



Ministry of Water and Sanitation



Blantyre Water Board

MALAWI WATER AND SANITATION PROJECT-1 (MWSP-1)

Terms of Reference:

Consultancy Services for Development of Dam Safety Management Plan (DSMP) and Detailed Design and Construction Supervision of Mudi Dam and Water Treatment Plant

PROCUREMENT REFERENCE: MW-BWB-333131-CS-OCBS

Blantyre Water Board,
Off Makata Road
P.O. Box 30369
Chichiri,
Blantyre 3.
Email: bwb@bwb.mw
Website: www.bwb.mw

April 2023

1. Introduction

1.1 Background

The Government of Malawi (GoM) is committed to providing adequate, reliable and sustainable water and sanitation services to the urban, peri-urban, towns and rural population of Malawi to meet the ever-increasing demand for safe water for domestic, institutional, industrial, commercial and agricultural use. One focus area is Blantyre City, which currently faces a number of challenges related to water supply and sanitation services delivery. Some of the challenges include; high population growth, dwindling water resources, climate change, lagging infrastructure development and aging water and sanitation systems with high levels of non-revenue water creating large gaps between supply and demand, leading to unreliable services. The current water and sanitation situation in the city is alarming, which calls for comprehensive measures that will bring about sustainable and reliable improved services.

GoM through Blantyre Water Board (BWB) and Blantyre City Council (BCC) with financial support from the International Development Agency (IDA) of the World Bank intends to implement the Malawi Water and Sanitation Project (MWSP). The MWSP seeks to address the immediate and medium-term water and sanitation needs and support a long-term solution to Blantyre City's growing demand for improved water services and safely managed sanitation services.

BWB and BCC which are the implementing entities for the BWSP commit themselves to successful implementation of the project which aligns with Malawi's development goals as well as strategic plans for the two institutions. The project is consistent with the Government's priorities, as it directly aligns with Malawi's commitment to improving urbanization as stipulated in the Malawi 2063.

1.2 Project Development Objective and Components for the Malawi Water and Sanitation Project (MWSP)

The project development objective (PDO) is to increase access to improved water supply and safely managed sanitation services in Blantyre metropolitan area and to enhance the operational and financial efficiency of the Blantyre Water Board. The PDO will be achieved through development and rehabilitation of water and sanitation infrastructure for Blantyre City and surrounding areas so that the city has adequate and reliable potable water supply with adequate pressure and safely managed improved sanitation services. The project focuses on four components that contribute to the achievement of the PDO.

Component 1: Water supply improvements

Under this component, the project will finance investments to improve water production, stabilize and improve network operational efficiency, reduce water losses, increase energy efficiency, improve water supply service quality, and expand water access to unserved areas, increasing energy efficiency, and boosting water access.

Key interventions under this component include:

- i. Rehabilitation and upgrading of Mudi Dam and water treatment plant to increase water yield and strengthen the resilience of the water supply system with an alternative source of water during water interruptions caused by frequent floods and siltation along the Shire River.
- ii. Priority water supply transmission network upgrade – 20.54km of transmission pipeline from Chileka to Blantyre and four associated reservoirs with a combined capacity of 40,000m³ to increase the storage capacity and BWB drought resilience, and six solar-powered boosters to improve energy efficiency and enhancing infrastructural climate resilience.
- iii. Distribution network upgrade with around 266km pipe replacement and upgrade pressure management systems to recover water leaks, thus reducing water wastage and improving water availability to serve more people.
- iv. Distribution network expansion in selected zones, including 60 smart water kiosks. Under this component, the project will also finance the TA activities required to design and implement the water supply improvement, including consultancy services for engineering designs, procurement, supervision, and related safeguards implementation for water infrastructure planned under the Project.

Component 2: Priority sanitation investments

This component involves several interventions to increase access to safely managed sanitation and reduce environmental pollution that has public health impacts.

Key interventions under this component include:

- i. The rehabilitation and upgrade of 50km of sewer network and connections and treatment works in the Blantyre, and Soche sewerage catchments, including interceptors to collect leaking sewers into river streams and reduce environmental pollution and methane capture to reduce emissions from the WWTP.
- ii. Technical assistance, equipment and tools to improve solid waste sorting and collection at the source with business development support and integration of private sector and waste pickers, and the construction of a new solid waste recycling plant and landfill in Chigumula with the aim of maximizing waste re-use and minimize emissions from uncontrolled solid waste dumping.
- iii. Construction and upgrade of public sanitation facilities for ten schools, five health centers, and five markets to reduce the incidence of open defecation in public places. Public toilet facilities will be enhanced with accessibility features for persons with disability and MHM facilities and training to increase girls' retention in schools and support female entrepreneurs in markets. Public toilets in markets will be managed through public-private-partnership contracts with local entrepreneurs to enhance the operations and maintenance (O&M) and support job creation. The project will also finance TA for engineering designs and supervision

of sanitation investments, sanitation tariff assessment, and preparation and implementation support for safeguards instruments.

Component 3: Institutional capacity strengthening

This component will finance a set of institutional development activities aimed at enhancing BWB's financial efficiency and governance systems, improving BCC's capacity to manage sanitation services and supporting the water sector investment planning and policy development to enhance the sustainability of urban water services.

For Blantyre Water Board, the activities will be financed through a performance-based mechanism to incentivize improvements in:

- i. Staff efficiency through performance management systems, cost reduction, strategy, and capacity-building activities for women's empowerment and participation in decision making roles and promotion of internship opportunities for female graduates.
- ii. Investment in innovative solutions for enhancing climate resilience, asset management and operations including water treatment works.
- iii. Customer services improvements.

For Blantyre City Council, the project will finance the development and update of policies, by-laws, and key guiding institutional documents/plans. It will also finance trainings, equipment; capacity development in sewerage and solid waste management and stakeholder engagement activities.

Under the sector ministry financing, the project will finance a set of policy and planning instruments, including the feasibility assessments and engineering design of priority infrastructure investments for selected Boards, training, and equipment to enhance the sector coordination and technical support to the water boards. The project will also support the development of a sector regulatory function and the establishment of a ring-fenced water tariff framework.

Further, the project will support stakeholder engagements through the sanitation task force to facilitate the sewerage transfer dialogue and ensure the financial sustainability of sewerage services. The project will also support awareness raising and training to improve water resource management and the integration of data monitoring and early warning systems of climate risks such as droughts and floods.

Component 4: Technical Assistance and Project Management Support

This component will finance TA activities designed to support the project implementing unit and the incremental operating costs for project management, including safeguards, communications, and project monitoring and evaluation. The project will also finance relevant training to enhance financial management, procurement, and safeguards capacity for the implementing entities

2. Objectives

2.1 Overall Objective of the Assignment

The main objective of this assignment is to carry out detailed design and construction supervision for the rehabilitation and upgrading of Mudi dam and Mudi Water treatment plant under component 1 of the MWSP, and to develop a Dam Safety Management Plan (DSMP) in line with World Bank requirements .

2.2 Specific Objectives of the Assignment

The specific objectives of the assignment are to:

- i. Review and comment on previous studies, including Mudi dam safety review report (2022) and the optimum scale of possible water yield of Mudi Dam (2022)
- ii. Identify the best options for the rehabilitation and upgrading of Mudi dam;
- iii. Prepare the Detailed Design and Tender Documents for the rehabilitation and upgrading works for Mudi dam;
- iv. Develop a sustainable sediment management strategy to ensure long-term safe operation of the dam;
- v. Prepare the DSMP, including the Construction Supervision and Quality Assurance Plan (CSQAP), the dam instrumentation plan (IP), the Operation and Maintenance (O&M) Plan, and the Emergency Preparedness Plan (EPP) in compliance with World Bank Environmental and social Framework (ESF) and in particular with Environmental and Social Standard (ESS) 4-Annex 1 and following recommendations of WB's Good practice note on dam safety (<https://openknowledge.worldbank.org/handle/10986/35484>);
- vi. Prepare the Detailed Design and Tender Documents for the new Mudi Water Treatment Plant; and
- vii. Carry out supervision and quality assurance for the rehabilitation and upgrading works under this assignment.

3 Scope of the Assignment

The assignment shall be conducted in two phases: Phase 1–Study of the rehabilitation and upgrading works and development of the DSMP for Mudi dam and study of the rehabilitation and upgrading works of the new Mudi Water Treatment Plant; and Phase 2–Construction supervision.

Phase 1 shall be undertaken on a lump-sum contract with a duration of Twelve (12) months. The Consultant shall take full responsibility of the designs and shall make any necessary reviews/changes required design during construction phase. Phase 2 shall be undertaken on a time-based contract with a duration of 36 months (i.e. 24 months construction period and 12 months defects liability period). Both phases will be procured together – i.e. the Consultant is required to quote for both phases. Phase 2 of the contract shall come into effect after completion of phase 1 and upon Client's notice to the Consultant instructing commencement of Phase 2 services.

3.1 Phase 1 –Rehabilitation/Upgrading needs Assessment, Detailed Design for Dam Rehabilitation Works and Mudi Water Treatment Plant and Tender Documentation and DSMP Development,

Phase 1 of the assignment will be categorized into three parts

3.1.1 Part 1: Rehabilitation/upgrading needs and opportunities assessment, Detailed Design and Tender Documentation for Dam Rehabilitation Works

The Consultant shall prepare Detailed Design and Tender Documents for the rehabilitation and upgrading needs of Mudi dam in accordance with the appropriate version of the World Bank Guidelines and Standard Bidding Documents for the Prequalification process and Procurement of works. Specific activities shall include, but not necessarily limited to:

- a. Review and comment on previous dam safety assessment;
- b. Review and comment on previous study of the optimum scale of possible water yield of Mudi Dam;
- c. Conduct a geological study on embankment and foundation conditions;
- d. Review and update hydrological and hydraulic study;
- e. Review and update structural safety study;
- f. Assess rehabilitation/upgrading needs and opportunities for the Mudi dam;
- g. Identify the best options for the rehabilitation and upgrading of Mudi dam;
- h. Carry out an environmental impact;
- i. Conduct all necessary engineering and topographic surveys for the rehabilitation works;
- j. Prepare Detailed Design and Tender Documents (civil/structural and electro-mechanical), including construction drawings, technical specifications, bill of quantities, and engineer's cost estimates for the dam's rehabilitation and upgrading works;
- k. Prepare detailed construction plan and implementation program for the works;
- l. Develop a sustainable sediment management strategy;
- m. Assist BWB in obtaining approvals where necessary from local authorities, utility bodies, land offices and other approving authorities;
- n. Advise on procurement packaging of the rehabilitation works and prepare bid documents in accordance with World Bank requirements; and
- o. Assist BWB in the tendering process, including assistance in preparing tender notices, arranging pre-bid meetings, responding to queries from bidders, evaluation of bids and contract negotiations.

3.1.2 Part 2: Development of DSMP

3.1.2.1 Sub-Task 1 – Develop a Construction Supervision and Quality Assurance Plan (CSQAP)

Under this task, the Consultant shall prepare a CSQAP specific for the Project, reflecting key aspects and elements of Section 3.2, and following recommendations of Appendix 1 of WB's

good practice note on dam safety
(<https://openknowledge.worldbank.org/handle/10986/35484>).

3.1.2.2 Sub-Task 2 – Develop a dam instrumentation plan

Under this task, the Consultant shall:

- a. Review previous studies (if any) on existing dam instrumentation;
- b. Analyze the behavior of the dam and performance of existing dam's instrumentation (if any) including but not limited to identifying gaps and recommendations;
- c. Compile relevant technical information of the existing dam instrumentation as well as details and contacts of accessible manufacturers and suppliers of the same;
- d. Prepare the instrumentation plan following recommendations of Appendix 2 of WB's good practice note on dam safety (<https://openknowledge.worldbank.org/handle/10986/35484>)

3.1.2.3 Sub-Task 3 – Develop an Operation and Maintenance plan

Under this task, the Consultant shall but not necessarily limited to:

- a. Specify the requirements of safety inspections on daily, monthly, yearly and periodic (period to be recommended by the consultant)¹;
- b. Analyse the existing staffing level and technical expertise for Dam Safety Management;
- c. Analyse the suitability of existing tools and equipment for Dam Safety Management;
- d. Prepare the operation and maintenance plan following recommendations of Appendix 3 of WB's good practice note on dam safety (<https://openknowledge.worldbank.org/handle/10986/35484>)
- e. Develop and recommend staffing levels, technical expertise and required tools and equipment for dam maintenance and operation procedures including safety inspections as well as necessary capacity building;
- f. Provide onsite training to BWB operational personnel in implementing the procedures which are outlined in the final O&M plan, including tasks such as data collection, record-keeping, and data interpretation to optimize plant operation and safety.

3.1.2.4 Sub-Task 4-Develop an Emergency Preparedness Plan (EPP)

The purpose of the EPP is to provide a pre-determined plan of actions that the dam operator should implement if a dam safety emergency develops. This plan will be prepared by the Consultant in close collaboration with the authorities in charge of emergency management.

Under this task, the Consultant shall identify possible emergencies including possible dam failure. The Consultant shall produce a plan describing the role of parties (stakeholders) to meet these possible emergencies including situations when dam failure is imminent.

¹ Periodic Safety Inspection should be carried out by independent experts.

In preparing the plan, the Consultant's activities shall include preparation of descriptions and associated atlases and flow charts for stakeholders for the following (but not necessarily limited) situations:

- a. Emergency situations;
- b. Dam Breach (Structural failure);
- c. Expected floods from dam failure
- d. Identify measures required on Mudi to withstand flood caused by dam failure flood of Hynde Dam.
- e. Extreme Floods
- f. Seismic waves
- g. Cyclones
- h. Water Contamination
- i. Terrorism and Sabotage

Preparation of the EPP will require simulations of extreme flood and dam break scenarios with flood waves propagation downstream. Dam break inundation maps shall show inundation areas at scales sufficient for the identification of areas at risk and shall include inundation tables which show the arrival time of the flood water, peak flood elevation, velocity, etc. at key locations.

The emergency preparedness plan and associated maps shall be prepared following recommendation of Appendix 4 of WB's good practice note on dam safety (<https://openknowledge.worldbank.org/handle/10986/35484>).

3.1.3 Part 4: Detailed Design and Tender Documentation for New Mudi Water Treatment Plant

The Consultant shall prepare Detailed Design and Tender Documents for Mudi water treatment plant which will involve the construction of a new water treatment plant whose capacity shall be determined by the consultant, raw water transmission mains, rehabilitation and upgrading of pumps and pumping station at Mudi. The Tender Documents shall be prepared in accordance with the appropriate version of the World Bank Guidelines and Standard Bidding Documents for the Prequalification process and Procurement of works. Specific activities shall include, but not necessarily limited to:

- a. Carry out an analysis of the existing water treatment plant in order to identify gaps and areas for improvement taking into account adequacy of the water source and the related water resources security.
- b. Conduct an assessment of rehabilitation/upgrading needs for the Mudi clear water pumping station and balancing reservoir.
- c. Conduct geotechnical investigations to determine bearing capacities of the soils for the water treatment plant, pipeline routes and all the associated infrastructure;
- d. Conduct all necessary engineering and topographic surveys for the works;
- e. Prepare Detailed Design and Tender Documents (civil/structural and electro-mechanical), including construction drawings, technical specifications, bill of quantities, and engineer's cost estimates for the water treatment plant, raw water

transmission pipeline works, clear water balancing reservoir and pumping station rehabilitation works;

- f. Prepare detailed construction plan and implementation program for the works
- g. Assist BWB in obtaining approvals where necessary from local authorities, utility bodies, land offices and other approving authorities;
- h. Advise on procurement packaging of the transmission network investments and prepare bid documents in accordance with World Bank requirements; and
- i. Assist BWB in the tendering process, including assistance in preparing tender notices, arranging pre-bid meetings, responding to queries from bidders, evaluation of bids and contract negotiations.

3.2 Phase 2 – Construction Supervision

3.2.1 In close collaboration with BWB’s Project Implementation Unit (PIU), the Consultant shall supervise the works execution on a day-to-day basis in accordance with the signed works contract and the CSQAP.

3.2.2 Contract administration

Under this task, the Consultant shall but not necessarily limited to:

- a. Assist BWB in all aspects of contract administration and management of the construction works for the network interventions;
- b. Prepare contract management manual which shall be set out an organization chart, full contact details for each organization involved in the execution of the works, together with detailed procedures for the issuance of correspondences, information request, shop drawings, engineers instruction, variation orders management, contract sum adjustments, extension of time, standard monthly reporting by the contractor, minutes of monthly meeting, site inspection, standard forms to be used and project filing system;
- c. Examining the contractor’s detailed work program and guiding the contractors in preparation of a supervision schedule/work plan for each package;
- d. Ensure that conditions/ recommendations made by all statutory and approval authorities are met without incurring loss of time and money on the project;
- e. Prepare detailed site reports, certified by the site Engineer, during the continuation of the Contract. The reports shall include on site/off site activities, weather conditions, ground and traffic conditions, number of staff on site, records of visitors to the site, construction materials delivered, plants or equipment used or idling at site, daily works recording, quality inspections, encumbrances causing delays, photographic and video recording of important activities at site etc;
- f. Maintain daily site diaries, and daily reports to verify contractor’s daily records of labour, plant and equipment, weather conditions, progress, instructions and delays.

- g. Maintain a photographic record of the progress of the work.
- h. Issue field instructions in writing as required and ensuring that the construction drawings are revised to suit actual site conditions encountered and to minimizing disruption to the progress of the works.
- i. Organize and chair site meetings. As soon as practical after the meeting, prepare and distribute minutes for agreement and signing.
- j. Report to the Client regularly on progress and advise the Client of any potential problem areas likely to affect progress and propose solutions to avert the problem.

3.2.3 Quality Assurance Plan Implementation

Referring to the CSQAP, the Consultant will implement the Quality Assurance clauses covering all the works at Mudi Dam and Mudi Water Treatment Plant.

3.2.4 Schedule and Cost Management

Under this task, the Consultant shall but not necessarily limited to:

- a. Monitor the progress of the contract and prepare monthly progress reports on both schedule and cost performance of the contracts using Earned Value Techniques or other tools as appropriate. Flag any issues to BWB in a timely manner, and recommend actions to be taken;
- b. Assess and incorporate confidential delay contingencies, should delays become unavoidable and advise BWB regarding the target practical completion dates for the project components;
- c. Undertake cost management for BWB. The Consultant shall follow several bases in monitoring the cost such as details of breakdown of work items as in the Contract, variation and escalation contingencies within the budget, status of sub-packages, anticipated variations, running forecast cost at completion for each item;
- d. Monitor the Contract costs relative to the Contract budget and programmed expenditure considering actual quantities and update quantity estimates, costs of variation orders, costs of potential claims and any other costs.
- e. Review and effect any design changes during construction with prior approval from the client.
- f. Prepare actual and forecast monthly/yearly cash flows to assist BWB's cash flow management for the works;
- g. Check contractor's invoice and issue progress payment certificates;
- h. Check and make recommendation for any variation orders if required;
- i. Check and recommend any extension of time required to be given to the contractor.

- j. Recommend substantial completion certificate to the contractor for each contract;
- k. Recommend final acceptance certificate for each contractor after expiration of defect liability period;

3.2.5 As-Built Drawings and O&M Manuals

Under this task, the Consultant shall but not necessarily limited to:

- a. Ensure that the contractors maintain at the site a complete set of 'as-built' drawings for the contract as the work proceeds.
- b. Ensure the contractors provide all manufacturers operation manuals, instructions and technical details for the installations. The consultant shall review any detailed operation and maintenance manuals prepared by the contractor and shall be responsible for ensuring the manuals are complete and submitted to BWB. The O&M manuals shall include at least:
 - i. reference to all relevant design and other reports, specifications etc. to provide a complete bibliography on the structures and plant such that the operation and maintenance staff can understand the basis of their functions;
 - ii. details of any problems encountered during construction which may have a bearing on the future safe operation and decommissioning of the facilities;
 - iii. full operating instructions for all systems; drawings, diagrams, charts, notices etc. to facilitate understanding of safe operation and maintenance including trouble shooting guide of electro-mechanical equipment; and
 - iv. maintenance schedule and consumables required to give reliable operation of the facilities.

3.2.6 Environmental and Social (ES) Obligations

The Consultant shall ensure that the Contractor's ES performance is in accordance with good international industry practice and delivers the Contractor's ES obligations. The ES related services shall include but not limited to:

- i. review the Contractor's Environment and Social Management Plan (C-ESMP), including all updates and revisions at frequencies specified in the Contractor's contract (normally not less than once every 6 months);
- ii. review all other applicable contractor's documents related to ES aspects including the health and safety manual, security management plan and sexual exploitation and abuse (SEA), and Sexual Harassment (SH) prevention and response action plan;

- iii. review and consider the ES risks and impacts of any design change proposals and advise if there are implications for compliance with ESIA, ESMP, consent/permits and other relevant project requirements;
- iv. undertake, as required, audits, supervisions and/or inspections of any sites where the Contractor is undertaking activities under its contract , to verify the Contractor's compliance with ES requirements (including relevant requirements on SEA/SH));
- v. undertake audits and inspections of Contractor's accident logs, community liaison records, monitoring findings and other ES related documentation, as necessary, to confirm the Contractor's compliance with ES requirements (including relevant requirements on SEA/SH);
- vi. determine remedial action/s and their timeframe for implementation in the event of a noncompliance with the Contractor's ES obligations;
- vii. ensure appropriate representation at relevant meetings including site meetings, and progress meetings to discuss and agree appropriate actions to ensure compliance with ES obligations;
- viii. monitor that the Contractor's actual reporting (content and timeliness) is in accordance with the Contractor's contractual obligations;
- ix. review and critique, in a timely manner, the Contractor's ES documentation (including regular reports and incident reports) regarding the accuracy and efficacy of the documentation;
- x. undertake liaison, from time to time and as necessary, with project stakeholders to identify and discuss any actual or potential ES issues;
- xi. establish and maintain a grievance redress mechanism including types of grievances to be recorded and how to protect confidentiality e.g. of those reporting allegations of SEA and/or SH.
- xii. carry-out the following activities consistent with the Works contract to be supervised, including but not limited to the following::
 - a) support the Works employer to organize an SEA/SH conference, ensure appropriate representation in the conference and follow-up on any agreed actions by the attendees;
 - b) monitor contractor's compliance with its SEA/SH Prevention and Response Obligations, and take appropriate contractual actions if non-compliance is identified, including upon identification of potential non-compliance by a dispute board;

- c) ensure that any allegation of SEA and/or SH that are received by the Consultant are documented , maintaining appropriate confidentiality, and promptly submitted to the Employer and the Contractor;
 - d) prior to its engagement for the Works, verify that, a subcontractor not named in the contract, is qualified in accordance with the provisions of the SEA/ SH performance declaration for sub-contractors; provide appropriate support and relevant documents that a dispute board may need in reviewing SEA/SH contractual compliance;
- xiii. Supervise the Contractor’s contractual obligation on HIV/AIDS prevention, as well as safety and health. Check that works are being carried out in a safe manner and report all breaches of safety requirement. Monitor the corrective action taken to ensure unsafe practice does not continue.

3.2.7 Progress Reporting

The consultant shall prepare several reports to document progress of the works. These include, but not limited to the following:

- a. Comprehensive monthly report to BWB which includes the current expected completion date, the current forecast and cost, achievements during the month, status against program, current expenditures against expected cash flow, an analysis of any cost changes or variations, report on any significant problem areas and the action being undertaken to resolve them. The reports shall include a summary program showing the status, together with the trend graphs of key activities and a photographic and video record of work on site. The reports shall incorporate individual reports prepared by others as required.
- b. Comprehensive annual report covering the same subjects as the monthly reports, but in a comprehensive format related to technical and financial matters including consultant’s work plan for the next twelve months.
- c. Prepare a comprehensive final Project Completion Report (PCR) at the end of the assignment. This report must be submitted immediately after completion of contracts and shall summarize the methods of construction, construction supervision performed and recommendations for future projects of similar nature to be under taken by the Employer. The report should also contain summary of all reports in terms of project implementation, targets versus achievements, lessons and experience gained in project implementation, problems encountered and resolved.
- d. Other reports as required (such as ESHS reports, technical reports etc)

4 Expected Deliverables and Timeframe

4.1 Phase 1 Deliverables and Timeframe

Table 1 provides a summary of the expected deliverables and timeframe. For each deliverable, the Consultant shall prepare and submit to the Client one [1] electronic copy, preferably in MS Word, on CD Rom/ Pen-drive and five (5) hard copies of the reports.

Table 1 – Expected Deliverables for Phase 1

No	Deliverable	Due date (months after commencement)
1	Inception Report	1.0
2	Review and updated of the hydrologic, hydraulic, structural and operational safety of the dam	3.0
3	Study on optimum water yield of Mudi Dam and upgrading opportunities	4.0
4	Draft Detailed Design Report and Tender Documents for Dam Rehabilitation Works	6.0
5	Final Detailed Design Report and Tender Documents for Dam Rehabilitation Works	7.0
6	Draft Detailed Design Report and Tender Documents for Mudi Water Treatment Plant	9.0
7	Final Detailed Design Report and Tender Documents for Mudi Water Treatment Plant	10.0
8	Draft Dam Safety Management Plan	11.0
9	Final Dam Safety Management Plan	12.0
10	Training on Dam Inspection, Operation and Maintenance	12.0

4.1.1 Inception Report

Within four weeks of commencement of the assignment, the Consultant shall submit to the Client, five (5) hard copies and one [1] electronic copy on Flash Pen/ CD Rom of an inception report for the assignment. The report shall outline the Consultant’s organization and programme of work, methodology, approach and schedule of man-power to take account of the contract negotiations and Consultant’s initial findings after reviewing work already performed by BWB. The role and consultations to be made with stakeholders shall be included in the report.

4.1.2 Report on review and update of the hydrologic, hydraulic, structural and operational safety of Mudi Dam

The Report on the review and update of the safety condition of the dam, incl. sustainable sediment management strategy, shall be submitted within three [3] months of commencement of the assignment in five [5] hard copies and one [1] electronic copy on CD Rom/Flash Pen.

The report shall contain findings and results of all the analysis undertaken to assess the structural integrity and safety of the dam in line with good international industry practice (USBR, ICOLD, ...). The report shall come up with operation and maintenance requirements for the dam with cost and time estimates.

4.1.3 Study on optimum water yield of Mudi Dam and upgrading opportunities

The study report on optimum water yield of Mudi Dam and upgrading opportunities shall be submitted within four [4] months of commencement of the assignment in five [5] hard copies and one [1] electronic copy on CD Rom/Flash Pen. The report shall inter alia, contain a comprehensive cost-benefit & sensitivity analysis and recommendations on the best possible rehabilitation and upgrading options of the Mudi Dam to optimize yield and production. Prior to submission, the study report shall be subjected to a brainstorming session with the client and relevant stakeholders to ascertain the proposed rehabilitation and upgrading options.

4.1.4 Draft Detailed Design Reports and Tender Documents

The Consultant shall submit to the Client five (5) hard copies and one [1] electronic copy on CD Rom/ Flash Pen of the Draft Design Reports, including drawings, and Tender Documents.

4.1.5 Final Detailed Design Reports and Tender Documents

The Client will review and submit comments on the draft Detailed Design Reports and Tender documents. The Consultant shall submit to the Client five (5) hard copies and one [1] electronic copy on CD Rom/ Flash Pen of the final Design Reports and Tender documents incorporating the Client's comments. The reports shall include a Preliminary Confidential Engineers Cost Estimate. The drawings shall be in five (5) hard copies on A3 paper and one (1) electronic copy on CD/ Flash pen preferably in PDF format.

4.1.6 Tender Documents

A complete set of Tender documents shall comprise of:

- Volume I – Bidding Document (Bidding Procedures, Works Requirements, Conditions of Contract and Contract Forms);
- Volume II – Bills of Quantities
- Volume III – Specifications
- Volume IV – Tender Drawings

The submissions shall be in accordance with the appropriate version of the World Bank Guidelines and Standard Bidding Documents for the Prequalification process and Procurement of works.

The Consultant shall submit separate Tender Documents and Final Tender Drawings for each package. This shall be in five (5) hard copies and one [1] electronic copy on CD Rom/ Flash

Pen for the Bidding Documents per package. For each package, the bidding documents shall also include a Final Confidential Engineers Cost Estimate and an Excel version of the Bills of Quantities. All tender drawings shall be on A3 paper and electronic preferably in PDF format and in AutoCAD format.

4.1.7 Draft Dam Safety Management Plan

The Consultant shall submit to the Client five (5) hard copies and one [1] electronic copy on CD Rom/ Flash Pen of the draft Dam Safety Management Plan (DSMP). The DSMP shall comprise the following documents:

- Construction Supervision and Quality Assurance Plan (CSQAP);
- Dam Instrumentation Plan (IP);
- Operation and Maintenance (O&M) Plan;
- Emergency Preparedness Plan (EPP).

4.1.8 Final Dam Safety Management Plan

The Client will review and submit comments on the draft Dam Safety Management Plan (DSMP). The Consultant shall submit to the Client five (5) hard copies and one [1] electronic copy on CD Rom/ Flash Pen of the final Dam Safety Management Plan (DSMP) after incorporating the Client’s comments. The final DSMP shall comprise the following documents:

- Construction Supervision and Quality Assurance Plan (CSQAP);
- Dam Instrumentation Plan (IP);
- Operation and Maintenance (O&M) Plan;
- Emergency Preparedness Plan (EPP).

4.1.9 Monthly Progress Report

The Consultant shall submit monthly progress reports in five [5] hard copies indicating progress against program or schedule of activities.

4.1.10 Payment Schedule for Phase 1

Payments for Phase 1 of the assignment shall be based on approved deliverables. Table 2 shows the expected payment schedule (subject to negotiation with winning bidder).

Table 2: Payment Schedule

	Deliverable	Proportion of payment (%)
1	Inception Report	5%
2	Initial Dam Safety Review and Update	5%
3	Study of best options for the rehabilitation and upgrading of Mudi dam	5%

	Deliverable	Proportion of payment (%)
4	Draft Detailed Design Report and Tender Documents for Dam Rehabilitation Works	10%
5	Final Detailed Design Report and Tender Documents for Dam Rehabilitation Works	15%
6	Draft Detailed Design Report and Tender Documents for Mudi Water Treatment Plant	10%
7	Final Detailed Design Report and Tender Documents for Mudi Water Treatment Plant	15%
8	Draft Dam Safety Management Plan	10%
9	Final Dam Safety Management Plan	15%
10	Training on Dam Operation and Maintenance	10%
		100%

4.2 Phase 2 Deliverables

Table 3 below provides a summary of the expected deliverables during this period. For each deliverable, the consultant shall prepare and submit to the Client one [1] electronic copy, preferably in MS Word, on CD Rom/ Flash Pen and five (5) hard copies of the reports

The Consultant will be required to prepare reports during the implementation of the project. All reports and documents will be in English language and all quantities expressed in metric units. The Consultant shall prepare and submit to the Client the following reports:

Table 3: Summary of the Expected Deliverables – Phase 2

No.	Description	Due date (No. of months from commencement date)
1	Monthly progress reports (technical + financial)	Monthly
2	Contract management manual	1.5 month from commencement
3	Memorandums with proposed actions to be undertaken to address any issues arising during the implementation of the contract	As required
4	Certificates on quality of works	As required
5	Financial Reports	Monthly

6	Memorandums on the contractor's Interim Certificates payments and claims	As required
7	Environmental and Social Reports	Monthly
8	Operation and Maintenance Manuals from contractors	1 month after project completion
9	As-Built Drawings	1 month before practical completion
10	Final construction report (for each works package) _	3 months after practical completion
11	Inspection reports during defect notification period	As required
12	Certificate of completion	As required
13	Project Completion Report	3 months before the end of the Defects Liability Period

4.2.1 Monthly Progress Reports

The Consultant shall submit five [5] hard copies and one [1] electronic copy of Monthly Progress Reports to the Client during construction phase. The Monthly Progress Reports to the Client during construction phase should include:

- Brief description of the Works;
- Description of activities completed and in progress;
- Progress compared with construction programme and estimated completion date including approved extension;
- Financial report with payments to date compared to programme disbursements;
- Schedule and cost performance
- Quality control;
- Contractor's personnel and constructional plant;
- Consultant personnel;
- Weather conditions;
- Safety matters;
- Labour matters;
- Environmental and pollution control; and
- Photographic records.

4.2.2 Environmental and Social Reports

The Consultant shall provide immediate notification to the Client should any incident in the following categories occur while carrying out the Services. Full details of such incidents shall be provided to the Client within the timeframe agreed with the Client. Such reports may include:

- a. Immediately notify the Client of any allegation, incident or accident, which has or is likely to have a significant adverse effect on the environment, the affected communities, the public, Client's Personnel, Contractor's Personnel or Experts. In case of SEA and/or SH, while maintaining confidentiality as appropriate, the type of allegation (sexual exploitation, sexual abuse or sexual harassment), gender and age of the person who experienced the alleged incident should be included in the information. The Consultant shall provide full details of such incidents or accidents to the Client within the timeframe agreed with the Client;
- b. Immediately inform and share with the Client notifications on ES incidents or accidents provided to the Consultant by the Contractor, and as required of the Contractor as part of the Progress Reporting;

Share with the Client in a timely manner the Contractor's ES metrics, as required of the Contractor as part of the Progress Reports.”

4.2.3 Contract Management Manual

Within Forty-Five [45] days of signing the contract, the Consultant shall prepare a Contract Management Manual which will lay out procedures to be followed during the execution of the works. The manual shall be set out an organization chart, full contact details for each organization involved in the execution of the works, together with detailed procedures for the issuance of correspondences, information request, shop drawings, engineer's instruction, variation orders management, contract sum adjustments, extension of time, standard monthly reporting by the contractor, minutes of monthly meeting, site inspection, standard forms to be used and project filing system. The Manual will also serve as a basis for on-the-job training of the Employer's Representative staff during the implementation of the works contract.

4.2.4 O&M manuals

Within one [1] month of practical completion, the Consultant shall compile necessary and detailed institutional arrangements including manuals for operation, servicing and maintenance of the works from the contractor and or supplier.

4.2.5 Final Construction Report

The Consultant shall submit five (5) hard copies and two [2] electronic copies of Final Construction Report to the Client within three [3] months of practical completion of each of the works packages. The report shall cover all main aspects of the works, construction methods, design changes, actual conditions, quality control, problems encountered, as-built construction programme compared with original, disbursement schedule and other major aspects during construction of works.

4.2.6 Project Completion Report

The Consultant shall submit five (5) hard copies and two [2] electronic copies of Project Completion Report to the Client within three [3] months before the end of Defects Liability Period and shall cover the relevant information on the Project pertaining to the Consultant's observation and work carried out during Defects Liability Period.

4.2.7 Payment Schedule

Payments for Phase 2 of the assignment shall be time based. The consultant shall be paid in equal installments over the duration of the contract period that will amount to the total contract sum.

5 Client's Personnel and Training

The Board, will second one Civil Engineer, one Electrical Engineer and two dam operators to the Consultant. The Consultant shall provide on the job training to these personnel so that they provide useful contribution as part of the Consultant. Failure of the Board to provide such staff shall not relieve the Consultant of his responsibility to fulfil the whole or part of this Assignment.

6 Reporting

The Consultant shall report to the Project Implementation Unit Manager of Blantyre Water Board on contractual issues and Blantyre Water Board's assigned Contract Manager on daily operational issues.

7 Local Consultants

The Client encourages capacity building and expects International Consultants to work with a local consultant as part of capacity building.

8 Facilities to be provided by the Client

8.1 Office Space

Office space shall be provided by the Client during Phase I of the assignment and to be provided for under the works contract during Phase II.

8.2 Office Equipment

The Consultant will be self-reliant on office equipment.

8.3 Vehicles

The consultant should include in the financial proposal two (2) No. brand new 4 x 4 twin-cab vehicles as specified by the client for consultancy use and all operating costs (fuels, lubricants etc.) under Phase I. Operating costs for the vehicles under Phase II shall be provided for under the Works Contract. All vehicles and equipment procured under the contract shall remain the property of the client upon completion/expiry of the contract.

9 Immigration and Residence Permits

The Client will provide the Consultant assistance required to obtain necessary immigration and residence work permits for the approved expatriate personnel and their dependents. However, the responsibility remains that of the consultant.

10 Obligation of the Consultant

- i. The Consultant will be responsible for the payment of local taxes and duties for all goods and services including levies during execution of the project.
- ii. The Consultant is, therefore, expected to liaise with tax authorities, National Construction Industry Council (NCIC) and Blantyre City and District Councils in this respect.
- iii. The consultant shall be responsible for the accuracy of all data collected, analysis, conclusions and recommendations.
- iv. The copyright of all documents prepared by the consultant in connection with the agreement will automatically be transferred to the client. The consultant may make copies of such documents but shall not use the contents thereof for any purpose unrelated to the services without prior written approval of the client.

11 Expertise and Qualification Requirements

The Consultant shall provide a team of experts all of whom shall be adequately qualified and experienced in their respective fields and be eligible for registration with the relevant professional bodies in Malawi. It is expected that the consultant specialists will have as many as possible of the following credentials:

- i. Relevant general management or technical education and background;
- ii. A thorough understanding of the systems, procedures guiding the implementation, management and administration of loan projects supported by the IDA;
- iii. Practical working experience in the management and administration of projects supported by the IDA at the design level;
- iv. A thorough working experience of the management and administration of externally assisted projects in Sub-Saharan Africa;
- v. Fluent in English (Speaking and Writing).

The following is the minimum qualification and number of key personnel for Phase 1:

- a. **Team Leader:** The Team Leader shall have a multi-disciplinary experience in the interventions on the detailed design works of dam and water supply projects. In particular, he/she should have:
 - i. At least a Master's Degree in Hydraulic engineering or Civil Engineering with a minimum of 15 years relevant experience in design and supervision of dam and water supply projects, but also in team leadership in similar projects;

- ii. Be affiliated to relevant professional bodies;
 - iii. Proven capabilities in handling multi-disciplinary donor funded projects of this nature;
- b. Dam Safety Specialist:** Dam Safety Specialist will have a minimum qualification of a Master's Degree in Dam Engineering or equivalent with at least 10 years' relevant experience in the development and implementation of dam projects including responsible experience in dam engineering, dam safety, water resources management and hydrology. S/he should have experience in design of embankment dams and appurtenant structures and preparation of bidding documents for projects financed by multilateral development banks. The Specialist should have experience in projects funded by World Bank.
- c. Dam Instrumentation Specialist** He/she will have with a minimum qualification of master degree in instrumentation, mechanical or electrical engineering and 10 years' experience in dam monitoring. He/she will be responsible for identifying the available instrumentation and analysis and interpretation of historical instrumentation data. He/she will identify the requirements of any additional instrumentation necessary for monitoring dam safety and prepare proposals and Detailed Designs for installation and commissioning of additional instruments, if required. The specialist shall provide training to the clients Dam personnel on Dam monitoring, Data analysis and Interpretation.
- d. Hydrologic and Hydraulic Modelling Specialist:** He/she will have with a minimum qualification of a Master's Degree in Hydraulics/Water Resources or equivalent with at least 10 years' relevant experience in hydrological and hydraulic modelling, and dam break analysis. The specialist will model and plot the flood hydrographs generated by dam failure and the estimation of flood water levels in the downstream area. The specialist will review and update of the critical design flood and the hydraulic design of the spillway.
- e. Civil Engineer:** Shall have at least a Bachelor's Degree in Civil Engineering and 10 years experience in design and construction supervision of hydraulic infrastructures. The Engineer should have experience in preparation of bidding documents for projects financed by multilateral development banks. The Engineers shall be responsible for producing designs, both initial outlines and full plans, of water treatment plant and structures such as pump systems and pipe networks.
- f. Geotechnical Engineer:** A Geo-technical Engineer with a minimum of a Master's degree in geotechnical engineering or equivalent with at least 10 years' experience, or a minimum of a BSc in Civil Engineering with at least 15 years' experience in geotechnical works. The Engineer shall be responsible for all invasive and non-invasive tests for the proposed site of works and provide site condition data for structural design purposes. The expert shall also be responsible on the assessment of the Dam embankment structural integrity assessment;

- g. **Structural Engineer:** Shall have at least a Bachelor's Degree in Civil/ Structural Engineering particularly reinforced concrete and steel designs or its equivalent and at least 10 years of relevant experience. The Engineer should have 5 years' experience in designing, detailing and construction management of water retaining structures, pipelines, pumping stations etc. The expert shall be responsible for the design all concrete and steel structures and also assess existing structures integrity and provide recommendation;
- h. **Electromechanical Engineer:** Shall have at least a Bachelor's Degree (Electrical or Mechanical Engineering) with at least 10 years' experience in designing, construction management, supervision and quality assurance of mechanical and electrical equipment and systems in large integrated water supply projects, pipelines, water treatment plants, and pumping stations. The specialist shall be responsible for the design of the electrical works for Pumps, Dam's fish belly gates and all appurtenances for the Dam and the treatment plant
- i. **Water Treatment process engineer:** Shall have at least a Bachelor's Degree in Civil Engineering with at least 10 years' experience in municipal water infrastructure design and treatment processes. The Engineer shall have a proven track record in
 - i. Design and create specifications and construction drawings for water and wastewater facility upgrades, booster stations, pipelines, and other pipeline appendages and structures
 - ii. Conducting planning studies, modeling, and hydraulic / treatment calculations
 - iii. Preparing Preliminary Engineering Reports and Provide support for project bidding, construction, and construction observation
- j. **Land Surveyor:** Shall have at least a Bachelor's Degree in Land Surveying or equivalent, expertise in GIS and preferably a postgraduate training in GIS with at least five (5) years of relevant experience in large earth structures, integrated water supply projects, pipe lines, and pumping stations.
- k. **Environmental, Social Health and Safety Specialist:** Shall have at least a Bachelor's Degree in Environmental Sciences, Social Sciences or equivalent. The expert should have at least ten (10) years' experience in provision of Environment, Social (including sexual exploitation and abuse (SEA) and Sexual Harassment (SH)), Health and Safety [ESHS] oversight on infrastructure projects. The specialist should have capabilities to recognize and to deliver good international industry practice with respect to Environment, Social (including SEA and SH), Health and Safety (ESHS). The Specialist should have experience in projects funded by World Bank.

The following is the minimum qualification and number of key personnel for Phase 2:

- a. **Resident Chief engineer:** The Resident engineer shall have a multi-disciplinary experience in the interventions on the detailed design works of dam and water supply projects. In particular, he/she should have:
 - i. At least a Master's Degree in Civil Engineering with a minimum of 15 years relevant experience in supervision of dam and water supply projects, at least two dam projects as a resident engineer, and in team leadership in similar projects;
 - ii. Be affiliated to relevant professional bodies;
 - iii. Proven capabilities in handling multi-disciplinary donor funded projects of this nature;
- b. **Process Engineer:** The Engineer will have a minimum qualification of a Master's Degree in in water engineering/sanitary engineering/chemical engineering or equivalent with at least 10 years' relevant experience in implementation of water treatment plants. The main role shall be to complete detailed process system design and supervision for the water treatment plant.
- c. **Civil Engineer** Shall have at least a Bachelor's Degree in Civil Engineering and 10 years general experience with 5 years of relevant experience in construction supervision. The Civil Engineers shall coordinate all site inspection and supervision during construction.
- d. **Cost and Time Control Specialist:** Shall have a minimum of Bachelors in Business/Finance, Construction, Technology, Engineering or related field with certification by PMI or any other relevant professional body. The specialist shall have a minimum of 5 years' experience in construction industry costs and finance with proven experience in developing sustainable project control, cost, planning and document control systems in Donor funded multidisciplinary projects. Individual responsibilities among others during construction shall include:
 - i. Implementing applicable project controls standards and procedures.
 - ii. Tracking and analyzing the project costs including budgets, commitments, actuals, accruals and forecasts.
 - iii. Predicting and mitigating potential cost impacts to the project by managing, monitoring, trending and reporting changes in accordance with the project change management process.
 - iv. Maintaining a current overall project forecast to completion, including owner's costs and contractor's costs in the cost management application / system.
 - v. Monitoring and reports the actual costs compared to budget, including detailed variance analysis.
- e. **Environmental, Social, Health and Safety Specialist:** Shall have at least a Bachelor's Degree in Environmental Sciences, Social Sciences or equivalent. The expert should have at least five (5) years' experience in provision of Environment, Social (including sexual exploitation and abuse (SEA) and Sexual Harassment (SH)), Health and Safety [ESHS] oversight on infrastructure projects. The expert should have capabilities to

recognize and to deliver good international industry practice with respect to Environment, Social (including SEA and SH), Health and Safety (ESHS).

- f. Inspector of Works:** Shall have at least a Bachelor's Degree in Civil Engineering with at least five (5) years of relevant experience in earthworks and concrete works of similar magnitude and complexity, or a Diploma in Civil Engineering with at least eight (8) years of relevant experience earth works and concrete works of similar magnitude or other Technician qualifications in Civil Engineering with at least ten (10) years of relevant experience in earthworks and concrete works of similar magnitude and complexity.

The Level of Effort of professional staff to be provided by the Consultant is estimated at – 213 person months for both phases of the assignment. Details are provided in Tables 5 and 6 below.

Table 5: Person months for Phase 1

No	Expert	PERSON MONTHS PHASE 1		
		Detailed Design	Procurement of Contractor	Total
1	Team Leader	11	1	12
2	Dam Safety Specialist	4	0	4
3	Dam Instrumentation Specialist	4	0	4
4	Civil Engineer	5	0	5
5	Structural Engineer	5	0	5
6	Hydrologic and Hydraulic Modelling Specialist	5	0	5
7	Geotechnical Engineer	5	0	5
8	Electromechanical Engineer	4	0	4
9	Water Treatment Process Engineer	5	0	5
10	Land Surveyor	4	0	4
11	Environmental, Social and Health and Safety Expert	4	0	4
Total		56	1	57

Table 6: Person months for Phase 2

No	Expert	PERSON MONTHS PHASE 2		
		Construction Supervision	Defects Liability Period	Total
1	Resident Chief Engineer	24	2	26
2	Process Engineer	2	0	2
3	Civil Engineer	24	0	24
4	Cost and Time control Specialist	24	0	24
5	Environmental, Social and Health and Safety Expert	24	0	24
6	Inspector of Works (2 No)	48	2	50
Total		144	12	156

The estimated staff-months are indicative only. The consultant may propose an alternative level of effort, if it is supported by sufficient documentation in their proposal to show that it can successfully meet the assignment's objectives. The Resident Chief Engineer shall be full time on the assignment.