



Republic of Malawi



Blantyre Water Board



Blantyre City Council

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

**Terms of Reference:
Consultancy Services for Detailed Design and Construction Supervision of
Solid Waste Recycling Facility and Engineered Landfill in Blantyre City**

REFERENCE NO.: MW-BWB-333142-CS-QCBS

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1.0 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-1 (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 and sanitation services.

The project aligns with Malawi's development goals as well as strategic plans for the BWB and BCC. 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-1 (MWSP)

The project development objective (PDO) is to increase access to improved water supply and 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 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.

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 including 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.

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.

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

1.3 Description of project Area

Blantyre is the main commercial city of Malawi. Figure 1 shows Blantyre City's location map. According to the 2018 population census, the City of Blantyre has a total population of 853,500 people, with an average growth rate of 2.8% per annum. The Local Government Act of 1998, as amended in 2017, and the National Decentralization Policy of 1998, mandate Blantyre City Council (BCC) to govern and manage the City of Blantyre. The Local Government Act stipulates a number of services which councils are to provide to their residents and among them is the provision of solid waste management services.

1.4 Solid Waste Management

1.4.1 Collection, Waste Content, Quantities and Disposal

Solid waste collection and disposal service has been provided by the City Council for all ratable properties in Blantyre City. The Cleansing Services within the BCC's Department of Health and Social Services is responsible for waste collection and disposal. Waste management is largely focused towards planned areas such as industries, commercial properties, institutions, markets and ratable domestic dwellings. The informal urban areas, which include over 70 percent of the urban population, have little access to waste management services provided by the BCC.

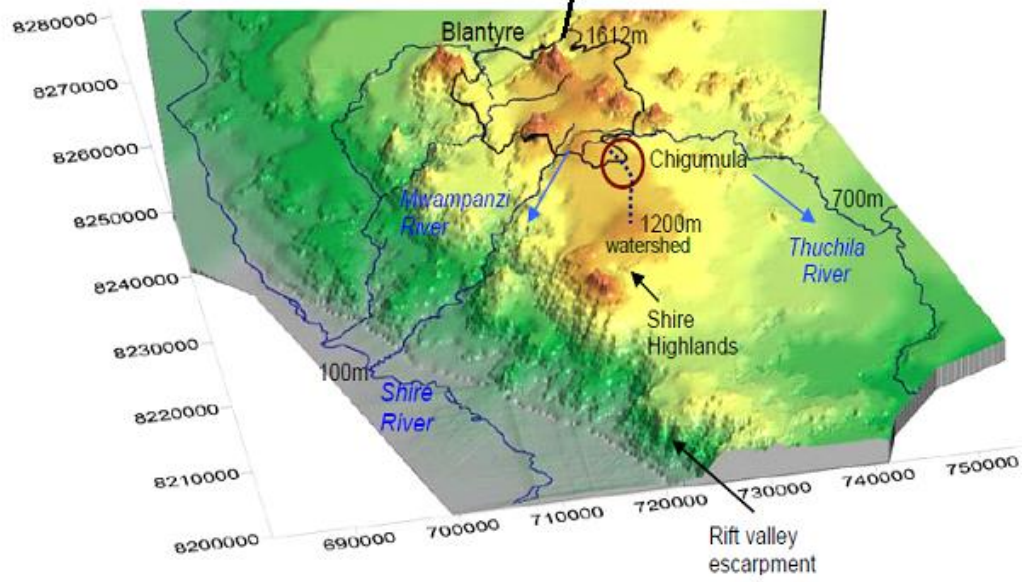
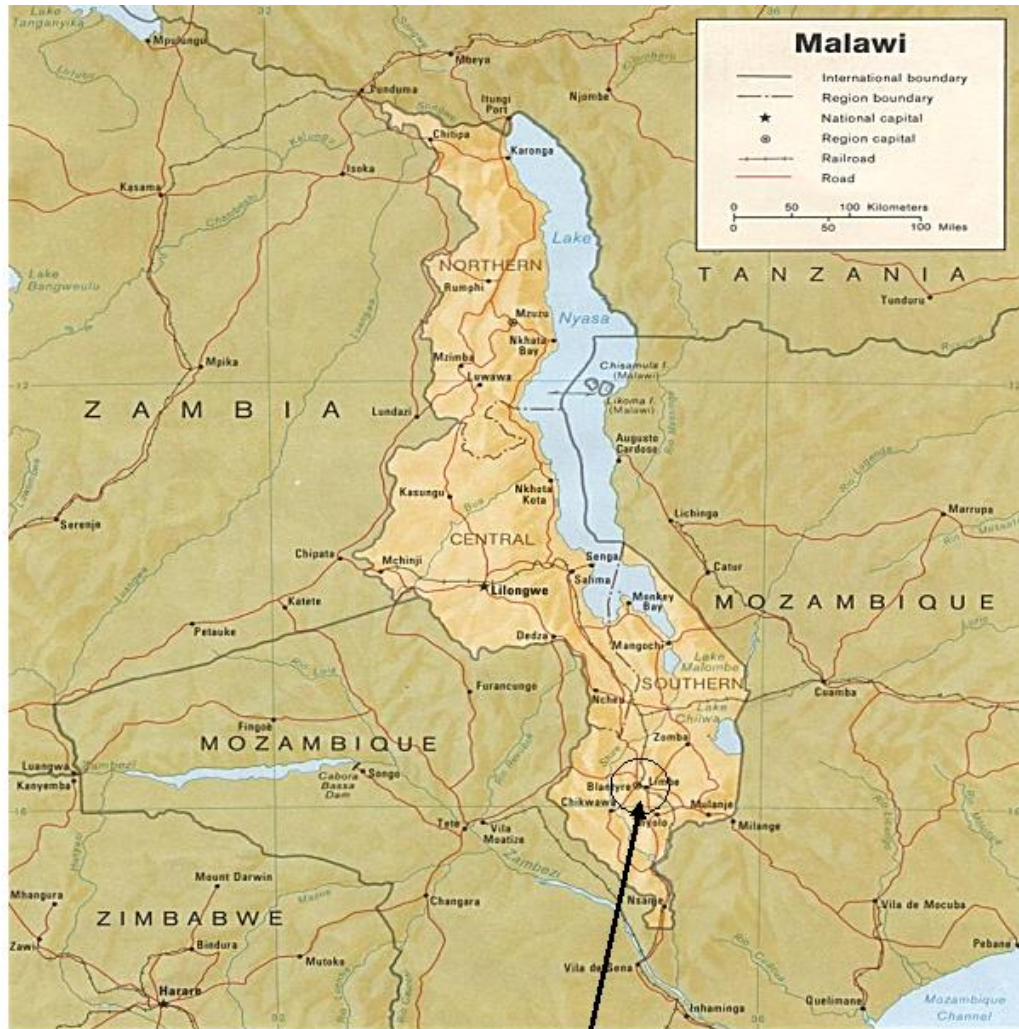


Figure 1: Blantyre City Location Map

Solid Waste Management in Blantyre City mainly involves primary collection, secondary collection and final disposal. Apart from the conventional system in managing solid waste stated above, there are some efforts to manage solid waste through resource recovery initiatives such as recycling, composting and waste to energy. Primary collection includes street and market cleansing, solid waste capture and containment. While secondary collection involves emptying and transportation of the solid waste from the containment sites to the final disposal site. At the final disposal site, solid waste is mostly disposed of unsegregated and thereafter it is periodically spread and compacted using machinery particularly the bull dozer. Solid waste management daily activities base their planning on the fact that 70% of the residents in the city live in high density areas and that the waste generation rate is pegged at 475 tons/Day.

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The collection of refuse in permanent housing areas is, only undertaken once the property owner or tenant has provided a suitable container, usually a small galvanized dustbin, and usually collection is currently planned to occur twice per week, though in some areas this is rarely achieved. Refuse collection from both planned and unplanned Traditional Housing Areas (THA) involves use of 6m³ skip bins that are estimated to serve 3,000 people (Blantyre City Sanitation Master Plan, 1995).

Solid waste collection in the City of Blantyre is mainly done using a fleet of 5 refuse collection vehicles. These vehicles are coordinated by a daily collection schedule guiding which routes to be collected on a particular day. Solid waste collection is done once a week for each residential area and every day in the Central Business District (Blantyre and Limbe) and in some markets. Some private companies also provide refuse collection (5%) and transportation services for their institutional premises.

The Council has an average of 800 employees responsible for solid waste management distributed in four (4) cleansing depots (zones) namely Blantyre, Limbe, Ginnery Corner and Soche. Tools provided for the primary collection of solid waste include: local brooms, rakes, shovels, digging forks and wheelbarrows. Apart from the working tools, the employees are also provided with protective wear for their safety while carrying out their duties. Prior to its subsequent disposal, solid waste is contained in litter bins (street or household), skip bins in markets and open spaces in low income areas and bunkers in markets and some private institutions.

Previous reports indicate that the density and content of wastes, from different sources in the city, vary considerably. Trade wastes contain very little moisture and a high volume of packing material such as mis-formed plastic and card packing. Domestic waste, however, has high moisture content, is acidic and contains abrasive charcoal ash and sweepings. Refuse arising from street sweeping is mostly dust, leaves, and considerable quantities of maize peelings and is usually not abrasive and dry, except during the rainy season. Scrap metal is collected by waste pickers who normally sell to recycling companies located at various sites within the city. Specialized waste is sometimes collected, but mostly disposal is done by producers. The City Council manages disposal of hazardous wastes. Data from the cleansing services section of the City indicates that 7,665 truckloads were disposed of at Mzedi dumpsite in 2022 alone. Estimated waste generated quantities in THAs is put in the order of 300g per person per day, at a density of 300kg/m³ (Blantyre City Sanitation Master Plan, 1995).

The current disposal site is Mzedi Dumpsite, a former timber plantation and was acquired by BCC in 1992. Solid waste collected is finally disposed at this site which is located some 5.5 km north of Limbe CBD, along the Blantyre Zomba road soon after Kachere Township. Mzedi dumpsite has a total area of about 17.3 hectares (including the buffer zone) out of which a total of 3.0ha is currently being used for waste disposal purposes. It was established around 1992 and was designed as an open dumpsite where there are no mechanisms for the treatment of leachate and gaseous waste produced from the solid waste decomposition processes. Spreading and compaction of refuse at the dumpsite is done periodically by hired machinery in an effort to manage the available dumping space.

Also worth noting is that BCC has been implementing a number of initiatives and exploring some partnerships aimed at enhancing service delivery in critical hotspots such as markets and crowded commercial areas. However, the current approach to service delivery has proven costly as it relies mostly on the BCC capacity, with little private sector involvement. Diagnostic and prefeasibility studies that were undertaken in Blantyre City (1995, 2004 & 2020) identified development of integrated recycling facility and new engineered landfill; and improvement of collection and transport systems as critical interventions that can be done in a short term period in order to meet the city development targets. Blantyre City carried out a Waste Site Investigation in 2004 under which sites such as Khumbe, Chirimba, Mapanga, and Cigumula were sampled. The 2004 waste site investigation report recommended Chigumula as the suitable site for construction of an engineered landfill. In line with these studies and in a bid to improve on service delivery, Blantyre City Council, with financing

from WB under the MWSP, seeks consulting services from a competent firm to prepare detailed engineering designs, tender documents for an integrated recycling facility and engineered landfill and improvement of collection and transport of solid waste. The proposed projects will reduce illegal dumping, which in turn will reduce environmental and health risks to the local population, improve hygiene conditions and the quality of the environment in the city.

1.6 Objectives

1.6.1 Overall Objective of the Assignment

The main objective of this consultancy is to do a full solid waste management chain assessment, design of Solid Waste Management services and treatment facility (recycling and landfill), and supervise the construction of a solid waste recycling facility and an engineered landfill in Blantyre City to ensure sustainable public health and environmental protection.

1.6.2 Specific Objectives of the Assignment

The specific objectives of the assignment include but not limited to the following:

- (i) Conduct a full solid waste management chain assessment for managing solid waste in the City of Blantyre and designing of Solid Waste Management services and treatment facility (recycling and landfill) in Chigumula as well as all-weather access road into the landfill.
- (ii) Prepare the following documents for the targeted solid waste recycling facility and engineered landfill as well as all-weather access road into the landfill:
 - a. Detailed designs including;
 - Construction drawings
 - Bills of quantities
 - Engineering cost estimates
 - b. Tender documents and technical specifications with respect to World Bank Standards
 - c. Implementation plan and framework
- (iii) Conduct strategic assessment of Solid Waste Management Services and Systems with a focus on improving sorting, storage, collection, transportation, disposal and reuse of solid waste in the City of Blantyre.
- (iv) Prepare construction supervision and quality assurance plan, and broad institutional framework including O&M plan (asset management).
- (v) Supervise the works during the implementation in accordance with the highest national and internationally accepted standards of the engineering profession (Standard Specifications for solid waste recycling and engineered landfill, FIDC conditions of Contract, GIIP, and WBG Guidelines) and ensure that the work is carried out in accordance with the contract conditions, drawings and technical specifications, and within the program and budget for the construction contract.

2.0 Detailed Scope of Services

The consultant's scope of services consists of two major Phases: (i) Feasibility study and Design phase (ii) Construction supervision phase. The consultant shall perform all services, and carry out all necessary investigations, to enable production of acceptable, safe, economic, usable and feasible designs, detailed bills of quantities, bidding documents according to World Bank Standards, as well as GIIP, national and international standards, and supervise the execution of the works.

The services shall be carried out in accordance with generally acceptable international standards, following recognized engineering and management principles and practices. The languages of all drawings, documents and reports shall be in English.

All drawings (including As-built drawings), documents and reports produced by the consultant under the contract and equipment bought shall become the property of Blantyre City Council upon completion of the consultancy services.

2.1 Detailed Description of Tasks

2.1.1 Phase 1 – Feasibility Studies, Detailed Engineering Design and Bidding Phase

2.1.1.1 Strategic assessment of Solid Waste Management Services and value chain in the City of Blantyre.

- i. Obtain and review all relevant documents, including previous strategic plans, waste value chain maps, reports, etc.
- ii. Carry out a comprehensive review and analysis of current status of solid waste management in Blantyre, with respect to service coverage, technical/operational issues, environmental issues, institutional and human resources/staffing issues, financing arrangements for both capital investment and running costs/service management costs, current levels of investment.
- iii. Assess and provide detailed analysis of all major aspects of integrated solid waste management such as generation, collection, storage, transportation and final treatment (disposal, segregation, reuse, recycle, recovery and composting). The quantities of Solid Waste (SW) generated should be presented as total (tonnes per year) and relative quantities (kg per capita per year). The quantities of SW generated (tonnes per year) by large commercial waste generators should also be presented separately.
- iv. Review and assess assets used/created for Solid Waste Management (SWM) service delivery: This will include an assessment of equipment/vehicles/infrastructure purchased/created/leased for the complete value chain in terms of their age, adequacy, capacity and efficiency.
- v. Assess and identify potential land or location of proposed site for stationing of mobile waste transfer vehicles that can be used as transfer stations so as to shorten the distance from furthest point of the city to the disposal site.
- vi. Establish existing community engagement practices and Information, Education and Communication (IEC) activities

- vii. Document nature and scale of informal sector working in waste collection and recycling and the livelihood dependence of such groups on SWM sector
- viii. Review, assess and design SWM management system and partnership models of both the existing and new legal, regulatory, and organization frameworks for solid waste management, private sector engagement in SWM service provision including recycling plant and landfill management in Blantyre City. The Consultant shall inform the client on how they plan to engage the current players and ensure sorting and adequate transportation to the disposal site.
- ix. Review waste management strategies, guidelines, policies and current best practices at international, regional and national levels and identify lessons relevant for Blantyre City;
- x. Identify any gaps which were not considered in the previous studies and reports
- xi. Organize meetings, workshops and seminars to present the initial findings
- xii. Conduct baseline survey where necessary to update the available data
- xiii. Develop a solid waste management planning framework for improvement of collection, transport/transfer, recycling, disposal and resource recovery in Blantyre City
- xiv. Undertake stakeholder consultation process in conjunction with the Client so that stakeholders' inputs are taken on board in the final strategic assessment report.
- xv. Provide Recommendations on the following:
 - a. Institutional arrangements which would be more supportive of efficient and effective solid waste management.
 - b. Privatization arrangements which would promote contestability of government service and lead to improved efficiency and reliability of service.
 - c. Routing assessment to optimize collection and transportation of solid waste in Blantyre City; strategies and implementation models for waste management and waste segregation at source
 - d. An asset management strategy to ensure that there is adequate planning and budgeting for managing landfills, SWM equipment, collection stations, etc in the future. This shall include recommendation on the revenue model and tariff rates.
 - e. Environmental Assessment (EA) to gain a thorough understanding of the environment where the recycling plant and landfill are to be sited so as to ensure that the designs of the recycling plant and landfill minimize impacts on the environment. The EA shall consider the following measures: (i) assess meteorological data; (ii) conduct soil investigation (iii) conduct a hydrogeological assessment to assess the potential for impacts on local groundwater quality; (iv) investigate water management requirements; (v) investigate recycling plant and landfill gas and odour control options; (vi) ensure that the recycling plant and landfill is sited to protect groundwater, surface waters and flora and fauna; (vii) ensure that sufficient buffer is available for the life of the recycling plant and landfill and until the recycling plant and landfill have stabilized; (viii) consider the most appropriate recycling and landfilling type to meet the requirements imposed by the local conditions; (ix) consider natural features that will reduce the visual impact of the recycling plant and landfill; (x) commence the community consultation process early (xi) conduct a hydrological review and rapid flood-risk assessment.

2.1.1.2 Feasibility studies and Detailed Engineering Designs and Tender Documentation

Specific tasks to be undertaken by the Consultant shall include the following:

2.1.1.2.1 Feasibility studies

2.1.1.2.1.1 Recycling and engineered landfill site

- (i) Assess medium and long-term urbanization trends in the City of Blantyre;
- (ii) Based on projected population growth; analyze the current waste generation capacity and volumes and forecast waste volumes and characteristics (e.g. organic, paper, glass, plastic or metal content) for a 15-year term.
- (iii) Provide a map of the entire city that demarcates the different areas to be serviced by the different landfill site and estimate the quantity and quality of solid waste to be treated in a particular site
- (iv) Carry out a detailed analysis based on waste generation, collection and transport mechanisms to select the best waste management option and alternative additional disposal sites which can accommodate the projected waste.
- (v) Develop a framework and a ranking methodology for prioritization of the sites. Climate change risks such floods, fires etc shall be considered in the multi-criteria analysis for selection of the site.
- (vi) Assess the feasibility of the proposed engineered sanitary landfill. Feasibility assessments shall cover technical, environmental and social and economic feasibility
- (vii) Analyze the level of biogas production expected during the life of the landfill and assess biogas recovery options, its potential end-use (gas, heat and electricity), technical and economic feasibility, and its impact on GHG emissions
- (viii) Carry out a detailed assessment of storm water management in and around the site to determine how rainwater will be managed to prevent intrusion into the ground and water ponding of the area;
- (ix) Carry out an assessment of the anticipated quality of leachate at the site and propose leachate collection, treatment/management measures;
- (x) Analyze flood risks to the recycling plant and engineered landfill site and assess impacts of flooding on collection/transportation and the disposal infrastructure;
- (xi) Assess potential impacts associated with climate change – including effects of river level rise, storm surge and other potential impacts as relevant using different climate change modeling scenarios.
- (xii) Assess the general conditions (physical development, sanitary conditions, accessibility and mobility, resilience and sustainability, etc.) of the built environment within the study area and its immediate surrounding;
- (xiii) Assess and analyze the recycling plant and engineered landfill site in terms of:
 - a. available land presently designated specifically for waste management/treatment at the proposed site,
 - b. formal or informal recycling being undertaken within the proposed site's waste collection areas,
 - c. specifically, designate areas within the recycling plant and engineered landfill site for hospital wastes and other dangerous wastes, and

- d. an estimate of how much SW (in m³) is shall be received by the recycling plant and engineered landfill site.

2.1.1.2.1.2 Waste Characterization

In this task, the Consultant shall conduct waste characterization through field investigations and verifications including:

- (xiv) Sample the municipal, commercial and industrial, construction and demolition, pesticide and hazardous waste stream from at least X representative urban areas and the surrounding townships outside Blantyre City, by taking statistically viable composite samples from collection trucks which serve various types of representative neighborhoods and analyze the MSW, commercial and industrial(e.g. hydrocarbons, solvents, etc.), liquid waste, construction and demolition, pesticide and hazardous waste stream composition, abattoir waste, etc. including but not limited to, percentage of wet weight for various components: vegetable/putrescible organics, paper, cardboard, film plastic, hard durable plastic, stone, rubber, textile, wood, bone, leaves and other garden wastes, ferrous metals, other metals, ash and construction rubble, but also level of decomposition and the existence or otherwise of toxic elements
- (xv) Analyze the waste characteristics such as:
 - a. moisture content of each sample
 - b. carbon to nitrogen ratio
 - c. lower heating calorific value
 - d. compost, in a batch system developed for this purpose, a composite of all of the samples taken and analyze the resulting compost for heavy metals (i.e., cadmium, chromium, zinc, mercury, lead) and refractory organics (i.e., pesticides).

2.1.1.2.1.3 Geotechnical/Soil Investigations and Analysis

- i. Conduct field investigations (test pits, trenching, boring, in situ testing) and laboratory subsurface soil exploration tests (california bearing ratio test, specific gravity of solids by pycnometer method, specific gravity of solids by density bottle method, determination of water content of soil, dry density of soil by water displacement method, in-situ dry density by sand replacement method, dry density of soil by core cutter method, particle size distribution of soil by sieving, particle size distribution by hydrometer method, the liquid limit of soil test, determination of shrinkage limit of remoulded soil, permeability of soil by constant head permeameter, variable head permeability test of soil, consolidation test of soil, shear strength of soil by direct shear test, unconfined compressive strength of cohesive soil, compaction of soil proctor's test, triaxial shear strength test, vane shear test on soil).
- ii. Conduct test pits and collect soil to assess the soil conditions and carry out soil classification using standard soil classification/characterization tests.
- iii. Conduct geophysical surveys to determine overall stratigraphy of soil and weathered rock layers and determine the depth to bedrock.
- iv. Conduct borings to assess geologic and hydro geologic conditions, take piezometric water levels, take groundwater samples to test for basic parameters of portability, and determine

- flow directions. Assess whether any deep aquifers which are used or potentially anticipated to be used for water supply are protected by a confining layer of impermeable rock or soil.
- v. Determine whether there is adequate on-site soil of acceptable quality and quantity for construction of cell bunds and provision of soil cover and base liner, to ensure that the shrinkage, permeability and strength of the soil is determined. If not, identify site(s) within economic haulage distance of suitable materials for off-site borrow. Off-site borrow areas shall be inspected, their suitability and quantities estimated, and their locations shown in the plans.
 - vi. Excavate test pits at the landfill site to a standard depth. Soil profiles and high groundwater markings shall be photographed and described.

Based on most cost-effective solutions particularly MSW and hazardous wastes transportation costs, conduct additional on-site field investigations at the landfill site to include the following:

- i. Topographic Survey. Topographic survey shall be done for the entire area needed for at least a 50-year life. The survey shall be adequate to develop a topographic contour map with at least 2-meter contour intervals. The perimeter boundary survey coordinates shall be mapped together with the 2-meter topographic contours. All roads, surface waters, and major landmarks shall be indicated on the map, as well as survey benchmarks. Identify all underground and overhead utility systems on the topographic survey maps, including water supply wells and lines, drainage channels and culverts, and electrical lines and poles. Identify all structures, including squatter housing and animal corrals. The maps shall be drawn to scales suitable for statutory authorizations, planning, constructions, operations and maintenance.
- ii. Borings. Borings shall be drilled through the soil column to unweathered bedrock, or to an appropriate alternative depth, whichever is less. Conduct soils analysis and testing to identify, classify and evaluate the engineering properties of the soils in order to optimize operations of the Landfill. Analysis and testing shall be conducted on disturbed and undisturbed soil samples in accordance with an internationally acceptable Testing and Materials Standards. The consultant shall propose an appropriate sampling grid.
- iii. Develop groundwater wells at the landfill site, to among others determine the groundwater level and flow patterns, establish permanent ground water monitoring wells, as well as the overall permeability of the groundwater regime and the potential for contaminated leachate from the proposed landfill to migrate.
- iv. Conduct a geophysical survey and justify the parameters, methods and grids selected throughout the area of the proposed engineered landfill. Analyze geophysical data obtained in relation with other technical information obtained at the site in order to inform the suitability of the site for the landfill.
- v. Laboratory Tests – Conduct mechanical, physical and physio-chemical analysis as well mineralogical analysis in accordance with the approved standards by an independent recognized institute and analyse them for suitability of a landfill.
- vi. The Consultant shall carry out the required detailed surveys for the landfill site. The consultant shall prepare relevant drawings related to the landfill and associated infrastructure at scales suitable for statutory authorizations, planning, constructions, operations and maintenance.

2.1.1.2.1.4 Design of Recycling Plant and Engineered Landfill

Based on the approved feasibility studies report;

- i. Provide recommendations and design parameters for construction of a climate resilient recycling plant and engineered landfill at the proposed waste treatment site.
- ii. Evaluate design conditions and report the engineering analysis, complete with identification of design issues and needs; in terms of technical, time, cost, quality and sustainability;
- iii. Carry out a detailed analysis based on waste generation, sorting, storage, collection and transport, disposal/treatment mechanisms, leachate management, gas collection etc. to select the best waste management option and disposal methods that can accommodate the projected waste.
- iv. Prepare preliminary design of projected facility for an **operational capacity of, at least 50 years** within an engineered structure and adoption of, modern and effective method of disposal taking into consideration: the environment, cost, applicability and sustainability.
- v. Select best international practices and technologies to prevent environmental and social impacts, and greenhouse gas emissions associated with the new facility and conduct consultations with the Client to validate these technical options; that they are appropriate and feasible in the country context.

The consultant shall be required to present all the options developed as informed by the findings from feasibility studies to stakeholders for approval before development of detailed designs.

2.1.1.2.2 Detailed Engineering Design

Prior to advancing to Detailed Engineering Design, the Consultant shall present, based on the approved Situation Analysis Report to the Blantyre City council the findings of its assessment and the recommendations, including the available options for the proper dry waste collection, transfer, and dumping mechanism, the sites, anticipated risks, the type of waste handling facilities which shall be signed/accepted by the Council.

The detailed design calculations for solid waste generated shall take into account of routes configuration, waste pooling sites and collection scheduling based on locations and volume of solid generated and recommend level of service for collection and transport mechanism for residential, industrial, commercial and institutions.

The Consultant shall design a durable fixed refuse bunkers with strong walls at recommended solid waste pooling sites designed to enable waste segregation at the garbage station and with easy access to cleaning.

Specific tasks to be undertaken by the Consultant shall include preparation of detailed engineering designs of the following:

A. Refuse Transfer Stations

- i. Design durable fixed refuse transfer stations with strong walls at recommended solid waste pooling sites designed to enable waste segregation at the garbage station and with easy access to cleaning.

B. Landfill Layout and Site Preparation Plan

- i. Design Administrative and staff houses buildings
- ii. Design access roads to the landfill and recycling facilities
- iii. Design internal access roads and loops
- iv. Design water supply system for regular consumption and firefighting measures
- v. Design energy (electricity) supply system and network
- vi. Design landscape
- vii. Design site layout identifying and specifying areas for:
 - a. Gate(s)
 - b. Administrative and staff houses buildings
 - c. Waste disposal cells
 - d. Receiving area and weighbridge
 - e. Landscape
 - f. Leachate treatment plant
 - g. Gas management plant
 - h. Recycling facility
 - i. Composting facility
 - j. Perimeter fence
- viii. Design filling sequence to ensure that landfill cells are open (not capped) for the shortest period of time and site operations are optimized.
- ix. Design a perimeter fence to minimize public access to the tipping face and where appropriate, ensure that waste received at the recycling facility and engineered landfill can be vetted and recycled.
- x. Design a gatehouse and weighbridge for plant and material monitoring, product sales and waste transfer station for the public.
- xi. Design site facilities to take into account: haul-road gradients, the external road network and the availability of services.
- xii. Design recycling facility to take into account provision of sufficient covered floor space to store at least one day's input.
- xiii. Design recycling facility to take into account installation of concrete floor to facilitate use of a front loader to feed the waste to an elevated conveyor.
- xiv. Design recycling facility to take into account installation of a drum shredder at the front of the waste stream to give better material conditioning prior to composting.
- xv. Design recycling facility to take into account installation of a hand sorting conveyor, with sufficient space for hand sorting staff to stand on either side of the unit and drop the sorted waste (rejects and recyclable materials) down chutes into suitable containers.
- xvi. Design recycling facility to take into account adequate number of sorting spaces of waste depending on the composition.
- xvii. Design recycling facility to take into account provision of organics storage area where organic material can be discharged on the ground and then loaded into wagons for transport to composting area.
- xviii. Design recycling facility to take into account provision of adequate space for an 8-10 week composting cycle, which includes weekly turning of the material using front loader.

- xix. Design recycling site facilities to take into account: provision of space for compost curing/maturation period, installation of a screening unit for screening of material prior to marketing and construction of a product storage facility/shed.
- xx. Design recycling site facilities to take into account: installation of all the necessary housing and/or installation of all waste recycling associated equipment and installations, be it mechanical and electrical.

C. Liner Design: To avoid adverse impacts to groundwater quality and also ensure that the liner meets the minimum requirements for liner utilization set by the regulatory authority.

- i. provide a comprehensive analysis of various options including but not limited to compacted clay liner (CCL), Geosynthetic Clay Liner (GCL), Geomembrane and or combination thereof
- ii. Recommend the preferred option
- iii. Design the most preferred bottom and cover liner system to contain leachate.
- iv. Design the lining system based on the outcomes of the hydrogeological, stability and landfill gas risk assessments as well as geotechnical investigation.

D. Leachate Collection:

- i. Provide a predictive analysis of leachate quantity
- ii. Design leachate collection and drainage system including sumps, manholes and pipe network taking into consideration the following, among others:
 - a. The head of leachate over the base of the liner.
 - b. Primary and secondary leachate extraction system.
 - c. Chemical resistance of construction materials.
 - d. Collection system drains to an extraction point.
 - e. Liner hydraulic coefficient.

E. Landfill Gas Collection System

- i. Strategies for monitoring and early collection of LFG
- ii. Horizontal gas collectors vs. vertical gas wells
- iii. Header design
- iv. Blower Flare Facility short term and lifespan capacity
- v. GHG reduction strategies
- vi. Feasibility of Gas to Energy (GTE) initiatives

F. Stormwater Management:

- i. Design stormwater management system that should take into consideration the following, among others:
 - a. Storm water, leachate and groundwater segregation.
 - b. Reuse of water onsite.
 - c. Drains or bund walls for storm water management.
 - d. Erosion and sediment control features.

G. Site Management Plans

- i. Design of intermediate and final cover system

- ii. Design Internal road and traffic management
- iii. Prepare and design Groundwater Monitoring Plan
- iv. Prepare and design Surface water Monitoring Plan (if applicable)
- v. Prepare and design Air quality monitoring plan
- vi. Prepare and design Landfill Fire protection plan
- vii. Provide a landfill closure plan
- viii. Provide a post closure plan

H. Recycling Facility:

- i. design of waste separation system, automated and manual where applicable with detailed list of equipment and their technical specifications
- ii. Provide estimate of rejected waste stream and management system to dispose of the rejected stream

I. Hazardous Waste Management

- i. Design systems and procedures to be followed for disposing hazardous waste including hazardous waste disposal facilities.

J. Convenient Access to the Facility

- i. Design an all-weather access road off Thyolo road to the recycling/engineered landfill facility, that will allow easy movement of refuse collection vehicles.

The prepared preliminary and detailed designs of the recycling facility and engineered landfill shall take into consideration of the operational capacity of at least 50 years with limited required maintenance expense.

2.1.1.3 Bidding Documentation and Assistance

- i. Prepare technical specifications, drawings, bidding documents, bill of quantities with estimated costs of the new facility and all site auxiliary infrastructure in accordance with World Bank requirements.
- ii. The consultant shall prepare bidding invitation notices and assist the Client with the invitation of bids, provide clarifications during the bid period, all in accordance with the Bank's procurement rules of procedures

2.1.2 Phase 2 - Construction Supervision and Contract Management

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. The consultant shall make sure, amongst others, that:

- (i) the works are carried out in accordance with the construction contract;
- (ii) the quality of materials and workmanship conforms with the specification of the construction contract; and
- (iii) construction plant and personnel provided and used by the contractors are adequate to construct the works.

- (iv) contractors are compliant to environmental, safety, health and social requirements.

Specific tasks shall include, but not necessarily limited to the following:

2.1.2.1 Contract administration

- a. Assist the client 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.

2.1.2.2 Quality assurance

- a. Establish a quality assurance system, including verification of source material and certification;
- b. Carry out necessary quality control activities and certifying that the quality of works and materials conforms to the specifications;
- c. Examine and approve the contractors' proposed changes to design (if any) and drawings for

- compliance with the specifications;
- d. Assist client to carry out factory tests/pre-shipment inspection for major equipment as and when required;
 - e. Examining the construction methods proposed by the contractor including environmental, safety, personnel and public issues. The consultant must ensure that the construction methods as proposed by the contractor for carrying out the works comply with the World Bank's environmental and social safeguards policy and guidelines.
 - f. Check survey points for the works and main setting out done by the contractor and ensuring that any errors found are promptly notified to the contractor and necessary remedial action is taken.
 - g. Undertake site supervision of construction, installation, testing and commissioning;
 - h. Undertaking resident supervision of the works by a qualified resident engineer in the respective discipline with sufficient experience who shall perform his duties with due diligence, efficiency and in accordance with the best engineering profession and consulting standards;
 - i. Direct locations or times for field testing in accordance with the specification and witness all such tests that will be performed by the Contractor in the laboratory to be established by the Contractor. Ensure all tests are conducted in accordance with the approved standards.
 - j. From time to time, if deemed necessary, carry out independent tests using the Consultant's personnel and the Contractor's laboratory and equipment
 - k. Check that testing equipment conforms to and is operated in accordance with relevant standard and that calibration certificates, where applicable, are current.

2.1.2.3 Schedule and Cost Management

- 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;

2.1.2.4 As-Built Drawings and O&M Manuals

- a. Ensure that the contractors maintain at the site a complete set of 'as-built' drawings for the contract as the work proceeds.
- b. On completion of the construction of each structure, the consultant shall assist BCC to transfer all records changes to BCC's GIS system. Any updating of the GIS shall be in accordance with the existing system.
- c. 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 BCC. 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.

2.1.2.5 Environmental, Social, Health and Safety (ESHS) Monitoring

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

- i. Supervise environmental matters in accordance with the stipulation of the Environmental and Social Management Plan (ESMP). Any additional and unexpected environmental incidences should be noted and necessary adjustments recommended and amended accordingly.
- ii. Review and approve the Contractor's Environment and Social Management Plan (C-ESMP), including all updates and revisions (not less than once every 6 months);
- iii. Review and approve ESHS provisions of method statements, implementation plans, Gender-Based Violence/Sexual Exploitation and Abuse (GBV/SEA) prevention and response action plan, drawings, proposals, schedules and all relevant Contractor's documents;
- iv. Review and consider the ESHS risks and impacts of any design change proposals and advise

- if there are implications for compliance with Environmental Social Impact Assessment (ESIA), ESMP, consent/permits and other relevant project requirements;
- v. Undertake audits, supervisions and/or inspections of any sites where the Contractor is undertaking activities related to the Works, to verify the Contractor's compliance with ESHS requirements including its GBV/SEA obligations, with and without contractor and/or client relevant representatives, as necessary, but not less than once per month
 - vi. Undertake audits and inspections of Contractor's accident logs, community liaison records, monitoring findings and other ESHS related documentation, as necessary, to confirm the Contractor's compliance with ESHS requirements;
 - vii. Agree remedial action/s and their timeframe for implementation in the event of a noncompliance with the Contractor's ESHS obligations;
 - viii. Ensure appropriate representation at relevant meetings including site meetings, and progress meetings to discuss and agree appropriate actions to ensure compliance with ESHS obligations;
 - ix. Check that the Contractor's actual reporting (content and timeliness) is in accordance with the Contractor's contractual obligations;
 - x. Ensure that all environmental and pollution control measures are implemented in accordance with the contract and are maintained for the duration of the works
 - xi. Review and critique, in a timely manner, the Contractor's ESHS documentation (including regular reports and incident reports) regarding the accuracy and efficacy of the documentation;
 - xii. Undertake liaison, from time to time and as necessary, with project stakeholders to identify and discuss any actual or potential ESHS issues;
 - xiii. 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 GBV/SEA.
 - xiv. 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.
 - xv. Ensure any GBV/SEA instances and complaints that come to the attention of the consultant are registered in the grievance redress mechanism

2.1.2.6 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)

3.0 Duration of the Assignment

3.1 Deliverables and Timeframes

The proposed duration for the Phase 1 of this assignment shall be a maximum of 10 months. Phase 2 of the consultancy services shall be 18 months construction supervision period and 12 months defects liability supervision period. The works for the various sites will run concurrently. The Consultant shall draw up their own proposal for a work schedule, but shall make due allowance for time required by the Council/PIU to assess and approve documents submitted by the Consultant, before subsequent project tasks can be commenced with. The following schedule is to be used as a guide. The works for the various sites will run concurrently. Table 1 provides a summary of the expected deliverables and timeframe.

Table 1 – Schedule of the Deliverables

Item No.	Deliverable	Due date
Phase 1: Feasibility Studies, Detailed Engineering Design and Bidding Phase (10 Months)		
1	Inception Report	1 month after commencement
2	Draft Strategic Assessment Report	3 Months after commencement
3	Final Strategic Assessment Report	4 Months after commencement
4	Draft Feasibility Studies Report	6 Months after commencement
	Final Feasibility Studies Report	7 Months after commencement
5	Draft Detailed Design Report and Bidding Documents	9 Months after commencement
6	Final Detailed Design Report and Bidding Documents	10 months after commencement
7	Environmental and Social Management Plans (ESMPs)	10 months after commencement
Phase 2a: Construction Supervision Phase, Site Handover (18 Months)		
1	Supervision and contract management manual	1 month from commencement
2	Monthly progress reports	Every 5 th day of the following month

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	Cash flow projections versus actual disbursements	As required
6	Memorandums on the contractor's Interim Certificates payments and claims	As required
7	ESHS Reports	Every 5 th day of the following month
8	Operation and Maintenance Manuals	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
Phase 2b: Defects Liability Period (12 Months)		
11	Support Implementation of proposed SWM management system and partnership models	As required
12	Quarterly Inspection Reports	Every 4 th Month after commencement of phase 3
13	Project Completion Report	3 months before the end of the Defects Liability Period

The Consultant shall draw up their own proposal for a time schedule, but shall make due allowance for time required by the Council/PIU to assess and approve documents submitted by the Consultant, before subsequent project tasks can be commenced with.

3.2 Format of Reports or Deliverables

3.2.1 Inception Report

The Consultant shall prepare an Inception Report one [1] month after commencement date. This report shall be prepared and submitted in five [5] hard and one [1] electronic copies to the Employer and shall include at least the following:

- (i) The Consultant's state of mobilization highlighting team details (consultant and subconsultant and their level of involvement, responsibility, liability and tasks)
- (ii) Any changes to the composition of the Consultant's team
- (iii) Proposed methodology and work plan for carrying out the following: designing of landfill and recycling facility, Waste characterization, Site Investigations (Geotechnical, Hydrogeological, Hydrological, Infrastructure, Traffic, Environmental), including quality, cost control, and ensuring compliance with environmental, H&S, PHPSA Plan and other requirements
- (iv) Proposed site communication procedures and recordkeeping
- (v) Detailed program of works, showing time, duration and personnel, as well as inter-relationship between activities

- (vi) Risk register that will be updated in the subsequent monthly progress report. The register should highlight what is required for the attention of the client and may affect the successful delivery of the assignment
- (vii) Format of Monthly Progress Reports
- (viii) Understanding of the ToR and scope of work, any proposals to improve the TORs, indication of adequacy or inadequacy of the ToR Outputs implementation, costs and performance of the system,
- (ix) Preliminary findings from initial assessments and/or review of historical data and information on solid waste sources, quantities and composition (desk or documentation review and field)

3.2.2 Strategic Assessment Report

The Consultant shall prepare a situation analysis report and presentation. This report shall be prepared and submitted in five [5] hard and one [1] electronic copies to the Employer and shall include at least the following:

- (i) Review of historical data and information on sources, quantities and composition
- (ii) Comprehensive review and analysis of current status of solid waste management, with respect to service coverage, technical/operational issues, environmental issues, institutional and human resources/staffing issues, financing arrangements for both capital investment and running costs/service management costs, current levels of investment.
- (iii) Comprehensive review and analysis on major aspects of solid waste management such as generation, segregation, storage, collection, transportation, use and reuse, trade, process/treatment, and disposal.
- (iv) Comprehensive review and analysis on SWM management system and partnership models
- (v) Projection of waste generation and management streams throughout the active lifespan of the proposed landfill and recycling facility
- (vi) Assessment of waste recycling potential
- (vii) Assessment of waste composting/characterisation
- (viii) Initial estimate of required landfill capacity and predictive characterization of the incoming waste during active lifespan of the proposed landfill
- (ix) Soil stratigraphy, type and grain size analysis (including clay content) bearing capacity, Identification of existing naturally consolidated clay layers, borrow pits for possible liner construction and /or daily and final cover in case needed, Hydrological Assessment
- (x) Assessment of existing infrastructure (Roads, Water supply, Energy supply, Traffic Assessment
- (xi) Environmental Assessment

Presentations on all deliverables, summarizing findings, shall be prepared and then presented and discussed at workshops attended by representatives of all stakeholder groups. The workshops and

meetings with representatives of individual organizations and groups shall be used to check information and obtain views on the key issues and the possible options for addressing them. Following the workshops, a final version of each respective report shall be prepared.

3.2.3 Monthly Progress Reports

The Monthly Progress Reports to the Client during construction phase should include:

- (i) Brief description of the Works;
- (ii) Description of activities completed and in progress;
- (iii) Progress compared with construction programme and estimated completion date including approved extension;
- (iv) Financial report with payments to date compared to programme disbursements;
- (v) Schedule and cost performance
- (vi) Quality control;
- (vii) Contractor's personnel and constructional plant;
- (viii) Consultant personnel;
- (ix) Weather conditions;
- (x) Safety matters;
- (xi) Labour matters;
- (xii) Environmental and pollution control;
- (xiii) challenges, issues, risks, updated risk register, and level of effort expected from the consultant's team in the following month; and
- (xiv) Photographic records.
- (xv) Plant and equipment deployment
- (xvi) progress on procurement,
- (xvii) planned work or activities in the next reporting period

3.2.4 Environmental, Social, Health and Safety (ESHS) 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. The Bank shall also be informed of such incidents with 48 hours, and a detailed report provided within 7 days. Such reports may include issues such as confirmed or likely violation of any law or international agreement, non-compliance with ESMP; any fatality or serious (lost time) injury; (significant adverse effects or damage to private property (e.g. vehicle accident); or any allegation of gender-based violence (GBV), sexual exploitation or abuse (SEA), sexual harassment or sexual misbehavior, rape, sexual assault, child abuse or defilement, or other violations involving children etc.

3.2.5 Contract Management Manual

Within Thirty [30] days of signing the contract, the Consultant shall, in consultation with the contractor, 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.

3.2.6 O&M manuals

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

3.2.7 Final Construction Report

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. 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.

3.2.8 Project Completion Report (PCR)

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, lessons learnt, 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. The PCR shall cover the relevant information on the Project pertaining to the Consultant's observation and work carried out during Defects Liability Period. 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.

4.0 Staffing Requirements

4.1 Key Professionals

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 Level of Effort of professional staff to be provided by the Consultant is estimated at 153 -person months for all phases of the assignment. Details are provided in Table 2 below.

Table 2 Person months for all phases of the assignment

No.	Expert	Minimum Number of Required Staff		Man-months
Phase 1: Assessments, Review, Update, Design and Tender Phase				
1	Team leader (Municipal Engineer)	1		10
2	Civil Engineer	1		10
3	Electromechanical Engineer	1		6
4	Financial / Economic Analyst	1		6
5	Environmental / Social Safeguards Specialist	1		3
6	Land Surveyor	1		5
Total				40
Phase 2 & 3: Construction Supervision Phase, Site Handover and Defects Liability Period				
No	Expert	Minimum Number of Required Staff	Supervision	Defects Liability
7	Resident engineer	1	18	3
8	Assistant Resident engineer	1	18	0
9	Civil Engineer	1	6	1
10	Electromechanical Engineer	1	6	1
11	Inspectors	2	36	0
12	Environmental/ Social Safeguards/ Health and Safety expert	1	18	0
13	Land Surveyor	1	6	0
Sub-Total			108	5
TOTAL				113

In addition to above listed positions of professionals, the Consultant shall consider other experts and support professionals with adequate qualifications and experience in relevant fields, and include in the technical and financial proposal. During technical evaluation process, these staff will not be evaluated individually. However, they will be considered collectively along with other support staff, if any, under “Organization and Staffing” criteria of evaluation. The indicative person months are meant to indicate number of months a professional staff will be in the field. Therefore, all key professional staff will have to be permanently present on the project site during design

4.2 Qualifications and Key Personnel Requirements

The key professionals for the consultant should have individual experience in related fields that shall include minimum two similar assignments carried out in a similar setting. The following is the minimum qualification of key personnel:

Table 3 – Key Personnel

Designation	Academic Qualification Required		Professional Experience Required
Phase 1: Assessments Detailed Design and Tender Phase			
Team Leader/Municipal Engineer	BSc (or higher) in Civil Engineering or similar (e.g. other Engineering disciplines) technical education Plus MSc. Degree in Civil / Municipal/Environmental Engineering	15 years	<p>Should have at least 10 years’ experience in planning and design of MSW facilities particularly engineered landfills and leachate and Highway Design</p> <p>Should have experience with design of integrated faecal sludge and solid waste treatment facilities</p> <p>Should have at least 10years experience in the design, construction, and operation of engineered landfills, landfill liner barrier protection systems, gas recovery systems and sanitation and leachate management systems.</p> <p>Should have handled at least three assignments of similar nature as a Team Leader</p> <p>Must be registered with a recognized Engineering Institution. Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank</p>
Civil Engineer	BSc in Civil/ Structural Engineering	15 years	<p>Should have 10 years’ experience in Landfill design and construction of barrier systems materials and specifications</p> <p>Surface and ground water investigations, hydrology, hydrogeology</p> <p>Quality assurance and laboratory testing</p> <p>Should have at least 10years experience in the design, construction, and operation of engineered landfills, landfill liner barrier protection systems, gas recovery systems and sanitation and leachate management systems.</p> <p>The Engineer should have 10 years’ experience in designing, detailing and construction management of water retaining structures, pipe lines, pumping stations etc.</p> <p>Should have handled at least 2 assignments of similar projects,</p> <p>Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank</p>

Electro Mechanical Engineer	Bachelor's degree in Electrical/Mechanical engineering	15 years	Should have at least 10 years' experience in design and construction supervision of waste treatment plant / Recycling plants/engineered landfills consisting of mechanical and electrical components Should have handled at least two assignments of similar nature Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank
Financial Economic Analyst	Minimum of BSc in Economics or Finance Management	15 years	At least 10years of experience in financial and economic analysis of infrastructure and/or municipal projects. Fluency in both written and spoken English is essential.
Environmental / Social Safeguards Specialist	BSc (or higher) in Environmental Health or similar (e.g. other Environmental Management Plus Master's Degree in Environmental Sciences/ Engineering/Social Sciences/Development studies	10 years	At least 5 years' experience working on environmental management with sound knowledge of environmental and social issues, initiatives and managing mitigation measures should have undertaken at least 2 feasibility studies and detailed design projects as an Environmental and Social Expert. Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank
Land Surveyor	Bachelor's Degree in Land Surveying	10 years	Should have expertise in GIS with at least 5 years of relevant experience in topographical surveys for civil works including sanitation and water supply projects Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank
Phase 2: Construction Supervision Phase, Site Handover and Defects Liability Period			
Resident engineer	BSc (or higher) in Civil Engineering or similar technical education Plus MSc. Degree in Civil / Municipal/Environmental Engineering or its equivalent including project	15 years	At least 10 years' experience in construction supervision, 5 years of which should as Resident Engineer in construction management and operation and maintenance of waste management infrastructure. Practical, hands-on experience in operating or managing solid waste facilities and others similar installations, is highly desirable. Should have fully completed (in all respects) at least 2 urban comprehensive waste management projects as Resident Engineer involving planning,

	management or contract management		<p>process design, detail engineering design, construction supervision, monitoring and commissioning.</p> <p>The Resident Engineer should have demonstrable working experience on works.</p> <p>Must be registered with a recognized Engineering Institution. Proficiency in listening and speaking of English.</p> <p>Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank</p>
Assistant Resident engineer	Bsc in civil engineering	15 years	<p>At least 10 years of professional experience working as Inspector of civil engineering works, waste management Inspector or other equivalent type of projects. Working experience in a similar position in at least 3 similar projects, in the past ten years. Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank</p>
Civil Engineer	BSc degree in civil engineering	10 years	<p>Should have 8 years' experience in Landfill design and construction of barrier systems materials and specifications</p> <p>Surface and ground water investigations, hydrology, hydrogeology</p> <p>Quality assurance and laboratory testing</p> <p>At least 10 years' experience in designing, detailing and construction management of water retaining structures, pipe lines, pumping stations etc.</p> <p>Should have handled at least 2 assignments of similar projects,</p> <p>Proficiency in listening and speaking of English. Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank</p>
Electro Mechanical Engineer	BSc in Electrical/mechanical Engineering or its equivalent	15 years	<p>At least 10 years working experience in supervising the construction of control stations (including equipment, electrical installation, automation, instrumentation and control) and installation of mechanical equipment and associated pipe works.</p> <p>Working experience in a similar position in at least 3 similar projects, in the past ten years.</p> <p>Proficiency in listening and speaking of English.</p> <p>Demonstrable experience with FIDIC Conditions and projects funded by international financing institutions such as the World Bank</p>

5.0 Obligations of the Client

The Client shall, wherever possible:

- (i) Assist the Consultant in obtaining information and data to enable the Consultant execute the services described herein effectively. However, the Consultant shall be solely responsible for executing the ground levels surveys, analysis and interpretation of all data and from his findings, making appropriate conclusion and recommendations;
- (ii) Ensure that data is accurate and available for ease of supervision of the works;
- (iii) Provide copies of available study reports and other relevant documents;
- (iv) Ensure that the Consultant has access to all available information required for timely execution of the assignment;
- (v) Assist the consultant to obtain necessary immigration, VISAs, registration with any board or agency, and residence work permits for the approved expatriate personnel and their dependants. However, the consultant remains responsible for this

6.0 Obligations of the Consultant

- (i) The Consultant shall be responsible for the payment of local taxes and duties for all goods and services including levies during execution of the project. The Consultant is, therefore, expected to liaise with tax authorities, National Construction Industry Council (NCIC) and Blantyre City and District Councils in this respect.
- (ii) The Consultant is expected to be fully self- sufficient in terms of accommodation, office supplies, office equipment, communication, transport, VISAs or permits, insurance and living expenses of the staff. The Consultant's proposal should include the cost of procuring 1 No. Brand New Twin cab 4 x 4 pickup vehicle, for use during the assignment, as provisional sums whose estimated market value has been predetermined by the client as part of Request for Proposal documents. The consultant will be instructed to procure this and/or any other property, under the direction and supervision of the client. All items, including vehicles, bought under this assignment or contract that will become property of the client after the project. The cost of running the vehicles will be borne by the Consultant.
- (iii) The data, documentation and assets from the consultancy will remain the property and in the custody of the Client at the end of the consultancy.
- (iv) The Consultant shall be available, at all times, for subsequent discussions of the assignment with the Client. The Consultant shall be responsible for the payment of local taxes and duties for all goods and services including applicable levies, during execution of the project.
- (v) The consultant shall ensure that data is accurate and available for ease of supervision of the works.
- (vi) The consultant shall cooperate fully with the responsible Government Ministries.
- (vii) The Consultant shall liaise closely with Blantyre City Council throughout the period of the services, keeping them informed at all times.
- (viii) The consultant shall also familiarize themselves and comply with all laws, customs and practices in Malawi related to the work.

7.0 Payment Schedule for Phases 1 and 2

Payments shall be based on approved deliverables. Table 4 shows the expected payment schedule (subject to negotiation with winning bidder).

Table 4 – Payment Schedule

Deliverable	Proportion of payment (%)
Phase 1: Detailed Design	
Inception Report	15%
Final Existing Situation Analysis Report	15%
Preliminary Design Report	20%
Draft design report (Drawings, Specifications, Implementation schedule) and Draft Bidding documents	20%
Final Detailed Design Report and Bidding Documents	20%
Environmental and Social Management Plans (ESMPs)	10%
Total	100%
Phase 2: Construction Supervision Phase, Site Handover and Defects Liability Period	
Supervision and contract management manual	
Monthly progress reports	
Memorandums with proposed actions to be undertaken to address any issues arising during the implementation of the contract	
Certificates on quality of works	
Cash flow projections versus actual disbursements	
Memorandums on the contractor's Interim Certificates payments and claims	
ESHS Reports	
Support Implementation of proposed SWM management system and partnership models	