpetofauna and tadpoles

### Local Knowledge

Visual Encounter Surveys were supported by Local Knowledge (LK). Local people were interviewed using a method known as Local Knowledge (LK) to establish the herpetofauna, particularly reptile species known to be present in a project site. This was treated as secondary data and used to build the species checklist.

### Species Identification

Identification of herpetofauna followed Schiøtz, (1999), Spawls et al., (2002, 2006) and Channing & Howell (2006)). The AmphibiaWeb (2022), Frost (2022) and The Reptile Database (Uetz et al., (eds.) 2022) was also used. The conservation status of the herpetofauna was reported using the IUCN Red Listing (IUCN 2022) and the Ugandan Red List (WCS 2016). Validation of voucher specimens collected from their field or their photos was carried out in the lab at Makerere University. Table 4.12 below shows the way points sampled for herpetofauna representing the key localities and habitats for the Enyau Gravity Flow Scheme (GFS).

Table 4.12: Geo-referenced Sites in Selected Localities of Enyau GFS.

| Way Point | UTM                   | Altitude | Description   |
|-----------|-----------------------|----------|---|
| 367       | 36 N 294932<br>357784 | 838 m    | Water Intake, Alternative B   |
| 374       | 36 N 301322<br>356588 | 827 m    | Water Treatment Plant – in murrum-rocky area. Formerly wooded savanna, in Invepi Refugee Settlement |
| 369       | 36 N 298510<br>360120 | 900 m    |   |
| 371       | 36 N 301622<br>356768 | 830 m    | Tank 1A – Invepi Refugee Settlement, Jakisa Village1, Zone 4, Block 5                               |

| Way Point | UTM                   | Altitude | Description   |
|-----------|-----------------------|----------|---|
| 378       | 36 N 303302<br>356437 | 782 m    | Tank 2 – formerly wooded savanna. Now grassland with scattered trees. Next to football f=ground and dilapidated grass thatched school/church  |
| 384       | 36 N 306699<br>354713 | 671 m    | Tank 3,<br>Amia Village, Invepi   |
| 386       | 36 N 305081<br>355926 | 705 m    | River Ibiro – Rose to confirm the name.<br>Crossing point on Road from Tank 2 to Tank 3 – Plant – Sorghum planted all around, with homesteads and a few trees. Fish team sampled here |
| 382       | 36 N 307577<br>354378 | 663 m    | Extensive wetland stretching from R. Enyau – frogs, and reptiles. Many culverts being laid – could not be crossed. To Tank 4: more or less in similar composition like Tank 3         |
| 388a      | 36 N 317658<br>362095 | 670      | Tank 4 in Likido Village, Invepi Parish, Odupi SubCounty, Terego District   |

#### 4.2.2.3 Results (Amphibians)

##### Amphibian species richness and distribution

A total of 22 amphibian species belonging to one Order Anura, 10 families and 13 genera were recorded during the study and have been identified (Table 4.13).

Table 4.13: Amphibian Species of Surveyed Locations in Selected areas of Enyau GFS

| Order             | Species                               | Common name                | Listing |
|-------------------|---------------------------------------|----------------------------|---------|
| Hyperoliidae      | <i>Afrivalus quadrivittatus</i>       | Four-lined Spiny Reed Frog | LC/LC   |
| Pyxicephalidae    | <i>Amietia nutti</i>                  | Nutti's River Frog         | LC/LC   |
| Arthroleptidae    | <i>Arthroleptis cf. poecilnotus</i>   | Mottled Squeaker           | LC/LC   |
| Arthroleptidae    | <i>Arthroleptis cf. schubotzi</i>     | Schubotz's Squeaker        | LC/LC   |
| Hemisotidae       | <i>Hemisus guineensis</i>             | Guinea Piglet Frog         | LC/LC   |
| Dicroglossidae    | <i>Hoplobatrachus occipitalis</i>     | Crowned Bullfrog           | LC/LC   |
| Microhylidae      | <i>Phrynomantis microps</i>           | West African Rubber Frog   | LC/LC   |
| Hyperoliidae      | <i>Hyperolius cinnamomeoventris</i>   | Cinnamon-bellied Reed Frog | LC/LC   |
| Hyperoliidae      | <i>Hyperolius kivuensis</i>           | Kivu Reed Frog             | LC/LC   |
| Hyperoliidae      | <i>Hyperolius viridiflavus</i>        | Common Reed Frog           | LC/LC   |
| Hyperoliidae      | <i>Kassina senegalensis</i>           | Senegal Land Frog          | LC/LC   |
| Arthroleptidae    | <i>Leptopelis oryi</i>                | Oryi's Tree Frog           | LC/LC   |
| Arthroleptidae    | <i>Leptopelis viridis</i>             | Green Tree Frog            | LC/DD   |
| Phrynobatrachidae | <i>Phrynobatrachus cf. acridoides</i> | East African Puddle Frog   | LC/LC   |
| Phrynobatrachidae | <i>Phrynobatrachus natalensis</i>     | Natal Dwarf Puddle Frog    | LC/LC   |
| Ptychadenidae     | <i>Ptychadena anchietae</i>           | Anchietae's Ridged Frog    | LC/LC   |
| Ptychadenidae     | <i>Ptychadena nilotica</i>            | Nile Grass Frog            | LC/LC   |
| Ptychadenidae     | <i>Ptychadena oxyrhynchus</i>         | Sharp-nosed ridged Frog    | LC/LC   |
| Ptychadenidae     | <i>Ptychadena porosissima</i>         | Grassland Ridged Frog      | LC/LC   |

| Order     | Species                      | Common name          | Listing |
|-----------|------------------------------|----------------------|---------|
| Bufonidae | <i>Sclerophrys maculata</i>  | Flat-backed Toad     | LC/LC   |
| Bufonidae | <i>Sclerophrys regularis</i> | African Common Toad  | LC/LC   |
| Pipidae   | <i>Xenopus victorinus</i>    | Victoria Clawed Frog | LC/LC   |
|           |                              |                      |         |

The most species rich site was the transition line between Tanks 3 and 4 with 17 amphibian species recorded in the area, followed by area along the line between Tanks 2 and 3 (15 species), then line between Water Intake and Water Treatment Plant (11 species), while Water Intake area and Tank 4 had 9 species each. The poorest sites were the Water Treatment Plant area, Tank 1 and Tank 2 (1 species each) because they were all located on raised ground and dry countryside.

The most common species were *Ptychadena nilotica* (Nile Grass Frog) recorded in eight out of 10 sites, followed by *Africalus quadrivittatus* (Four-lined Spiny Reed Frog) and *Hyperolius kivuensis* (Kivu Reed Frog) (6/10 sites each), while *Hyperolius viridiflavus* (Common Reed Frog) and *Sclerophrys regularis* (African Common Toad) were recorded in five out of the 10 sites.

The least common species were *Arthroleptis cf. poecilonotus* (Mottled Squeaker) and *Arthroleptis cf. schubotzi* (Schubotz's Squeaker) each recorded only once in one site, followed by *Phrynomantis microps* (West African Rubber Frog), *Hyperolius cinnamomeoventris* (Cinnamon-bellied Reed Frog), *Leptopelis viridis* (Green Tree Frog), *Ptychadena oxyrhynchus* (Sharp-nosed ridged Frog) and *Xenopus victorinus* (Victoria Clawed Frog) each recorded in two out of the 10 sites. Figure 4.10 below presents the number species encountered at various project sites.

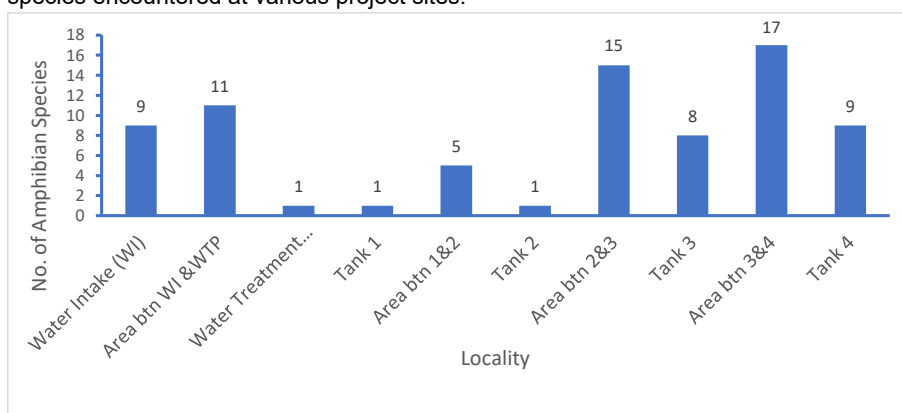


Figure 4.10: Amphibian Species Richness of Enyau GFS Surveyed Sites

### Amphibia Species of Conservation Concern

There are no species of Conservation Concern globally and nationally. The Arthropod - *Leptopelis viridis* - Green Tree Frog is globally listed as of Least Concern (LC) but nationally as Data Deficient (DD) – needing more research to be able to analyse its status adequately.

#### 4.2.2.4 Results (Reptiles)

### Reptilian Species Richness and Distribution

A total of 25 reptilian species belonging to two Orders – Chelonia and Squamata, 12 families and 16 genera were recorded during the study and have been positively identified as presented in table 4.14 below.

Table 4.14: Reptilian Species of Surveyed Locations in Selected areas of Enyau GFS

| Order    | Family        | Species                            | Common Name                  | IUCN Status |
|----------|---------------|------------------------------------|------------------------------|-------------|
| Chelonia | Pelomedusidae | <i>Pelomedusa neumanni</i>         | Neuman's Marsh Terrapin      | LC/LC       |
| Chelonia | Testudinidae  | <i>Knixys belliana</i>             | Bell's Hinge-back Tortoise   | NE/NT       |
| Squamata | Agamidae      | <i>Agama finchi</i>                | Malaba Rock Agama            | LC/LC       |
| Squamata | Agamidae      | <i>Agama lionotus</i>              | Kenyan Rock agama            | LC/LC       |
| Squamata | Chamelionidae | <i>Chamaeleo gracilis</i>          | Gracile Chameleon            | LC/LC       |
| Squamata | Chamelionidae | <i>Chamaeleo laevigatus</i>        | Smooth Chameleon             | LC/LC       |
| Squamata | Gekkonidae    | <i>Hemidactylus brookii</i>        | Brook's Gecko                | LC/LC       |
| Squamata | Gekkonidae    | <i>Hemidactylus mabouia</i>        | Tropical House Gecko         | LC/LC       |
| Squamata | Gekkonidae    | <i>Lygodactylus guttularis</i>     | Chevron-throated Dwarf Gecko | LC/LC       |
| Squamata | Lacertidae    | <i>Nucras boulengeri</i>           | Boulenger's Scrub Lizard     | LC/LC       |
| Squamata | Scincidae     | <i>Lygosoma sundevalli</i>         | Sundevall's Writhing Skink   | LC/LC       |
| Squamata | Scincidae     | <i>Trachylepis brevicollis</i>     | Short-necked Skink           | LC/LC       |
| Squamata | Scincidae     | <i>Trachylepis maculilabris</i>    | Speckled Skink               | LC/LC       |
| Squamata | Scincidae     | <i>Trachylepis perroteti</i>       | Orange-flanked Skink         | LC/LC       |
| Squamata | Scincidae     | <i>Trachylepis quinquetaeniata</i> | Five-lined Skink             | LC/LC       |
| Squamata | Scincidae     | <i>Trachylepis striata</i>         | Common Striped Skink         | LC/LC       |
| Squamata | Scincidae     | <i>Trachylepis varia</i>           | Variable Skink               | LC/LC       |
| Squamata | Varanidae     | <i>Varanus niloticus</i>           | Nile Monitor                 | LC/LC       |
| Squamata | Colubridae    | <i>Philothamnus battersbyi</i>     | Battersby's Green Snake      | LC/LC       |
| Squamata | Colubridae    | <i>Psammophis mossambicus</i>      | Olive Sand Snake             | LC/LC       |



| Order    | Family     | Species                       | Common Name                        | IUCN Status |
|----------|------------|-------------------------------|------------------------------------|-------------|
| Squamata | Colubridae | <i>Psammophis sudanensis</i>  | Northern Stripe-bellied Sand Snake | LC/LC       |
| Squamata | Colubridae | <i>Thelotornis kirtlandii</i> | Forest Vine Snake                  | LC/LC       |
| Squamata | Elapidae   | <i>Naja subflava</i>          | Forest Cobra                       | LC/LC       |
| Squamata | Viperidae  | <i>Bitis arietans</i>         | Puffadder                          | LC/LC       |
| Squamata | Pythonidae | <i>Python sebae</i>           | African Rock Python                | NT/VU       |

The most species rich sites for reptiles recorded in the Enyau GFS (Fig. 4.11) were: the transmission line between the Water Intake and Water Treatment Plant with 22 reptile species recorded, followed by the line between Tanks 3 and 4 (17 species). The Water Intake area, transmission line between Tanks 1 and 2 and the area around Tank 3 then followed with nine species recorded.

The most species poor sites were areas around Tanks 1 and 2, each with only 2 species recorded, followed by Tank 4 with four species recorded in the area. The most common reptilian species recorded were: *Agama finchi* (Malaba Rock Agama), recorded in seven out of the 10 sites surveyed, followed by *Agama lionotus* (Kenyan Rock agama), *Trachylepis macuilabris* (Speckled Skink) and *Trachylepis quinquetaeniata* (Five-lined Skink) (6/10 sites each), while *Hemidactylus mabouia* (Tropical House Gecko), *Varanus niloticus* Nile Monitor and *Naja subflava* (Forest Cobra) were each recorded in five out of the 10 sites surveyed.

The least common species was *Thelotornis kirtlandii* (Forest Vine Snake) recorded in only one site during the survey. This was followed by *Knixys belliana* (Bell's Hinge-back Tortoise), *Chamaeleo laevigatus* (Smooth Chameleon), *Trachylepis brevicollis* (Short-necked Skink), *Trachylepis varia* (Variable Skink), *Psammophis mossambicus* (Olive Sand Snake) and *Bitis arietans* (Puffadder), each recorded in two out of 10 sites.

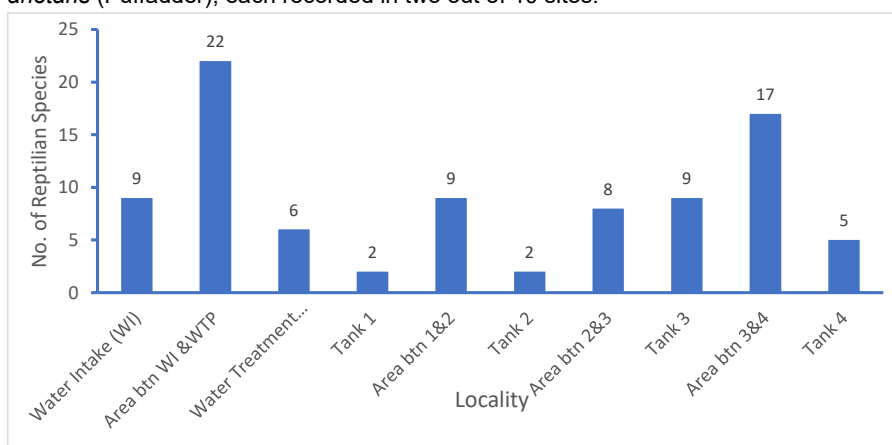


Figure 4.11: Reptilian Species Richness of Enyau GFS Surveyed Sites

### Species of Conservation Concern

The species of conservation concern in this area were *Knixys belliana* - Bell's Hinge-back Tortoise, which is globally not well assessed i.e. Not Evaluated (NE) and nationally considered as Vulnerable (VU). The other is *Python sebae* – the African Rock Python globally listed as Nearly Threatened (NT) and nationally as Vulnerable (VU). The rest of the reptile species are globally and nationally listed as of Least Concern (LC).

### 4.2.3 Mammals

#### 4.2.3.1 Data collection methods

#### Visual Encounter Surveys (VESs)

VESs involved walking along transects searching for surface-active species of medium sized and large mammals. This method involves looking out for indirect signs of mammalian presence such as scat, foot prints and burrows or roosts in case of bats. This survey method is commonly used to determine the species richness of an area, to compile a species list and to estimate relative abundances of species within an assemblage.

#### Local interviews

These involved interviewing the local community members familiar with the areas of study about sighted mammal species.

#### 4.2.3.2 Results

From the surveys conducted, in total 6 species (Table 4.15) were recorded for the ecosystem. All species except Stripped Ground Squirrel *Xerus erythropus* and Cane rat *Thryonomys gregorianus* were recorded from interviews with people from the local community. The exceptions listed here were recorded either from direct observation of their presence and foot prints.

Table 4.15: Species of mammals recorded for the Enyau Ecosystem

| Order    | Mammals  | IUCN Status |
|----------|--|-------------|
|          | Common Bush Duiker <i>Sylvicapra grimmia</i>     | LC          |
|          | Marsh Mongoose <i>Atilax paludinosus</i>         | LC          |
|          | Spot necked Otter <i>Lutra maculicollis</i>      | LC          |
| Primates | Vervet Monkey <i>Cercopithecus aethiops</i>      | LC          |
| Rodentia | Cane rat <i>Thryonomys gregorianus</i>           | LC          |
|          | Stripped ground Squirrel <i>Xerus erythropus</i> | LC          |

#### Conservations status

For all mammal species encountered, none is vulnerable, endangered or near threatened.

#### 4.2.4 Birds

##### 4.2.4.1 Overview

#### Birds of Uganda

Generally, Uganda has 1007 bird species, of which 7 are Endangered, 11 Vulnerable and 26 Near-threatened. 190 species are listed in the East Africa Regional Red List (Bennun and Njoroge 1996). The categories of birds according to their habitat include forest specialists (FF), forest generalists or forest edge species (F), forest visitors (f), species restricted to wetlands/open waters (W), water bird non-specialist, often found near water (w) and grassland species (G) (Caswell, *et al* 2005, Bennun and Njoroge 1996).

#### Conservation value of birds

Given the significance of birds for conservation planning and environmental assessments, there is a need for a better ecological understanding of the role of avian community structure in conservation decision-making. Thus, they are widely used in conservation and population trends in farmland are one of the 15 'Quality of Life' indicators. In addition, small land birds in particular have often been proposed as potential indicators for the presence of other unrelated taxa or as environmental change indicators to be integrated into broader monitoring schemes. Furthermore, they are frequently included in evaluation studies for overall biodiversity conservation (Gregory *et al.* 2004; Kati and Sekercioğlu 2006).

#### Birds as biodiversity indicators

Birds are good indicators of general biodiversity i.e. areas very rich in bird species have been found to also be rich in other biodiversity. Birds have been found useful as bio-indicators because they are:

- Wide spread, they occur in all habitats (forest, grassland, water, cultivation)
- Relatively large, conspicuous- easily surveyed with simple methods like observations, use of calls to record presence or absence
- Mostly active during the day (compared to many mammals and amphibians)
- Specialized in their habitats in some cases e.g. forest or water bird specialist. The disappearance of such specialist species in an ecosystem can be used to assess the health of that particular ecosystem or the extent of degradation.

Table 4.16 below presents the classification of birds according to their habitat requirements

Table 4.16: Classification of birds according to their habitat requirements

| Category | Description   | Abbreviation |
|----------|---|--------------|
| Forest   | <ul style="list-style-type: none"> <li>➤ Forest specialists</li> <li>➤ Cannot survive outside the primary forest</li> </ul> | FF           |

| Category   | Description  | Abbreviation |
|--|--|--------------|
|  | <ul style="list-style-type: none"> <li>➤ Forest Generalists.</li> <li>➤ They can live in the forest and at the forest edge or a degraded forest</li> </ul>   | F            |
|  | <ul style="list-style-type: none"> <li>➤ Don't live in the forest</li> <li>➤ They come to the forest as 'visitors'</li> </ul>  | f            |
| Water  | <ul style="list-style-type: none"> <li>➤ Species restricted to wetlands/open waters</li> <li>➤ They cannot survive outside an aquatic environment</li> </ul>   | W            |
|  | <ul style="list-style-type: none"> <li>➤ Non-specialist water birds often found near water</li> <li>➤ Facultative water birds</li> </ul>   | w            |
| Grassland & Agricultural Cultivation   | <ul style="list-style-type: none"> <li>➤ They live in grassland habitats</li> <li>➤ They are generally widely spread in all habitats but tend to avoid forests</li> <li>➤ They are species that can be found in cultivated areas like gardens, fallow lands and settlements</li> </ul> | NF           |
| Least Concern  | <ul style="list-style-type: none"> <li>➤ Bird species that are listed to be of least concern according to the IUCN red list of threatened species</li> </ul>   | LC           |
| Vulnerable   | <ul style="list-style-type: none"> <li>➤ Bird species whose populations are listed to be of vulnerability according to the IUCN red list of threatened species</li> </ul>  | VU           |
| Near threatened  | <ul style="list-style-type: none"> <li>➤ Bird species that are listed to be nearly threatened numbers according to the IUCN red list of threatened species</li> </ul>  | NT           |
| Endangered   | <ul style="list-style-type: none"> <li>➤ Bird species that are listed to be endangered in numbers according to the IUCN red list of threatened species</li> </ul>  | EN           |
| Globally critical  | <ul style="list-style-type: none"> <li>➤ Bird species whose populations are listed to be globally critical according to the IUCN red list of threatened species</li> </ul>   | G-CR         |
| Regionally critical  | <ul style="list-style-type: none"> <li>➤ Bird species whose populations are listed to be regionally critical according to the IUCN red list of threatened species</li> </ul>   | R-CR         |
| Globally vulnerable  | <ul style="list-style-type: none"> <li>➤ Bird species whose populations are listed to be globally vulnerable according to the IUCN red list of threatened species</li> </ul>   | G-VU         |
| <a href="#">Regionally vulnerable</a><br><a href="#">Regionally vulnerable</a> | <ul style="list-style-type: none"> <li>➤ Bird species whose populations are listed to be regionally vulnerable according to the IUCN red list of threatened species</li> </ul>   | R-VU         |
| Globally lower-risk, near threatened   | <ul style="list-style-type: none"> <li>➤ Bird species that are listed to be globally lower-risk, near <del>threatened according</del><a href="#">threatened according</a> to the Bird Atlas of Uganda</li> </ul>   | G-LR/nt      |
| Regionally Near threatened   | <ul style="list-style-type: none"> <li>➤ Bird species that are listed to be regionally near threatened according to the Bird Atlas of Uganda</li> </ul>  | R-NT         |

| Category                           | Description   | Abbreviation |
|------------------------------------|---|--------------|
| Globally Endangered                | ➤ Bird species that are listed to be globally endangered in numbers according to the Bird Atlas of Uganda   | G-EN         |
| Regionally Endangered              | ➤ Bird species that are listed to be regionally endangered in numbers according to the Bird Atlas of Uganda | R-EN         |
| Globally range-restricted          | ➤ Bird species that are listed to be globally range-restricted according to the Bird Atlas of Uganda        | G-RR         |
| Species of regional responsibility | ➤ Bird species that are listed to be of regional responsibility according to the Bird Atlas of Uganda       | R-RR         |
| Breeding                           | ➤ Occasional breeder  | OB           |
|                                    | ➤ Resident breeder (Species that are residents and breed from within their permanent locality)              | RB           |
|                                    | ➤ Resident, breeding not proved but likely  | R(B)         |
|                                    | ➤ Former breeder  | FB           |
| Migrant Species                    | ➤ Migrant breeder   | MB           |
|                                    | ➤ Migrant, breeding not proved (but likely)   | M(B)         |
|                                    | ➤ Intra-African migrant, breeding   | AfM/B        |
|                                    | ➤ Intra-African migrant, breeding not proved (but likely)   | AfM/(B)      |
|                                    | ➤ Intra-African Migrant, not breeding   | AfM/NB       |
|                                    | ➤ Regular passage migrant   | PM           |
|                                    | ➤ Regular Winter Visitor  | WV           |
|                                    | ➤ Resident non-breeder  | RN           |
|                                    | ➤ Occasional Winter Visitor   | OW           |
| ➤ Accidental Visitor or vagrant    | AV  |              |
| Introduced species                 | ➤ These are species that are not indigenous to Africa (Uganda) but were just introduced                     | I            |
| Not Evaluated                      | ➤ Bird species whose population status has not yet been evaluated.  | NE           |

#### 4.2.4.2 Data collection methods

##### Timed Species Counts (TSC)

Given the need for rapid assessment, a method that gives the researcher the opportunity to flush out all observable species was employed. This method involved developing a species list in which all species positively identified are listed in the order seen or heard within a period of an hour, but for this survey 30 minutes will be used. The observer walks around the survey point in a radius of 100meters flushing out shy and cryptic birds.

The species recorded between 0-5,5-10,10-15, 15-20, 20-25 and 25-30 minutes were given scores of 6, 5, 4, 3, 2 and 1 respectively (Pomeroy 1992). TSC is good for quick assessment

of species richness and abundance of an area and is thus good for inventorying areas in environmental assessments. It involves the researcher looking for vantage points without any obstructions, and recording all the birds heard and seen with the help of binoculars. Field identifications was done with the help of a field guide to the birds of East Africa by Stevenson and Fanshawe (2002).

#### 4.2.4.3 Results

Overall, 188 individuals were observed in the study area representing 47 species of birds; the observations were made from the proposed survey areas as shown in the Table 4.17 below. Figure 1 presents a graph showing the general abundance and distribution of bird species within the project survey areas

Table 4.17: Table showing site species abundance

| Survey Site                          | Number of Individuals Observed | Number of Species Represented. |
|--------------------------------------|--------------------------------|--------------------------------|
| Water Intake, Alternative B          | 15                             | 8                              |
| Water Intake, Alternative A in Dondi | 18                             | 10                             |
| Water Treatment Plant                | 12                             | 10                             |
| Tank 1 – Azapi, Odupi                | 14                             | 9                              |
| Tank 1A – Invempi Refugee Settlement | 12                             | 9                              |
| Tank 2 – formerly wooded savanna.    | 10                             | 4                              |
| River Ibiro                          | 12                             | 7                              |
| Tank 3, Amia Village, Invepi         | 24                             | 8                              |
| Tank 4                               | 42                             | 25                             |

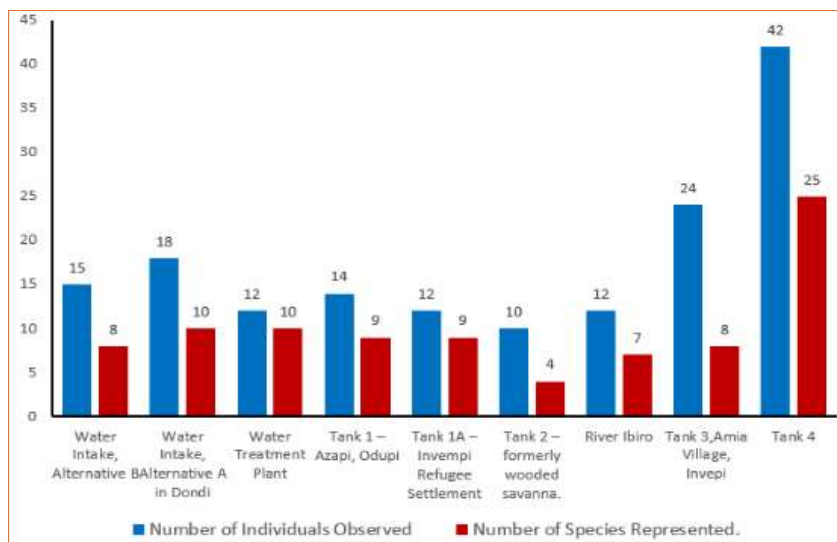


Figure 4.12: Graph showing the general abundancy and distribution of species within the project survey areas

The highest numbers of species were recorded in the Tank 4 area with 42 individuals, followed by the Tank 3 area (24 individuals), Water Intake Alternative A (18 individuals) and Water Intake Alternative B (15 individuals) and the rest followed. See Graph 1 above, Birds having a wider home range, they were found in all survey areas (Graph 1).

Diversity was highest in the Tank 4 area with 25 species, followed by Water Intake Alternative A and Water Treatment Plant (10 species each). Points near the water sources and river bank where there were trees had lots of black headed weaver birds and other water birds that were recorded in large numbers compared to other points that had few birds recorded at them being a bit further away from the river banks/ water sources. Diversity overall ranged low from all sites

The most abundant and widely distributed species was the common bulbul 82% followed by the Grey Kestrel 60%, four forest visitors (Black-and-white Mannikin (*Spermestes bicolor*), Greater Blue-eared Glossy-Starling (*Lamprotornis chalybaeus*), Green-backed Camaroptera (*Camaroptera brachyura*) and the Common Bulbul (*Pycnonotus barbatus*).

Three Forest generalists recorded included the Ring-necked Dove (*Streptopelia capicola*), Red-eyed Dove (*Streptopelia semitorquata*) and the Red-chested Sunbird (*Cinnyris erythrocerca*), were observed, eight grassland specialists (Black Bishop, Helmeted Guinea fowl, Little Weaver, Little Bee Eater and the Red checked Codon Blue) and three non-water specialist often found near water (African Pied Wagtail and African Open bill (*Anastomose lamelligerus*) and the African Marsh-Harrier (*Circus ranivorus*) the, that are usually found next to water but can as well survive where there is no water. Most of the species observed are those referred to as habitat generalists (Annex 7).

It was observed that the general low diversity and abundance of birds in most areas surveyed was because local people, especially children, are greatly involved in hunting for birds, using catapults.

#### 4.2.5 Butterflies

##### 4.2.5.1 Data collection methods

The adult butterfly fauna of the target areas was sampled systematically using sweep nets. An established transect line was walked at constant pace, recording all the butterfly species seen on wings. Individuals that were difficult to identify on wings were taken and stored for further processing identified using available field guides (e.g. Larsen, 1991; Kielland, 1990). Opportunistic observations were included to help build the species list. Each of the butterfly species was assigned to one of the ecological categories as described by Davenport (1996).

The major categories considered included forest dependent species (F), forest edge/woodland species (f), open habitat species (O), widespread species (W), migratory species (M), and wetland species (S).

#### **4.2.5.2 Results**

A total of 52 species of butterflies (Appendix1) were recorded from the different surveyed areas. For butterflies, five forests edge/woodland species, 13 migrant species, six open habitat species, 26 widespread species and only two wetland species were recorded within the Project areas. From the butterflies' ecological preferences, over 50% of the total species recorded were those that are typically widespread: 12% of species were those typical of open habitats.

The study did not record within the direct impact areas any globally or nationally threatened species of butterflies. No species of conservation concern in the sense of endemism, threat in IUCN context or rarity were recorded. Of all the butterfly species recorded by the surveys, only three species (*Eurema brigitta*, *Junonia oenone* and *Zizina antanossa*) have been evaluated for the IUCN Red List, while the other species have not yet been evaluated. The three species are all categorized as being of least concern.

#### **4.2.6 Aquatic biodiversity**

##### **4.2.6.1 Data collection methods (Enyau River)**

###### **Overview**

At Enyau intake, the samples were taken at a point with coordinates (36 N 294885 357786) in Dombi, Otumbari, Odupi Sub County, Terego district local government and is characterized by moderate water flow speed, with a width of about 6meters, surrounded by gardens of sorghum, sesame, cassava and many more food crops in distance of about 200m away from the rive shore line. The river section was characterised by sandy sediments and high turbidity levels. Measuring of Physical Chemical Parameters (Temperature and Dissolved Oxygen (DO) was undertaken. The water quality parameters (temperature and Dissolved Oxygen (DO)) were measured using HI 9147 oxygen probe.





Figure 4.15: Measuring of Temperature and Dissolved Oxygen

### Fish biodiversity

Gill nets, hooks and cast nets were set for over one night in addition to interviews to local fishermen to identify the commonly caught fishes from the rivers and streams as shown in the figure below.



Figure 4.16: Photos during fishing with Cast nets and gill nets at River Enyau

**Phytoplankton**

The phytoplankton sampling was carried out at R. Enyau gravity Flow Scheme area (GPS coordinates: 36 N 294885, 357786). The concentration of Phytoplankton was determined based on cell density and bio volume using an Inverted Microscope and Modified Utermohl. Sedimentation Technique using (Hasle 1978) in terms of Cells /ml of water and converted to cells per Litre of water (Cells/L). Samples of water were collected using an integrated water column sampler to collect phytoplankton. A large plastic container (20 L) was filled using the integrated water sampler. The compound sampler was mixed and a pre-labelled 125-ml amber bottle was manually immersed into the container. The bottle was labelled with the date, station ID and sample type. The sample was immediately preserved with 2-ml Lugol's solution per 100-ml of sample (Vollenweider 1974) and stored in the dark cool place.

In the laboratory, Phytoplankton were counted using the inverted microscope procedure of Utermohl following standard procedures of Lund et al. (1958). Sub-samples were settled for at least 24 hours in a sedimentation chamber prior to counting. Replicate areas were enumerated at a magnification of not less than 500X. For enumeration of rare, large taxa, the entire chamber was subsequently scanned and counted at low magnification. Results were expressed as cells/ml of water and then converted to Cells/Litre of water using appropriate geometric formulae (Downing and Rigler, 1984) for all algal taxa.

**Zooplankton**

The zooplankton sampling for this survey was carried out at R. Enyau for gravity Flow Scheme project area (GPS coordinates: 36 N 294885, 357786). The total zooplankton volume was determined by the displacement volume method. In this method the zooplankton sample was filtered through a piece of clean, dried netting material. The mesh size of netting material was 20micron meter mesh size of the net used for collecting the samples. The interstitial water between the organisms was removed with the blotting paper. The filtered zooplankton was then transferred with a spatula to a measuring cylinder with a known volume of 75% ethanol. The displacement volume is obtained by recording the volume of fixative in the measuring jar displaced by the zooplankton. The settled volume was obtained by making the sample to a known volume in the measuring jar. The plankton was allowed to settle for at least 24 hours before recording the settled volume.

**4.2.6.2 Results (Enyau River)**

**Physical chemical parameters**

| Site     | Temperature (°C) | Dissolved Oxygen DO (Mg/l) |
|----------|------------------|----------------------------|
| R. Enyau | 27.1-27.9        | 5.39-6.6                   |

## Phytoplankton

The results from the laboratory analyses (Table 4.18) indicated that the blue greens, greens and diatoms are dominant. These results are consistent with previous ESIA findings on Rivers and streams in the West-Nile<sup>1</sup>.

Table 4.18: Composition of Phytoplankton in R. Enyau

| Taxon                    | Number of Phytoplanktons per litre of water (*percentage composition) |
|--------------------------|---|
| BLUE GREEN               |   |
| <i>Microcystis (sp)</i>  | 102 (16.4)  |
| <i>Anabeana (sp)</i>     | 98 (15.8)   |
| <i>Oscillatoria (sp)</i> | 71 (11.4)   |
| <i>Desmidium (sp)</i>    | 47 (7.6)  |
| <i>Tolypothrix (sp)</i>  | 46 (7.4)  |
| GREENS                   |   |
| <i>Nitella (sp)</i>      | 86 (13.8)   |
| <i>Cladophora (sp)</i>   | 64 (10.4)   |
| <i>Peridinium (sp)</i>   | 21 (3.4)  |
| <i>Spirogyra</i>         | 32 (5.2)  |
| <i>Microspoyra</i>       | 12 (1.9)  |
| FLAGELIATES              |   |
| <i>Euglena (sp)</i>      | 13 (2.1)  |
| <i>Phacos (sp)</i>       | 5 (0.8)   |
| DIATOMS                  |   |
| <i>Synedra (sp)</i>      | 24 (3.9)  |

## Zooplankton in R. Enyau

The results from the laboratory analyses (Table 4.19) indicated that river zooplankton community consists mainly of Rotifera, Copepoda and Cladocera. The *Proales sp* were found to be the most prominent of the rotifers in section of the river sampled.

Table 4.19: Zooplankton composition in R. Enyau

| Taxon                 | Number of Phytoplanktons per litre of water |
|-----------------------|---|
| ROTIFERS              |   |
| <i>Proales (sp)</i>   | 173 (15.9%)                                 |
| <i>Polyathra (sp)</i> | 140 (12.8%)                                 |
| <i>Ascomopha (sp)</i> | 123 (11.2%)                                 |
| <i>Euclanis (sp)</i>  | 107 (9.8%)                                  |

<sup>1</sup> UNRA. (2020). ESIA for upgrading of the 105Km Koboko-Yumbe-Moyo road, 2020

|                        |             |
|------------------------|-------------|
| <i>Brachionus (sp)</i> | 93 (8.5%)   |
| COPEPODS               |             |
| <i>Cyclops (sp)</i>    | 301 (27.6%) |
| Nauplius               | 102 (9.4%)  |
| CLADOCERA              |             |
| <i>Bosmina (sp)</i>    | 51 (4.7%)   |

### Fish species

From the gill nets and cast nets, 3 fish species were identified that is Nile tilapia (*Oreochromis niloticus*), African catfish (*Clarias gariepinus*), and Cray fish (*Neopetrolisthes maculatus*) as shown in the Table 4.20 below.

Table 4.20: The fish species in R. Enyau identified with gill and cast nets

| Sites    | Fish species                                  | Weight (average and range) | Standard length (average and range) and photos |
|----------|---|----------------------------|--|
| R. Enyau | African catfish ( <i>Clarias gariepinus</i> ) | 800g (400-1200) g          | 20-45cm  |
|          | Nile tilapia ( <i>Oreochromis niloticus</i> ) | 250g(200-300) g            | 10-15cm  |
|          | crab ( <i>Neopetrolisthes maculatus</i> )     | 200g                       | 6cm  |

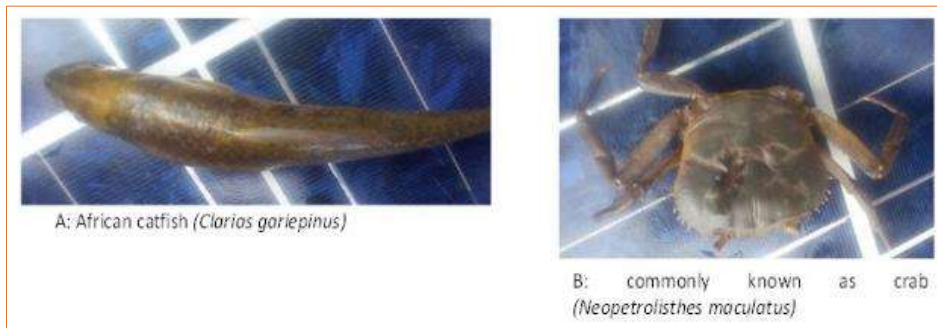


Plate 4.17: The fish species caught with gillnets and cast nets at R. Enyau

From consultations with the local authorities as well as the fishermen, 10 fish species were found to be caught from R. Enyau as shown in Table 4.21. The existence was confirmed of all along the whole length of the river. All the species that were recorded are native to Uganda

and the region and none of them was of critical conservation concern, according to the IUCN red list status (Table 4.21).

Table 4.21: Fish species reported from interviews with local leaders and fisher men

| Local name      | Scientific name                | English/common name              | IUCN Red List status (2017) |
|-----------------|--------------------------------|----------------------------------|-----------------------------|
| Adel            | <i>Clarias gariepinus</i>      | Mud fish                         | Least concern (LC)          |
| Lara            | <i>Barbus sp.</i>              | Barbel fish                      | Least Concern (LC)          |
| Ngasiya         | <i>Hydrocynus forskalii</i>    | Tiger fish                       | Least concern (LC)          |
| Dala            | <i>Barbus altianalis</i>       | Ripon barbell                    | Least concern (LC)          |
| Nyai            | <i>Clarias sp.</i>             | Catfish                          | Least concern (LC)          |
| Okebu/Ngogo     | <i>Protopterus aethiopicus</i> | African lungfish                 | Least concern (LC)          |
| Osogoro/Ozogoro | <i>Oreochromis niloticus</i>   | Nile Tilapia                     | Not assessed ( NA)          |
| Okuwu           | <i>Clarias liocephalus</i>     | Smoothhead catfish               | Least concern (LC)          |
| Karuka          | <i>Barbus jacksonii</i>        | Jackson's barbel                 | Least Concern (LC)          |
| Ekuci           | Crab                           | <i>Neopetrolisthes maculatus</i> | Least concern (LC)          |

#### 4.2.6.3 Discussion

This study clearly indicates that the aquatic biodiversity of R. Enyau is rich and steps will have to be taken to protect and conserve the rivers biodiversity. The fact that water will be extracted upstream may have some minimal or negligible impacts on the aquatic biodiversity and ecosystem dynamics of the river since water volumes are not likely to significantly reduce in addition to water depth. According to the feasibility study consultant (Alliance Consultants Ltd), the minimum discharge of river Enyau is 1.67m<sup>3</sup>/second while the mean discharge is 10.32m<sup>3</sup>/second. Enyau WSS will abstract 0.0345 m<sup>3</sup>/s which is just 2% of the minimum river flow and 0.33% of the mean flow. Therefore, the impact of this abstraction will not slow down the speed of water and will not reduce the depth of this stream. Hence concerns that the river could be colonized by new riverine species that prefer shallow running waters will not occur.

#### 4.2.6.4 Data collection methods

Samples were taken at section of coordinates (36 N 305081 355926) on Ibiru river which is a tributary of River Enyau. It's on the eastern part of tank 3 at Imvepi refugee settlement camp and is characterized by muddy water with vegetation along its shores, rocky and without a bridge. It is one of the streams used by communities for domestic work like washing motorcycles and clothes. The water quality parameters (temperature and Dissolved Oxygen (DO)) were measured using HI 9147 oxygen probe.

## **Phytoplankton**

The samples for phytoplankton analysis were taken Ibiri stream (GPS coordinates: 36 N 305081 355926) on the eastern part of tank 3 at Imvepi refugee settlement camp. The concentration of Phytoplankton was determined based on cell density and bio volume using an Inverted Microscope and Modified Utermohl. Sedimentation Technique using (Hasle 1978) in terms of Cells /ml of water and converted to cells per Litre of water (Cells/L). Samples of water were collected using an integrated water column sampler to collect phytoplankton.

A large plastic container (20 L) was filled using the integrated water sampler. The compound sampler was mixed and a pre-labelled 125-ml amber bottle was manually immersed into the container. The bottle was labelled with the date, station ID and sample type. The sample was immediately preserved with 2-ml Lugol's solution per 100-ml of sample (Vollenweider 1974) and stored in the dark cool place.

In the laboratory, Phytoplankton were counted using the inverted microscope procedure of Utermohl following standard procedures of Lund et al. (1958). Sub-samples were settled for at least 24 hours in a sedimentation chamber prior to counting. Replicate areas were enumerated at a magnification of not less than 500X. For enumeration of rare, large taxa, the entire chamber was subsequently scanned and counted at low magnification. Results were expressed as cells/ml of water and then converted to Cells/Litre of water using appropriate geometric formulae (Downing and Rigler, 1984) for all algal taxa.

## **Zooplankton**

The zooplankton sampling for this survey was carried out analysis were taken Ibiru stream (GPS coordinates (36 N 305081 355926) on the eastern part of tank 3 at Imvepi refugee settlement camp. The total zooplankton volume was determined by the displacement volume method. In this method the zooplankton sample was filtered through a piece of clean, dried netting material. The mesh size of netting material was 20micron meter mesh size of the net used for collecting the samples. The interstitial water between the organisms was removed with the blotting paper. The filtered zooplankton was then transferred with a spatula to a measuring cylinder with a known volume of 75% ethanol. The displacement volume is obtained by recording the volume of fixative in the measuring jar displaced by the zooplankton. The settled volume was obtained by making the sample to a known volume in the measuring jar. The plankton was allowed to settle for at least 24 hours before recording the settled volume.

## **Fish biodiversity**

Gill nets, hooks and cast nets were set for over one night in addition to interviews to local fishermen to identify the commonly caught fishes from the rivers and streams as shown in the figure below.

#### 4.2.6.5 Results (Ibiru River – a tributary of river Enyau)

##### Physical chemical parameters

| Site         | Temperature (°C) | Dissolved Oxygen DO (Mg/l) |
|--------------|------------------|----------------------------|
| Ibiru stream | 27.9-28.5        | 5.6-6.0                    |

##### Phytoplankton

The results from the laboratory analyses (Table 4.22) indicated that the blue greens, greens and diatoms are dominant. These results are consistent with the two previous ESIA's.

Table 4.22: Composition of Phytoplankton in Ibiru stream

| Taxon                    | Number of Phytoplanktons per litre of water<br>(*percentage composition) |
|--------------------------|--|
| BLUE GREENS              |  |
| <i>Oscillatoria (sp)</i> | 68 (13.1%)   |
| <i>Microcystis (sp)</i>  | 61 (11.8%)   |
| <i>Tolypothrix (sp)</i>  | 55 (10.6%)   |
| <i>Anabeana (sp)</i>     | 50 (9.6%)  |
| <i>Calothrix (sp)</i>    | 9 (1.7%)   |
| GREENS                   |  |
| <i>Dedogonium (sp)</i>   | 93 (17.9%)   |
| <i>Cladophora (sp)</i>   | 81 (15.6%)   |
| <i>Spirogyra (sp)</i>    | 70 (13.5%)   |
| <i>Hildenbradia (sp)</i> | 32(6.2%)   |

##### Zooplankton

The zooplankton community consisted mainly of Copepoda, Cladocera (water fleas) and Rotifera taxonomic groups. The results from the laboratory analyses (Table 4.23) indicated that river zooplankton community consists mainly of Rotifera, Copepoda an Cladocera. The *Proales sp* are the most prominent of the rotifers in all the three sections of the river sampled. These results are also consistent with the results of the previous ESIA's.

Table 4.23: Zooplankton composition in Ibiru stream

| Taxon                    | Number of Phytoplanktons per litre of water |
|--------------------------|---|
| ROTIFERS                 |   |
| <i>Proales (sp)</i>      | 144 (24.7%)                                 |
| <i>Oscillatoria (sp)</i> | 72 (12.3%)                                  |
| <i>Polyathra (sp)</i>    | 96 (16.4%)                                  |
| <i>Brachionus (sp)</i>   | 79 (13.5%)                                  |
| <i>Euclanis (sp)</i>     | 58 (9.9%)                                   |

|                      |           |
|----------------------|-----------|
| <i>Tricerca (sp)</i> | 57 (9.7%) |
| COPEPODS             |           |
| Cyclops (sp)         | 13.4%     |

### Fish species

From the gill nets and cast nets, no species was caught. However, with consultations with local authorities as well as the fishermen, the following fish species were listed as shown in table 4.24 below;

Table 4.24: Fish species reported from interviews with local leaders and fishermen

| Local Name      | Scientific name                | English/common name | IUCN red List status (2017) |
|-----------------|--------------------------------|---------------------|-----------------------------|
| Adel            | <i>Clarias gariepinus</i>      | Mud fish            | Least concern (LC)          |
| Ngasiya         | <i>Hydrocynus forskalii</i>    | Tiger fish          | Least concern (LC)          |
| Dala            | <i>Barbus altianalis</i>       | Ripon barbell       | Least concern (LC)          |
| Okebu/Ngogo     | <i>Protopterus aethiopicus</i> | African lungfish    | Least concern (LC)          |
| Osogoro/Ozogoro | <i>Oreochromis niloticus</i>   | Nile Tilapia        | Not assessed ( NA)          |
| Okuwu           | <i>Clarias liocephalus</i>     | Smoothhead catfish  | Least concern (LC)          |

All the species that were recorded are native to Uganda and the region and none of them was of critical conservation concern, according to the IUCN red list status.

#### 4.2.6.6 Discussion

This study indicates that stream Ibiru is moderately diverse with various phytoplankton, Zooplanktons and fish. This therefore requires some steps to protect and conserve them. Similarly, water abstraction on river Enyau will not affect the aquatic life in this stream.



## 5. SOCIAL ECONOMIC BASELINE ENVIRONMENT

### 5.1 Overview

As highlighted in section 1.5.4, data collection on social economic baseline was done through a combination of methods such as transect drives to generate primary data, secondary data review and stakeholder consultation. Knowledge of existing social conditions is essential to understanding project affected communities, potential benefits to recipient communities and likely challenges during project implementation. The social assessment used qualitative methods and several techniques in data collection, including, key informant interviews (Stakeholder consultations), focus group discussions and case study reviews. These were vital in establishing the social baseline information and subsequent assessment of potential social impacts. The choice of the sample points was predetermined and was done based on areas identified as affected by the proposed water infrastructure, and therefore potential exposure to environmental and social impact of the project.

### 5.2 Social economic Baseline

#### 5.2.1 Demographic Information

The table below shows primary data obtained from consultations done in the villages and sub-counties along the proposed transmission line and communities intended to benefit from the project.

| Characteristics                     | ARIAMA |         | ARIWA  |         | OMUGO  |        | UDUPI  |        | Total      |               |
|-------------------------------------|--------|---------|--------|---------|--------|--------|--------|--------|------------|---------------|
|                                     | Number | %age    | Number | %age    | Number | %age   | Number | %age   | Number     | %age          |
| <b>Gender of Respondent</b>         |        |         |        |         |        |        |        |        |            |               |
| Female                              | 6      | 21.43%  | 6      | 11.76%  | 6      | 17.65% | 50     | 23.04% | <b>68</b>  | <b>20.61%</b> |
| Male                                | 22     | 78.57%  | 45     | 88.24%  | 28     | 82.35% | 167    | 76.96% | <b>262</b> | <b>79.39%</b> |
| <b>Age group of Respondent</b>      |        |         |        |         |        |        |        |        |            |               |
| 18-30 years                         | 17     | 60.71%  | 18     | 35.29%  | 17     | 50.00% | 106    | 48.85% | <b>158</b> | <b>47.88%</b> |
| 31-50 years                         | 11     | 39.29%  | 22     | 43.14%  | 17     | 50.00% | 105    | 48.39% | <b>155</b> | <b>46.97%</b> |
| 51++ years                          | 0      | 0.00%   | 11     | 21.57%  | 0      | 0.00%  | 6      | 2.76%  | <b>17</b>  | <b>5.15%</b>  |
| <b>Marital Status of Respondent</b> |        |         |        |         |        |        |        |        |            |               |
| Married                             | 28     | 100.00% | 51     | 100.00% | 22     | 64.71% | 177    | 81.57% | <b>278</b> | <b>84.24%</b> |
| Single                              | 0      | 0.00%   | 0      | 0.00%   | 6      | 17.65% | 34     | 15.67% | <b>40</b>  | <b>12.12%</b> |
| Widow                               | 0      | 0.00%   | 0      | 0.00%   | 6      | 17.65% | 6      | 2.76%  | <b>12</b>  | <b>3.64%</b>  |
| <b>HH with PWDs</b>                 |        |         |        |         |        |        |        |        |            |               |

|   |    |         |    |         |    |         |     |       |            |              |
|---|----|---------|----|---------|----|---------|-----|-------|------------|--------------|
| 1-2'  | 0  | 0.00%   | 6  | 11.7%   | 19 | 55.8%   | 60  | 27.6% | <b>85</b>  | <b>25.7%</b> |
| None  | 28 | 100.00% | 45 | 88.2%   | 15 | 44.1%   | 157 | 72.3% | <b>245</b> | <b>74.2%</b> |
| <b>Education level of Respondent</b>        |    |         |    |         |    |         |     |       |            |              |
| Primary                                     | 11 | 39.2%   | 39 | 76.4%   | 17 | 50.0%   | 67  | 30.8% | <b>134</b> | <b>40.6%</b> |
| Secondary                                   | 6  | 21.4%   | 6  | 11.7%   | 11 | 32.3%   | 99  | 45.6% | <b>122</b> | <b>36.9%</b> |
| Tertiary/College                            | 11 | 39.2%   | 6  | 11.7%   | 6  | 17.6%   | 34  | 15.6% | <b>57</b>  | <b>17.2%</b> |
| University                                  | 0  | 0.00%   | 0  | 0.00%   | 0  | 0.00%   | 17  | 7.83% | <b>17</b>  | <b>5.15%</b> |
| <b>School-going Children in the HH</b>      |    |         |    |         |    |         |     |       |            |              |
| 1-3'  | 11 | 39.2%   | 22 | 43.1%   | 17 | 50.0%   | 73  | 33.6% | <b>123</b> | <b>37.2%</b> |
| 4-6'  | 11 | 39.2%   | 6  | 11.7%   | 11 | 32.3%   | 122 | 56.2% | <b>150</b> | <b>45.4%</b> |
| 7-10'                                       | 0  | 0.00%   | 17 | 33.3%   | 6  | 17.6%   | 22  | 10.1% | <b>45</b>  | <b>13.6%</b> |
| None  | 6  | 21.4%   | 6  | 11.7%   | 0  | 0.00%   | 0   | 0.00% | <b>12</b>  | <b>3.64%</b> |
| <b>Whether Respondent can write/read</b>    |    |         |    |         |    |         |     |       |            |              |
| Yes   | 28 | 100.00% | 51 | 100.00% | 34 | 100.00% | 172 | 79.2% | <b>285</b> | <b>86.3%</b> |
| NO  | 0  | 0.00%   | 0  | 0.00%   | 0  | 0.00%   | 45  | 20.7% | <b>45</b>  | <b>13.6%</b> |
| <b>Religious Affiliation of Respondents</b> |    |         |    |         |    |         |     |       |            |              |
| Roman Catholic                              | 11 | 39.2%   | 11 | 21.5%   | 34 | 100.00% | 134 | 61.7% | <b>190</b> | <b>57.5%</b> |
| Anglican                                    | 17 | 60.7%   | 6  | 11.7%   | 0  | 0.00%   | 72  | 33.1% | <b>95</b>  | <b>28.7%</b> |
| Pentecostal                                 | 0  | 0.00%   | 6  | 11.7%   | 0  | 0.00%   | 11  | 5.07% | <b>17</b>  | <b>5.15%</b> |
| Islam                                       | 0  | 0.00%   | 28 | 54.9%   | 0  | 0.00%   | 0   | 0.00% | <b>28</b>  | <b>8.48%</b> |
| <b>Tribe of Respondent</b>                  |    |         |    |         |    |         |     |       |            |              |
| Alur  | 0  | 0.00%   | 0  | 0.00%   | 0  | 0.00%   | 16  | 7.37% | <b>16</b>  | <b>4.85%</b> |
| Lugbara                                     | 11 | 39.2%   | 45 | 88.2%   | 28 | 82.3%   | 101 | 46.5% | <b>185</b> | <b>56.0%</b> |
| Kakwa                                       | 17 | 60.7%   | 6  | 11.7%   | 6  | 17.6%   | 83  | 38.2% | <b>112</b> | <b>33.9%</b> |
| Acholi                                      | 0  | 0.00%   | 0  | 0.00%   | 0  | 0.00%   | 6   | 2.76% | <b>6</b>   | <b>1.82%</b> |
| Other                                       | 0  | 0.00%   | 0  | 0.00%   | 0  | 0.00%   | 11  | 5.07% | <b>11</b>  | <b>3.33%</b> |
| <b>Vulnerability Status of Respondent</b>   |    |         |    |         |    |         |     |       |            |              |
| Vulnerable                                  | 6  | 21.4%   | 2  | 3.92%   | 11 | 32.3%   | 78  | 35.9% | <b>97</b>  | <b>29.3%</b> |
| Not Vulnerable                              | 22 | 78.5%   | 49 | 96.0%   | 23 | 67.6%   | 139 | 64.0% | <b>233</b> | <b>70.6%</b> |

| <b>Household Size of Respondent</b>          |    |             |    |             |    |             |     |            |            |                          |  |
|--|----|-------------|----|-------------|----|-------------|-----|------------|------------|--------------------------|--|
| 1-4'   | 6  | 21.4<br>3%  | 11 | 21.5<br>7%  | 0  | 0.00<br>%   | 22  | 10.1<br>4% | <b>39</b>  | <b>11.8</b><br><b>2%</b> |  |
| 5-10'  | 11 | 39.2<br>9%  | 23 | 45.1<br>0%  | 28 | 82.3<br>5%  | 161 | 74.1<br>9% | <b>223</b> | <b>67.5</b><br><b>8%</b> |  |
| 11 & Above                                   | 11 | 39.2<br>9%  | 17 | 33.3<br>3%  | 6  | 17.6<br>5%  | 34  | 15.6<br>7% | <b>68</b>  | <b>20.6</b><br><b>1%</b> |  |
| <b>Land Ownership Status of Respondent</b>   |    |             |    |             |    |             |     |            |            |                          |  |
| Owner  | 17 | 60.7<br>1%  | 39 | 76.4<br>7%  | 34 | 100.<br>00% | 123 | 56.6<br>8% | <b>213</b> | <b>64.5</b><br><b>5%</b> |  |
| Licensee                                     | 0  | 0.00<br>%   | 6  | 11.7<br>6%  | 0  | 0.00<br>%   | 11  | 5.07<br>%  | <b>17</b>  | <b>5.15</b><br><b>%</b>  |  |
| Tenant                                       | 11 | 39.2<br>9%  | 6  | 11.7<br>6%  | 0  | 0.00<br>%   | 17  | 7.83<br>%  | <b>34</b>  | <b>10.3</b><br><b>0%</b> |  |
| Co-owner                                     | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 34  | 15.6<br>7% | <b>34</b>  | <b>10.3</b><br><b>0%</b> |  |
| Other  | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 32  | 14.7<br>5% | <b>32</b>  | <b>9.70</b><br><b>%</b>  |  |
| <b>Type of House Owned by Respondent</b>     |    |             |    |             |    |             |     |            |            |                          |  |
| Permanent                                    | 0  | 0.00<br>%   | 6  | 11.7<br>6%  | 0  | 0.00<br>%   | 34  | 15.6<br>7% | <b>40</b>  | <b>12.1</b><br><b>2%</b> |  |
| Semi-Permanent                               | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 17 | 50.0<br>0%  | 22  | 10.1<br>4% | <b>39</b>  | <b>11.8</b><br><b>2%</b> |  |
| Temporary                                    | 28 | 100.<br>00% | 45 | 88.2<br>4%  | 17 | 50.0<br>0%  | 161 | 74.1<br>9% | <b>251</b> | <b>76.0</b><br><b>6%</b> |  |
| <b>Utility Service Owned by Respondent</b>   |    |             |    |             |    |             |     |            |            |                          |  |
| Water (NWSC)                                 | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 6   | 2.76<br>%  | <b>6</b>   | <b>1.82</b><br><b>%</b>  |  |
| Solar Energy                                 | 11 | 39.2<br>9%  | 17 | 33.3<br>3%  | 11 | 32.3<br>5%  | 67  | 30.8<br>8% | <b>106</b> | <b>32.1</b><br><b>2%</b> |  |
| Telephone Lines                              | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 6  | 17.6<br>5%  | 61  | 28.1<br>1% | <b>67</b>  | <b>20.3</b><br><b>0%</b> |  |
| Others                                       | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 6  | 17.6<br>5%  | 11  | 5.07<br>%  | <b>17</b>  | <b>5.15</b><br><b>%</b>  |  |
| None   | 17 | 60.7<br>1%  | 34 | 66.6<br>7%  | 11 | 32.3<br>5%  | 72  | 33.1<br>8% | <b>134</b> | <b>40.6</b><br><b>1%</b> |  |
| <b>Primary Income Source of Respondent</b>   |    |             |    |             |    |             |     |            |            |                          |  |
| Carpentry                                    | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 6   | 2.76<br>%  | <b>6</b>   | <b>1.82</b><br><b>%</b>  |  |
| Farming                                      | 28 | 100.<br>00% | 51 | 100.<br>00% | 34 | 100.<br>00% | 194 | 89.4<br>0% | <b>307</b> | <b>93.0</b><br><b>3%</b> |  |
| Casual Labour                                | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 6   | 2.76<br>%  | <b>6</b>   | <b>1.82</b><br><b>%</b>  |  |
| Trading                                      | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 11  | 5.07<br>%  | <b>11</b>  | <b>3.33</b><br><b>%</b>  |  |
| <b>Secondary Income Source of Respondent</b> |    |             |    |             |    |             |     |            |            |                          |  |
| Brick Making                                 | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 17  | 7.83<br>%  | <b>17</b>  | <b>5.15</b><br><b>%</b>  |  |
| Other  | 0  | 0.00<br>%   | 6  | 11.7<br>6%  | 0  | 0.00<br>%   | 6   | 2.76<br>%  | <b>12</b>  | <b>3.64</b><br><b>%</b>  |  |
| Farming                                      | 0  | 0.00<br>%   | 0  | 0.00<br>%   | 17 | 50.0<br>0%  | 27  | 12.4<br>4% | <b>44</b>  | <b>13.3</b><br><b>3%</b> |  |

|  |           |                |           |                |           |                |            |                |            |              |
|--|-----------|----------------|-----------|----------------|-----------|----------------|------------|----------------|------------|--------------|
| Formal Employment                                | 0         | 0.00 %         | 0         | 0.00 %         | 0         | 0.00 %         | 6          | 2.76 %         | 6          | 1.82 %       |
| Casual Labour                                    | 0         | 0.00 %         | 11        | 21.5 7%        | 11        | 32.3 5%        | 77         | 35.4 8%        | 99         | 30.0 0%      |
| Trading  | 6         | 21.4 3%        | 6         | 11.7 6%        | 0         | 0.00 %         | 28         | 12.9 0%        | 40         | 12.1 2%      |
| Service provision (hotel, mm, salon, transport)  | 6         | 21.4 3%        | 0         | 0.00 %         | 0         | 0.00 %         | 17         | 7.83 %         | 23         | 6.97 %       |
| Student  | 0         | 0.00 %         | 6         | 11.7 6%        | 0         | 0.00 %         | 5          | 2.30 %         | 11         | 3.33 %       |
| None   | 16        | 57.1 4%        | 22        | 43.1 4%        | 6         | 17.6 5%        | 34         | 15.6 7%        | 78         | 23.6 4%      |
| <b>Monthly Income level of Respondent in UGX</b> |           |                |           |                |           |                |            |                |            |              |
| <100,000   | 6         | 21.4 3%        | 11        | 21.5 7%        | 0         | 0.00 %         | 39         | 17.9 7%        | 56         | 16.9 7%      |
| 100,001-300,000                                  | 6         | 21.4 3%        | 34        | 66.6 7%        | 22        | 64.7 1%        | 115        | 53.0 0%        | 177        | 53.6 4%      |
| 300,001-500,000                                  | 10        | 35.7 1%        | 0         | 0.00 %         | 6         | 17.6 5%        | 28         | 12.9 0%        | 44         | 13.3 3%      |
| 500,001-800,000                                  | 6         | 21.4 3%        | 0         | 0.00 %         | 0         | 0.00 %         | 6          | 2.76 %         | 12         | 3.64 %       |
| 800,001-1,500,000                                | 0         | 0.00 %         | 0         | 0.00 %         | 6         | 17.6 5%        | 11         | 5.07 %         | 17         | 5.15 %       |
| 1,500,001-2,000,000                              | 0         | 0.00 %         | 0         | 0.00 %         | 0         | 0.00 %         | 6          | 2.76 %         | 6          | 1.82 %       |
| 2,000,001-3,000,000                              | 0         | 0.00 %         | 0         | 0.00 %         | 0         | 0.00 %         | 6          | 2.76 %         | 6          | 1.82 %       |
| Above 3,000,000                                  | 0         | 0.00 %         | 6         | 11.7 6%        | 0         | 0.00 %         | 6          | 2.76 %         | 12         | 3.64 %       |
| <b>Total</b>                                     | <b>28</b> | <b>100.00%</b> | <b>51</b> | <b>100.00%</b> | <b>34</b> | <b>100.00%</b> | <b>217</b> | <b>100.00%</b> | <b>330</b> | <b>100 %</b> |

Source: Primary data

## 5.2.2 Population

According to the 2014 housing and population census Terego district which was a county in Arua district then had a total population of 204,021 people with 97,663 males and 106,358 females. According to population projections of the Uganda Bureau of Statistics, the non-refugee population of Terego District for 2020 was estimated at 233,300 people (UBOS, 2019). On the other hand, the population of Yumbe district was 484,822 according to the 2014 census. The population of Udupi, Omugo and Uriama sub counties in Terego district and Ariwa Sub County in Yumbe district which are the project host sub counties was disaggregated as presented in the table 5.1 below

Table 5.1: Population of affected sub counties at 2014

| Sub county | Male   | Female | Total  | Average H.H |
|------------|--------|--------|--------|-------------|
| Udupi      | 19,970 | 21,454 | 41,424 | 5.7         |
| Omugo      | 20,547 | 22,932 | 43,479 | 5.5         |

|              |               |               |                |     |
|--------------|---------------|---------------|----------------|-----|
| Uriama       | 11,542        | 11,879        | 23,421         | 5.7 |
| Ariwa        | 12,487        | 11,956        | 24,443         | 7.2 |
| <b>Total</b> | <b>64,546</b> | <b>68,221</b> | <b>132,767</b> |     |

Source: NPHC 2014

The scheme is expected to serve a population of more than 150,579 persons because this has grown over the past eight years after the census due to reproduction an influx of refugees from neighboring countries of Congo and South Sudan.

### 5.2.2.1 Average Household size

Based on the above population table, the project area has an average household size of 5.85 which much higher than the national average household size of 4.7. The relatively large household size implies a relatively large household size in the project area, which is associated with less wealth and high poverty levels according to the 2015 National Household survey reports (UBOS, 2015).

### 5.2.2.2 Age structure

Because Terego district was curved from Arua barely two years ago, the age structure has been taken to be similar to that of its mother district. Arua and Yumbe districts generally had a young population with 59.6% and 68.2% of its population aged 19 and below respectively while the elderly constituted only 3.9% and 3.2 for the same districts.

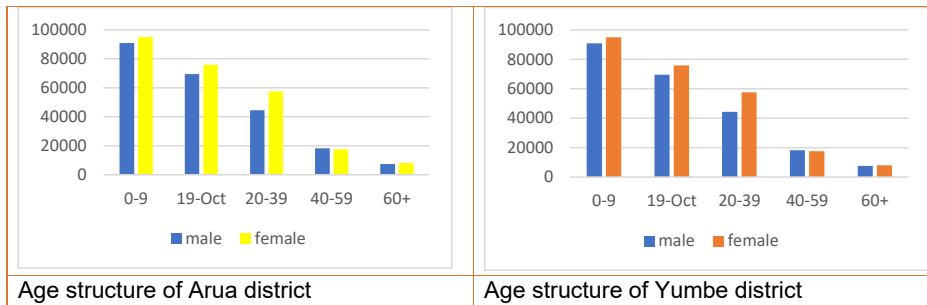


Figure 5.1: Age structure in Arua and Yumbe district

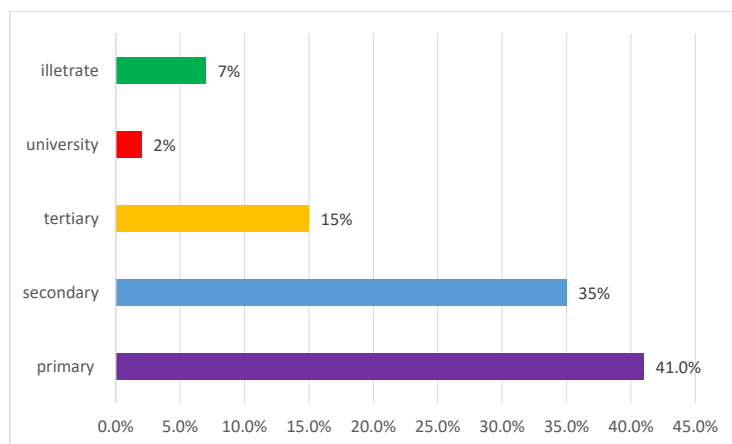
Source: UPHC 2014

The implications of a growing population for sustainable economic development are many. For instance, it requires investment in social services (education and health) as a priority, that is, more schools / class rooms and health units are required to cater for the growing

population. The dependency ratio is high since every working person has a number of people to look after which limits their capacity to save and invest.

### 5.2.2.3 Literacy level

The household survey revealed that majority (40.61%) of the respondents had attained some primary education without completing it and 7% of the respondents did not have any formal education. This indicates that the literacy level is significantly lower than the national level statistics, which stand at 73.2%. These statistics have a bearing on the project in multiple ways for example the low level of education translates into low standards of living, low ability to internalize project information especially when presented in written form.



Source: Primary data

Figure 12 literacy level among PAPs

## 5.2.3 Settlement patterns & housing

### 5.2.3.1 Settlement patterns

The nature of settlements in the project area has been described based on the nature/location in terms of camp or host community. Settlement in the project host community was observed to be very sparse with mild concentration around trading centres such as Opira, Edie, Jue and Widi. The low population in the area has largely influenced its sparse distribution. Observed population concentrations were noted to be influenced by ease of access to socio-economic infrastructure mainly schools, health centres and markets. On the other hand, in settlement camps settlements were seen to be concentrated or clustered. The Imvepi settlement area had settlements 96 organized in zones, blocks within villages that originally existed. Zones were said to be organized on the basis of the origin of refugees for ease of

coping for new comers and in the bid to conserve customs and cultures of different sects within the camp.

### 5.2.3.2 Housing

Based on the household survey conducted, 90% of respondents lived in their own houses, 76% of these were temporary, 12% were semi-permanent and another 12% represented those that were permanent.

As per National Household survey of 2012/2013 Northern region had the highest % of owner-occupied dwellings (over 90%). According to the NPHC, counties that now form Terego district had on average 33.5% temporary dwellings, 62.3% semi-permanent and only 4.2% were permanent.



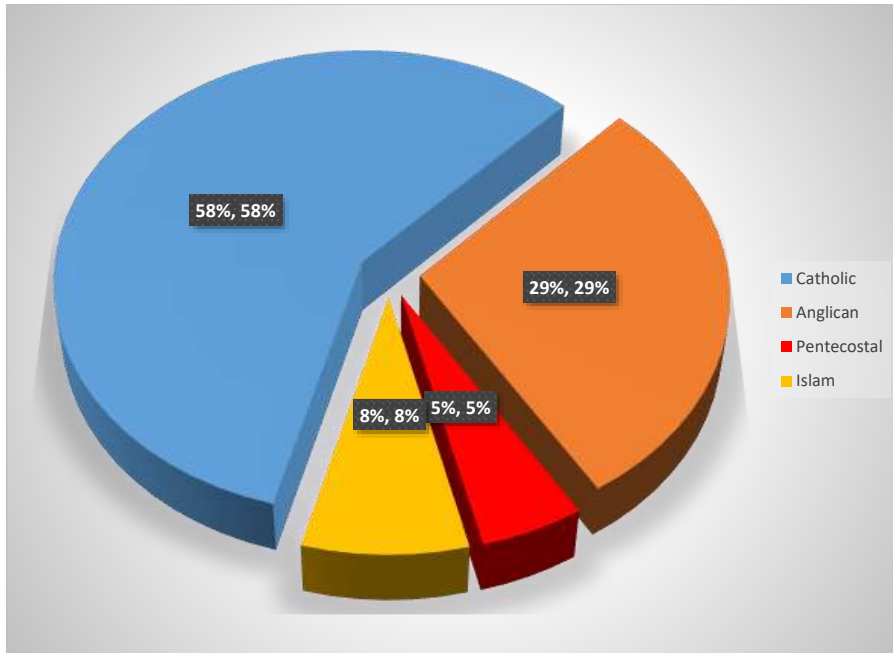
Plate 5.1: Typical home steads in the project area.

Similar to the general district statistics the project area was observed to have mainly temporary structures which are one of the indicators for measuring poverty. In fact, most of the permanent and semi-permanent structures are in trading centres and resettlement camps. Most structures in the refugee host community are temporary. Using the nature of structures as an indicator of welfare, it can be deduced that the general standards of living of people in the project area are low.

### 5.2.4 Ethnicity and religion

Concerning ethnicity, the social economic survey established that people in the project area are mainly Lugbara representing 56%, Kakwa at 34%, Alur at 5% and Acholi at 2%. The remaining proportion constituted other immigrants from neighboring countries.

Religiously the people in the project area were predominantly Catholic and Protestants who constituted 58%, and 29% respectively. Other religious affiliations included the Pentecostal faith and Muslims in different proportions as detailed in the figure below.



**Figure 13: Pie Chart showing Religious Affiliations of PAPs**

Source: Primary data - HHS 2022

According to UBOS 2014, ethnic majority in Terego and Yumbe district are the Lugbara who constitute almost 89% of the total population. Other tribes include Kakwa, Madi and Alur. The fact that the two districts host large numbers of refugees, this has influence the tribal composition and the languages spoken. For example, in areas with settlement camps tribes such as the Lendu were reported. Lingalala and French were noted to be widely spoken among Congolese refugees.

Through FGDs with community leaders, it was established that the affected communities largely subscribe to the catholic faith followed by Protestants and Muslims for Terego district. On the other hand, people in Yumbe mainly comprised of Catholics followed closely by the Muslims. Other religious sects such as the [born-again-born-again](#) Christians and believer in the African tradition were also existent although in negligible proportions.

### 5.2.5 Economic status

Base on the HH survey, the primary economic activity of household heads in the project area is farming which employs 93%, while trading and casual labour represented 3 and 2% each. Other activities such as carpentry, saloon, restaurants and boda-boda contributed to the



remaining 2%. Farming being the main source of livelihood in the project area care should be exercised to ensure that minimal damage is caused to crops during execution of all project activities.

Other economic activities such as brick making, charcoal burning, business, crafts making, animal rearing and casual work also contributed significantly towards income of some households although their contribution is generally lower than that from crop farming.

The proposed Enyau water project will be established on land where the key source of livelihood is subsistence cultivation. In the entire project area, the principle common food crops grown include cassava, sorghum, millet, sweet potatoes and beans. Cassava was reported to be the main crop grown in the project area and it doubled as both a food and cash crop. Maize, sweet potatoes, groundnuts and sorghum also contribute greatly towards household income. The survey ascertained that production is undertaken on subsistence scale using rudimentary tools. However, because the project area is near Imvepi and Bidibidi refugee settlement camps, it was reported that effort into livelihood improvement through embracing modern farming, which is offered to refugees, is slowly but steadily being embraced by community members.

Areas within the four sub counties of Udupi, Omugo Uriama and Odravu were largely for crop farmers. Farming was noted to be on subsistence scale were most of what is produced being consumed at household level. It is also worth noting that farming patterns in Terego involve localized seasonal migration patterns. During community engagements it was noted that most settlements/households around trading centres had gardens a little far from residences which necessitates temporary relocation during the planting, weeding and harvest seasons. As a consequence, some parents leave their homes behind during these periods manned by children who usually indulge in risky behaviour in absence of parental guidance.

The main types of crops produced as food crops include, millet, maize, sorghum, rice, cassava, pigeon peas, sunflower, beans and vegetables. Cash crops mainly include; Cotton, sun flower, rice, sim sim, and soya beans. People expressed frustration about the closure of BATA which had made tobacco a major cash crop in the area for decades. During interaction with community members it was stressed that the closure of the factory rendered the entire West Nile Region economically vulnerable because people have to re-strategize and establish what can work for them as a cash crop at household level.



Plate 5.2: Maize and cassava in the project area



Plate 5.3: Onions, charcoal selling and sorghum cultivation in the project area

Animal keeping was said to be an importance life support activity in the region. Despite being important, it was established during the focused group discussion that only a few households are engaged. In fact, it was noted that owning animals is considered as an indication that one is wealthy and the household head or his male children can easily find suiters because they are believed to have the potential to look after them.

Animals are also important in serving cultural functions such as paying dowry and appeasing ancestors. The interviews revealed that Ox ploughing is vital in crop production for land opening. Communities reported draught as one of the challenges they experience which in most instances leads to decline in animal productivity and occasional loss of animals especially cows. Animals kept mainly include cattle, goats, sheep, pigs and poultry.



Plate 5.4: Cattle and goa grazing in the project area



Plate 5.5: Sheep and duck rearing in the project area

Other important economic activities in the district include; formal employment, retail and whole sale businesses and [small scalesmall-scale](#) cottage industries. Apiary and grain and cassava milling was noted to be an important household income generating activity. Several groups especially for the youth were noted to have selected apiary as their enterprise of choice during the youth livelihood enhancement project and under different funding. The remaining proportion of the population depends on family support and other miscellaneous activities



Plate 5.6: A retail shop within a settlement in Nyaranga

### 5.2.6 Water Sources

The survey revealed that 54% of households in the area use water from boreholes, 29% get water from public piped water stands, 9% from protected wells and the remaining 8% reported getting water from open sources such as rivers and swamps. It was also noted that rain water harvesting is not widely embraced in the area as majority of the households did not have provisions for harvesting and the many were grass thatched which made difficult to harvest.

Concerning distance of households from a nearest water sources, the survey revealed that 64% lived in a distance of less than 1km, 17% lived in a distance of between 1-2km, 14% were 2-3km from their nearest water source, 3% lived in a distance of 3-4km while only 2% of households were located 4km and above from their nearest water source. It should be noted that areas that lied in Yumbe had relatively longer distances to water sources as compared to those in Terego.

The survey further wanted to establish the sort of challenges experienced with the current water sources and sources drying up and long distances emerged as key. Other factors stated by respondents are as represented graphically below.

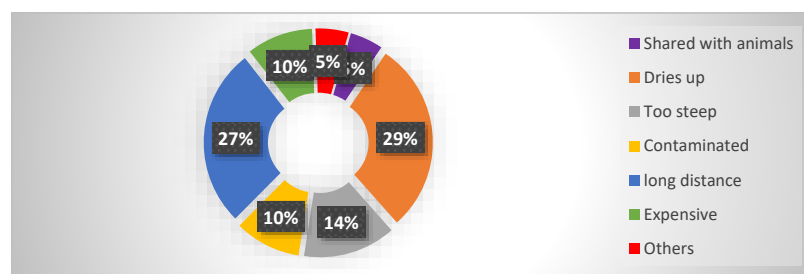


Figure 14: Challenges experienced by households with current water source.

Source: Primary data

According to the national water supply atlas, access to safe water in Terego stands at 64%. The same is estimated to be 49%, 68%, 60% and 82% for Omugo, Udupi, Aria and Uriama sub counties respectively. During the study, majority of households sampled reported boreholes as the main source for project area residents.

It should be noted that access to treated water and distribution of water points is not even throughout the community. All project areas that are within settlement camps are reasonably serviced with either pumped piped water or boreholes in a radius of less than 1.5 km which is the recommended distance. On the other hand, communities outside the camp reported having challenges of limited access to safe water sources with most villages having only one borehole.



Plate 5.7: Imvepi Safe Water Project in Imvepi Settlement Zone 2 provided by UNICEF and Water Mission Uganda



Plate 5.8: A bore hole in Udupi

During community consultation members said very often than not conflicts have ensued at water points between refugees and indigenous people because of long queues and a feeling of entitlement to these water sources by refugees. This occasionally breeds friction between the two communities but the conflicts are resolved at village level.

Despite being near rive Enyau, villages such as Angazi, Dondi and Nyapira use open water sources that are prone to contamination from open human waste dumping due to lack of pit latrines, sharing of the same sources of water with their animals and washing and bathing nearby the water source.

### 5.2.7 Household Income

It was established that more than half of the households' income is below the national per capita income of 879 USD (Approximately 280,000 Uganda shillings per month) according to the third national development plan 2020/2021-2024/2025.

**Table 2: Income of sampled households in the project area**

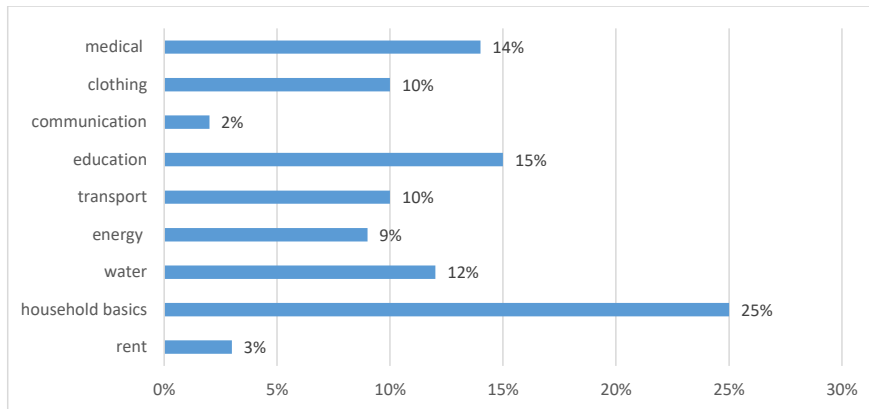
| Income range        | Frequency | Percentage of respondents |
|---------------------|-----------|---------------------------|
| <100,000            | 46        | 17%                       |
| 100,001-300,000     | 143       | 53%                       |
| 300,001-500,000     | 35        | 13%                       |
| 500,001-800,000     | 11        | 4%                        |
| 800,001-1,500,000   | 14        | 5%                        |
| 1,500,001-2,000,000 | 5         | 2%                        |
| 2,000,001-3,000,000 | 5         | 2%                        |
| above 3,000,000     | 11        | 4%                        |
| Total               | 270       | 100                       |

**Source: HHS 2022**

It was also established that many household members are not involved in any income generating activity, which strains the few working household members. Several reasons were given for some household members not working which included; some members were too young to work, lack of employment opportunities, too old or physically incapacitated. Other reasons for not working included sickness and retirement because some respondents were above the Ugandan working age.

### 5.2.8 Main area of expenditure

According to the survey, household basics (food, salt, soap etc.) was the main area of expenditure taking up 25% of all income earned. This was attributed to the fact that part the project traverses refugee settlements where people have limited land to grow crop hence rely on purchased food and the monthly rations from relief agencies. Other areas of expenditure included education, medical and farm inputs. This is graphically represented below.



**Figure 1546 Main areas of expenditure among households**

Source: Primary data – HHS 2022

Analyzing household incomes and expenditures provide a basis upon which project planners make important planning decisions regarding how to integrate the different social/income groups during service provision. This in essence addresses aspects of social inclusion/exclusion fostering harmony and building a sustainable community. It also enables the project team to relate the required services and income status of the residents

### 5.2.9 Sanitation

Sixty-six percent of households had human waste management facilities. Most of these facilities were ordinary pit latrines representing 84% while pit latrines with a concrete slab represented 16%. It was noted that up to 34% of sampled households did not have a human waste management facility and members from such households used the bush. Lack of human waste disposal facilities was considered a threat to water quality given that the source (R. Enyau) is open.

Even with the numerous campaigns for improvement of sanitation at public, institutional and household level, it is still a major challenge. Local leadership engaged during key informant interviews said that sanitation conditions were very different between host communities and communities within the settlement camps. Sanitation in all areas occupied by refugees was reported to be of good status and adequate for the numbers of a zone or block under consideration. In fact, they said refugees were supported at household level to ensure that each has a human waste management facility.

In areas where considerable numbers congregate such as trading centres, public toilets are provided. On the other hand, among the host communities, the situation was said to be bad with an estimated 15-20 percent of households in rural areas lacking basic sanitary facilities.

Even where latrines are in place, their state leaves a lot to be desired and a number of them being a threat to those who use them.



Plate 5.9: A hand washing facility at Nyaranga A



Plate 5.10: A public notice encouraging people to hand wash



Plate 5.11: A typical sanitary facility in Andiku village



On a positive note it was reported that during and after the COVID-19 pandemic, hand washing practices improved and the practice has been upheld mainly at health centres, institutions of learning and some public places. A number of public hand wash facilities were observed around the project area which affirmed the area leaders' statements.

### 5.2.10 Transport

The fact that the district is a new administrative unit, it inherited roads from Arua district. All roads in the district area earth surfaced roads. Status of the roads is fair as most of them were in motorable condition during the time of the ESIA study. The district leadership acknowledged that the presence of Imvepi and Rhino camp refugee camps have contributed significantly to ensuring constant maintenance of the roads so that goods and services are timely delivered to the refugees.



The only mode of transport that exists is road. Road transport mode consists of motor vehicles, motor cycles for the motorized means while bicycles and pedestrians constitute the non-motorized means. All the roads in the project area are marram roads which are become impassable during rainy seasons. During the field study it was noted that there were no regular public taxis serving the district. In fact, residents indicated that movement by public means as by prior booking because the taxis to Arua leave early morning. Socially, absence of regular means indicates that communities within the project area are less mobile either because all required services are within reach or because they are economically constrained hence have resigned to live by what is within their boundaries. Table 5.2 below presents a list of roads that will be crossed by the proposed Enyau WSS.

Table 5.2: List of roads crossed by the proposed Enyau WSS

| Road name            | Type of Road | Coordinates at crossing point |          | Administration at point of crossing |           |          |
|----------------------|--------------|-------------------------------|----------|-------------------------------------|-----------|----------|
|                      |              | Easting                       | Northing | Village                             | Subcounty | District |
| Obongi - Kulikulinga | tertiary     | 315377                        | 361684   | Loli                                | Ariwa     | Yumbe    |
| Obongi - Kulikulinga | secondary    | 319993                        | 360749   | Ombeci                              | Ariwa     | Yumbe    |
| Obongi - Kulikulinga | tertiary     | 316989                        | 363478   | Ombeci                              | Ariwa     | Yumbe    |
| Obongi - Kulikulinga | secondary    | 321671                        | 358489   | Kiranga                             | Ariwa     | Yumbe    |
| Obongi - Kulikulinga | tertiary     | 324374                        | 356576   | Okubani                             | Ariwa     | Yumbe    |
| Odupi-Lugbari-Imvepi | tertiary     | 305510                        | 356156   | Amia                                | Odupi     | Terego   |
| Lugbari-Inde         | tertiary     | 308337                        | 350265   | Ariwa                               | Odupi     | Terego   |
| Lugbari-Inde         | tertiary     | 306919                        | 354966   | Amia                                | Odupi     | Terego   |
| Lugbari-Inde         | tertiary     | 308278                        | 353827   | Amia                                | Odupi     | Terego   |
| Lugbari-Inde         | tertiary     | 308640                        | 352374   | Amia                                | Odupi     | Terego   |
| Lugbari-Imvepi       | tertiary     | 308365                        | 354592   | Ediofe                              | Odupi     | Terego   |
| Lugbari-Imvepi       | tertiary     | 308764                        | 361257   | Yinga                               | Odupi     | Terego   |
| Lugbari-Imvepi       | tertiary     | 311511                        | 361114   | Yinga                               | Odupi     | Terego   |
| Lugbari-Imvepi       | tertiary     | 308912                        | 357355   | Yinga                               | Odupi     | Terego   |
| Lugbari-Imvepi       | tertiary     | 308905                        | 360055   | Yinga                               | Odupi     | Terego   |
| Lugbari-Imvepi       | tertiary     | 309334                        | 357995   | Yinga                               | Odupi     | Terego   |

### 5.2.11 Health

Common illnesses identified during the study included: malaria with 69% of all households surveyed recording having had a case in the last three months. Respiratory tract infections were noted at 7% while diarrhea and worms represented 5% each while HIV was reported by 2% and the remaining two constituted other diseases such as ulcers, skin infections, UTIs and epilepsy. Findings for occurrence of common illnesses tally with national statistics that

indicate that malaria is the most common illness among the population therefore the developer should plan for its management among his workers.

It was noted 71% of households seek medical care from Imvepi H.C.III which is the nearest facility serving both the refugees and the host community. In terms of distance from health facility, it was revealed that only 14% of the sampled households lived in a distance of more than 4km.

Regarding health care, a number of health facilities were recorded in the project area. Notably, Omugo health centre IV was the supreme public facility within Terego district. Other facilities included Udupi H.C III, Imvepi H.C III and II, Etiyo H.C II and Uriama H.C III. It was noted that some of these health centres are as far as 8km from the population they are supposed to service which makes access limited. Because of the above limitation as cited by area resident, the existing public health facility is supplemented by private clinics and drug shops



Plate 5.12: Omugo H.C IV

According to FGDs and K.I conducted with area leadership and resident, of the households obtain medical services from the government health facility, while the rest access medical services from nearby drug shops and private clinics within the centres. Complicated medical cases are referred to Omugo health centre IV and if further attention is required the cases are forwarded to Arua regional referral hospital. Prevalent diseases reported by respondents for having been recorded in the past three months in the project area were malaria (76%), respiratory diseases like cough, asthma and flu cough (44%), and water related diseases (31%), other diseases recoded in the area included Tuberculosis, syphilis HIV and skin infections. The disease burden was mainly among children.

During the interviews and FGDs, there was general concurrence that the health facilities and services offered from there were in appalling situation. Such a situation was qualified by inadequate medicines resulting from infrequent stocks from national medical stores, shortage

of medical workers and long distance to health facilities. It is such perceptions about the conventional health services within the area that lead the communities not using them facilities.

### 5.2.12 Educational Institutions

Educational institutions of different levels were observed to be existent in the project area include Nursery and Kindergarten schools, primary schools, secondary school and vocational training colleges. However, their distribution was uneven. For example, Edife and Amia villages had a total of 10 schools, seven of which were primary, one nursery school, one secondary and one vocational school. Primary schools were more or less well distributed with majority (85%) of households living in a distance of not more than the recommended distance of 5km.



Plate 5.13: Some of the schools recorded within the project area



Plate 5.14: Some of the schools recorded within the project area

Concerning secondary level education, distribution was uneven with students having to move considerable distances to the nearest school. For example, Utambari secondary school, in Utambari Parish has a catchment area of more than 10km. Other nearby schools are Yikuru

secondary, St. Luke secondary school which serves Ndapi and Azapi Parishes and Imvepi Secondary which serves the refugees and neighboring communities. One vocational institute, Siripi was recorded in the project area. Access to secondary and tertiary institutions was lower indicating a gap in availability of such services in the area.

The development of the proposed water system will impact these schools in different ways. Where school property is affected, the process will be catered for under the RAP before construction commences.

West Nile had estimated water coverage in schools at 61% which is relatively lower. Water is an important component of menstrual management. Safe water coverage in school is still low thus presenting a constraint to girls and women of menstrual age to access water for their menstruation. The SNV/IRC report (2012) indicated that on average, 11% of the time a girl pupil will miss learning due to menstrual periods. The study also indicates that 60% of the girl pupils absented themselves from schools during their menstruation according to the study. The project objectives are to improve water supply and sanitation facilities in the project areas and to bring about reduction in water and sanitation related diseases. The sanitation situation in schools is not appropriate, given that only a few schools meet the recommended pupil stance ratio of 40:1. Majority of the schools in West Nile are far above the national average pupil stance ratio of 70:1. Poor hygiene and sanitation facilities in schools are important factors for high school dropout rates for girls at this level and this is reflected in lower enrolment rates for girls/women in post primary schools institutions, tertiary and universities leading to gender inequality in education.

### **5.2.13 Power/ Electricity**

#### **5.2.13.1 Energy for Lighting**

In the project area households mainly rely on rudimentary sources of energy for lighting. The main sources of energy for lighting were hand held candles representing 75% and 25% solar. Use of paraffin contributes to indoor pollution through the smoke and soot that is emitted.

Solar was noted to double as an energy source for small businesses like shops and bars.



Plate 5.15: One of the public solar lighting systems

#### **5.2.13.2 Energy for Cooking**

Firewood is the dominant form of energy used by 96% of all households surveyed. The second commonly used source of energy for cooking is charcoal with 4% of households using it. It should be noted that charcoal was recorded only in rural growth and town centers along the proposed water network. The above consumption trend will subsequently be detrimental to the ecosystem in terms of climate change by way of increased environmental degradation, failure to go to school due to failure of acquiring firewood since it's the main form of energy used, domestic violence brought about increased expenses on wood fuel and registered cases of respiratory illnesses due to utilization of unclean energy.

#### **5.2.14 Physical Cultural Resources (PCR)**

Worship centers, graves and communal burial grounds were the PCR recorded in the project area. Burial grounds are areas where family members remember their departed ones and it is one of the safeguarded identities in the cultural setting of a given ethnicity. Most of these were non-recognizable because they were earth graves and some had been washed away.

Effort will be made to ensure that all burial grounds along the proposed route for the proposed water transmission and distribution pipes will not affect identified burial grounds. However, details what may be affected will be captured during the RAP study and specifics will be detailed in this report. The proposed project largely traverses rural areas which culturally do not have central burial areas hence chances of encountering some burial grounds exist.

#### **5.2.15 Communication**

Terego district had all the mobile telecommunication networks in Uganda are available and can be accessed. However, all networks are intermittent in most areas though the Airtel and MTN networks were fair. Telecommunication network has also facilitated money transfer to finance business transactions through the various mobile money platforms they offer. There are 5 Radio stations in Arua which are also listened to in Terego and these include; Arua One FM 88.7, Voice of Life FM 100.9, Pacis FM 90.9/94.5, Nile FM 94.1 and Access FM 96.3. They have greatly improved listening culture, mass mobilization and entertainment as well as dissemination of policy and development programs that come at the cost. Television and print media accessed in the project area is so limited. Though a variety communication medium were established to be existent in the project area, the project needs to strategies more on radio given the advantage of wider and faster coverage

#### **5.2.16 Poverty**

West Nile has high poverty incidences of 59.1% (UBOS Multidimensional Poverty Index Report 2022) despite having the highest multidimensional differences between the two poverty measures in 2016/17 and 2019/20 (ranging between 34% – 42%), West Nile registered the highest Poverty incidences and intensity.

A number of people categorized as vulnerable were identified to be in the project area and these included people with disability, the elderly, orphans and vulnerable children, widows and widowers, women because of the patriarchy nature of Ugandan societies, the youth, the poor and the landless. Evidently extreme poverty was the principle driver of poverty among the project host community. According to Owor 2020, 50-70% of the population in West Nile region was categorized as poor. Poverty levels are generally higher among women. Consequently, the poverty and livelihood analyses have guided entry points for the district during implementation of project. Similarly, MWE should mainstream issues of marginal groups and devise way of how such groups will benefit from the project.

#### **5.2.17 Land tenure**

Like in many rural Districts of Uganda, land in west Nile, land is mainly communally owned and governed by the customary system of land tenure. Under this tenure arrangement, land ownership is vested in the lineage and is allocated by a father to his sons, who in turn, assign it to their wives and children for cultivation. Women therefore tend to be excluded from owning land, although they are allowed the right of use. While in theory, it sounds as if no single

individual or household owns land under such tenure ship arrangement, in practice; the ownership is actually vested in the users.

In every community, it is clear which portion of land belongs to which household, and usually the head of the household is recognized as the owner. It is also the head of the household (land owner) who has the responsibility to rent or sell out potion of such land in case of need; though this is usually done after consultation with and the consent of the larger members of the lineage is obtained. From the household survey conducted during the ESIA assessment, 66 women out 330 people interviewed along the water transmission line owned land. Figure 5-5 below presents land ownership segregated by gender

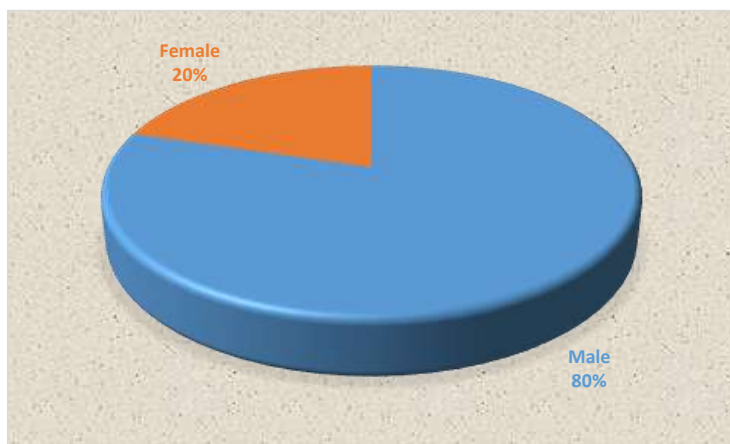


Figure 5-5 : Land ownership along the proposed water transmission line segregated by gender

#### 5.2.18 Gender

The study was keen about profiling roles of women and men in the project area. At a household level, it was established that men are more likely to be responsible for; buying or acquiring assets as compared to women. Women were more involved in domestic activities participating in household chores as compared to men. Though farming was noted as an activity in which all family members participate, marketing of agricultural produce was a women dominated activity.

According to the Water and Sanitation Gender Strategy 2018-2022, women and children are the most affected by lack of sanitation and inadequate safe water supply. They bear the burden of carrying water for long distances at the expense of other economic activities and education in case of the children. It is further stressed in the strategy that 1 in every 3 women risks shame, disease, harassment and attack due to lack of a safe sanitation place. During

the ESIA study it was established that Ariwa sub county was the worst hit in terms of water shortage.

In fact, during a community meeting, one of the elderly females stated that the fertility rate of young women had reduced due to the fact that most women of child bearing age spent a lot of time looking for water. She added that during the long dry spells, women wake up as early as 4a.m to look for water, which not only strains them but also puts them at many more risks including sexual harassment.

They added that this trend did not only affect women but also the girl child given that most roles are divided based on gender and that of water provision is largely placed on the women and girls.

Based on the above analysis, the success and effective use of water and sanitation facilities therefore depends on the involvement of women and men, boys and girls in selecting the location of such facilities, and taking responsibility for management, operation and maintenance.

Although this is the desired scenario, realistically, the selection of the location remains largely a domain of men given that they are the landowners. Women are mainly active in the management and maintenance roles which are equally important because proper siting per say may not guarantee sustainability.

Women lack control over land, the crops their labour produces, livestock and other productive resources, yet they are responsible for meeting family needs. They only have access to the land. However, decisions on what to produce and in what quantity remain the domain of men. Women complain bitterly of men wasting time and family resources on drinking. In West Nile women have more family responsibility than men, for example, being responsible for paying school fees, nurturing children and taking care of all household needs. Surprisingly this was echoed as a culturally acceptable practice where men are treated as kings.

The gender dynamics within the wider community were also investigated through considering activities in which the larger community participates. Sports were mainly defined as a male dominated activity with men and boy's participation standing at 52% and 32% respectively. Both men and women participated in attending community meetings although the percentage of men still outweighed that of women in all meetings held during consultations.

These findings show that men have more control over community resources whereas women are more involved in activities at household level. This means that men have to be consulted widely on where community resources are likely to be affected because they are the decision takers. Other gender-based roles are expounded on included, working outside for income, owning land, livestock and other assets all of which were dominated by men. Interestingly, marketing agricultural produce was said to be an area dominated by women yet men controlled the proceeds from the same sales.



### **5.2.19 Water and sanitation related diseases**

In West Nile, it is estimated that 75% of the overall disease burden derives from inadequate sanitation and hygiene and about 90% of the deaths are directly attributable to inadequate water, poor sanitation and unhygienic practices. In other words, they would be entirely preventable through basic water, sanitation and hygiene interventions. With estimates indicating that only 12% of healthcare facilities have basic sanitation services, the need to provide Water, Sanitation and Hygiene (WASH) services is acute, especially in maternity and primary-care environments. In schools, the lack of proper WASH facilities leads to absenteeism and dropouts of adolescent girls. Of concern is the absence of means for girls to manage menstruation, which deters them from attending classes. Similarly, inadequate sanitation and hygiene facilities in the workplace mean that women are unable to manage menstruation, risking work absenteeism and depriving society of their full participation.

### **5.2.20 Gender Based Violence and Violence against Women**

Compared with a national average of 51%, the 2016 Uganda Demographic and Health Survey showed that 64% of women ages 15–49 in the refugee-hosting West Nile sub-region reported having experienced physical, sexual, or emotional violence perpetrated by their current or most recent spouse or partner. In response to the 2018 National Violence Against Children Survey, one in four girls and one in 10 boys reported having experienced sexual violence. In the most recent survey i.e. National Survey on violence in Uganda: Module 1- Violence against women and girls (UBOS 2021), 30.6% of women in West Nile experience GBV while 55% of women experience physical violence and 56.7% emotional abuse. According to police statistics, since 2014 to 2021, the police in West Nile recorded 5,372 cases of GBV. According to Police, alcohol consumption, unfriendly cultural norms, lack of trust among couples, poverty, land wrangles and widow inheritance fuel violence in homes in the sub-region. According to Child Protection Assessment in Refugee host districts Report (2022), Child labour in West Nile Stands at 18%. The most common types of economic work where children are engaged include farm work, construction, house helpers, brick making, and charcoal burning.

## 6. STAKEHOLDER CONSULTATION AND DISCLOSURE

### 6.1 Introduction

The Stakeholder engagement and consultation process was undertaken as per the requirements of the National Environment (Environmental and Social Impact Assessment) Regulations 2020. Under sub-regulation (1) of regulation (16) of the National Environmental and social Impact Assessment regulations (2020) and best international practice, the project developer is required to undertake relevant stakeholder consultations during the ESIA process as detailed below. The developer shall, in carrying out the consultations under regulation 16;

- (a) Choose the mode of consultation, taking into account the nature and location of the project and the key issues to be consulted on;*
- (b) Give advance notice of the proposed consultation, with a minimum notice of seven days;*
- (c) Hold meetings with relevant stakeholders, communities likely to be affected by the project and the public to explain the project, its likely benefits, likely negative impacts and proposed mitigation measures, and to receive their oral or written views;*
- (d) Where the consultations involve holding meetings, ensure that the venues of and time for the meetings are convenient to the relevant stakeholders, communities likely to be affected by the project and the public; and*
- (e) Ensure that the comments received during consultations are recorded, made publicly available and taken into account during the environmental and social impact study.*

*Source: Extracted from the National Environment (Environmental and Social Assessments) Regulations 2020*

### 6.2 Public participation objectives

Meaningful consultation by communities (especially targeted groups) and stakeholders that are likely to be affected by or benefit from the proposed water scheme will continue to be sought throughout the project life cycle, commencing as early as possible. The objective of such stakeholder consultation was to ensure that communities contribute to the development of management plans and provide feedback on the activities preceding the proposed project. Consultations were conducted in order to solicit broad community support to the project (especially a category A project or one that is highly sensitive to climate and social risks) and to ensure that affected people endorse the proposed mitigation/risk reduction and management measures. Stakeholders' consultation sought to create awareness about the project and obtain their perceived positive and negative social and environmental impacts. Specifically, consultations were undertaken in order to;

- i. Explain the project and create awareness;

- ii. Ensure Compliance with both national regulations and international best practice
- iii. Obtain baseline environmental and social conditions in the proposed project area based on local knowledge;
- iv. Obtain perceived economic, social and environmental benefits so that they can be enhanced during project implementation and operation;
- v. Capture perceived potential negative environmental and social impacts so that they can be mitigated;
- vi. Provide equal opportunity to stakeholders to get involved in project planning;
- vii. Manage Expectations and Concerns: by providing a mechanism for stakeholders to engage with the Project about their concerns and expectations and provide a mechanism for receiving, documenting and addressing comments received;
- viii. Build trust with the stakeholders.

### **6.3 Stakeholder identification**

Identification of stakeholder groups started with investigating groups/agencies that present threats and opportunities associated with the proposed Enyau water project. This was based on some key questions below:

- a) Who will the project benefit/ affect?
- b) Who are key players in development and implementation of the project?
- c) What key resources will be impacted?
- d) Who is most dependent on resources likely to be affected?
- e) Who possesses claims on resources to be affected – including legal jurisdiction and customary use?
- f) Are several government sectors and ministry departments involved?
- g) Which agencies license certain aspects or resources to be affected (forestry, wetlands, wildlife areas)?
- h) Are there major events or trends currently affecting the stakeholders (e.g. development initiatives, migration, population growth)?

The ESIA team particularly targeted officials of the district of, Terego and Yumbe and all the four affected sub counties of Udupi, Omogo, Uriama and Ariwa. A stakeholder engagement plan was prepared to guide the ESIA study clearly identifying stakeholders and their probable interest. These included; directly affected and indirectly affected community members, local leaders, district leadership and Government Agencies.

### **6.4 Stakeholder mobilization**

Consultation of government agencies and district officials were done through formal meetings held with the respective agencies and district leadership. A letter of introduction for this purpose was issued by Ministry of Water and Environment the client. To date the different national agencies consulted included, Ministry of Water and Environment and Uganda Wildlife Authority. Agencies such as Ministry of Gender Labour and Social Development,

National Environment Management Authority, National Forestry Authority, Ministry of Water and Environment and Directorate of Water Resources Development will be consulted in due course. At District level key stakeholders from relevant departments such as that of production, Natural resources and Community development, planning and engineering were mobilized.

At community level, mobilization was through different structures as highlighted below. At the District, the CAO was notified about the intention of the ESIA team to conduct consultations with affected communities. A contact person from the water department was then allocated by the office of the CAO to guide the team and to liaise with leadership of the four sub counties. At the Sub County, the leadership was notified about the project and their views sought.

At village level, identified villages and their representatives were mobilized through L.C I leaders. Local leaders from the identified villages would then select a central meeting place where village members and their leaders convened. Meetings were held with local leaders, representatives of the youth, women, the old and disabled, potential water users, land owners and users among others.

Below is a pictorial view of some of the stakeholder meetings conducted during the ESIA study



Plate 6.1: Entry meeting held with Terego District leadership



Plate 6.2: Meeting with District water officer Yumbe



Plate 6.3: Meeting with Terego District Environment Officer



Plate 6.4: Meeting with water mission Uganda



Plate 6.5: Meeting with Omugo Sub-county Chief



Plate 6.6: Meeting with L.C III and Sub-county chief Udupi



Plate 6.7: Meeting with communities of Siripi and Osira



Plate 6.8: Meeting with communities of Ariwa



Plate 6.9: Meeting with communities of Okuyo and Loli



Plate 6.10: Meeting with communities of Iyivu



Plate 6.11: Meeting with Andiku community members



Plate 6.12: Meeting held with community members of Edioefe village



Plate 6.13: Meeting with Jue community members



Plate 6.14: Meeting with Amia community members



Plate 6.15: Meeting with Dondi and Angazi villages



Plate 6.16 Meeting with village 1, Block 4, Zone 5 (Nyaranga)

## 6.5 Methods of engagement

Stakeholder engagement during the ESIA study involved different methods. These included formal meetings, key informant interviews, focus group discussions and public meetings as illustrated in the Table 6.1 below.

Table 6.1: Summary of stakeholders identified and consulted during the ESIA process

| Activities  | Stakeholder   | Purpose of Information sharing/ disclosure  |
|---|---|---|
| Awareness/sensitization meetings by the ESIA team | PAPs, Land owners, beneficiaries and communities  | General overview of project and implications  |
| Focus groups                                      | Women<br>Youth<br>Elderly<br>Persons with disability<br>Area leaders<br>Other interest groups | General overview of project and implications<br>Disclosure of mitigation measures and grievance mechanism<br>Identification of views and expectations |

| Activities                            | Stakeholder  | Purpose of Information sharing/ disclosure  |
|---------------------------------------|--|---|
| Village meeting / public consultation | All PAPs<br>Indirectly affected people<br>Beneficiaries<br>Communities                     | General project overview<br>Identification of views and expectations<br>Disclosure of mitigation measures<br>Acquisition of information for input into ESIA |
| Formal meetings                       | Government bodies<br>Local government  | Overview of project and implications<br>Disclosure of mitigation measures<br>Acquisition of information for input into ESIA                                 |
| Key informant interviews              | Local government<br>Government officers<br>Local and political leaders<br>Cultural Leaders | Overview of project and implications<br>Baseline data<br>Feedback on the project proposals  |

## 6.6 Stakeholder consultation findings

Findings from the National, district, sub counties and community have been summarized as presented below. Detailed minutes of the ESIA study have been appended to the report.

**Table 6-1: Summary of findings from the meetings**

| Date of engagement | Community/Personnel engaged                     | Issues raised  | Response   |
|--------------------|---|--|--|
| 5/11/2022          | Ayivu Village, Ariwa Subcounty, Yumbe District. | The LCI Chairperson informed us that the area has 560 households with an estimated population of about 1026 people   | Noted  |
|                    |   | Then community informed us about the available water sources that dry up during the dry season, and the boreholes that have been drilled have become unsuccessful because of dry wells. The men lack time for their wives since they spend most of the time fetching water | Ala-Ora Water Supply and Sanitation scheme is intended to solve all this challenge |
|                    |   | A community member suggested that River Nile should be used the water source because River Enyau dries up during the dry season  | Noted.   |
|                    |   | Inquiry was made about whether there will be a   | There will be a fee that shall be paid by the water users, and shall be            |



|           |                              |   |  |
|-----------|------------------------------|---|--|
|           |                              | payment for fetching the water.   | decided on by the water-user committees  |
|           |                              | One of the community members inquired if the project will extend deep into the village settlements  | Yes<br>The distribution lines will be extended to the areas of water demand within the village.                            |
|           |                              | Inquiry was done whether institutions like churches, mosques and schools shall benefit from the project   | Yes, the institutions shall benefit from the project   |
|           |                              | The community expressed their expectations of clean water, good coverage and affordability  | Noted.   |
| 3/11/2022 | CAO's Office, Yumbe District | Ariwa is one of the most water stressed sub counties in Yumbe district.<br><br>The capacity of wells available cannot accommodate the current population. | With the Ala-ora water supply scheme, water coverage will increase in the district.  |
|           |                              | The water from R. Enyau is usually dirty, wont community members be at risk of getting like bilharzia.  | Water will be treated before distribution.   |
|           |                              | Emphasized on the issue of water costs more so during the dry season where a jerrycan of water can go as high as ug.shs 2000                              | Ministry of water and environment will agree on the amount to pay once the project is handed over                          |
|           |                              | He requested information about the project and is interested in the report.   | Noted.   |
|           |                              | He proposed Okubani market as a proposed site for the VIP Latrine   | Noted  |
| 3/11/2022 | LC5 Office, Yumbe District   | Requested for the locals to be given first priority when it comes to labour to reduce on the levels of poverty in Yumbe district.                         | Members of the community who are willing to work be given first priority and at least 70% of the workers should be locals. |

|           |   |  |  |
|-----------|---|--|--|
|           |   | He suggested the sanitary facility should be put at Okuban market so as to much the population more so on market days.   | Noted.   |
|           |   | Safe water coverage is 48% in Yumbe district   | The project was intended to increase the water coverage in the district, especially in water stressed areas.   |
| 3/11/2022 | District Environment Office, Yumbe District | Communities should play a role in contributing to the project through labour more so semi-skilled labour for example excavators.   | Priority will be given to locals who are willing and able to do work that may not be technical.  |
|           |   | People have not been getting clean drinking water and with this project they hope to get safe and clean drinking water so as to reduce cases of diseases like bilharzia which has been common.                             | Purification will be done and the community will be able to receive clean and safe drinking money.   |
|           |   | concern was raised to whether the transmission lines are too thin to affect the community so much  | The issue of compensation has nothing to do with the transmission lines. It will be in the road reserve and in case of any destruction of crops or property they will be compensated together with the tank reservoirs that are not in government land |
|           |   | Yumbe has very many land cases. Land is communally owned and people want to own their own due to scarcity. If a tank falls in communal land of an ethnic clan, and they are not compensated, it would bring disagreements. | Noted.   |
| 3/11/2022 | District Water Office, Yumbe District       | Booster points should be put up to increase on coverage of people at a higher elevation like Rukuyu center.  | This is noted and will be heavily stressed in the report.  |

|           |  |   |  |
|-----------|--|---|--|
|           |  | <p>The project should be able to fit into the other existing water supply systems. Amalgamate all the small systems into one water supply system.</p>   | <p>the ministry shall work with organizations and communities that are maintaining the existing water schemes to ensure a better implementation of the project</p>                         |
|           |  | <p>He pointed out the issue of irrigation and mentioned that it would be important if the project catered for that since community members carry out farming and are always having problems more so during the dry seasons.</p> | <p>The main purpose of the project is to avail clean and safe water for people and hence forth, the issue will be forwarded to ministry of agriculture, animal industry and fisheries.</p> |
|           |  | <p>How long will the project take to commence?</p>  | <p>The EISA studies are already being done but construction is anticipated to start next year</p>  |
|           |  |   |  |
| 4/11/2022 | Subcounty chief, LCIII, CDO Ariwa subcounty Yumbe. | <p>requested sensitization of people along the transmission line and distribution lines to inform the public about the ongoing project</p>  | <p>Noted.</p>  |
|           |  | <p>He informed us about the reduction of the water volumes at River Enyau more so during the dry season which maybe a challenge.</p>  | <p>A catchment protection plan shall be developed and implemented to maintain the volumes of water at all times of the year including dry seasons.</p>                                     |
|           |  | <p>Subcounty expressed its concern on unaffordability to drill boreholes. In addition, the water table is too low to rely on extraction of underground water.</p>   | <p>Ministry of water and environment will agree on the amount to pay that is affordable once the project is handed over</p>  |
|           |  | <p>He suggested the facility should be put at Okubani market because it is the most convenient place</p>  | <p>Noted.</p>  |
|           |  |   |  |
| 7/11/2022 | Office of the prime minister, Arua City.           | <p>Requested ministry of water and environment to work closely with the existing water</p>  | <p>Noted.</p>  |

|           |                                  |  |   |
|-----------|----------------------------------|--|---|
|           |                                  | scheme partners like Mission water Uganda  |   |
|           |                                  | Informed us about the ownership of land which is majorly communally owned and therefore care should be taken during the design and implementation of the RAP of the project. | Compensation will be done for land in which tank reservoirs will be constructed if not in government land.                              |
|           |                                  | Requested that there should be maximum following of the polies and regulations during the project implementation like zero tolerance to sexual exploitation and abuse.       | The workers on the project will be informed and warned against such practices and their consequences.                                   |
|           |                                  | Communities expect to get employment from this project more so for the casual labour   | Priority will be given to the local community and at least 60%of the labour force casual work will be the locals                        |
|           |                                  | Requested ministry of water and environment to take not of the rituals done by community members before the commencement of the project to ensure its success.               | noted, the issue will be presented to ministry of water and environment so that they can put it into considerations                     |
|           |                                  | Informed us about the effects of dry seasons on the volume levels of the rivers  | A catchment protection plan shall be developed and implemented to maintain the volumes of water at all times including the dry seasons. |
|           |                                  | Rhino camp settlement boarders two district of Madi-Okollo and Terego, and therefore faces many challenges of land disputes at these boarders                                | Noted.  |
| 4/11/2022 | Mission Water Uganda, Yumbe Town | Informed us about the available water systems in the refugee camps and they include hand pumped boreholes, solar powered and generator powered boreholes.                    | Noted.  |

|           |                      |  |   |
|-----------|----------------------|--|---|
|           |                      | <p>The biggest water challenge in Ariwa subcounty is in Ombechi village which is far from the existing water supply systems and has a rapidly growing population.</p>  | <p>Ombechi will be one of the beneficiaries of the scheme whose water source is river Enyau.</p>  |
|           |                      | <p>Mission water Uganda informed us that they provide water free of charge</p>   | <p>Noted.</p>   |
|           |                      | <p>They express concern about the reality of the gravitation flow especially in the dry season (February) when the water levels are very low.</p>  | <p>The design team had been monitoring the flow changes of the river at all times of the year and they expect that the water abstraction and supply shall not be so much affected by the dry seasons. The decrease in the water levels shall be manageable.</p> |
|           |                      |  |   |
| 7/11/2022 | RDC, Terego District | <p>Requested ministry of water and environment to show major project sites to the district officials, so that the visit to the sites shall help evaluate the quantity and supply persistence.</p> <p>Identify the sites especially those in the refugee hosting sub counties since investing a lot in refugees is questionable because some day the refugees will go back to their refugees.</p> | <p>Noted.</p>   |
|           |                      | <p>Requested ministry of water and environment to ensure good quality of the pipes used in the project construction.</p>   | <p>Equipment will first be checked by the engineers before construction begins to ensure that they are good quality</p>   |
|           |                      | <p>Informed us to take care during selection of a water fee to be subjected to the users because the project can be abused, vandalized by the</p>  | <p>Ministry will come up with a fee that will be affordable to most of the members in the community.</p>  |

|           |   |   |  |
|-----------|---|---|--|
|           |   | vulnerable if they fail to meet the costs.  |  |
|           |   | She requested to given consultation and scouting in order to spot the most appropriate area for placement of the VIP sanitary facility.   | Noted.   |
| 7/11/2022 | District Natural Resource Office and District Environment Office, Terego District | concern was raised on the water fees which are not affordable by the community members, considering their financial standing  | Ministry of water and environment will come up will an amount which will be affordable to all community members considering their financial status.                                |
|           |   | Requested Ecoserv limited that during the execution of source protection plan, it should be done from a bigger distance upstream to capture all communities upstream that may affect the river  | Ecoserv limited has a competent team of experts including the hydrologist, sociologists, biodiversity experts and GIS experts who shall exhaust the scope of work.                 |
|           |   | Requested for adequate information to the community and leaders about the project   | Leaders will be involved at all stages of the ESIA study and community members are being informed about the project and an inception meeting held for all the government officials |
|           |   | There should be restricted access to water source by the people in the community prevent pollution.   | A source protection assessment will put this into consideration.   |
| 7/11/2022 | Upidi Subcounty Office, Terego District.  | The subcounty leaders requested ministry of water and environment to issue a document informing them about the project.<br><br>They also requested for detailed information about the terms and conditions of the project including compensation of land. | The project information will be expounded more during the inception meeting.   |

|           |   |   |   |
|-----------|---|---|---|
|           |   | There are already existing water schemes and they are hand pumped boreholes though do not cover the existing population hence the project is welcomed.              | Noted.  |
|           |   | Demand for water is higher than the current supply especially through the dry seasons (months of January and February)  | The project was intended to increase water coverage more so the water stressed areas. So, the supply of water will definitely increase with this project. |
| 7/11/2022 | Omugo Subcounty Office, Terego district.          | The water levels for river Enyau are very to supply the growing population especially in the dry season, what happens when it dries up?                             | The project has a component of source protection studies and developing a plan that will seek to maintain the quality and quantity of the river.          |
|           |   | Why doesn't the ministry consider abstracting from R.Nile which is more reliable  | The proposed scheme is gravity flow and Terego District is at a higher Elevation from the R.Nile this will require pumping, hence being very costly       |
|           |   | Required the locals be given jobs during construction since the poverty level in the district is very high.   | Local will be given first priority during project execution.  |
|           |   | Sensitize the workers and community to avoid sexual relations with school going children and people's wives   | Sensitization on issue is being done and will continue to be done through the project life  |
| 5/11/2022 | Okubani Village, Ariwa Subcounty, Yumbe District. | Inquiry was made as to whether other communities like Kitoli, Awinga, Bobo, Bidibid, Biria are likely to part of the scheme since they already have existing tanks. | No they will not be on this particular scheme since they are at a higher elevation.   |
|           |   | Then community informed us about the available water sources that dry up during the dry season, including River Enyau which is the source of the water scheme.      | The flow and quantity of water was monitored by the design team at all times of the year and they expect water to be available at the source at           |

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|  |  |   | all times of the year, including February. A catchment protection plan will be implemented to maintain the hydrological flow of the river  |
|  |  | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
|  |  | One of the community members inquired about the tree species that will be planted to stop the river from drying   | A bio diversity team is already on ground to establish the best species that are supported by the area, and the already available species in the area. This team shall provide the best advice on the most favourable species during catchment protection. |
|  |  | One of the community members inquired if the project will provide water for irrigation  | The scheme is designed to provide clean water for drinking and domestic use. However, Ecoserv Limited shall report to the Ministry about the need for the communities to have water for irrigation.  |
|  |  | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their land       | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground                    |
|  |  | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move                                       | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to   |



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|           |  | long distances to access this water.   | solve all these challenges   |
|           |  | Inquiry was made whether there will be any pumping on the scheme.  | There will be no pumping of the water. The scheme will entirely be gravitational flow  |
|           |  | The community wanted to know if committees will be formed  | Water-user committees shall be formed from the local community to aid in maintenance of the scheme   |
|           |  | Inquiry was made about where the workers will come from.   | The contractor shall come with a number of employees, where as some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders  |
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| 5/11/2022 | Okuyo and Loli, Ariwa Subcounty, Yumbe District. | Inquiry was made about whether there will be a payment for fetching the water.   | There will be a fee that shall be paid by the water users, and shall be decided on by the water-user committees  |
|           |  | The community informed us about how they have so many challenges with water and the boreholes they have are not enough. They were happy to receive the project | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
|           |  | An inquiry was made if there would be compensation on the project  | The project has a component of RAP which will be done to identify the project affected people and compensation done for those affected, like those offering land for the tanks but please note that the project will strictly maintain the road reserve. |
|           |  | The community requested that a VIP latrine should be considered and constructed for the community  | A VIP latrine is already part of the design and the Ministry shall keep engaging the local   |

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|           |  |  | leaders to establish where this can be appropriately established  |
|           |  | Inquiry was made about where the workers will come from, and if the contractor has casual labourers. The community pledged that they have their workers who can do casual work | The contractor shall come with a number of employees, where as some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders |
| 5/11/2022 | Ombeci Village, Ariwa Subcounty, Yumbe District. | The community raised a concern about the recent Ebola outbreak and requested that all workers coming to the area should be checked to prevent the spread of the disease        | Noted.  |
|           |  | Inquiry was made about whether there will be a payment for fetching the water.   | There will be a fee that shall be paid by the water users, and shall be decided on by the water-user committees   |
|           |  | The community informed us about how they have so many challenges with water and the boreholes they have are not enough. They were happy to receive the project                 | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges  |
|           |  | The community requested that a VIP latrine should be considered and constructed for the community  | A VIP latrine is already part of the design and the Ministry shall keep engaging the local leaders to establish where this can be appropriately established                           |
|           |  | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.                     | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
|           |  | Inquiry was made about where the workers will come from, and if the contractor has   | The contractor shall come with a number of employees, where as  |

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|           |   | casual labourers. The community pledged that they have their workers who can do casual work   | some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders  |
| 5/11/2022 | Kiranga Village, Ariwa Subcounty, Yumbe District.       | Inquiry was made as to whether the water will reach the different households  | The water will be distributed into the homes as long as the household can afford and is willing to take in the water. The water shall also be accessed by the community through public taps |
|           |   | The community wanted to know if there will be job opportunities for the locals during project construction.   | Casual labourers shall be employed from the local community on recommendation from the local leaders.   |
|           |   | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges  |
|           |   | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.  | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
|           |   | Inquiry was made whether there will be any pumping on the scheme.   | There will be no pumping of the water. The scheme will entirely be gravitational flow   |
|           |   | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in maintenance of the scheme  |
| 6/11/2022 | Ajusia Budre Village, Udupi Subcounty, Terego District. | The community welcomed the project to the community and pledges to work with the  | Noted   |

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|  |  | Ministry to make sure the project is a successful one   |   |
|  |  | The community raised concern that the only available water source is a public tap at the church and cannot sustain the entire population. Most people in Ajusia Budre village have to walk long distances of about 2 Miles to get water                       | Ala-Ora Water Supply and Sanitation scheme is intended to solve the challenge of water shortage   |
|  |  | A community member raised a concern that the only available water is for pay and four jerrycans cost Ugshs 100, which is a lot. An inquiry was raised if this water will be paid for.   | The payment that shall be made will be affordable and it is only meant for operation and maintenance of the water scheme, for the benefit of the entire community. The water fee to be paid shall be set by the Water User committees |
|  |  | The community expressed about the existing water scheme. They have put a lot of time, and walked long distances to obtain it and they find the water has been cut off from the water stations. This causes conflicts and they hope this will not be the case. | Noted. The Ministry will ensure that the Operation and Maintenance team communicates to the public in case there is a breakdown, or there are maintenance works that will be done at the scheme                                       |
|  |  | The community wanted to know where the transmission and distribution lines will pass  | The transmission lines will be constructed along the road reserves and the transmission lines will branch off to the different water users. The pipes will be moving under the ground surface   |
|  |  | A community member raised concern about the fees of connecting water to their homesteads. They reported that Northern Umbrella charges them Ugshs 150,000 which is a lot of money that they cannot afford. They suggested that the connection                 | Noted. The Ministry will discuss with the Northern Umbrella team and raise the concerns of water connection fees from the community   |

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|           |  | fees should be reduced or they leave them to suffer  |   |
|           |  | The community wanted to know if committees will be formed  | Water-user committees shall be formed from the local community to aid in maintenance of the scheme  |
| 6/11/2022 | Ariwa Village, Udupi Subcounty, Terego District. | The community welcomed the project to the community and pledges to work with the Ministry to make sure the project is a successful one   | Noted   |
|           |  | A community member suggested that sensitization should be made to let the community be aware of what is going to take place in the area during project implementation.   | Noted. The Ministry shall hold continuous engagements with the local leaders and the community to update them about the progress of the project.  |
|           |  | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their land. The requested that sensitization on land issues should be made to make people comfortable | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground. The locals shall first be consulted before excavation is done on their land. |
|           |  | Inquiry was made about where the workers will come from, and if the workers carrying out casual works such as excavation shall be paid. They requested that labourers should be from the community for ownership purposes.                       | The contractor shall come with a number of employees, where as some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.   |

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|           |   | <p>A member raised concern about the security of the construction material during and after construction.</p>   | <p>The community is encouraged to ensure that scheme materials are safe and security is a responsibility for everyone in the community. However, structures such as reservoir tanks shall have a fencing to prevent unauthorized access</p>                               |
|           |   | <p>An elder in the community advised that a traditional ritual should be carried out to sustain the success of the project, and informed us that this ritual has been a norm for any new project in the community</p> | <p>Noted. The Ministry and World bank shall be informed about the traditional rituals so that they are considered before project execution.</p>   |
|           |   | <p>The community wanted to know if committees will be formed</p>  | <p>Water-user committees shall be formed from the local community to aid in maintenance of the scheme</p>   |
| 6/11/2022 | Ngulungulu Village, Udipi Subcounty, Terego District. | <p>The community wanted to know where the transmission and distribution lines shall be passing</p>  | <p>The transmission lines shall be passing along the road reserves and shall be passing under the ground surface. The distribution lines shall be adjusted according to the area that is receiving the water, but care shall be taken not to damage people's property</p> |
|           |   | <p>Inquiry was made about where the workers will come from, and if the community shall be employed during construction of the scheme.</p>   | <p>The contractor shall come with a number of employees, where as some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as</p>  |

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|           |  |   | excavation shall be paid for.   |
|           |  | A community member inquired how much it would cost them to bring the water into their homesteads  | The project, after construction, shall be handed over to Northern Umbrella Rural Water Supply, an organization that shall be responsible for operation and maintenance, plus extending the water to different households. These shall determine the criteria and cost it will take to install the water |
|           |  | Inquiry was made whether there will be any pumping on the scheme such as generator or solar.  | There will be no pumping of the water. The scheme will entirely be gravitational flow   |
|           |  | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their fields | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground   |
| 6/11/2022 | Payiofe Village, Udupi Subcounty, Terego District. | The community welcomed the project to the community and pledges to work with the Ministry to make sure the project is a successful one                  | Noted   |
|           |  | A community member inquired how much it would cost them to bring the water into their homesteads  | The project, after construction, shall be handed over to Northern Umbrella Rural Water Supply, an organization that shall be responsible for operation and maintenance, plus extending the water to different households. These shall determine   |

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|  |  |   | the criteria and cost it will take to install the water   |
|  |  | The community wanted to know where the transmission and distribution lines will pass  | The transmission lines will be constructed along the road reserves and the transmission lines will branch off to the different water users. The pipes will be moving under the ground surface   |
|  |  | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges  |
|  |  | A community member wanted to know how the maintenance will be carried out in case there is damage on a pipe during cultivation by the locals                | The contractor shall excavate and put the pipes at a depth that cannot easily be tampered with by the land activities. Nevertheless, maintenance shall be done by Northern Umbrella Rural Water supply in case of such damages          |
|  |  | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their fields     | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground |
|  |  | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.  | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
|  |  | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in  |



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|           |  |  | maintenance of the scheme   |
|           |  | Inquiry was made about where the workers will come from, and if the workers carrying out casual works such as excavation shall be paid.  | The contractor shall come with a number of employees, where as some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.   |
|           |  | Inquiry was made whether there will be any pumping on the scheme such as generator or solar.   | There will be no pumping of the water. The scheme will entirely be gravitational flow   |
|           |  | An elder in the community advised that a traditional ritual should be carried out to sustain the success of the project, and informed us that this ritual has been a norm for any new project in the community | Noted. The Ministry and World bank shall be informed about the traditional rituals so that they are considered before project execution.  |
| 6/11/2022 | Siripi and Ocea (Osia) Villages, Udipi Subcounty, Terego District. | A community member inquired how much it would cost them to bring the water into their homesteads   | The project, after construction, shall be handed over to Northern Umbrella Rural Water Supply, an organization that shall be responsible for operation and maintenance, plus extending the water to different households. These shall determine the criteria and cost it will take to install the water |
|           |  | A community member expressed concern about why the water is for payment, yet the Office of the Prime Minister asked the locals to give land for refugee settlement, and in return, they                        | The payment that shall be made shall be affordable and it is only meant for operation and maintenance of the water scheme, for the benefit of the entire community  |

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|  |  | are provided with social services.  |   |
|  |  | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges  |
|  |  | A community member wanted to know how the maintenance will be carried out in case there is damage on a pipe during cultivation by the locals                | The contractor shall excavate and put the pipes at a depth that cannot easily be tampered with by the land activities. Nevertheless, maintenance shall be done by Northern Umbrella Rural Water supply in case of such damages          |
|  |  | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their fields     | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground |
|  |  | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.  | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
|  |  | The community wanted to know if the existing schemes will be merged into this one scheme  | The ministry shall engage with the stakeholders of the existing water schemes, especially the NGOs such as Mission Water Uganda, so that the newly established project shall fit within the already existing schemes                    |

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|  |  | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in maintenance of the scheme   |
|  |  | Inquiry was made about where the workers will come from, and if the workers carrying out casual works such as excavation shall be paid.   | The contractor shall come with a number of employees, where as some workers such as casual labourers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.              |
|  |  | One of the community members inquired if the project will provide water for small scale irrigation  | The scheme is designed to provide clean water for drinking and domestic use. However, Ecoserv Limited shall report to the Ministry about the need for the communities to have water for irrigation.  |
|  |  | Inquiry was made whether there will be any pumping on the scheme such as generator or solar.  | There will be no pumping of the water. The scheme will entirely be gravitational flow  |
|  |  | An elder in the community advised that a traditional ritual should be carried out to sustain the success of the project, and informed us that this ritual has been a norm for any new project in the community                      | Noted. The Ministry and World bank shall be informed about the traditional rituals so that they are considered before project execution.   |
|  |  | The community informed us that dry seasons are so hot in the area, that even River Enyau sometimes dries up during the dry season (especially February) and they were worried that the project shall be helpless during dry seasons | The flow and quantity of water was monitored by the design team at all times of the year and they expect water to be available at the source at all times of the year, including February. Moreso, a catchment protection plan will be implemented to maintain |

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|           |   |  | the hydrological flow of the river   |
| 7/11/2022 | Andiku Village, Azapi Parish, Udupi Subcounty, Terego District. | An inquiry was made on where the water will be extracted from  | The water will be drawn from River. Enyau  |
|           |   | The community also needed to know if money will be collected or if the services are free   | The services are not free there will be a fee collected and this is to be used for the maintenance of pipes and taps   |
|           |   | The community expressed the need to be offered money in case the project affects their houses  | There is no compensation because the project design tries to avoid community structures but in case, they are affected they will be valued and compensated   |
|           |   | An inquiry was made on whether animals too will benefit from the project   | Yes, they will benefit   |
| 4/11/2022 | Dondi and Aganzi villages, Udupi Subcounty, Terego District.    | The community wanted to know if the landowners will be compensated and whether the water point is going to be for the people or the government | Another team will come and measure the exact points and one thing is they don't compensate land they just request you to let them bury the pipe in your land so the services can be extended to people, but all this will be explained in detail then the abstraction point will be in the river |
|           |   | An inquiry was made on what the intention behind the project was because the government has failed to inform chairpersons about it             | Apologies, but there are studies undertaken known as feasibility studies to see whether the project can be undertaken in the area so different aspects are looked at, once the spot they want can sustain the project, a go ahead is   |

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|  |  |   | given but from now on we shall be moving with shared information.   |
|  |  | The community wanted to know if there is any document that was issued to the sub-counties on where the project is passing since it started  | The team first met the district leaders (CAO, CDO, LCV) and others so they know of our presence in the area. Next time we shall move with the documents but the leaders are in the know.  |
|  |  | The community raised an issue about them knowing what they need for example would the government offer things like chairs to people   | No, because this is M.W.E and its mandate is among those areas.   |
|  |  | An inquiry was made on whether labourers will be brought from other regions as they did during the drilling   | Experts like engineers will be brought from other regions while this other casual work will be offered to the community people but, not all of them will be employed. Your leaders should be vigilant and ask for the offer from the contactors |
|  |  | An inquiry was made by the community members about where the materials that will be used to implement will be stored  | Once everything is finished, the contractor will find a place to stock the materials that will be needed for implementation   |
|  |  | The community expressed the need to know the distance to the water points given the fact that the spots that were identified were having two villages and the water to be purified will quite far | This is a gravity water flow scheme, it follows a certain flow or slope once it arrives, eventually, distribution will surely happen  |
|  |  | The community wanted to know where else such projects have been implemented   | In hundreds of districts because the government has embraced this approach to provide water, especially in small rural towns. So, they all operate similarly and this will not be any different   |

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|           |  | They also wanted to know how many teams will be moving around the villages  | They are many but for now, we have the bio-diversity team, social team, physical team, and surveyors.  |
|           |  | The community stressed the need to know if they will pay for the water or if it will be distributed for free  | Yes, there will be bills but not like the national bills, they will be affordable  |
|           |  | The community asked in case the line lands on one's house or garden with plants, how will that be solved  | It can be compensated but they try to avoid affecting houses and gardens but those will be explained in detail in the next meetings  |
|           |  | The community wanted to know if the water they are purifying from the main point will be for only drinking or irrigation purpose too  | This water is for domestic use but if one requests and applies for a tap for their garden, they will be responsible for the bills something that will not be sustainable in the long run.  |
| 6/11/2022 | Edioffe Village, Udipi Subcounty, Terego District. | The community expressed the need to know whether the government will pay for the land they are using since they are also paying for the water   | No, the government is not paying for any land they are simply requesting you to offer a small portion of your land so that services are extended to the community.   |
|           |  | They also needed to know what the money collected will be used for  | The money collected is used for maintaining the pipes and taps.  |
|           |  | Concern was expressed on whether the community members who are living at further places from the water points will be able to request for these taps in their compounds and would NWSC allow? | This is a rural scheme providing water to people in centres as planned by M.W.E but, once the project is handed over to National Water and Sewerage Cooperation (NWSC) one can apply for a tap and they will be given one which will be quite expensive compared to the water points provided by the |

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|           |   |   | Ministry and in the long run will not be sustainable.  |
|           |   | An Inquiry was made on the mode of payment if it will be per jerrycan or monthly or a number of jerrycans at a certain amount | This will be done per jerrycan that is to say whenever you go to fetch water, you pay for what you have collected.   |
|           |   | Community members asked if there will be compensation for land used   | No, there is no compensation for the land used in this project.  |
|           |   | Concern was raised on where the labourers shall come from   | Some of the labourers will be brought by the contractor for example the engineers who will come from different regions and some will be picked from the community for the work they can do. Not all of you will be given the opportunity but some and I urge the community leaders to talk to the contractors to offer their people jobs as soon as they see them on ground. |
| 7/11/2022 | Etiyo village, Ndapi parish, Omugo Subcounty, Terego district | The community wanted to know how the dirty water will be brought to the people  | The water will be treated from what we call a treatment plant which will be established and will flow by gravity naturally   |
|           |   | An inquiry was made on whether the water will be free of charge   | No a small fee will be paid which will be used for maintenance of taps and pipes.  |
|           |   | The community also wanted to know if the households that are far away from the centers will be given water                    | Water is going to mainly be taken to centers and later it could be moved to households   |
|           |   | An inquiry was made on when the project will begin  | The project has already began given the fact that we are conducting an ESIA and getting your views about the project so it will be very soon   |

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|           |  | The community members wanted to know how the materials will be shifted from one place to another during implementation                          | The contractor will use the labour force from the community  |
|           |  | An inquiry was made on whether it will be the government to employ the security personnel to guard the tanks                                    | With the help of the local leaders, an individual will be selected for security purposes   |
| 6/11/2022 | Jue Village, Udupi Subcounty, Terego District. | The community raised a concern about the tank and whether it will be able to supply all these areas since the village is large                  | Yes the tank will be able to supply water to the whole village   |
|           |  | The community expressed the need to know if every home will be provided with a pipe since the main source is in Yinga and the population is big | No, pipes will not be distributed to every household but taps or water source points will be placed in centres where each and everyone will be able to reach in order to get clean safe water                              |
|           |  | The community wanted to know how much the water will cost   | We are not certain because this can only be told to you by N.W.S.C but not to worry because it will be affordable to each and everyone   |
|           |  | Community members also needed to know who would operate the repair taps and pipes once they are damaged given the fact that they are illiterate | This project will be handed over to NWSC and they will be in charge once implementation is done.   |
|           |  | The community raised concerns about compensation being a problem with many projects and how this will be solved                                 | The government is not compensating anyone but rather requesting you offer them a small portion where the pipe can be laid so that the whole community gets clean safe water. These pipes will not interrupt Garden work in |



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|           |   |   | any way so you will continue using your land.   |
|           |   | The community asked if the water will be free or paid for.  | The water will not be free, there will be a small amount charged  |
| 7/11/2022 | Obiya Village, Omugo Subcounty, Terego District.    | The community made a concern about this being the 3 <sup>rd</sup> company for the same project and they commented that the project will be a good one because they are heading towards the dry season and they only have one borehole which is broken leaving River Enyau the only source of water and it has dirty water | Noted   |
|           |   | The community stressed the issue of when the project will commence because there are over 2000 people in the village in need of this water  | The project already commenced and different groups have been coming to collect different data from the different villages we are here to conduct an ESIA which will be handed over to NEMA and construction will begin. |
|           |   | The community asked whether their destroyed property during implementation will be valued and paid for  | No, there is no compensation but allow the government to use your land to extend services to you.   |
|           |   | An inquiry was made by the community members on whether local people will be considered to do casual work   | Yes, a few will be employed by the contractor so we urge your leaders to ask the contractor to employ their community members once seen on ground so as to have an opportunity.   |
| 6/11/2022 | Nyaranga Village, Udipi Subcounty, Terego District. | The community expressed the need to know whether it was opira or Azapi parish residents benefiting from the project   | It is not only opira benefiting from this project but water will be extracted from River Enyau to tanks and the   |

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|  |  |   | whole village will be able to access clean water.  |
|  |  | The community people reported that a group of people went to the village without informing the local leaders, concerns were raised by the local people and the work was put on hold | The people that came were conducting a feasibility study and they were able to draft a design on how the water will flow.  |
|  |  | An Inquiry was made on whether the incomplete borehole in their area was part of the project  | No, it's not.  |
|  |  | During the community meeting, they wanted to know if the relevant authorities are aware of these meetings going on in villages  | Yes, they are aware that we are here.  |
|  |  | The community stated the need to have a security guard where the tanks will be installed  | Of course, there will be a guard who will be got from the community.   |
|  |  | The community wanted to know if residents will be given work to do in case the project commences  | The engineers (experts) will come from other regions and once the contractor comes, approach the foremen and ask for work. The chairman should take the initiative to ask the contractor to give his community members work although not all community members will get work but, a few will be given the opportunity. |
|  |  | The community emphasized the need to know how the water from River Enyau will be made safe for drinking   | The water will first be taken to the treatment plant and put in the reservoir tank and from the tank to the taps making it readily available and safe.   |
|  |  | They expressed the need to know where the Ecoserv offices are located   | Ecoserv Ltd offices are found in Kololo, Kampala.  |
|  |  | The community wanted to know about the funding and  | Ministry of Water and Environment has  |

|           |   |   |  |
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|           |   | gave examples where projects like this are left incomplete because of funds, and make people work and later disappear off ground without paying those they employed | secured funds with the world bank so such incidents will not happen.   |
|           |   | An Inquiry was made on whether people will be made to pay for the water   | Yes, water will be paid for but it will be a small amount the community can afford because this money is to be used to maintain the water pipes and taps.  |
| 4/11/2022 | Opiraa Village, Udipi Subcounty, Terego District. | The community wanted to know if the landowners will be compensated  | Another team will come and measure the exact points and one thing is they don't compensate land they just request you to let them bury the pipe in your land so the services can be extended to people, but all this will be explained in detail then the abstraction point will be in the river |
|           |   | The community wanted to know if the local labour will be required   | Yes, for mainly casual work but not everyone will be employed the contractor will pick a few and your leaders should be able to help request for the vacancies   |
|           |   | The community stressed a concern about them suffering and not having water  | Noted, and this is an issue which will be conveyed to the ministry.  |
|           |   | An inquiry was made on whether the pipes will cross Azapi parish because the road does not connect so how would they connect to that side                           | Yes, azapi is one of the beneficiaries   |
|           |   | The community wanted to know if the water extracted will be returned  | Yes, they will return the water through the tanks placed at different points   |

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|           |   | The community also asked if there would be charges for this water   | Yes, there will be charges but it will be a small manageable fee  |
|           |   | An inquiry was made on how long it would take for the project to commence   | This will depend on the document that we have to prepare and hand over to NEMA.   |
|           |   | The community wanted to know if we had contacted the district for easy follow up in case the project is not implemented | Yes, we met the district leaders and they know we are here  |
|           |   | An inquiry was made on whether a bridge would be constructed on the river   | No, they are just inserting a pipe in the water so that it can be treated and bridges are under Ministry of works and UNRA  |
|           |   | The community wanted to know what level of education would be required for the casual work                              | Once the contractor comes, they will let locals know what kind of work is available and can be done by the community members  |
|           |   | An inquiry was made on what the team that came earlier had taken away after drilling and why                            | A team came to conduct a feasibility study so that they can know if the area is suitable for the project and the soil samples that were taken were tested to confirm whether the areas where that tanks are can facilitate their capacity |
|           |   |   |   |
| 5/11/2022 | Village 1, zone 4, block 5 jakisa village in Imvepi settlement, Udupi Subcounty, Terego District. | An inquiry was made by the community members on whether jerrycans will also be provided                                 | No, but it will be reported to M.W.E, if they can be in a position to then they will  |
|           |   | The community wanted to know if the available spoilt taps will be repaired to produce water                             | Those taps are not on this project and probably on a different line so they will not be repaired.   |
|           |   | The community expressed the need to know if the contractor would bring their own  | For the experts, they will have to be brought from other regions but for works that they can do,  |

|           |  |   |   |
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|           |  | technicians or they will work will the local community  | they will be given but also the chairman should demand for his people jobs once the contractors are on ground.  |
|           |  | They also wanted to know if the project is being implemented for them or the other settlements because they are already having water issues | This water is coming from River Enyau so it's up to Yumbe district, all in all it's a big project.  |
|           |  | The community also wanted to know when the project or work will commence  | Once this study we are carrying out is completed, the report will be submitted to NEMA and when approved the works will begin.  |
|           |  | An Inquiry was made on whether the water being extracted from River Enyau will be treated since it's dirty                                  | We are establishing a treatment plant here and it will be treated before being transferred to the reservoir tanks.  |
| 5/11/2022 | Villages 2,3,4 (AMIA), Udupi Subcounty, Terego District. | The community wanted to know how much the water will cost   | We cannot dictate that for now but once the project is implemented and handed over to NWSC they will be able to inform the community but it will be a fair price.   |
|           |  | An inquiry was made on where the labourers will be got from for the project   | The experts like the engineers will be brought by the contractor while casual work will be given to some of the community people and this will be through your leaders who will have to request jobs from the contractor for their people |
|           |  | An inquiry was made on whether the district leaders know about our being in the village for these meetings and about the project            | Yes the district leaders are aware of our being here and clearly know about the project   |

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|-----------|--|---|--|
|           |  | <p>The community was concerned about how the contractor will deal with damages they will cause to properties</p>  | <p>There will be no compensation because the design focuses on the road and not people's properties but just in case it does, the property will be valued and paid for.</p>  |
|           |  | <p>An inquiry was made on who will be in charge of collecting these funds</p>   | <p>NWSC will communicate about this once the project is completely implemented and handed over to them for operations</p>  |
|           |  | <p>The community wanted to know where exactly the pipes will pass</p>   | <p>That will be known in our next meeting because the surveyor will come and show us where exactly these pipes are passing so that we are in the know.</p>   |
| 5/11/2022 | Villages 5 and 8 (Nyaranga), Udupi Subcounty, Terego District. | <p>Concern was expressed as to whether the whole settlement would be served by the proposed project because some zones are far from the proposed location of tank.</p>  | <p>The distribution network will be clearly laid out at later stages. At the moment we are making assessments for the main infrastructure which are tanks and transmission and a few distribution pipes. The intention is to improve access to safe water for areas with high population concentrations.</p> |
|           |  | <p>Inquiry was made as to whether refugees, would be considered for employment during the construction stage. They stressed that they needed to be considered so as to earn some money and wanted to know whether multiple opportunities would be availed for the youth as this</p> | <p>Priority shall be given to local people for work that may not be technical. It was stressed though that the opportunities might be limited in number so not everyone will be taken on.<br/>This is a world bank funded project and one of the requirements during</p>                                     |

|  |  |   |  |
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|  |  | would reduce on idle time and crimes in the area.<br>The community also mentioned that sometimes youths are engaged and never paid for services they offer.   | implementation is adherence to national and international best practice labour laws. Whoever works shall be paid.  |
|  |  | The community wanted to know how long the project would take before commencement.<br>Area leaders stressed that project timelines should be followed to limit pressure likely to be exerted on them by the local community.   | The ESIA study is one of the processes that precede such works. The project will start after a certificate is obtained. However, we cannot determine with certainty because our assignment ends at delivering the ESIA report. |
|  |  | Community members said that the hilly topography of the area made it difficult for some people to easily access water. A request was made to put taps in strategic places to ease access for the disabled, old, young and pregnant women  | Easing access to clean water is the main objective of the project. This is capture and will be one of our recommendations in the report.   |
|  |  | It was reported that some of the available water sources dry up during the long dry spell which leaves both humans and animals in dare need.  | Noted  |
|  |  | During the community meeting, high cases of theft were reported hence the need to put up a strong security system and guards.   | This is noted and will be stressed in the report.  |
|  |  | They stated that the Chlorine concentration in the water they currently use was making them sick. Fear was expressed about this scheme having similar problems. They wanted to know whether there was any other chemical that could be used for water purification other than chlorine. | Water purification will be done using the right doses because qualified people will be employed.   |

|           |   |   |   |
|-----------|---|---|---|
|           |   | Community members stated that people (women) end up picking up quarrels at water collection points because of competition caused by limited number of sources.      | Once the project is implemented it will improve on availability of clean water and the stand points are expected to ease access.  |
|           |   | It was indicated that these are crop farming communities hence requested that excavation works be undertaken during the dry season after crops have been harvested. | Noted and will be one of the recommendations in the ESIA report.  |
|           |   | Inquiry was made as to whether the water from the proposed project could be used for other purposes such as irrigation and fish ponds.                              | The project is intended to avail clean water for humans. The activities you are suggesting are agricultural related and its Ministry of Agriculture Animal Industry and Fisheries mandated to provide water for production. |
|           |   | Community member wanted to know the mode of payment for water under this project.   | It will be proportional to the volume one uses and it's likely to be per jerry can. However details of this will be shared by the ministry as the project advances.   |
|           |   | They expressed the need to have a representative from the refugee settlement on the GRC so that their complaints are tabled before the responsible.                 | This is noted as key because the project traverses refugee settlements. It will be recommended.   |
| 7/11/2022 | Widi Village, Omugo Subcounty, Terego District. | The community wanted to know how long the project will take to be implemented   | Even if construction hasn't begun, these assessments we are carrying out show that it has started, however, it's a government project and they have processes so we cannot determine the construction period                |
|           |   | The community raised concern about the village  | Noted and we shall let the ministry know  |



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|-----------|--|--|--|
|           |  | being so happy with this project and has always waited for it<br>They have no safe water and go distances to collect it                                    |  |
|           |  | An inquiry was made on whether they will be paying for the water before use  | Yes, there will be a small charge that will be used to maintain the pipes and taps.  |
|           |  | The community also asked if the officials are aware of the project   | Yes, they are aware we are here and know about the project   |
|           |  | The community members informed us about the different water systems they know of and asked which type of water is going to be constructed in their village | This is a gravity flow scheme it will flow naturally with no need for pumping  |
|           |  | The community expressed the need to know if their people will be given jobs during the project   | Experts like the engineers, hydrologist will be brought from other regions and for the labour, it will be given. Your leaders must task the contractors so as to get you employment.                                   |
|           |  | An inquiry was made on whether the bio-diversity team will take the fish away from the river or not  | The team will not take away the fish they just need to find out which species are in the river and if the project will affect its survival.  |
|           |  |  |  |
| 6/11/2022 | Yinga (point J) Village, Udupi Subcounty, Terego District. | An inquiry was made on whether the water will be free of charge or paid for  | The water will not be free of charge a small fee will be asked for which will be used for the maintenance of taps and pipes  |
|           |  | The community wanted to know if their people will be given casual work to do so as to keep them busy   | Yes, employment will be offered to some of the community members and the experts such as the water engineers will be brought by the contractor from other regions. Your leaders should request the contractor to offer |

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|--|--|--|--|
|  |  |  | community members the casual jobs.   |
|  |  | The community also asked about when the project will commence and end  | This cannot be figured out at the moment but the project has already started and that is why we are here conducting different studies                    |
|  |  | The community wanted to know where exactly the pipes will be placed  | The surveyor will be coming soon to show the community where these exactly these pipes will be placed  |
|  |  | Another inquiry was made on how much would be paid per jerrycan  | We are not certain as this will be communicated by NWSC after the project is handed to them, they will be able to communicate the cost of the safe water |
|  |  | The community wanted to know how to protect their people from abuse since there will be new workers in the area a lot happens for example Adultery, HIV Aids spread and others | Mitigation measures will be put in place and different trainings will be conducted by the contractor to cub these vices.                                 |

## 6.6.1 Community Findings

### 6.6.1.1 Extent of the scheme

Concern was expressed as to whether the whole settlement and areas of host community surrounding it would be served by the proposed project because some zones are far from the proposed location of tank. They were informed that the feasibility study had determined that the proposed scheme would sustainably supply water to all towns as indicated on the proposed distribution network.

### 6.6.1.2 Employment for refugees

Inquiry was made as to whether refugees, would be considered for employment during the construction stage. They stressed that they needed to be considered so as to earn some money and wanted to know whether multiple opportunities would be availed for the youth as this would reduce on idle time and crimes in the area. Relatedly, the community also mentioned that sometimes youths are engaged and never paid for services they offer. The community was informed that priority is usually given to local people for opportunities for which they have the required skills. In regard to non-payment, they were advised to involve

their local leaders during the recruitment exercise and also request for contracts and/or formal letters of appointment.

#### **6.6.1.3 Project timing**

The community wanted to know how long the project would take before commencement. Area local leaders stressed that project timelines should be followed to limit pressure likely to be exerted on them by the local community. They were advised to be patient and be hopeful as government finalizes all funder's requirements.

#### **6.6.1.4 Compensation for affected property**

Community members also wanted to know whether compensation for affected property would be before project activities commence. They were informed that compensation will be before construction begins because the RAP team would follow shortly to address all compensation and corridor acquisition issues before the project is implemented.

#### **6.6.1.5 Water pressure**

Community members around the reserve tank said that the hilly topography of the area made it difficult for some people to easily access water. A request was made to put taps in strategic places to ease access for the disabled, old, young and pregnant women. They were notified that feasibility studies had been conducted cognizant of this and the project was found viable. All areas shall get water according to the plan.

#### **6.6.1.6 Theft**

During the community meeting, high cases of theft were reported to be existent in the area hence the need to put up a strong security system and guards. The community was informed that this was noted and would be stressed in the report.

#### **6.6.1.7 Effect of chlorine**

They stated that the Chlorine concentration in the water they currently use was making them sick. Fear was expressed about this scheme having similar problems. In line with this, they wanted to know whether there was any other chemical that could be used for water purification other than chlorine. They were informed that a water treatment plant was to be established at Nyaranga to ensure that the water is purified before distribution.

#### **6.6.1.8 Management of the water scheme**

Concern was expressed about the management of the proposed scheme. Fear of likely failure of the scheme due to management was expressed. The community was informed that this is

a World Bank funded government project and consideration of this had been made under the feasibility study to ascertain among others sustainability of the project.

#### **6.6.1.9 Current water shortage**

It was reported that some of the available water sources dry up during the long dry spell which leaves both humans and animals in dire need. Community members stated that people (women) end up picking up quarrels at water collection points because of competition caused by limited number of sources. The ESIA team informed them that once the project is implemented it would improve on availability of clean water and the stand points are expected to ease access.

#### **6.6.1.10 Destruction of Gardens**

Community members indicated that all areas traversed by the network were crop farming communities hence requested that excavation works be undertaken during the dry season after crops have been harvested. The ESIA team informed the community that that had been noted and would be communicated to the ministry

#### **6.6.1.11 Water use**

Inquiry was made as to whether the water from the proposed project could be used for other purposes such as irrigation and fish ponds. They were informed that project is intended to avail clean water for humans. The activities you are suggesting are agricultural related and its Ministry of Agriculture Animal Industry and Fisheries mandated to provide water for production.

#### **6.6.1.12 Payment for water**

Community member wanted to know the mode of payment for water under this project. They were informed that payment would be proportional to the volume one uses and it's likely to be per jerry can. However, details of this will be shared by the ministry as the project advances.

#### **6.6.1.13 Grievance Redress Committee**

They expressed the need to have a representative from the refugee settlement on the GRC so that their complaints are tabled before the responsible. They were informed that the project targets both Refugees and host communities hence both categories would be represented. It will be strongly recommended in the ESIA report.

#### 6.6.1.14 Water extension to institutions

Communities mentioned that there are a number of institutions like schools, health and worship centre among others that should not be left out during this project. They were informed that most institutions especially schools had been considered during development of the planned water network hence they would be connected.

Table 6.3: Examples of issues and questions (verbatim) raised by stakeholders

- Have similar projects been implemented elsewhere or this is the first of its kind
- Will the water be for only home use or it includes a component of irrigation?
- Supposing the proposed network destroys a house or other property
- Will water be extended to households or just along the road and in trading centres?
- Shall the water be free of charge especially to those who provide land?
- Will the project employ refugees or consideration will only be for Ugandans?
- Different people have come on the issue of water are these not lies?
- Will local people be given opportunity to work or contractors will come with workers?
- Can water be extended to my house if I want?
- They complained about water treated with chlorine causing health issue so they inquired if any other chemical could be used
- After assessing the impact of the project on the environment, what will be done?
- When will the work start?
- Who will be in charge of the system and facility?
- In case there is compensation, will it be before or after the project
- Why should the community pay for water yet they are offering land for the project?
- Will the scheme have the capacity to supply water to all these places
- Supposing people refuse the project, what happens?
- Is the district and sub county aware of the project?
- Cultural ritual should be made before the project starts for it to be successful
- What happens if the ESIA study recommends that project cannot be established

Public consultation and information disclosure will be a continuous process throughout the ESIA study. Based on the above suggestions it was inferred that people were supportive of the project and those with reservation were not necessarily opposed to it; rather they required continuous sensitisation about project activities and the impacts it's likely to present and mitigation measures suggested. As noted from the engagement summaries above potential beneficiaries and the community at large still need sensitisation to fully understand and appreciate the project before fully embracing it.

## **7. ANALYSIS OF ALTERNATIVES**

### **7.1 Introduction**

In environmental impact assessment studies, it's important that alternatives be analyzed to maximize environmental safety. Alternatives can take on several forms including technological options, project site options, transportation options, labour sources and type and others. Several factors can influence the choice of alternatives to be considered by a Developer and in most cases, such factors are either technical, financial, socio or environmental. The best option is one which tries to strike a balance on the above factors with viable mitigations measures for residual impacts. In this project, the scenarios discussed are as follows;

1. Water sources
2. Sanitation options
3. Technological options of evacuating water to the consumers
4. Technological options of treating water
5. Project or no project options

### **7.2 Sources of water**

#### **7.2.1 Ground Water Sources**

According to the feasibility study, West Nile has a very low potential for groundwater development. There is difficulty in finding underground water through drilling in the water stressed areas, especially close to river Nile, in West Nile Region. These areas have been described as West Nile dry corridor. The average borehole drilled depth is 100m along the Nile. Every Financial year, the districts in West Nile drill on average three dry wells. The dry wells are paid for by the districts in their contracts. It is estimated that the districts pay 400million shillings for dry wells to the contractors annually.

The districts will pay 8bn shillings in 20 years' time if no alternative solution is sought for other technologies. There is sanitation related diseases in west Nile region with cholera, typhoid, malaria etc. reported annually in the health units. The boreholes in the West Nile dry corridor (stressed areas) have high operation and maintenance costs which are expensive to manage by the communities.

Cases of the water sources breaking down within five years due to technical failure accounts for about 43.4% according to ministry of water and environment reports. This has been noted as a concern to planning and development particularly in the Nile belt. Therefore, the option of exploiting underground water sources as an alternative to Enyau Water Supply System is not a feasible one. It's very expensive and not achievable.

### **7.2.2 Surface Water Sources**

As regards surface water, the major water body in the catchment is River Enyau. According to the feasibility study of this project, the maximum demand for the project is 2,977m<sup>3</sup>/day. Although there are other surface water sources in the project area including mainly River Enyau's tributaries, such sources would not be able to provide the required water quantity and head at the same time. Only River Enyau is the main water source that is able to meet the demand of the project area over to 2043 considering the quantity, quality, protection and feasibility. The total water demand for the proposed project is just 2% of the minimum river flow and 0.33% of the mean flow therefore the project will not have significant impact on the downstream users of the river. Therefore, this is the preferred source for the proposed project.

## **7.3 Sanitation options**

### **7.3.1 Sewerage system**

This ESIA is in agreement with the sanitation assessment of the feasibility study report that since the generated waste water from house connections and institutions cannot meet the minimum requirements for both the gravity conventional system and small-bore sewers, the individual connections dispose of their effluent in septic tanks, i.e. on-site storage. On being full, the septic tanks can be emptied using a cesspool emptier.

### **7.3.2 Public toilets**

The project option is that the project will provide for 2 public toilets (water borne toilet type of 9 stances each) to be located at markets or parks. The alternative for water borne toilets are pit latrines. However, the pit latrines have safety issues, can lead to foul smell in public areas and most importantly they are potential sources of ground water pollution. Therefore, the pit latrines were not considered based on these reasons.

The ESIA assessment of the sanitation facilities on the ground indicates that this provision is still low and should be increased. *The ESIA recommends that in addition to providing sanitation facilities at all market centers and parks (which may be more than 2), public toilets should be considered at trading centers with a high population density on a case-by-case basis and as demand arises.*

## **7.4 Water Transmission and Distribution options**

The transmission and distribution pipes are either made of steel or plastic. The steel pipes may undergo rusting and this may compromise the quality of water as well. This may also lead to increased maintenance costs as rusting of the pipes may require them to be replaced.

The plastic pipes are therefore the best alternative. Treated water will be transmitted and distributed through clear water transmission plastic pipes from the WTP to the Storage Reservoirs as presented on chapter 2 by gravity. Water will then be distributed to users through consumer connections.

## 7.5 WTP Technology Selection Alternatives

The type of treatment operation performed at a drinking WTP and treatment chemicals used depend largely on the contaminants present in the source water (EPA, 2011a). An analysis of the source water quality indicates elevated levels of total suspended solids (TSS), faecal coliforms, turbidity, and apparent colour with respect to the Uganda Drinking Water Standard (Annex 3).

To transform the source water to a potable form, the key processes of coagulation/flocculation, sedimentation, filtration, and disinfection will have to be employed. Below is an analysis of the key technologies that hat could be adopted in the key processes of coagulation/flocculation, filtration and disinfection.

### 7.5.1 Coagulation/Flocculation

Coagulants and flocculants that are added to raw water include metal salts (e.g. aluminum sulphate/chloride and ferrous sulphate/chloride) and polyelectrolytes. Below is an analysis of available options. Aluminium sulphate is the preferred option.

Table 7.1: Technology analysis of coagulants/flocculants.

|      | Aluminium/Ferrous sulphate/chloride   | Polyelectrolytes  |
|------|---|---|
| Pro  | Offer the lowest price per unit weight and are widely available, thus most commonly used; insoluble at normal drinking water treatment operating conditions, thus very little metal is carried into finished product; generally, settles readily.   | Effective over a wider pH range than inorganic coagulants; can be applied at lower doses; produce smaller volumes of more concentrated, rapidly settling floc; floc formed from use of a properly selected polymer will be more resistant to shear, resulting in less carryover and a cleaner effluent;                       |
| Cons | Require corrosion-resistant storage and feed equipment; may alter the pH of water since they consume alkalinity, thus need for liming; sludge exhibits poor compaction traits, ranging from 0.5 to 2 percent solids (ASCE/AWWA, 1997), thus difficult to dewater; sludge is biologically inert (inorganic) with little organic content and have little value as a fertilizer/soil conditioner; large volumes of settled floc must be disposed of in an environmentally acceptable manner. | Several times more expensive in price per unit weight than inorganic coagulants; selection of the proper polymer for the application requires considerable jar testing under simulated plant conditions, followed by pilot or plant-scale trials; All polymers must be approved for potable water use by regulatory agencies. |



### 7.5.2 Filtration

After solids settling, the source water passes through filters to remove finer particles and metals. Various types of filter media may be used by WTPs, including permeable fabric and porous beds (EPA, 2011a; EPA, 1995). Table 7.2 below is an analysis of the types of filters used by WTPs. In general, the multimedia filter should be considered as a first option with the rapid sand filter as a second and last option given their suitability as summarized in Table 6-3 for the project, the selected option is rapid sand filtration.

Table 7.2: Technology analysis of filter types

| Filter type               | Characteristic   | Pros/cons   |
|---------------------------|--|---|
| Slow sand filter          | Consists of a bed of fine sand above a gravel layer and underdrain system; used for low-flow rates.  | Not suitable for high turbidity source waters; trap microorganisms that break down algae, bacteria, and other organic matter. The source water for the project contains up to 16.4 NTU of turbidity. This is above the Uganda Drinking Water Standard of 10 NTU. The use of slow sand filters in the project will imply increase in dosing levels of alum so as to alleviate turbidity, with cost implications.   |
| Rapid sand filter         | Consists of a bed of sand above several layers of gravel in varying sizes.   | Gravity filtration is the most widely used form of water filtration in many countries. However, in rapid gravity filtration the particulate impurities are removed in or on the media, thus causing the filter to clog after a period. Clogged filters are cleaned by backwashing.  |
| Pressure filter           | Similar to rapid sand filters but the operation is housed within a cylindrical tank and the water passes through the filter while under pressure generated by a Pump rather than by gravity. | Pressure filters have been found to offer lower installation and operation costs in small filtration plants. However, they are generally somewhat less reliable than gravity filters. Their use is mainly confined to the treatment of water for industrial purposes.   |
| Diatomaceous earth filter | Consists of a layer of diatomaceous earth above a septum or filter element.  | Most suitable for low turbidity and low bacterial count source water; Coagulants and filter aids are required for effective virus removal. The source water for the project contains up to 16.4 NTU and 20 CFU of, respectively, turbidity and bacterial faecal coliforms. These are above the Uganda Drinking Water Standards of, respectively, 10 NTU and 0 CFU. The use of diatomaceous earth filter in the project will imply increase in dosing levels of alum and chlorine, with cost implications. |
| Multimedia filter         | Consists of layers of various sizes of gravel, high-density garnet, sand, and anthracite coal.   | Enhances the removal of tastes, odors, and organic substances. Thus, lowering the amount of alum to be employed. However, frequent backwashing may be required to remove clogs.   |

| Filter type      | Characteristic   | Pros/cons  |
|------------------|--|--|
| Membrane filters | Include ultrafilters and micro filters; use pressure as the driving force. | Designed to remove particulates smaller than 10 micrometers; WTPs using membrane separation are typically smaller plants (serving less than 50,000 people) (EPA, 2011a), thus cannot be employed in the project with an ultimate year population of 186,295. |

### 7.5.3 Disinfection

Historically, chlorine was the disinfectant used, but more recently other chemicals such as chlorine dioxide, chloramines, and ozone have been used to purify water. Non-chemical methods of disinfection include heat and radiation (e.g. ultraviolet light (UV)). Table 6.4 below is an analysis of the key options that could be employed in the project. The application of UV disinfection for source water treatment is limited because turbidity and suspended solids that can render it ineffective (EPA, 1999c). Thus, UV has not been analyzed for the project. As can be seen from Table 6.4, ozone, the most efficient disinfectant, is not a persistent disinfectant, thus unsafe water consumption can occur in case of recontamination along transmission/distribution lines and reservoirs.

It is also difficult to fulfil the legal limit for the formation of bromate during the process of ozonation, thus most WTPs tend not to employ ozonation. Chlorine and chloramines are more effective in secondary disinfection in comparison to chlorine dioxide (Less persistent chemical). Thus, chlorine dioxide may not be suitable for the project given the extent of piping systems. Lastly, though the combined residual from chloramines lasts longer than chlorine residuals, chloramines are not as effective as other germicidal agents. In general, chlorine is the key form of disinfectant employed in Uganda. This is similar to the US, a developed country, with up to 80% of WTPs employing free chlorine (EPA, 2011a).

Table 7.3: Technology analysis of disinfection types

| Criteria                 | Disinfectant   |   |  |  |
|--------------------------|--|---|--|--|
|                          | Chlorine   | Chloramines   | Chlorine dioxide   | Ozone  |
| Persistency              | Persistent chemical (used locally and for transport across long distances to the final consumers).   | Persistent chemical (used locally and for transport across long distances). | Less persistent chemical (used locally and for transport across long distances). | Non-persistent chemical (used Locally at production plants). |
| Oxidant demand rate      | Chloramine > Chlorine > Chlorine dioxide > Ozone   |   |  |  |
| Disinfection efficiency  | Ozone > Chlorine dioxide > Chlorine > Chloramine<br>NB: efficiency order can be changed by local conditions e.g. disinfectant consumption rate, biofilm protection, etc. |   |  |  |
| Disinfection by-products | More than 500 by-products  | Nearly no halogenated organic   | Nearly no halogenated  | Nearly no halogenated organic                                |

| Criteria | Disinfectant   |  |  |   |
|----------|--|--|--|---|
|          | Chlorine   | Chloramines  | Chlorine dioxide   | Ozone   |
|          | identified that are formed by reaction with organic matter; most products are halogenated (Cl, Br, I) organics; most relevant organic halogenated by-products are Trihalomethanes, Haloacetic acids, Haloacetoneitriles, Haloketones, and Haloaldehydes; Trihalomethanes are regulated in Europe; Both Trihalomethanes and Haloacetic Acids are regulated in the US. | by-products formed; negligible reaction with organic matter, except halogen transfer to nitrogen amines; some halogenated organic by products formed with trace of chlorine or chlorine in excess; Ammonia is formed if used in excess, thus nitrite formed from Bacterial oxidation of ammonia. | organic by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated organic by products formed with excess of chlorine used or Chlorine formed in-situ. | by-products; significant reaction with organic matter leading to no halogen transfer; some halogenated by-products formed with excess of chlorine used or chlorine formed in-situ; main halogen by-product is bromate; it's difficult to fulfil the legal limit for its formation, thus many WTPs have replaced the Ozonation step. |

## 7.6 Project Option Vs No Project Option

### 7.6.1 No project option

Analysis of the 'no project option' as an alternative is an important component of this ESIA. It provides an environmental baseline against which impacts of the proposed action can be compared. The '**no project option**' alternative here means that the proposed Enyau water and sanitation project will not be developed, and hence the site and project area continue with the present course of actions or status quo. In this respect, government and the communities would lose all potential benefits associated clean water. With respect to the socio-economic environment, the "no-action" option would eliminate the opportunity for jobs creation, and secondary socio-economic benefits, which the proposed development would have created. This Alternative is not sustainable in the long run because the growing demand for clean water in West Nile needs a solution. Therefore, this alternative is not recommended.

## **7.6.2 Project Option**

Project option means proceeding with the current plan and implementing the project as it is with some modifications to avert environmental damage and risks associated with community and occupational safety. The proposed Enyau water and sanitation project is urgently needed by the community and local leaders to accelerate development in the project areas. All stakeholders consulted had no objection to the proposed project. They were very optimistic about the project citing its contribution to development in the districts, through job creation, revenue collection by government and other secondary socio-economic benefits, which the proposed development will create. In view of this discussion, the Project Option is taken as viable for implementation on condition that the identified impacts are mitigated as suggested.

### **7.6.2.1 Key Benefits of Improved Water Supply If Project Is Implemented**

- a) Easy access to potable water within homesteads at various levels – stand posts, yard taps and house connections;
- b) Reduction in incidences of diarrheal and other water borne diseases; this leads to reduction in mortality and morbidity, especially of children;
- c) Improvement in hygiene and sanitation from increased use of hand washing, personal hygiene and environmental sanitation;
- d) Reduction in hours spent searching for and fetching water from distant sources which would significantly increase the time allowed for other activities; this is expected to lead to better livelihood for women and the girl child, who are traditionally, responsible for fetching water;
- e) Reduction in domestic violence and abuse of women as people in the homestead compete for the little potable water;
- f) Reduction incidences of promiscuity which are often carried out in the guise of fetching water, some involving children; this leads to incidences of child abuse, domestic violence and early pregnancies;
- g) Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
- h) Higher quality hotels, restaurants and entertainment places since the developers can erect and maintain high quality toilets;
- i) Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
- j) Increased revenue to the local authority and the country in general through the collection of taxes.

### **7.6.2.2 Key Benefits of Improved Sanitation Facilities If Project Is Implemented**

- a) Reduced incidences of diarrheal and other water borne diseases; this leads directly to lower rates of mortality and morbidity, especially of children;

- b) Greater school attendance by the girl children since they are more comfortable with cleaner and safer toilets; this leads to increased gender awareness and improvement;
- c) Reduced costs for collection and disposal of faecal and other matter from homesteads; this leads to improved environmental sanitation and its attendant benefits;
- d) Cleaner and more conducive environment for urban activities such as sports, markets, public places, etc.;
- e) Higher quality hotels, restaurants and entertainment places since the developers can erect and maintain high quality toilets;
- f) Employment opportunities at all stages of the project – from construction, operation and marketing of the services; this leads to increased skills transfers to the community;
- g) Increased revenue to the local authority and the country in general through the collection of taxes.

### **7.6.3 Conclusion on the 'No Project' Option**

Terego and Yumbe districts are in urgent need of a sustainable water supply and sanitation facilities. The existing piped Water Supply System is operating below demand. The current sanitation systems are unreliable, in sorry state and sub-standard. If this is allowed to continue, not only will the residents be exposed to public health risks but development opportunities will continue to be stifled and curtailed. This certainly will have local, national and regional implications. Secondary implications include continuing trends of water-related diseases, no direct or indirect employment opportunities associated with the project, and continuing degradation of the environment and water resources due to unplanned disposal of faecal sludge. In general, the minor benefits of the No-Project option are far outweighed by the benefits to be attained on implementing the Enyau Water Supply and Sanitation Project.

## 8. IMPACT AND MITIGATION

### Introduction

This chapter identifies and evaluates significant environmental consequences of the construction and operation phases of the proposed project. While positive impacts should be enhanced, the proposed mitigation measures should be implemented as suggested to minimize or eliminate the predicted negative environmental and social impacts.

### 8.1 IMPACT EVALUATION AND ANALYSIS

#### 8.1.1 Impact evaluation and analysis

This section assesses the level of potential impacts based on various criteria including severity of impacts, duration, geographical scope, and the existence of readily identifiable cost-effective mitigations. The impact assessment also considers the impacts identified by the stakeholders consulted. The methodology for impact evaluation was as follows:

- a. **Extent:** within limited area (<500m from site), local (up to 10 km) or wide (regional or global)
- b. **Duration:** Temporary (1 year), short term (1-5 years), Medium term (5 -10 years), Long term (> 10 years – 50yrs) or Permanent;
- c. **Magnitude of impact:** Low, Medium or High/Very high
  - **Very High (VH) and High (H):** These denote that the impact is un-acceptable and further mitigation measures must be implemented to reduce the significance.
  - **Medium (M):** Impacts in this region are considered tolerable but efforts must be made to reduce the impact to levels that are as low as reasonably practical.
  - **Low (L):** Impacts in this region are considered acceptable.
- d. **Probability of occurrence:** Highly unlikely, Unlikely, Possible, Likely or Almost certain as presented in table 8.1 below.

Table 8.1: Likelihood of occurrence classification

| Probability of occurrence |                |  |
|---------------------------|----------------|--|
| Level                     | Probability    |  |
| 5                         | Almost certain | • Very likely to occur (91 - 100%) Could occur either immediately or within a short period of time (likely to occur most weeks or months)                                      |
| 4                         | Likely         | • This impact will probably occur in most circumstances if controls are not applied (several times a year) (61 - 90%)  |
| 3                         | Possible       | • This impact could occur at some time if controls are not applied May happen every 1 to 15 years). It is expected that the impact will occur; Chance of occurrence (41 - 60%) |
| 2                         | Unlikely       | • This impact is not likely to occur. Chance of Occurrence 11 – 39%.   |

| Probability of occurrence |                 |  |
|---------------------------|-----------------|--|
| Level                     | Probability     |  |
| 1                         | Highly unlikely | <ul style="list-style-type: none"> <li>Very unlikely to occur (0 - 10%)</li> </ul> |

e. **Overall assessment of impact:** Negligible, minor, moderate, substantial or severe as presented in Table 8.2 and Table 8.3 below.

Table 8.2: Criteria for rating overall impact severity (environment parameters)

| Impact rating | Description of impact  |
|---------------|--|
| Severe        | <ul style="list-style-type: none"> <li>Highly noticeable, irreparable effect upon the environment.</li> <li>Significant, widespread and permanent loss of resource</li> <li>Major contribution to a known global environmental problem with demonstrable effects.</li> <li>Causing mortality to individuals of a species classified as globally or regionally endangered.</li> <li>Major exceedance of water/air quality and noise guidelines representing threat to human health in long and short term.</li> <li>Causing widespread nuisance both on and off site.</li> </ul>  |
| Substantial   | <ul style="list-style-type: none"> <li>Highly noticeable effects on the environment, difficult to reverse.</li> <li>Widespread degradation of resources restricting potential for further usage.</li> <li>Significant contribution to a known global environmental problem when compared with the industry world-wide.</li> <li>Sub-lethal effects upon a globally or regionally endangered species compromising reproductive fitness and/or resulting in long-term disruption/disturbance to normal behavior.</li> <li>Air quality/noise approaching occupational exposure limits. Water quality parameters approaching maximum stipulated values.</li> <li>Periodic widespread nuisance both on and off site.</li> </ul> |
| Moderate      | <ul style="list-style-type: none"> <li>Noticeable effects on the environment, reversible over the long term.</li> <li>Localized degradation of resources restricting potential for further usage.</li> <li>Sub-lethal effects upon a globally or regionally endangered species with no effect on reproductive fitness and/or resulting in disruption/disturbance to normal behavior returning to normal in the medium term.</li> <li>Elevated contribution to global air pollution problem partly due to preventable releases.</li> <li>Frequent breaches of water/air quality and noise guidelines.</li> <li>Causing localized nuisance both on and off site.</li> </ul>  |
| Minor         | <ul style="list-style-type: none"> <li>Noticeable effects on the environment, but returning naturally to original state in the medium term.</li> <li>Slight local degradation of resources but not jeopardizing further usage.</li> <li>Disruption/disturbance to normal behavior of a globally or regionally endangered species returning to normal in the short term.</li> </ul>   |

| Impact rating | Description of impact  |
|---------------|--|
| Negligible    | <ul style="list-style-type: none"> <li>• Small contribution to global air problem through unavoidable releases.</li> <li>• Elevation in ambient water/air pollutant levels greater than 50% of guidelines.</li> <li>• Infrequent localized nuisance.</li> </ul>  |
|               | <ul style="list-style-type: none"> <li>• No noticeable or limited local effect upon the environment, rapidly returning to original state by natural action.</li> <li>• Unlikely to affect resources to noticeable degree.</li> <li>• No noticeable effects on globally or regionally endangered species.</li> <li>• No significant contribution to global air pollution problem.</li> <li>• Minor elevation in ambient water/air pollutant levels well below guidelines.</li> <li>• No reported nuisance effects.</li> </ul> |

Table 8.3: Criteria for rating overall impact severity (Social and economic parameters)

| Criteria       | Significance Definition   |                  |
|----------------|---|------------------|
| Harm to People | Potential to cause multiple fatalities or widespread chronic health problems for many people  | Severe           |
|                | Potential; to cause fatalities, mutilations or serious chronic health problems to a person  | Substantial      |
|                | Potential to cause Lost Time Incidents  | Moderate         |
|                | Not likely to result in Lost Time Incidents   | Minor-Negligible |
| Assets         | Extensive damage to infrastructure, possibly including off-site structures  | Severe           |
|                | Major damage to on-site infrastructure, halting operations and incurring substantial delay to supply replacement equipment  | Substantial      |
|                | Minor damage to individual item of equipment for which a spare part or replacement can be quickly mobilized to the development  | Moderate         |
|                | Damage resolved by on-site reserves, maintenance equipment and on-site personnel  | Minor-Negligible |
| Reputation     | Incident attracting international negative press coverage causing lasting harm to corporate reputation, or for which the company could be prosecuted and fined a large amount of money  | Severe           |
|                | Incident attracting critical reporting requiring the company to take measures to maintain its reputation, or for which the company could be prosecuted and receive a token fine or be required to pay compensation to third parties | Substantial      |
|                | Incident attracting local news coverage and complaints, and which involves expense in engaging local communities to apologize, clarify issues and make amends   | Moderate         |
|                | Incident that does not provoke complaints   | Minor-Negligible |



### 8.1.2 Other considerations in impact analysis

In terms of phases involved, the environmental impacts of the proposed water supply can be grouped under two major categories. These include impacts associated with construction of the project and those associated with operation phase. However, under IFC, the Environmental, Health, and Safety (EHS) guidelines are categorized as follows;

- Environmental;
- Occupational Health and Safety;
- Community Health and Safety.

Therefore, the discussion and presentation of impacts in this chapter has been based on the two major processes involved (construction and operation phases) as well as IFC Environmental, Health, and Safety (EHS) guidelines.

## 8.2 CONSTRUCTION PHASE ENVIRONMENTAL AND SOCIAL IMPACTS

### 8.2.1 Topography (Aesthetics pollution)

The topography of the area is gently sloping enabling gravity flow of water from Terego (intake area) to the beneficiaries in lower areas of Terego and Yumbe district (See section 4.1.3). Excavations and heaping of spoil soil or storage of the construction materials will be visible because of the nature of the area and may be an aesthetic to some people. The project will involve construction of a water treatment plant, water reservoirs, an office and two sanitary facilities. These being above ground may lead to visual pollution for those who do not want to see them. Because of this, the project may attract complaints from a section of the affected people which may slow down the project implementation pace. A well planned and designed development of this nature with well-kept green areas may be aesthetically pleasing to the eye compared to the current land use. Although this will be permanent, the extent will be local and the magnitude is low and hence the impact is rated as minor.

#### Risk assessment matrix

| Impact               | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|----------------------|--------|-----------|-----------|---------------------------|--------------------|
| Aesthetics pollution | Local  | low       | permanent | Likely                    | Minor              |

#### Mitigation Measures:

- Excavated soil shall be heaped for a short time (1-5 days) and re-used for backfilling. In case the soil is not required for backfilling, it shall be ferried to designated waste disposal sites in Terego or Yumbe Town Council.
- The affected area shall be restored through landscaping and leaving it to undergo natural colonization by plants.
- The materials shall be stored in a way that the height does not cause visual intrusion. Preferably the height should not be more than 2 metres.

### 8.2.2 Susceptibility to soil erosion

The soils in the project area are Ferralsols and Vertisols with a sandy loam texture (See section 4.1.5). The sandy nature of soils makes it susceptible to erosion if exposed. The site earthworks during construction of water treatment plant, water distribution pipework network, and associated infrastructure will reduce soil stability and hence make the soils aggregated and more susceptible to erosion especially during the rainy season. The impact of soil erosion is likely to be Negligible-Minor since width of the trenches for the pit is not big (for transmission lines the trenches are Diameter 6 feet x Depth 1.2m, for the distribution its Diameter 3feet x Depth 1m), excavated soil is used to backfill the trenches immediately after laying the pipes and the impact is localised and for a short time. Whereas for the treatment plants the soil that will be excavated is a lot (more than 50m<sup>3</sup>) and if not well handled may be washed away by rain thereby silting some of the nearby streams including Enyau river itself.

#### Risk assessment matrix

| Impact                                   | Extent | Magnitude | Duration  | Probability occurrence | of Overall Assessment |
|--|--------|-----------|-----------|------------------------|-----------------------|
| Increased susceptibility to soil erosion | Local  | Low       | Temporary | Likely                 | Negligible-Minor      |

#### Mitigation measures

- The construction sites for water treatment plant, sanitary facilities, and storage tanks will be hoarded off to intercept any eroded material and any soil material will remain within the site until it is taken away for proper disposal or used for backfilling to avoid loose soil being washed away by storm water.
- No spoil soil shall be temporarily placed in water ways.
- The Project Contractor should backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation. The top soil shall be kept separately so that it is used last in backfilling of the excavated areas. This is to ensure that the living soil (top soil) is available for plant growth in disturbed areas.
- MWE will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion. Native vegetation must be used for re-seeding the excavated site.
- The excess soil shall be spread along the trench by the Contractor but in liaison with the local people; special attention would be made not to dispose of such construction wastes in swamps on any sensitive ecosystem.
- The excavated soil from the pit for the water treatment plant, sanitary facilities and water storage areas shall be used for backfilling uneven areas at the site and then stabilised through planting of grass and trees.

### 8.2.3 Exposure to high noise levels

The sound measurements made during the ESIA exercise indicated that noise levels were within the national standards (See table 4.1). The construction activities like excavations, vehicle movements are likely to generate noise levels beyond the current levels and those stipulated in the National Environment (Noise Standards and Control) Regulations, 2003. Exposure of communities and workers to high noise levels can be a health concern and needs to be mitigated. High noise levels are likely to be generated by workers and movement of equipment. The noise levels should not be above 85dBs as stipulated by the National Environment (Noise) Control Regulations, 2003.

#### Risk assessment matrix

| Impact                                    | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|---|---------------------|-----------|-----------|---------------------------|--------------------|
| Hearing impairment and potential accident | Within limited area | Medium    | Long-term | Possible                  | Moderate           |

#### Mitigation measures

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs;
- Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;
- The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the management of the Water Treatment Plant.
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.
- Annual medical hearing checks should be performed on workers exposed to high noise levels.
- Sites must be hoarded to curb noise impacts to neighboring communities.
- Works should be undertaken during day time i.e. from 8am to 6pm.

### 8.2.4 Impact on drainage, wetlands and water resources

There exist some riverine wetlands where some project infrastructure will be constructed. In some areas, the wetland is natural and permanent while others are seasonal and have been encroached by other human activities such as farming. The project infrastructure i.e. the water abstraction system and associated components, the transmission and distribution lines

will affect some wetlands. The actual area (distance traversed has been presented in Table 4.4).

Waste management and management of off cuts practices can affect the wetland areas if not well managed, but the mismanagement is not expected to occur since the contractor will be closely monitored. The concern here is that the project may increase sediments in these water sources, pollute these water sources with contaminants especially if waste is not well managed and can even affect and or change the drainage patterns of some streams resulting into floods. Therefore, the impact on wetlands is rated as moderate.

#### Risk assessment matrix

| Impact                                    | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|---|--------|-----------|-----------|---------------------------|--------------------|
| Impacts of project activities to wetlands | Local  | Low       | Permanent | likely                    | Moderate           |

#### Mitigation measure

- Suspend water pipes across streams and wetlands on concrete pillars to ensure future disturbance during repairs will not result into further interface with the water resources in these ecosystems.
- No materials/waste shall be dumped in the nearby wetland and all the foreign materials introduced during construction period shall be removed and disposed of in gazetted areas
- For all activities that will affect wetlands and river banks, make sure you obtain a wetland user permit before conducting activities in such ecosystems.

#### 8.2.5 Potential air pollution

Construction dust can lead to lung and sight related health risks. Dust will be generated during excavation works, movement of haulage trucks, grading and levelling of ground surfaces, operation of stone crushers, etc. In general, the impact of dust emissions, though medium in magnitude, will be localized, temporary, and reversible and is non-cumulative. Exhaust emissions from vehicles and machinery (e.g. generators) are expected to occur particularly at the construction phase.

This will consist mainly of poorly burnt fuels and oils, including nitrogen oxides, carbon oxides, hydrocarbons, particulate matter, etc. Nitrogen oxides react with moisture and other compounds to form nitric acid vapor and related particles. Small particles can penetrate lung tissue, thus worsening of respiratory diseases. Carbon monoxide is highly toxic and the most common type of fatal air poisoning in many countries (Omaye, 2002). Carbondioxide traps solar radiation being emitted from the earth, thus causing a rise in the earths' temperature, which leads to global warming.

The warming of the earth results in the changing of weather patterns leading to climate change. In general, the impact of exhaust emissions, though important to local/immediate surrounding and moderate in magnitude, will be temporary, is reversible and non-cumulative.

**Risk assessment matrix**

| Impact                             | Extent | Magnitude | Duration   | Probability of occurrence | Overall Assessment |
|------------------------------------|--------|-----------|------------|---------------------------|--------------------|
| Lung and sight impacts due to dust | Local  | Medium    | Short term | Almost certain            | Moderate           |

**Mitigation measures**

- Construction sites shall be hoarded off to restrict dust to within site boundaries;
- Sprinkle water on vehicle pathways;
- PPE like dust masks shall be availed to workers whenever needed;
- Loose materials like sand that are susceptible to dust generation during haulage be covered with tarpaulin;
- Limit vehicle speed to 30 Km/hr on marram roads.
- Maintenance schedules of vehicles and equipment should be developed and adhered to in line with manufacturers requirements

**8.2.6 Flora (Loss of vegetation and destruction of crops)**

The project largely crosses settled and built-up areas interspersed in rangelands with modified equatorial type, wooded savannah mosaic, savannah grassland, supporting an active agro-ecosystem (see sections 4.1.1 & 4.2.1). For the most part, the Project Site traverses through an area previously mapped as dry acacia savannah. The landscape in the Project Site is highly transformed from original natural state and in contrast, hosts few remaining species. Very little remaining natural vegetation cover of conservation importance remains, due to extensive human activities. There is no characterization of rare and/or restricted-range species in the actual project foot print.

However, the area contains some species of high conservation value such as *Azelia africana* Sm, *Vitellaria paradoxa* C. F and *Tamarindus indica* L. which are rated as vulnerable and *Milicia excelsa* (Welw.) C.C.Berg which is rated as near threatened according to IUCN. There was no natural forest within the project area however, along the water transmission and distribution network, there were pockets of planted forests mainly comprising of teak trees (*Tectona grandis*).

The clearing of corridor, movement of equipment and contractor staff and laying of pipes will lead to spot destruction of vegetation especially in areas under fallow and those planted with private wood Lots (plantation forests), and the likelihood of soil erosion due to removal of top soil. These areas are mainly farmlands, savannah grasslands and woodlands. The surveys

show that the project area is degraded and comprises mainly subsistence farmlands. The location of the water treatment plant will result into minor destruction of vegetation since the site is a farmland.

Although the systematic clearing of the 3-meter strip of land in the road reserve will result into destruction of vegetation, the impact on the conservation status of the affected flora & ecosystems is expected to be minor-low. The extent of damage is also minor-low. However, movements of the contractor and the entire crew may spread invasive species from one locality to another. Such species include *Eicchornia crassipes*, *Salvinia molesta*, *Senna siamea*, *Lantana camara*, *Mimosa pigra*, *Ricinus communis* and *Senna spectabilis*. In general, the impact of vegetation clearance along the water transmission/distribution line and or at the WTP sites, though permanent (at points that infrastructures will be erected), will be localized, minor in magnitude, is reversible and non-cumulative, thus a minor change will occur. Therefore, the impact of construction activities on the vegetation and habitats is expected to be moderate.

**Risk assessment matrix**

| Impact  | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|---|--------|-----------|-----------|---------------------------|--------------------|
| Loss of vegetation and terrestrial habitat alteration | Local  | Low       | Temporary | Likely                    | Moderate           |

**Mitigation measures**

- A RAP shall be developed and implemented by MWE to ensure that affected crops is compensated. Compensation should be in line with the World Bank and Government Chief Valuers approved RAP report.
- Prior to compensating destroyed crops, the affected persons, adequate community sensitization meetings shall be carried out to ensure that the PAPs are aware of the entire program including visitation schedule per village, parish and or sub-county and how each PAP will be contacted and approached for payment.
- The construction of the proposed water transmission and distribution lines shall only commence when all the affected farmers have been fully sensitized of the pending activities. Prior to the construction phase, farmers shall be sensitized on the pending project at least 6 months in advance such that cultivation under the line and within the water pipe corridor is stopped or reduced. This will give affected farmers ample time to plan in advance.
- The contractor must be instructed to move in a definite order and the pattern of movement must follow the established corridor as agreed upon by the local government authorities and the Developer. Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated path ways or agreed upon access roads. This must be followed to avoid further destruction of crops by the contractor after compensation has already been affected.

- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated path ways or agreed upon access roads. The designated path must avoid the threatened species as those identified in section 4.2.1. This will avoid unintended damages to vegetation.
- The Developer and the contractor must guard against fires arising from construction negligence because the impact of fire on vegetation and biological diversity can be immense especially in the savannah woodlands and grasslands. Therefore, the contractor must have a fire management plan in place. That at minimum covers the following mitigation measures:
  - Cooking for the construction crew shall be done in a gazetted area with good clearance from the bushy parts of the area.
  - No smoking shall be permitted while at construction site.
  - If the site has flammable substances like petrol and diesel, the Contractor shall maintain on site a serviced fire extinguisher.
- The line alignment shall be inspected and all the trees that will be affected identified, marked (for cutting or retained) and the conservation status identified before wayleaves clearance
- After construction, there should be landscaping and then grass left to recolonize the disturbed area naturally. The Developer shall set aside funds to contribute towards local environmental programs. MWE shall remit funds towards district and sub-county afforestation projects as part of the catchment management program to compensate for biomass lost during corridor clearing and habitat fragmentation. In case the destruction is due to contractor's negligence, it will be the responsibility of the contractor to make compensation. MWE shall take the overall responsibility however, the contractor takes liability of those plants/trees destroyed either knowingly or unknowingly and which is outside the Corridor.
- The contractor should restore sites where activities will be carried out at all the project sites. The topsoil that will have been removed before pitting the trenches for the pipeline should be put back to cover the trenches so that the crops can regrow in a natural environment. Excess soil, stones and boulders should be dumped in an area that has been approved by the District Environment Officer.
- MWE should also identify and support afforestation initiatives to enhance tree cover areas as a way of reducing its project footprint.

### **8.2.7 Fauna (Loss of wildlife, invertebrates, birds, etc.)**

Although the baseline data on fauna as presented in sections 4.2.2-4.2.5 indicates that the project area harbors some vulnerable species such as reptiles (Gaboon Viper & African Rock Python) and mammals such as Tree pangolin, careful planning and implementation of the project may not impact any. Majority of all reptiles, Amphibians and mammals recorded in the project area according to the red listing (IUCN, 2018; WCS, 2016) are of Least Concern (LC) both globally and nationally, and most. Bush clearance at the project sites can specifically create a biotope in areas with dense vegetation and hence may become hunting grounds for

carnivores. Clearing of trees may also disrupt or alter habitats for some of the birds while at the same time new and invasive species could gain ground. At all stages of planning, implementation and operations and post construction, it is possible to integrate biodiversity consideration to address the potential biodiversity impacts of the project.

**Risk assessment matrix**

| Impact               | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|----------------------|--------|-----------|-----------|---------------------------|--------------------|
| Loss of biodiversity | Local  | Low       | Temporary | Likely                    | Moderate           |

**Mitigation measures**

- Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to fauna.
- The contractor should restore sites where activities will be carried out at all the project sites.
- If wild animals are encountered, the Contractor shall notify UWA so that it is picked and taken to a secure place.
- Trenching, pipework laying as well as backfilling will be done concurrently. For pits like at the clarifier and the booster pump, the contractor shall ensure that every evening, the pits are covered with timber while being secured with a warning tape.
- Implement environmental awareness programs / training among the all project employees, particularly during construction. They should be trained to identify arboreal or burrowing species exposed by vegetation and soil stripping and should have immediate access to a competent specialist on site (e.g. the Environment Officer) who can capture and translocate them to an undisturbed area.
- There are no specific measures for the protection of invertebrates because of the difficulty in identifying these species for those unfamiliar with entomology and for practical reasons with respect to topsoil collection and storage. However, all mitigation measures related to minimizing habitat fragmentation, prevention of soil and water pollution, minimizing trampling and control of invasive species should be applied.
- Access and service roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation
- Following construction, rehabilitation of all areas disturbed during construction phase and that are not required for regular maintenance operations must be undertaken.
- All exposed area to be re-vegetated using indigenous species

**8.2.8 Impacts on aquatic biodiversity**

Section 4.2.6 presents the status of aquatic biodiversity in the streams of the project area. Such biodiversity includes fish, phytoplanktons, zooplanktons and other aquatic organisms. Construction operations such as installation of water transmission infrastructure across and



along streams and or wetlands has the potential to discharge sediments and other pollutants into water resources if appropriate controls are not put in place.

Damping of pollutants into water streams could significantly affect the quality of life of aquatic biodiversity. The concern here is construction works may negatively impact water quantity and quality of streams, water bodies, and ground water resulting in seasonal hydrologic changes and potential negative impacts on downstream river biota and communities. Impacts to water quality may result from erosion and accumulation of sediment and organic debris in water bodies (e.g. chemical contamination (e.g. from use of pesticides, fuels, lubricants, and coolants); increased nutrient loads (e.g. from erosion and use of fertilizers); and changes to temperature levels and stream flows which may affect aquatic biota populations. Impacts to water quantity and timing of flows may occur due to the amount and spatial distribution of vegetation removed in response to the precipitation regime and remaining ecosystem processes.

Preventing direct, adverse impacts to water resources and maintaining riparian zones is critical to protect water quality and quantity, in addition to aquatic and terrestrial forest habitats. This impact reversible.

**Risk assessment matrix**

| Impact          | Extent | Magnitude | Duration   | Probability of occurrence | Overall Assessment |
|-----------------|--------|-----------|------------|---------------------------|--------------------|
| Water pollution | Local  | High      | Short term | Possible                  | moderate           |

**Mitigation measures**

- Prevent or limit disturbance to water resources during the planning phase.
- Implement a riparian management zone (RMZ) by keeping safe shelter belts of undisturbed ecosystems around streams.
- Locate roads, skid trails, and landings away from streams and wetlands.
- Where appropriate, slash and debris should be stockpiled above the high-water mark to prevent materials from entering streams and wetlands.
- Restore or rehabilitate disturbed sites to desired ecological conditions prior to completing or decommissioning project operations and facilities. This should include installing water bars on skid trails and restoration of landings (e.g. ripping and seeding to natural vegetation).
- Suspend water pipes across streams and wetlands on concrete pillars to ensure future disturbance during repairs will not result into further interface with the water resources in these ecosystems.
- No materials/waste shall be dumped in the nearby wetland and all the foreign materials introduced during construction period shall be removed and disposed of in gazetted areas
- For all activities that will affect wetlands and river banks, make sure you obtain a wetland user permit and construction permits from DWRM before conducting activities in such ecosystems.

### 8.2.9 Impact on Houses/structures and or settlement patterns

Although the proposed Enyau WSS will be undertaken using the road reserves of the existing public roads, the possibility of displacing some structures cannot be ruled out. Trenching within Imvepi refugee settlement may displace some road side kiosks, signposts, and business stalls that were constructed within the road reserve. Therefore, such encumbered areas need to be approached with due care and compensation issues handled well in accordance with the law. However, the chance that a structure will be impacted is very low.



Some structures in Imvepi refugee settlement in the road reserve and could be displaced

#### Risk assessment matrix

| Impact               | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|----------------------|--------|-----------|-----------|---------------------------|--------------------|
| Impact on structures | Local  | Medium    | Long term | Possible                  | Moderate           |

#### Mitigation measures

- MWE shall work with local council committees, sub-county committees, Councilors, district land boards, CAOs, RDCs, Politicians and other local leaders to sensitize all people to be affected on the intentions of land acquisition.
- MWE shall conduct a Resettlement Action Plan (RAP) in accordance with the Land Act and World Bank environmental and social Safeguard Policies especially Involuntary Resettlement (OP 4.12).
- MWE shall negotiate with land and structural owners in compliance with local market prices and government rates so as to establish rational figures for compensation and resettlement.
- All sorts of compensation and settlements must be done at least 6 months before structures are demolished.
- All physically or economically displaced people should be offered an option between either a full resettlement package, including the provision of replacement residential land and a house, or cash compensation.
- Any grievances in the course of project implementation shall be addressed in accordance with the grievance redress mechanism presented under Annex 13.

### **8.2.10 Impact on the economy**

The construction phase of the project will have positive impacts on the project. The main impact on the economy will be contribution towards eradication of poverty and improved livelihoods of the local people. As described in section 5.3.14, 50-70% of the population in Terego and Yumbe live below the poverty line. The project will create jobs during construction phase for the local community especially for the unskilled workforce. About -20 people will get jobs during operation phase during operation phase. During construction, about 50-100 people will be employed (see section 2.5.4) and employment will be created to the local proprietors who will be providing services like food, accommodation, medical care and supplies like sand and stone aggregates. The income accruing from such activities will obviously have a contribution on enhancing their standards of living. This impact will be enhanced through giving priority to local communities while recruiting workers and procurement of materials for the project.

### **8.2.11 Water and Sanitation impacts**

Open water sources that are commonly used by the project area residents are prone to contamination from open waste dumping, lack of pit latrines, sharing of the same sources of water with their animals and the use of such sources for washing and bathing areas. Access to safe water in Terego stands at 64%. The same is estimated to be 49%, 68%, 60% and 82% for Omugo, Udupi, Ariwa and Uriama sub counties respectively (Section 5.3.5). About 15-20 percent of households in rural areas lacking basic sanitary facilities. (Section 5.3.6).

During construction, excavations and hipping of soils may affect surface flow regimes of some streams thereby causing flooding and/or water stagnation. Stagnant water may be a breeding ground for disease vectors like mosquitos which cause malaria. The soils may be washed away into water bodies therefore leading to silt loading and causing water turbidity. The Project is expected to engage about 50-100 workers. These will generate wastes and most especially sanitary wastes at all work areas. The sanitary wastes if not well managed can pollute water bodies thereby causing reduced dissolved oxygen as a result of decomposition of organic wastes, algae growth as a result of nutrients as well as increasing faecal coliforms which are a public health threat.

The project will use earth moving equipment and vehicles. During servicing of these equipment, used oil may accidently find its way in water bodies thereby increasing BOD and reducing the DO while impacting of aquatic micro-organisms. This impact is limited in the extent and temporary but medium in magnitude. The impacts stated above are localised and of short term and therefore not expected to lead to cause adverse effects to surface water.

### **Risk assessment matrix**

| Impact                   | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--------------------------|--------|-----------|-----------|---------------------------|--------------------|
| Impacts on Surface Water | Local  | Medium    | Temporary | Likely                    | Moderate           |

**Mitigation Measure:**

- The Contractor shall construct a drainage system with silt traps to reduce impacts of storm water from the construction site. No spoil soil or any other materials shall be dumped or temporary stored in a known drainage system
- All excavated soils shall be used for backfilling immediately after laying of pipes. The heaped soils at deep excavations shall be consolidated in an area with embankments to prevent it from being washed away.
- Appropriate sanitary facilities shall be installed at the campsite and working gangs shall be provided with mobile toilets that will be maintained and emptied on time. The emptied sanitary waste shall be disposed of at regional NWSC Treatment Plant.
- Regular servicing of project vehicles shall be outsourced to gazetted vehicle service centres (Vehicle maintenance and Servicing companies) either in Terego or Yumbe districts. No vehicle shall be allowed to be serviced in sensitive ecosystems. The Service centre must present with proof that its fluids such as old car engine oil shall be is properly managed.

**8.2.12 Impacts due to solid waste**

The Construction of the project will have potential negative impacts due to waste generation. About 15-20 percent of households in rural areas lacking basic sanitary facilities. (Section 5.3.6). Hence such people use risky defecation systems (such as open areas) standing a high likelihood of triggering and spreading sanitation related diseases like cholera and hepatitis E.

During Construction, solid sanitary wastes will be generated by workers along and /or at construction sites and the campsite/materials yard. Waste will also be generated during construction and laying of water transmission and distribution pipes. Such waste may include plastic offcuts from the HDPE and uPVC pipes and other accessories associated with water and sanitation projects. Organic waste will also be generated at temporally eating places.

Plastics waste such as mineral water bottles, polythene bags (Kaveera), Jerrycans, cups, plates and other plastic accessories may be found along the corridor, at the site if not well managed. The impact of littering waste is likely to be Negligible-Minor since much of the waste is not expected to be hazardous or infectious.

**Risk assessment matrix**

| Impact                    | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|---------------------------|--------|-----------|-----------|---------------------------|--------------------|
| Generation of Solid Waste | Local  | Low       | Temporary | Likely                    | Negligible-Minor   |

#### Mitigation measures

- All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and given to recycling facilities. Other forms of waste which are inert or ceramic in nature may be collected by NEMA gazetted waste handlers (Who shall be engaged by the Contractor) and taken to a NEMA gazetted waste disposal facilities for disposal.
- All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated Town Council landfills for disposal. This activity shall be supervised by the District Environment Officer and the supervising consultant.
- All plastic waste generated at rented residences for the workers or campsites in the course of work such as mineral water bottles, polyethene bags, jerrycans and cups shall be collected and given/sold either to the local people for re-using or taken for recycling in respective factories.
- The Contractor shall develop and implement a Waste Management Plan that puts into consideration sorting at the source, proper storage and transportation. That will at minimum contain the types, nature and quantities of wastes expected to be generated as well as their corresponding methods of treatment and disposal. The plan shall also indicate the sites of proposal as well as the frequency of collection and disposal.
- Adequate and appropriate sanitary facilities shall be constructed at the campsite while workers along the construction sites shall be provided with mobile toilets that shall be cleaned and emptied promptly.

#### 8.2.13 Transport – Traffic and road safety

The proposed project will cut across several access roads within the project areas. All the roads within project area have been presented in Section 5.3.7. The water transmission and distribution network shall also interfere with the access roads to public institutions like Ogoko Seed Secondary School in Ogiba village, Inde Town Council, Okollo district at E: 319849, N: 297426, H:719m. The excavations for the water transmission/distribution line will cross some access roads which may interfere with their integrity. Fortunately, this project will be crossing the earth surfaced roads. With the understanding that the water pipelines will be constructed along the main road reserves of the existing gravel public roads, the impact of construction works on road safety can be a major challenge. Unless proper mitigation measures are put in place, construction works across and along these roads could result into critical interferences with traffic or accidents. It's therefore necessary that key precautions be undertaken at such road crossing to avoid accidents and impairing traffic activities.



Plate 8.1: Some of the project area roads whose road reserves will host the proposed project

**Risk assessment matrix**

| Impact   | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--|---------------------|-----------|-----------|---------------------------|--------------------|
| Interference with traffic and diminished road safety | Within limited area | Very high | Temporary | Possible                  | Substantial        |

**Mitigation measures**

- To minimize interference with traffic, digging trenches and piping across roads shall be conducted in hours with less traffic preferably on weekends.
- The trench excavated across the roads, after laying the pipes should be backfilled with marram, compacted and levelled to the level of the existing road immediately. This is to ensure that the integrity of the road is not affected by the water line construction activities.
- Conspicuous notices shall be well placed on roads and guides on ground shall direct traffic in case of diversions or open trenches.
- The contractor will have to notify traffic police in advance and work with it during trenching across high ways and other major roads.
- All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits.
- The roads that will be affected by the repaired and restored immediately after laying of pipes
- The Contractor will develop and implement a Traffic Management Plan that is approved by the Supervising Engineer.

#### 8.2.14 Social ills of Influx of constrction labour

The influx of workers, typically young males seeking construction jobs will likely be associated with a series of social challenges such as crime, alcoholism/illicit drug abuse, Sexual Exploitation and Abuse (SEA) of women and girls and prostitution. These are often related to the spread of sexually transmitted diseases including HIV/AIDS. Vices such as drug abuse and prostitution would affect social coherence and security in project communities tarnishing the image and intent of an otherwise good project.

- **Crime, drug abuse and prostitution**

Unless sensitization of all workers is undertaken by contractor, this impact is highly sensitive (considering that the project area hosts refugee settlements). Duration of above-mentioned social ills will be short-term ending with completion of road construction but associated social and health effects can be long-term and irreversible, especially addiction to drugs making impact magnitude high.

- **HIV/AIDS Risk**

The influx of male workers into the project area may increase the risk of HIV/AIDS transmission. The concentration of young males in worker's camps may lead to illicit and unsafe sexual behavior that may push up infection rates in the local areas. However, since most of the labor force will be below 40 years and local residents, it is expected that behavioral change will help stabilize the infection rate. Risky sexual behavior and drug abuse are ranked as likely to occur due to common attitudes of contract labor though this will be moderated by high rates of sensitization on HIV/AIDs. However, should infections occur due to lapses in awareness, sensitivity is high and impact magnitude is **high**. This is therefore an impact of **Major** significance.

- **Sexual Harassment (SH)**

Sexual harassment can occur between workers, particularly male workers against female workers, when there is insufficient sensitization of workers against prohibitions for sexual harassment, as well as the absence of reporting and disciplinary measures.

- **Sexual Exploitation and Abuse (SEA)**

Construction workers are predominantly males. When attitudes that condone gender inequality and abuse of power are prevalent in the work sites and/or the culture, this may increase risk for women and girls in the community of sexual exploitation and abuse committed by construction workers, particularly in settings where there is impunity for this violence. A large influx of male construction workers may also contribute to a human trafficking, whereby women and girls are forced into sex work.

- **Gender Based Violence (GBV) at the community level**

This impact refers to GBV that women and girls may experience as a result of Project implementation. This includes, for example, an increase in intimate partner violence (IPV) when compensation schemes that share funds equally among husband and wife at the household level do not provide adequate sensitization and safety measures to reduce

potential for increased tensions due to females receiving funds. This also refers to other GBV-related risks incurred as a result of projects creating changes in the communities in which they operate and causing shifts in power dynamics between community members and within households. Male jealousy, a key driver of GBV, can be triggered by labor influx on a project when workers are believed to be interacting with community women with the fear that it could exacerbate the risk of family breakdown.

**Risk assessment matrix**

| Impact                 | Extent | Magnitude | Duration           | Probability of occurrence | Overall Assessment |
|------------------------|--------|-----------|--------------------|---------------------------|--------------------|
| Public Health concerns | Local  | High      | Short –medium term | Possible                  | High               |

**Mitigation**

- The contractor shall involve local (LC) leaders in labour recruitment to ensure people hired have no criminal record.
- Local governments and the contractor shall collaborate with police to contain criminal activities.
- A register of all construction workers shall be filed with local authorities to aid in tracking cases of child neglect.
- With the assistance of a competent sub-contractor, the contractor shall draft an HIV/AIDS policy
- A service provider for professional HIV/AIDS activities shall be procured and engaged
- The contractors shall put in place worker place committees to oversee implementation of HIV/AIDS control activities.
- Contractor will provide counseling support and work based positive culture to posttest workers
- The contractor will provide condoms to all workers free of charge placed in private and areas of confidence.
- Peer based awareness and counseling shall be instituted within the workforce.
- All workers (permanent or temporary) will be required to sign the project code of conduct prior to commencing their assignments.
- A worker Grievance mechanism shall be established and operated.
- Signing of codes of conduct by workers
- Ensure that there is recruitment of (a) service provider(s) to support in prevention (sensitization) and response (referral pathway) activities.
- Develop and implement a SEA/SH action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA/SH action plan will follow guidance on the World Bank’s Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). The SEA/SH action plan will include how the project will ensure necessary steps are in place for:



- Prevention of SEA/SH: including COCs and ongoing sensitization of staff on responsibilities related to the COC and consequences of non-compliance;
- Response to SEA/SH: including survivor-centered, multi-sectoral referral and assistance to complainants; staff reporting mechanisms; written procedures related to case oversight, investigation and disciplinary procedures at the project level
- Engagement with the community: including development of confidential community-based complaints mechanisms GM; mainstreaming of SEA awareness-raising in all community engagement activities; IEC materials; regular community outreach to women and girls about social risks and their SEA-related rights;
- Management and Coordination: including integration of SEA/SH in job descriptions, employments contracts, performance appraisal systems, etc.; development of contract policies related to SEA/SH, including whistleblower protection; training for all project management; management of coordination mechanism for case oversight, investigations and disciplinary procedures; supervision of dedicated SEA focal points and trained community liaison officers as applicable.
- Develop and implement provisions that ensure that gender-based violence at the community level is not triggered by the project, including:
  - effective and on-going community engagement and consultation, particularly with women and girls;
  - review of specific project components that are known to heighten GBV risk at the community level, e.g. compensation schemes; employment schemes for women; resettlement; etc.
  - Specific plan for mitigating these known risks, e.g. sensitization around gender-equitable approaches to compensation and employment; etc

#### **8.2.15 Exposure to high noise levels**

The activities like movement of heavy equipment are likely to generate noise levels beyond those stipulated in The National Environment (Noise Standards and Control) Regulations, 2003. The selection of the equipment for the waste water treatment plant has not been done and therefore it has not been possible to anticipate what the noise levels will be during operation. The water treatment facility will be far away from the community members, and therefore they will not be affected. However, the affected group will be workers at the facility. The current noise levels in the project area are presented in section 4.1.7. Exposure of workers to high noise levels can be a health concern and needs to be mitigated.

#### **Risk assessment matrix**

| Impact                        | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|-------------------------------|---------------------|-----------|-----------|---------------------------|--------------------|
| Exposure to high noise levels | Within limited area | Medium    | Long-term | Possible                  | Moderate           |

#### Mitigation measures

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs;
- Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;
- The procurement process of the equipment for water treatment should put into consideration the noise level requirements under the national standards.
- In the circumstances that the equipment at the treatment plant generates noise above the national standards, then the use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the management of the Water Treatment Plant.
- Annual medical hearing checks should be performed on workers exposed to high noise levels.
- Sites must be hoarded to curb noise impacts to neighboring communities.
- The selection of the equipment for water treatment must put into consideration the national requirement/standards for noise level emissions.

#### 8.2.16 Impacts on Education

Section 5.3.9 presents schools that are within the project area. A number of schools are fairly close to the road reserve and during construction activities are likely to impact on the learning process. Noise from trench excavation activities and laying of water pipes may will disrupt the learning process because these schools are all within the vicinity of the project area. The noise from the works site especially when construction is near the schools will disrupt the concentration of students.

There is also a probability of occurrence of accidents in locations near schools. Male workers could lure school girls with money and other gifts which could make them drop out of school. School attendance may be affected as some children might decide to skip school so as to earn money from the project while others may spend time simply watching construction works. This is a highly sensitive impact of moderate magnitude because its duration is short term.

#### Risk assessment matrix

| Impact                                 | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--|--------|-----------|-----------|---------------------------|--------------------|
| Impact on schools and learning process | Local  | Medium    | Temporary | Likely                    | Minor              |

#### Mitigation measures

- Schools shall be sensitized on the need to keep off construction sites.
- When working near schools, work should be scheduled to ensure minimal disruption for the learning. The schools should be notified of the work schedule ahead of time
- The contractor shall not employ any person below 18 years and any pupil or student above 18 shall not be employed during school time. Students above 18 years can be employed only during holidays.
- The Contractor should ensure that there is minimal contact between workers and school population.

#### 8.2.17 Physical Cultural Resources impacts

Some cultural properties as highlighted in (section 5.3.12) exist in the project area (mainly cemeteries). Although most of the major cultural sites identified are quite far from the proposed project infrastructure, the possibility that some cultural features (along the transmission route or where the treatment plant and other infrastructure will be located) can be encountered can't be ruled out. In general, the impact on Physical Cultural property will be minor since hardly any existing cultural property are likely to be affected.

#### Risk assessment matrix

| Impact                               | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--------------------------------------|---------------------|-----------|-----------|---------------------------|--------------------|
| Impact on Physical Cultural Property | Within limited area | Medium    | Temporary | Possible                  | Minor              |

#### Mitigation

- Structures like shrines and graves if any will be relocated in accordance with the existing rituals and norms of the society. Loss of incomes shall also be compensated for since the owners may take some time without any income from them especially if it's deemed necessary to relocate them far from their original site due to cultural rituals involved. Details of compensation shall be contained in the RAP.
- Sites that are buried may be discovered during project implementation. Such discoveries of archaeological nature are termed as '**archaeological chance finds**'. These could be concentrations of pottery, animals and human bones, worked stone etc. Chance Find Procedures as presented in section 8.2 shall be adhered to. In summary, the following shall be undertaken:
  - On discovering evidence of possible scientific, Paleontological, historical, prehistoric, or archaeological remains, the contractor shall notify the

Department of Museums and Monuments giving the location and nature of the finds.

- The Contractor shall cease work in the vicinity of the site and request the responsible officer from the Department of Museums and Monuments to inspect the site and make recommendation on possible salvage within 72 hours.
- The Contractor shall exercise care so as not to damage artefacts or fossils uncovered during excavation operations and shall provide such cooperation and assistance as may be necessary to preserve the findings.
- The department of Museums and Monuments is located in Kampala, Kamwokya just before Uganda Wild Life Authority on the road to Ntinda (Kira road). The Commissioner Uganda Museum can be contacted on +256 772485624. A detailed chance find procedure has been presented in Annex 12.
- To mitigate damage to archaeological resources, it is proposed that the construction foremen will inform construction crew to be aware of the possibility of discovering fossils or archaeological remains, what form these would take (bones, fossils in rock, shards or pottery, arrow heads etc.) and the procedure to be followed shall be as stated above.
- Further still, the contractor shall develop and implement avoidance procedures. In the event of human remains, there shall be no further excavations or disturbance of the site until the responsible police authorities have been informed.

#### 8.2.18 Land take

Land in the project areas is mainly communally owned and governed by the customary system of land tenure system (see section 5.3.16). The project areas that will be affected have been modified by agricultural activities and only has patches on natural vegetation (see section 4.1.1). The land requirements for the Enyau WSS have been presented in section 2.5.2. The project case scenario is that total land take will be 9.0 acres to be acquired to host the intake structures, raw water main, water treatment plant and area for storage tanks. Land for hosting such structures shall be compensated for in accordance with the Land Act and World Bank Environmental and social safeguard policies.

#### Risk assessment matrix

| Impact                                   | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--|--------|-----------|-----------|---------------------------|--------------------|
| Loss of land to the water infrastructure | Local  | Medium    | Long term | Almost certain            | Substantial        |

#### Mitigation measures

- MWE shall engage all affected land owners and obtain consent before their land is used as water transmission corridor/way leave for the proposed Enyau water and sanitation project.

- Where the landlords object using their land without any compensation, MWE shall obtain an alternative route for the proposed water pipes.
- All land acquired for establishment of the water treatment plant, transmission pipes, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies. The compensation for married couple should be done after the wife has consented. This is aimed at promoting gender equality given that in the area, women rarely own land (see section 5.3.17).

## **8.2.19 Gender and vulnerable groups**

### **8.2.19.1 Gender Impacts**

This impact is related to the effect of the proposed project on direct and indirect gender impacts focusing specifically on access and utilization of resources and reducing the gender poverty gap.

1. The project has considerable potential to generate positive impacts on women's and men's livelihood opportunities and empower women, through inclusion in roles from which they have traditionally been excluded. The project has the potential to make a significant difference in women's health, labour burdens, time use, safety and security, and increase possibilities for income generation.
2. The provision of safe water to all, men and women within the trading centres, government institutions and facilities such as health centres, churches, mosques, schools etc., will be perceived by the District Local Government Officials at various levels and by the local communities, as a direct positive impact of the project on gender considerations. In addition, the impact on the local economic and employment dynamics and especially the anticipated opportunities for both men and women to provide local supplies and services, will be an additional benefit in the context of gender equality.
3. Women in a rural setting such as the Project Site, are predominantly engaged in demanding household chores including spending long hours fetching water for domestic use. The supply of community piped water will provide time savings that will in turn widen women's opportunities to gain employment and income outside the home.
4. However, the project also has the potential to reinforce existing gender disparities and biases, in which positive benefits (employment, compensation, etc.) are felt disproportionately more by men and the negative impacts by women. For example, stakeholder consultations in the Project Area identified the following concerns which they perceived as potentially negative gender-biased impacts of the project:
  - a) limited engagement of women on project activities;

- b) increase in sexual harassment of women and young girls by construction workers;
- c) increase in sexually transmitted diseases including HIV/AIDS;
- d) sexual exploitation of young girls which could lead to increased incidents of school drop-out;
- e) social tension within households, gender-based violence and disruption of family units; and
- f) In addition, evidence from previous infrastructure projects demonstrate that women-owned businesses (kiosks, grinding, milling, tailoring, grocery shops, etc.) have less access to property and land for economic activities, and even less access to credit needed for business investment, including electricity connection. The need to address this imbalance is one that will require careful consideration, as it cuts across several government sectors and entities, including financing institutions.

#### Risk assessment matrix

| Impact         | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|----------------|--------|-----------|-----------|---------------------------|--------------------|
| Gender impacts | Local  | High      | Long term | Almost certain            | Substantial        |

#### Mitigation Measures

1. A key consideration for the proposed project is the ability to effectively involve key stakeholders in a realistic and positive participatory process to combat gender violence and the abuse and mishandling of women and children on such government infrastructure projects and the Contractor must present a plan to address such.
2. Conducting appropriate sensitization on gender issues at all levels within the Project Area and creation of awareness on the responsibility of all concerned during the various phases of the project to address specific gender concerns. This should entail consultation with both women and men in the Project Area and within the construction teams.
3. MWE and the Contractor should ensure that:
  - a) effective gender responsive and equality activities under the proposed project are duly defined and implemented through participatory engagement;
  - b) the targets and indicators for monitoring the gender impacts and outcomes are clearly defined in the contract documentation;
  - c) the quantifiable and none quantifiable, gender and social related direct and indirect benefits have been defined and duly achieved; and
  - d) a social specialist is deployed on the project to oversee among others, gender mainstreaming in the project cycle is observed and implemented.
  - e) A Gender Awareness Program be established and an HIV/AIDS awareness campaigns must be regularly conducted for PAPs, workers and local communities, as well as activities promoting access to health services, treatment and counselling

### 8.2.19.2 Impacts to vulnerable groups

This impact is related to the effect of the proposed project on vulnerable groups (women, children, persons with disabilities).

1. Stakeholder consultations conducted in the project identified child abuse as a problem that has emerged from previous infrastructure projects. There is therefore concern in the local communities and amongst some of the leadership at various levels that this project may also have the potential to impact school children as vulnerable members of society.
2. The proposed project traverses areas with schools and settlements and it is likely that some project workers could engage in sexual relations with school and under-aged children. This could result in an increase in child pregnancy/marriage, which was established to be at about 8% in the project area. In addition, sex work involving children and school dropout, defilement of school children and marrying school girls, were also cited as potential impacts that could be generated by the project. The local communities are also concerned that during the construction phase of the project, as has happened in previous infrastructure projects, the Contractors are likely to be tempted to use children as labourers, to save money on labour costs; this amounts to child labour and abuse.
3. As has been mentioned in previous sections of this document, the project has the potential to make a positive and significant contribution to women's livelihoods through provision of employment opportunities, increased income levels, improved maternal healthcare and gender empowerment.
4. Equally though, the project has the potential to exacerbate existing gender inequalities and lead to a situation in which women become the target of the potential negative impacts of the project. Examples of such impact include: limited engagement in available project work and tasks; sexual harassment and exploitation; social tension in some homes; disruption of marriages; gender-based violence, among others.
5. Male construction workers are also likely to lure school girls with money and other gifts and ultimately lead to incidents of sexual exploitation of young girls, pregnancies and school-drop out. School attendance is also likely to be affected; some children might decide to skip school to earn money from the project, while others may spend time simply watching construction works.
6. For people with disabilities, access to water is an essential service. In addition, people with disabilities are often more likely to have less income and therefore struggle to get employment, afford water costs, and therefore end up requiring greater assistance for basic services. There is concern that people with disabilities are likely to experience the same challenges throughout the life of this project.

#### Risk assessment matrix

In general, incidents of child abuse, gender-based violence, sexual harassment and exploitation of women, as well as exclusion of persons with disabilities are issues of serious concern that require considerable attention and remedial action by all concerned parties in infrastructure projects, such as the proposed distribution line project. While the above negative impacts are likely to be localised in geographical extent, their cumulative effects will continue to be felt during the operation and maintenance phases of the project. Consequently, the significance of the impact of the project on vulnerable groups is considerable in intensity and duration.

| Impact                   | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--------------------------|--------|-----------|-----------|---------------------------|--------------------|
| Vulnerable group impacts | Local  | High      | Long term | Almost certain            | Substantial        |

#### **Mitigation Measures**

1. A Child Protection Plan should be developed and provided to all the Contractors and school management to discourage the Contractors from using children as labourers. In addition, Contractors will be required to avoid employing workers who are below eighteen years old. They will also be required to keep records that show the ages of their workers.
2. Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 116. The existence of the hotline can be displayed throughout near the construction site and in the community at large.
3. The Contractor should ensure that mechanisms for close monitoring of worker's behaviour/conduct are in place e.g. Contractor could discreetly engage the police to identify anonymous informers from among the workers to monitor and report any negative behaviour by the workers including child abuse related misconduct, display a call line or suggestion box where the community can provide feedback on workers behaviour.
4. MWE and the Contractor should ensure that all local leaders and women/child representatives are fully oriented to the labour force related risks for children engaging in construction related activities.
5. Talks with the Contractor and his workforce by relevant officials (including the police) on child protection should be encouraged and appropriately scheduled, including continuous popularization of the child help line 116. Parents/guardians should be sensitized and held accountable for children leaving and arriving home before dark.
6. MWE and the Contractor should ensure strict compliance with the provision of relevant safeguard policies with respect to persons with disabilities. MWE and the Contractor should ensure that there are full and effective participations of persons



with disabilities and other vulnerable groups, like children and through representative organizations, in all phases of the project, including monitoring and evaluation.

### 8.2.19.3 Potential abuse to women and girls

The proposed water and sanitation project is likely to attract women who will be employed as labourers. During employment and execution of their duties, it is possible that their sexual rights as women may be abused by educate and unchecked sexual behaviors of contractors and their workers. Impacts relating to women will include issues like denial of employment opportunities, gender-based violence when husband forcefully demand their wives pay. Other potential negative impacts on women include exposure to HIV/AIDS and STIs and increased sexual exploitation of young girls which may likely lead to unwanted pregnancies, drop-out from school and others. These are large negative impacts which are of medium significance and magnitude making the overall impact moderate. These are proposed to be mitigated through the following measures:

#### Risk assessment matrix

| Impact          | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|-----------------|--------|-----------|-----------|---------------------------|--------------------|
| Gender concerns | Local  | Medium    | Temporary | Likely                    | Moderate           |

#### Mitigation measures

- Workers will be sensitized on their sexual rights. MWE shall Work with the contractor on establishing zero tolerance policies and codes of conduct related to violence against women and girls (VAWG). All employees must be made aware of the zero-tolerance policy and codes of conduct for employees.
- All workers shall receive adequate briefing and education on the laws against defilement and other sexual offences.
- To the extent possible, there will be gender sensitivity in task allocation;
- The contractor shall conduct gender sensitization to the work force on matters such as gender sensitive communication and on the gender sensitive conduct of workers towards women including putting in place toilets segregated by gender amongst others and;
- There will be a Specialist (Social Specialist) to oversee amongst others gender mainstreaming in the project.

### 8.2.19.4 Potential child abuse

The proposed project traverses' areas with a number of schools and settlements and it is likely that some project workers could engage in sexual relations with school and under aged children. This could result in increase in child pregnancy/marriage, sex work involving children and school dropout/Defilement of school children/marrying school girls. In addition, during the construction phase contractors could be tempted to use children as laborers in order to save

money on labour costs, which amounts to child labour and abuse. Sensitivity is medium due to relative public awareness about child abuse which makes the overall impact significance substantial.

**Risk assessment matrix**

| Impact                | Extent       | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|-----------------------|--------------|-----------|-----------|---------------------------|--------------------|
| Potential child abuse | Limited area | Very high | Temporary | Possible                  | Substantial        |

**Mitigation measures**

- A child protection plan will be developed by MWE and provided to all the contractors and school management to discourage the contractors from using children as laborers. In addition, contractors will be required to avoid employing workers who are below eighteen years old. They will also be required to keep records that show the ages of their workers.
- Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 611. The existence of the hotline can be displayed throughout near the construction site and in the community at large.
- The contractor shall ensure that mechanisms for close monitoring of worker’s behavior/conduct are in place e.g. contractor could discreetly engage the police to identify anonymous informers from among the workers to monitor and report any negative behavior by the workers including child abuse related misconduct, display a call line or suggestion box where the community can provide feedback on workers behavior.
- MWE and the contractor shall ensure that all local leaders and women/child representatives are fully oriented to the labour force related risks for children engaging in construction related activities.
- Talks with the contractor and his workforce by relevant guests (including the police) on child protection shall be encouraged and appropriately scheduled, including continuous popularization of the child help line 611. Parents/guardians shall be sensitized and held accountable for children leaving and arriving home before dark.
- Any person involved in child abuse shall be dealt with in accordance with the law.

**8.3 OPERATION PHASE IMPACTS ENVIRONMENTAL AND SOCIAL IMPACTS**

**8.3.1 Overview**

Once the water treatment plant, transmission and distribution pipes have been constructed, the environmental impacts associated with the operation phase will be minimum. Most of the impacts of the operation phase are associated with the quality of water treatment process, water transmission and management, social impacts, Sewage collection and management

all of which have been discussed already in this chapter under construction phase. Additional impacts during operational phase as detailed down below;

### 8.3.2 Exposure to high noise levels

The water treatment plant is likely to generate noise levels beyond those stipulated in The National Environment (Noise Standards and Control) Regulations, 2003. The current noise levels in the project area are presented in section 4.1.7. Exposure of workers to high noise levels can be a health concern and needs to be mitigated. High noise levels is likely to be generated by the water pumps and generators among other tools and equipment that will be used at the water treatment plant. The noise levels should not be above 85dBs as stipulated by the National Environment (Noise) Control Regulations, 2003.

#### Risk assessment matrix

| Impact                        | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|-------------------------------|---------------------|-----------|-----------|---------------------------|--------------------|
| Exposure to high noise levels | Within limited area | Medium    | Long-term | Possible                  | Moderate           |

#### Mitigation measures

- No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs;
- Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;
- The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment (earmuffs) should be enforced by the management of the Water Treatment Plant.
- The water treatment plant should continuously monitor the noise levels at the plant and in case, the levels go above the national standards, then the cause of the increase should be investigated and addressed.
- Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.
- Periodic medical hearing checks should be performed on workers exposed to high noise levels.

### 8.3.3 Impact on water quality and quantity due to WTP operations

The WTP will be constructed on a hill in Imvepi refugee settlement. The WTP will employ alum and lime in its treatment processes. Thus, the sludge will have to be disposed. Additionally, backwash (filter cleaning) wastewater will have to be disposed. The clarified backwash water will continuously release residues of aluminum sulphate, suspended solids,

chlorine and nutrients. Over the long term, these residues will form a sludge on the river bottom but this is expected to be of minor significance owing to the large dilution effect of the river. In general, the impact of WTP residuals (e.g. Dissolved salts, filtrate residues, Aluminium salts, sulphates, chlorides), if discharged into source water, though localized and temporary, will be limited because of the dilution factor and non-cumulative in effect, thus the impact will be minor. If in considerable quantities, these components can lead to turbidity of and salinity of water. In the aquatic environment, aluminium acts as a toxic agent on gill-breathing animals such as fish and invertebrates, by causing loss of plasma- and haemolymph ions leading to osmoregulatory failure.

According to the design, the amount of water that will be abstracted by 2040 by the project is estimated at 3,009m<sup>3</sup>/d which translates into 1,083,240m<sup>3</sup>/year. The hydraulic assessments also showed that the existing direct abstractions from River Enyau is negligible compared to the available volume. Therefore, the project will have negligible impacts on the flow (volume of the river) and hence no need to apply any restrictions. However, the client will have to acquire the water abstraction permit from the Directorate of Resources Management and ensure compliance to the set conditions on volume if any.

**Risk assessment matrix**

| Impact   | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--|--------|-----------|-----------|---------------------------|--------------------|
| Degradation of source water quality and quantity | Local  | Low       | Temporary | Likely                    | Negligible-Minor   |

**Mitigation measures**

Management of alum & lime sludge

- Do not discharge any sludge into River Enyau or any nearby water body. Adopt mechanisms that lead to:
  - Pollution prevention & waste reduction (resource recovery) at the WTP as a priority; followed by
  - Residuals treatment and
  - Safe disposal of wastes as a last option.
- Adopt the following pollution prevention & waste reduction mechanisms:
  - optimize intake location to lower turbidity & suspended loads by siting and installing intake infrastructure at a deeper and clearer point of the river profile;
  - Optimize solids settling using the pH in clarifiers and sedimentation tanks to reduce coagulant chemicals (alum coagulation has a minimum solubility at pH 6 (Tchobanoglous, et al., 2003). Thus, adjusting of pH (i.e. above 6) to keep optimal coagulation conditions might help to reduce waste products but still effectively treat the source water);
  - Reduce softening chemicals by monitoring source water hardness (WTPs remove calcium hardness to a level that meets the requirements of the

customer. By monitoring the calcium content of the influent, WTPs might reduce the amount of chemicals needed to precipitate the required fraction of calcium hardness, thus resulting in a minimized level of residuals requiring additional treatment or disposal); recycle/reuse sludge where applicable.

- Adopt the following residuals treatment mechanism:
  - Utilize drying beds in separating solids and liquid at the WTP facility.
  - Contract a NEMA approved WTP residual handler to collect hazardous solid wastes for safe disposal;
  - Landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically, not hazardous (EPA, 2011a), thus can be landfilled).
  - Do not discharge backwash water into River Enyau or any nearby water body prior to chlorination; adopt mechanisms that lead to:
    - Pollution prevention & waste reduction (resource recovery) at the WTP as a first priority; followed by
    - Backwash water treatment; and adopt the following pollution prevention & waste reduction mechanisms:
      - Optimize the filter media by employing filter medium that ensure longer filter run times, thus infrequent backwashing while maintaining or improving on the finished water quality;
      - Return backwash water to the head of the source water treatment plant for reuse.
- Adopt the following backwash water treatment mechanism:

Dechlorinate the free or total combined chlorine residual remaining after disinfection through the addition of sulfur chemicals such as sulfur dioxide, sodium sulfite, sodium bisulfite, sodium metabisulfite, and sodium thiosulfate (NB: do not overdose with sulphite). Too much sulfite can result in sulfate formation, which suppresses oxygen content and lowers the pH of the treatment residuals (EPA, 2000b)
- The Project Proponent shall apply for and acquire a Water Abstraction Permit from Directorate of Water Resources and ensure compliance to the conditions therein

#### **8.3.3.1 Wastewater and septage collection**

Measures to minimize potential community health risks in sanitation can be implemented both in the collection and treatment of wastewater and sludge. Collection of sewage and transportation away from public toilets that will be constructed under this program, while not alone sufficient to protect public health, is nevertheless generally the most important aspect of sanitation. Under the Enyau WSS, human waste will be managed by use of septic tanks (during both construction and operational phases) which shall be emptied and treated at a nearest site (waste treatment plant) gazetted by NEMA –NWSC sewage treatment plant in Arua. Therefore, measures need to be put in place to ensure all waste water and sewage from septic tanks is fully collected and disposed appropriately.

### Risk assessment matrix

| Impact   | Extent              | Magnitude | Duration             | Probability of occurrence | Overall Assessment |
|--|---------------------|-----------|----------------------|---------------------------|--------------------|
| Failure to collect & dispose waste water and septage | Within limited area | Medium    | Temporary-short term | Possible                  | Moderate           |

### Mitigation measures

- Promotion of collection services and ensuring that collection services are available
- Timely collection of sewage should be undertaken to prevent sewage over flows.
- There should be a system among the communities, their leaders and the health workers to monitor, detect and alert the responsible authorities to call for emptying of any septic tank that poses a danger to the community.

### 8.3.4 Fauna (fisheries)

During abstraction water, there is a risk of sucking fish alongside the abstracted water. This is likely to occur at the abstraction point on River Enyau. However, sucking of fish is less likely as the size of the filter is too small for fish to pass through. Improper management of water treatment chemicals may end up in the river thereby poisoning fish (Chemicals i.e. coagulants like alum and disinfectant like chlorine if not well managed will end up in the water body and may be up taken by fish thereby either killing the fish or bioaccumulation in them. However, poisoning of fish is less likely to occur because of the high dilution by the river. This notwithstanding, the mitigation measures for ensuring that chemicals don't find their way into water bodies have been proposed. In the event that the discharge can not be avoided, then the effluent must meet the national effluent discharge standards. Improper management of wastes especially organic based wastes may lead to increased organic waste loading in the river thereby increasing risks of suffocating fish due to reduced dissolved oxygen in the river. Given the dilution effect, this impact is minor. The impact on fish has a negative implication on the livelihood of the fishermen in the area and this will obviously have an impact on the entire chain of fish trading. Impact on fish also has an indirect impact on the nutritional values as either fish's price will be high and unfordable to many or the fish catch will be reduced. Further, if fish bio accumulates chemicals in chemical wastes, it may end up in food chain thereby affecting public health.

### Risk assessment matrix

| Impact   | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--|--------|-----------|-----------|---------------------------|--------------------|
| Impacts of project activities to the fisheries | Local  | Low       | Temporary | Likely                    | Negligible-Minor   |

### Mitigation strategies for protecting the fisheries

- In order to avoid fish being sucked into abstraction pipe, the pipe should be screened (Screen of utmost less than a 100<sup>th</sup> inch holes) at the suction end to prevent entrance and sucking in of the fish during water uptake.
- Chemicals and Chemicals containing substances shall be stored in a facility that is leak free to minimize the amount of chemicals entering River Enyau.
- Chemical containing wastes shall not be disposed of directed into the environment but shall be disposed of to a NEMA approved disposal facility using a NEMA licensed waste transporter.
- In case the discharge of chemicals contaminated effluent into the environment can not be avoided, then the effluent must meet the national standards for discharge.

### **8.3.5 Economy**

The operational phase of the project will mainly present positive impacts. The impacts are presented below.

#### **8.3.5.1 Eradication of poverty and improved livelihoods of the local people**

As described in section 5.3.14, 50-70% of the population in Terego and Yumbe live below the poverty line. Human capacity building and the creation of jobs in water management through the involvement of private operators in the construction, management, repair and maintenance of water supply facilities will come along with this project. These will constitute skilled, semi-skilled and unskilled laborers. Skilled personnel will be employed as Managers, Supervisors, and in other technical positions whereas unskilled laborers will be support staff and perform non-technical work. The income accruing from such activities will obviously change their standards of living. About -20-30 people will get jobs during operation phase during operation phase. Employment will be created to the local proprietors who will be providing services like food, accommodation, medical care, among other services. The proposed project will also result in increase of volume of water for production which could result in improved livelihoods of the local people. Water is indispensable for survival and improving the quality of life – for health (drinking, eating and bathing) and for economic development (agro-processing and business). The project would, therefore increase productive activities through reduced sick days and time saved in fetching water. This impact will be enhanced through giving priority to local communities while recruiting workers for the project and putting in place initiatives to promote productive use of water.

#### **8.3.5.2 Increased Revenue to the government**

This water supply and sanitation project will generate revenue to the districts and the country in general. This will be in form of VAT on water supply and other taxes associated with extension such as expanded and improved business opportunities in the project areas. This will be enhanced by putting in place an efficient mechanism for revenue collection.

### 8.3.5.3 Increase in investment in the area

The business community could take advantage of the proposed development to establish businesses that would otherwise be impossible without piped water. This impact will be enhanced through embedding initiatives for promoting productive use of water.

### 8.3.5.4 Loss of livelihoods

While most households would receive real tangible benefits from the operation of the improved infrastructure, there is one social group, the water vendors, who are likely to have their livelihoods seriously undermined following project implementation. A number of water vendors who are the men (very rarely are women) currently collect water and sell it on to individual users. During the assessment, 11 people identified themselves as water vendors. These Vendors are involved in other activities like farming and water vending is their secondary/ additional source of income.

#### Risk assessment matrix

| Impact              | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|---------------------|--------|-----------|-----------|---------------------------|--------------------|
| Loss of livelihoods | Local  | Medium    | Temporary | Likely                    | Moderate           |

#### Mitigation Measures

- MWE should sensitize existing water vendors in the area about adapting to the new developments in the area. This would eliminate their negative attitude towards the proposed project and result in total project support.
- The community Development officer (CDO) should mobilize the local people (including water vendors) and sensitize them about the opportunities that the proposed project would bring in the area and how they can take advantage of piped water in the area to create jobs (such as washing bays) and spur development in the area.
- Vendors would be encouraged to become scheme or kiosk operators; vendors would be encouraged to tender for public water points and shall be given priority
- Vendors could continue selling water to those who would wish to get water at their door steps.
- Vendors would be encouraged to be involved in casual work in the course of the construction works.

### 8.3.6 Water and Sanitation

The project will support construction of 2 water borne toilet type (9 stance) at one of the parks and or market areas at a location to be agreed by the Terego & Yumbe district authorities. The project will therefore present both positive and negative impacts in the project area.



## Positive impacts

### 8.3.6.1 Access to clean and safe water

The main Positive Impact will access to clean and safe water for the majority of the project area dwellers. Another major positive impact of this project will be the easing of the burden of fetching water which is one of the most arduous tasks for women and young girls in the rural areas. Therefore, the time which has always been wasted on water fetching can be invested into the development of income-generating activities especially for the women. This impact will be enhanced through the following:

- Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
- Ensuring that water is affordable and available all the time

## Negative

### 8.3.6.2 Siltation from excavated soils

During operation of the project, there will be new connections to be made or maintenance of the water line. These may require excavations and hipping of soils. The heaped soils may be washed away into water bodies therefore leading to silt loading and causing water turbidity. The impacts stated above are localised and of short term and therefore not expected to lead to cause adverse effects to surface flow regimes resulting from temporary disruption of existing/natural drains occurring during site preparation or risk of surface water contamination due to erosion and siltation.

## Risk assessment matrix

| Impact                   | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--------------------------|--------|-----------|-----------|---------------------------|--------------------|
| Impacts on Surface Water | Local  | Low       | Temporary | Likely                    | Negligible-Minor   |

## Mitigation Measure:

- No spoil soil or any other materials shall be dumped or temporary stored in a known drainage system
- All excavated soils shall be used for backfilling immediately after laying of pipes. The heaped soils at deep excavations shall be consolidated in an area with embankments to prevent it from being washed away.

### 8.3.7 Solid waste

Solid waste residuals generated by water treatment include process residuals, used filtration membranes, spent media and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process, such as lime and coagulants. Pre-sedimentation, coagulation (e.g. with aluminum hydroxide [alum]), lime softening, iron and manganese removal, and slow sand and diatomaceous earth filtration all produce sludge. Composition of the sludge depends on the treatment process and the characteristics of the source water, and may include metals, lime, polymers and other organic compounds, microorganisms, etc. Spent media may include filter media (including sand, coal, or diatomaceous earth from filtration plants), ion exchange resins, granular activated carbon [GAC] and others. Therefore, the different types of wastes generated by the various water treatment processes shall be assessed for toxicity before they are disposed of. The public toilets that will be constructed by this project will also generate sanitary wastes which will require to be emptied and disposed of from septic tanks. If the emptying and disposal is not done promptly and at properly, it may lead to environmental and public health risks.

#### Risk assessment matrix

| Impact                        | Extent       | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|-------------------------------|--------------|-----------|-----------|---------------------------|--------------------|
| Soil, water and air pollution | Limited area | Medium    | Permanent | Almost certain            | Substantial        |

#### Mitigation measures proposed

- Minimize the quantity of solids generated by the water treatment process through optimizing coagulation processes.
- A NEMA approved waste handler should be engaged to collect and dispose of solid wastes to a gazetted NEMA waste disposal facility
- Alternatively, landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically not hazardous (EPA, 2011a), thus can be landfilled).
- Regenerate activated carbon such as by returning spent carbon to the supplier.
- Promptly empty the public toilets and toilets at the water office and dispose of sewage to Regional NWSC sewage treatment plant.

### 8.3.8 Chemicals management

Water treatment may involve the use of chemicals for coagulation, disinfection and water conditioning. The chemicals that are used include Alum, Chlorine strong acids and bases, sodium and calcium hypochlorite. Workers may be exposed to these chemicals. If these chemicals are not well managed, they may lead to pollution of water as well occupational health and safety hazards. Therefore, appropriate measures need to be taken to prevent,

minimize, and control potential impacts associated with the storage, handling and use of chemicals in water treatment facilities.

**Risk assessment matrix**

| Impact                                      | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|---|---------------------|-----------|-----------|---------------------------|--------------------|
| Chemical Exposure and Hazardous Atmospheres | Within limited area | High      | Temporary | Possible                  | Moderate           |

**Mitigation measures**

- Prudent handling and storage of hazardous chemicals, as described above, will help to minimize potential risks to workers.
- All chemicals shall be transported, stored and handled appropriately and shall have respective material safety data sheets well displayed in the store. In addition, the chemicals storage areas and transportation vehicles shall be well secured with appropriate labels. The project shall construct chemicals storage facilities. During operation, covered vehicles with labels like hazardous substances in transit shall use to transport chemicals
- Obsolete/expired chemicals shall be handled by a NEMA licensed Service Provider and shall be disposed off at Luwero Industries or Enviroserv Waste Management facility (These are licensed by NEMA to handle wastes)
- Develop and implement a plan for responding to accidental releases. The plan should at minimum include who to contact (communication and reporting), how to act in an emergency and how to mitigate risk (procedures), and what resources to use. This plan should be communicated to all staff.
- Install containment and scrubber systems to capture and neutralize chlorine should a Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease
- Implement a training program for operators who work with chlorine and ammonia regarding safe handling practices and emergency response procedures.
- Provide appropriate personal protective equipment (including, for example, self-contained breathing apparatus) and training on its proper use and maintenance.
- Prepare escape plans from areas where there might be a chlorine or ammonia emission.
- Install safety showers and eye wash stations near the chlorine and ammonia equipment and other areas where hazardous chemicals are stored or used.
- Ventilate enclosed processing areas and ventilate equipment, such as pump stations, prior to maintenance.
- Periodically sample air quality in work areas for hazardous chemicals. If needed to meet applicable occupational health national requirements or internationally accepted standards, install engineering controls to limit worker exposure.
- Prohibit eating, smoking, and drinking except in designated areas.

- Rotate personnel among the various treatment plant operations to reduce inhalation of air-stripped chemicals, aerosols, and other potentially hazardous materials.

### 8.3.9 Risk of fire from offices

There is a potential risk of accidental fire outbreaks in the building structures (offices, waste water treatment plant and booster station) especially as a result of short circuits. This can lead to significant loss of property and lives. The impact is significant as it is likely to occur with dire consequences if prevention measures are not put in place.

#### Risk assessment matrix

| Impact                     | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|----------------------------|--------|-----------|-----------|---------------------------|--------------------|
| Loss of lives and property | Local  | Major     | permanent | Likely                    | Major              |

#### Mitigation measures

- The project proponent and the contractor will put in place a comprehensive fire plan to guide the occupants and users of the offices in case of fire outbreak.
- The buildings shall be fitted with fire alarms to alert the occupants of any potential fire outbreak
- All electrical wiring will be carried out by certified electricians.
- There will be installation and proper maintenance of firefighting equipment (fire extinguishers and firefighting water hose pipes).
- Management will carry out annual drills to ensure evacuation plans are effective and are understood by all facility occupants.
- The premises should also have permanently stationed security guards and lighting to ensure security against arson-associated fires.

### 8.3.10 Transport – Traffic and road safety

During operation, the main activities will be maintenances and making new connections. The new connections and or maintenance activities may cut across some access roads. Currently, all the roads within project area are earth surfaced (Section 5.3.7). But in future, these roads may be tarmacked. The excavations for the new connections of maintenance activities across some roads will interfere with their integrity. Unless proper mitigation measures are put in place, new connections and or maintenance activities across and along the roads may interfere with traffic or cause accidents. It's therefore necessary that key precautions be undertaken at such road crossing to avoid accidents and impairing traffic activities.

#### Risk assessment matrix

| Impact   | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|--|---------------------|-----------|-----------|---------------------------|--------------------|
| Interference with traffic and diminished road safety | Within limited area | Very high | Temporary | Possible                  | Substantial        |

#### Mitigation measures

- To minimize interference with traffic, digging trenches and piping across roads shall be conducted in hours with less traffic preferably on weekends.
- The trench excavated across the roads, after laying the pipes should be backfilled with marram, compacted and levelled to the level of the existing road immediately. This is to ensure that the integrity of the road is not affected by the water line construction activities.
- Conspicuous notices shall be well placed on roads and guides on ground shall direct traffic in case of diversions or open trenches.

#### 8.3.11 Health

The Project area has health centres at parishes and sub-counties (H C II & III respectively) and several clinics. Further it was also reported that the area experiences several diseases that are water related diseases. The health centres sampled rely mainly on rain water harvesting during the rainy season. However, many of the rain water harvesting structures are non-functional. The healthcare facilities in Uganda had basic sanitation services. Clean and reliable water supply is critical for a health facility given that it is used for cleaning the facilities, bathing for patients and cleaning/washing key equipment used in health care provision in the hospital. Therefore, water is critical in prevention of diseases in health care facilities. Therefore, the need to provide Water, Sanitation and Hygiene (WASH) services is acute, especially in maternity and primary-care environments During operation stage, the project will have potential positive and negative impacts in the project area. The impacts are:

#### Positive impacts

##### 8.3.11.1 Improved health care services through supply of water

The project will extend water to health centers and clinics in the project area. This would result in bringing improved water and sanitation services closer to the people. This impact will be enhanced through:

- Ensuring that most of the communities in the project footprint foot-print are connected or have access to the piped water.
- Ensuring that operations and maintenance are properly done to avoid issues of water contamination
- Ensuring that water is affordable and available all the time

#### **8.3.11.2 Reduction in diseases**

The proposed Enyau water and sanitation project will contribute towards reduction in the prevalence rates of waterborne diseases especially cholera, dysentery and diarrhea in the refugee camps. This is because the current water sources are prone to contamination and hence source of water borne diseases. The communities were also optimistic that the initiative would reduce the incidence of people using contaminated water and hence the water borne diseases such typhoid, intestinal worms and cholera that have a high occurrence in the area because of limited access to safe potable water (See sections 5.3.6 & 5.3.8). This is expected since the communities will access clean water for drinking and domestic activities. The project would have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced.

This positive impact will be enhanced if the following are done:

- Ensuring that most of the communities in the project footprint foot-print are connected or have access to the piped water.
- Ensuring that operations and maintenance are properly done to avoid issues of water contamination
- Ensuring that water is affordable and available all the time

The improved health conditions will significantly result in a reduction in health costs and time for collecting water which translates into substantial savings for rural households.

#### **8.3.11.3 Improved health in the area**

Community engagements concluded that the project would enhance safe water coverage which would in turn improve the health of the area (Section 5.3.5). The people would also have access to improved sanitation facilities. The project will have awareness programs tailored towards enhancing project benefits while minimizing negative impacts. The awareness campaigns for public health, hygiene and sanitation particularly targeted at women and girls would be widened to include measures for tackling HIV/AIDS and other diseases. The project would have significant strategic benefits in reducing the burden on the cost of health care services as diseases could be reduced. Improved water supply and sanitation would promote good health and reduce health care costs thus making overall national savings for investment in other developmental activities.

#### **8.3.11.4 Reduction of child mortality**

Infant mortality rate of the project area is estimated at 53/1000 individuals. With Safe drinking water, personal/household hygiene and improved sanitation infant/child morbidity and mortality would be reduced. Communities of the project area also recognized the role of safe water in reducing child mortality rates. The marginal price of improved hygiene and sanitation promotion would make them cost effective health interventions. Therefore, extending piped water would reduce such risks. This impact will be enhanced through the following:

- Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
- Ensuring that water is affordable and available all the time

#### 8.3.11.5 Improved maternal health

Women in the project area are responsible for domestic chores including fetching water. The Project would therefore result in reduced physical stress and improved health status of pregnant women, thereby reducing miscarriages, maternal deaths, and adverse impacts on fetuses and new-borne. This impact will be enhanced through the following:

- Ensuring that most of the communities in the project footprint foot-print are connected or have access to the piped water.
- Ensuring that water is affordable and available all the time

#### 8.3.11.6 Public Health concerns due to labour influx and sanitation

The project is also expected to have some negative impacts in the project area. This is because it is expected to attract various categories of people who will seek employment on project activities during operation of the project. The number of employees during operational phase is expected not to be more than ten (10). The project will obviously lead to establishment of social networks among the locals and the project workers, which can promote the spread of socially transmitted diseases especially Covid-19, HIV/AIDS and other STIs. According to the community, HIV/AIDS scares them most. Pressure on the existing health services is likely to increase. Although not many skilled workers are expected, the impacts of diseases have a multiplier negative effect. Interaction of workers with communities may enhance chances of the impact on health services and the health of the residents is likely to be minor since the number of imported workers for the operation of the water and sanitation project may be less than 10.

When completed, the project will have two 9 stance public toilets in additions to sanitary facilities at offices. The public toilets if not cleaned on a daily basis, provided with water all the time and if septic tank emptying is not done on time, it may become a public health risk in the area. The public health impacts due to sanitary facilities is major if the mitigation measures are not implemented. The overall impact assessment is moderate.

#### Risk assessment matrix

| Impact   | Extent | Magnitude | Duration           | Probability occurrence | of Overall Assessment |
|--|--------|-----------|--------------------|------------------------|-----------------------|
| Public Health concerns due to labour influx and sanitation | Local  | High      | Short –medium term | Possible               | Moderate              |

#### Mitigation

- The public toilets should have an adequate water storage facility to ensure that water is available 24 hours even when the supply from the main is off.
- The project should provide for provision of adequate hand washing facilities at the public toilets
- The Operator should ensure that the public toilets are clean at all times
- The Contractor shall provide surveillance and active screening and treatment of workers and the community where a communicable disease is discovered.
- All impacts of public health nature shall be mitigated using a well-coordinated approach that must involve health centres in the project area.
- All workers shall be orientated and sensitized about responsible sexual behaviour in project communities.
- The Operator will develop and follow a code of conduct. The information regarding Worker Code of Conduct will be provided in local language(s).
- Other future epidemics/pandemics shall be handled as per the guidelines of Ministry of Health and World Health Organisation.

For prevention of Covid-19, the following measures shall be adhered to:

- Establish a daily screening protocol for staff and visitors, to ensure that potentially infected staff do not access worksites.
- Regularly clean and sanitize surfaces like desks, doors, printers, vehicles, toilets, and other shared equipment and spaces.
- Establish a hand washing station at the entrance to the worksite and the security MUST ensure that all people accessing the worksite wash their hands.
- Employees and visitors must at all times maintain the recommended social distancing and must not make unnecessary make direct contact with the staff and clients. The Ministry of Health proposal for working in shifts MUST be complied with. In this regard, recommend that a rotational timetable for staff be prepared and communicated.
- The Developer/contractor should provide protection materials i.e. (i) face shields which must be put on all the time when the employees are on duty and (ii) Hand sanitizers to be on every work desk/station.
- The physical meetings must be minimized and virtual meetings encouraged.

### **8.3.12 Education**

The engagement with communities indicated that there a number of schools in the project area. Section 5.3.9 presents schools that are within the project area that will benefit from the project. The schools' water access in the project area stands at 61% which is relatively lower and yet water is an important component of menstrual management among others. This presents a constraint to girls and women of menstrual age to access water for their menstruation. This has led to about 60% of the girl pupils absenting themselves from schools during their menstruation period. Further, poor hygiene and sanitation facilities in schools are important factors for high school dropout rates for girls and this is reflected in lower enrolment



rates for girls/women in post primary schools institutions, tertiary and universities leading to gender inequality in education. The project will extend water to some schools and also support the construction of two 9-stance toilet facility in the project area. Therefore, the proposed project would result in bringing improved water and sanitation services closer to the schools and the people at large, support the menstrual management by a girl child, reduce absentism of pupils and enhance enrolment rates of the girl child in schools and hence gender equality in education. This positive impact will be enhanced through:

- Ensuring that most of the communities in the project foot-print are connected or have access to the piped water.
- Ensuring that operations and maintenance are properly done to avoid issues of water contamination
- Ensuring that water is affordable and available all the time
- Ensuring that all the schools within the project footprint are connected to the water supply.

### **8.3.13 Gender and vulnerable groups**

As presented in section 5.3.17, women and children are the ones carrying out most of household activities including fetching water. Therefore, the proposed project would free women and girls of the burden of having to spend a lot of their time collecting and carrying water almost on a daily basis often from sources distant from their houses. This reduction in burden would allow women and girls time for other activities including involvement in economic ventures that could contribute to reducing poverty and furthering their education (thus increasing school enrolment). This impact will be enhanced through:

- ensuring that women and girls are given priority while recruiting personnel for the project
- Ensuring the all the households within the project footprint are either are connected or have access to clean and safe water.

## **8.4 DECOMMISSIONING PHASE IMPACTS**

### **8.4.1 Overview**

The Enyau Water Supply and Sanitation Project has been planned to operate up to 2040 after which a system upgrade may be required. Therefore, for the next 20 years, full scale decommissioning of the project is not anticipated to take place except a site construction decommissioning approach which can be considered at the moment in this study. During construction phase auxiliary facilities like camps shall be established. These facilities might not be aesthetically pleasing to communities or the land onto which they were established was compacted and therefore cannot be re-used for agriculture. Decommissioning of these facilities will depend on whether the host communities want these facilities. In case they want them, the contractor shall enter into a handover MOU. However, if they are not required, the

Contractor shall decommission them. The practical decommissioning will for now involve the following:

- An Operational Phase ESMP shall be prepared and training on its implementation undertaken by all the staff for operational phase before handover of the site
- Restoration of disturbed sites through levelling and re-vegetation measures;
- Removal of obsolete equipment and associated equipment parts;
- Demobilization and return of imported labour force after the project;
- Grievance management mechanisms with the host communities before site closure;
- Repairs of damaged roads and restoration of access routes and rout deviations;
- Removal of construction debris and unused materials.
- Within 3months before decommissioning, the operator shall develop a, detailing the following;
- Requirements and procedure for removing equipment and structures from the site,
- Requirements and procedures to restore the site to a useful condition;
- Site investigation to determine contaminated areas and extent of contamination;
- Description of options for remediation of contaminated areas on site, post decommissioning land use, information on how possible socio-environmental impacts will be minimized during decommissioning and measures to protect the public against risk or danger resulting from site conditions prevailing after decommissioning,
- Plan on how decommissioning will be funded.
- The developer shall submit the decommissioning plan to NEMA for approval. Decommissioning shall also have a restoration plan to adequately remediate any onsite contamination and restore site to the maximum extent consistent with anticipated post decommissioning use.

#### **8.4.2 Positive impacts of decommissioning**

The following positive impacts are associated with the decommissioning phase of the project

##### **8.4.2.1 Site Rehabilitation**

Decommissioning of the project support facilities will be carried out to restore the site to its original status or to a better state than it was originally. This will include replacement of topsoil and re-vegetation which will lead to restoration of the visual quality of the area.

##### **8.4.2.2 Employment Opportunities**

For demolition to take place properly and in good time, several people will be involved. As a result, several employment opportunities will be created for the demolition staff during the demolition phase of the unwanted facilities. The impact will be direct, temporary and minor.

### **8.4.3 Negative impacts of decommissioning**

The following three negative impacts discussed below are associated with the decommissioning phase.

#### **8.4.3.1 Noise and Vibration**

The demolition works will lead to significant deterioration of the acoustic environment within the project decommissioning facilities' areas. This will be as a result of the noise and vibration that will be experienced as a result of demolishing the structures. The impact will be direct, temporary and minor.

##### ***Mitigation***

Workers shall be provided with adequate protective wear (Ear muffs)

#### **8.4.3.2 Solid Waste Generation**

Demolition of the structures will result in generation of solid waste. The waste will contain the materials used in construction including concrete, metal, wood, glass, paints and adhesives. Although demolition waste is generally considered as less harmful to the environment since they are composed of inert materials, there is growing evidence that large quantities of such waste may lead to release of certain hazardous chemicals into the environment. The impact will be direct, permanent and major.

##### ***Mitigation***

Solid waste shall be managed in accordance with the National laws. A licensed waste handler shall be contracted to transport and dispose wastes at a gazette waste disposal facility

#### **8.4.3.3 Generation of Dust**

Some dust will be generated during demolition works. This will affect demolition staff as well as the neighbors. The impact will be direct, temporary and minor.

##### ***Mitigation***

- *All workers shall be provided with adequate and appropriate Dust masks*
- *Communities shall be informed of the plan to decommission and shall be sensitized on potential impacts*

## 8.5 CROSS CUTTING IMPACTS

### 8.5.1 Health & safety (Accidents and Injuries)

Work at water and sanitation facilities like excavations and lifting of materials is often physically demanding and may involve hazards such as open water, trenches, and slippery walkways, working at heights, energized circuits, and heavy equipment. Work at water and sanitation facilities may also involve entry into confined spaces, including storage tanks, wet wells, and pump stations. Transportation of workers, materials and equipment may also pose serious health and safety risks both to workers and communities.

#### Risk assessment matrix

| Impact                 | Extent              | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|------------------------|---------------------|-----------|-----------|---------------------------|--------------------|
| Accidents and injuries | Within limited area | High      | Temporary | Possible                  | Moderate           |

#### Mitigation measures

- Only trained and certified workers shall be allowed to install, maintain, or repair any equipment and tool associated with the Enyau WSS infrastructure.
- Install railing around all process tanks and pits. Require use of a life line and personal flotation device (PFD) when workers are inside the railing, and ensure rescue buoys and throw bags are readily available.
- Use PFDs when working near waterways (River Enyau).
- Implement a confined spaces entry program that is consistent with applicable national requirements and internationally accepted standards. Valves to process tanks should be locked to prevent accidental flooding during maintenance.
- Use fall protection equipment when working at heights.
- Maintain work areas to minimize slipping and tripping hazards.
- Use proper techniques for trenching and shoring.
- Implement fire and explosion prevention measures in accordance with internationally accepted standards.
- When installing or repairing mains adjacent to roadways, implement traffic management plan that is approved – by the supervising engineer – with procedures and traffic controls, such as:
  - Establishment of work zones so as to separate workers from traffic and from equipment as much as possible;
  - Limit speed limits of vehicles to 20 km/hour in working areas by installing speed humps as well as signage
  - Use of high-visibility safety apparel for workers in the vicinity of traffic;
  - No works shall be allowed at night
  - Traffic guides/flag men shall guide traffic and ensure road safety especially where road users are risk of being injured by construction equipment.

- Temporary road signage warning communities of water and sanitation construction works and heavy vehicles turning into/out of main road and sensitive sites shall be used.
- Locate all underground utilities before digging.
- All drivers to be employed by the contractor and the developer shall be qualified, skilled with valid driving permits. With an appropriate class depending on the size of vehicles.
- All construction workers shall be provided with adequate Personal Protective Equipment (PPE).
- The Contractor should also develop and implement a health and safety management plan which should be easily available to all workers.
- All company vehicles used in the transportation of construction workers, material and equipment to and away from the site shall be in sound mechanical conditions. Evidence shall always be provided by recording the status of the vehicle in the Daily Vehicle Inspection Form (Annex 4) before usage.
- The Contractor should prepare emergency plans, carry out drills on the usage during emergency events. The drills should be planned and conducted on a regular basis.

### 8.5.2 Labour influx impacts

Projects of such nature are normally labour intensive and need a multidisciplinary team of workers ranging from professionals, semi-skilled and casual labourers. According to section 2.5.4, several workers (will be contracted during project implementation. Some Engineers (Mechanical & possibly Civil) will be contracted during project construction and operation. All staff under the contractor or under the Developer need to be procured under well-established working procedures and must be protected from exploitation. On average, an estimated 50-100 people are anticipated to constitute the workforce during project implementation.

#### Risk assessment matrix

| Impact                  | Extent | Magnitude | Duration  | Probability of occurrence | Overall Assessment |
|-------------------------|--------|-----------|-----------|---------------------------|--------------------|
| Exploitation of Workers | Local  | High      | Temporary | Possible                  | Moderate           |

#### Mitigation measures

- Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in cases of accidents, payments and contracts, a grievance management/redress mechanism for all the complaints including Gender Based Violence (GBV) and Sexual exploitation and Abuse (SEA)
- Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement

- To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly.
- Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff.
- Contractor to have in place a workers' code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour
- While recruiting workers specially to fill up the non-skilled nature of jobs such as casual jobs or where skills can be obtained easily on job, the Developer or Contractor shall give the local people first priority.
- In the employment contracts, workers shall be entitled to work for 8 hours beyond which overtime will be paid.
- All workers shall be given appointment letters indicating their obligations as employees.
- All workers shall be entitled to free medical care if the cause of the injury or sickness is as result of working at the distribution line or any activities of the Contractor or Developer.
- All contract workers must be paid as per the contract. All casual labourers must receive a fair pay for the work done.
  - Exploitation of workers and refusal to pay workers is an offence and the contractor must be monitored to ensure that all workers are paid.
  - All workers must be paid promptly and correctly.
  - Workers need to be sensitized of their rights and need to be represented by a mediator in the affected districts through the office of the labour officer.
  - The contractor shall employ an onsite Environment Health and Safety Officer with a Safety Committee in place.
  - The Contractor shall develop and implement a health and safety management plan that at minimum has safety risks and their corresponding mitigation measures.

## **9 SOCIAL AND ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN**

### **9.1 GENERAL CONSIDERATIONS**

The Environment and Social management and monitoring plan proposed in Table 9.1 specifies mitigation measures and monitoring actions with time frames, specific responsibilities assigned and follow-up actions defined in order to check progress and the resulting effects on the environment by the construction works of the project. Monitoring shall begin right away and shall continue through both the construction stage and through to the operation phase. One important aspect of monitoring shall be to assess the effectiveness of the mitigation measures suggested. Where they are found lacking, appropriate new actions to mitigate any adverse effects shall be undertaken.

Implementations of these measures have to be carried out at different stages of project construction & operation phases. During the detailed design stage, the consultant shall incorporate proposed mitigation measures in the design and tender documents. The contractual agreement shall also include articles to enforce the environmental issues. Construction stage activities are mainly the responsibility of the contractor and that of the construction supervision consultant. The actual physical implementation works are carried out mostly at this stage. The execution of construction works for the proposed Enyau water and sanitation project shall also equally treat the implementation of the physical works of environmental mitigation measures.

## 9.2 ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN MATRIX

| No.                        | Environmental/<br>Social Impact                      | Activity   | Project<br>Phase | Impact<br>Location          | Mitigation Measures   | Responsible<br>Party<br>for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party<br>for<br>Monitoring        | Annual<br>Cost<br>(USD) |
|----------------------------|--|--|------------------|-----------------------------|---|---|---|--|-------------------------|
| <b>General Provisions</b>  |  |  |                  |                             |   |   |   |  |                         |
| 1.                         | All impacts  | All activities in<br>Project Site  | All phases       | All project sites           | <p>a) Achieve full compliance with the national and World Bank safeguards requirements, upon which this ESMP is based, through regularly monitoring and address on-site situations and through applying the relevant mitigation measures.</p> <p>b) The Environmental Officer can issue penalties, in consultation with relevant authorities, for incidents of non-compliance, and always in liaison with NEMA.</p> <p>c) Sensitise all Contractors, including foremen, supervisors and labourers in the requirement for and full implementation of the ESMP.</p> <p>d) Employ an adequately qualified and experienced Environmental and Social Safeguards Officers to ensure environmental and social safeguards requirements are integrated in the design and construction phases of the project.</p> <p>e) Put in place simple Construction Method Statements for activities in sensitive areas, like densely populated areas.</p> | MWE   | <p>Level of Compliance with all ESMP requirements.</p> <p>Number of non-compliance fines issued.</p> <p>Safeguard officers are present and supported to carryout their duties</p> <p>Designs and construction activities that are informed by environmental and social requirements</p> | NEMA,<br>MoLGSD,<br>MoLUD,<br>DWRM,<br>DLGs, DMM | 30,000                  |
| <b>Specific provisions</b> |  |  |                  |                             |   |   |   |  |                         |
| 2.                         | Impact on<br>topography<br>(Aesthetics<br>pollution) | Excavations<br><br>Heaping of<br>excavated<br>soils<br><br>Erection of<br>structures | Constructi<br>on | At all the<br>project sites | <p>a) Excavated soil shall be heaped for a short time (1-5 days) and re-used for backfilling. In case the soil is not required for backfilling, it shall be ferried to designated waste disposal sites in the town council</p> <p>b) The affected area shall be restored through landscaping and leaving it to undergo natural colonisation by plants.</p> <p>c) The materials shall be stored in a way that the height does not cause visual intrusion. Preferably the height should not be more than 2 metres.</p>  | Contractor                                    | <p>Presence of heaped soils that have stayed for more than five days</p> <p>Number of restored sites and their Restoration closure reports</p> <p>The height of of stored materials (Materials whose storage height is less than 2 metres</p>   | NEMA,<br>MWE                                     | 10,000                  |



| No. | Environmental/<br>Social Impact | Activity   | Project<br>Phase           | Impact<br>Location                                 | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|--|----------------------------|--|--|--|--|--|-------------------------|
| 3.  | Susceptibility to soil erosion  | Excavations<br><br>Storage of construction materials               | Construction               | All excavated areas<br><br>Materials storage areas | <p>a) The construction sites for project infrastructure will be hoarded off to intercept any eroded material and any soil material will remain within the site until it is taken away for proper disposal or used for backfilling to avoid loose soil being washed away by storm water. The Project Contractor should backfill all trenches immediately after laying the pipes and compact such areas as to near level prior to excavation.</p> <p>b) No spoil soil shall be temporarily placed in water ways.</p> <p>c) The top soil shall be kept separately so that it is used last in backfilling of the excavated areas. This is to ensure that the living soil (top soil) is available for plant growth in disturbed areas.</p> <p>d) MWE will also ensure that proper landscaping and vegetation restoration is carried out to further reduce the possibility of soil erosion. Native vegetation must be used for re-seeding the excavated site.</p> <p>e) The excess soil shall be spread along the trench by the Contractor but in liaison with the local people; special attention would be made not to dispose of such construction wastes in swamps on any sensitive ecosystem.</p> <p>f) The excavated soil from the pit at the WTP shall be removed from the site every end of the day and disposed of in accordance with the National Environment (Waste) Management Regulations, 2020.</p> | Contractor                                 | <p>Number of complaints from communities</p> <p>Number of temporary storage areas for spoil in a water way</p> <p>Disturbed areas that have been properly restored</p> <p>Number of swamps where construction wastes have been disposed off</p> <p>Waste transfer notes for waste soil disposed off at a NEMA approved facility</p> <p>Culverts installed along access roads to key project components</p> <p>The acreage of cleared land for construction of key project components</p> | NEMA, MWE, DLGs                        | 15,000                  |
| 4.  | Exposure to high noise levels   | Excavations<br><br>Machinery operations<br><br>Vehicular movements | Construction and operation | On all project sites                               | <p>a) No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection. (National Environment (Noise) Standards and Regulations). Workers operating equipment generating noise levels greater than 80 dBA over long hours must be given earmuffs;</p> <p>b) Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;</p>   | Contractor/<br>Operator                    | <p>Noise monitoring records</p> <p>PPE issuance records</p> <p>Number of workers observed without PPE during works</p>   | NEMA, MWE, MoLGSD, DLGs                | 10,000                  |

| No. | Environmental/<br>Social Impact                | Activity  | Project<br>Phase | Impact<br>Location  | Mitigation Measures   | Responsible<br>Party for<br>implementation   | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD)                   |
|-----|--|---|------------------|---|---|--|--|--|---|
|     |  |   |                  |   | <p>c) The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment ( earmuffs) should be enforced by the management of the Water Treatment Plant.</p> <p>d) Prior to the issuance of hearing protective devices as the final control mechanism, use of acoustic insulating materials, isolation of the noise source, and other engineering controls should be investigated and implemented, where feasible.</p> <p>e) Periodic medical hearing checks should be performed on workers exposed to high noise levels.</p> <p>f) Sites must be hoarded to curb noise impacts to neighbouring communities.</p> <p>g) Works should be undertaken during day time i.e. from 8am to 6pm.</p> <p>h) Works near schools should be done in periods like weekends in order not to interfere with learning environment.</p> |  | <p>Installed Equipment with acoustic insulation</p> <p>Hoarded off working sites</p> <p>Work schedules clearly showing plans for working near public facilities and day time</p> <p>Presence of workers not wearing appropriate PPEs</p> <p>Medical check-up reports</p> <p>Number of complaints registered on noise</p> |  |   |
| 5.  | Impacts on Wetlands                            | Works along the banks of the river              | Construction     | At the site for water treatment plant and along the transmission line | <p>a) An abstraction infrastructure shall be installed within R. Enyau. MWE shall apply for and acquire a river bank &amp; lake shore user permit in accordance with the National Environment (Wetlands, Lake Shores and River banks) Management Regulations, 2000.</p> <p>b) No materials/waste shall be dumped in the nearby wetland/river and all the foreign materials introduced during construction period shall be removed and disposed of in gazetted areas</p> <p>c) No auxiliary facilities shall be allowed within 30m of the wetland/river buffer zone.</p>   | Contractor   | <p>River bank and wetland user permits in place</p> <p>Number of swamps where construction wastes have been disposed off</p> <p>Distance from the riverbanks where auxiliary facilities are constructed</p>  | NEMA, MWE, DLGs                        | Embedded in the works BOQs                |
| 6.  | Impact on Flora (Loss of vegetation and crops) | Clearance for the right and other project sites | Construction     | All project sites   | <p>a) A RAP shall be developed and implemented by MWE to ensure that affected property is compensated.</p> <p>b) Prior to compensating the affected persons, adequate community sensitization meetings shall be carried out to ensure that the PAPs are aware of the entire program including visitation</p>  | MWE for the approved RAP and the Contractor for property destroyed by their activities | <p>Number of complaints registered on destruction of crops and other vegetation</p> <p>Approved RAP report and its</p>   | NEMA, MoLUD, DLGs, MWE                 | 15,000<br>But compensation costs shall be |

| No. | Environmental/<br>Social Impact | Activity  | Project<br>Phase | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|---|------------------|--------------------|---|--|---|--|-------------------------|
|     |                                 |   |                  |                    | <p>schedule per village, parish and or sub-county and how each PAP will be contacted and approached for payment.</p> <p>c) The construction of the proposed water infrastructure shall only commence when all the affected farmers have been fully sensitized of the pending activities. Prior to the construction phase, farmers shall be sensitized on the pending project at least 6 months in advance such that cultivation under the line and within the water pipe corridor is stopped or reduced. This will give affected farmers ample time to plan in advance so as to avoid going into several negotiations with The Developer at later stage when the contractors have come in to implement the project.</p> <p>d) Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to vegetation.</p> <p>e) When invasive species are encountered, they will be removed and destroyed, for example, by burning. The equipment and cars shall be cleaned to ensure that the construction activities do not contribute to the spread of the invasive species.</p> <p>f) The contractor should restore sites where activities will be carried out at all the project sites. The topsoil that will have been removed before pitting the trenches for the pipeline should be put back to cover the trenches so that the crops can regrow in a natural environment. Excess soil, stones and boulders should be dumped in an area that has been approved by the District Environment Officer</p> |  | <p>implementation report</p> <p>Percentage of PAPs compensated</p> <p>Works undertaken in only the right of way that has no incumbrances</p> <p>Number and type of invasive species encountered and removed from the project sites</p> <p>Number of disturbed sites that have been fully restored</p> |  | determined by the RAP   |
| 7.  | Impacts on fauna                | Excavations<br><br>Clearance of the right of way<br><br>Movement of equipment | Construction     | Habitats areas     | <p>a) Movement of equipment (vehicles, contractors and the entire construction crew) must follow designated pathways or agreed upon access roads. This will avoid unintended damages to fauna.</p> <p>b) The contractor should restore sites where activities will be carried out at all the project sites. The topsoil that will have been removed</p>   | Contractor                                 | <p>Number of ungazetted access tracks by vehicles</p> <p>Number of disturbed sites that are restored</p>  | NEMA, MWE, DLGs, UWA                   | 8000                    |

| No. | Environmental/<br>Social Impact | Activity   | Project<br>Phase | Impact<br>Location                        | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|--|------------------|---|---|--|---|--|-------------------------|
|     |                                 |  |                  |   | <p>before pitting the trenches for the pipeline should be put back to cover the trenches so that the mobile fauna is not affected.</p> <p>c) If wild animals are encountered, the Contractor shall notify UWA so that it is picked and taken to a secure place.</p> <p>d) Trenching, pipework laying as well as well as backfilling will be done concurrently. For pits like at the clarifier and the booster pump, the contractor shall ensure that every evening, the pits are covered with timber while being secured with a warning tape.</p>   |  | <p>Number of wild animals encountered and reported to UWA</p> <p>Restoration plan and closure reports</p> <p>Number of awareness sessions for managing any wildlife encountered</p> <p>Number of incidents of animals falling in uncovered pits</p>   |  |                         |
| 8.  | Impact on Aaquatic biodiversity | Installation of water transmission infrastructure<br>Construction of intake infrastructure | Constructi on    | At and across river, streams and wetlands | <ol style="list-style-type: none"> <li>1) Prevent or limit disturbance to water resources during the planning phase.</li> <li>2) Implement a riparian management zone (RMZ) by keeping safe shelter belts of undisturbed ecosystems around streams.</li> <li>3) Locate roads, skid trails, and landings away from streams and wetlands.</li> <li>4) Where appropriate, slash and debris should be stockpiled above the high-water mark to prevent materials from entering streams and wetlands.</li> <li>5) Restore or rehabilitate disturbed sites to desired ecological conditions prior to completing or decommissioning project operations and facilities. This should include installing water bars on skid trails and restoration of landings (e.g. ripping and seeding to natural vegetation).</li> <li>6) Suspend water pipes across streams and wetlands on concrete pillars to ensure future disturbance during repairs will not result into further interface with the water resources in these ecosystems.</li> <li>7) No materials/waste shall be dumped in the nearby wetland and all the foreign materials introduced during construction period shall be removed and disposed of in gazetted areas</li> <li>8) Access and service roads should be kept to a minimum in order to limit direct vegetation loss and habitat fragmentation</li> </ol> | Contractor                                 | <p>Riparian Management Zone(RMZ) established in water and wetland areas</p> <p>Number of access roads established in streams and wetlands</p> <p>Number of disturbed areas restored</p> <p>Number of streams and wetlands spanned over by the pipeline</p> <p>Number of spoil disposal areas established in wetlands or near streams</p> <p>Number of new access roads opened by the contractor</p> | NEMA, DLGs, MWE                        | 10,000                  |

| No. | Environmental/<br>Social Impact | Activity                                  | Project<br>Phase | Impact<br>Location             | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD)                                       |
|-----|---------------------------------|---|------------------|--------------------------------|---|--|--|--|---|
| 9.  |                                 | During water abstraction                  | Operation        | At and around the intake point | <p>1) In order to avoid fish being sucked into abstraction pipe, the pipe should be screened (Screen of at most less than a 100th inch holes) at the suction end to prevent entrance and sucking in of the fish during water uptake.</p> <p>2) Chemicals and Chemicals containing substances shall be stored in a facility that is leak free to minimize the amount of chemicals entering River Enyau. (Refer to Annex 11 for more details on chemicals handling).</p> <p>3) Chemical containing wastes shall not be disposed of directed into the environment but shall be disposed of to a NEMA approved disposal facility using a NEMA licensed waste transporter.</p> <p>4) Empowering fishermen through provision of incentives for protecting water source e.g. supporting other livelihood programmes</p>  | Operator                                   | <p>Screens installed at the suction end of the abstraction pipe</p> <p>Number of incidents of fish sucked into the water treatment plant</p> <p>Levels of Chemicals detected in the river during water quality monitoring</p> <p>Delivery notes of obsolete chemicals disposed off at a NEMA approved facility</p> <p>Number of livelihood programs designed and implemented</p> | NEMA, MAAIF, DWRM, DLGs, MWE           |   |
| 10. | Impact on Houses/structures     | Site clearance for project infrastructure | Construction     | All project areas              | <p>a) MWE shall work with local council committees, sub-county committees, Councillors, district land boards, CAOs, RDCs, Politicians and other local leaders to sensitize all people to be affected on the intentions of land acquisition.</p> <p>b) MWE shall conduct a Resettlement Action Plan (RAP) in accordance with the Land Act and World Bank environmental and social Safeguard Policies especially Involuntary Resettlement (OP 4.12).</p> <p>c) MWE shall negotiate with land and structural owners in compliance with local market prices and government rates so as to establish rational figures for compensation and resettlement that are in line with the World Bank environmental and social Safeguard Policies especially Involuntary Resettlement (OP 4.12).</p> <p>d) All sorts of compensation and settlements must be done at least 6 months before structures are demolished.</p> | MWE  | <p>Number of engagement meetings with stakeholders</p> <p>RAP report approved by the CGV and the Bank</p> <p>Percentage of PAPs compensated</p> <p>6 months' notification to the PAPs</p> <p>Number of complaints registered</p> <p>Clearly spelled out options for compensation procedures disclosed</p>  | NEMA, MoLGSD, MoLUD, DLGs,             | 10,000 + compensation costs as detailed out in the RAP report |

| No. | Environmental/<br>Social Impact | Activity   | Project<br>Phase | Impact<br>Location | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|--|------------------|--------------------|--|--|---|--|-------------------------|
|     |                                 |  |                  |                    | <p>e) All physically or economically displaced people should be offered an option between either a full resettlement package, including the provision of replacement residential land and a house, or cash compensation in line with the World Bank environmental and social Safeguard Policies especially Involuntary Resettlement (OP 4.12).</p> <p>f) Any grievances in the course of project implementation shall be addressed in accordance with the grievance redress mechanism presented in Annex 13.</p>   |  | Grievance log showing status of addressing complaints   |  |                         |
| 11. | Impact on Water and Sanitation  | Excavations, sanitation management and equipment servicing | Construction     | All project areas  | <p>a) The Contractor shall construct a drainage system with silt traps to reduce impacts of storm water from the construction site.</p> <p>b) All excavated soils shall be used for backfilling immediately after laying of pipes. The heaped soils at deep excavations shall be consolidated in an area with embankments to prevent it from being washed away.</p> <p>c) Appropriate sanitary facilities shall be installed at the campsite and working gangs shall be provided with mobile toilets that will be maintained and emptied on time. The emptied sanitary waste shall be disposed of at regional NWSC Treatment Plant.</p> <p>d) Regular servicing of project vehicles shall be outsourced to gazetted vehicle service centres (Vehicle maintenance and Servicing companies) either in Enyau or neighbouring districts. No vehicle shall be allowed to be serviced in sensitive ecosystems. The Service centre must present with proof that its fluids such as old car engine oil shall be properly managed</p> | Contractor                                 | <p>Number of complaints from community registered on pollution of water</p> <p>Silt traps in drainage system</p> <p>Spoil soil consolidated with embankments</p> <p>Appropriate and adequate sanitary facilities</p> <p>Vehicle maintenance log</p> | NEMA, MoLGSD, MWE, DWRM, DLGs, NWSC    | 8000                    |
|     |                                 | Siltation from excavated soils                             | Operation        | Excavated area     | <p>a) No spoil soil or any other materials shall be dumped or temporary stored in a known drainage system</p> <p>b) All excavated soils shall be used for backfilling immediately after laying of pipes.</p>   | Operator                                   | Number of complaints registered due to siltation of drainage channels, water sources and gardens  | NEMA, MWE, DLGs                        | 10000                   |

| No. | Environmental/<br>Social Impact | Activity   | Project<br>Phase | Impact<br>Location | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|--|------------------|--------------------|--|--|--|--|-------------------------|
|     |                                 |  |                  |                    |  |  | No excavated trenches are left not backfilled<br><br>Number of Draining systems with spoil soil<br><br>Work procedures with an initiative of backfilling the pits immediately after laying pipes   |  |                         |
|     |                                 | water quality and quantity due to WTP operations | Operation        | At the WTP         | <ul style="list-style-type: none"> <li>a) Do not discharge any sludge into River Enyau or any nearby water body</li> <li>b) Adopt the following pollution prevention &amp; waste reduction mechanisms:</li> <li>c) Utilize drying beds in separating solids and liquid at the WTP facility.</li> <li>d) Contract a NEMA approved WTP residual handler to collect hazardous solid wastes for safe disposal;</li> <li>e) Landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically, not hazardous (EPA, 2011a), thus can be landfilled).</li> <li>f) Do not discharge backwash water into River Enyau or any nearby water body prior to dichlorination; adopt mechanisms that lead to:</li> <li>g) Pollution prevention &amp; waste reduction (resource recovery) at the WTP as a first priority; followed by</li> <li>h) Optimize the filter media by employing filter medium that ensure longer filter run times, thus infrequent backwashing while maintaining or improving on the finished water quality;</li> <li>i) The Project Proponent shall apply for and acquire a Water Abstraction Permit from Directorate of Water Resources and ensure compliance to the conditions therein</li> </ul> | Operator                                   | <p>Number of complaints registered due to contamination of water</p> <p>Water quality monitoring results with traces of sludge components</p> <p>Water Discharge and abstraction permits in place</p> <p>Deliverly notes of sludge to waste disposal facilities</p> <p>Installed drying beds and in use</p> <p>Water Discharge permit</p> <p>Percentage of wastes re-used or recycled</p> <p>Contract with a NEMA license waste handler</p> <p>Records of types, quantities of wastes generated and how they are handled</p> | NEMA, MWE, DLGs                        | 15000                   |

| No. | Environmental/<br>Social Impact | Activity                          | Project<br>Phase | Impact<br>Location           | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|-----------------------------------|------------------|------------------------------|--|--|---|--|-------------------------|
|     |                                 | Wastewater and septage collection | Operation        | At the sanitation facilities | <p>a) Promotion of collection services, or ensuring that collection services are available, is of primary concern.</p> <p>b) Timely collection of sewage should be undertaken to prevent sewage over flows.</p> <p>c) There should be a system among the communities, their leaders and the health workers to monitor, detect and alert the responsible authorities to call for emptying of any septic tank that poses a danger to the community</p>   | Operator                                   | <p>Number of complaints registered due to overflowing septic tank</p> <p>Number of promotional initiatives implemented</p> <p>Number of private sector players involved in septic collection services</p> <p>Number of sewage overflows from septic tanks reported</p> <p>Emptying and collection schedule and records</p> <p>Contacts of emptying service providers readily available</p> <p>Availability of sewage delivery notes</p> | NEMA, MWE, DWRM, DLGs, NWSC            | 15000                   |
| 12. | Impact from waste generation    | Construction activities           | Construction     | All project sites            | <p>a) All sorts of waste generated during construction such as HPDE and uPVC offcuts and other accessories associated with water and sanitation projects shall be collected by the contractor and given to recycling facilities. Other forms of waste which are inert or ceramic in nature may be collected by NEMA gazetted waste handlers (Who shall be engaged by the Contractor) and taken to a NEMA gazetted waste disposal facilities for disposal.</p> <p>b) All organic waste generated at eating places during construction such as food stuffs shall be collected and transported by the contractor to designated Town Council landfills for disposal. This activity shall be supervised by the District</p> | Contractor                                 | <p>No Wastes indiscriminately disposed off in the project site observed</p> <p>Sanitary facilities on all project sites</p> <p>Number of complaints on improper waste disposal registered</p> <p>Waste Management plan and records</p>  | NEMA, MWE, DLGs                        | 20000                   |



| No. | Environmental/<br>Social Impact | Activity  | Project<br>Phase | Impact<br>Location          | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|---|------------------|-----------------------------|---|--|--|--|-------------------------|
|     |                                 |   |                  |                             | <p>Environment Officer and the supervising consultant.</p> <p>c) All plastic waste generated at rented residences for the workers or campsites in the course of work such as mineral water bottles, polyethene bags, jerrycans and cups shall be collected and given/sold either to the local people for re-using or taken for recycling in respective factories.</p> <p>d) The Contractor shall develop and implement a Waste Management Plan that puts into consideration sorting at the source, proper storage and transportation. That will at minimum contain the types, nature and quantities of wastes expected to be generated as well as their corresponding methods of treatment and disposal. The plan shall also indicate the sites of proposal as well as the frequency of collection and disposal.</p> <p>e) Adequate and appropriate sanitary facilities shall be constructed at the campsite while workers along the construction sites shall be provided with mobile toilets that shall be cleaned and emptied promptly.</p> |  | <p>Number of waste bins on sites</p> <p>Records of quantities of waste collected and recycled or disposed off</p> <p>Waste Delivery Notes after disposal</p>                                   |  |                         |
|     |                                 | Water treatment and sanitary facilities maintenance | Operation        | WTP and Sanitary facilities | <p>a) Minimize the quantity of solids generated by the water treatment process through optimizing coagulation processes.</p> <p>b) A NEMA approved waste handler should be engaged to collect and dispose of solid wastes to a gazetted NEMA waste disposal facility</p> <p>c) Alternatively, landfill solid wastes but not close to any surface or groundwater (residuals from WTPs are typically not hazardous (EPA, 2011a), thus can be landfilled).</p> <p>d) Regenerate activated carbon such as by returning spent carbon to the supplier.</p> <p>e) Promptly empty the public toilets and toilets at the water office and dispose of sewage to regional NWSC sewage treatment plant.</p>   | Operator                                   | <p>Quantities of wastes generated</p> <p>MOU with NEMA licensed waste handler</p> <p>Emptying schedules and disposal records</p> <p>Number of incidences of overflowing of the septic tank</p> | NEMA, MWE, NWSC, DWRM, DLGs            | 20000                   |

| No. | Environmental/<br>Social Impact              | Activity  | Project<br>Phase           | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|--|---|----------------------------|--------------------|---|--|--|--|-------------------------|
| 13. | Impact on transport -Traffic and Road Safety | Excavations across roads                                    | Construction and operation | Road crossings     | <p>a) To minimize interference with traffic, digging trenches and piping across roads shall be conducted in hours with less traffic preferably on weekends.</p> <p>b) The trench excavated across the roads, after laying the pipes should be backfilled with marram, compacted and levelled to the level of the existing road immediately. This is to ensure that the integrity of the road is not affected by the water line construction activities.</p> <p>c) Conspicuous notices shall be well placed on roads and guides on ground shall direct traffic in case of diversions or open trenches.</p> <p>d) The contractor will have to notify traffic police in advance and work with it during trenching across high ways and other major roads.</p> <p>e) All drivers to be employed by the Developer or Contractor shall be qualified, skilled with valid driving permits.</p> <p>f) The roads that will be affected by the repaired and restored immediately after laying of pipes</p> | Contractor and Operator                    | <p>Number of traffic incidents registered</p> <p>Number of complaints regarding traffic interactions registered by the road users</p> <p>Road traffic signages</p> <p>Notifications to Traffic Police</p> <p>Daily reports</p> <p>Number of affected road crossings that are repaired</p> <p>Drivers with defensive driving licenses</p> | NEMA, MWE, UNRA, DLGs, Uganda Police   | 8000                    |
| 14. | Impact on public Health                      | Interaction of workers with communities (Influx of workers) | Design and Construction    | All project sites  | <p>a) Workers and the community shall be sensitized on protective behaviour and practices during work by distributing appropriate education materials to workers and the surrounding community.</p> <p>b) The Contractor shall develop and implement an HIV prevention and management Plan.</p> <p>c) High risk groups such as the youths especially students shall be continuously sensitized on the dangers of casual sex, consequences of early marriages, teenage pregnancy and monitored to ensure that such groups are not at risk of falling victims.</p> <p>d) The Contractor shall provide surveillance and active screening and treatment of workers and the community where a communicable disease is discovered.</p>  | Contractor                                 | <p>Number of incidents related to public health, drunkardness, etc regiered on the project</p> <p>Number and category of Stakeholder sensitised</p> <p>Number of HIV prevention programs implemented</p> <p>Diseases outbreak surveillance and management plan</p> <p>Appropriate and adequate sanitation</p>                            | MWE, NEMA, MoLGSD, DLGs,               | 15,000                  |

| No. | Environmental/<br>Social Impact | Activity | Project<br>Phase | Impact<br>Location | Mitigation Measures  | Responsible<br>Party<br>for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party<br>for<br>Monitoring | Annual<br>Cost<br>(USD) |
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|     |                                 |          |                  |                    | <p>e) Excessive alcohol abuse shall be discouraged as a policy among project construction workers.</p> <p>f) The contractor and subcontractors ought to have adequate sanitation facilities for the workers at both places of residences and at all work places.</p> <p>g) The contractor or subcontractors shall procure a secure and descent accommodation for all staff either through renting the existing structures in the project area or by constructing new houses in consultation with MWE and local authorities.</p> <p>h) All construction workers shall be orientated and sensitized about responsible sexual behaviour, prevention of Gender Based Violence (GBV) and Sexual Exploitation and Abuse (SEA) in project communities.</p> <p>i) The contractors will develop and follow a code of conduct. The information regarding Worker Code of Conduct will be provided in local language(s).</p> <p>For prevention of Covid-19, the following measures shall be adhered to:</p> <p>a) Establish a daily screening protocol for staff and visitors, to ensure that potentially infected staff do not access worksites.</p> <p>b) Regularly clean and sanitize surfaces like desks, doors, printers, vehicles, toilets, and other shared equipment and spaces.</p> <p>c) Establish a hand washing station at the entrance to the worksite and the security MUST ensure that all people accessing the worksite wash their hands.</p> <p>d) Employees and visitors must at all times maintain the recommended social distancing and must not make unnecessary make direct contact with the staff and clients. The Ministry of Health proposal for working in shifts MUST be complied with. In this regard, recommend</p> |   | <p>facilities at all active sites</p> <p>Substance/alcohol and abuse policy</p> <p>Orientation and sensitisation reports on GBV, SEA and responsible sexual behaviour</p> <p>Appropriate and adequate accommodation facilities for workers</p> <p>Code of conduct developed and signed by all employees</p> <p>SOPs for Covid -19 prevention</p> |   |                         |

| No. | Environmental/<br>Social Impact | Activity  | Project<br>Phase | Impact<br>Location      | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|---|------------------|-------------------------|--|--|---|--|-------------------------|
|     |                                 |   |                  |                         | <p>that a rotational timetable for staff be prepared and communicated.</p> <p>e) The Developer/contractor should provide protection materials i.e. (i) face shields which must be put on all the time when the employees are on duty and (ii) Hand sanitizers to be on every work desk/station.</p> <p>f) The physical meetings must be minimized and virtual meetings encouraged.</p>   |  |   |  |                         |
|     |                                 | Social ills as a result of influx of construction workers(Crime , , HIV risks, Sexual Harrasment, Sexual Exploitation and Abuse and GBV | Constructi on    | Along all project sites | <ol style="list-style-type: none"> <li>1) The contractor shall involve local (LC) leaders in labour recruitment to ensure people hired have no criminal record.</li> <li>2) Local governments and the contractor shall collaborate with police to contain criminal activities.</li> <li>3) A register of all construction workers shall be filed with local authorities to aid in tracking cases of child neglect.</li> <li>4) With the assistance of a competent sub-contractor, the contractor shall draft an HIV/AIDS policy</li> <li>5) A service provider for professional HIV/AIDS activities shall be procured and engaged</li> <li>6) The contractors shall put in place worker place committees to oversee implementation of HIV/AIDS control activities.</li> <li>7) Contractor will provide counseling support and work based positive culture to posttest workers</li> <li>8) The contractor will provide condoms to all workers free of charge placed in private and areas of confidence.</li> <li>9) Peer based awareness and counseling shall be instituted within the workforce.</li> <li>10) All workers (permanent or temporary) will be required ro sign the project code of conduct prior to commencing their assignments.</li> <li>11) A worker Grievance mechanism shall be established and operated.</li> <li>12) Ensure that there is recruitment of (a) service provider(s) to support in prevention (sensitization) and response (referral pathway) activities.</li> <li>13) Develop and implement a SEA/SH action plan with an Accountability and Response Framework as part of the C-ESMP. The SEA/SH action plan will follow guidance on the</li> </ol> | Contractor                                 | <p>Recommendation letters for workers from LCs</p> <p>Number of coordination meetings held between the contractor, LCs and Police</p> <p>Workers' register shared with LCs</p> <p>HIV prevention and management initiatives implemented</p> <p>Service provider for counselling engaged</p> <p>Code of conduct signed by all workers</p> <p>Workers GRM established and functional</p> <p>SEA/SH Action plan and implementation reports</p> | MWE, NEMA, MoGLSD, DLGs, Uganda Police | 20000                   |

| No. | Environmental/<br>Social Impact | Activity                           | Project<br>Phase        | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|------------------------------------|-------------------------|--------------------|---|--|---|--|-------------------------|
|     |                                 |                                    |                         |                    | World Bank's Good Practice Note for Addressing Gender-based Violence in Investment Project Financing involving Major Civil Works (Sept 2018). The SEA/SH action plan will include how the project will ensure necessary steps are in place.   |  |   |  |                         |
|     |                                 | Drug abuse and prostitution        | Design and Construction | All project site   | <ul style="list-style-type: none"> <li>a) The contractor shall involve local (LC) leaders in labour recruitment to ensure that people hired have no criminal record.</li> <li>b) The local content provision shall be emphasised to minimize labour requirements needed from outside the community.</li> <li>c) Local governments and the contractor shall collaborate with police to contain criminal activities.</li> <li>d) The Developer together with the Contractor and the Terego &amp; Yumbe district local governments shall undertake comprehensive awareness to avoid/minimize risks related to drug use and prostitution.</li> </ul>  | Contractor                                 | <ul style="list-style-type: none"> <li>Recommendations from LCs for workers</li> <li>Percentage of of labour sourced from the community</li> <li>Number of engagement meetings held with police</li> <li>Number of awareness and sensitisation meetings held</li> </ul> | MWE, NEMA, MoLGSD, DLGs, Uganda Police | 5000                    |
|     |                                 | Exposure to high noise             | Construction            | Construction sites | <ul style="list-style-type: none"> <li>a) No employee should be exposed to a noise level greater than 85 dB (A) for a duration of more than 8 hours per day without hearing protection.</li> <li>b) Workers be provided with the necessary personal protective equipment (PPE) such as ear muffs as found appropriate;</li> <li>c) The use of hearing protection by all the workers should be mandatory. The mandatory use of hearing protection equipment ( earmuffs) should be enforced by the management of the Water Treatment Plant.</li> <li>d) Periodic medical hearing checks should be performed on workers exposed to high noise levels.</li> <li>e) Sites must be hoarded to curb noise impacts to neighbouring communities</li> </ul> | Contractor                                 | <ul style="list-style-type: none"> <li>Complaints registered on noise pollution</li> <li>Levels of noise from Noise monitoring records</li> <li>Medical check-up reports</li> <li>Records of PPE issuance</li> <li>Hoarded off sites</li> </ul>                         | MWE, NEMA, MoLGSD, DLGs                | 7000                    |
|     |                                 | Exposure to Air pollution and Dust | Construction            |                    | <ul style="list-style-type: none"> <li>a) Construction sites shall be hoarded off to restrict dust to within site boundaries;</li> <li>b) Sprinkle water on vehicle pathways;</li> </ul>  | Contractor                                 | Complaints registered on air/dust pollution   | NEMA, MWE, DLGs                        | 10,000                  |

| No. | Environmental/<br>Social Impact                    | Activity   | Project<br>Phase | Impact<br>Location                             | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD)                                    |
|-----|--|--|------------------|--|--|--|---|--|--|
|     |  |  |                  |  | <p>c) PPE like dust masks shall be availed to workers whenever needed;</p> <p>d) Loose materials like sand that are susceptible to dust generation during haulage be covered with tarpaulin;</p> <p>e) Limit vehicle speed to 30Km/hr on marram roads.</p>   |  | <p>Levels of air/dust emissions from the monitoring repors</p> <p>Trucks covered with taupaline during transporationWater sprinkling records</p> <p>PPE issuance records</p> <p>Instructions to drivers on speed limit including speed limit signage installed along the haulage routes</p>                               |  |  |
|     |  | Interaction of workers and communities during connections and maintenance activities | Operation        | Water offices<br>At all project infrastructure | <p>a) The public toilets should have an adequate water storage facility to ensure that water is available 24 hours even when the supply from the main is off.</p> <p>b) The project should provide for provision of adequate hand washing facilities at the public toilets</p> <p>c) The Operator should ensure that the public toilets are clean at all times</p> <p>d) The Contractor shall provide surveillance and active screening and treatment of workers and the community where a communicable disease is discovered.</p> <p>e) All workers shall be orientated and sensitized about responsible sexual behaviour in project communities.</p> <p>f) The Operator will develop and follow a code of conduct. The information regarding Worker Code of Conduct will be provided in local language(s).</p> | Operator                                   | <p>Number of engagement/sensitisation meetings undertaken</p> <p>Complaints registered due to lack of flowing water</p> <p>Hand washing facilities in place</p> <p>A public toilet attendant recruited for cleaning</p> <p>Medical check up for cleaners</p> <p>Code of conduct developed and signed by all employees</p> | NEMA, MoLGSD, NWSC, DLGs, MWE          | 15,000   |
| 15. | Impact on Education (schools and learning process) | Excavations and pipe laying  | Constructi on    | Within or near schools                         | <p>a) Schools shall be sensitized on the need to keep off construction sites.</p> <p>b) Working schedule shall be consulted with the school administrator to avoid critical quite hours. The working schedule shall be designed</p>  | Contractor                                 | <p>Number of engagement meetings held with the schools</p>  | NEMA, MWE, MoLGSD, , DLGs              | Costs of hoarding of construction site already incorporate |

| No. | Environmental/<br>Social Impact        | Activity                            | Project<br>Phase | Impact<br>Location   | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|--|-------------------------------------|------------------|----------------------|--|--|---|--|-------------------------|
|     |  | Construction of the booster station |                  |                      | <p>considering the school schedule and any potential adjustments needed to minimize any disturbances to student education and learning performance.</p> <p>c) Workers to be instructed to observe silence while working across sections of the project and transmission line which are considered nearby schools.</p> <p>d) The contractor shall not employ any person below 18 years and any pupil or student above 18 shall not be employed during school time. Students above 18 years can be employed only during holidays.</p> <p>e) Workers shall be required to strictly adhere to the code of conduct designed for the project</p> <p>d) The workers shall not be allowed to interface with the students of the affected schools. The Code of conduct that shall be signed by all workers and will have a requirement of workers not interacting with school children.</p>   |  | <p>Agreed working schedules with respective schools</p> <p>Complaints from schools registered</p> <p>Code of conduct developed and signed</p> <p>Child protection policy developed and implemented</p> <p>Records of employees with their national IDs</p> <p>Work procedures for working in and/or near institutions are developed and implemented</p> |  | d in civil works BoQs   |
| 16. | Impacts on Physical Cultural Resources | During excavations                  | Construction     | At all project sites | <p>a) Structures like shrines and graves if encountered (if any) will be relocated in accordance with the existing rituals and norms of the society. Loss of incomes shall also be compensated for since the owners may take some time without any income from them especially if it's deemed necessary to relocate them far from their original site due to cultural rituals involved. Details of compensation shall be contained in the RAP.</p> <p>b) On discovering evidence of possible scientific, Paleontological, historical, prehistoric, or archaeological remains, the contractor shall notify the Department of Museums and Monuments giving the location and nature of the finds.</p> <p>c) The Contractor shall cease work in the vicinity of the site and request the responsible officer from the Department of Museums and Monuments to inspect the site and make recommendation on possible salvage within 72 hours.</p> | Contractor                                 | <p>Number of complaints on PCR registered</p> <p>Notifications to DMM</p> <p>Proof of payments for the relocation</p> <p>Number of incidents when works stop due to PCR</p> <p>Training records on CFP</p> <p>PCR avoidance procedures</p>  | NEMA, MWE, MoLGSD, DLGs, DMM           | 5000                    |

| No. | Environmental/<br>Social Impact | Activity         | Project<br>Phase | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD)   |
|-----|---------------------------------|------------------|------------------|--------------------|---|--|--|--|---|
|     |                                 |                  |                  |                    | <p>d) The Contractor shall exercise care so as not to damage artefacts or fossils uncovered during excavation operations and shall provide such cooperation and assistance as may be necessary to preserve the findings.</p> <p>a) The department of Museums and Monuments is located in Kampala, Kamwokya just before Uganda Wild Life Authority on the road to Ntinda (Kira road). The Commissioner Uganda Museum can be contacted on +256 772485624. A detailed chance find procedure has been presented in this report.</p> <p>b) To mitigate damage to archaeological resources, it is proposed that the construction foremen will inform construction crew to be aware of the possibility of discovering fossils or archaeological remains, what form these would take (bones, fossils in rock, shards or pottery, arrow heads etc.) and the procedure to be followed shall be as stated above.</p> <p>f) The contractor shall develop and implement avoidance procedures. In the event of human remains, there shall be no further excavations or disturbance of the site until the responsible police authorities have been informed.</p> |  |  |  |   |
| 17. | Impacts on land                 | Sites clearances | Construction     | All project sites  | <p>d) MWE shall engage all affected land owners and obtain consent before their land is used as water transmission corridor/way leave for the proposed Enyau water and sanitation project.</p> <p>e) Where the landlords object using their land without any compensation, MWE shall obtain an alternative route for the proposed water pipes.</p> <p>f) All land acquired for establishment of the water treatment plant, transmission pipes, reservoir tanks and any other activity either by the developer or contractor shall be compensated for in accordance with land Act and World Bank Environmental and Social Safeguard Policies. The compensation for married couple should be done after the wife has consented. This is aimed at promoting gender equality given that in the area, women rarely own land.</p>   | MWE  | <p>Number of land owners engaged</p> <p>Number of PAPs that sign the consent forms</p> <p>Number of PAPs compensated for the land taken up by project components</p> <p>Complaints related to land take registered</p> | NEMA, MoLGSD, MoLUD, DLGs              | Sensitisation costs already imbedded in sensitisation budget and the cost of compensation to be determined by RAP |



| No. | Environmental/<br>Social Impact                           | Activity   | Project<br>Phase | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD)   |
|-----|---|--|------------------|--------------------|---|--|--|--|---|
| 18. | Impact on gender vulnerable groups (Women, children, etc) | Employment<br><br>Compensation<br><br>Sexual relationships | Construction     | All project sites  | <p>a) Workers will be sensitized on their sexual rights. MWE shall Work with the contractor on establishing zero tolerance policies and codes of conduct related to violence against women and girls (VAWG).</p> <p>b) All workers shall receive adequate briefing and education on the laws against defilement and other sexual offences.</p> <p>c) To the extent possible, there will be gender sensitivity in task allocation;</p> <p>d) The contractor shall conduct gender sensitization to the work force on matters such as gender sensitive communication and on the gender sensitive conduct of workers towards women including putting in place toilets segregated by gender amongst others</p> <p>e) A child protection plan will be developed by MWE and provided to all the contractors and school management to discourage the contractors from using children as laborers. In addition, contractors will be required to avoid employing workers who are below eighteen years old. They will also be required to keep records that show the ages of their workers.</p> <p>f) Ensure that the community and local leadership have access to and know of and report abuse using the national child abuse hotline 611. The existence of the hotline can be displayed throughout near the construction site and in the community at large.</p> <p>g) The contractor shall ensure that mechanisms for close monitoring of worker's behaviour/conduct are in place e.g. contractor could discreetly engage the police to identify anonymous informers from among the workers to monitor and report any negative behaviour by the workers including child abuse related misconduct, display a call line or suggestion box where the community can provide feedback on workers behaviour.</p> <p>h) MWE and the contractor shall ensure that all local leaders and women/child representatives are fully oriented to the labour force related</p> | Contractor                                 | <p>Number of compliants related to gender and other vulnerable groups</p> <p>Number workers sensitised on their sexual rignts</p> <p>Number of sensitisation on social protection requirements undertaken</p> <p>Atleast 30% of the workforce are women</p> <p>Number of workers sensitised on gender, children and other vulnerable groups requirements</p> <p>Number of complaints registered</p> <p>Child protection Policy and implementation reports</p> <p>National abuse hotline availed to all the workers</p> <p>Number of cases on child abuse, SH and GBV reported to police</p> <p>Orientation plans and reports on child abuse, GBV, SH etc</p> | NEMA, MWE, MoLGSD, DLGs                | Social Development Expert already catered for in 2 above.<br><br>15,000 |

| No. | Environmental/<br>Social Impact | Activity | Project<br>Phase | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|----------|------------------|--------------------|---|--|---|--|-------------------------|
|     |                                 |          |                  |                    | <p>risks for children engaging in construction related activities.</p> <p>i) Talks with the contractor and his workforce by relevant guests (including the police) on child protection shall be encouraged and appropriately scheduled, including continuous popularization of the child help line 611. Parents/guardians shall be sensitized and held accountable for children leaving and arriving home before dark.</p> <p>j) Any person involved in child abuse shall be dealt with in accordance with the law.</p> <p>k) There will be a Specialist (Social Specialist) to oversee gender mainstreaming in the project.</p> <p>l) Workers will be informed about national laws and funder's policies that make sexual harassment and gender-based violence a punishable offence which is prosecuted;</p> <p>m) Worker Code of Conduct will be part of the employment contract, and including sanctions for non-compliance (for example, termination);</p> <p>n) The contractor, where a case arises, will cooperate with law enforcement agencies in investigating complaints about gender-based violence.</p> |  |   |  |                         |
|     |                                 |          | Operation        | All project sites  | <p>a) The Operator will develop and implement zero tolerance policies and codes of conduct related to violence against women and girls (VAWG).</p> <p>b) All workers shall receive adequate briefing and education on the laws against defilement and other sexual offences.</p> <p>c) To the extent possible, there will be gender sensitivity in task allocation;</p> <p>d) The Operator shall conduct gender sensitization to the work force on matters such as gender sensitive communication and on the gender sensitive conduct of workers towards women including putting in place toilets segregated by gender amongst others and;</p>  | Operator                                   | <p>Number of sensitisation on social protection requirements undertaken</p> <p>Number of workers sensitised on gender, children and other vulnerable groups requirements</p> <p>Number of complaints registered</p> | NEMA, MWE, MoLGSD, DWRM, DLGs          | 10000                   |

| No. | Environmental/<br>Social Impact | Activity           | Project<br>Phase | Impact<br>Location          | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD)        |
|-----|---------------------------------|--------------------|------------------|-----------------------------|---|--|--|--|--------------------------------|
|     |                                 |                    |                  |                             | e) Worker Code of Conduct will be part of the employment contract, and including sanctions for non-compliance (for example, termination);   |  | National abuse hotline availed to all the workers<br><br>Number of cases on child abuse, SH and GBV reported to police<br><br>Policies related to gender developed and implemented<br><br>Code of conduct developed and signed by all workers                  |  |                                |
| 19. | Loss of livelihoods             | Water distribution | Operation        | In the distribution network | a) Sensitise existing water vendors in the area about adapting to the new developments in the area<br><br>b) Mobilise the local people and sensitise them about the opportunities presented by proposed project<br><br>c) Encouraged Vendors to tender for public water points.<br><br>d) Develop and implement a livelihood restoration program for the affected communities   | Operator                                   | No. of sensitization meetings targeting existing water vendors<br><br>No. of Vendors operating public water points<br><br>Number of people benefiting from Livelihood restoration program  | NEMA, MoLGSD, DLGs, MWE                | Covered under awareness budget |
| 20. | Fire outbreak                   | Electrical shocks  | Operation        | Offices                     | a) The project proponent will put in place a comprehensive fire plan to guide the occupants and users of the offices in case of fire outbreak.<br><br>b) The buildings shall be fitted with fire alarms to alert the occupants of any potential fire outbreak<br><br>c) All electrical wiring will be carried out by certified electricians.<br><br>d) There will be installation and proper maintenance of firefighting equipment (fire extinguishers and firefighting water horse pipes). | Operator                                   | Fire prevention and management plan<br><br>Fire suppression equipment installed at the key facility<br><br>Fire alarms installed<br><br>Wiring certificate for electricals in place<br><br>Number of fire drills undertaken<br><br>Presence of security guards | MWE, NEMA, MoLGSD, DLGs,               | 15,000                         |

| No. | Environmental/<br>Social Impact | Activity                        | Project<br>Phase | Impact<br>Location | Mitigation Measures  | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---------------------------------|---------------------------------|------------------|--------------------|--|--|---|--|-------------------------|
|     |                                 |                                 |                  |                    | <p>e) Management will carry out annual drills to ensure evacuation plans are effective and are understood by all facility occupants.</p> <p>e) The premises should also have permanently stationed security guards and lighting to ensure security against arson-associated fires.</p>   |  |   |  |                         |
| 21. | Chemical exposure               | Storage, transportation and use | Operation        | At WTP             | <p>a) Prudent handling and storage of hazardous chemicals, as described in Annex 11 will help to minimize potential risks to workers.</p> <p>b) All chemicals shall be transported, stored and handled appropriately and shall have respective material safety data sheets well displayed in the store. In addition, the chemicals storage areas and transportation vehicles shall be well secured with appropriate labels. The project shall construct chemicals storage facilities. During operation, covered vehicles with labels like hazardous substances in transit shall use to transport chemicals</p> <p>c) Develop and implement a plan for responding to accidental releases. The plan should at minimum include who to contact (communication and reporting), how to act in an emergency and how to mitigate risk (procedures), and what resources to use. This plan should be communicated to all staff.</p> <p>d) Install containment and scrubber systems to capture and neutralize chlorine should a Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease</p> <p>e) Implement a training program for operators who work with chlorine and ammonia regarding safe handling practices and emergency response procedures.</p> <p>f) Provide appropriate personal protective equipment (including, for example, self-contained breathing apparatus) and training on its proper use and maintenance.</p> | Operator                                   | <p>Number of incidents of chemical exposure</p> <p>Chemicals Management Plan</p> <p>Emergency Response Plan</p> <p>Training records on chemicals management</p> <p>Emergency showers in place</p> <p>Working schedule</p> | NEMA, MoLGSD, MWE, DLGs                | 20,000                  |

| No. | Environmental/<br>Social Impact   | Activity  | Project<br>Phase           | Impact<br>Location                             | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|---|---|----------------------------|--|---|--|--|--|-------------------------|
|     |   |   |                            |  | <p>g) Prepare escape plans from areas where there might be a chlorine or ammonia emission.</p> <p>h) Install safety showers and eye wash stations near the chlorine and ammonia equipment and other areas where hazardous chemicals are stored or used.</p> <p>i) Ventilate enclosed processing areas and ventilate equipment, such as pump stations, prior to maintenance.</p> <p>j) Periodically sample air quality in work areas for hazardous chemicals. If needed to meet applicable occupational health national requirements or internationally accepted standards, install engineering controls to limit worker exposure.</p> <p>k) Prohibit eating, smoking, and drinking except in designated areas.</p> <p>l) Rotate personnel among the various treatment plant operations to reduce inhalation of air-stripped chemicals, aerosols, and other potentially hazardous materials.</p> |  |  |  |                         |
| 22. | Decommissioning phase impacts (Noise and vibration, Solid waste generation and <a href="#">Dust</a> ) | Demolition of structures and levelling          | Decommissioning            | At sites where decommissioning is taking place | <p>a) Workers shall be provided with adequate protective wear (Ear muffs and dust masks)</p> <p>b) Solid waste shall be managed in accordance with the National laws. A licensed waste handler shall be contracted to transport and dispose wastes at a gazette waste disposal facility</p> <p>a) Communities shall be informed of the plan to decommission and shall be sensitized on potential impacts</p>  | Contractor                                 | <p>Number of complaints on restoration process registered</p> <p>Approved decommissioning plan</p> <p>No wastes are left on site</p> <p>Number and category of community members engaged</p> | MWE, NEMA, MoLGSD, DLGs                | 30,000                  |
| 23. | Occupational health and safety of workers   | Lifting, working at heights, transportation etc | Construction and Operation | All project sites                              | a) The contractor should have in place a Health and Safety Policy and Action Plan, addressing workers' occupational health and safety issues, workers' welfare and working conditions in line with the Occupational Health and Safety Act of 2006, and World Bank Group   | Contractor and Operator                    | <p>Number of Safety Inductions undertaken</p> <p>Number of safety incidents registered</p>   | NEMA, MoLGSD, MWE, DLGs                | 10,000                  |

| No. | Environmental/<br>Social Impact    | Activity                        | Project<br>Phase           | Impact<br>Location | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators  | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----|------------------------------------|---------------------------------|----------------------------|--------------------|---|--|---|--|-------------------------|
|     |                                    |                                 |                            |                    | <p>EHS general Guidelines, and the EHS guidelines for water projects</p> <p>b) The Contractor should have HSE induction for all workers, and undertake daily tool box meetings prior to works, including work at heights</p> <p>c) Ensure adequate provision of PPEs (gloves, safety shoes, safety belts, overalls and goggles), as well as continuous awareness on the need for use of PPEs and enforcement of usage</p> <p>d) Ensure good housekeeping practices on site (have all equipment, materials, containers well stacked or stored) to avoid trips and falls on site</p> <p>e) The movement of hazardous liquid chemicals will be done on drip trays to avoid spillage to the ground</p> <p>f) All workers on sites should be well trained on the risks and their tasks</p> <p>g) Workers should regularly be taken through safety drills and emergency preparedness training allowing for quick and efficient responses to accidents that could result in human injury or damage to the environment.</p> <p>h) First aid facilities should be provided on site and accessible to all personnel. It should among others contain rubber gloves, bandages, pain killers and cotton wool to cater for minor accident victim.</p> <p>i) Fence off equipment storage areas and camp sites to discourage idlers to the sites</p> <p>j) The contractor and Operator to have in place a traffic management plan, and guidelines for drivers to avoid accidents.</p> |  | <p>Number of complaints on health and safety registered</p> <p>Workers observed on sites with appropriate and adequate PPEs</p> <p>PPE issuance records</p> <p>Traffic Management Plan</p> <p>Training records for workers</p> <p>Records of safety drills</p> <p>Fenced material storage areas and camp sites</p> <p>First aid box and facilities available at worksites</p> |  |                         |
| 24. | Labour issues and employee conduct | Employment Interrelations among | Construction and Operation | All project sites  | a) Contractor to have in place a Labour Force Management Plan, in line with the Labour Act and OHS Act. Labour Force Management Plan to address issues of workers' welfare, child labour, workers code of conduct, sexual harassment among workers, compensation in   | Contractor and Operator                    | Number of complaints from workers registered  | NEMA, MWE, MoLGSD, DLGs                | 12,000                  |

| No.                               | Environmental/<br>Social Impact  | Activity  | Project<br>Phase                   | Impact<br>Location                          | Mitigation Measures   | Responsible<br>Party for<br>implementation | Monitoring<br>indicators   | Responsible<br>Party for<br>Monitoring | Annual<br>Cost<br>(USD) |
|-----------------------------------|----------------------------------|---|------------------------------------|---|---|--|--|--|-------------------------|
|                                   |                                  | workers and communities   |                                    |   | <p>cases of accidents, payments and contracts, a grievance management mechanism</p> <p>b) All workers to have contracts</p> <p>c) Persons seeking employment will have to be screened, including references from the local Council Chairpersons of their villages of origin before engagement</p> <p>d) To mitigate negative impacts arising from recruitment of labour from distant places, the contractor should hire local labour mainly.</p> <p>e) Both men and women will be given equal employment opportunities and that there will be fair treatment and non-discrimination among staff.</p> <p>f) Contractor to have in place a workers' code of conduct to address abuse of women and girls that may lead to broken marriages, early pregnancies, sexual exploitation, spread of HIV/AIDS and all kinds of risky and inappropriate behaviour.</p> |  | <p>Number of Workers with contracts</p> <p>Percentage of workers recruited from the project area</p> <p>Workers code of conduct signed</p> <p>Workers Grievance Management Committes established and functional</p> <p>Policy on gender equality developed and implemented</p> <p>Recommendations from LCs for workers</p> |  |                         |
| 16.                               | Project delays due to complaints | Formation of Grievance Redress Commitees(GRCs)<br>Training of GRCs<br>Facilitation fo GRC | Pre-constructi on<br>Constructi on | All project sites and at the district level | <p>1) GRCs shall be formed at the village and district levels in the project area</p> <p>2) All GRCs shall be inducted/trained on the requirements for the project, their role in grievance management, handling and process procedures for handling Grievances</p> <p>3) GRCs shall be facilitated with Grievance Register books, refreshments during their meetings and any other facilitation deemed necessary for successful management of complaints</p>   | MWE  | <p>Functional GRs in place</p> <p>Reports on GRC formation and induction/training</p> <p>Grievance Register Books issued to all GRCs</p> <p>Minutes of GRCs meetings</p> <p>Percentage of complaints resolved by the respective GRCs</p>   | NEMA, MWE, MoGLSD, DLGs                | 30,000                  |
| Overall ESMP Implementation costs |                                  |   |                                    |   |   |  |  |  | 416,000                 |

### **9.3 PENALTIES FOR NON-COMPLIANCE**

Where actions have resulted in significant environmental and/or social impacts, with no remedy action been shown, a penalty mechanism and/or stop work order can be used against the Contractor for causing environmental and social harm. It should be specified as early as bidding for the construction work that high E&S performance is mandatory and non-compliance will be dealt with through the issuing of non-compliance fines, with no claims allowed for lost time by the Contractor. This will ensure that Contractors take E&S compliance seriously and conduct all work within the specified guidelines of the ESMP. Failure to do so, resulting in fines and/or stop work orders, will show that full E&S compliance simply makes for better profits; it certainly supports better environmental and social governance, enhances positive benefits and reduces the risks and realization of negative project impacts.

### **9.4 E&S ACTION PLANS AND METHOD STATEMENTS**

Action Plans from the Contractor will be required for overall E&S management. Action Plans will indicate what further plans/programs the Contractor has compiled to manage, for instance, HIV/AIDS, gender equality, gender-based violence and the abuse of children, amongst others. Method Statements from the Contractor are more specific and will be required for specific sensitive actions. A Method Statement describes how sensitive area work takes place, is a dynamic document in which modifications are agreed on between the Contractor and E&S Supervising Consultant/s during the construction phase, as construction works progress. A Method Statement describes the scope of the intended work in a step-by-step process in order for the E&S Supervising Consultant to understand the Contractors intentions and methods. This will enable them to assist in linking mitigation measures, which would reduce environmental and social impacts during the execution of these construction activities. For each instance wherein, it is recommended that the Contractor submits a Method Statement to the satisfaction of the E&S Supervising Consultant, the format should clearly indicate the following:

- Description of the activity to be undertaken;
- Detailed description of the process of work, methods, equipment and materials storage and movement to work sites;
- Description/sketch map of the locality of work;
- Sequence of actions with commencement dates and completion date estimates;
- Management of any emergencies, like contamination and spills, if they should occur; and
- Show how E&S risks will be managed.

The Contractor must submit E&S component specific Action/Management Plan/s and Method Statement/s prior to commencement of any particular construction activity, and work may not commence until these have been approved by MWE. The approval of the Methods Statement/s or E&S component specific contractor management plane does not absolve the



Contractor from other or additional obligations or responsibilities as contained in the terms of contract, the ESMP and their E&S Action Plan.

For this project, Methods Statement/E&S specific contractor management plan that shall be required are:

- **Influx Management Plan**

While project-induced influx can benefit the project and host communities (e.g., by increasing business opportunities, improving the availability goods and services, and offering employment to locals), the influx can pose significant risks and impacts. If not carefully managed, labour influx can negatively affect public infrastructure, utilities, public services, housing, health, food security and social dynamics in the project area, especially in rural, remote or small communities, which typically have less absorptive capacity than a large urban environment. The Plan will detail measures aimed at: a) avoiding or reducing negative influx impacts and enhancing positive impacts in the project area of influence; and b) providing capacity building for Contractor, local government and communities to help them cope with project-induced in-migration.

- **Labour Management Plan**

The Contractor is expected to have a clear plan for recruitment of workers to promote project ownership by the communities. The Contractor should give preference to local people by recruitment of unskilled and semi-skilled labour from project villages and this should be done through local areas councils from where those seeking employment should get letters of recommendations.

- **Explosives and Blasting Management Plan**

The project construction activities will require considerable amounts of gravel. In order to quarry this material, explosives will be employed as a primary means of breaking the rock from designated sources. The purpose of the Explosives and Blasting Management Plan is to describe how the Contractor will integrate safe use of explosives into quarrying operations while minimizing environmental and social impacts. The objectives of the Explosives and Blasting Management Plan are as follows:

- Ensure that handling of explosives is done in a manner that will minimize the possibility of accidents or incidents;
- Provide guidance on explosives management for the Project;
- Prescribe procedures for safe blasting;
- Ensure that infrastructure for explosives storage is compliant with all applicable regulations;
- Prescribe safe and environmentally sound measures for disposal or destruction of explosives;

- Prescribe procedures for dealing with spills of explosive materials; and
- Elaborate the chain of responsibility for explosives management.

Permits required for the use and storage of explosives will be obtained prior to quarrying. The permits and licenses required are listed below;

- Permit for Use of Explosives (Renewable yearly) – Required under the *Explosives Act*,
- Explosives Magazine License (Renewable yearly) – Required under the *Explosives Act*,
- Explosive Transportation Permits – Required under the *Explosives Act*,
- Blasting Certificate – Required under the Occupational Health and Safety Regulations.

- **Traffic Management Plan**

The major purpose of the Traffic Management Plan is to help protect road users and workers and keep traffic delays to a minimum through proper and clear signage and controls. The Traffic Management Plan will provide actions to ensure safety of road users and construction staff during construction of the project. It will outline traffic control and traffic management procedures to prevent potential hazards associated with road use during construction. Any work resulting in obstruction of roads needs to be managed so that safety is not compromised and disruptions and delays to road users are kept to a minimum. The Plan should include a road safety awareness program.

- **Security Management Plan**

The Plan will provide guidance and requirements on safety and security for the Project. It will identify potential security risks present during the construction phase, methods and actions to mitigate these risks, and the requirements to ensure the highest levels of safety and security in the implementation of the Project. It will, therefore, set out commitment of the Project to security under the project. MWE will not sanction any use of force by direct or contracted workers in providing security except when used for preventive and defensive purposes in proportion to the nature and extent of the threat. MWE will (a) make reasonable inquiries to verify that the direct or contracted workers retained by the Contractors to provide security are not implicated in past abuses; (b) train them adequately in the use of force and appropriate conduct towards workers and host communities; (c) require them to act within the applicable law and Bank safeguards policies; (d) MWE will review all allegations of unlawful or abusive acts of security personnel, take action to prevent recurrence and where necessary report unlawful and abusive acts to relevant Authorities such as the Police, Local Councils, District Local Governments; (e) MWE shall require that all deployed Security personnel sign a Code of Conduct to make behavioral commitments; (f) MWE shall require establishment of a clear and accessible Grievance Redress Mechanism handle complaints from both the Workers and the host community; (g) Establish coordination and reporting arrangements between the Project Security and the Public Security Agencies; and (h) Put in place appropriate site access and control measures such as fencing of facilities, installing manned gates, surveillance cameras etc.

- **Noise Control Plan**

The noise sensitive receptors mainly include schools and residential areas located within less than 100 m from the direct project footprint. Workers exposed to construction noise are sensitive receptors as well. The Noise Control Plan will consolidate the noise control mitigations and methods to be compiled by the contractor while undertaking activities leading to noise impacts. The objective is to mitigate noise nuisance and disturbances to other public/ socio-economic activities and land uses sensitive to noise. It will be a requirement in the plan that construction activities will be prohibited between 10pm and 6am in residential areas. Also, when operating close to sensitive areas (within 250m) such as residential, schools or medical facilities, the contractor's working hours shall be limited to 7am to 6pm.

- **Air Quality and Dust Control Plan**

This plan will detail the actions to be taken to mitigate dust generation and air emissions associated with construction works. It will identify the sources of air pollution, the predicted levels in the ESIA, the sensitive receptors, management actions and details of the air quality monitoring program. The objectives of the Plan are as follows:

- To minimize the nuisance impact on surrounding communities of dust generation during construction activities;
- To minimize potential risks from dust generation;
- Identify all possible air pollution sources related to construction activities as well as actions to minimize emissions into air.
- Ensure there is regular monitoring and reporting of air quality aspects.

- **Erosion and Pollution Control Plan**

Erosion risks are expected to be mainly associated with vegetation clearance, construction of access roads and storage of excavated materials. In some cases, the project area may receive high amounts of rainfall that will be associated with several soil erosion and drainage impacts, such as, siltation and water stagnation that could be experienced in the direct project area. It is recommended that the Contractor includes a comprehensive Erosion, Sedimentation & Pollution Control Plan Checklist.

- **Waste Management Plan**

The Waste Management Plan should include the following:

- Waste sources and streams
- Management Hierarchy (3Rs)
- Practices (collection + storage + disposal) for non-hazardous waste
- Practices (collection + storage + disposal) for hazardous waste
- Logistics (bins, etc.)
- Permitting requirements
- Monitoring + Reporting (KPIs)

The Contractor will implement waste management measures and practices throughout the construction period to mitigate risks. The Contractor shall undertake measures to respond to all generated categories of wastes i.e. solid wastes (food residues, metal scraps, bottles, plastics, polythene sheets, wood pallets, papers, faecal matter and other parking materials), construction wastes such as rejects/offcuts of bricks, steel reinforcement, nails, iron sheets, timber among others and liquid wastes (waste oil, wastewater, urine etc.). The Contractor should be aware that large quantities of cut to spoil may be generated which will require disposal. Therefore, the contractor is expected to identify potential sites for waste disposal before excavation works commence in order to secure the requisite approvals in a timely manner.

- **Occupational Health and Safety Plan**

The Contractor will have to prepare a document that presents the framework for occupational health and safety management and monitoring measures that he will undertake. The OHS plan should typically cover safety programs that will be applied for promoting health and safety, preventing harm, fatality and hazards to the employees, sub-contractors, properties and the general public.

- **Emergency Response Plan**

The Emergency Response Plan (ERP) will cover the required actions for all situations that could generate emergency situations during the project's construction phase. The ERP will provide guidance to manage emergency events during different stages of construction. It will include general guidelines and procedures for the management of emergency events including emergency management command structure and mechanisms for incident reporting and investigation.

- **HIV/AIDS and Gender Management Plan**

The Contractor in pursuit of his commitment to health and safety will organize trainings, conduct awareness and education on the use of infection control measure in the workplace. The Contractor is expected to provide appropriate PPE to protect workers from the risk of exposure to HIV/AIDS and incorporate HIV/AIDS information in occupational health and safety inductions, provide guideline in preventing the spread of HIV/AIDS and other sexually transmitted infections (STIs), publicize knowledge related to HIV/AIDS and STIs to the work crews and the surrounding communities, provide information on good HIV prevention interventions, including promotion of the correct use of condoms and ensure sufficient resources are available for HIV programs. The contractor is expected to also come up with a Gender Management Plan (GMP). The GMP will cover gender related aspects, such as GBV risks at community and worker's level, Sexual Harassment to protect women workers as well as community members, mitigation measures, responses and who is in charge of different actions, show aspects of gender division of labour in terms of equality and equity, gender segregation (for example female workers having separate toilets and changing rooms from

male workers), gender working conditions, provision of job opportunities where the contractor identifies areas where ladies are given high opportunities such as cleaning, human resource positions, working in laboratories, flag ladies among others. The GMP should show gender sensitivity and show a clear code of conduct. The GMP should also provide a checklist to help identify whether the project is gender complainant.

- **Site Restoration/ Decommissioning Plan**

At the end of construction activities, the Contractor shall ensure restoration of the disturbed natural sites through environmental rehabilitation, backfilling and restoring topsoils, (re-) introduction of genetic species (e.g. natural re-grassing) similar to those destroyed in order to re-establish the natural local ecology. The decommission phase will focus on any of the following as applicable:

- Workers' camp
- The parking/ equipment yards
- Material stockpile areas
- Access roads
- Quarries and borrow pits

Specifically, the process of rehabilitating and restoring the site shall follow the following sequential approach:

- All facility structures shall be demolished; the rubble/debris shall be used for fill purposes or taken to an approved disposal site;
- All equipment, vehicles, trucks and machinery shall be removed from sites;
- Makeshift access roads shall be closed, scarified and revegetated
- Backfilling all openings with soil and leftover overburden
- Planting fast-growing trees and grasses to stabilize excavated areas with native species;
- Fencing off the re-vegetated areas should be provided until the reinstated vegetation has reached maturity

Joint site inspections will be conducted to ensure site restoration before handover of the project in order to assess the progress of restoration activities. They will constitute the Contractor, MWE, Supervision Consultant and the District Environment Officer.

Progressive restoration should be encouraged throughout project implementation, especially for the exhausted materials areas/sites, including parts of quarries, etc. Thus need for restoration plans to be prepared in advance and where necessary approved by NEMA and other responsible statutory bodies.

- **Stakeholder Engagement and Information Disclosure**

Environment and Social Safeguards requirements recognize the importance of open and transparent engagement with project stakeholders. Success of any project is hinged on level and quality of stakeholder engagement which is an inclusive process expected to occur throughout the project life cycle. Engagement is more useful when introduced in the

early phases of project development and is mainstreamed into all levels of decision-making.

- Under Stakeholder Engagement and Information Disclosure , the following scope is envisaged:
  - Stakeholder identification and analysis: This requires the identification of key project affected parties and those with interests in the project. At this level emphasis is on vulnerable people or groups of people whose situation are likely to be accelerated by project implementation. Identification should be able to bring out different sets of affected people and their interests.
  - Stakeholder Engagement Plan: A Stakeholder Engagement Plan (SEP) shall be drafted in consultation with the Bank. The SEP will be disclosed at all appropriate levels to afford all affected and interested have inputs into project design and implementation.
  - Information Disclosure: The borrower is obliged to undertake timely and effective disclosure of information regarding the project including its purpose, nature, scale, potential risks and impacts on the local communities and further present possible mitigation measures.
  - Meaningful Consultations: Consultation is meaningful if a dialogue exists, communities and individuals should be given an opportunity to interact with respect and dignity. Interactions should be based on prior disclosure of project relevant information to all parties.
  - Engagement during project implementation and external reporting: Continuous interaction with project affected persons throughout the project lifecycle is key for successful implementation of the project. Project affected Persons shall be availed all relevant information using appropriate means to enable them reach an informed decision.
  - Grievance mechanism: A grievance mechanism is expected to guide the resolution and management of concerns, complaints and issues that may arise during the entire project life cycle. The GRM will be proportionate to identified potential risks and impacts.
  - Organisational capacity and Commitment: MWE shall define clear roles, responsibilities and authority and further designate properly skilled personnel to be responsible for implementation of specific stakeholder assignments.

Prior to construction activities, and in pursuit of timely, meaningful and appropriate stakeholder engagement, the contactor shall develop a clear strategy for stakeholder engagement to assist in managing and facilitating engagement through the construction activities. The SEP at this stage will be guided by that developed by the borrower at the project planning stage. This stakeholder engagement plan will adopt an inclusive perspective. The SEP will inform on-going stakeholder engagement through the various stages of construction, decommissioning and the defects liability period.

## **9.5 INSTITUTIONAL AND IMPLEMENTATION ARRANGEMENTS**

The Project will be implemented by MoWE through its regional entities (WMZs, WSDFs) in close collaboration with Terego & Yumbe District local governments and their partners (e.g. private sector operators). To facilitate integration within the sector, MOU/MOUs outlining joint responsibilities will be signed between the MWE, respective district local governments and entities responsible for specific activities (e.g. Districts).

The Project's primary stakeholders are the: a) MoWE through which the project will be implemented in coordination with its relevant departments (e.g. DWRM, DWD, DEA); ii) Terego & Yumbe District Local Governments iii) and local communities and consumers who will participate in project planning, and benefit from the outputs and outcomes of the project. The MWE currently has adequate Environmental and Social Safeguards staffing, Terego & Yumbe District Local Government has Environment Officers and Community Development Officers who will be involved in project monitoring and supervision.

### **9.5.1 Stakeholders to be involved in the implementation**

The management and supervision of the ESMP is strictly the responsibility of the Ministry of Water and Environment as the Developer. During construction, the Contractor will be responsible for the day-to-day implementation of the ESMP. During the operation phase, the National Water and Sewerage Corporation (NWSC), who will take over management of the project, will be responsible for the implementation of the ESMP. The Contractor shall hire the following key staff to undertake project implementation: Project Manager, Environmental Specialist, Sociologist, Health and Safety Officer. At the local level Terego & Yumbe districts will be responsible for the day-to-day monitoring of the ESMP in their areas of jurisdiction.

At the National level, two institutions i.e. the National Environment Management Authority (NEMA) and the Department of Occupational Safety and Health (DOSH) of the Ministry of Gender, Labour and Social Development will be involved. The role of NEMA is to monitor the project as per the Environment Act No.5 of 2019 and to approve external environmental compliance audits as per the Environmental Audit Regulations (1999). The role of DOSH is to issue Workplace Registration Certificates and periodically inspect the project site. DOSH will issue workplace Certificates every year if the project meets working conditions as set out in the Occupational Safety and Health Act 2006. The District and town councils will approve construction permits in their area of jurisdiction. As a means of impartiality, local NGO's or CBOs will be involved in the implementation of ESMP. Their role is to be neutral observers. They should have experience in environmental and social management and skills in conflict resolution.

### 9.5.2 Roles and Responsibilities in the ESMP Implementation

Ministry of Water and Environment will coordinate with NEMA on ensuring that environmental and social issues are addressed effectively throughout the lifecycle of the Project. Implementation of the different environmental issues is done through the relevant government institutions (Lead Agencies) within whose mandate the respective issues lie. The role of NEMA is to coordinate the input by all the different lead agencies and ensure compliance with the National Environmental Policy and Law. The monitoring team/ institutions shall be required to report on a quarterly basis. The reporting metrics shall include among others accident and incidents, compliance with ESMPs, challenges and how to address the challenges. Implementation of the ESMP will involve multiple institutions at all levels as detailed out below in Table 9.1 below.

Table 9.1: Institutions involved in safeguards management of the project

| Ministries and Departments                   | Mandates/Responsibilities  |
|--|--|
| The Ministry of Water and Environment (MoWE) | The Ministry of Water and Environment (MoWE) has the overall mission: to promote and ensure the rational and sustainable utilization, development and effective management of water and environment resources for socio-economic development of the country. The ministry has three directorates: Directorate of Water Resources Management (DWRM), Directorate of Water Development (DWD) and the Directorate of Environmental Affairs (DEA). MoWE shall take lead on implementation of the project and shall ensure all recommendations contained in the mitigation plan are implemented.  |
| Ministry of Local Government -MoLG           | The Ministry is mandated to carry out a number of responsibilities in the Local Government Act as follows: to inspect, monitor, and where necessary offer technical advice/assistance, support supervision and training to all Local Governments; to coordinate and advise Local Governments for purposes of harmonization and advocacy; to act a Liaison/Linkage Ministry with respect to other Central Government Ministries and Departments, Parastatals, Private Sector, Regional and International Organizations; and to research, analyze, develop and formulate national policies on all taxes, fees, levies, rates for Local Governments. Terego & Yumbe DLGs fall under this Ministry and will be supervised and supported by MoLG. |
| <b>STATUTORY AGENCIES</b>                    |  |
| National Environment                         | NEMA retains its mandatory role of coordination, supervision and monitoring environmental issues. As for the implementation of the ESIA process, NEMA's role will involve coordinating the review of   |



|  |  |
|--|--|
| Management Authority (NEMA)                      | <p>the ESIA's of the planned interventions with relevant line agencies. Other lead agencies that would participate in the review are the Ministry of Local Government and local governments.</p> <p>Specifically, the Environmental Monitoring and Compliance Department of NEMA is responsible for the review and approval of ESIA's, post-implementation audits and monitoring of approved projects. Although project sponsors have a responsibility for monitoring their own activities, NEMA carries out its own monitoring largely through District Environmental Officers and environmental inspectors at NEMA's head office/ Lead Agencies.</p> |
| <b>DIRECTORATES</b>                              |  |
| Directorate of Environmental Affairs (DEA)       | The DEA is responsible for environmental policy, regulation, coordination, inspection, supervision and monitoring of the environment and natural resources as well as the restoration of degraded ecosystems and mitigating and adapting to climate change.  |
| Directorate of Water Development (DWD)           | The DWD is responsible for providing overall technical oversight for the planning, implementation and supervision of the delivery of urban and rural water and sanitation services across the country, including water for production. DWD is responsible for regulation of provision of water supply and sanitation and the provision of capacity development and other support services to Local Governments, Private Operators and other service providers.   |
| Directorate of Water Resources Management (DWRM) | The DWRM is responsible for developing and maintaining national water laws, policies and regulations; managing, monitoring and regulation of water resources through issuing water use, abstraction and wastewater discharge permits; Integrated Water Resources Management (IWRM) activities; coordinating Uganda's participation in joint management of transboundary waters resources and peaceful cooperation with Nile Basin riparian countries.  |
| <b>DISTRICT</b>                                  |  |
| District Environment Officer (DEO)               | The functions of the District Environment Officer is amongst others, advice the district Environment committee on all matters relating to the environment amongst others.  |
| District Environmental Committees                | The functions of the District Environment Committees include: to act as a forum for community members to discuss and recommend environmental policies and bye laws to the District Council and advice the District Technical Planning Committee, the District  |

|                                    |  |
|------------------------------------|--|
|                                    | Council and NEMA on environmental management issues in the district.   |
| NGOs                               | The NGOs working in the sector are coordinated at the national level through UWASNET, Uganda Water and Sanitation NGO Network an umbrella organization, which has been largely funded by sector development partners through MoWE.   |
| Water Management at District Level | They receive funding from the center in the form of a conditional grant and can also mobilize additional local resources for water and sanitation programs. Local Governments, in consultation with MoWE appoint and manage private operators for urban piped water schemes that are outside the jurisdiction of NWSC.   |
| <b>COMMUNITY</b>                   |  |
| Beneficiary Communities            | The Communities will participate in planning and implementation of the rural water supply and sanitation project. A water user committee (WUC), which is sometimes referred to as a Water and Sanitation Committee (WSC) shall be established at each water point. Being the primary beneficiaries of the project, the community will be made to participate fully in all aspects of the program including project identification, preparation, implementation, operation and maintenance. |

### 9.5.3 Capacity Building in Environmental & Social Aspects of the Project

The goal of the IWMDP is to the maximum extent possible utilize existing institutional structures and capacity within the MWE and NWSC to implement the Project. In order to successfully implement the ESMP, it is important to ensure that target groups and stakeholders who play a role in implementing it are provided with the appropriate and continuous Environmental and Social Safeguards capacity development.

From the assessment, MWE and NEMA has safeguards personnel that have some level of capacity in terms of equipment and training in environmental management and monitoring. However, the assessment ascertained that the beneficiary communities and District Local Governments do not have sufficient capacity in terms of equipment, personnel and funds to monitor the implementation of the project. The contractors may also need awareness and training in the environmental and social aspects of the project. The ESMF also recommended capacity building in environmental management at the district and sub-district levels and refresher training at National level as well. It is therefore recommended

The key institutions/group of people whose capacity needs to be enhanced to effectively implement and monitor the ESMP of this project are:

- Beneficiary Communities: There is a need to carry out training and awareness trainings for the key community members on the safeguard's aspects of the project through community policing and reporting.
- Staff of the respective District Local Governments: The staff at the district level needs to be trained on key aspects of the project including but not limited to environmental monitoring, RAP implementation, health and safety, reporting and modeling as well as catchment management. They also need to be facilitated to enable them effectively monitor the ESMP implementation process.
- MWE and NEMA staff also need refresher training in environmental monitoring, RAP implementation, reporting and modeling as well as catchment management approaches.

There is also need for the project to foster inter institutional monitoring of the implementation of the project's ESMP. An interinstitutional monitoring committee should be formed, trained and their activities facilitated. A capacity building plan should be developed after instituting the inter institutional monitoring committee.

In general, the human resource equation for the delivery of environmental and social safeguards compliance oversight by environment and social safeguards experts of the Ministry has been reinforced with the recruitment of the Project Social Development Specialist and Environmental Specialist. Hence the Ministry has adequate capacity to monitor the implementation of the safeguards requirements of the project. In execution of supervisory and monitoring role, Ministry relies largely on physical site inspections, interviews and review of records without going into some in situ measurements of some physical and ecological parameters. The approach can be exploited by fraudulent contractors since they will have known that, there will be measures for on-site physical verifications. It is therefore important that the Ministry obtains some in-house equipment for rapid verification of noise, air quality, vibrations and water, and the results may be used to inform resolution of related complaints. In the same vein, there should be readily available logistics in terms of vehicles for the environment and social personnel of the Ministry to rapidly respond to environmental and social safeguards emergencies in the projects as they happen.

#### **9.5.4 Roles of the Contractors during Project Implementation**

- (i) All contractors hired to undertake project civil works shall be required to develop a Contractor's ESMP which will include among others the following aspects: the initial sub-project ESIA approved by both NEMA and World Bank, Health and Safety Management Plan, Traffic Management Plan, Waste Management Plan, Equipment Yard Management Plan, Labour Influx Management Plan which shall also include Code of Conduct for Workers, Construction Materials Acquisition Due Diligence Procedure, etc.
- (ii) The Contractors shall hire the following key staff to undertake project implementation: Project Manager, Environmental Specialist, Sociologist and, a Health and Safety

Officer. The contractor shall be required to submit a monthly safeguards report. The reporting metrics shall include among others accident and incidents, compliance with ESMPs, challenges and how to address the challenges

- (iii) The Contractor shall be required to report any severe and serious incident to Mwe within 24 hours of its happening.

## **9.6 ENVIRONMENTAL MONITORING PROGRAMME**

### **9.6.1 Overview**

The general approach to effective monitoring is to compare the pre- and post- project situations, measuring relevant environmental impacts against baseline conditions. Baseline data establish a reference basis for managing environmental impacts throughout the life of the project. A monitoring process will therefore be introduced to check progress and the resultant effects on the environment as the implementation of Enyau water and sanitation project proceeds.

MWE will undertake the necessary monitoring measures for short- and long-term monitoring program respectively. However, during monitoring close links shall be maintained with other relevant lead agencies. The key lead agencies that shall be kept in the loop will include Terego and Yumbe Local Governments, NEMA and DWRM. It is the role of the Developer to ensure that the Contractor implements the proposed mitigation measures presented in this ESIA report. The planned mitigation measures indicated in chapter 7 (Project Impacts) and chapter 8 (ESMP) shall be the starting point. These shall be planned and checked against their effectiveness in reducing the negative impacts/or enhancing the benefits identified in this report.

The process shall also include regular reviews of the impacts that cannot be contemplated at the time of doing this Environment Impact Assessment. Action shall be taken in response to the unforeseen changes and subsequently scale up the mitigation and monitoring measures. Monitoring shall undertake appropriate new actions to mitigate any negative effects.

The issues to monitor may include the following:

- Monitoring the clearing of the water transmission and distribution corridors including all forms of compensations and or resettlements made in respect of the displaced families or persons.
- Monitoring and supervision of the excavations for the water pipes and subsequent laying and burying of pipes.
- Monitoring the occupational health and safety of workers and the community among others.
- Monitoring the fate of solid waste/debris disposal and other wastes after it has reached and has left the site.
- Monitoring behavioural changes among the community and Contractors staff
- Monitoring Water Quality

- Monitoring Noise and dust pollution
- Monitoring Biodiversity changes

The Developer will monitor the actual environmental and social impacts of the proposed water and sanitation project to ensure that mitigation measures are implemented and standards adhered to. To be able to fulfill this requirement, it will be necessary to work with indicators of environmental change outlined in the ESMP. The indicators will be monitored as indicated in the ESMP and for some impacts, it may be weekly, monthly, quarterly, annually and at project decommissioning. Capacity to conduct monitoring will be built through training. The major objectives of the monitoring plan shall be;

- To assess compliance with the National Environment Management Authority (NEMA) EIA approval certificate conditions;
- Measure and improve the effectiveness of the Environment and Social Management Plan (ESMP);
- Assess the chemical, physical, and biological impacts of the project to the general environment.

A monitoring program will check on progress of the project and the resulting impact on the environment. It will also include regular reviews of the impacts that could not be adequately assessed before the project started, or which may arise unexpectedly. In such cases, appropriate new actions to mitigate any adverse effects will be undertaken. Furthermore, an environmental audit report will be prepared annually and submitted to NEMA for review and approval.

### **9.6.2 Monitoring Team**

While the Developer will do his own internal monitoring; a monitoring team headed by the District Environment Officers of Terego & Yumbe districts and composed of the local environmental authorities, representatives from the District and NEMA and any other lead agencies may also carry out monitoring. The Contractor shall undertake monitoring of key environmental and social parameters as per the ESMP like water quality, noise and air pollution etc. and make monthly reports to the Developer.

### **9.6.3 Water Source Protection**

The area for the water source protection is defined mainly as the land that drains into the point of abstraction where the intake works for Enyau WSS will be located. The consultant has defined this area further in Water Source sub-catchment delineation. In addition, the area covered by the future Water Supply System is considered for the purpose of protecting the water resource all along its path from intake to consumers. Protection interventions proposed focus on addressing priority protection issues identified during source protection baseline assesment. These interventions include among others limiting harmful activities and encourage beneficial activities by creating a buffer zone as per the National Environment

(Wetlands, Lake shores and River Banks) Regulation. These interventions should be implemented as part of the ESMP.

Table 9.2: Proposed source protection interventions.

| Water Source protection                       | Underlying Cause   | Intervention/control   |
|---|--|--|
| Sustaining water quality at Abstraction point | Loss/degradation of wetland belt (due to agricultural encroachment) thus undermining capacity to filter sedimentation and or stabilize the river bank.                 | <ul style="list-style-type: none"> <li>• Enforce wetland policy to protect or regulate wetland use.</li> <li>• Enforce Environmental Regulations (River banks, Lake Shore and Wetlands).</li> <li>• Promote wise use practices of wetland resources. Demarcate and protect Wetland/river bank protection zone. You will supervise the Contractor during installation of concrete pillars along the boundary of the protection zone and planting of trees in the zone.</li> </ul> |
|   | Use of agro pesticides that find their way into water at abstraction point   | <ul style="list-style-type: none"> <li>• Improve capacity for safe handling and disposal of agro-pesticides</li> <li>• Promote soils erosion control measures so as to reduce surface runoff</li> <li>• Supervise the Contractor during construction of diversion trenches to trap and divert storm water or Soil wash from uptake point</li> </ul>  |
|   | Soil erosion/surface erosion from gardens and along the access road resulting in sedimentation/silting and pollution.  | <ul style="list-style-type: none"> <li>• Promote soils erosion control measures so as to reduce surface run off</li> <li>• Supervise the Contractor during construction of road drainage to divert storm water away from abstraction point.</li> </ul>   |
|   | Poor human and livestock waste disposal leading to contamination of water at the abstraction point   | <ul style="list-style-type: none"> <li>• Restrict human and livestock access to abstraction and water treatment point through implementation of fencing.</li> <li>• Ensure safe disposal of human waste by implementation of Public, Communal and Institutional toilets.</li> </ul>  |
|   | Sand mining in the upstream drainage system  | <ul style="list-style-type: none"> <li>• Regulate sand mining</li> </ul>   |
| Sustaining water quantity                     | Poor agricultural land uses in the catchment that affect the hydrological system (underground water) e.g., through increased surface runoff, exposing high water table | <ul style="list-style-type: none"> <li>• Promote Sustainable land management /agricultural practices in the catchment.</li> <li>• Regulate sand mining in upstream drainage</li> </ul>   |
| Maintenance of Water Supply Infrastructure    | Insecurity of water supply infrastructure due to vandalism and thefts  | <ul style="list-style-type: none"> <li>• Implement fencing of water supply infrastructure and provide for security of major infrastructure.</li> </ul>   |

| Water Source protection                               | Underlying Cause   | Intervention/control   |
|---|--|--|
| Ensuring adequate and equitable access to piped water | Population growth or concentration along supply routes resulting into increasing water demand                                      | <ul style="list-style-type: none"> <li>• Develop and apply conflict mitigation/management strategies.</li> <li>• Implement Water Supply System that serves all the current and future population within the Project area.</li> <li>• Promote alternative water supply /water harvesting /water storage technologies.</li> </ul>  |
|   | Conflicts related to access to piped water among current and potential water users   | <ul style="list-style-type: none"> <li>• Engage all Stakeholders during implementation of the Water Supply System.</li> <li>• Develop and apply conflict mitigation/management strategies.</li> </ul>  |
| Sustaining livelihoods                                | Declining soil fertility and overall land productivity   | <ul style="list-style-type: none"> <li>• Promote Sustainable Land Management practices (soil fertility management, control of soil loss, etc.)</li> <li>• Promote technologies for enhancing land productivity (e.g., improved varieties of crops, disease and pest control, etc.)</li> </ul>  |
|   | Conflicting or competing land uses (e.g., cultivate wetland edge) and water uses (e.g., fishing near/around the abstraction point) | <ul style="list-style-type: none"> <li>• Zoning protection areas of the wetland, River and infrastructure</li> <li>• Empowering stakeholders to plan for and manage their water sources (provision of incentives for protecting water source e.g., fishing gear and boats that enables fishing activity in deep waters)</li> <li>• Increase awareness on the relationship between land/water use and water quality and water availability in the project areas.</li> </ul> |

## 9.7 GRIEVANCE REDRESS MECHANISM

This section presents procedures for affected persons to lodge a complaint or express a grievance against the project staff or contractors during project implementation. It also describes the roles and responsibilities for addressing grievances. The objectives of the grievance process are:

- a) Ensure that appropriate and mutually acceptable corrective actions are identified and implemented to address complaints;
- b) Verify that complainants are satisfied with outcomes of corrective actions;
- c) Avoid the need to resort to judicial proceedings.
- d) The project will operate two major grievance redress mechanisms, namely:
  - i. Worker's grievance redress mechanism, and
  - ii. Community Grievance Redress Mechanism.

Each of the affected persons should be able to trigger the GRM to resolve their complaints, while still being able to resort to the judicial system. Nonetheless PAPs are free to seek judicial redress, as a result of dissatisfaction with the GRM in place, the implications of that alternative shall be explained to them as well as providing the necessary information that the courts will require during the litigation process. The project will also cooperate with NGO's providing pro-bono services for example Legal Aid of Uganda. The grievance redress procedure will address any grievance or complaint by the PAPs promptly and fairly in a manner acceptable to all parties concerned. Grievances are useful indicators of a project performance therefore have to be treated with the due care they deserve.

A high number of grievances may be an indicator of poor work practices. Likewise, a low number of grievances may not necessarily mean everything is working out smoothly but could point to a nonfunctional system that is inaccessible to PAPs or is inefficient and ineffective in handling project related complaints.

The following guiding principles shall be followed during grievance and complaint redress;

- i. Receiving, assessing and resolving complaints in a timely, transparent and conclusive manner;
- ii. Identifying and implementing appropriate and mutually acceptable actions to redress complaints;
- iii. Keeping accurate records of all the complaints received, actions on each and time taken to resolve each complaint.
- iv. Observing confidentiality where necessary at all times
- v. Ensuring non-retaliation in all cases reported to the GRC
- vi. Gender responsiveness and social inclusion through sensitivity to vulnerability and provision of additional support to the less empowered to report and follow up their complaints handling. These groups include the elderly, children, women, people with disabilities, etc.



- vii. Ensuring that all the complainants are satisfied with outcomes of the corrective actions; and
- viii. Supporting PAPs to resort to the judicial process if necessary.
- ix. Improving project outcomes through addressing complaints received.

#### **9.7.1 Village and District Grievances Redress Committees**

It is proposed that dispute resolution will depend on Grievance Redress Committees (GRC) which will be initiated at the village level to record grievances and also help in mediation. These committees will comprise the LC I Chairperson of the affected village, a trusted village elder, a religious representative, chairperson Area Land Committee, a representative of PAPs, representative of specific vulnerable group r of relevance to the village i.e. women and the disabled who will be elected by the PAPs save for the LC I who is elected and known and may not necessarily be a PAP. The same committee shall also participate in the verification of PAPs. Disputes will as much as possible be resolved at the village level and where need be referred to the District GRC.

No GRC is established at the Sub County level although there will be one at the district level. At the District Level, the Grievance Redress Committee will be established [as an appeal mechanism] to deal with any grievances unsettled at the village level. The Grievance Redress Committee at the district level will at a minimum comprise the LCV Chairperson, CAO, RDC, District Land officer, District Water Officer/ Project focal person, LC3 representative, Sub county Chief/ representative, representatives of vulnerable groups, District Environment Officer, District Land Officer/Surveyor and District Community Development Officer. The Sociologist from MWE will be called in when the committee deems it necessary.

The GRCs will be responsible for receiving and logging complaints and resolving disputes. The GRCs will work with the MWE to resolve each grievance or dispute to ensure that redress actions are implemented. If affected persons are not satisfied with the grievance redress structures, they will be entitled to seek redress through the Area Land Committees before referral to the District Land Tribunals in the case of land related complaints or Ugandan Courts of Law.

When GRCs are in place, they will be oriented through appropriate induction training. This training will be tailored to enable the GRCs perform their expected roles. These roles include providing advice on and grievance resolution including compiling records of all project grievances raised and ensuring their timely resolution through the various referral points. The GRCs will also popularize alternative channels through which PAPs can raise their complaints including use of phone calls, hot lines if any and letters among others.

#### **9.7.2 Site Grievance Redress Committee for Community Grievances**

The GRC at site level shall include the following: Resident Engineer- Chair Person, Site Engineer, Contractor's Sociologist, Contractor's Health and Safety Officer, Consultant's Site

Sociologist- Secretary and Consultant's Site Environmentalist. For timely management of community level complaints, the Contractors shall have a grievance desk at, the site. Under the supervision of the consultant Site Sociologist, the contractor shall make immediate, responses to matters related to the project construction, contractor's workers, agents, sub-contractors or suppliers. Unresolved matters by the contractors shall be escalated or referred to the MWE's Grievance Redress Committee.

### **9.7.3 Project Workers Grievances Redress Committees**

Complaints are likely to arise during construction activities. Project Workers' Grievance Committees (WGCs) shall be set up to receive and resolve such complaints. This may include; physical violence, noncompliance in the use of PPE, Illegal drug taking, possession of drugs or the consumption of alcohol during operations, undesirable working conditions in physical terms, changes without prior notice, poor employee relations, improper wage adjustments, dissatisfactory office policies in case of: promotion, demotion, leaves, overtime, violation of laws, labour-management hostility, incidences of workplace favouritism and nepotism, among others. etc. Any complaints that may not be handled by the WGCs shall be referred to the government authorities such as Uganda Police. The WGCs will comprise the Project Manager, Foreman and the social and environment safeguards personnel and representatives of the following categories of workers; Casual workers, Drivers, Operators and Turn men, Flag Personnel, Site Cooks & Cleaners and Technical. The disciplinary process will be conducted in five stages and can be initiated by an employee as well. This stages include; initial action where a reminder to the individual is provided, issue a warning, stop the work, removal of individual from site; disciplinary report, escalation, discipline review and contract cancellation.

### **9.7.4 Roles of Workers Grievance Redress Committees**

These committees shall proactively and fairly handle complaints registered by workers or employer. The Committee doesn't take on the obligations of the project management but rather provides an opportunity for any aggrieved workers of employer to register complaints and have them resolved in a fair way. Workers' Grievance Redress Committee shall:

Provide a forum for registering a complaint and free exchange of information between management and employees on issues that affect them.

- 1) Receive and report workers' complaints/grievances to management and negotiate for timely redress/ participate in arbitration of cases between workers and management through disciplinary hearings and / or between fellow workers through conflict resolution meetings
- 2) Represent the interests of workers pertaining to their terms and conditions of employment, staff welfare, staff development and other matters of concern to the

workers, and to negotiate with the contractor's management on their behalf accordingly.

- 3) Educate Workers on their rights, discipline, code of conduct, spirit of staff unity across the project as well as on respect for cultural diversity pertaining to workers of different races, tribes, religion and other cultural differences
- 4) Solicit for employees' suggestions/opinions to management through appropriate and
- 5) organized channels such as their representatives, suggestion box, or joint meetings from time to time.
- 6) Establish and maintain good relations, foster effective two-way communication and mutual understanding between workers on one hand, and with management on another.
- 7) Identify and represent concerns of special interest groups on the project such as women, expectant and lactating mothers, workers with disability etc.
- 8) Organize and conduct monthly Workers' WGN meetings to review and discuss staff welfare, discipline and related matters; compile and share in timely manner meeting minutes with the contractor, supervising consultant and MWE pointing to key action areas requiring attention.
- 9) Keep adequate log of all matters that come before the Workers' GRC for better reference and effective management

#### **9.7.5 MWE'S Internal Grievance Redress Committee**

MWE will have an internal GRC which will be responsible for handling the cases that are escalated to MWE in order to ensure quick processing of the complaints. It will include:

1. The Project Coordinator;
2. The Environment Officer
3. The Sociologist
4. The Project Engineer

If a complaint remains unresolved at this level, it will be forwarded to the MWE Management.

#### **9.7.6 Process of handling grievances**

##### **Step 1: Receipt of complaint**

The grievance management committees at all levels will have one person to act as the grievance officer. A verbal or written complaint from a complainant will be received by the grievance officer and recorded in a grievance log that is kept in the community at each Grievance management level. Complaints can be submitted at any time, either directly or through a grievance handling committee member. Some can also be submitted by word of mouth or through telephone, SMS or emails.

At the village committee level, which is the first level of community grievance management, the secretary shall register the complaint, screen it and handle it if possible or;

1. Refer to the grievance management committee for further investigations, or
2. Refer to police if the grievance is of criminal nature for example assaults, rapes, defilements, theft etc. If the aggrieved party is satisfied, the matter shall be closed and signed off with them in the complaints Register.

This committee shall sit at least every two weeks to investigate and conduct hearings, outcomes of which will be given to the complainant within 24hrs. If the complainant agrees and is satisfied with the decision taken, the matter shall be closed and signed off in the complaints Register. If the party is not satisfied, the matter shall be referred to the site committee in Step 2.

### **Step 2: Escalation of Grievances to Construction Site Grievance management committee**

The site GRC shall receive and register the grievances by the Contractor's Sociologist. The Consultant, Site Sociologist will then review the register and recommend to the Chairperson the schedule for GRC meeting. The affected person (s) shall be involved in GRC hearings so that conclusive solutions are arrived at. Once completed, the affected person shall sign in the grievance register if satisfied and if not satisfied with outcome, he/ she or the Site committee will escalate to District GRC within 7 days. *NB: At the Site level, the Resident Engineer shall update MWE on grievances management and emerging issues which might require immediate or explicit action or support from MWE to expedite project implementation.*

### **Step 3: Escalation of Grievances to District Grievance management committee**

In the event that a complainant is not satisfied with the decision made by the village committee or the committee fails to resolve it, it shall be referred to the District Grievance Redress Committee. At district level, the District Community Development Officer shall be responsible for receiving and recording the grievance in the complaints register. On receipt, he or she will screen the grievance and handle it if possible. If not, he will notify the committee chairperson who shall convene a meeting/ hearing within one week, the outcome of which shall be communicated to the aggrieved person within 24hrs. If the complainant is satisfied with the outcome, the matter shall be signed off in the Complaints Register. If the aggrieved is not

satisfied, the matter shall be referred to the Ministry of Water and Environment. *NB: At the District level, the CAO shall update MWE on grievances management and emerging issues which might require immediate or explicit action or support from MWE to expedite project implementation*

#### **Step 4: Escalation of Grievances to MWE Grievances Management Committee**

At the Ministry of Water and Environment/ NWSC, referrals shall be registered in a complaint Register by the Project's Sociologists. Within 2 weeks, the MWE committee shall investigate and if necessary, conduct site visits and conclude the issue.

If the complainant is satisfied with the decision, the matter shall be signed off in the complaints Register with consent of the complainant. The Ministry shall, in form of reports, also report to the World Bank on the complaints handled and the outcomes of the same.

In the event that the matter has not been solved at this level, MWE may advise the complainant to seek further justice from alternative offices like courts of law or any other Government agencies.

#### **9.7.7 The World Bank's Grievance Redress Service (GRS)**

The WB GRS provides an avenue for individuals and communities to submit complaints directly to the World Bank if on their opinion a World Bank financed project has or is likely to cause harm to communities and the environment which in turn may have adverse effects to them or the community. The GRS seeks to ensure that grievances are promptly reviewed and responded to, and problems and solutions identified by working together. The GRS acknowledges the project-level grievance mechanisms as the primary tools for raising and addressing project-related grievances. The GRS helps to resolve issues that cannot be resolved at the project level or where there is no project-level grievance mechanism.

#### **9.7.8 Establishment and Composition of the GRCs at village level**

Community meetings will be held in the selected central areas within the villages hosting the project. Residents will be sensitized on the importance and need for a GRM, its mandate and the type of people required on the GRCs. The community members present (including PAPs) will then nominate and elect their representatives who will receive induction training on their roles and responsibilities.

Membership of the GRCs will be voluntary and it will be functional throughout the project life. The size of the GRC will depend on the number of villages within the cluster. It will comprise:

1. The GRC Chairperson, who will be a trusted village elder, (for example a religious representative) and not any of the LC chairpersons. This is to avoid conflicts about

jurisdiction, political inclination and also to ensure public trust of the committee in case some community members do not trust their chairpersons;

2. Vice Chairperson who may be an opinion leader or a respected member of the community;
3. Secretary (responsible for recording grievances in the log book and taking minutes during GRC sittings);
4. Representative of vulnerable groups/special interest groups;
5. The LC I chairpersons of each of the affected villages in the cluster or their representatives will be ordinary members.

Presence of female members on the GRCs is crucial in order to ensure better consideration of gender issues for conflict resolution. The PAP representatives will be democratically chosen by the PAPs with the help of their leaders. The same committee shall also participate in the verification of PAPs during disclosure. Therefore, this committee will be set up before disclosure of compensation packages

#### **9.7.9 Grievance processing**

Grievances will be screened and categorized into three (3no.) as detailed in the table below:

### Screening and categorization criteria

| Category    | Description  | Implication   |
|-------------|--|---|
| Category 0: | Complaints that are not related to a MWE project, project workers or any MWE activity  | Out of scope and require immediate feedback/referral and closure                    |
| Category 1: | Queries, comments, and suggestions   | Require immediate feedback and closure  |
| Category 2: | Complaints and concerns, which are not criminal in nature or do not require the involvement of police  | It is within mandate of MWE in respect to project activities and require processing |
| Category 3: | Complaints and concerns that involve allegations that require investigation or intervention by the police or other law enforcement authorities. These cases mainly involve <i>SEAH/GBV, CH etc</i> | Require immediate escalation to police and other regulatory agencies                |

Once the complaint is screened for eligibility, then a decision will be taken to either drop it or proceed with assessments and investigation, and the complainant will be duly informed. Complaints that are categorized as (0) or (1) are quite straight forward will be resolved on first contact and closed out. The complainant will be given feedback and sign a closure out form. After screening and ascertaining need for further investigation by MWE, the grievance will be attended to by the GRC or assigned to relevant department at MWE as quickly as possible.

Investigation and Feedback: If a grievance is categorized as (2) and requires further investigation it will be handled by the GRC or by mandate assigned to relevant officers or department. The process flow is lustrated in table below

**NB:** In all cases, criminal matters (SEAH/GBV, CH etc) shall be explicitly handled in accordance with the Criminal Code Act and other laws governing criminal issues in Uganda. I.e. these cases shall be directly referred to police for investigations and submission to the Office of Director of Public Prosecution for sanctioning.

### Grievances Process Flow

| Step | Action   | Responsibility   |
|------|--|--|
| 1.   | Reception and registration by GRC or MWE office/centre/contractor/consultant | GRC sec or appointed MWE representative or contractor /consultant sociologists     |
| 2.   | Acknowledgement of receipt to complainant                                    | GRC sec or appointed MWE representative or contractor /consultant sociologists     |
| 3.   | Sorting/categorization   | GRC sec or appointed MWE representative or contractor /consultant sociologists     |
| 4.   | Grievance review and investigation (if category 2) and solution discussion   | GRC, relevant MWE department or contractor/consultant representative               |
| 5.   | Feedback to complainant  | GRC sec or appointed MWE representative or contractor /consultant sociologists     |
| 6.   | Notification of responsible parties and implementation of resolution         | GRC sec or appointed MWE representative or contractor /consultant CLO/sociologists |
| 7.   | Closure  | GRC sec or appointed MWE representative or contractor /consultant CLO/sociologists |

- In case the complainant is satisfied with the proposed solution, the solution will be effected and grievance closed out. Complainant will sign a grievance closure form witnessed by the MWE or appointed representative.
- The second tier is where the complainant is not satisfied with the resolution at the first tier. A mediator will be identified to mediate between the complainant and MWE or contractor/consultant. Possible mediators include religious leaders, family/clan leaders, elders and CSO leaders or managers.
- At the second tier, a near process described in table above will apply.
- In case the complainant is satisfied with the mediator proposed solution, the resolution will be effected and grievance closed out. Complainant will sign a grievance closure form witnessed by the mediator or appointed representative.
- In case complainant is not satisfied with the mediation resolution, this GRM provides for recourse to the formal and traditional judicial system. For SEA/SH/GBV cases, the GRM shall adapt a survivor centred approach facilitating safe and confidential access to services by complainants/survivors. The project shall support the survivor with phycho social support by using the existing administrative, social and health structures like health centres.



#### 9.7.10 Publicity of the GRM and GRCs

It is not possible to have every community member/PAP attend all the meetings. Some people may not be aware of the newly constituted GRCs. Therefore, MWE will popularize the GRCs by:

1. Holding an adequate number of community meetings within the affected villages;
2. Preparing posters with names, designations and contacts of selected GRC members and their roles, posted in communal areas such as market places, trading centers, churches and mosques;
3. Making announcements using community radios and any other popular local radio stations as well as in churches and mosques.

#### 9.7.11 Terms of Reference for the GRCs

1. The village GRC through its operations will handle complaints related to project activities in liaison with the Sociologist of MWE. The GRC will, also deal with the complaints from contractor workers by liaising with contractor's workers disciplinary committees. The GRC will schedule regular monthly meetings to handle the routine grievances.
2. Ad-hoc meetings will be held when incidents that require urgent attention arise.
3. The GRC together with the community members will decide on the official venue of the monthly meetings and these will be communicated to the communities during sensitizations and radio announcements.
4. The GRC will ensure timely resolution of complaints, with timeline for resolutions expected between two weeks and one month.
5. The District GRC will monitor the working of the village GRC and work as a forum for appeal against decision of the village GRC

5.

#### 9.7.12 Training of the GRCs

The GRC will be trained on the following:

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1. Execution of the terms of reference
2. Categorization of complaints/grievances
3. Referral pathway for each category of complaints/grievances
4. Basic mediation, conflict resolution techniques and skills
5. Communication and basic public relations skills
6. The property valuation process
7. Scope of the project and the associated risks
8. Code of conduct for the contractor
9. The committee's mandate: The committee will be charged with the responsibility of ensuring timely resolution of complaints from site workers and PAPs to ensure project success.

#### **9.7.13 Facilitation of the GRCs**

MWE will provide the following in order to facilitate the GRC's work:

1. Grievance Logbooks and related logistics;
2. Orientation/training of GRCs on grievance resolution;
3. Materials such as pens and notebooks; and
4. Branded items such as MWE T-Shirts, pens, folders etc. for motivation.

#### **9.7.14 Monitoring and Evaluation of the GRCs**

In addition to the Grievance Resolution Form, a Grievance Log will be kept by the project implementers, indicating the date the complaint was lodged, a brief description of the grievance, actions to be taken, status of the resolution etc. The Project Liaison Officer will monitor and document the progress of all complaints through monthly grievance resolution reports.

The performance of the GRCs will be evaluated based on the following:

1. Number of meetings held compared to the planned meetings including numbers of members actively participating in the committees including women

2. The cases resolved against cases received
3. Functionality of the referral system i.e. number of cases referred, feedback received on referred cases and time taken for action at various levels including final resolution.
4. Time taken to resolve complaints (depending on its magnitude and urgency)
5. Content of the complaint reports made including data on:
  - Numbers of complaints/suggestions
  - Compliance with performance standards
  - Issues raised in complaints
  - Trends in complaints over time
  - The causes of complaints
  - Whether remedial action was warranted and redress given
  - Recommendations/strategies to prevent or limit future recurrences

Feedback from PAPs and community members on the effectiveness and efficiency of the project GRM will be very important in its evaluation

## 10 CONCLUSION AND RECOMMENDATIONS

### 10.1 Recommendations

Generally, the purpose of this project is to increase sustainable access to safe water and basic sanitation in the selected sub-counties of Terego and Yumbe districts especially those hosting refugees in Imvepi and Bidibidi refugee settlement. From the assessment, the positive impacts outweigh the negative impacts. Further, the negative impacts of the project are identifiable and mitigatable. The report presents specific mitigation measures for each impact identified. The mitigation measures are aimed at either eliminating the impact or reducing its magnitude and or severity or both. Therefore, ESIA team recommends that the project should proceed but with the following recommendations;

- a) Conduct and implement pre-construction phase mitigation measures which include;
  - Induction of contractor's and Consultant's personnel
  - Sensitization of the affected community
  - Planning and co-ordination with local authority of Terego & Yumbe district administration
- b) Prepare a Resettlement Action Plan on which actual compensation and resettlement shall be based. This will include:
  - Socio-economic Survey of the people who have either been displaced, lost property including land, crops as well as loss of income due to change in business premises {Directly Project Affected Persons};
  - Cadastral Survey of the individual peoples' portions of land to be acquired by the project;
  - Property Valuation.
- c) Construct the proposed water transmission/distribution line along the road reserves of the existing public roads as proposed by the Developer in order to avoid several delays, impacts and negotiations associated with land acquisitions with private landlords. The land for other project infrastructure should be acquired in compliance with the national legal requirements and World Bank Safeguard Policy OP 4.12.
- d) The mitigation measures outlined in the ESMP above should be fully implemented to minimise potential negative impacts of the project.
- e) Detailed design for the water transmission and distribution lines shall be undertaken in close consultation with UNRA so as to take care of the new road designs which UNRA may be planning to implement in the project area.
- f) The environmental management and monitoring plan shall be attached as a condition for the project construction contract so as to make the contractor aware of his

environmental obligation before securing the contract and enhance the implementation of the ESMP.

- g) In case of any archaeological finds during excavation, these shall be reported and handed over to the Department of Museums and Monuments in the Ministry of Tourism, Wildlife and Antiquities for further follow up in accordance with the Chance Find procedure developed for this project (Annex 12).

## **10.2 Conclusion**

The main conclusion of this Environment and Social Impact Assessment is that there are no significant environmental obstacles to hinder the development of this project if the proposed mitigation measures are implemented. The proposed Enyau WSS is therefore a viable undertaking considering the proposed project sites and source of water.

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## 12 ANNEXES

Annex 1: Details of Stakeholder Consultation

Annex 2: List of People Consulted

Annex 3: Water Test Results

Annex 4: Daily Vehicle Inspection Form

Annex 5: List of Plant Species identified in the Project area

Annex 6: Amphibian and Reptilia species identified in the project area

Annex 7: List of Bird's Species identified in the project area

Annex 8: List of butterflies' species identified in the project area

Annex 9: List of maps

Annex 9(a): Map showing villages affected by Eyau WSS

Annex 9(b): Map showing the general administrative setup of the project area

Annex 9(c): Map showing general land cover of the project area

Annex 9(d): Map showing the geology of the project area

Annex 9(e): Map showing the soils of the project area

Annex 9(e): Map showing the rainfall distribution in the project area

Annex 9(g): Map showing the topography of the project area

Annex 10: Nema Approved ToRs

Annex 11: Handling of Chemicals And Other Potentially Harmful Materials

Annex 12: Chance Find Procedure

Annex 13: Grievance Redress Mechanism

Annex 14: Project Drawings

Annex 15: Bills of quantities for the project

## ANNEX 1: DETAILS OF STAKEHOLDER CONSULTATION

Meeting with residents of Siripi and Ocea (Osia)

|                                       |  |   |
|---------------------------------------|--|---|
| Project name                          | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |   |
| Category of stake holders             | Project affected people of Siripi and Ocea (Osia)  |   |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |   |
| Date, time, place of meeting          | 6 <sup>th</sup> /11/2022<br>9:00am<br>center   |   |
| present agenda                        | List of stakeholders is appended to the report<br>1. Prayer<br>2. Remarks from chairman LC1<br>3. Communication from Ecoserv team<br>4. Concerns / issues or views<br>5. closure   |   |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |  |   |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>   | <b>Response /guidance offered</b>   |
| Cost of water installation            | A community member inquired how much it would cost them to bring the water into their homesteads   | The project, after construction, shall be handed over to Northern Umbrella Rural water Supply, an organization that shall be responsible for operation and maintenance, plus extending the water to different households. These shall determine the criteria and cost it will take to install the water |
| Water Payment                         | A community member expressed concern about why the water is for payment, yet the Office of the Prime Minister asked the locals to give land for refugee settlement, and in return, they are provided with social services. | The payment shall be affordable and it is only meant for operation and maintenance of the water scheme, for the benefit of the entire community   |
| Water challenges                      | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme  | Ala-Ora Water Supply and Sanitation scheme is intended to solve some of these challenges  |
| Maintenance                           | A community member wanted to know how the maintenance will be carried out in case there is damage on a pipe during cultivation by the locals   | The contractor shall excavate and put the pipes at a depth that cannot easily be tampered with by the land activities. Nevertheless, maintenance shall be done by the company licensed to provide the services.   |
| Compensation                          | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their fields  | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground   |
| Water challenges                      | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.   | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve some of these challenges   |

|                       |   |  |
|-----------------------|---|--|
| Existing schemes      | The community wanted to know if the existing schemes will be merged into this one scheme  | The ministry shall engage with the stakeholders of the existing water schemes, especially the NGOs such as Mission Water Uganda, so that the newly established project shall fit within the already existing schemes   |
| Water-User committees | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in maintenance of the scheme   |
| Employment            | Inquiry was made about where the workers will come from, and if the workers carrying out casual works such as excavation shall be paid.   | The contractor shall come with a number of employees, where as some workers such as casual laborers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.   |
| Irrigation water      | One of the community members inquired if the project will provide water for small scale irrigation  | The scheme is designed to provide clean water for drinking and domestic use. Irrigation is water for production which is under the ministry of agriculture.  |
| Water pumping         | Inquiry was made whether there will be any pumping on the scheme such as generator or solar.  | There will be no pumping of the water. The scheme will entirely be gravitational flow  |
| Traditional Rituals   | An elder in the community advised that a traditional ritual should be carried out to sustain the success of the project, and informed us that this ritual has been a norm for any new project in the community.                 | Noted. The Ministry and World bank shall be informed about the traditional rituals so that they are considered before project execution.   |
| Climate change        | The community informed us that dry seasons are so hot in the area that even River Enyau sometimes dries up during the dry season (especially February). They were worried that the project shall be helpless during dry seasons | The flow and quantity of water was monitored by the design team at all times of the year and they expect water to be available at the source at all times of the year, including February. Moreso, a catchment protection plan will be implemented to ensure protector of the river right from the source. |



Plate 12. 1: Meeting with residents of Siripi and Ocea (Osia)

Meeting held with Project affected persons of Payiofe village

|                              |   |
|------------------------------|---|
| Project name                 | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM  |
| Category of stake holders    | Project affected people of Payiofe  |
| Purpose of meeting           | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme. |
| Date, time, place of meeting | 6 <sup>th</sup> /11/2022<br>4:00pm<br>center  |
| present agenda               | List of stakeholders is appended to the report<br>1. Prayer<br>2. Remarks from chairman LC1                         |

|                                       |   |   |
|---------------------------------------|---|---|
|                                       | 3. Communication from Ecoserv team<br>4. Concerns / issues or views<br>5. closure   |   |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |   |   |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>  | <b>Response /guidance offered</b>   |
| Project response                      | The community welcomed the project to the community and pledges to work with the Ministry to make sure the project is a successful one                      | Noted   |
| Cost of water installation            | A community member inquired how much it would cost them to bring the water into their homesteads  | The project, after construction, shall be handed over to Northern Umbrella Rural water Supply, an organization that shall be responsible for operation and maintenance, plus extending the water to different households. These shall determine the criteria and cost it will take to install the water |
| Transmission and distribution lines   | The community wanted to know where the transmission and distribution lines will pass  | The transmission lines will be constructed along the road reserves and the transmission lines will branch off to the different water users. The pipes will be moving under the ground surface   |
| Water challenges                      | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges  |
| Maintenance                           | A community member wanted to know how the maintenance will be carried out in case there is damage on a pipe during cultivation by the locals                | The contractor shall excavate and put the pipes at a depth that cannot easily be tampered with by the land activities. Nevertheless, maintenance shall be done by Northern Umbrella Rural Water supply in case of such damages  |
| Compensation                          | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their fields     | Compensation along the transmission and distribution lines shall only be for what is on the land. There will be no compensation of the land since the lines will pass underground   |
| Water challenges                      | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.  | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
| Water-User committees                 | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in maintenance of the scheme  |
| Employment                            | Inquiry was made about where the workers will come from, and if the workers carrying out casual works such as excavation shall be paid.                     | The contractor shall come with a number of employees, where as some workers such as casual laborers shall be got from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.   |

|                     |  |  |
|---------------------|--|--|
| Water pumping       | Inquiry was made whether there will be any pumping on the scheme such as generator or solar.   | There will be no pumping of the water. The scheme will entirely be gravitational flow  |
| Traditional Rituals | An elder in the community advised that a traditional ritual should be carried out to sustain the success of the project, and informed us that this ritual has been a norm for any new project in the community | Noted. The Ministry and World bank shall be informed about the traditional rituals so that they are considered before project execution. |

Meeting held with Ngulungulu community

|                              |  |
|------------------------------|--|
| Project name                 | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |
| Category of stake holders    | Project affected people of Ngulungulu  |
| Purpose of meeting           | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |
| Date, time, place of meeting | 6 <sup>th</sup> /11/2022<br>5:40pm<br>center   |
| present agenda               | List of stakeholders is appended to the report<br>1. Prayer<br>2. Remarks from chairman LC1<br>3. Communication from Ecoserv team<br>4. Concerns / issues or views<br>5. closure |

**SUMMARY OF MEETING PROCEEDINGS**

| Theme  | Issue/ concern raised   | Response /guidance offered  |
|--|---|---|
| Passage of the Transmission and distribution lines | The community wanted to know where the transmission and distribution lines shall be passing   | The transmission lines shall be passing along the road reserves and shall be passing under the ground surface. The distribution lines shall be adjusted according to the area that is receiving the water, but care shall be taken not to damage people's property                                      |
| Labour   | Inquiry was made about where the workers would come from, and if the community shall be employed during construction of the scheme. | The contractor shall come with a number of employees, where as some workers such as casual laborers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.  |
| Cost of water installation                         | A community member inquired how much it would cost them to bring the water into their homesteads                                    | The project, after construction, shall be handed over to Northern Umbrella Rural water Supply, an organization that shall be responsible for operation and maintenance, plus extending the water to different households. These shall determine the criteria and cost it will take to install the water |
| Water pumping                                      | Inquiry was made whether there will be any pumping on the scheme such as generator or solar.  | There will be no pumping of the water. The scheme will entirely be gravitational flow   |
| Compensation                                       | The community wanted to know if the project will give something (compensation) for the  | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and  |

|  |  |  |
|--|--|--|
|  | transmission and distribution lines passing through their fields | construction of these lines. There will be no compensation of the land since the lines will pass underground |
|--|--|--|



Plate 12.2: Interviews with key informants of Ngulungulu

Meeting held with Ariwa community

|                                       |  |                                   |
|---------------------------------------|--|-----------------------------------|
| Project name                          | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |                                   |
| Category of stake holders             | Project affected people of Ariwa   |                                   |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |                                   |
| Date, time, place of meeting          | 6 <sup>th</sup> /11/2022<br>2:00pm<br>center   |                                   |
| present agenda                        | List of stakeholders is appended to the report<br>1. Prayer<br>2. Remarks from chairman LC1<br>3. Communication from Ecoserv team<br>4. Concerns / issues or views<br>5. closure |                                   |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |  |                                   |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>   | <b>Response /guidance offered</b> |
| Project response                      | The community welcomed the project to the community and pledges to work with the   | Noted                             |

|                         |  |   |
|-------------------------|--|---|
|                         | Ministry to make sure the project is a successful one  |   |
| Community sensitization | A community member suggested that sensitization should be made to let the community be aware of what is going to take place in the area during project implementation.   | Noted. The Ministry shall hold continuous engagements with the local leaders and the community to update them about the progress of the project.  |
| Compensation            | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their land. The requested that sensitization on land issues should be made to make people comfortable | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground. The locals shall first be consulted before excavation is done on their land. |
| Employment              | Inquiry was made about where the workers will come from, and if the workers carrying out casual works such as excavation shall be paid. They requested that laborers should be from the community for ownership purposes.                        | The contractor shall come with some workers especially the technical team, where as some workers such as casual laborers shall be gotten from the local community, on recommendation by the local leaders, and all casual works such as excavation shall be paid for.   |
| Security for materials: | A member raised concern about the security of the construction material during and after construction.   | The community is encouraged to ensure that scheme materials are safe and security is a responsibility for everyone in the community. However, structures such as reservoir tanks shall have a fencing to prevent unauthorized access  |
| Traditional Rituals     | An elder in the community advised that a traditional ritual should be carried out to sustain the success of the project, and informed us that this ritual has been a norm for any new project in the community                                   | Noted. The Ministry and World bank shall be informed about the traditional rituals so that they are considered before project execution.  |
| Water-User committees   | The community wanted to know if committees will be formed  | Water-user committees shall be formed from the local community to aid in maintenance of the scheme  |





Plate 12.3: Meeting with residents of Arwia

Meeting held with communities of Ajusia Budre

|                                       |   |   |
|---------------------------------------|---|---|
| Project name                          | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM  |   |
| Category of stake holders             | Project affected people of Ajusia Budre   |   |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.   |   |
| Date, time, place of meeting          | 6 <sup>th</sup> /11/2022<br>12:00pm<br>center   |   |
| present agenda                        | List of stakeholders is appended to the report<br>1. Prayer<br>2. Remarks from chairman LC1<br>3. Communication from Ecoserv team<br>4. Concerns / issues or views<br>5. closure  |   |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |   |   |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>  | <b>Response /guidance offered</b>   |
| Project response                      | The community welcomed the project to the community and pledges to work with the Ministry to make sure the project is a successful one  | Noted   |
| Available water schemes               | The community raised concern that the only available water source is a public tap at the church and cannot sustain the entire population. Most people in Ajusia Budre village have to walk long distances of about 2 Miles to get water | Ala-Ora Water Supply and Sanitation scheme is intended to solve the challenge of water shortage |
| Water payment                         | A community member raised a concern that the only available water is for pay  | The payment that shall be made will be affordable and it is only meant for                      |

|                                     |   |   |
|-------------------------------------|---|---|
|                                     | and four jerrycans cost Ugshs 100, which is a lot. An inquiry was raised if this water will be paid for.  | operation and maintenance of the water scheme, for the benefit of the entire community. The modalities for setting user fees shall be explained in detail at a later stage.                   |
| Water reliability                   | The community was disgrantled about the existing water scheme. They have put a lot of time, and walked long distances to get water extended only to find the water disconnected from the water stations. This causes conflicts and they hope this will not be the case.                           | Noted. This will be communicated to the Ministry to ensure that the Operation and Maintenance team communicates to the public in case there is a breakdown, or maintenance works.             |
| Transmission and distribution lines | The community wanted to know where the transmission and distribution lines will pass  | The transmission lines will be constructed along the road reserves and the transmission lines will branch off to the different water users. The pipes will be moving under the ground surface |
| Cost of water installation          | A community member raised concern about the fees of connecting water to their homesteads. They reported that Northern Umbrella charges them Ugshs 150,000 which is a lot of money that they cannot afford. They suggested that the connection fees should be reduced or they leave them to suffer | Noted. The Ministry will discuss with the Northern Umbrella team and raise the concerns of water connection fees from the community   |
| Water-User committees               | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in maintenance of the scheme  |



Plate 12.4: Meeting with residents of Ajusia Budre

Meeting held with communities of Ombeci

|                                       |  |  |
|---------------------------------------|--|--|
| Project name                          | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |  |
| Category of stake holders             | Project affected people of Ombeci  |  |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |  |
| Date, time, place of meeting          | 5 <sup>th</sup> /11/2022<br>4:30pm<br>center   |  |
| present agenda                        | List of stakeholders is appended to the report   |  |
|                                       | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from chairman LC1</li> <li>3. Communication from Ecoserv team</li> <li>4. Concerns / issues or views</li> <li>5. closure</li> </ol> |  |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |  |  |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>   | <b>Response /guidance offered</b>  |
| Spread of diseases                    | The community raised a concern about the recent Ebola outbreak and requested that all workers coming to the area should be checked to prevent the spread of the disease                                  | Noted.   |
| Water Payment                         | Inquiry was made about whether there will be a payment for fetching the water.   | There will be a fee that shall be paid by the water users, and shall be decided on by the water-user committees  |
| Water challenges                      | The community informed us about how they have so many challenges with water and the boreholes they have are not enough. They were happy to receive the project   | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
| Sanitation                            | The community requested that a VIP latrine should be considered and constructed for the community  | A VIP latrine is already part of the design and the Ministry shall keep engaging the local leaders to establish where this can be appropriately established                          |
| Water challenges                      | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.   | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve these challenges  |
| Employment                            | Inquiry was made about where the workers will come from, and if the contractor has casual laborers. The community pledged that they have their workers who can do casual work                            | The contractor shall come with a number of employees, where as some workers such as casual laborers shall be gotten from the local community, on recommendation by the local leaders |

Meeting held with Okuyo and Loli communities

|              |  |
|--------------|--|
| Project name | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM |
|--------------|--|

|                                       |   |  |
|---------------------------------------|---|--|
| Category of stake holders             | Project affected people of Okuyo and Loli   |  |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.   |  |
| Date, time, place of meeting          | 5 <sup>th</sup> /11/2022<br>6:30pm<br>center  |  |
| present agenda                        | List of stakeholders is appended to the report<br>1. Prayer<br>2. Remarks from chairmen<br>3. Communication from Ecoserv team<br>4. Concerns / issues or views<br>5. closure        |  |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |   |  |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>  | <b>Response /guidance offered</b>  |
| Water Payment                         | Inquiry was made about whether there will be a payment for fetching the water.  | There will be a fee that shall be paid by the water users, and shall be decided on by the water-user committees  |
| Water challenges                      | The community informed us about how they have so many challenges with water and the boreholes they have are not enough. They were happy to receive the project                      | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
| Compensation                          | An inquiry was made if there would be compensation on the project   | The project has a component of RAP which will be conducted to identify the project affected people and the nature of property affected. Note that area around the tanks and reservoir will be compensated for. |
| Sanitation                            | The community requested that a VIP latrine should be considered and constructed for the community   | A VIP latrine is already part of the design and the Ministry shall keep engaging the local leaders to establish where this can be appropriately located.   |
| Employment                            | Inquiry was made about where the workers will come from, and if the contractor will have casual laborers. The community pledged that they have their workers who can do casual work | The contractor shall come with a number of employees, where as some workers such as casual laborers shall be gotten from the local community, on recommendation by the local leaders                           |



Plate 12.5: Meeting with residents of Okuyo and Loli

Meeting held with Okubani community

|                              |  |
|------------------------------|--|
| Project name                 | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |
| Category of stake holders    | Project affected people of Okubani   |
| Purpose of meeting           | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |
| Date, time, place of meeting | 5 <sup>th</sup> /11/2022<br>1:00pm<br>center   |
| present                      | List of stakeholders is appended to the report   |
| agenda                       | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from chairman LC1</li> <li>3. Communication from Ecoserv team</li> <li>4. Concerns / issues or views</li> <li>5. closure</li> </ol> |

**SUMMARY OF MEETING PROCEEDINGS**

| Theme                    | Issue/ concern raised   | Response /guidance offered  |
|--------------------------|---|---|
| Water stressed areas     | Inquiry was made as to whether other communities like Kitoli, Awinga, Bobo, Bidibid, Biria are likely to part of the scheme since they already have existing tanks.       | No they won't be on this particular scheme since they are at a higher elevation.  |
| Unreliable water sources | Then community informed the ESIA team about the available water sources that dry up during the dry season, including River Enyau which is the source of the water scheme. | The flow and quantity of water was monitored by the design team at all times of the year and they expect water to be available at the source at year round. A catchment protection plan will be implemented to ensure hydrological sustainability.        |
| Water challenges         | The community informed us about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme               | Ala-Ora Water Supply and Sanitation scheme is intended to solve some of these challenges  |
| Catchment protection     | One of the community members inquired about the tree species that will be planted to stop the river from drying   | A bio diversity team is already on ground to establish the best species that are supported by the area, and the already available species in the area. This team shall provide the best advice on the most favorable species during catchment protection. |
| Irrigation water         | One of the community members inquired if the project would provide water for irrigation   | The scheme is designed to provide clean water for drinking and domestic use. However, Ecoserv Limited shall report to the   |

|                       |  |   |
|-----------------------|--|---|
|                       |  | Ministry about the need for the communities to have water for irrigation.   |
| Compensation          | The community wanted to know if the project will give something (compensation) for the transmission and distribution lines passing through their land      | Compensation along the transmission and distribution lines shall only be done for the damages caused during excavation and construction of these lines. There will be no compensation of the land since the lines will pass underground |
| Water challenges      | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water. | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to reduce on such burdens.  |
| Water pumping         | Inquiry was made whether there will be any pumping on the scheme.  | There will be no pumping of the water. The scheme will entirely be gravitational flow   |
| Water-User committees | The community wanted to know if committees will be formed  | Water-user committees shall be formed from the local community to aid in maintenance of the scheme  |
| Employment            | Inquiry was made about where the workers would come from.  | The contractor shall come with a number of employees, where as some workers such as casual laborers shall be got from the local community, on recommendation of the local leaders   |



Plate 12.6: Meeting with Locals in Okubani

Meeting held with Kiranga

|                                       |  |                                   |
|---------------------------------------|--|-----------------------------------|
| Project name                          | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |                                   |
| Category of stake holders             | Project affected people of Kiranga   |                                   |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |                                   |
| Date, time, place of meeting          | 5 <sup>th</sup> /11/2022<br>2:30pm<br>Center   |                                   |
| present                               | List of stakeholders is appended to the report   |                                   |
| agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from chairman LC1</li> <li>3. Communication from Ecoserv team</li> <li>4. Concerns / issues or views</li> <li>5. closure</li> </ol> |                                   |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |  |                                   |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>   | <b>Response /guidance offered</b> |



|                       |   |  |
|-----------------------|---|--|
| Water Distribution    | Inquiry was made as to whether the water would reach the different households   | The water shall also be accessed by the community through public taps. Distribution to households will be at a later stage when the scheme is handed over to a service provider. |
| Job Opportunities     | The community wanted to know if there will be job opportunities for the locals during project construction.   | Casual laborers shall be employed from the local community on recommendation from the local leaders.   |
| Water challenges      | The community informed team about how they have so many challenges with water and their prayer is that all the village settlements are included on the scheme | Ala-Ora Water Supply and Sanitation scheme is intended to solve all these challenges   |
| Water challenges      | The community expressed the challenge of women suffering while fetching water from the Nile River, and having to move long distances to access this water.    | Noted. Ala-Ora Water Supply and Sanitation scheme is intended to solve such challenges   |
| Water pumping         | Inquiry was made whether there will be any pumping on the scheme.   | There will be no pumping of the water. The scheme will entirely be gravitational flow  |
| Water-User committees | The community wanted to know if committees will be formed   | Water-user committees shall be formed from the local community to aid in maintenance of the scheme   |



Plate 12.7: Meeting in Kiranga Village

Meeting held with Ayivu community

|                                       |  |   |
|---------------------------------------|--|---|
| Project name                          | ALA-ORA WATER SUPPLY AND SANITATION SYSTEM   |   |
| Category of stake holders             | Project affected people of Ayivu   |   |
| Purpose of meeting                    | To disclose the project and collect social and environment input into the proposed River Enyau gravity flow scheme.  |   |
| Date, time, place of meeting          | 5 <sup>th</sup> /11/2022<br>3:30pm<br>center   |   |
| present                               | List of stakeholders is appended to the report   |   |
| agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from chairman LC1</li> <li>3. Communication from Ecoserv team</li> <li>4. Concerns / issues or views</li> <li>5. closure</li> </ol> |   |
| <b>SUMMARY OF MEETING PROCEEDINGS</b> |  |   |
| <b>Theme</b>                          | <b>Issue/ concern raised</b>   | <b>Response /guidance offered</b>   |
| Population                            | The LCI Chairperson informed us that the area has 560 households with an estimated population of about 1026 people   | Noted.  |
| Water stressed areas                  | Then community informed the ESIA team about the available water sources that dry up during the dry season, and that the boreholes that have been drilled are all unsuccessful because of dry wells.      | Ala-Ora Water Supply and Sanitation scheme is intended to address such challenges.                              |
|                                       | The men lack time for their wives since they spend most of the time fetching water   | We hope the scheme will solve this and other domestic water related problems                                    |
| Water source                          | A community member suggested that River Nile should be used as a water source because River Enyau dries up during the dry season   | Noted.  |
| Water Payment                         | Inquiry was made about whether there will be a payment for fetching the water.   | There will be a fee that shall be paid by the water users, and shall be decided on by the water-user committees |
| Water distribution                    | One of the community members inquired if the project will extend deep into the village settlements   | Yes<br>The distribution lines will be extended to the areas of water demand within the village.                 |
| Water coverage                        | Inquiry was done whether institutions like churches, mosques and schools shall benefit from the project  | Yes, the institutions shall benefit from the project  |
| Expectations                          | The community expressed their expectations of clean water, good coverage and affordability   | Noted.  |



Plate 12.8: Showing meeting in Ayivu Trading Centre

Meeting held with Jue Communities

|                          |   |
|--------------------------|---|
| <b>Project Name</b>      | <b>River Nyagak &amp; Enyau gravity flow scheme</b> |
| Category of stakeholders | Project Affected Persons of Jue village             |

|                                       |   |   |
|---------------------------------------|---|---|
| Purpose of meeting                    | Disclose the project and collect environmental and social input on the proposed River Enyau gravity flow scheme   |   |
| Date, time and place of meeting       | 6 <sup>th</sup> /11/2022<br>1:00 pm<br>Community Church   |   |
| Present                               | List of stakeholders is appended to the report  |   |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |   |
| <b>Summary of meeting proceedings</b> |   |   |
| Theme                                 | Issue/Concern raised  | Response/guidance offered   |
| Tank capacity                         | The community raised a concern about the tank and whether it will be able to supply all these areas since the village is large  | Yes the tank will be able to supply water to areas based on the scheme. The feasibility study determined the extent.  |
| Water distribution                    | The community expressed the need to know if every home will be provided with a pipe since the main source is in Yinga and the population is big   | No, pipes will not be distributed to every household but rather at central places where each and every one will be able to reach in order to get clean safe water   |
| Cost of water                         | The community wanted to know how much the water will cost   | We are not certain because this can only be told to you by MWE but not to worry because it will be affordable to each and everyone  |
| Operation                             | Community members also needed to know who would operate the repair taps and pipes once they are damaged given the fact that they may not have the expertise required.   | This project will be handed over to NWSC and they will be in charge once implementation is done.  |
| Compensation for loss of property     | The community echoed concern about the need to compensate people for loses attributed to the project. They said other projects pay why not this one.  | Compensation will be for what is on land and not land itself. The RAP team will clearly explain what shall be compensated in the coming few weeks.<br>The community is implored to be cooperative and supportive towards the project. |
| Query                                 | The community asked if the water will be free or paid for.  | The water will not be free, there will be a small amount charged for maintenance purposes.  |



Plate 12.9: Showing meeting at Jue village

Meeting held with Obiyu community

|                                       |   |                           |
|---------------------------------------|---|---------------------------|
| <b>Project Name</b>                   | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |                           |
| Category of stakeholders              | Project Affected Persons of Obiyu village   |                           |
| Purpose of meeting                    | Disclose the project and collect environmental and social input on the proposed River Enyau gravity flow scheme   |                           |
| Date, time and place of meeting       | 7 <sup>th</sup> /11/2022<br>2:20 pm<br>Center   |                           |
| Present                               | A List of stakeholders is appended to the report  |                           |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |                           |
| <b>Summary of meeting proceedings</b> |   |                           |
| Theme                                 | Issue/Concern raised  | Response/guidance offered |
| Water stressed                        | The community stated that this was the 3 <sup>rd</sup> company in the area talking about the same project without commencement.   | Noted                     |

|              |   |   |
|--------------|---|---|
|              | They noted that the dry season is underway and Enyau is the only source since the only borehole that served the community broke down years ago. |   |
| Time frame   | The community stressed the issue of when the project will commence because there are over 200 households in the village in need of this water   | The project already commenced and different groups have been coming to collect different data from the different villages we are here to conduct an ESIA which will be handed over to NEMA and construction will begin. |
| Compensation | The community asked whether their destroyed property during implementation will be valued and paid for  | The RAP team will come in about two months to explain land acquisition and compensation issues in detail.   |
| Employment   | An inquiry was made by the community members as to whether local people would be considered to do casual work                                   | Yes, a few will be employed by the contractor so we urge your leaders to ask the contractor to employ their community members once seen on ground so as to have an opportunity.   |



Plate 12.10: Showing meeting at Obiyu village

Meeting held with Dondi and Angazi communities

|                                 |   |
|---------------------------------|---|
| Project Name                    | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |
| Category of stakeholders        | Project Affected Persons of Dondi and Angazi villages   |
| Purpose of meeting              | Disclose the project and collect environmental and social input of the proposed River Enyau gravity flow scheme |
| Date, time and place of meeting | 4 <sup>th</sup> /11/2022<br>11:00 am<br>Grounds opposite chakai primary school                                  |
| Present                         | A List of stakeholders is appended to the report  |

|  |   |  |
|--|---|--|
| Agenda                                       | 6. Prayer<br>7. Remarks from the L.C.1 chairperson<br>8. Communication from the Ecoserv team<br>9. Concerns/ views/Issues<br>10. Closure  |  |
| <b>Summary of meeting proceedings</b>        |   |  |
| Theme  | Issue/Concern raised  | Response/guidance offered  |
| Compensation                                 | The community wanted to know if the landowners would be compensated and whether the government is going to take over the area around the abstraction point and restrict access. | Some facilities for abstraction will be places at specific point but the rest of the river will be free and the community will continue using it as before. Details of land acquisition will be explained by the RAP team in the near future.  |
| Delay in information sharing                 | An inquiry was made about why information shared about the project was so scanty.   | Apologies, but there are studies undertaken known as feasibility studies to ascertain whether the project can be undertaken in the area so different aspects are looked at. Probably they were still in the feasibility stage hence they weren't sure. However hence forth, all chairpersons will be informed about planned project activities prior to their execution. |
| Involvement of area leadership at all levels | The community wanted to know if there is any document that was issued to the sub-counties on where the project is passing since it started                                      | The team first met the district leaders (CAO, CDO, LCV) and others so they know of our presence in the area. Your leaders are aware.   |
| Expected benefits                            | They expressed a desire to get chairs and tents for their communal gathering if possible.   | This cannot be a direct component of this but may be the contractor could consider it under the CSR  |
| Employment                                   | An inquiry was made as to whether laborers will be brought from other regions as they did during the drilling of boreholes  | Experts like engineers will be brought from other regions while this other casual work will be offered to the community people but, not all of them will be employed. Your leaders should be vigilant and ask for the offer from the contactors  |
| Storage                                      | An inquiry was made by the community members about where the materials for construction would be stored.  | The contractor will find a place to stock pile the materials.  |
| Distance of water points                     | The inquired about the distance between how area would be supplied given that it's a long distance between the abstraction and treatment plan.                                  | This is technical that's why several studies had to be conducted prior. Feasibility studies have established that it possible and all areas proposed will be served.   |

|                           |  |  |
|---------------------------|--|--|
| Example of similar scheme | The community wanted to know where else such projects have been implemented  | Government has embraced this approach to provide water, especially in small rural towns. So, they all operate similarly and this will not be any different |
| Inquiry                   | They also wanted to know how many teams will be moving around the villages   | They are many but for now, we have the bio-diversity team, social team and physical environment team.  |
| Water bills               | The community stressed the need to know if they will pay for the water or if it will be distributed for free                         | Yes, a modest fee will be charged for maintenance purposes.  |
| Compensation              | They wanted to know what could happen if the proposed line damages someone's property or crops.                                      | It can be compensated but they try to avoid affecting houses and gardens but if they cannot be avoided they will be compensated for.                       |
| Water usage               | The community wanted to know if the water they are purifying from the main point will be for only drinking or irrigation purpose too | This water is for domestic use. Water for irrigation (production) is provided by MAIIF   |



Plate 12.11: Showing meeting at Dondi and Angazi villages

Meeting held with Ediofe community

|                                 |  |
|---------------------------------|--|
| Project name                    | <b>River Nyagak &amp; Enyau gravity flow scheme</b>  |
| Category of stakeholders        | Project affected persons of Ediofe village   |
| Purpose of the meeting          | To disclose the project and collect social and environmental input into the proposed River enyau gravity flow scheme |
| Date, time and place of meeting | 6 <sup>th</sup> /11/2022<br>11:00 am<br>Centre   |



| Present                            | List of stakeholders is appended to the report   |  |
|------------------------------------|--|--|
| Agenda                             | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views or issues</li> <li>5. Closure</li> </ol> |  |
| Summary of the meeting proceedings |  |  |
| Theme                              | Issue/ concern raised  | Response/ guidance offered   |
| Compensation                       | The community expressed the need to know whether the government will pay for the land they are using since the services will not be free of charge.  | No, the government is not paying for land where the pipes will be laid. However for section that will host major structures such as a reservoir and tanks, they will be compensated for.   |
| Money usage                        | They also needed to know what the money collected will be used for   | The money collected shall be used for maintaining the pipes and taps.  |
| Personal water sources             | Concern was expressed on whether the community members who are living far from where tanks are proposed would get water.   | This scheme was planned to provide water for people hence the project design has been made cognizant of this fact.   |
| Household water stands             | They wanted to know whether a person could extend water to their home under this scheme  | There will be no extension to households under this scheme   |
| Payment mode                       | An Inquiry was made about the mode of payment and if it would be per jerrycan or monthly   | The amount one pays shall be directly proportional to the volume of water used. This will be a metered.  |
| Employment                         | Concern was raised on where the laborers shall come from   | The technical people such as engineers and water experts will come from outside the community. However for casual work, labourers will come from the community. Not all people will be taken on because opportunities will be limited. |



Plate 12.12: Showing meeting at Ediofe village

Meeting held with Etiyo Community

|                                       |   |   |
|---------------------------------------|---|---|
| <b>Project Name</b>                   | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |   |
| Category of stakeholders              | Project Affected Persons of Etiyo village, Ndapi parish, Terego district  |   |
| Purpose of meeting                    | Disclose the project and collect environmental and social input on the proposed River Enyau gravity flow scheme   |   |
| Date, time and place of meeting       | 7 <sup>th</sup> /11/2022<br>12:26 pm<br>Centre  |   |
| Present                               | A List of stakeholders is appended to the report  |   |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |   |
| <b>Summary of meeting proceedings</b> |   |   |
| Theme                                 | Issue/Concern raised  | Response/guidance offered   |
| Water Treatment                       | The community wanted to know how the dirty water in River Enyau   | The water will be treated from a treatment plant before distribution. |

|                      |  |  |
|----------------------|--|--|
|                      | would be refined and made fit for human consumption  | which will be established and will flow by gravity naturally   |
| The water flow       | They indicated that their town is at a high altitude compared to the river hence wondered how the water would flow upward. | Raised areas have been identified where tanks will be placed to allow the water to flow under gravity. All this was established at the feasibility stage before designing  |
| Cost                 | An inquiry was made as to whether the water would be free of charge  | No a small fee will be paid which will be used for maintenance of activities.  |
| Distribution network | The community also wanted to know if the households that are far away from the centers will be given water                 | Water is going to mainly be taken to trading centers or areas with population concentrations. Household connections could come in later after the scheme is handed over to operators                               |
| Project commencement | An inquiry was made on when the project will begin   | The project has already began given the fact that we are conducting an ESIA and getting your views about the project so it will be very soon. Actual works will start after obtaining all the necessary clearance. |
| Labour force         | The community members wanted to know whether the process would be mechanized or engage local labour.                       | Most of the work will be labour based which will create opportunities for some community members.  |
| Security             | An inquiry was made on whether it will be the government to employ the security personnel to guard the tanks               | At a later stage the ministry together with local leaders will establish a committee that will oversee the sustainable running of the scheme.  |



Plate 12.13: Showing meeting at Etiyo village

Meeting held with Andiku Community

|                                       |   |   |
|---------------------------------------|---|---|
| <b>Project Name</b>                   | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |   |
| Category of stakeholders              | Project Affected Persons of Andiku village, Azapi parish  |   |
| Purpose of meeting                    | Disclose the project and collect environmental and social input on the proposed River Enyau gravity flow scheme   |   |
| Date, time and place of meeting       | 7 <sup>th</sup> /11/2022<br>4:30 pm<br>L.C.1 residence  |   |
| Present                               | A List of stakeholders is appended to the report  |   |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |   |
| <b>Summary of meeting proceedings</b> |   |   |
| Theme                                 | Issue/Concern raised  | Response/guidance offered                 |
| Source                                | An inquiry was made about where the water will be extracted from  | The water will be drawn from River. Enyau |

|                |  |  |
|----------------|--|--|
| Cost           | The community also needed to know if the service would come at a cost.                           | The services are not free there will be a fee collected and this is to be used for operation and maintenance of project during its life cycle  |
| Compensation   | The community expressed the need to be offered money in case the project affects their houses    | The project design has tried to avoid developments but in case they are affected they will be valued and compensated   |
| Project design | The community wanted to know if the pipes will be designed home to home or at one central place. | The M.W.E plans to implement this through the use of points where a given number of taps are placed in a central place so that it serves numerous people. Extension to households could be at a later stage when the scheme is handed over to operators. |
| Beneficiaries  | An inquiry was made on whether animals too will benefit from the project                         | Yes they may benefit but the scheme is intended to provide safe water for use by humans.   |





Plate 12.14: Showing meeting at Andiku village

Meeting held with village 5 and 8

|                                 |   |   |
|---------------------------------|---|---|
| <b>Project name</b>             | <b>River Nyagak and Enyau gravity flow scheme</b>   |   |
| Category of stakeholders        | Project affected persons of villages 5 and 8 (Nyaranga)   |   |
| Purpose of meeting              | To disclose the project and collect social and environmental input into the proposed River Enyau Gravity Flow scheme  |   |
| Date, time and place of meeting | 5 <sup>th</sup> /11/2022<br>11am<br>Canaan Church   |   |
| Present                         | List of stakeholders is appended to the report  |   |
| Agenda                          | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C1 chairperson</li> <li>3. Communication from Ecoserv team</li> <li>4. Concerns/ issues or views</li> <li>5. Closure</li> </ol> |   |
| Summary of meeting proceedings  |   |   |
| Theme                           | Issue/concern raised  | Response/guidance offered   |
| Project coverage                | Concern was expressed as to whether the whole settlement would be served by the proposed project because some zones are far from the proposed location of tank.   | The distribution network will be clearly laid out at later stages. At the moment we are making assessments for the main infrastructure which are tanks and transmission and a few distribution pipes. The intention is to improve |

|                          |  |  |
|--------------------------|--|--|
|                          |  | access to safe water for areas with high population concentrations.  |
| Employment               | Inquiry was made as to whether refugees, would be considered for employment during the construction stage. They stressed that they needed to be considered so as to earn some money and wanted to know whether multiple opportunities would be availed for the youth as this would reduce on idle time and crimes in the area.<br>The community also mentioned that sometimes youths are engaged and never paid for services they offer. | Priority shall be given to local people for work that may not be technical. It was stressed though that the opportunities might be limited in number so not everyone will be taken on.<br>This is a world bank funded project and one of the requirements during implementation is adherence to national and international best practice labour laws. Whoever works shall be paid. |
| Project timelines        | The community wanted to know how long the project would take before commencement.<br>Area leaders stressed that project timelines should be followed to limit pressure likely to be exerted on them by the local community.  | The ESIA study is one of the processes that precede such works. The project will start after a certificate is obtained. However, we cannot determine with certainty because our assignment ends at delivering the ESIA report.   |
| Topography of the area   | Community members said that the hilly topography of the area made it difficult for some people to easily access water. A request was made to put taps in strategic places to ease access for the disabled, old, young and pregnant women   | Easing access to clean water is the main objective of the project. This is capture and will be one of our recommendations in the report.   |
| Unreliable water sources | It was reported that some of the available water sources dry up during the long dry spell which leaves both humans and animals in dire need.   | Noted  |
| Theft                    | During the community meeting, high cases of theft were reported hence the need to put up a strong security system and guards.  | This is noted and will be stressed in the report.  |
| Chlorine dose            | They stated that the Chlorine concentration in the water they currently use was making them sick. Fear was expressed about this scheme having similar problems.<br>They wanted to know whether there was any other chemical that could be used for water purification other than chlorine.   | Water purification will be done using the right doses because qualified people will be employed.   |
| Disputes                 | Community members stated that people (women) end up picking up quarrels at water collection points because of competition caused by limited number of sources.   | Once the project is implemented it will improve on availability of clean water and the stand points are expected to ease access.   |

|                      |   |   |
|----------------------|---|---|
| Destruction of crops | It was indicated that these are crop farming communities hence requested that excavation works be undertaken during the dry season after crops have been harvested. | Noted and will be one of the recommendations in the ESIA report.  |
| Water use            | Inquiry was made as to whether the water from the proposed project could be used for other purposes such as irrigation and fish ponds.                              | The project is intended to avail clean water for humans. The activities you are suggesting are agricultural related and its Ministry of Agriculture Animal Industry and Fisheries mandated to provide water for production. |
| Payment for water    | Community member wanted to know the mode of payment for water under this project.   | It will be proportional to the volume one uses and it's likely to be per jerry can. However details of this will be shared by the ministry as the project advances.   |
| Grievance committee  | They expressed the need to have a representative from the refugee settlement on the GRC so that their complaints are tabled before the responsible.                 | This is noted as key because the project traverses refugee settlements. It will be recommended.   |



Plate 12.15: Showing meeting at villages 5 and 8 (Nyaranga)



Meeting held with Amia community

|                                       |   |  |
|---------------------------------------|---|--|
| Project Name                          | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |  |
| Category of stakeholders              | Project Affected Persons of villages 2,3,4 (AMIA)   |  |
| Purpose of meeting                    | Disclose project and collect environmental and social input of the proposed River Enyau gravity flow scheme   |  |
| Date, time and place of meeting       | 5 <sup>th</sup> /11/2022<br>3:00 pm<br>Church   |  |
| Present                               | A List of stakeholders is appended to the report  |  |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |  |
| <b>Summary of meeting proceedings</b> |   |  |
| Theme                                 | Issue/Concern raised  | Response/guidance offered  |
| Cost                                  | The community wanted to know how much the water will cost   | We cannot determine that for now but once the project is implemented and handed over to a service provider. The prices shall definitely be fair.   |
| Employment                            | They wanted to know where the work force would be got from  | Experts like the engineers will be sourced from outside the community while casual work will be given to some of the community people and this will be through your leaders who will have to request jobs from the contractor for their people |
| Protocol                              | Community members wanted to know whether the district leaders know about the project and the ongoing stakeholder consultations.   | Yes the district leaders are aware of our being here and clearly know about the project  |
| Compensation                          | The community was concerned about how the contractor will deal with damages they are likely to cause to people's properties   | There will be minimal compensation because the design is a long road. However where damage of property is occasioned by the project they will be paid for. The RAP team will explain this exhaustively in the near future.                     |
| Funds collection                      | They wanted to know how money from sale of water would be managed.  | Modalities of payment for water and maintenance of the system will be disclosed by the MWE at a later stage  |
| Project design                        | The community wanted to know where exactly the pipes will pass  | That will be established at a later stage when the surveyor comes on ground during the RAP exercise.   |



Plate 12.16: Showing meeting at villages 2,3,4 (AMIA)

Meeting with Jakisa community

|                                       |   |  |
|---------------------------------------|---|--|
| <b>Project Name</b>                   | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |  |
| Category of stakeholders              | Project Affected Persons of Village 1, zone 4, block 5 jakisa village in Imvepi settlement  |  |
| Purpose of meeting                    | Disclose the project and collect environmental and social input on the proposed River Enyau gravity flow scheme   |  |
| Date, time and place of meeting       | 5 <sup>th</sup> /11/2022<br>1:00 pm<br>Church   |  |
| Present                               | A List of stakeholders is appended to the report  |  |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |  |
| <b>Summary of meeting proceedings</b> |   |  |
| Theme                                 | Issue/Concern raised  | Response/guidance offered  |
| Equipment provision                   | An inquiry was made by the community members on whether jerrycans will also be provided   | No, but it will be reported to M.W.E, if they can be in a position to then they will   |
| Faulty taps                           | The community wanted to know if the available spoilt taps will be repaired to produce water   | This is a different and new scheme so the said taps are not on this project and probably on a different line so they will not be repaired. |

|                 |   |   |
|-----------------|---|---|
| Employment      | The community expressed the need to know if the contractor would bring their own technicians or they will work with the local community     | For the experts, they will have to be brought from other regions but for works that community members can do, they will be recruited through the area local leadership                                  |
| Water stressed  | They also wanted to know if the project is being implemented for them or the other settlements because they are already having water issues | This is a big project and a number of sub counties both with and without refugees will be served  |
| Project details | The community also wanted to know when the project or work will commence  | A number of conditions have to be fulfilled before the project commences and the ESIA is one of them. We can't tell with certainty when actual earth works will be done but the project will start soon |
| Treatment       | An Inquiry was made on whether the water being extracted from River Enyau will be treated before distribution                               | Yes. The ministry will put up a treatment plant to ensure that the water is safe before distribution  |



Plate 12.17: Showing meeting at Village 1, zone 4, block 5 Jakisa village

Meeting held with Nyaranga and Opira community

|                          |  |
|--------------------------|--|
| <b>Project Name</b>      | <b>River Nyagak &amp; Enyau gravity flow scheme</b>      |
| Category of stakeholders | Project Affected Persons of Opiira and Nyaranga villages |

|                                       |   |  |
|---------------------------------------|---|--|
| Purpose of meeting                    | Disclose the project and collect environmental and social input of the proposed River Enyau gravity flow scheme   |  |
| Date, time and place of meeting       | 4 <sup>th</sup> /11/2022<br>1:00 am<br>L.C.1 residence  |  |
| Present                               | A List of stakeholders is appended to the report  |  |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |  |
| <b>Summary of meeting proceedings</b> |   |  |
| Theme                                 | Issue/Concern raised  | Response/guidance offered  |
| Compensation                          | The community wanted to know if the landowners will be compensated  | A RAP team will come and explain issues related to land take and compensation in detail. However its important to note that the project will not compensate for land but rather what is on the land and damages that may result from project activities. |
| Labour                                | Inquiry was made as to whether local labour would be required.  | Yes, for mainly casual work but of course not everyone will be taken because the opportunities are limited. It will be on a first come first serve basis and will be done through your area leaders.   |
| Water stressed                        | The community emphasised that the area is water stressed hence the need for this project  | Noted, and this is an issue which will be conveyed to the ministry.  |
| Access to some project sites          | Community members wanted to know whether Azapi parish was part of the areas to be served and how this would be accessed since there is no road connecting the two.  | Yes, azapi is one of the area and it will be accessed through the Imvepi side.   |
| Extraction                            | The community wanted to know if the water extracted will be returned to the river   | No because it shall be used for domestic chores. However hydrological studies have been conducted extensively and it has been established that the river can sustainably yield the amounts required to run the scheme.                                   |
| Charges                               | The community also wanted to know if there would be charges for this water  | Yes, there will be charges but it will be a small manageable fee   |
| Timeline                              | An inquiry was made on how long it would take for the project to commence   | It will depend on how fast the MWE obtains the required clearance. This will be in the near future.  |

|                    |  |   |
|--------------------|--|---|
| Protocol           | The community wanted to know if we had contacted the district for easy follow up of the project. | Yes, we met the district leaders and they know we are here  |
| Construction       | An inquiry was made on whether a bridge would be constructed on the river                        | No, they are just inserting a pipe in the water for abstraction which doesn't require a bridge. Bridges are under Ministry of works and UNRA  |
| Level of education | The community wanted to know what level of education would be required for the casual work       | Once the contractor comes, they will let locals know what kind of work is available and the required competencies.  |
| Feasibility study  | An inquiry was made on what the team that came earlier had taken away after drilling and why     | A team came to conduct a feasibility study so that they can know if the area is suitable for the project. A number of samples could have been picked including but not limited to soil and water. |





Plate 12.18: Showing meeting at Opira and Nyaranga villages

Meeting held with Opira and Nyaranga Communities

|                                    |  |   |
|------------------------------------|--|---|
| Project name                       |  |   |
| Category of stakeholders           | Project affected persons of Opira and Nyaranga   |   |
| Purpose of the meeting             | To disclose the project and collect social and environmental input into the proposed River enyau gravity flow scheme   |   |
| Date, time and place of meeting    | 6 <sup>th</sup> /11/2022<br>9:00 am<br>Centre  |   |
| Present                            | List of stakeholders is appended to the report   |   |
| Agenda                             | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from Ecoserv team</li> <li>4. Concerns/ views or issues</li> <li>5. Closure</li> </ol> |   |
| Summary of the meeting proceedings |  |   |
| Theme                              | Issue/ concern raised  | Response/ guidance offered  |
| Beneficiaries                      | The community expressed the need to know whether it was Opira  | It is not only Opira benefiting from this project. A total of 24 villages for 4 sub counties and two district will benefit. |

|                              |  |  |
|------------------------------|--|--|
|                              | or Azapi parish residents benefiting from the project  |  |
| Query on studies undertaken  | The community reported that a group of people went to the village without informing the local leaders, concerns were raised by the local people and the work was put on hold             | That could have been the feasibility or design team. Apologies for that but hence forth, the community will be informed prior of any activity related to ESIA, RAP and SPP.          |
| Query on other water sources | An Inquiry was made as to whether the incomplete borehole in their area was part of the project  | No, it's not. This is a piped water scheme   |
| Protocol                     | During the community meeting, they wanted to know if the relevant authorities are aware of these meetings going on in villages   | Yes, they are aware that we are here.  |
| Security                     | The community stated the need to have a security guard where the tanks will be installed   | Of course, there will be a guard who will be got from the community.   |
| Employment                   | The community wanted to know if residents will be given work to do in case the project commences   | The engineers (experts) will come from other regions.<br>Local recruitment will be through local leadership through whom the contractor will make known the available opportunities. |
| Water treatment              | The community emphasized the need to know how the water from River Enyau will be made safe for drinking  | The water will first be taken to the treatment plant and put in the reservoir tank before distribution.<br>The water will be safe;   |
| Location                     | They expressed the need to know where the Ecoserv offices are located  | Ecoserv Ltd offices are found in Kololo, Kampala.  |
| Funds                        | The community wanted to know about the funding and gave examples where projects like this are left incomplete because of funds including engaging local laborers and not paying them off | Ministry of Water and Environment has secured funds with the world bank which is very keen about such social issues. Such incidents if any will be minimal                           |
| Water bills                  | An Inquiry was made on whether people will be made to pay for the water  | Yes, water will be paid for but it will be an affordable amount to cater for operation and maintenance costs.  |



Plate 12.19: Showing meeting at Opiira and Nyaranga villages

Meeting held with Wide community

|                                       |   |   |
|---------------------------------------|---|---|
| <b>Project Name</b>                   | <b>River Nyagak &amp; Enyau gravity flow scheme</b>   |   |
| Category of stakeholders              | Project Affected Persons of Widi village  |   |
| Purpose of meeting                    | Disclose the project and collect environmental and social input on the proposed River Enyau gravity flow scheme   |   |
| Date, time and place of meeting       | 7 <sup>th</sup> /11/2022<br>11:30 am<br>Centre  |   |
| Present                               | A List of stakeholders is appended to the report  |   |
| Agenda                                | <ol style="list-style-type: none"> <li>1. Prayer</li> <li>2. Remarks from the L.C.1 chairperson</li> <li>3. Communication from the Ecoserv team</li> <li>4. Concerns/ views/Issues</li> <li>5. Closure</li> </ol> |   |
| <b>Summary of meeting proceedings</b> |   |   |
| Theme                                 | Issue/Concern raised  | Response/guidance offered   |
| Project Timeline                      | The community wanted to know how long the project will take to be implemented   | The ESIA study is part of what precedes project implementation. However a number of other clearances need to be obtained before |




|                      |   |   |
|----------------------|---|---|
|                      |   | construction. We can't determine when it will start precisely but soon  |
| Water stressed       | The community was happy about the project adding that its long overdue They said the community doesn't have safe water hence people move for long distances in search of water. | Noted and we shall let the ministry know  |
| Cost                 | An inquiry was made as to whether they will be paying for the water before use  | Yes, there will be a small charge that will be used to operate and maintain the scheme in terms of associated infrastructure maintenance.   |
| Protocol             | The community also asked if the officials are aware of the project  | Yes, they are aware we are here and know about the project  |
| Type of water system | Community members wanted to know how the scheme that's proposed for extension into their area would be powered.   | This is a gravity flow scheme it will flow naturally with no need for pumping   |
| Employment           | The community expressed the need to know if their people will be given jobs during the project  | Yes. Some people will get employed especially as casual laborer's. However for skill people like experts like the engineers, hydrologist these will be got from outside the community because they may not be available within. |
| Concern              | An inquiry was made on whether the bio-diversity team will take the fish away from the river or not   | The team will not take away the fish they just need to find out which species are in the river and if the project will affect its survival.   |



Plate 12.20: Showing meeting at Widi villages

**ANNEX 2: WATER TEST RESULTS**



**NATIONAL WATER AND SEWERAGE CORPORATION**  
**CENTRAL LABORATORY - BUGOLOBI**  
 P.O BOX 7053 KAMPALA Email: [waterquality@nwscc.co.ug](mailto:waterquality@nwscc.co.ug)

**CERTIFICATE OF ANALYSIS**

**CLIENT: Ecoserv Limited**  
**Address: Kololo, Uganda**  
**Sampled by: Client Staff**  
**Date Sample Received: 09/11/2022**

**Document No: NWSC/WQ/QF/21.2A**  
**Invoice No: LS131/INV/2022/1134**  
**Date of Report: 05/12/2022**


| Parameters                   | Units     | Enyau Downstream River<br>E: 304437, N: 354185 | National Standards<br>for<br>Untreated Potable water |
|------------------------------|-----------|--|--|
| Sample Number                | --        | 3074/2022/C/B                                  |  |
| Alkalinity: Total            | mg/L      | 51.2   | 500  |
| Bact: Faecal coliforms       | CFU/100mL | 800  | 0  |
| COD                          | mg/L      | 28   | Not Specified  |
| Electrical Conductivity (EC) | uS/cm     | 110.6  | 2500   |
| Hardness: Total              | mg/L      | 38   | 600  |
| pH(Physical-Chemical)        | -----     | 7.22   | 5.5 – 9.5  |
| Total Dissolved Solids(TDS)  | mg/L      | 70.784   | 1500   |
| Total Suspended Solids(TSS)  | mg/L      | 678  | 0  |
| Turbidity                    | NTU       | 553.883  | 25   |

**Remarks**  
 Chemistry: The water sample showed complying physiochemical characteristics with exception of TSS and Turbidity as provided for by the National Standards for Untreated Potable water.  
 Biology: The water sample showed uncomplying bacteriological characteristics as provided for by the National Standards for Untreated Potable water.

**AUTHORISED BY:**                      **Manager Central Laboratory Services:** \_\_\_\_\_

**APPROVED BY:**                      **Senior Manager - Water Quality Management Department:** \_\_\_\_\_

The NWSC certificate of analysis by no means constitutes a permit to any person or company undertaking to conduct business  
 \*\*\* This report reflects results of the sample as received at the laboratory premises.





**NATIONAL WATER AND SEWERAGE CORPORATION  
CENTRAL LABORATORY - BUGOLOBI**

P.O BOX 7653 KAMPALA Email: [waterquality@nwsc.co.ug](mailto:waterquality@nwsc.co.ug)

**CERTIFICATE OF ANALYSIS**

**CLIENT: Ecoserv Limited**

**Address: Kololo, Uganda**

**Sampled by: Client Staff**

**Date Sample Received: 09/11/2022**

**Document No: NWSC/WQ/QF/21.2A**

**Invoice No: LS131/INV/2022/1134**

**Date of Report: 05/12/2022**

| Parameters                   | Units     | Enyau Downstream River<br>E: 304437, N: 354185 | National Standards<br>for<br>Untreated Potable water |
|------------------------------|-----------|--|--|
| <b>Sample Number</b>         | --        | 3074/2022/C/B                                  |  |
| Alkalinity: Total            | mg/L      | 51.2   | 500  |
| Bact: Faecal coliforms       | CFU/100mL | 800  | 0  |
| COD                          | mg/L      | 28   | Not Specified  |
| Electrical Conductivity (EC) | µS/cm     | 110.6  | 2500   |
| Hardness: Total              | mg/L      | 38   | 600  |
| pH(Physical-Chemical)        | -----     | 7.22   | 5.5 – 9.5  |
| Total Dissolved Solids(TDS)  | mg/L      | 70.784   | 1500   |
| Total Suspended Solids(TSS)  | mg/L      | 678  | 0  |
| Turbidity                    | NTU       | 553.883  | 25   |

**Remarks**

Chemistry: The water sample showed complying physiochemical characteristics with exception of TSS and Turbidity as provided for by the National Standards for Untreated Potable water.

Biology: The water sample showed uncomplying bacteriological characteristics as provided for by the National Standards for Untreated Potable water.

**AUTHORISED BY:** Manager Central Laboratory Services: \_\_\_\_\_

**APPROVED BY:** Senior Manager - Water Quality Management Department: \_\_\_\_\_

*The NWSC certificate of analysis by no means constitutes a permit to any person or company undertaking to conduct business*

*\*\*\* This report reflects results of the sample as received at the laboratory premises.*







**NATIONAL WATER AND SEWERAGE CORPORATION  
CENTRAL LABORATORY - BUGOLOBI**

P.O BOX 7053 KAMPALA Email: [waterquality@nwsc.co.ug](mailto:waterquality@nwsc.co.ug)

**CERTIFICATE OF ANALYSIS**

**CLIENT: Ecoserv Limited**

**Address: Kololo, Uganda**

**Sampled by: Client Staff**

**Date Sample Received: 09/11/2022**

**Document No: NWSC/WQ/QF/21.2A**

**Invoice No: LSI31/INV/2022/1134**

**Date of Report: 05/12/2022**

| Parameters                   | Units     | Enyau Upstream River<br>E: 294922, N: 357795 | National Standards<br>for<br>Untreated Potable water |
|------------------------------|-----------|--|--|
| Sample Number                | --        | 3073/2022/C/B                                |  |
| Alkalinity: Total            | mg/L      | 44.4   | 500  |
| Bact: Faecal coliforms       | CFU/100mL | 800  | 0  |
| COD                          | mg/L      | 41   | Not Specified  |
| Electrical Conductivity (EC) | µS/cm     | 106.7  | 2500   |
| Hardness: Total              | mg/L      | 52.4   | 600  |
| pH(Physical-Chemical)        | -----     | 6.79   | 5.5 - 9.5  |
| Total Dissolved Solids(TDS)  | mg/L      | 68.288                                       | 1500   |
| Total Suspended Solids(TSS)  | mg/L      | 1171   | 0  |
| Turbidity                    | NTU       | 658.88                                       | 2.5  |

**Remarks**

Chemistry: The water sample showed complying physiochemical characteristics with exception of TSS and Turbidity as provided for by the National Standards for Untreated Potable water.

Biology: The water sample showed uncomplying bacteriological characteristics as provided for by the National Standards for Untreated Potable water.

**AUTHORISED BY:** Manager Central Laboratory Services: \_\_\_\_\_

**APPROVED BY:** Senior Manager - Water Quality Management Department: \_\_\_\_\_

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*\*\*\* This report reflects results of the sample as received at the laboratory premises.*



### ANNEX 3: DAILY VEHICLE INSPECTION FORM

VEHICLE REGISTRATION NUMBER: \_\_\_\_\_ WEEK ENDING DATE \_\_\_\_\_

|    | ITEM DESCRIPTION  | G= GOOD ORDER B= BAD CONDITION |     |     |     |     |     |     |
|----|---|--------------------------------|-----|-----|-----|-----|-----|-----|
|    |   | MON                            | TUE | WED | THU | FRI | SAT | SUN |
| 1  | LEAKS – WATER / FUEL                                    |                                |     |     |     |     |     |     |
| 2  | OIL LEAKS – ENGINE / DIFFERENTIAL / GEARBOX / HYDRAULIC |                                |     |     |     |     |     |     |
| 3  | TYRES – FRONT / REAR / SPARE / PRESSURE / NUTS          |                                |     |     |     |     |     |     |
| 4  | WINDSCREEN / WINDOWS / MIRRORS                          |                                |     |     |     |     |     |     |
| 5  | BODY WORK – DOORS / HANDLES / CHASSIS / PANALS          |                                |     |     |     |     |     |     |
| 6  | VEHICLE LICENCE / REGISTRATION PLATES - VALIDITY        |                                |     |     |     |     |     |     |
| 7  | EXHAUST – ENGINE SMOKE / PROPERLY SECURED               |                                |     |     |     |     |     |     |
| 8  | LEVELS – OIL / WATER / BRAKES / CLUTCH / HYDRAULIC      |                                |     |     |     |     |     |     |
| 9  | BATTERY – WATER LEVEL / CONNECTIONS / CABLES            |                                |     |     |     |     |     |     |
| 10 | ABNORMAL WEAR ON STEARING                               |                                |     |     |     |     |     |     |
| 11 | BRAKES – FOOT / HAND / AIR                              |                                |     |     |     |     |     |     |
| 12 | LIGHTS – MAIN / STOP / PARK                             |                                |     |     |     |     |     |     |
| 13 | INDICATORS – FRONT / REAR                               |                                |     |     |     |     |     |     |
| 14 | REFLECTORS – FRONT / REAR AND REAR CHEVRONS             |                                |     |     |     |     |     |     |
| 15 | JACK / WHEEL SPANNER / WARNING TRI-ANGLES               |                                |     |     |     |     |     |     |
| 16 | HORN / WINDSCREEN WIPERS                                |                                |     |     |     |     |     |     |
| 17 | INTERIOR – SEATING / INSTRUMENTATION / HOUSEKEEPING     |                                |     |     |     |     |     |     |
| 18 | FIRST AID KIT   |                                |     |     |     |     |     |     |
| 19 | FIRE EXTINGUISHER                                       |                                |     |     |     |     |     |     |
| 20 | LOADING AREA EQUIPMENT PROPERLY SECURED                 |                                |     |     |     |     |     |     |
| 21 | PROPER HOUSEKEEPING ON LOADING AREA                     |                                |     |     |     |     |     |     |
| 20 | VEHICLE ROADWORTHY                                      |                                |     |     |     |     |     |     |
| 21 | REMARKS:  |                                |     |     |     |     |     |     |
|    |   |                                |     |     |     |     |     |     |
|    |   |                                |     |     |     |     |     |     |
|    |   |                                |     |     |     |     |     |     |
|    |   |                                |     |     |     |     |     |     |
| 22 | NAMES OF PERSON CONDUCTING INSPECTION:                  |                                |     |     |     |     |     |     |

| DAILY VEHICLE LOGSHEET |                                |                              |                    |              |
|------------------------|--------------------------------|------------------------------|--------------------|--------------|
| DATE                   | ODOMETER START OF TRIP READING | ODOMETER END OF TRIP READING | TRIP DISTANCE (KM) | TRIP DETAILS |
|                        |                                |                              |                    |              |
|                        |                                |                              |                    |              |

|  |  |  |  |  |
|--|--|--|--|--|
|  |  |  |  |  |
|  |  |  |  |  |

Supervisor's Name: \_\_\_\_\_  
Sign: \_\_\_\_\_



**ANNEX 4: LIST OF PLANT SPECIES IDENTIFIED IN THE PROJECT AREA**

| Name  | IUCN | Natio<br>nal | WI<br>A | WI<br>B | Tank<br>1 | T 1<br>A | Tank<br>2 | Tan<br>k 3 | Tan<br>k 4 | Oth<br>ers |
|---|------|--------------|---------|---------|-----------|----------|-----------|------------|------------|------------|
| <i>Asystasia gangetica</i> (L.) T. Anders.          | LC   | LC           | 1       | 1       | 1         | 0        | 1         | 1          | 1          | 1          |
| <i>Dyschoriste radicans</i> Nees                    | LC   | LC           | 0       | 1       | 0         | 0        | 1         | 1          | 0          | 1          |
| <i>Hypoestes aristata</i>                           | LC   | LC           | 1       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Justicia flava</i>                               | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 1          | 1          |
| <i>Hygrophylla auriculata</i>                       | LC   | LC           | 0       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Agave sisalana</i>                               | LC   | LC           | 1       | 0       | 1         | 0        | 0         | 0          | 0          | 1          |
| <i>Achyranthes aspera</i> L.                        | LC   | LC           | 1       | 1       | 1         | 0        | 0         | 1          | 1          | 1          |
| <i>Lannea barteri</i> (Oliv.) Engl.                 | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 1          | 1          |
| Unid tree 5   | LC   | LC           | 0       | 0       | 0         | 1        | 0         | 0          | 0          | 1          |
| <i>Lannea humilis</i> (Oliv.) Engl.                 | LC   | LC           | 0       | 0       | 1         | 1        | 0         | 1          | 0          | 1          |
| <i>Lannea schimperi</i> (A.Rich.) Engl.             | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 0          | 1          |
| <i>Lannea schweinfurthii</i> Engl.) Engl.           | LC   | LC           | 0       | 0       | 1         | 0        | 1         | 1          | 0          | 1          |
| <i>Mangifera indica</i> L.                          | LC   | LC           | 0       | 0       | 1         | 0        | 1         | 1          | 1          | 1          |
| Unid tree 4   | LC   | LC           | 0       | 0       | 0         | 1        | 0         | 0          | 0          | 1          |
| <i>Pseudospondias microcarpa</i> (A.Rich.) Engl.    | VU   | LC           | 1       | 1       | 0         | 0        | 0         | 1          | 0          | 1          |
| <i>Searsia natalensis</i> (Rhus natalensis Krauss.) | LC   | LC           | 0       | 0       | 1         | 1        | 0         | 1          | 0          | 1          |
| <i>Annona senegalensis</i> Pers.                    | LC   | LC           | 0       | 0       | 1         | 0        | 1         | 1          | 0          | 1          |
| <i>Centella asiatica</i> (L.) Urban.                | LC   | LC           | 1       | 1       | 1         | 0        | 0         | 0          | 1          | 1          |
| <i>Carissa edulis</i>                               | LC   | LC           | 1       | 1       | 0         | 0        | 0         | 1          | 0          | 1          |
| <i>Saba comorensis</i> (Bojer ex A.DC.) Pichon      | LC   | LC           | 1       | 0       | 1         | 0        | 0         | 0          | 0          | 1          |
| <i>Sclerocarya birrea</i> (A.Rich.)Hochst.          | LC   | LC           | 0       | 0       | 1         | 1        | 1         | 1          | 1          | 1          |
| <i>Cussonia arborea</i> Hochst.ex A.Rich.           |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Borassus aethiopicum</i> Mart.                   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 1          | 0          | 1          |
| <i>Pentarrhinum hispidum</i>                        | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Acanthospermum hispidum</i>                      | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 1          | 1          |
| <i>Acmella caulihiza</i> Del.                       | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Ageratum conyzoides</i> L.                       | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 1          | 1          |
| <i>Aspilia kotschyi</i>                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Bidens pilosa</i> L.                             | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 1          | 0          | 1          |
| <i>Conyza sumatrensis</i>                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 1          | 0          | 1          |
| <i>Crassocephalum picridifolia</i>                  | LC   | LC           | 0       | 1       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Emilia coccinea</i>                              | LC   | LC           | 0       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Galinsoga parviflora</i>                         | LC   | LC           | 0       | 0       | 0         | 1        | 1         | 0          | 0          | 1          |
| <i>Melananthera scandens</i> (Schum. & Thonn.) Rob. | LC   | LC           | 0       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |

| Name  | IUCN | Natio<br>nal | WI<br>A | WI<br>B | Tank<br>1 | T 1<br>A | Tank<br>2 | Tan<br>k 3 | Tan<br>k 4 | Oth<br>ers |
|---|------|--------------|---------|---------|-----------|----------|-----------|------------|------------|------------|
| <i>Chromolaena odorata</i> (L.)<br>R.M.King & Robins        | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Triumfetta rhomboidea</i> Jacq.                          | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Vernonia amygdalina</i> Del.                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vernonia lasiopus</i>                                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vernonia perrottii</i>                                   | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Vernonia cinerea</i>                                     | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Tithonia diversifolia</i>                                | LC   | LC           | 0       | 0       | 1         | 0        | 1         | 1          | 0          | 1          |
| <i>Balanites aegyptiaca</i> (L.)<br>Delile                  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 1          | 1          | 1          |
| <i>Kigelia africana</i> (Lam.)<br>Benth.                    | LC   | LC           | 1       | 1       | 0         | 1        | 1         | 0          | 1          | 1          |
| <i>Crateva adansonii</i> DC                                 | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Capparis erythrocarpus</i>                               | LC   | LC           | 0       | 0       | 1         | 1        | 0         | 1          | 0          | 1          |
| <i>Carica papaya</i>  | LC   | LC           | 0       | 0       | 0         | 1        | 1         | 0          | 0          | 1          |
| <i>Maytenus heterophylla</i> (Eck.<br>& Zehy.)Robson        | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Maytenus senegalensis</i>                                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Combretum collinum</i> Fresen.                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Combretum molle</i> (R. Br. ex<br>G. Don.) Engl. & Diels | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Combretum paniculatum</i><br>Vent.                       | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Terminalia brownii</i>                                   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Commelina africana</i> L.                                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Commelina benghalensis</i> L.                            | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Luffa cylindrica</i>                                     |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Momordica foetida</i> K. Schum.                          | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Trochomeria macrocarpa</i><br>(Sond.) Hook.f.            | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Abildgaardia ovata</i> (Burm.f.)<br>Kral.                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Dioscorea dumetorum</i><br>(Kunth.) Pax                  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Dioscorea schimperiana</i>                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Euclea divinorum</i> Hiem.                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Acalypha neptunica</i> Mull.<br>Arg.                     | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Acalypha</i> sp.   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Bridelia bridelifolia</i>                                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Bridelia scleronuera</i> Mll. Arg.                       | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Erythrococca bongensis</i> Pax                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Euphorbia heterophylla</i>                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Flueggea virosa</i> Viogt.                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Manihot esculenta</i>                                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |

| Name   | IUCN | Natio<br>nal | WI<br>A | WI<br>B | Tank<br>1 | T 1<br>A | Tank<br>2 | Tan<br>k 3 | Tan<br>k 4 | Oth<br>ers |
|--|------|--------------|---------|---------|-----------|----------|-----------|------------|------------|------------|
| <i>Manihot esculenta</i> Crantz                                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Micrococca mercurialis</i> (L.) Benth.                          | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Lonchocarpus laxiflorus</i>                                     | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tamarindus indica</i> L.  | NE   | VU           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tylosema fassoglensis</i> (Kotschy ex Schweinf.) Torre & Hillc. | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 0          | 1          |
| <i>Aeschynomene indica</i> L.                                      | LC   | LC           | 1       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ptilostigma thonningii</i>                                      | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Senna bicapsularis</i>  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Senna hirsuta</i>   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Senna occidentalis</i> (L.) Link                                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Senna sanguineum</i>  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Sesbania macrantha</i> Phill. & Hutch.                          | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Setaria homonyma</i>  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Daniellia oliveri</i> (Rolfe) Hutch. & Dalz.                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Azelia africana</i> Sm.   | VU   | EN           | 0       | 0       | 1         | 0        | 0         | 0          | 0          | 1          |
| <i>Clitoria ternata</i> L.   | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 0          | 1          |
| <i>Desmodium triflorum</i> (L.) DC.                                | LC   | LC           | 0       | 1       | 1         | 0        | 1         | 0          | 1          | 1          |
| <i>Desmodium velutina</i>  | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 0          | 1          |
| <i>Erythrina abyssinica</i> Lam.                                   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Indigofera arrecta</i> Hochst. ex A. Rich.                      | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Indigofera spicata</i> Forssk.                                  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Lonchocarpus laxiflorus</i> Guill. & Perr.                      | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Rhynchosia hirta</i> (Andr.) Meik & Verdc.                      | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ricinus communis</i>  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tephrosia vogellii</i>  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Teramnus labialis</i> (L.f.) Spreng.                            | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vigna unijugata</i>   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vigna vexillata</i> (L.) A. Rich.                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Pseudarthria hookeri</i>  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Aeschynomene abyssinica</i>                                     | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Acacia hockii</i>   |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Acacia sieberiana</i> DC  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Acacia nilotica</i>   |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Albizia glaberrima</i>  |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Albizia coriaria</i>  | LC   | LC           | 1       | 0       | 1         | 0        | 0         | 0          | 0          | 1          |

| Name   | IUCN | Natio<br>nal | WI<br>A | WI<br>B | Tank<br>1 | T 1<br>A | Tank<br>2 | Tan<br>k 3 | Tan<br>k 4 | Oth<br>ers |
|--|------|--------------|---------|---------|-----------|----------|-----------|------------|------------|------------|
| <i>Dicrostachys cinarea</i>                          | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tylosema fassoglensis</i>                         | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Chamaecrista mimosoides</i><br>Standl.            | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Entada abyssinica</i>                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vachellia hockii</i>                              | LC   | LC           | 1       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Albizia zygia</i> J.F. Macbr.                     | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tectona grandis</i> L.f.                          | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Gmelina arborea</i> Roxb.                         | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 1          | 0          | 1          |
| <i>Hyptis suaveolens</i>                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Leonotis nepetifolia</i> (L.) Ait.f.              | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tephrosia pumila</i> (Lam.)<br>Pers.              | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vitex doniana</i>                                 | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Gmelina arborea</i> Roxb.                         |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hibiscus aethiopicus</i> L.                       | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hibiscus cannabinus</i>                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hibiscus diversifolia</i>                         | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Sida ovata</i> Forssk.                            | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Sida rhombifolia</i> L.                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Sida urens</i> L.                                 | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Solanum nigrum</i> L.                             | LC   | LC           | 0       | 0       | 0         | 1        | 0         | 1          | 1          | 1          |
| <i>Urena lobata</i> L                                | LC   | LC           | 0       | 1       | 1         | 1        | 1         | 1          | 1          | 1          |
| <i>Grewia trichocarpa</i>                            | LC   | LC           | 0       | 1       | 1         | 0        | 1         | 1          | 1          | 1          |
| <i>Cissampelos mucronata</i> A.<br>Rich.             | LC   | LC           | 1       | 0       | 0         | 1        | 0         | 1          | 0          | 1          |
| <i>Azadirachta indica</i>                            | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 1          | 0          | 1          |
| <i>Khaya grandifolia</i>                             | VU   | EN           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Pseudoceadrella kotschyi</i><br>(Schweinf.) Harms | LC   | LC           | 0       | 0       | 0         | 0        | 1         | 0          | 1          | 1          |
| <i>Dissotis canescens</i>                            | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Artocarpus heterophyllus</i><br>Lam.              | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Milicia excelsa</i> (Welw.)<br>C.C.Berg.          | NT   | EN           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ficus bracypoda</i>                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ficus sur</i> Forssk.                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ficus thonningii</i>                              |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Moringa oleifera</i>                              | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Eucalyptus</i> spp.                               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Eucalyptus</i> spp.                               |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ximenia Americana</i>                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |

| Name   | IUCN | Natio<br>nal | WI<br>A | WI<br>B | Tank<br>1 | T 1<br>A | Tank<br>2 | Tan<br>k 3 | Tan<br>k 4 | Oth<br>ers |
|--|------|--------------|---------|---------|-----------|----------|-----------|------------|------------|------------|
| <i>Ludwigia abyssinica</i> A. Rich.                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ludwigia leptocarpa</i> (Nutt.) Hara                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Oxalis corniculata</i> L.                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Sesamum indicum</i>                                 | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hymenocardia acida</i> Tul.                         | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Phyllanthus amarus</i> Schum & Thonn.               | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Phyllanthus muellerianus</i> (O.Ktze) Exell.        | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Pinus</i> sp.                                       |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Andropogon schirensis</i> Hochst.                   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Brachiaria brizantha</i> (A. Rich.) Stapf           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Chloris gayana</i> Kunth.                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Cynodon dactylon</i> (L.) Pers.                     | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Digitaria abyssinica</i> (Hochst. Ex A.Rich.) Stapf | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Digitaria velutina</i> (Forssk.) P. Beauv.          | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Echinochloa</i> sp.                                 | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Eleusine indica</i> (L.) Gaertn.                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Eragrostis aspera</i> (Jacq.) Nees                  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Eragrostis ciliaris</i>                             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Heteropogon contortus</i> (L.) Roem. & Schult.      | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hyparrhenia diplandra</i> A. Rich.                  | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hyparrhenia filipendula</i> (Hochst.) Stapf         | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hyparrhenia rufa</i> (Nees) Stapf                   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Hyperthelia dissolute</i>                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Loudetia simplex</i>                                | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Melinis repens</i> (Willd.) Zizka                   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Microchloa kunthii</i>                              | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Panicum maximum</i> Jacq.                           | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Panicum trichocladum</i> K.Schum.                   | LC   | LC           | 1       | 1       | 1         | 1        | 1         | 0          | 0          | 1          |
| <i>Paspalum scrobiculatum</i> (A. Rich.) Stapf         | LC   | LC           | 0       | 1       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Pennisetum polystachion</i> (L.) Schult.            | LC   | LC           | 1       | 1       | 0         | 1        | 0         | 1          | 0          | 1          |
| <i>Pennisetum purpureum</i> Schumach                   | LC   | LC           | 1       | 1       | 1         | 1        | 1         | 1          | 0          | 1          |
| <i>Setaria sphacelata</i> (Schumach.) Moss             | LC   | LC           | 1       | 1       | 1         | 1        | 1         | 1          | 1          | 1          |
| <i>Sida acuta</i>                                      | LC   | LC           | 0       | 1       | 1         | 1        | 1         | 0          | 1          | 1          |

| Name   | IUCN | Natio<br>nal | WI<br>A | WI<br>B | Tank<br>1 | T 1<br>A | Tank<br>2 | Tan<br>k 3 | Tan<br>k 4 | Oth<br>ers |
|--|------|--------------|---------|---------|-----------|----------|-----------|------------|------------|------------|
| <i>Sorghum vulgare</i>                         | LC   | LC           | 0       | 0       | 0         | 1        | 1         | 0          | 1          | 1          |
| <i>Spermacoce prince</i>                       | LC   | LC           | 0       | 0       | 1         | 1        | 1         | 1          | 1          | 1          |
| <i>Sporobolus pyramidalis</i><br>Beauv.        | LC   | LC           | 0       | 1       | 1         | 1        | 1         | 1          | 0          | 1          |
| <i>Stephania abyssinica</i>                    | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Echinochloa haploclada</i>                  | LC   | LC           | 1       | 1       | 0         | 0        | 0         | 1          | 0          | 1          |
| <i>Zea mays</i>                                | LC   | LC           | 0       | 0       | 0         | 1        | 1         | 0          | 1          | 1          |
| <i>Securidaca longipedunculata</i>             | LC   | LC           | 0       | 0       | 0         | 1        | 1         | 0          | 1          | 1          |
| <i>Senna sanguinea</i>                         | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Ziziphus mauritiana</i> Lam.                | LC   | LC           | 0       | 1       | 1         | 1        | 1         | 1          | 1          | 1          |
| <i>Gardenia imperialis</i>                     | LC   | LC           | 0       | 0       | 1         | 0        | 0         | 1          | 0          | 1          |
| <i>Toddalia asiatica</i> (L.) Lam.             | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Tridax procumbens</i> L.                    | LC   | LC           | 0       | 1       | 1         | 1        | 1         | 1          | 1          | 1          |
| <i>Paulinia pinnata</i>                        | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Strychnos innocua</i>                       |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Vittalleria paradoxa</i>                    | VU   | VU           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Harrisonia abyssinica</i> Oliv.             | LC   | LC           | 1       | 1       | 0         | 0        | 1         | 0          | 0          | 1          |
| <i>Solanum melongana</i>                       |      |              | 0       | 1       | 1         | 0        | 0         | 1          | 0          | 1          |
| <i>Sorghum arundinaceum</i><br>(Desv.) Stapf   | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Sterculia setigera</i>                      |      |              | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Grewia trichocarpa</i>                      | LC   | LC           | 0       | 0       | 0         | 0        | 0         | 0          | 0          | 1          |
| <i>Lantana camara</i> L.                       | LC   | LC           | 0       | 0       | 1         | 0        | 1         | 1          | 0          | 1          |
| <i>Cyphostemma adenocaula</i><br>Wild. & Drum. | LC   | LC           | 1       | 1       | 1         | 0        | 0         | 1          | 1          | 1          |

**ANNEX 5: AMPHIBIAN AND REPTILIA SPECIES IDENTIFIED IN THE PROJECT AREA**

**Annex 5(a): Amphibian Fauna Richness of Enyau GFS**

| Species/Site                          | Water Intake (WI) | Area btn WI & WTP | Water Treatment Plant (WTP) | Tank 1 | Area btn 1&2 | Tank 2 | Area btn 2&3 | Tank 3 | Area btn 3&4 | Tank 4 | Total |
|---------------------------------------|-------------------|-------------------|-----------------------------|--------|--------------|--------|--------------|--------|--------------|--------|-------|
| <i>Afrivalus quadrivittatus</i>       | 1                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 0      | 1            | 1      | 6     |
| <i>Amietia nutti</i>                  | 1                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 0      | 1            | 0      | 3     |
| <i>Arthroleptis cf. poecilonotus</i>  | 0                 | 0                 | 0                           | 0      | 0            | 0      | 0            | 1      | 0            | 0      | 1     |
| <i>Arthroleptis cf. schubotzi</i>     | 0                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 0      | 0            | 0      | 1     |
| <i>Hemisus guineensis</i>             | 0                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 1      | 1            | 0      | 3     |
| <i>Hoplobatrachus occipitalis</i>     | 1                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 1      | 4     |
| <i>Phrynomantis microps</i>           | 0                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 0      | 1            | 0      | 2     |
| <i>Hyperolius cinnamomeoventris</i>   | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 2     |
| <i>Hyperolius kivuensis</i>           | 1                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 0      | 1            | 1      | 6     |
| <i>Hyperolius viridiflavus</i>        | 1                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 0      | 1            | 0      | 5     |
| <i>Kassina senegalensis</i>           | 0                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 1      | 1            | 1      | 4     |
| <i>Leptopelis oryi</i>                | 0                 | 1                 | 0                           | 0      | 0            | 0      | 1            | 1      | 1            | 0      | 4     |
| <i>Leptopelis viridis</i>             | 0                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 1      | 0            | 0      | 2     |
| <i>Phrynobatrachus cf. acridoides</i> | 0                 | 1                 | 0                           | 0      | 0            | 0      | 1            | 0      | 1            | 0      | 3     |
| <i>Phrynobatrachus natalensis</i>     | 1                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 1      | 4     |
| <i>Ptychadena anchietae</i>           | 0                 | 1                 | 0                           | 0      | 1            | 0      | 0            | 0      | 0            | 1      | 3     |
| <i>Ptychadena nilotica</i>            | 1                 | 1                 | 0                           | 1      | 0            | 1      | 1            | 1      | 1            | 1      | 8     |
| <i>Ptychadena oxyrhynchus</i>         | 0                 | 0                 | 0                           | 0      | 0            | 0      | 1            | 1      | 0            | 0      | 2     |
| <i>Ptychadena porosissima</i>         | 0                 | 0                 | 0                           | 0      | 0            | 0      | 0            | 1      | 1            | 1      | 3     |
| <i>Sclerophrys maculata</i>           | 0                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 0      | 1            | 0      | 4     |
| <i>Sclerophrys regularis</i>          | 1                 | 0                 | 1                           | 0      | 0            | 0      | 1            | 0      | 1            | 1      | 5     |
| <i>Xenopus victorianus</i>            | 1                 | 0                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 2     |
| Total                                 | 9                 | 11                | 1                           | 1      | 5            | 1      | 15           | 8      | 17           | 9      | 77    |

**Annex 5(b): Reptilian Fauna Richness of Enyau GFS**

| Species/Site                       | Water Intake (WI) | Area btn WI & WTP | Water Treatment Plant (WTP) | Tank 1 | Area btn 1&2 | Tank 2 | Area btn 2&3 | Tank 3 | Area btn 3&4 | Tank 4 | Total |
|------------------------------------|-------------------|-------------------|-----------------------------|--------|--------------|--------|--------------|--------|--------------|--------|-------|
| <i>Pelomedusa neumanni</i>         | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 1      | 3     |
| <i>Knixys belliana</i>             | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 1      | 0            | 0      | 2     |
| <i>Agama finchi</i>                | 1                 | 1                 | 1                           | 0      | 1            | 1      | 0            | 1      | 1            | 0      | 7     |
| <i>Agama lionotus</i>              | 1                 | 1                 | 1                           | 1      | 0            | 0      | 0            | 1      | 0            | 1      | 6     |
| <i>Chamaeleo gracilis</i>          | 1                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 1      | 1            | 0      | 4     |
| <i>Chamaeleo laevigatus</i>        | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 0            | 1      | 2     |
| <i>Hemidactylus brookii</i>        | 0                 | 1                 | 1                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 3     |
| <i>Hemidactylus mabouia</i>        | 0                 | 0                 | 1                           | 0      | 0            | 1      | 1            | 1      | 0            | 1      | 5     |
| <i>Lygodactylus guttularis</i>     | 0                 | 1                 | 0                           | 0      | 0            | 0      | 1            | 1      | 0            | 0      | 3     |
| <i>Nucras boulengeri</i>           | 0                 | 1                 | 0                           | 0      | 1            | 0      | 0            | 0      | 1            | 0      | 3     |
| <i>Lygosoma sundevalli</i>         | 0                 | 1                 | 0                           | 0      | 0            | 0      | 1            | 0      | 1            | 0      | 3     |
| <i>Trachylepis brevicollis</i>     | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 2     |
| <i>Trachylepis maculilabris</i>    | 1                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 1      | 1            | 0      | 6     |
| <i>Trachylepis perroteti</i>       | 0                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 0      | 1            | 0      | 4     |
| <i>Trachylepis quinquetaeniata</i> | 0                 | 1                 | 1                           | 0      | 1            | 0      | 1            | 1      | 1            | 0      | 6     |
| <i>Trachylepis striata</i>         | 1                 | 0                 | 0                           | 1      | 1            | 0      | 0            | 0      | 0            | 1      | 4     |
| <i>Trachylepis varia</i>           | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 2     |
| <i>Varanus niloticus</i>           | 1                 | 1                 | 1                           | 0      | 0            | 0      | 1            | 0      | 1            | 0      | 5     |
| <i>Philothamnus battersbyi</i>     | 0                 | 1                 | 0                           | 0      | 1            | 0      | 0            | 0      | 1            | 0      | 3     |
| <i>Hapsidophrys smaragdina</i>     | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 2     |
| <i>Psammophis mossambicus</i>      | 1                 | 0                 | 0                           | 0      | 0            | 0      | 0            | 1      | 0            | 0      | 2     |
| <i>Psammophis sudanensis</i>       | 0                 | 1                 | 0                           | 0      | 1            | 0      | 0            | 0      | 1            | 0      | 3     |
| <i>Thelotornis kirtlandii</i>      | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 0            | 0      | 1     |
| <i>Naja subflava</i>               | 1                 | 1                 | 0                           | 0      | 1            | 0      | 1            | 0      | 1            | 0      | 5     |
| <i>Bitis arietans</i>              | 0                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 2     |
| <i>Bitis gabonica</i>              | 0                 | 1                 | 0                           | 0      | 1            | 0      | 0            | 0      | 0            | 0      | 2     |
| <i>Python sebae</i>                | 1                 | 1                 | 0                           | 0      | 0            | 0      | 0            | 0      | 1            | 0      | 3     |
| Total                              | 9                 | 24                | 6                           | 2      | 10           | 2      | 8            | 9      | 18           | 5      | 93    |



## ANNEX 6: LIST OF BIRD'S SPECIES IDENTIFIED IN THE PROJECT AREA

### Annex 6(a): List of bird's Species as identified during assessment in the project area

| SPECIES   | IUCN | HABITANT SPECIALIZATION | Atlas Number | Migration  |
|---|------|-------------------------|--------------|------------|
| Abyssinian Ground-Hornbill <i>Bucorvus abyssinicus</i>            | LC   | NF                      | 518          | RB         |
| African Reed-Warbler <i>Acrocephalus baeticatus</i>               | LC   | NF                      | 881          | RB         |
| African Mourning Dove <i>Streptopelia decipiens</i>               | LC   | NF                      | 347          | RB         |
| African Yellow White-eye <i>Zosterops senegalensis</i>            | LC   | NF                      | 1133         | RB         |
| Black Bishop <i>Euplectes gierowii</i>                            | LC   | NF                      | 1144         | RB         |
| Black Kite <i>Milvus migrans</i>                                  | LC   | NF                      | 138          | RB,PM      |
| Black-and-white Mannikin <i>Spermestes bicolor</i>                | LC   | f                       | 1265         | RB         |
| Black-and-white-casqued Hornbill <i>Bycanistes subclindricus</i>  | LC   | NF                      | 513          | RB         |
| Black-crowned Waxbill <i>Estrilda nonnula</i>                     | LC   | NF                      | 1230         | RB         |
| Black-headed Heron <i>Ardea melanocephala</i>                     | LC   | NF                      | 27           | RB         |
| Black-headed Weaver <i>Ploceus melanocephalus</i>                 | LC   | NF                      | 1165         | RB         |
| Blue-headed Coucal <i>Centropus monachus</i>                      | LC   | w                       | 404          | RB         |
| Blue-spotted Wood Dove <i>Turtur afer</i>                         | LC   | NF                      | 355          | RB         |
| Bocage's Bush- Shrike <i>Malaconotus bocagei</i>                  | LC   | w                       | 1013         | RB         |
| Bronze Mannikin <i>Spermestes cucullatus</i>                      | LC   | NF                      | 1266         | RB         |
| Common Bulbul <i>Pycnonotus barbatus</i>                          | LC   | NF                      | 732          | RB         |
| Common Quail <i>Coturnix cotunix</i>                              | LC   | NF                      | 165          | WV, AfM/B  |
| Common Sandpiper <i>Actitis hypoleucos</i>                        | LC   | NF                      | 252          | WV, PM, FB |
| Eastern Plantain-eater <i>Crinifer zonurus</i>                    | LC   | NF                      | 376          | RB         |
| Green-backed Camaroptera <i>Camaroptera brachyuran</i>            | LC   | A/f                     | 889          | RB         |
| Grey Kestrel <i>Falco ardosiaceus</i>                             | LC   | NF                      | 147          | RB         |
| Greater Blue-eared Glossy-Starling <i>Lamprotornis chalybaeus</i> | LC   | f                       | 1055         | R(B)       |
| Grey-backed Fiscal <i>Lanius excubitoroides</i>                   | LC   | NF                      | 1032         | RB         |
| Grey-headed Sparrow <i>Passer griseus</i>                         | LC   | NF                      | 1207         | RB         |
| Hadada Ibis <i>Bostrychia hagedash</i>                            | LC   | NF                      | 51           | RB         |
| Helmeted Guineafowl <i>Numida meleagris</i>                       | LC   | F/S/G                   | 190          | RB         |
| Laughing Dove <i>Streptopelia senegalensis</i>                    | LC   | NF                      | 351          | RB         |
| Little Egret <i>Egretta garzetta</i>                              | LC   | w                       | 36           | RB         |
| Little Green Sunbird <i>Anthreptes seimundi</i>                   | LC   | F                       | 1121         | RB         |
| Little Swift <i>Apus affinis</i>                                  | LC   | NF                      | 443          | RB         |
| Little Weaver <i>Ploceus luteolus</i>                             | LC   | NF                      | 1172         | RB         |

|  |    |      |      |              |
|--|----|------|------|--------------|
| Lizard Buzzard <i>Kaupifalco monogrammicus</i>             | LC | NF   | 129  | RB           |
| Long-tailed Cormorant <i>Phalacrocorax africanus</i>       | LC | NF   | 17   | RB           |
| Malachite Kingfisher <i>Alcedo cristata</i>                | LC | w    | 466  | RB           |
| Mariqua Sunbird <i>Cinnyris mariquensis</i>                | LC | f    | 1107 | RB           |
| Northern Black-Flycatcher <i>Melaenornis edolioides</i>    | LC | NF   | 934  | RB           |
| Pied wagtail <i>Motacilla aguimp</i>                       | LC | NF   | 995  |              |
| Red-eyed Dove <i>Streptopelia semitorquata</i>             | LC | NF   | 350  | RB           |
| Ring-necked Dove <i>Streptopelia capicola</i>              | LC | NF   | 346  | RB           |
| Sooty Chat <i>Myrmecocichla nigra</i>                      | LC | NF   | 771  | RB           |
| Speckled Mousebird <i>Colius striatus</i>                  | LC | NF   | 459  | RB           |
| Stout Cisticola <i>Cisticola robustus</i>                  | LC | NF   | 869  | RB           |
| White-headed Sawwing <i>Psalidoprocne albiceps</i>         | LC | NF   | 639  | RB,Af/NB     |
| White-rumped Swift <i>Apus caffer</i>                      | LC | NF   | 447  | RB           |
| White-throated Bee-eater <i>Merops albicollis</i>          | LC | f    | 479  | AfM/NB,FB,PM |
| Yellow-rumped Tinkerbird <i>Pogoniulus bilineatus</i>      | LC | NF/W | 548  | RB           |
| Yellow-throated Tinkerbird <i>Pogoniulus subsulphureus</i> | LC | F    | 555  | RB           |

#### Annex 6(b): List of bird's Species identified in the project area

| ATLAS No. | COMMON NAME                | SCIENTIFIC NAME                | Water Intake, Alternative A in Dondi | Water Intake, Alternative B | Tank 1 – Azapi, Odupi | Tank 1A – Invempi Refugee Settlement | Tank 2 – formerly wooded savanna | River Ibiro | Tank 3, Amia Village, Invepi | Tank 4 | Water Treatment Plant |
|-----------|----------------------------|--------------------------------|--------------------------------------|-----------------------------|-----------------------|--------------------------------------|----------------------------------|-------------|------------------------------|--------|-----------------------|
| 518       | Abyssinian Ground-Hornbill | <i>Bucorvus abyssinicus</i>    | •                                    |                             |                       |                                      |                                  | •           | •                            |        |                       |
| 347       | African Mourning Dove      | <i>Streptopelia decipiens</i>  |                                      |                             | •                     |                                      |                                  |             |                              |        |                       |
| 1133      | African Yellow White-eye   | <i>Zosterops senegalensis</i>  |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 1144      | Black Bishop               | <i>Euplectes gierowii</i>      | •                                    | •                           | •                     | •                                    |                                  | •           | •                            |        | •                     |
| 138       | Black Kite                 | <i>Milvus migrans</i>          | •                                    |                             |                       |                                      |                                  |             |                              |        |                       |
| 1265      | Black-and-white Mannikin   | <i>Spermestes bicolor</i>      | •                                    |                             | •                     |                                      |                                  |             |                              |        |                       |
| 513       | Black-and-white-           | <i>Bycanistes subclindicus</i> | •                                    |                             |                       |                                      |                                  |             | •                            | •      |                       |

| ATLAS No. | COMMON NAME              | SCIENTIFIC NAME               | Water Intake, Alternative A in Dondi | Water Intake, Alternative B | Tank 1 – Azapi, Odupi | Tank 1A – Invempi Refugee Settlement | Tank 2 – formerly wooded savanna | River Ibiro | Tank 3, Amia Village, Invepi | Tank 4 | Water Treatment Plant |
|-----------|--------------------------|-------------------------------|--------------------------------------|-----------------------------|-----------------------|--------------------------------------|----------------------------------|-------------|------------------------------|--------|-----------------------|
|           | casqued Hornbill         |                               |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 1230      | Black-crowned Waxbill    | <i>Estrilda nonnula</i>       |                                      |                             |                       |                                      |                                  | •           |                              | •      |                       |
| 27        | Black-headed Heron       | <i>Ardea melanocephala</i>    |                                      | •                           |                       |                                      |                                  | •           |                              | •      |                       |
| 1165      | Black-headed Weaver      | <i>Ploceus melanocephalus</i> |                                      |                             | •                     |                                      |                                  | •           |                              | •      |                       |
| 404       | Blue-headed Coucal       | <i>Centropus monachus</i>     |                                      |                             |                       |                                      |                                  |             |                              | •      |                       |
| 355       | Blue-spotted Wood Dove   | <i>Turtur afer</i>            |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 1013      | Bocage's Bush-Shrike     | <i>Malaconotus bocagei</i>    |                                      |                             |                       | •                                    |                                  |             |                              |        |                       |
| 1266      | Bronze Mannikin          | <i>Spermestes cucullatus</i>  |                                      | •                           |                       |                                      |                                  |             |                              |        |                       |
| 732       | Common Bulbul            | <i>Pycnonotus barbatus</i>    | •                                    | •                           | •                     | •                                    |                                  | •           |                              |        | •                     |
| 165       | Common Quail             | <i>Coturnix coturnix</i>      |                                      |                             | •                     |                                      |                                  | •           |                              |        |                       |
| 252       | Common Sandpiper         | <i>Actitis hypoleucos</i>     | •                                    | •                           | •                     |                                      |                                  |             |                              |        |                       |
| 376       | Eastern Plantain-eater   | <i>Crinifer zonurus</i>       |                                      | •                           |                       |                                      |                                  |             |                              | •      |                       |
| 889       | Green-backed Camaroptera | <i>Camaroptera brachyura</i>  | •                                    | •                           |                       |                                      |                                  | •           |                              |        |                       |
| 147       | Grey Kestrel             | <i>Falco ardosiaceus</i>      | •                                    | •                           | •                     |                                      |                                  | •           |                              |        | •                     |
| 1032      | Grey-backed Fiscal       | <i>Lanius excubitoroides</i>  |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 1207      | Grey-headed Sparrow      | <i>Passer griseus</i>         |                                      |                             | •                     |                                      | •                                |             |                              | •      |                       |
| 51        | Hadada Ibis              | <i>Bostrychia hagedash</i>    |                                      |                             |                       |                                      |                                  | •           |                              | •      |                       |
| 190       | Helmeted Guineafowl      | <i>Numida meleagris</i>       |                                      |                             |                       |                                      | •                                |             |                              | •      |                       |

| ATLAS No. | COMMON NAME               | SCIENTIFIC NAME                  | Water Intake, Alternative A in Dondi | Water Intake, Alternative B | Tank 1 – Azapi, Odupi | Tank 1A – Invempi Refugee Settlement | Tank 2 – formerly wooded savanna | River Ibiro | Tank 3, Amia Village, Invepi | Tank 4 | Water Treatment Plant |
|-----------|---------------------------|----------------------------------|--------------------------------------|-----------------------------|-----------------------|--------------------------------------|----------------------------------|-------------|------------------------------|--------|-----------------------|
| 351       | Laughing Dove             | <i>Streptopelia senegalensis</i> |                                      | •                           |                       |                                      |                                  |             |                              | •      |                       |
| 36        | Little Egret              | <i>Egretta garzetta</i>          |                                      |                             | •                     |                                      |                                  | •           |                              | •      |                       |
| 1121      | Little Green Sunbird      | <i>Anthreptes seimundi</i>       |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 443       | Little Swift              | <i>Apus affinis</i>              | •                                    |                             | •                     |                                      |                                  |             |                              | •      |                       |
| 1172      | Little Weaver             | <i>Ploceus luteolus</i>          | •                                    |                             |                       |                                      |                                  |             |                              | •      |                       |
| 129       | Lizard Buzzard            | <i>Kaupifalco monogrammicus</i>  | •                                    |                             | •                     |                                      |                                  |             |                              | •      |                       |
| 17        | Long-tailed Cormorant     | <i>Phalacrocorax africanus</i>   | •                                    |                             |                       |                                      |                                  |             |                              | •      |                       |
| 466       | Malachite Kingfisher      | <i>Alcedo cristata</i>           |                                      |                             |                       |                                      |                                  |             |                              | •      |                       |
| 1107      | Mariqua Sunbird           | <i>Cinnyris mariquensis</i>      |                                      |                             |                       |                                      |                                  |             |                              | •      |                       |
| 934       | Northern Black-Flycatcher | <i>Melaenornis edoloides</i>     |                                      |                             |                       |                                      |                                  |             |                              |        | •                     |
| 995       | Pied wagtail              | <i>Motacilla aguimp</i>          |                                      |                             |                       |                                      | •                                | •           |                              | •      |                       |
| 350       | Red-eyed Dove             | <i>Streptopelia semitorquata</i> |                                      |                             |                       |                                      |                                  |             |                              | •      |                       |
| 346       | Ring-necked Dove          | <i>Streptopelia capicola</i>     |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 771       | Sooty Chat                | <i>Myrmecocichla nigra</i>       |                                      |                             |                       |                                      |                                  |             |                              |        |                       |
| 459       | Speckled Mousebird        | <i>Colius striatus</i>           |                                      | •                           |                       |                                      |                                  |             |                              |        | •                     |
| 869       | Stout Cisticola           | <i>Cisticola robustus</i>        |                                      |                             |                       |                                      |                                  |             |                              | •      |                       |
| 639       | White-headed Sawwing      | <i>Psalidoprocne albiceps</i>    |                                      |                             |                       | •                                    |                                  | •           |                              | •      |                       |
| 447       | White-rumped Swift        | <i>Apus caffer</i>               |                                      |                             |                       |                                      |                                  |             |                              | •      |                       |
| 479       | White-throated Bee-eater  | <i>Merops albicollis</i>         |                                      |                             |                       | •                                    |                                  |             |                              | •      |                       |
| 548       | Yellow-rumped Tinkerbird  | <i>Pogoniulus bilineatus</i>     |                                      | •                           |                       |                                      |                                  |             |                              | •      |                       |

| ATLAS No. | COMMON NAME                | SCIENTIFIC NAME                 | Water Intake, Alternative A in Dondi | Water Intake, Alternative B | Tank 1 – Azapi, Odupi | Tank 1A – Invempi Refugee Settlement | Tank 2 – formerly wooded savanna | River Ibiro | Tank 3, Amia Village, Invepi | Tank 4 | Water Treatment Plant |
|-----------|----------------------------|---------------------------------|--------------------------------------|-----------------------------|-----------------------|--------------------------------------|----------------------------------|-------------|------------------------------|--------|-----------------------|
| 555       | Yellow-throated Tinkerbird | <i>Pogoniulus subsulphureus</i> |                                      |                             |                       | •                                    | •                                |             | •                            |        |                       |

#### ANNEX 7: LIST OF BUTTERFLIES' SPECIES IDENTIFIED IN THE PROJECT AREA

| Species                    | Ecotype | Intake | Treatment | Tank 1 | Tank 1a | Tank 2 | Tank 3 | Tank 4 |
|----------------------------|---------|--------|-----------|--------|---------|--------|--------|--------|
| <i>Acraea acerata</i>      | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Acraea encedon</i>      | W       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Acraea eponina</i>      | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Acraea natalica</i>     | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Acraea zetes</i>        | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Amauris niavius</i>     | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Amauris tartarea</i>    | f.      | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Azanus jesus</i>        | M       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Belenois aurota</i>     | M       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Belenois creona</i>     | M       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Bicyclus safitza</i>    | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Bicyclus vulgaris</i>   | W       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Byblia anvata</i>       | M       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Catopsilia florella</i> | M       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Charaxes etesipe</i>    | f.      | 1      | 1         | 1      | 1       | 1      | 1      | 1      |

| Species                         | Ecotype | Intake | Treatment | Tank 1 | Tank 1a | Tank 2 | Tank 3 | Tank 4 |
|---------------------------------|---------|--------|-----------|--------|---------|--------|--------|--------|
| <i>Charaxes numenes</i>         | f.      | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Charaxes varanes</i>         | W       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Colotis antevippe</i>        | O       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Colotis danae</i>            | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Colotis eucharis</i>         | W       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Danaus chrysippus</i>        | M       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Dixeia orbona</i>            | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Dixeia pigea</i>             | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Eicochrysops hippocrates</i> | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Eretis lugens</i>            | W       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Euchrysops malathana</i>     | O       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Eurema brigitta</i>          | M       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Eurema hecabe</i>            | M       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Eurytela dryope</i>          | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Hamanumida daedalus</i>      | W       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Junonia chorimene</i>        | O       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Junonia oenone</i>           | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Junonia sophia</i>           | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Junonia terea</i>            | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Leptotes pirithous</i>       | M       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Metisella midas</i>          | S       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Mylothris rubricosta</i>     | S       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Neptis metella</i>           | f.      | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Neptis saclava</i>           | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Neptis serena</i>            | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Papilio bromius</i>          | f.      | 1      | 1         | 1      | 1       | 1      | 1      | 1      |

| Species                     | Ecotype | Intake | Treatment | Tank 1 | Tank 1a | Tank 2 | Tank 3 | Tank 4 |
|-----------------------------|---------|--------|-----------|--------|---------|--------|--------|--------|
| <i>Papilio dardanus</i>     | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Papilio demodocus</i>    | M       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Pelopidas mathias</i>    | M       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Sallya occidentarium</i> | M       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Sarangesa maculata</i>   | O       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Spialia spio</i>         | O       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <i>Tirumala petiverana</i>  | M       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Tuxentius cretosus</i>   | O       | 1      | 0         | 1      | 1       | 0      | 1      | 0      |
| <i>Zizeeria knysna</i>      | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Zizina antanossa</i>     | W       | 1      | 1         | 1      | 1       | 1      | 1      | 1      |
| <i>Zizula hylax</i>         | W       | 0      | 1         | 0      | 0       | 1      | 0      | 1      |
| <b>Total = 52</b>           |         |        |           |        |         |        |        |        |
|                             |         |        |           |        |         |        |        |        |

### **ANNEX 8: LIST OF MAPS**

Annex 8(a): Map showing villages affected by Eyau WSS

Annex 8(b): Map showing the general administrative setup of the project area

Annex 8(c): Map showing general land cover of the project area

Annex 8(d): Map showing the geology of the project area

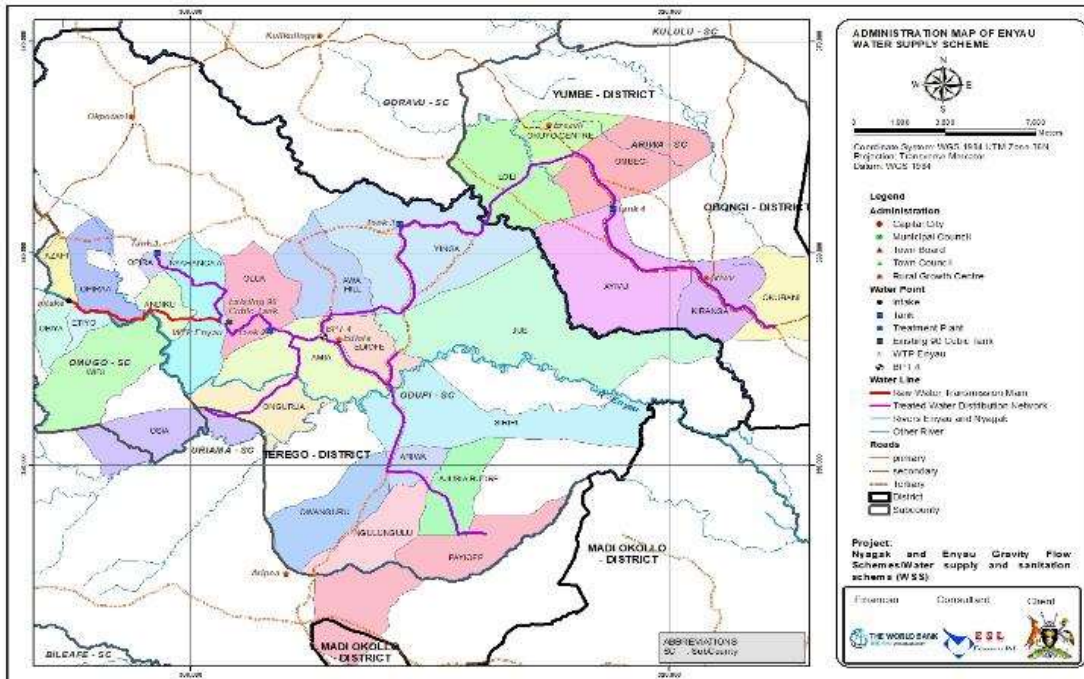
Annex 8(e): Map showing the soils of the project area

Annex 8(f): Map showing the rainfall distribution in the project area

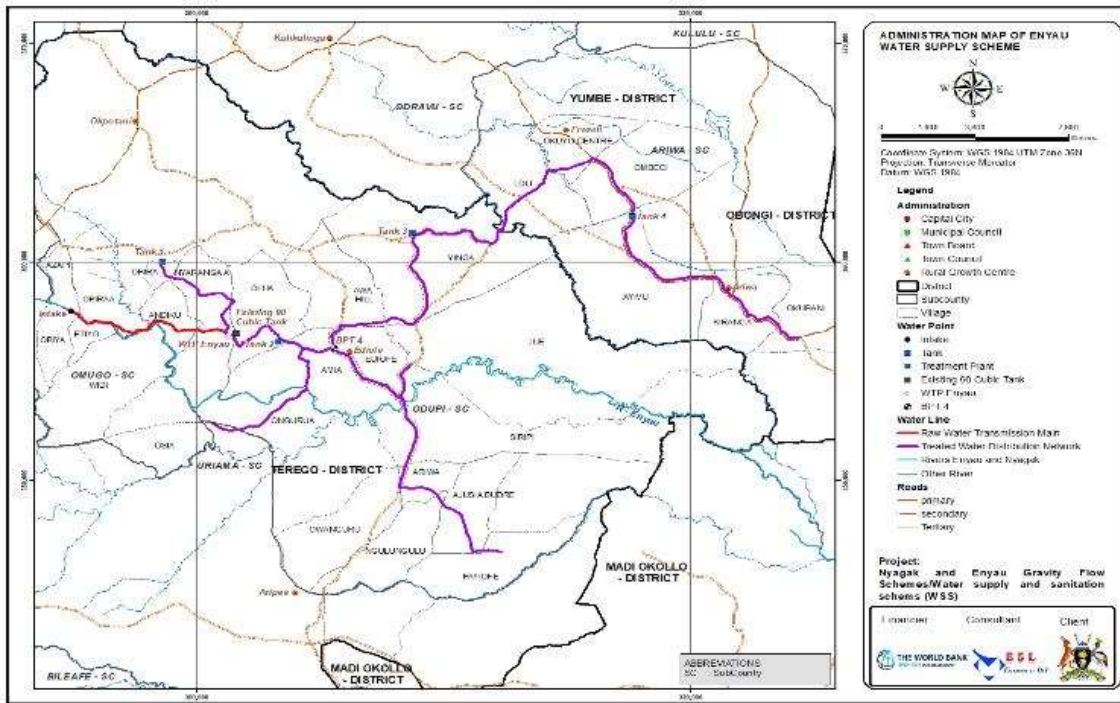
Annex 8(g): Map showing the topography of the project area



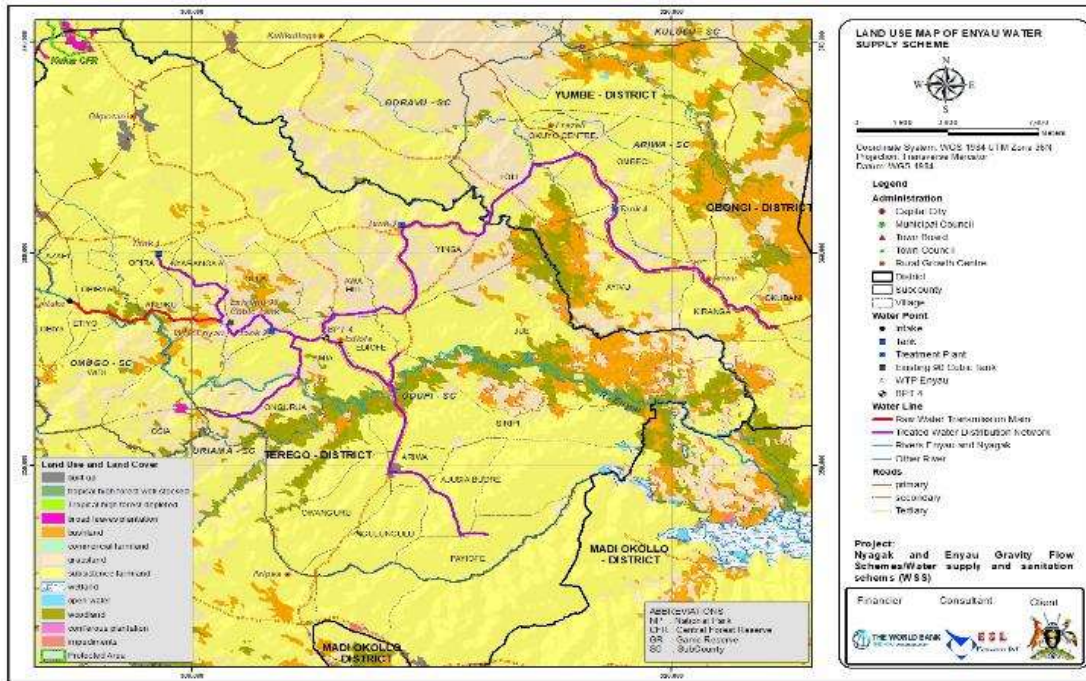
Annex 8(a): Map showing villages affected by Eyau WSS



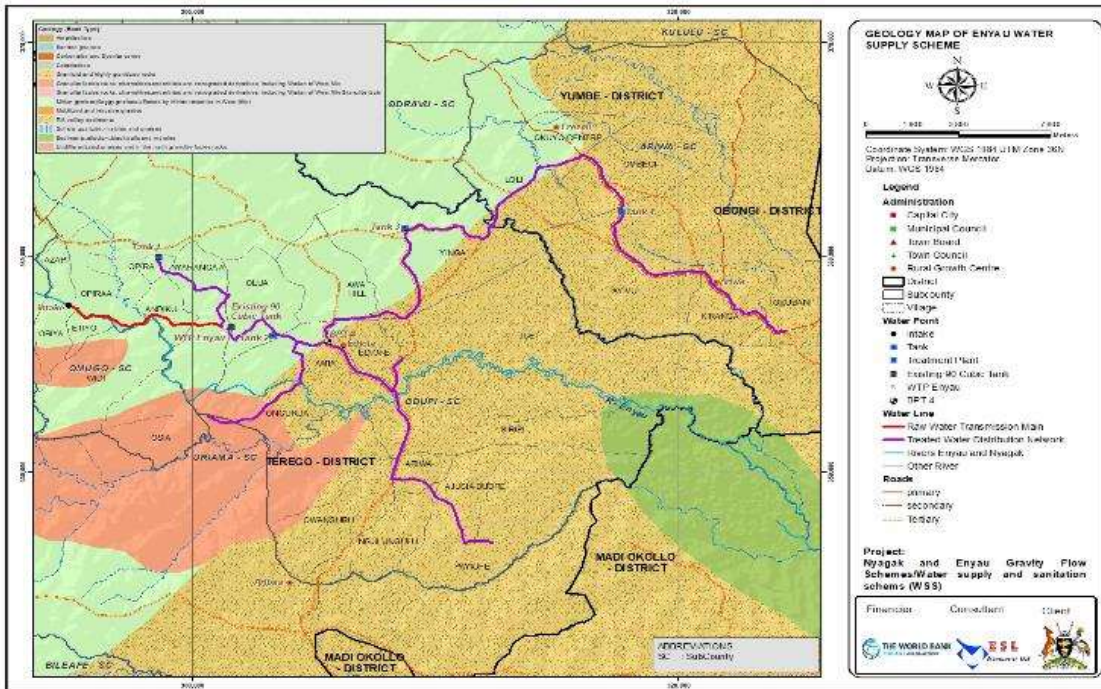
Annex 9(b): Map showing the general administrative setup of the project area



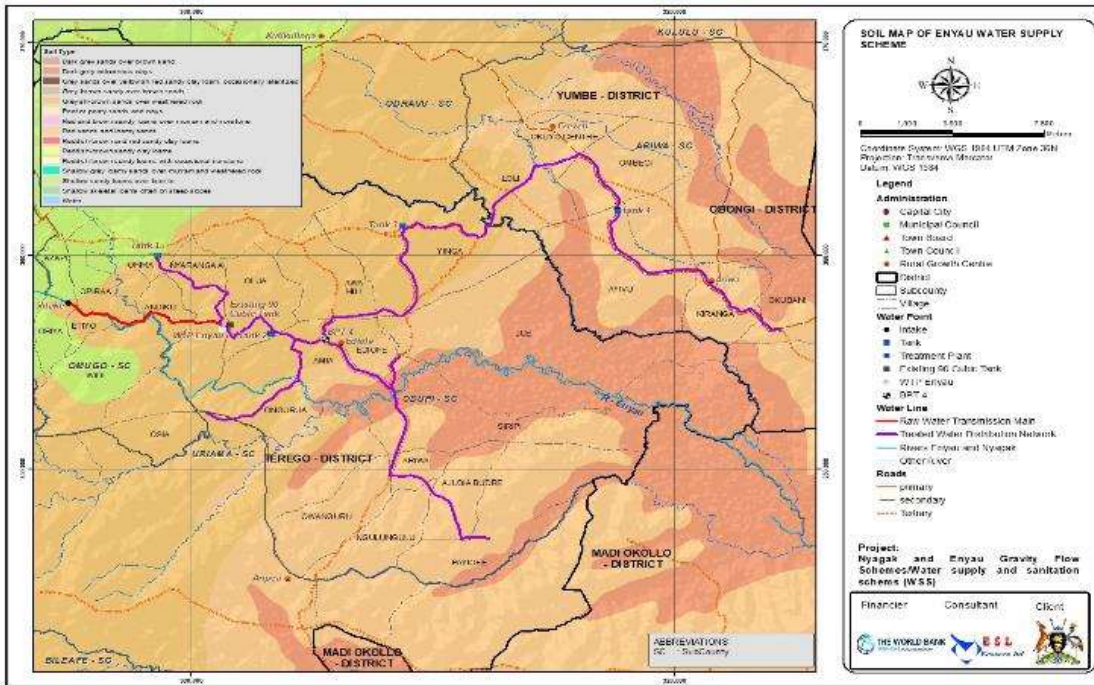
Annex 8(c): Map showing general land cover of the project area



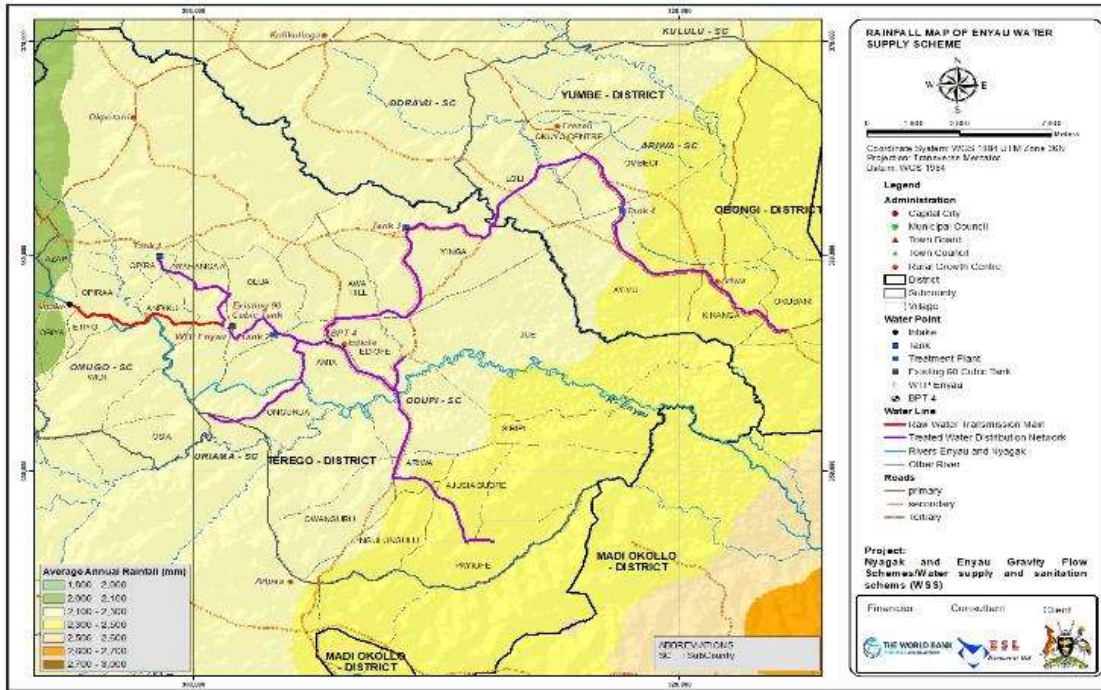
Annex 8(d): Map showing the geology of the project area



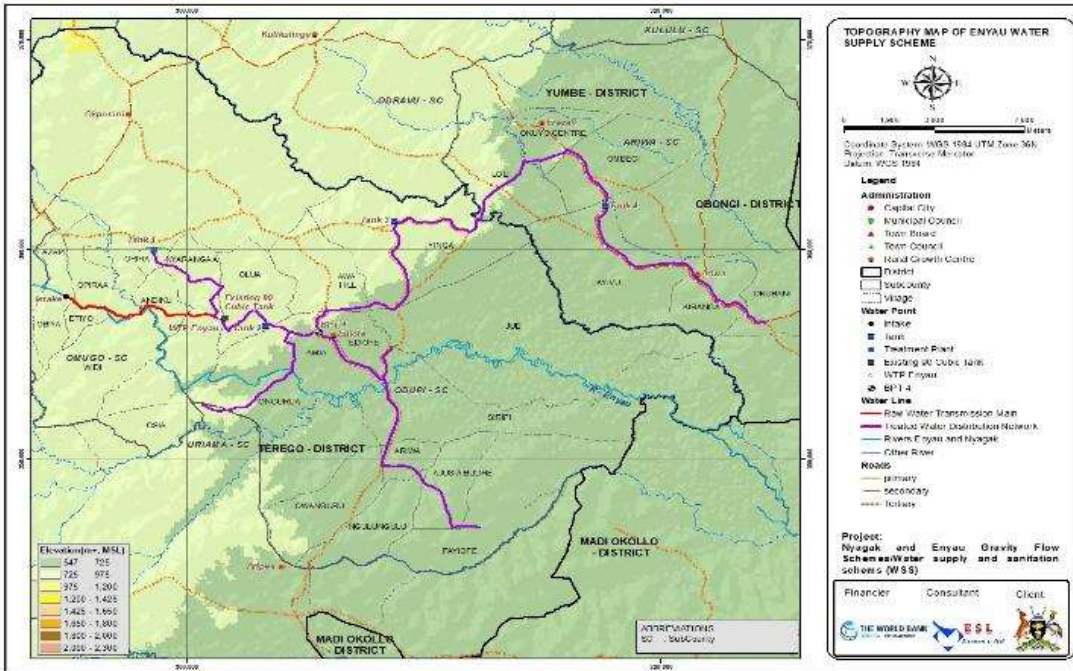
Annex 8(e): Map showing the soils of the project area



Annex 8(f): Map showing the rainfall distribution in the project area



Annex 8(g): Map showing the topography of the project area



**ANNEX 9: NEMA APPROVED TORS**





## NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY (NEMA)

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**NEMA/4.5**

8<sup>th</sup> February, 2023

The Permanent Secretary,  
Ministry of Water and Environment,  
P. O. Box 200226,  
**KAMPALA.**

**Tel:** +256 414 505942

**Email:** ps@mwe.go.ug

**RE: SCOPING REPORT AND TERMS OF REFERENCE FOR UNDERTAKING AN ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ALA-ORA WATER SUPPLY AND SANITATION SYSTEM OF ENYAU GFS IN REFUGEE HOST DISTRICTS OF TEREKO AND YUMBE (EIATOR 10013)**

This is in reference to the Terms of Reference (TOR) for carrying out an Environmental and Social Impact Assessment (ESIA) for the Ala-Ora Water Supply and Sanitation System of Enyau GFS in Refugee Host Districts of Terego and Yumbe which was submitted to this Authority for consideration for approval. This Authority has finalized the review and grants formal **APPROVAL** of the said TOR.

Please note that the approval of the TORs does not constitute permission to start implementing any of the proposed project activities, as this is not a Certificate of approval.

In addition to the scope of work detailed in the TOR, the ESIA team should consider the key aspects below during the conduct of the Environmental and Social Impact Study and the preparation of the report.

- (i) Make reference to the updated regulatory frameworks for environmental management. In particular, the National Environment (Waste Management) Regulations, 2020, the National Environment (Standards for Discharge of Effluent into Water or Land), Regulations, 2020, the National Environment (Environment and Social Assessment) Regulations, 2020 and the National Environment (Audit)

Page 1 of 3

Regulations, 2020. Uganda has not yet developed standards for air quality, however, reference can be made to the East African Standard: Air Quality Specification (EAS 751:2010). The project should be designed and planned to meet the standards and requirements set out in the respective pieces of legislation.

(ii) Undertake comprehensive hydrological studies of the respective catchment areas, should therefore be undertaken as part of the ESIA process. The report should provide details of the respective hydrological systems and identify issues that may need to be addressed to minimize potential impacts on surface and ground water resources. Efforts should be made to avoid disturbing the critical areas or core of the catchment systems, and areas with a relatively high water table or undisturbed wetland.

(iii) Identify and map (including providing GPS coordinates) community water sources within the project sites or their surroundings. Assess potential impacts on such water sources and mitigation measures in this regard.

(iv) Clearly detail the quality assurance and quality control measures that will be implemented to ensure health and safety for the proposed disposal options of treated faecal sludge from the sanitation systems.

(v) Provide site specific baseline information on the soils, water, air quality and existing activities at the respective sites and their surroundings, including maps and images where appropriate. In particular, provide baseline characteristics of water quality within the respective project sites and their surroundings.

(vi) Ensure that the project alternatives are clearly be documented and appropriate justification provided for the selected options. This shall include options for the safe disposal of treated sludge and effluent from the respective Plants.

(vii) Consider any other critical environmental concerns that were not initially foreseen during the preparation of the Scoping Report and TOR, and include an evaluation of such concerns, in the ESIA report

(viii) Carry out comprehensive stakeholder consultations involving, among others, the Terego and Yumbe District Local Government Authorities, the concerned local communities in the different Town Councils and other relevant

stakeholders and, ensure that their **views/ concerns are well-documented and included in ESIA report.**

(ix) Append to the ESIA report **authentic copies of land acquisition and ownership documents.**

(x) Indicate the actual total project (investment) cost including costs of works, machinery/equipment and land where applicable; and these should be submitted by a certified valuer and valuation certificate attached to the ESIA report.

(xi) In line with Regulation 49(2) of the National Environment (Environmental and Social Assessment) Regulations S.I. No. 143/2020 pay a non-refundable administrative fee of thirty percent (30%) of total fees payable on submission of the Environmental and Social Impact Statement

This is therefore, to recommend that you proceed with carrying out the ESIA for the **Ala-Ora Water Supply and Sanitation System of Enyau GFS in Refugee Host Districts of Terego and Yumbe.** We look forward to your cooperation and receipt of comprehensive copies of the respective ESIA reports, for our further action.



Waiswa Ayazika  
**For: EXECUTIVE DIRECTOR**

## **ANNEX 10: HANDLING OF CHEMICALS AND OTHER POTENTIALLY HARMFUL MATERIALS**

Chlorine, a harmful and toxic chemical, will be employed at the WTP during project operation. Thus, it must be safely handled to prevent any accidents, including health and safety issues. The following chemicals that are associated with this project shall be handled as follows;

### **Design and Management of Chlorination Storage and Dosing Areas**

The following special storage and handling features should be utilized and maintained during the WTP operation.

- i. Storage and equipment rooms be equipped with doors, opening outward to the outdoors complete with panic hardware;
- ii. Viewing window into chlorine storage and equipment rooms for operator security;
- iii. Visual and audible emergency alarms at the chlorine room entrance;
- iv. Exhaust fans with a typical rating to air changeover every minute;
- v. A chlorine gas leak detector to generate alarms and attendant ammonia bottle to help locate a leak;
- vi. A drench shower located where it is easily accessible in case of emergency, with single turn (butterfly valve) water tap;
- vii. An emergency kit to repair leaking containers.

For systems that use gas chlorination:

- i. Install alarm and safety systems, including automatic shutoff valves, that are automatically activated when a chlorine release is detected;
- ii. Install containment and scrubber systems to capture and neutralize chlorine should a leak occur;
- iii. Use corrosion-resistant piping, valves, metering equipment, and any other equipment coming
- iv. in contact with gaseous or liquid chlorine, and keep this equipment free from contaminants, including oil and grease;
- v. Store chlorine away from all sources of organic chemicals, and protect from sunlight, moisture, and high temperatures.

### **Handling of Chlorine during Operation**

Chlorine reacts violently with hydrogen, acetylene gases and solvents creating heat (EPA, 2011b). The reaction of chlorine with ammonia can create explosive compounds and gases that are toxic to breathe. Chlorine also reacts with metals. In the presence of water, chlorine can create a highly corrosive and dangerous acid mist. Therefore:

- i. Prepare and approve standard operating procedures for its storage and handling.
- ii. Never store chlorine gas and ammonia in the same building or area.

- iii. Keep chlorine isolated and in different rooms from the chemicals that it reacts with.
- iv. Chlorine storage areas, storage containers and process equipment and lines should be properly labelled and appropriate hazard warning should be posted in accordance with site specific operating procedures.
- v. Gas containers should be stored in separate or divided rooms separately from flammable materials and other chemicals such as ammonia and sulphur dioxide, if used elsewhere in the installation.
- vi. Containers should be stored and used above ground level and always in a vertical position.
- vii. Chlorine gas containers should be stored in marked areas shielded from external heat sources.
- viii. The protective hood should be kept secure on all unused containers and should only be taken off only when the container is being used. All containers in use should be secured in position by chains or other methods as appropriate. Gas containers should only be lifted with suitably rated and tested equipment and never by their protective hoods. Empty cylinders should be clearly marked and segregated from unused cylinders.

#### **Storage and Handling of Alum during Operation**

- i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.
- ii. Alum is readily soluble but the solution is corrosive to aluminum, steel and concrete so tanks of these materials need protective linings.
- iii. Though a weak acid, avoid all unnecessary contact with it, as a matter of good working practice. Wear rubber or PVC boots, apron and overclothing as necessary depending on the condition of handling. The occupational exposure limit is 2 mg per cubic meter for an 8-hour reference period.
- iv. Apply cold water to affected skin and eye areas. Move to fresh air, loosen clothing and seek medical attention in case of inhalation. Immediate medical attention should be sought for a person who has ingested the chemical and vomiting should not be encouraged.

#### **Storage and Handling of Lime during Operation**

- i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.
- ii. Ensure that bulk supplies of lime are pneumatically transferred to storage silos to prevent lime dust.
- iii. Delivery and use of bags of slaked lime can give rise to severe dust problems if care is not taken. The occupational exposure standard is 5 mg per cubic meter for an 8-hour reference period. Ensure that workers wear protective gears.
- iv. Enclose slurry storage tanks to avoid dust.

- v. The pump and feed lines should be emptied of all lime by rodding if necessary and flushed with clean water. This should be done when the lime dosing plant is taken out of use, say when a change of duty pump is made.

#### **Storage and Handling of Polyelectrolytes during Operation**

- i. Prepare and approve standard operating procedures for its storage and handling as the products Data Sheet.
- ii. Polyelectrolytes are not acutely toxic but care should be taken to avoid swallowing, contact with the eyes or prolonged contact with the skin. Always consult the Safety Data Sheet for the product in use for details of any health hazards involved.
- iii. Polyelectrolyte powder, dropped on a wet floor turns into a tough slippery jelly which is dangerous and difficult to clean up. Powder, if spilled, should be collected as dry material as far as possible before the area is washed liberally with (if possible) warm water.
- iv. Some polyelectrolytes may contain a small proportion of acrylamide for which the occupational exposure limit is 0.3 mg per cubic meter for an 8 - hour reference period.

## **ANNEX 11: CHANCE FIND PROCEDURE**

The following procedural guidelines should be considered in the event that previously unknown heritage resources are exposed or found during the life of the project.

### **Initial Identification and/or Exposure**

Heritage resources may be identified during construction or may be accidentally exposed. The initial procedure when such sites are found aim to avoid any further damage. The following steps and reporting structure must be observed in both instances:

1. The person or group (identifier) who identified or exposed the burial ground must cease all activity in the immediate vicinity of the site;
2. The identifier must immediately inform his/her supervisor of the discovery;
3. The supervisor must ensure that the site is secured and access is controlled; and response time/scheduling of the Field Assessment is to be decided in consultation with MWE and the environmental consultant.

The Field Assessment could have the following outcomes:

- If a human burial, the appropriate authority is to be contacted. The find must be evaluated by a human burial specialist to decide if Rescue Excavation is feasible, or if it is a Major Find.
- If the fossils are in an archaeological context, an archaeologist must be contacted to evaluate the site and decide if Rescue Excavation is feasible, or if it is a Major Find.
- If the fossils are in a palaeontological context, the palaeontologist must evaluate the site and decide if Rescue Excavation is feasible, or if it is a Major Find.

### **Rescue Excavation**

Rescue Excavation refers to the removal of the material from the “design” excavation. This would apply if the amount or significance of the exposed material appears to be relatively circumscribed and it is feasible to remove it without compromising contextual data. The time span for Rescue Excavation should be reasonable rapid to avoid any undue delays, e.g. one to three days and definitely less than one week. In principle, the strategy during the mitigation is to “rescue” the fossil material as quickly as possible. The strategy to be adopted depends on the nature of the occurrence, particularly the density of the fossils. The methods of collection would depend on the preservation or fragility of the fossil and whether in loose or in lithified sediment. These could include:

- On-site selection and sieving in the case of robust material in sand; and
- Fragile material in loose sediment would be encased in blocks using Plaster-of-Paris or reinforced mortar.

If the fossil occurrence is dense and is assessed to be a “Major Find”, a carefully controlled excavation is required.

### **Major Finds**

A Major Find is the occurrence of material that, by virtue of quantity, importance and time constraints, cannot be feasibly rescued without compromise of detailed material recovery and contextual observations.

#### **Management options for major finds**

In consultation with MWE and the environmental consultant, the following options should be considered when deciding on how to proceed in the event of a Major Find.

##### **Option 1: Avoidance**

Avoidance of the Major Find through project redesign or relocation. This ensures minimal impact to the site and is the preferred option from a heritage resource management perspective. When feasible, it can also be the least expensive option from a construction perspective. The find site will require site protection measures, such as erecting fencing or barricades. Alternatively, the exposed finds can be stabilised and the site refilled or capped. The latter is preferred if excavation of the find will be delayed substantially or indefinitely. Appropriate protection measures should be identified on a site-specific basis and in wider consultation with the heritage and scientific communities. This option is preferred as it will allow the later excavation of the finds with due scientific care and diligence.

##### **Option 2: Emergency Excavation**

Emergency excavation refers to the “no option” situation where avoidance is not feasible due to design, financial and time constraints. It can delay construction and emergency excavation itself will take place under tight time constraints, with the potential for irrevocable compromise of scientific quality. It could involve the removal of a large, disturbed sample by an excavator and conveying this by truck from the immediate site to a suitable place for “stockpiling”. This material could then be processed later. Consequently, the emergency excavation is not the preferred option for a Major Find.

### **Exposure of Fossil Shell Beds**

#### **Response of personnel**

The following responses should be undertaken by personnel in the event of intersection with fossil shell beds:

**Action 1:** The site foreman and Environment Consultant (EC) in charge must be informed;

**Action 2:** The responsible field person (site foreman or EC) must record the following information:

- Position (excavation position);
- Depth of find in hole;
- Digital image of the hole showing the vertical section (side); and
- Digital images of the fossiliferous material.



**Action 3:** A generous quantity of the excavated material containing the fossils should be stockpiled near the site, for later examination and sampling;

**Action 4:** The Environmental Consultant is to inform MWE who must then contact the archaeologist and/or palaeontologist contracted to be on standby. The Environmental Consultant is to describe the occurrence and provide images via email.

#### **Response by Palaeontologist**

The palaeontologist will assess the information and liaise with MWE and the Environmental Consultant and a suitable response will be established. This will most likely be a site visit to document and sample the exposure in detail, before it is covered up.

### **Exposure of Fossil Wood and Peats**

#### **Response of personnel**

The following responses should be undertaken by personnel in the event of exposure of fossil wood and peats:

**Action 1:** The site foreman and Environmental Consultant must be informed;

**Action 2:** The responsible field person (site foreman or Environmental Consultant) must record the following information:

- Position (excavation position);
- Depth of find in hole;
- Digital image of the hole showing the vertical section (side); and
- Digital images of the fossiliferous material.

**Action 3:** A generous quantity of the excavated material containing the fossils should be stockpiled near the site, for later examination and sampling;

**Action 4:** The Environmental Consultant is to inform the developer who must then contact the archaeologist and/or palaeontologist contracted to be on standby. The Environmental Consultant is to describe the occurrence and provide images via email.

#### **Response by Palaeontologist**

The palaeontologist will assess the information and liaise with the developer and the Environmental Consultant and a suitable response will be established. This will most likely be a site visit to document and sample the exposure in detail, before it is covered up.

### **Monitoring for Fossils**

A regular monitoring presence over the period during which excavations are made, by either an archaeologist or palaeontologist, is generally not practical. The field supervisor or foreman and workers involved in digging excavations must be encouraged and informed of the need to watch for potential fossil and buried archaeological material. Workers seeing potential objects are to report to the field supervisor who, in turn, will report to the Environmental

Consultant. The Environmental Consultant will inform the archaeologist and/or palaeontologist contracted to be on standby in the case of fossil finds.

To this end, responsible persons must be designated. This will include hierarchically:

- The field supervisor or foreman who is going to be most often in the field;
- The EC for the project;
- The Project Manager

Should the monitoring of excavations be stipulated in the Archaeological Impact Assessment and/or the Heritage Impact Assessment, the contracted Monitoring Archaeologist (MA) can also monitor for the presence of fossils and make a field assessment of any material brought to attention. The monitoring for fossils is usually sufficiently informed to identify fossil material and this avoids additional monitoring by a palaeontologist. In shallow coastal excavations, the fossils encountered are usually in an archaeological context. The monitoring for fossils then becomes the responsible field person and fulfils the role of liaison with the palaeontologist and coordinates with the developer and the Environmental Consultant. If fossils are exposed in non-archaeological contexts, the palaeontologist should be summoned to document and sample/collect them.

#### **Chance Find Procedures (Burial Ground and Grave-BGG)**

In the event that previously unidentified BGG are identified and/or exposed during construction or operation of the Enyau WSS, the following steps must be implemented subsequent to those outlined under "Initial Identification and or Exposure" above.

1. The Project Manager (MWE) and/or the HRM Unit must immediately be notified of the discovery in order to take the required further steps:

- i. The Uganda Police will be notified on behalf of MWE;
- ii. MWE in association with the Environmental Consultant will deploy a suitably qualified specialist to inspect the exposed burial and determine in consultation with Uganda police;

- The temporal context of the remains, i.e.:
  - a. forensic,
  - b. authentic burial grave,
  - c. archaeological (older than 100 years); and
- If any additional graves may exist in the vicinity.

2. Should the specialist conclude that the find is a heritage resource, MWE shall notify the Department of Museums and Monuments in the Ministry of Culture who may require that an identification of interested parties be done through adequate consultations in order to relocate the grave.

#### **Major institutions to contact while dealing with Chance Finds**

Under Secretary,  
Commissioner Uganda Museum  
The Department of Museums and Monuments  
Kira road, Kamwokya, Kampala

+256 772485624

The Senior Environment Officer  
Ministry of Water and Environment  
10 Hannington Road, Kampala  
Tel +256 417 889 400

#### ANNEX 12: SITE DISCIPLINARY COMMITTEE (SDC)

| S.No | Designation at Site              | Position in the SDC |
|------|----------------------------------|---------------------|
| 1    | Site Manager                     | Chairperson         |
| 2    | HSE Officer                      | Secretary           |
| 3    | Site Nurse                       | Member              |
| 4    | Caterer                          | Member              |
| 5    | Security Officer                 | Member              |
| 6    | Site Foreman                     | Member              |
| 7    | Village-Representative           | Member              |
| 8    | Workers' Representative (Male)   | Member              |
| 9    | Workers' Representative (Female) | Member              |

## ANNEX 13: PRIMARY SURVEY QUESTIONNAIRE SAMPLE

### ENVIRONMENT AND SOCIAL IMPACT ASSESSMENT (ESIA) PRIMARY SURVEY QUESTIONNAIRE

Project .....

Names of Enumerator..... Date...../...../ 2022

#### Location and Demographic Information

| 1) District | 2) Sub-County/Division | 3) Parish/Ward | 4) Village / LC I | 5) Telephone Contact |
|-------------|------------------------|----------------|-------------------|----------------------|
|             |                        |                |                   |                      |

| 6) Project Affected Person<br>Names... | 7) Age<br>[Years] | 8) Sex<br>1=Male<br><br>2=Female | 9) Marital<br>Status<br>1= Married<br>2=Single<br>3=<br>Divorced<br>4=Widower<br>5=Widow | 10) Highest<br>level of<br>Education<br>1= Primary<br>2=Secondary<br>3= Tertiary<br>4=University<br>5=Illiterate<br>6= Other | 11) Religious<br>affiliation<br>1= Roman<br>Catholic<br>2=Anglican<br>3= Pentecostal<br>4=Islam<br>5=Other<br>[Specify] | 12) Relationship<br>with Head of<br>H/H<br>1=Household<br>Head<br>2=Husband<br>3= Wife<br>4=Son<br>5= Daughter<br>6=Brother | 13)<br>Ethnicity/Tribe<br>1. Alur<br>2. Lugbara<br>3. Kakwa<br>4. Madi<br>5. Acholi<br>6. Langi<br>7. Baganda<br>8. Other (specify) | 14) Next of Kin [Friend]<br>[Give Name & Contact<br>Details]<br>Name: .....<br><br>Relationship<br>1=Husband 2= Wife<br>3=Son 4= Daughter<br>5=Brother 6=Sister<br>7=Relative [Specify]<br>8=Other (Specify) |
|--|-------------------|----------------------------------|--|--|---|---|---|--|
|  |                   |                                  |  |  |   |   |   |  |

|  |  |  |  |  |  |  |  |          |
|--|--|--|--|--|--|--|--|----------|
|  |  |  |  |  |  | 7=Sister<br>8=Relative<br>[Specify]<br>9=Other (Specify) |  | Contact: |
|  |  |  |  |  |  |  |  |          |

| 15) How Many People live in the House Hold [H/H]? | 16) How many Children are going to school? | 17) How many are in Primary level? | 18) How many are in Secondary Level? | 19) How many are in Tertiary Institutions? | 20) How many are at University? | 21) Does the HH head know how to read and write in English? |       | 22) Any local language? |       |
|---|--|------------------------------------|--------------------------------------|--|---------------------------------|---|-------|-------------------------|-------|
|   |  |                                    |                                      |  |                                 | 1= Yes  | 2= NO | 1= Yes                  | 2= No |

| 23) No of Persons with disability in the H/H | 24) Type of Disability Identified   | 25) Can the Enumerator describe in detail, the kind of Disability that the Person has. | 26) Can the Enumerator establish if the HH is Vulnerable? | 27) Can the Enumerator describe in detail the status of the HH considered to be Vulnerable.  |
|--|---|--|---|--|
|  | 1=Crippled[Lame]<br>2= Blind<br>3=Deaf<br>4= Slow Growth<br>5=Other [Specify] |  | 1= Yes<br>2= Not Vulnerable                               | 1= Old<br>2= Sickly<br>3=Widow/widower<br>4= Very poor<br>5= Child headed Household<br>6=Handicapped<br>7= Indigenous<br>8=Other [Specify] |
|  |   |  |   |  |

| Health, Welfare & Water Sources                                    |   |  |   |  |  |   |   |
|--|---|--|---|--|--|---|---|
| 28) Has any member of the household been ill in the last 3 months? | 29) If yes what were they suffering from?                         | 30) Where do you get treatment from?   | 31) What is distance to Nearest Public Health Centre/Unit?          | 32) Which of these do you have in working condition in your household? | 33) What is your main source of domestic water?                          | 34) What is the distance to your preferred water source?        | 35) What problems do you encounter with the water source? (multiple responses accepted) |
| 1= Yes<br><br>2= No  | 1=Malaria<br>2=Diarrhea<br>3= Coughs/RTI<br>4=Worms<br>5=HIV/AIDS | 1=Hospital/Heath IV<br>2= Health Centre III<br>3= Health Centre II<br>4=Clinic | 1= 0 – 1km<br>2= 1 – 2km<br>3= 2 – 3km<br>4=3 – 4km<br>5= Over 4 km | 1= Bicycle<br>2=Motorcycle<br>3=Car<br>4= TV<br>5=Radio                | 1=Protected Well<br>2= Borehole<br>3= River/swamp<br>4=Un protected Well | 1=0 – 1km<br>2= 1– 2km<br>3= 2– 3km<br>4=3– 4km<br>5= Over 4 km | 1= Too steep<br>2= Expensive<br>3= It dries up<br>4= Long distance<br>5= Contaminated   |

|  |                                     |  |  |  |  |  |   |
|--|-------------------------------------|--|--|--|--|--|---|
|  | 6= Hernia<br>7= Others<br>[Specify] | 5= Traditional<br>Healer/Herbalist<br>6=Self treatment<br>7= Others[Specify] |  | 6= Mobile Phone<br>7=Pit latrine<br>8= Flash Toilet\8<br>9=Private Water<br>source | 5=Piped water at<br>Home<br>6=Piped water at<br>public stall<br>7= Rain water<br>8=<br>others[Specify] |  | 6= Shared with<br>animals<br>7= other (specify) |
|  |                                     |  |  |  |  |  |   |



| Land ownership  |   |   |  |  |   |   |   |
|---|---|---|--|--|---|---|---|
| 36) What is your status in relation to the Land ownership?                                | 37) How did you acquire this land?  | 38) Do you possess any land ownership document?   | 39) For how long have you been on this affected land/plot?                             | 40) Is there any encumbrances on this land like;   | 41) If yes to 40 specify the kind of encumbrance  | 42) What is land Tenure system?   | 43) How would you describe your housing type? *** |
| 1= Owner<br>2= Licensee<br>3= Tenant<br>4= Co-owner<br>5= Co-Tenant<br>6= Others[Specify] | 1= Bought<br>2= Renting<br>3= Inherited<br>4= Given as a gift.<br>5= Just settled<br>6= Public land<br>7=Others (Specify) | 1= Land Title<br>2=Agreement<br>3=Tenancy<br>4= No  | 1= Since birth.<br>2= 0-10 years<br>3=10-20 years<br>4=20-30 years<br>5= Over 30 years | 1= Yes<br>2= No  | 1= Claim by: Family Members.<br>2= Mortgage/loan.<br>3= Dispute with neighbour<br>4= I don't know<br>5= Others[Specify] | 1= Mailo<br>2= Communal<br>3= Leasehold<br>4= Customary<br>5= Kibanja<br>6= Other[Specify]                | 1=Permanent<br>2=Semi-Permanent<br>3=Temporary    |
|   |   |   |  |  |   |   |   |
| 44) Do you own the house in which you live?   |   | 45) Which Utility Services do you have in your house?   |  | 46) How long have you lived in this house?   |   | 47) What is the purpose of the affected structure?  |   |
| 1= Yes<br>2= No   |   | 1= Electricity [Hydro]<br>2= Water [NWSC]<br>3= Solar Energy<br>4= Telephone Lines<br>5= Others [Specify] |  | 1= 1-5 years<br>2= 6 – 10years<br>3= 11 – 15 years<br>4=16 – 20 years<br>5=Over 20 years |   | 1=Residential<br>2= Commercial<br>3= Rent<br>4=Livestock<br>5=Residential/Commercial<br>6=Other [Specify] |   |
|   |   |   |  |  |   |   |   |

\*Permanent means burnt brick with mortar walls, iron/tiled roof cemented/tiled floor with or without exterior finishing

\*Semi-permanent means burnt or un-burnt brick walls without mortar, mud and wattle with or without plaster with iron roof

\*Temporary means mud and wattle walls with grass, banana fiber or polyethene roof

| Livelihood Sources   |  |   |  |   |  |
|--|--|---|--|---|--|
| 48) What is the main (Primary) Source of income of the Household:  | 49) What is the other (Secondary) Source of income of the Household:   | 50) If engaged in Business, how would you describe it?  | 51) If engaged in farming, what are the types of crops grown by this House hold? | 52) What Food crops do you have on your land?   | 53) What Cash crops do you have on your affected land?   |
| 1= Farming<br>2= Formal Employment<br>3= Casual labour<br>4= Trading<br>5= Service provision (hotel, mobile money, salon, transport)<br>6= Student<br>7= Rent collection<br>8= Remittance<br>9= Fishing<br>10= Brickmaking<br>11= Welding<br>12= Carpentry<br>13= Other (specify | 1= Farming<br>2= Formal Employment<br>3= Casual labour<br>4= Trading<br>5= Service provision (hotel, mobile money, salon, transport)<br>6= Student<br>7= Rent collection<br>8= Remittance<br>9= Fishing<br>10= Brickmaking<br>11= Welding<br>12= Carpentry<br>13= Other (specify | 1=Individual Business<br>2= Family Business<br>3= Partnership with Others<br>4=Limited Company<br>5=Other [Specify] | 1=Seasonal Crops<br>2= Perennial Crops   | 1=Banana<br>2= Sweet Potatoes<br>3= Cassava<br>4=Maize<br>5=Irish Potatoes<br>6=Yams<br>7= Beans<br>8=Ground nuts<br>9= Millet<br>10= Sim sim<br>11= Sun flower<br>12= Sorghum<br>13= Vegetables<br>14= Others[Specify] | 1=Coffee<br>2= Cotton<br>3= Pineapples<br>4=Vegetables<br>5= Maize<br>6= Forestry<br>7= Fruits<br>6= Pine trees<br>7= Others [Specify] |
|  |  |   |  |   |  |

| Income of Affected Household   |   |        |                           |                       | 58) Expenditure of Affected Households                                     |      |   |
|--|---|--------|---------------------------|-----------------------|--|------|---|
| 54) What are the types of Animals & Birds Kept by this H/H? State No. Of Each  | 55) Where do you sell your produce?   | 56) No | Activity                  | Total income Per Year | 57) What would you estimate to be the total income for this HH (per month) | Item | Total per year                            |
| 1= Cows ----<br>2= Goats ----<br>3= Sheep ---<br>4= Pigs ---<br>5= Chicken ---<br>6= Ducks ---<br>7= Turkeys ---<br>8= Other [Specify] --- | 1= Local trading center<br>2= Local produce buyer<br>3= Farm gate<br>4= Cooperative<br>5= Market<br>6= Others (specify) | 1.     | Crop farming              |                       | 1= <100,000/=  | 1.   | House hold basics (Food, Salt, Soap etc.) |
|  |   | 2.     | Paid employment           |                       | 2=100,001– 300,000/=   | 2.   | Water                                     |
|  |   | 3.     | Business                  |                       | 3=300,001 –500,000/=   | 3.   | Energy [Electricity, Gas, Charcoal]       |
|  |   | 4.     | Livestock trade           |                       | 4=500,001 –800,000/=   | 4.   | Transport [Including Fuel]                |
|  |   | 5.     | Rentals                   |                       | 5=800,001 – 1,500,000/=  | 5.   | Education [Tuition Fees]                  |
|  |   | 6.     | Professional / Consulting |                       | 6=1,500,000- 2,000,000/=   | 6.   | Communication                             |
|  |   | 7.     | Service provision         |                       | 7= 2,000,001-3,000,000   | 7.   | Clothing                                  |
|  |   | 8.     | Other (Specify)           |                       | 8= Above 3,000,000   | 8.   | Medical                                   |
|  |   |        | <b>Totals</b>             |                       |  | 10.  | Others (Specify)                          |
|  |   |        |                           |                       |  |      | <b>Total</b>                              |

| <b>Gender roles</b>   |   |                                     |   |
|---|---|-------------------------------------|---|
| 59) <b>Among the household members, whose primary responsibility is it to</b>               |   |                                     |   |
| Codes: 1.Woman 2.Man 3.Both man and woman 4.Boy child 5.Girl Child 6. All household Members |   |                                     |   |
| House hold activities   | Person Responsible<br>(Multiple response allowed) | b) Community Roles/activity         | Person Responsible<br>(Multiple response allowed) |
| 1= Do domestic chores   |   | 1= Sports                           |   |
| 2= Take care of children daily  |   | 1= Cleaning the well                |   |
| 3= Farming  |   | 2= Attending village meeting        |   |
| 4= Livestock rearing  |   | 3= Helping at funerals (specify)    |   |
| 5= Working for outside income   |   | 4= Helping at weddings              |   |
| 6= Attending village meetings   |   | 5= Cultural roles                   |   |
| 7= Owning land  |   | 6= Road maintenance                 |   |
| 8= Owning livestock   |   | 7= Construction of community centre |   |
| 9= Owning durable household assets  |   | 8= Other (specify)                  |   |
| 10= Marketing produce   |   |                                     |   |
| 11= Using financial resources   |   |                                     |   |
| 12= Buying basic necessities  |   |                                     |   |
| 13= Buying durable household assets   |   |                                     |   |
| 14= Other (Specify)...  |   |                                     |   |

|                          |
|--------------------------|
| <b>Domestic violence</b> |
|--------------------------|

| 61) How would you rate the prevalence of domestic violence in this area?       | 62) What are common abuses in this community? (Multiple response)  | 63) Who are the main victims?  | 64) Who are the perpetrators of the abuses?  | 65) Where are cases of gender and domestic abuses normally reported/referred?   |
|--|--|--|--|---|
| 1= None<br>2= Very rear<br>3= Relatively common<br>4= Rampant<br>5= Don't know | 1= Battering/beating<br>2= Burning<br>3= Verbal abuses/insults<br>4= Attempted murder<br>5= Forced sex<br>6= Marrying off girls early<br>7= Threatening violence<br>8= Use of proceeds/money without spouse consent<br>9= Preventing spouse from owning property<br>10= Preventing spouse from using family land<br>11= Stop spouse from talking/community meetings<br>12= Engaging children in work instead of school<br>13= Not economically supporting family<br>14= Locking spouse or children out of house<br>15= Other (specify) | 1= Girls<br>2= Married women<br>3= Boys<br>4= Men<br>5= Children<br>6= Maids | 1= Male spouse<br>2= Female spouse<br>3= Other relative<br>4= Clan elder<br>5= Community leader<br>6= Stranger<br>7= Employer<br>8= Teacher<br>9= Community member<br>10= Armed personnel<br>11= Other (Specify) | 1= Police<br>2= LC/community leaders<br>3= Religious leader<br>4= Clan leader<br>5= NGO/CBO<br>6= CDO/Probation<br>7= Courts of law<br>8= Head-teacher<br>9= Health worker<br>10= Media<br>11= Others |

| Resettlement & Relocation Options of Affected Household   |   | Dispute resolution   |  |   |
|---|---|--|--|---|
| <b>66) Would you prefer cash compensation or relocation to another place?</b>   | <b>67) If you have to move, how much time do you need?</b>                        | <b>68) Do you have a Bank Account?</b>                           | <b>69) Who is responsible for settling disputes at household level?</b>  | <b>70) What structures are available for resolving conflicts at community level?</b>          |
| Cash Compensation<br>Relocation<br>I don't know   | 1= Immediately<br>2= 3 months<br>3=6 months<br>4= Will not move<br>[State Reason] | 1=Yes<br>2= No   | 1= Police<br>2= Elders<br>3= Religious leaders<br>4= cultural leaders<br>5= L.Cs<br>6= Others  | 1= Police<br>2= Elders<br>3= Religious leaders<br>4= cultural leaders<br>5= L.Cs<br>6= Others |
|   |   |  |  |   |
| <b>71) What are the common sources of information?</b>  | <b>72) Do you anticipate any impacts related to the project?</b>                  | <b>73) What are the anticipated positive impacts (List them)</b> | <b>74) What are the anticipated negative impacts?</b>  | <b>75) Suggest any mitigation measures for the identified impacts</b>                         |
| 1= Radio<br>2= Newspapers<br>3= Mobile phone<br>4=Community radio<br>5=LC meetings<br>6= Places of worship<br>7= IEC materials (posters, brochures, newsletter etc) | 1= Yes<br>2= No   |  | 1= Fear of loss of households land<br>2=Displacement<br>3=Destruction of burial ground<br>4=Loss of source of income<br>5= Lack of information about the project<br>6= Inadequate compensation<br>7= Does not perceive any project benefit |   |

|   |  |  |   |  |
|---|--|--|---|--|
| 8= Sensitization workshops<br>9= Others (specify) |  |  | 8= Influx of migrant workers<br>9= Threat to local morals<br>10= Increase work load<br>11= Other (specify) .... |  |
|---|--|--|---|--|

Signature of Respondent..... (Optional) Signature of Interviewer.....

**THANK YOU**