

**REQUEST FOR EXPRESSION OF INTEREST (EOI):**  
**REPUBLIC OF BOTSWANA**  
**MAMBO WASTEWATER TREATMENT PLANT**  
**FEASIBILITY STUDY, TENDER MANAGEMENT AND CONSTRUCTION SUPERVISION**  
**TENDER NO. WUC 025 (2017)**

The Government of Botswana has received a loan from the World Bank towards the implementation of the Botswana Water Security and Efficiency project and intends to use part of the funding to finance consultancy for the Mambo Wastewater Treatment Plant Feasibility Study, Tender Management and Construction Supervision.

**Background**

The Water Utilities Corporation (WUC) under the Ministry of Land Management, Water and Sanitation Services in the Republic of Botswana intends to engage an experienced consultant to carry out Feasibility Study, Tender Management and Construction Supervision at Mambo WWTP.

**Shortlisting Criteria:**

**Eligibility:** The consultant must submit notarized or certified copies of Certificate of incorporation or Registration of the consulting firm, Company ownership (Directors and shareholders) of the company.

**Relevant experience in similar assignments and environments:** The consulting firm must also provide information on projects undertaken in **the past twenty (20) years**, with a brief description of each project, funding source(s), contract amount and the employer. Along with this, the consultant must also have completed at least two (2) similar assignment (feasibility studies, conceptual designs, and detailed designs as a lead consultant covering a population of at least 150,000 and plant capacity of 15 Mega litres per day) in terms of scope, complexity and value in the past 20 years. The Consultant must also demonstrate experience in contracts site supervision for rehabilitation/expansion of an existing waste water treatment facility. Consultants may associate with other firms in the form of a joint venture or a sub-consultancy to enhance their qualifications and certified copies of references must be attached. Consulting firms are encouraged to associate with Citizen owned consulting firms. Associations may take the form of either joint venture (whereby firms will be severally and jointly liable for the assignment and in which case all joint venture partners are required to demonstrate competence in the core areas of the assignment) or sub consultancy (where a firm possess competence in core areas of the assignment and sub contracts part(s) of the assignment to another firm(s)).

**Availability of appropriate skills among staff related to the assignment:** Evidence of appropriate skills including Project Team Leader (wastewater/process engineer), Electro-mechanical engineer, Wastewater Specialist and Hydraulic Modeller.

## Scope of Services:

The Consultant will execute a Feasibility Study, Tender Management and Construction Supervision for the Refurbishment, Rehabilitation, Upgrading and Expansion of the Mambo WWTP at Francistown and the surrounding areas which disposes wastewater to Mambo WWTP. The consultancy services will be for a continuous period of three (3) years.

A complete version of the “**Terms of Reference**” is available at [www.wuc.bw](http://www.wuc.bw)

## Submission of EOI

Interested parties are required to submit **one (1) original and four (4) copies and 1 CD of the Expression of Interest document** in sealed envelopes marked “**Expression of Interest for Mambo Waste Water Treatment Plant Feasibility Study, Tender Management and Construction Supervision.**” to:

The Corporation Secretary  
Room 208/02  
Water Utilities Corporation  
Sedibeng House  
Plot 17530  
Luthuli Road  
Old Industrial Site  
Private Bag 00276  
Gaborone, Botswana  
[Tel:00267 3619298/271](tel:002673619298271)  
Email: [procurement@wuc.bw](mailto:procurement@wuc.bw)

Expression of interest documents are to be hand delivered to the above address by 1400hrs Botswana Local Time on the **21<sup>st</sup> September 2017**. **LATE SUBMISSIONS and EOI NOT IN ENGLISH WILL NOT BE ACCEPTED**, neither will submissions received via telephone, email, facsimile.

## Selection Criteria

Shortlisting of the Consulting firms will be carried out according to the World Bank Procurement Regulations for IPF Borrowers (Regulations), revised July 2016 and the Water Utilities Corporation Tender Regulations and Procurement Procedures.

The attention of interested Consultants is drawn to paragraph 3.14 of the Procurement Regulations. A consultancy firm will be selected in accordance with the Quality and Cost Based Selection (QCBS) method.

Interested Consulting firms may obtain further information at the address below during working hours (i.e. 0800hrs to 1230hrs and 1400hrs to 1600hrs) Botswana local time, Mondays to Fridays inclusive, except on Public Holidays

Water Utilities Corporation reserves the right to accept or reject any or all applications, or to cancel the entire proceedings without giving any reasons whatsoever.



We keep it flowing, *for you.*

**WATER UTILITIES CORPORATION**

**TERMS OF REFERENCE**  
**FOR**  
**CONSULTING SERVICES**

**MAMBO WASTEWATER TREATMENT PLANT**

**FEASIBILITY STUDY, TENDER MANAGEMENT AND CONSTRUCTION**  
**SUPERVISION,**

***Tender No. WUC 025 (2017)***

**JULY 2017**

WATER UTILITIES CORPORATION  
PRIVATE BAG 00276  
GABORONE  
BOTSWANA

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## **1. INTRODUCTION**

### **1.1 Beneficiary**

The beneficiary of this project is the Water Utilities Corporation (WUC), which is a state-owned enterprise established in 1970 through an Act of Parliament to provide water in urban areas. The mandate of the Corporation was expanded in 2009 under the Water Sector Reforms Programme to include management of water and wastewater services in the villages previously managed by the Department of Water Affairs and Local Authorities.

The Corporation is a parastatal organization wholly owned by the Botswana Government. A Board of Directors appointed by the Minister of Minerals, Energy and Water Resources is the overall authority responsible for policy formulation and oversight on the operations of the Corporation. WUC has nine departments; Chief Executive's Office, Technical Services, Operations, Sustainability and Water Resources, Corporate Services, Finance, Shared Services, Human Resources and Internal Audit. The Operations department is further broken down into 16 Management Areas that are spread across the country. The Heads of Departments report to the Chief Executive Officer. The Technical Services Department (TSD) is responsible for management and implementation of all projects executed by WUC. The Director of TSD plays the role of a sponsor and then appoints a Project Manager to manage the project on behalf of WUC.

Given the current low water security of Botswana, low service coverage, high water losses and poor wastewater facilities, the Government of Botswana has applied for a loan from the World Bank for implementing the Botswana Water Security and Efficiency Project. The project is to be implemented in the period 2017 to 2020. The project development objective is to improve availability of water supply in drought vulnerable areas, increase the efficiency of WUC, and strengthen wastewater management in selected systems. The project has three components being: Component 1: Improve availability of water supply and efficiency of services; Component 2: Improve wastewater and sludge management; and Component 3: Sector reform and institutional Strengthening.

WUC now intends to use part of the funding to hire a Consulting firm ("Consultant"), who will be set in charge of the following: (i) carry out a Feasibility Study; (ii) Tender Management for a Design-Build contract for Mambo Wastewater Treatment Plant (WWTP), including assistance in bid evaluation; (iii) do the Construction Supervision for the tendered works and installations.

### **1.2 Project Background**

Botswana is a land locked country and a member of Southern African Development Community (SADC) (See Appendix 1, Map of Botswana). The surface area is approximately 582,000 km<sup>2</sup>, roughly the size of France or Texas in the US. About two thirds of the country is covered by the Kalahari Desert, rainfall ranges from 200 mm per annum in the desert to about 600 mm per annum in the North and North Eastern parts of the country. The population is estimated to be 2.1 million (2011 census) and is sparsely spread across the country with the biggest villages along the South East – North East Corridor. Gaborone, which is the capital city, has a population of about 270,000, accounting for 11% of the county's population. Botswana has been hailed as one of the success stories of Africa with an

annual per capita GDP of about US \$ 14, 800, compared to US \$ 70 at independence in 1966. The mining sector remains the main engine of growth for the Botswana economy. The sector contributes 40% of GDP, 75% of export earnings and over 55% of total government revenues. Botswana is one of the shining examples of democracy in Africa.

Botswana is water stressed and has suffered from repeated droughts. The 2015-2016 El-Nino related drought has affected Botswana and its regional trade partners quite significantly. Lower export receipts and higher food import costs caused Gross Domestic Product (GDP) growth to turn negative in 2015 (-0.3%), and entailed large budgetary shortfalls (a fiscal deficit of 6.3% of GDP in 2015). Thus, Botswana has become increasingly resource constrained and funding is required to finance the infrastructure investments in portable water and wastewater. Substantial investments are required to align water security requirements with the growing demands of Botswana's increasingly prosperous population. Greater rainfall variability and declining groundwater availability suggest that additional investment in surface water infrastructure will be a priority, including: additional storage and transmission, interlinking surface and groundwater supplies and developing water transfer schemes. It should also be noted that many villages are small and scattered and wastewater must be transported over long distances (often at high cost).

Mambo Wastewater Treatment Plant is serving Francistown and its surrounding areas. Francistown is the second largest city in Botswana according to the 2011 population and housing census. It is located 450km north eastern of Gaborone. The treated effluents eventually reach the Dikgatlong Dam, which is an important regional source for drinking water supply. Hence Mambo's treatment efficiency is of particular relevance.

The feasibility study will cover the wastewater treatment plant, network described above including all surrounding areas discharging sewage to the Mambo WWTP. The areas covered by the feasibility study include Tati Siding, Tonota, Shashe-mooke, Mandunyane, Borolong, Mathangwane, Matsiloje and Matshelagabedi as these areas form part of the Greater Francistown and Mambo WWTP being the only plant in the area will receive influent from these areas..

The principal local topographical feature of the project area is the Tati River. Like the rest of Botswana, the project area falls in the sub-tropical semi-arid climate, characterised by hot and wet summers between the months of October and April, and cold, dry winters from May until September. Most of the rainfall is received between November and February. The average annual rainfall recorded is around 520mm. The North East District is characterised by high temperature variations, with high summer temperature ranges of 20°C to 36°C, while in winter the temperature ranges from 4°C to 18°C

### ***1.3 Description of Francistown Sewerage system***

Francistown is a metropolitan city with various mining, commercial and industrial infrastructure. The plant therefore receives all kind of effluent from domestic, commercial and industrial sources. Due to the growth of mining industries around Francistown over the recent years there has been a sudden increase in housing development and municipal infrastructure, also contributing to increased volumes of wastewater entering Mambo WWTP. With growth came the need for upgrading wastewater systems, which resulted in:

- Construction and connection of ever more costumers to the sewerage network.
- Construction of lifting pump stations and the sewer trunk main that connect the town network to the treatment plant.

### **Existing Area of service**

- The actual sewer system that supplies to Mambo WWTP has a total length of > 400 km and 23 pumping stations.
- The Mambo Wastewater Treatment Plant receives effluent from the entire city of Francistown, both from domestic sources, government institutions, and from industries.
- The biggest industries are Francistown BMC Abattoir, Northern Textile milling, Botswana Breweries Limited.
- Francistown BMC (Botswana Meat Commission) Abattoir and Northern Textile.

Untreated effluent from these two major industries has proven to be problematic to the existing Mambo WWTP. Hence there is a serious need to improve pre-treatment of their effluents before they are pumped to the Mambo plant, and/or Mambo WWTP has to be adjusted such that it can cope with those industrial effluents.

Francistown BMC Abattoir is the country's second largest abattoir with a capacity to slaughter 400 cattle and 150 small stocks per day. The Francistown abattoir produces a range of canned products: tongues, corned beef, beef extract, pet foods and related by-products. The effluent from this abattoir is one of the major factors calling for this project. BMC has a pre-treatment facility but it is not operated properly, if at all.

### **1.4 Description of Mambo Waste Water Treatment plant**

As has been mentioned earlier Mambo WWTP receives effluent from Francistown and greater area around the city via the existing sewer system. Additionally, septage from septic tanks and pit latrines is hauled by trucks to Mambo WWTP.

Mambo WWTP was designed for 15 MLD, and is based on a trickling filter system, which incorporates the following treatment steps:

- Preliminary treatment: screening, grit removal and oil & grease removal;
- Primary treatment: two identical primary gravity settling tanks without the use of chemical coagulants;
- Secondary treatment: trickling filters and humus tanks;
- Tertiary stages: de-nitrification, chlorination,
- Sludge digestion, sludge drying beds, biogas holder, flare.

The main operational issues of the plant are:

- The treatment plant has never been refurbished since its commissioning in 2002;
- Some of its components and processes have never been operational since its commissioning,
- The current process is having poor quality treated effluent, which is being disposed to the environment and polluting downstream rivers and Dikgatlhong Dam.

## 2. CONTRACT OBJECTIVES AND EXPECTED RESULTS

### 2.1 Objectives

The objective of the present consulting services is to deliver a signed Design-Build (DB) contract that permits Mambo WWTP to comply with effluent standards, supervise its implementation, and assist Water Utilities Corporation (WUC) in the involved project management activities until the plant is finally handed over to WUC for operation, and WUC personnel is able to safely and efficiently operate and maintain the “new” Mambo WWTP.

### 2.2 Expected results of this assignment

The expected results are described in detail in the next sections. Its main components can be summarized as follows:

- **Task 1: Feasibility Study:** This study shall provide a thorough review of the existing situation at Mambo WWTP and its background conditions. It will define actual and future design input data for the DB contract. And it will provide the necessary basis for splitting the necessary works into an urgent refurbishment package, a rehabilitation package, and a staged upgrading package.
- **Task 2: Bidding Documents/Tender Management** for the DB (Design, Build) of Mambo WWTP, under ICB conditions, including prequalification, the bid evaluation processes, contract negotiations and preparations of a contract until it is signed.
- **Task 3: Construction Supervision** of all project implementation phases, including the daily project management and coordination, until successful completion of the DB contract, and until WUC personnel is able to safely and efficiently operate and maintain the “new” Mambo WWTP.

## 3. SCOPE OF WORKS

This section describes the scope of work for the Consultant.

### 3.1 Detailed description of tasks

#### 3.1.1 Task 1: Feasibility Study

The Consultant shall carry out a Feasibility Study which shall recommend and advise on remedial works to be carried out on refurbishment, rehabilitation and upgrading of Mambo Wastewater Treatment Plant. This will be done as a lump sum contract. This shall also include the following sub tasks:

##### 3.1.1.1 Review of Existing Documents

- i. The Consultant shall review the existing designs and As Built Information previously prepared for Mambo WWTP.



- ii. The Consultant shall review the infrastructure audit of the Mambo WWTP that was undertaken and completed in November 2012, by GES-LEBEYANA-WSSA joint venture. The audit assessed the infrastructure, personnel structure and process capacity of the plant and network. This information can be sourced from the Corporation Records Department.
- iii. The Consultant shall also review the Retrospective Environmental Impact Assessment for the Mambo WWTP, carried out by Herbco Technical Services in December 2012. The objective of the study was to prepare an Environmental Management Plan for Mambo WWTP, to ensure that the operations of the plant are environmentally justified and acceptable. There is also an Environmental Impact Assessment, which is currently being conducted by WUC for the entire Mambo WWTP for all infrastructures that are feeding the plant and the downstream effects of the plant. The Consultant should take these documents into consideration, which will greatly inform about the direction of this study.
- iv. It is also important that close consultation is maintained with relevant bodies such as the WUC, Ministry of Land Management & Water and Sanitation Services, Ministry of Local Government and Rural Development (MLGRD), and Department of Town and Regional Planning, Department of Water Affairs.
- v. Prepare a report of all findings.

#### 3.1.1.2 Review of existing Infrastructure and Human Resources

The Consultant shall be required to review the current situation with respect to existing wastewater human resources and infrastructure capability against the estimated updated projections until 2035. This exercise will assist in identification of immediate requirements for new or reinforced infrastructure and right sizing of human resources.

##### 3.1.1.2.1 Review of the sewer system:

- i. On-site visits of key experts of the Consultant working on this assignment to all relevant installations and locations.
- ii. Elaborate an infrastructure assessment that covers age, condition and serviceability state. This should also clearly identify the infrastructure upgrading/replacement needs along with the timelines taking a horizon of 2035.
- iii. Review capacity and status of existing Emergency Ponds. The study should include for assessment and advise on rehabilitation required to make the ponds to a state where there can be used as storage incase of flooding or breakdown of the plant.
- iv. Review of existing pipeline and pump station to the emergency ponds.
- v. Discuss with the staff and management in charge of sewer network, drainage network, pumping stations, regarding their O&M practices and problems.
- vi. Collect and review operation data, assess efficiencies and inefficiencies.
- vii. Prepare a report of all findings.

##### 3.1.1.2.2 Review of the WWTP:

- i. On-site visits of key experts of the Consultant working on this assignment to all relevant installations of Mambo WWTP.

- ii. Elaborate an infrastructure assessment that covers age, condition and serviceability state. This should also clearly identify the infrastructure upgrading/replacement needs along with the timelines taking a horizon of 2035.
- iii. Discuss with the staff and management in charge of the WWTP, regarding their O&M practices and problems.
- iv. Collect and review operation data, assess efficiencies and inefficiencies, compare actual influent data with design parameters of Mambo WWTP, compare actual effluent data with legal discharge requirements, assess the performance and operation practices for each and every treatment stage, derive conclusions for necessary improvements.
- v. Additionally, the Consultant must install a provisional flow meter near Mambo WWTP's inlet, and document daily flow rates for at least 100 days. For at least 50% of those days the Consultant will also need to provide a documentation and analysis of the hourly flow rates for full 24h/d cycles.
- vi. Finally, these metered flow rates must be compared to the calculated theoretical flow rates to Mambo WWTP; calibration of the calculation input parameters has to be done as needed.
- vii. By combining daily flow rates with influent pollutant concentrations, daily pollution loads have to be calculated. These pollution loads also have to be justified and calibrated based on the connected population and industries.
- viii. The outcome of this investigation shall thus be a theoretical model that is capable of reliably calculating actual wastewater flows and pollution loads at both dry weather flow and peak wet weather flow.
- ix. This model shall then be applied to forecast future flow rates and pollution loads up to a horizon of 2035, based on future developments in terms of population connected to the sewer system, and industrial developments.
- x. Prepare a report of all findings.

#### 3.1.1.2.3 Human and Plant Resources Needs for the Infrastructure

- i. Under this task the Consultant shall be expected to assess the existing human and plant resources for the plant and advice on improvements or investments required to effectively run the Mambo WWTP and the entire sewer system.
- ii. Prepare a report of all findings.

#### 3.1.1.3 Update on Actual and Future Wastewater Flow and Pollution Loads

- i. The Consultant shall be expected to take current flows of the system at normal hours and peak hour into account.
- ii. The flows must also include the volume of septage disposed to the treatment plant by vacuum tankers from Greater Francistown area, where there is no sewerage network.
- iii. The Consultant should derive the following parameter for designs and recommendations: daily wastewater flow rate (m<sup>3</sup>/d), maximum hourly flow rate (m<sup>3</sup>/h) in dry weather periods, maximum hourly flow rate (m<sup>3</sup>/h) during stormwater periods, maximum daily pollution loads entering the WWTP (BOD<sub>5</sub>, COD, SS, TN, TP), Faecal Coliforms in raw wastewater, minimum prevailing wastewater temperature, and any other parameter relevant for design.

- iv. The Consultant shall develop a forecast of the above defined parameters in 5 year intervals up to year 2035. These parameters will then later be applied to justify the short, medium and long term solutions.
- v. This study also requires a determination of forecasts on an annual basis up to the time when the upgraded wastewater infrastructure is fully commissioned.
- vi. The sanitation requirements in Francistown for land servicing will be relevant to consider:
  - a. The latest Francistown Development Plan and the Urban Development Plans will provide valuable information on the timing and extent of future development. The Consultant will be required to make use of this and other available information to produce the updated wastewater collection and treatment projections based on a development scenario agreed by the Corporation. The Consultant is required to look for more recent information from all relevant organisations.
  - b. Wastewater collection and treatment forecast will be required on an area by area basis indicating growth for different parts of Greater Francistown (existing and future), as determined by the Consultant, in agreement with the Corporation.

#### 3.1.1.4 Industrial Pre-treatment Investigation

- i. The Consultant shall be required to visit the following major industries that discharge effluent into the Mambo WWTP to assess and review the current pre-treatment facilities, if any.
  - a. Botswana Meat Commission (BMC)
  - b. Botswana Breweries Limited (BBL)
  - c. Northern Textile Mills (Nortext)
- ii. Make recommendation on the best pre-treatment facility required for each of those industries so the effluent they discharge to the sewer system is not damaging the sewer collectors, and is of acceptable and suitable quality to be treated by the Mambo WWTP.
- iii. Notwithstanding this prior requirement the Consultant shall also investigate and make recommendation on the necessary facilities and their design at the Mambo WWTP as a fall back solution should the industries fail to pre-treat the effluent before the discharging to the sewer system.

#### 3.1.1.5 Treated Wastewater Reuse

- i. The Consultant shall investigate the option of reusing Mambo WWTP's treated effluent and come up with some ways of using it.
- ii. The infrastructure required for treated effluent reuse must form part of the study.
- iii. All the prospective customers to reuse the treated effluent must be identified and approached by the Consultant on behalf of the Corporation.
- iv. The estimated volume required by each customer must form part of the study.
- v. Already there is some developed infrastructure at the existing Mambo plant to some part of the city and therefore the Consultant is expected to identify, assess and advise on their status, suitability and capacity to be used for transmission of treated effluent to the city.
- vi. The Consultant shall be required to investigate all development possibilities in detail before finalising recommendations on alternative proposals.

- vii. As part of the study the Consultant is expected to advise on the quality of effluent required by the various customers as per their consultation and advice on methods of separation or segregation and the infrastructure required.
- viii. The Consultant shall make recommendation on viable contractual set-up and responsibilities required to manage collection and distribution of treated effluent to the prospective customers.
- ix. The Consultant shall advise the Corporation on the timing implications of effluent reuse, as the effluent from the plant will vary both daily and with seasons, and advise if there will be need for any water buffering and/or varying in treatment methodology.
- x. Analyse existing water rights downstream of the Mambo WWTP, including an assessment to which extent those rights may be affected through water reuse.
- xi. The Consultant's recommendations must give an economically viable solution to the Corporation.

#### 3.1.1.6 Hydraulic Network Analysis

- i. The Consultant shall be required to analyse the existing wastewater network with the use of a computer sewer network analysis model.
- ii. The Consultant shall be required to do field testing, calibration and validation of the network model. This includes, but is not limited to, topographical surveys, geotechnical surveys, and quality assessment of the existing sewers through CCTV or other means.
- iii. The model shall be used to investigate current performance and adequacy of the wastewater system and shall also be used to predict future performance and adequacy of the infrastructure after upgrading and expansion under agreed possible scenarios.
- iv. The model shall also be used to simulate the performance of the network under different operational conditions and scenarios. Necessary works need to be defined, and priorities assigned.
- v. The Consultant shall be required to hand over a summary report and a calibrated model to the Corporation.
- vi. The Consultant shall be expected to train the Corporation personnel, who will be seconded to him, in the use of the model during the consultancy.
- vii. The Consultant shall be responsible for paying a total of 4No unlimited licenses and hardware required to run this model. The hardware shall be 2No servers, 1No Work station and 1No engineering tool (laptop). All these shall have all the required software and back up CDs.

#### 3.1.1.7 Recommendation on Short-, Medium-, and Long-term Measures

- i. The Consultant shall conduct a full study of discharges from domestic, industrial, commercial, schools and other entities. This shall include all tertiary, secondary and primary lines to the plant.
- ii. Recommend for appropriate treatment processes which will be able to treat all the influent to the plant.
- iii. The recommended treatment plant process should be able produce effluent suitable for reuse and must be sustainable and environmentally friendly.
- iv. The Consultant should provide all technical details of all the options expected at this stage including layouts.

- v. The Consultant should then analyse the options based on agreed criteria (with the Client) including costs, social and environmental impacts and select and recommend the best options for future sewer lines, pumping, treatment works, treated effluent disposal and reuse for the areas of study.
- vi. The Consultant shall be expected to come up with recommended short-, medium-, and long-term measures, separately for the wastewater collection system, Mambo WWTP, and water reuse.
- vii. The key features of both the rehabilitation and the new construction components need to be separately specified by the Consultant.
- viii. The Consultant shall state the estimated cost, estimated implementation periods and the packaging into contracts for the recommended measures.
- ix. Prepare a full report with recommendations.

#### 3.1.1.8 Environmental and Social Analysis

- i. The Consultant shall elaborate an Environmental and Social Impact Analysis (ESIA). The Consultant will be expected to work and liaise with the Environmental and Social Impact Analysis Consultant appointed under a separate contract as the scope of this assignment will inform the extent of their study and the output of the study will be key in advising the outcome of the Feasibility study.

#### 3.1.1.9 Institutional and Financial Analysis

- i. The Consultant shall be required to review the current situation with respect to existing institutional arrangements for wastewater and sanitation management in Francistown and surrounding areas. This will include a review of the local organization structure, supervision and reporting, human resources capacity, skills inventory, staff efficiency, logistical and other arrangements.
- ii. The Consultant will analyse the current operations on wastewater in Francistown, including the systems in place for various processes, existence and adequacy of standard operating procedures and manuals where required, key performance indicators, record keeping, management of operations, reporting and accountability.
- iii. Based on available financial data for the last five years, the Consultant shall determine the current annual capital and recurrent expenditure related to operation and maintenance of wastewater plant, sewer system and pump stations.
- iv. The expansion of service area and infrastructure will have an implication on manpower and other institutional needs as well as recurrent expenditure. The Consultant shall be required to work out staffing norms and make recommendations for appropriate personnel qualifications.
- v. The Consultant shall recommend appropriate training for WUC operation staff.
- vi. The Consultant shall make sure that operational readiness is addressed.

#### 3.1.1.10 Progress Meetings

- i. The Consultant shall organize and pay for monthly progress meetings including a final workshop, where they will present Draft, Draft Final Report and Final reports to be discussed with relevant stakeholders.

#### 3.1.1.11 Prepare Final Feasibility Study Report

- i. The Consultant shall prepare and present a Final Feasibility Study Report to the Client based on the above items 3.1.1.1 to 3.1.1.10. The report must clearly present all findings and decisions and demonstrate the technical, economic, social and environmental feasibility of all measures recommended by the Consultant.

#### 3.1.2 Task 2: Tender Management and Bidding Documents

The Consultant is expected to prepare Bidding Documents for the DB (Design, Build) of Mambo WWTP, under ICB (International Competitive Bidding) conditions, including prequalification, the bid evaluation processes, contract negotiations and preparations of a contract until it is signed. The Bidding Documents should –as much as possible- be based upon standard bidding documents prepared by the World Bank. In this context particular mention is made of the ongoing Bank’s activities to prepare DBO and DB Standard Bidding Documents, which are close to finalization. This will be done as a lump sum contract. This will be done as a lump sum contract.

The Consultant is expected to undertake the following services, including but not limited to:

##### 3.1.2.1 Prequalification

A prequalification (PQ) stage is foreseen to minimize risks for the Client, by limiting bidding only to prequalified contractors who meet minimum requirements regarding their financial resources, technical capacity & experience, in particular in handling large DB WWTP projects.

- i. Prepare selection criteria that will ensure the prequalification of contractors who meet requirements regarding financial resources, technical capacity & experience, in particular in handling large DB WWTP projects and confirm selection criteria with the Client and the World Bank.
- ii. Prepare complete prequalification documents acceptable to WUC and to the World Bank, based on ICB procurement.
- iii. Prepare Notice of Prequalification that can be used by WUC for advertising purposes.
- iv. Assist with opening of PQ documents and prepare the minutes of the PQ opening.
- v. Check all PQ documents received and prepare letters of request for clarification (if necessary) and conduct clarification meetings, if needed.
- vi. Prepare the draft PQ evaluation report and discuss and agree upon the outcome with WUC. Prepare the final PQ evaluation document, which will be subject to the approval of WUC and No Objection of the World Bank.

##### 3.1.2.2 Bidding

- i. Confirm with WUC and the World Bank the key features of the DB bidding (such as 1-stage or 2-stage bidding after pre-qualification), determine the number of contracts and the duration of the commissioning services for the WWTP that the Contractor shall provide, and agree with the Client and the World Bank on the Conditions of Contract to be used.
- ii. Make sure that there is clear differentiation among works and installations for (a) the urgent refurbishment, (b) rehabilitation, and (c) upgrading of Mambo WWTP

- iii. Prepare complete Bidding Documents for the agreed DB contract(s), using World Bank Standard Documents as much as possible, specifications and drawings of the Conceptual Design prepared under the Feasibility Study (see Task 1 in this TOR). The Conceptual Design and bid documents shall be of sufficient detail that tendering is acceptable according to local legislation and requirements of the World Bank.
- iv. Specifications shall describe the work to be done or materials to be procured, supplementing the information shown on the drawings & plans. Inclusion to be made for existing emergency pond to be rehabilitated and upgraded to be retention storage in case of emergency and for the refurbishment of the pipeline to the ponds and pump station to the pond under the expansion phase of the project. They shall also set forth the details of the performance of work including necessary time schedules and requirements of insurance, permits, licenses and other special procedures or requirements. Reference to brand names, catalogue numbers and other details that limit any materials or items to a specific manufacturer shall be avoided. Where standard specifications or codes of practice are referred to, a statement must be added to the effect that other national or international standards that ensure substantial equivalence are also acceptable. Specifications shall cover technical provisions of the contract as well as those non-technical items, which are unique to the contract. The two types of provisions shall not be intermixed and may be kept separate by classifying one group as General Specifications and the other as Specific Technical Specifications. The General Specifications shall include individual characteristics regarding conditions of the work, procedures, access to site, any special scheduling requirements and other details, which will be applicable to this work/contract. The Specific Technical Specifications shall be fully descriptive and give the full requirements in respect of, but not limited to, the following:
  - a. Standards of Materials;
  - b. Standards and Procedures of Workmanship;
  - c. Details of Manufacturing/Factory Tests or Other Tests required;
  - d. Details of Pre-commissioning and Commissioning Activities.
- v. Prepare bills of quantities for the DB contract(s) for Mambo WWTP of sufficient detail that are expected to provide a solid basis for the measurement of progress of the works and subsequent payments to the Contractor.
- vi. Prepare the “Engineer’s Cost Estimates” of the Conceptual Design by completing the Bills of Quantities and Schedule of Prices of the Bidding Documents with the Engineer’s Estimate (priced Bill of Quantities). All cost estimates shall be treated as confidential documents.
- vii. Provide an indicative list of essential ‘Construction Plant and Equipment’ that would be needed by the Contractors for execution of the required ‘Works’.
- viii. Recommend list of reports, data, topographical, geotechnical and other information to accompany the bid document and to be approved for release to bidders.
- ix. Obtain positive approval for the bidding documents from relevant bodies according to the requirements set by local legislation in Botswana and from the World Bank.
- x. Complete the Invitation to Bid to prequalified contractors.
- xi. Together with WUC conduct the Pre-bid meeting(s), reply to questions by bidders and prepare any necessary circular letters, including those related to pre-bid meeting report(s), which will be sent to all bidders.
- xii. Assist with opening of bids and prepare the minutes of the bid opening.

- xiii. Check all bids received and prepare letters of request for clarification (if necessary). Evaluate the technical and financial components of the bids in accordance with the criteria stipulated in the Instructions to Bidders, including review of completeness of bid, eligibility, qualifications, statement of work methods, equipment, personnel, schedule, provision of priced schedules, bid security, etc. Make arithmetic corrections and convert into one currency, evaluate quality and costs, etc., and compare substantially responsive bids to determine the lowest evaluated bid. After clarification (if any), prepare the Draft Bid Evaluation Report, including recommendation of award of Contract to the Bidder whose offer has been determined to be the lowest evaluated bid and is substantially responsive to the Bidding Document. Discuss and agree upon the outcome with WUC. Prepare the final bid evaluation report, which will be subject to the approval of WUC and No Objection of the World Bank.
- xiv. Prepare the letter of notification to the successful bidder.
- xv. Assist in the preparation of contract(s) between WUC and the Contractor(s). Check sufficiency of all documents necessary for the contract(s) as submitted by the Contractor, including the validity and compliance of bank guarantees, etc.

### 3.1.3 Task 3: Construction Supervision

The Consultant is expected supervise the implementation of the works and installations for the refurbishment, rehabilitation and upgrading of Mambo WWTP, tendered through the DB Bidding Documents specified under Task 2, This will be done under a time based contract. It must be noted however that progression from the Feasibility Study and Tender Management phase to the Construction Supervision and management phase by the consultant shall be upon Client's approval. The client is not obliged to progress to subsequent phase(s) immediately or if he is not convinced with the consultant's work on the previous phases. As clearly indicated the Consultant is expected to submit rates for Construction Supervision and this will be time based and this phase may not necessarily start immediately after completion of Task one and 2. .

#### 3.1.3.1 Mobilization and Initial Tasks

- i. Mobilization of Resident Team Leader and other permanent staff.
- ii. Review construction contract documents and outline (a) pertinent initial activities to be complied with by the contractors; and (b) obligations of the Client to the contractors, if any. Bring to the attention of the Client any potential contractual issues that warrant early attention.
- iii. Establish a site-office provided by the Contractor(s), for the supervision consulting services.
- iv. Review and coordinate overall and detailed work programs featuring all pertinent activities and critical paths.
- v. Prepare the project organization and upgrade and update the organization chart. Establish lines of authority and means of communication and coordination procedures necessary to ensure orderly and unimpeded progress of the work.
- vi. Establish a document and filing system for the project office, adopting an internationally recognized management system such as ISO 9000. Set up an electronic and internet based file



sharing system, which allows the Client, as well as all supervision team members, to have access to all documents and files stored in the Consultant's electronic system.

- vii. Establish efficient procedures for verifying contractors' performance and reporting progress and problems in a timely manner, including critical path program management and tracking system (such as MS Project or Primavera), quality control reports, quantity survey records, requests for variation or change orders, submittals and claims and invoices, etc.
- viii. Prepare an Inception Report, which shall include information regarding all of the above aspects and, as Appendices, stand-alone sub-reports/plans, as follows:
  - Project Execution Plan;
  - Organizational Plan;
  - Quality Management Plan;
  - Information Management Plan;
  - Communication Plan
  - Risk Management Plan;
  - Environmental Management Plan;
  - Health, Safety and Security Management Plan.

#### 3.1.3.2 Review and Approval of Detailed Designs for the DB contract(s)

The detailed design will be developed by the Contractor in the course of his obligation under the DB contract(s). The design, which is presented under these contracts for bidding, will be far from ready for construction and hence, during an initial period the selected DB contractor(s) will be required to complete the design and elaborate it further into a detailed design that can be used for construction.

The Consultant shall be responsible for the checking, commenting on errors and shortcomings of detailed designs and drawings and assist in obtaining approval for construction from the local authorities. The Consultant's responsibilities regarding the review and approval process of detailed designs for the DB contract(s) in question include, but shall not be limited to, the following tasks:

- i. Review all bid designs and drawings and verify that they comply with the DB contract(s). If non-compliance is observed, make recommendations to WUC on possible solutions.
- ii. Agree with the DB contractor(s) and WUC on a schedule of detailed design submittals by the Contractor(s) and on a priority listing with regard to their approvals by the Consultant and WUC.
- iii. Review contractor's requirement for power supply at the site and facilitate the process, together with WUC and the electricity utility, to provide power supply to the works site in time.
- iv. Review contractors' detailed designs and drawings, verify if they comply with the DB contract(s), and if they are sound from a technology, structural, mechanical and electrical point of view. Approve drawings, or make request for improvements, as the case may be, generally within 2 weeks from the date of submittal, with longer review periods possible at times, depending on the complexity of the designs and/or drawings submitted and the volume of documents submitted by the contractor at a given time.
- v. Review, approve, or comment (as the case may be) on the DB contractor's detailed construction/reinforcement designs and drawings.
- vi. Review, comment and process the DB contractor's submittal of proposed procurement of mechanical, electrical and SCADA equipment. The Consultant shall comment in writing as necessary on the submittals by the contractor.

- vii. Attend and approve any pre-shipment testing of equipment where so specified in the DB contract, and if not arranged in other ways. This should be done together with representatives from the Client and cost associated with that should be included in the contract.
- viii. Review DB contractor's work plans and proposed procedures to assure that they meet the design criteria, protect public and workers' safety and give full consideration to special conditions and hazardous conditions. Advise on safety and security matters.
- ix. Review, comment and process the DB contractor's submittal of working methods and working drawings. The Consultant shall comment in writing as necessary on the project documents and working drawings prepared by the contractor. All types of related calculations, reports, designs, quantity schedules, and technical specifications shall also be examined.
- x. Ensure that approved designs, drawings and equipment submittals are marked "APPROVED FOR CONSTRUCTION" and that no construction or procurement takes place based on documents without such mark.
- xi. Review, comment and process construction contractor's proposed implementation schedules and programs. Make recommendations and assist with improving schedules in case of possible conflicts between schedules of different contractors and/or sub-contractors.

#### 3.1.3.3 Construction Supervision

Assist WUC in all aspects of daily supervision of works, including but not limited to the following:

- i. At all times, maintain sufficient site-based staff, with clear allocation of duties, to supervise day-to-day construction of the works. Generally, the Consultant is to ensure works are carried out as designed into an acceptable quality in accordance with the specifications and drawings, and according to time schedules.
- ii. Review, comment and process contractor's proposed implementation schedules and programs. Make recommendations and assist with improving schedules in case of possible conflicts between schedules of different contractors. Monitor the approved schedules and make recommendations for remedial action if delays occur.
- iii. Review contractor's work plan and proposed procedures to assure that they meet the design criteria, protect public and workers' safety and give full consideration to special conditions and hazardous conditions. Advise on safety and security matters.
- iv. Ensure that the construction contractors carry out the construction works in accordance with the defined HSET (health, safety, environmental, and traffic) conditions of the contract documents.
- v. Supervise and assist the contractor in executing the Environmental Management Plan and check if in the implementation of the works the contractor complies with all conditions of the plan. Assist the Independent Environmental Safeguard Monitoring Consultants with data collection. The consultant is expected to have specialist to assist in implementing the recommendations by ESIA consultant.
- vi. The Consultant shall report any HSET issues, including complaints by third parties and any accidents or damages that occur, to WUC and shall propose remedies and/or penalties to be imposed, if need be.
- vii. Assist WUC in the coordination with other agencies to solve problems on traffic, public nuisance and others, as may arise from construction.
- viii. Review, comment and process contractor's submittal of working methods, working drawings, including proposed changes throughout the contract period. The Consultant shall comment in

writing as necessary on the project documents and working drawings prepared by the contractor. All types of related calculations, reports, designs, quantity schedules, and technical specifications shall also be examined.

- ix. Review, comment and process contractors' submittal of proposed procurement of equipment and materials etc. The Consultant shall comment in writing as necessary on the submittals by the contractor.
- x. Check that all permanent works are constructed according to approved designs and specifications and issue "APPROVED FOR CONSTRUCTION" drawings and support documents, based on the contract drawings and/or contractor's proposal for the construction of each item of work.
- xi. Make and keep records of conditions at each site prior to occupation of the sites by the contractor.
- xii. Maintain, at the site office, copies of contracts, technical specifications, standards, engineering drawings, relevant Botswana legislation and regulations regarding construction management, vendor catalogues, survey records, work measurements, test logs, samples, revision drawings, variation orders, etc. as appropriate for carrying out the daily supervision tasks.
- xiii. Provide site supervision and contractor liaison including supervision of day-to-day construction and installation works to ensure that standard of materials and workmanship comply with the design and specifications.
- xiv. Establish field survey control in accordance with the construction contract and check contractor's layout and setting out of works to ensure that they comply with the tolerances established by the contract documents.
- xv. Review all work, reject defective work, conduct continuous inspections of work in progress, oversee tests of materials and review contractor's reported results of such tests.
- xvi. Cooperate with WUC and the contractor in matters relating to permits, licenses, right-of-way, etc., which are within the authority of WUC.
- xvii. Carry out inspections and witness testing at source of equipment and materials to be incorporated into the permanent works.
- xviii. Review all survey and levelling reports in an effort to detect procedural errors on the part of the contractor.
- xix. Maintain accurate and comprehensive site records including, inter alia, master daily diary, monthly reports, photographs, correspondence files, minutes of meetings, measurement books, contractor's staffing and equipment, test results and records on unusual occurrences which may reflect on the progress of work, such as inclement weather, fire, civil commotion, strikes, lack of construction materials, etc.
- xx. Review and verify "as built" drawings prepared by the contractor.
- xxi. Maintain permanent reproducible record drawings that include detailed 'as built' information.
- xxii. Provide coordination at site between the contractors for different works, including mediation in disputes between those parties.
- xxiii. Interpret the meaning of contract documents.
- xxiv. Assist the contractor in developing alternative methods to overcome unforeseen obstacles to the performance or progress.
- xxv. Revise contract drawings and/or specifications as required to reflect any changes in conditions that make such revision necessary.

- xxvi. Check adequacy of contractor's work force and equipment and make recommendations regarding any shortfalls.
- xxvii. Conduct weekly meetings at the site and report the results to WUC.
- xxviii. Monitor and report on physical progress of the works and financial disbursements.
- xxix. Periodically check and verify contractor's progress measurements, certify the construction contractor's claims for progress payments and process payment certificates.
- xxx. Review, evaluate and process the contractor's requests for changes and claims throughout the contract period and issue variation orders after having obtained prior approval from WUC.
- xxxi. Review, evaluate and advise on any difficulties and disputes that may arise during the contract period, propose solutions to them, and assist in the implementation of the solutions.
- xxxii. Review, evaluate and advise on any claims by the contractor for additional time.
- xxxiii. Throughout the duration of the project implementation, assist on liaison with national and local Government agencies, as well as liaison with the World Bank.
- xxxiv. Assist WUC, as may be necessary, in meeting his obligations under the Loan Agreement.
- xxxv. Verify completion and issue certificates for completion of the works, including a description and specification of all works that need to be completed and/or remedied if found defective, as well as their required dates of completion.
- xxxvi. Review the Operation and Maintenance manuals provided by the contractor in detail and verify that these Manuals all relevant aspects of operation and maintenance.
- xxxvii. Assist with preparation of all documents required for handing over of the completed works to WUC.

#### 3.1.3.4 Defects Liability Period

During the Defects Liability Period, a number of obligations of the contractor require attendance, supervision and verification by the Consultant. This task comprises, but is not limited to the following activities:

- i. Check all items of work that needs to be finalized and/or remedied, as identified in the Completion Certificates.
- ii. Instruct the contractor to rectify any defect that becomes apparent during the Defects Liability Period and specify the date of completion for each defective item.
- iii. Scrutinize and verify all statements of completion including financial statements submitted by the contractor during the Defects Liability Period and advice WUC on their acceptability or on any rectification thereof required.
- iv. Upon completion of the Defects Liability Period and remediation and completion of all works to the satisfaction of the Consultant and WUC, prepare a Defects Liability Certificate for issuance to the contractor, indicating that he has satisfactorily carried out the works and is entitled to receive any outstanding amounts due to him.
- v. Advise the Client on any outstanding claim, variation or change order.
- vi. Scrutinize and verify the Final financial statement by the contractor, which shows final values of all works constructed and the final sums to which the contractor is entitled and prepare a Final Certificate to be issued to the contractor.
- vii. Review and advice on any outstanding issue related to the final as-built drawings prepared by the contractor.

- viii. Prepare a Final Completion Report of the project, which summarizes important features of the works, including time schedules, reasons for deviation from the schedules, overviews of claims and variation orders, as well as an inventory of all documents and records prepared during the contract period and that were handed over to WUC.

#### 3.1.3.5 Prolonged Commissioning Period at Mambo WWTP

To make sure that Mambo WWTP indeed complies with all criteria set forth in the DB contract under all kinds of seasonal conditions, the commissioning period shall be prolonged such that there is a 1-year period between start-up and handing over of the completed Mambo WWTP to WUC. During that period the contractor is in charge of operation, and has to train WUC staff on the job, while the Consultant shall deliver, but is not limited to, the following services:

- i. Assess the professional expertise available with the proposed DB contractor's staff and make recommendations for improvement, if necessary.
- ii. Verify if counterpart staff employed by WUC is available for the start-up process and suitable for long-term operation and maintenance of the completed Mambo WWTP.
- iii. Review the Operation and Maintenance manuals provided by the DB contractor in detail and verify that these Manuals cover all relevant aspects of operation and maintenance.
- iv. Review the initial operations of the Mambo WWTP and make recommendations for improvements, if needed.
- v. Check if effluent criteria specified in the DB contract are met and agree with the DB contractor and WUC on necessary improvements, if needed.
- vi. Review intermittently operation data and operation practices by the DB contractor as compared to what has been defined in the DB contract, verify that sampling has been carried out in compliance with the contract and that samples have been tested in independent laboratories as specified in the DB contract.
- vii. Check that all criteria on effluent discharge, energy consumption and chemicals use comply with the DB contract. In case of non-compliance, advice on remedial measures.
- viii. Check if competent WUC's staff seconded to the contractor for initial O&M of the Mambo WWTP are receiving training as specified in the DB contract, and verify if sufficient responsibility is given to WUC's staff in operating the Mambo WWTP.
- ix. Prepare a list of all other (physical) defects observed at the Mambo WWTP; instruct the contractor to rectify these defects and specify the date of completion for each defective item; Check all items that need to be finalized and/or remedied, as identified in the Completion Certificates.
- x. Upon completion of the 1-year Prolonged Commissioning Period, prepare a report on the compliance of the Mambo WWTP with all contract criteria. In case of (partial) non-compliance, make recommendations to the Client regarding the remedial actions the DB contractor should take and penalties that should be imposed on the DB contractor, in accordance with the DB contract, if no remedial actions are agreed upon, or if they are unfeasible.
- xi. Scrutinize and verify all statements of completion including financial statements submitted by the contractor and advise WUC on their acceptability or on any rectification thereof required.
- xii. Advise the Client on any outstanding claim, variation or change order.
- xiii. Review and advice on any outstanding issue related to the final as-built drawings prepared by the contractor.

- xiv. Prepare a Final Completion Report of the Mambo WWTP contract, which summarizes important features of the Mambo WWTP construction works, including time schedules, reasons for deviation from the schedules, overviews of claims and variation orders, as well as an inventory of all documents and records prepared during the contract period and that were handed over to WUC.
- xv. Assist with preparation of all documents required for handing over of the completed Mambo WWTP to WUC.

#### 3.1.3.6 Project Management Assistance to WUC

The Consultant is expected to assist WUC in the daily project management and coordination, until successful completion of the DB contract.

- i. Review WUC's organization and delegation of responsibilities regarding implementation of project components and make recommendations for improvements on the organization chart, lines of authority and means of communication and coordination procedures necessary to ensure orderly and unimpeded progress of the work.
- ii. Review WUC's financial administration and control systems and make recommendations for improvements.
- iii. In close consultation with WUC, establish a document and filing system for the project. Set up an electronic and internet based file sharing system, which allows WUC, as well as all other authorized parties, to have access to all documents and files stored in the project document and filing system, as well as the Consultant's electronic filing systems.
- iv. Organize a kick-off meeting to be attended by all contracted consultants and contractors to explain the position of the Consultant and to establish lines of communication.
- v. Propose efficient procedures for verifying consultants and contractors' performance and reporting progress and problems in a timely manner, including critical path program management and tracking system (such as MS Project or Primavera), quality control reports, quantity survey records, requests for variation or change orders, submittals and claims and invoices, etc. Prepare an initial overall planning schedule that also shows all critical path activities.
- vi. Prepare an Inception Report which shall include information regarding all of the above aspects and, as appendices, stand-alone sub-reports/plans, as follows:
  - a. Review of DWASA's project organization.
  - b. Quality Management Plan.
  - c. Information Technology and Computerized Document Control Plan.
  - d. Communication Plan.
  - e. Initial overall planning schedule.
- vii. Set up a framework for the semi-annual reporting to the World Bank that is acceptable to WUC and to the World Bank, including relevant sections on each consultancy, construction or supply contract, on special issues requiring attention, on planning and progress and on the project finance.
- viii. Together with WUC, prepare all reports in an orderly and timely fashion, in English.
- ix. Assist with handing over of completed project components to WUC.

- x. Upon handing over of works, the future Owner (WUC) will be responsible for the operations and maintenance of the completed works. Well before that, the future Owner shall budget and prepare for the O&M of these works already. The Consultant shall use his expertise to assist WUC in any possible way in preparing for the O&M of these completed project components. Already during commissioning of Mambo WWTP, the Consultant shall assist WUC to allocate and provide sufficient and suitable counterpart staff to the DB-contractor's operating staff. The Consultant is also expected to assist allocating proper budgets for the O&M of Mambo WWTP. The Consultant is expected to:
  - a. Assist WUC and the Mambo WWTP operators to understand and realize the operation mechanism and necessary inputs related to the works operation, including the allocation of adequate O&M budgets.
  - b. Timely review of all O&M manuals prepared by contractors and provision of feedback to the contractor(s) to enable them to improve these manuals. Discuss with the supervision consultants if the manuals reflect realities of the completed works and that the manuals correctly refer to signs and instructions for operating panels, etc.
  - c. Assist WUC in allocating adequate manpower to O&M functions at an early stage, so they can be properly and timely trained (classroom and on-the-job) by the contractors.
  - d. Review and comment (if needed) on training plans prepared by contractors or others.
  - e. Supervise the training process and instructions provided to operators by the contractors.
  - f. Verify and supervise the technology transfers provided by firms/contractors.
  - g. Supervise and assist WUC during the initial 6 months of Mambo WWTP's operation after handing over of Mambo WWTP to WUC.
  - h. Towards the end of the 6-months period prepare a final "Mambo WWTP Operation Report", summarizing all relevant results, and future recommendations.
- xi. Assist WUC in any project management issues, as needed, which may come up and have not been explicitly listed in any of the tasks of this TOR.
- xii. Organize and pay for a final workshop about lessons learnt from the Mambo DB project.

### **3.2 Project Management**

The suggested methodology of executing the assignment would be through a 'task force' approach wherein the Consultant is expected to assemble a task force of specialist engineers and technicians who would be assigned to carry out the required services.

Sufficient Client review time shall be taken into account. Client's comments, as deemed necessary, shall be taken into account when preparing the final output and in related project activities. In order to enable a smooth continuation of the project, it is strongly recommended to co-ordinate essential assumptions and conclusions with the Client even before the submission of any Draft Reports or documents.

The Consultant shall be expected to establish a project office in Francistown to support the Project Team. During the construction works at Mambo WWTP, the Consultant shall additionally establish a supervision site-office at Mambo WWTP's premises.

The Consultant shall organise and facilitate all required travels, including origin, destination and number of trips with substantiation of the purpose and need for the proposed travel. The Consultant shall be expected to procure, service and maintain project vehicles as may be required for the sole use of the

Client project team members for the entire duration of the contract. This vehicles will be reside with the Client and will revert to the Client at the end of the project. Should the project vehicles be not available at the beginning of the contract, the Consultant shall make available hire vehicle(s) by the Client project team members. The Consultant shall arrange and pay for all accommodation and meals for the Client project team member for all trips associated with the project.

#### **4. CONSULTANT QUALIFICATION**

##### **4.1 Consultant experience**

The Consultant is requested to present at least the below defined reference projects, which must have started after Jan 01, 2012 and been completed before bid submission for this project. Acceptable similar projects are:

- At least two (2) Feasibility Studies that include sewer system + wastewater treatment covering at least 150,000 populations. At least one of those two projects must have been based on trickling filter technology.
- At least one (1) site supervision contracts of rehabilitation / expansion of an existing WWTP, with a cost of supervised works of at least USD 10 million.

In the documentation of his reference projects the Consultant shall also clearly state the length of analysed sewer network, design capacity of the wastewater treatment plant, treatment technologies, investment cost.

Bidders who cannot present these requested minimum references shall be excluded from bidding.

##### **4.2 General personnel requirements**

The bidding Consultant company must be registered with regulatory boards from their country of origin or where they operate from, and all staff that are required to be registered with regulatory boards to practice must be registered from their countries and /or must be eligible to be registered by Engineers Registration Board (ERB) of Botswana before the start of the project. The following are contact details for ERB: Engineers Registration Board, Plot 145, Unit 3, Kgale Terrace, Opposite Game City, P O Box 1909, AAD Poso House, Gaborone, Botswana, Tel: +267 3914446, Fax: +267 3973626, Email: [enquiries@erb.org.bw](mailto:enquiries@erb.org.bw), <http://www.erb.org.bw>

A short description of the 'key personnel' and 'non-key personnel' with their experience and anticipated tasks in the performance of the project must be presented.

Only in exceptional cases and after full justification can change in the key-personnel be allowed after the offer is submitted. Under any circumstances, the qualifications and experience of any replacement (key or non-key) must be at least equal to or higher than that of the originally proposed candidate.

Key-staff requirements are imperative. Any bid that presents any key-staff not matching the defined minimum requirements will be excluded from this bid.

All key staff must have demonstrated international experience. For the purposes of this contract, 'internationally experienced' are considered to be those experts who have worked outside of Botswana, while local assignments are considered to be those in Botswana.



The below listed non-key staffs are indicative. The Consultant may propose additional non-key staff to ensure successful completion of the task. However the Consultant should ensure that the financial proposal includes these additional staff. The Consultant must provide all required staff to carry out all the stated tasks and other duties in the project.

In its bid, the Consultant shall include a detailed time schedule showing each specific task that will be used as a tracking sheet to meet the project deliverables. A personnel scheduling chart, identifying each individual by name and his discipline, and showing on a Gantt chart the estimated number of man-months of each individual, shall be used on the project.

The Consultant shall be required to make appropriate use of available local expertise to ensure that local conditions and capacities are best considered. In the selection of local individuals, any conflicts of interest must be avoided. The Consultant shall also note that civil servants and other staff of the public administration of the beneficiary country cannot be recruited as experts.

### **4.3 Personnel for Tasks 1 and 2 (Feasibility Study, Bidding Documents)**

#### **4.3.1 Key Personnel for Tasks 1 and 2**

**Project Team Leader:** The Team Leader should have a BSc in Civil Engineering or an MSc in Water Engineering or equivalent. He/she must be a professional engineer with 15 or more years working in the sanitation sector, including five (5) years as a team leader. He/she must be a self-starter who should be able to provide strategic leadership to the team and ensure high quality work within the agreed time frames. He/she should have extensive proven experience in design, construction and operation and maintenance of large wastewater schemes. He/she should have been a Team Leader for at least two (2) procurement projects of comparable magnitude to the Mambo WWTP (minimum required threshold for project size: 50,000 populations per reference project). Working experience in international donor-funded projects is a must. Experience working in South African region, in particular working experience in Botswana, is an advantage. The Team leader may also be one of the wastewater specialists.

**Electro-mechanical engineer:** He/she should have a BSc in Mechanical engineering or equivalent. He/she must be a registered engineer with 10 or more years. He/she should have proven experience in design, procurement, installation, and operation and maintenance of electro-mechanical equipment for wastewater projects. He should have worked on at least two (2) procurement projects of comparable magnitude and complexity (minimum required threshold for project size: 50,000 populations per reference project) focusing on design and specification of electrical and mechanical works.

**Wastewater Process Engineer:** He/she should have a BSc in Civil engineering majoring in Water Engineering. He/she must be a registered engineer with minimum 10 years experience in design of Wastewater Treatment Plants that include trickling filters with nitrification, separate denitrification stage, anaerobic sludge digestion, and biogas utilization. He should have worked on at least two (2) design projects of comparable magnitude and complexity (minimum required threshold for project size: 50,000 populations per reference project) focusing on design and operation of wastewater treatment.

**Hydraulic Engineer:** He/she should have a BSc in Civil engineering majoring in Process /Hydraulic Engineering. He/she must be a registered engineer with minimum 10 years experience in design of sewer networks. He / she must have previous experience on at least two (2) projects in the modelling of wastewater networks (minimum required threshold for project size: 50,000 populations per reference project). He/she must be computer literate with a good understanding of appropriate software packages.

**Procurement Specialist:** He/she should have a university degree (master), with 15 or more years professional experience in the preparation and evaluation of bidding documents in the construction sector, preferably in water and wastewater, thereof a minimum 10 years on international assignments. He/she should have worked on at least two (2) procurement projects of comparable magnitude and complexity (minimum required threshold for project size: USD 2 million investment cost per reference project) for the preparation of bidding documents in the water / sanitation sector within the last 5 years.

#### 4.3.2 Non-Key Personnel for Tasks 1 and 2

**Civil / Structural Engineer:** He/she should have a BSc in Civil engineering, and experience in the water/sanitation sector. He/she should have 10 or more years' international experience.

**Financial Management Specialist:** He/she should have a Bachelors' degree in accounting or finance or economics. An MBA in Financial Management and Resource planning or equivalent is an advantage. He/she should have 10 or more years' experience in project financing analysis and advisory, project/investment appraisal, financial and economic analysis.

**Environmental Specialist:** He/she should have a Bachelors' degree in environmental studies and minimum 5 years' experience in Environmental Impact Assessment, Environmental Management Plan, etc.

**Geotechnical Expert:** He/she should have a Bachelors' degree in Civil engineering majoring in Geotechnical Engineering and minimum 5years experience in the field.

**Social/Community development specialists:** He/she should have a degree, majoring in one of the following fields: public or business administration, urban planning, social work and must have 5 or more years' experience in community development.

**Sanitation specialist-for onsite systems:** He/she should have a degree in Civil Engineering majoring in water engineering. He/she must be a registered engineer with 5 or more years' experience in planning, design and implementation of programs for construction, operation and maintenance of on-site sanitation and faecal sludge management.

Other non-key expert - that the Consultant may include - are Operation & Maintenance Specialist, Surveyor etc.

## 4.4 Personnel for Task 3 (Construction Supervision)

### 4.4.1 Key Personnel for Task 3

**Chief Resident Engineer:** The Chief Resident Engineer should have an MSc in Civil Engineering or an MSc in Water Engineering or equivalent. He/she must be a registered engineer with 15 or more years working in construction, including five (5) years as construction supervisor on international projects in the sanitation sector. He/she should have familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large wastewater projects in developing and transition countries; experience with supervision of large wastewater projects. Minimum references: 1 international donor-funded reference wastewater treatment supervision project with investment cost above USD 5 million within the last 7 years. Experience working in South African region, in particular working experience in Botswana, is an advantage.

### 4.4.2 Non-Key Personnel for Task 3

**Deputy Resident Engineer:** The Deputy Resident Engineer should have an BSc in Civil Engineering or an BSc in Water Engineering or equivalent. He/she must be a registered engineer with 10 or more years working in construction, including three (3) years as construction supervisor on international projects in the sanitation sector. He/she should have familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large wastewater projects in developing and transition countries; experience with supervision of large wastewater projects. Experience working in South African region, in particular working experience in Botswana, is an advantage.

**Electrical Engineer:** He/she should have a Bachelors' degree in Electrical Engineering, and minimum 10 years' international experience in the field.

**Mechanical Engineer:** He/she should have a Bachelors' degree in Mechanical Engineering, and minimum 10 years' international experience in the field.

**Wastewater Process Engineer:** He/she should have a BSc in Civil engineering or Water Engineering or equivalent, and minimum 10 years' international experience in the field.

**O&M Specialist:** He/she should have a BSc in Civil engineering or Water Engineering or equivalent, and minimum 10 years' international experience in the field.

**Financial Specialist:** He/she should have a Bachelors' degree in accounting or finance or economics, and minimum 10 years' international experience in the field.

**Environmental Specialist:** He/she should have a Bachelors' degree in environmental studies and minimum 5 years' international experience in the field.

Other non-key nationally experienced staff may be:

- Quality control Specialist**
- Quantity surveyor**
- Site Supervisor**
- Soils/Materials Testing Engineer**
- Electrical Engineer**
- Mechanical Engineer**
- Environmental Engineer**
- HSET Inspector**
- Contract Management Specialist**
- Legal Expert**
- Financial Expert**
- IT Expert**
- O&M Specialist**

<b>Construction Supervision Stage</b>		<b>Key Staff Time Input</b>
<b>Chief Resident Engineer</b>	The Chief Resident Engineer should have an MSc in Civil Engineering or an MSc in Water Engineering or equivalent. He/she must be a registered engineer with 15 or more years working in construction, including five (5) years as construction supervisor on international projects in the sanitation sector. He/she should have familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large wastewater projects in developing and transition countries; experience with supervision of large wastewater projects. Minimum references: 1 international donor-funded reference wastewater treatment	

	<p>supervision project with investment cost above USD 5 million within the last 7 years. Experience working in South African region, in particular working experience in Botswana, is an advantage..</p>	
<p><b>Deputy Resident Engineer</b></p>	<p>The Deputy Resident Engineer should have an BSc in Civil Engineering or an BSc in Water Engineering or equivalent. He/she must be a registered engineer with 10 or more years working in construction, including three (3) years as construction supervisor on international projects in the sanitation sector. He/she should have familiarity with World Bank procurement procedures; experience in international donor-funded projects; experience in the implementation of large wastewater projects in developing and transition countries; experience with supervision of large wastewater projects. Experience working in South African region, in particular working experience in Botswana, is an advantage</p>	
<p>Assistant Resident Engineer (Civil) - 1 for Pipeline and 1 for Concrete &amp; Steel Tanks</p>	<p>B. Eng. (Civil/ Structural)</p> <p>5 years' experience in water supply construction supervision. He/she should have been an ARE on at least two projects.</p>	
<p>Assistant Resident Engineer (EMT)</p>	<p>B. Eng. (E&amp;M) or equivalent</p> <p>4 years' experience in water supply construction supervision.</p>	

	He/she should have been an ARE (EMT) on at least two projects.	
Environmental Officer	B. Sc. (Environmental Science), registered with regulatory body, 5 years' experience in EIA field. He/she should have been an Environmental Officer on at least two projects	

The above staff is indicative. The consultant may propose additional key and non-key staff to ensure successful completion of the task. However the consultant should ensure that the financial proposal includes these additional staff. The consultant must provide all required staff to carry out all the stated tasks and other duties in the project

## 5. LOGISTICS AND TIMING

### 5.1 Location, Facilities, Meetings and Workshops

The Consultant will be expected to establish an office and operate from that office in Francistown and will undertake all visits to the project area as necessary. The Consultant premises in Francistown shall provide sufficient office space for all project team members working at the project at any one time. It is expected that all cost and overheads associated with such an establishment will be clearly presented to ensure fair and just assessment of the consultancy costs.

At all times the Consultant shall have a representative in the office, who shall have the authority to respond to or address any query that maybe addressed to the Consultant by the Client or any stakeholder.

During the construction works at Mambo WWTP, the Consultant shall additionally establish a supervision site-office at Mambo WWTP's premises. The Consultant's personnel for Task 4 (Project Management) should preferably be assigned by WUC 1 or 2 rooms at WUC Offices in Francistown, to facilitate an optimum assistance to WUC in their project management.

Water Utilities Corporation shall appoint a liaison or Project Manager who shall assist the Consultant in obtaining information required for the successful completion of the project. The Consultant shall do likewise. The Consultant shall organize regular project meetings and such meetings will be held at WUC Offices in Francistown. The Consultant shall provide all required equipment during presentations. The Consultant shall meet costs of preparing minutes and reports, printing of reports and minutes and other associated expenses.

The Consultant shall be responsible to convene all meetings including stakeholder meetings and kgotla meetings in all the areas the study if required. The Client Project Manager shall chair all the meetings. The Consultant shall record proceedings of all the meetings and minutes must be made available to the Project Manager within one (1) week after the meeting.

The Consultant shall be required to organise, facilitate and pay for workshops as defined in section “5.2 Timing Schedule and Milestones”. Each workshop will have a minimum number of fifteen (15) participants.

## 5.2 Timing Schedule and Milestones

The total project period is defined as a maximum of **4 years**, including the 6-months period of operation assistance after handing over of Mambo WWTP to WUC. The Consultant shall commence work not later than four weeks from the date of the notice to proceed. The Consultant has to deploy necessary manpower, logistics and all other necessary items to complete the assignment within the stipulated time period.

Since there will be a number of parties involved in the project whose views and interests are to be considered and reflected in the study, the schedule must allow for sufficient time for the discussion and approval of the various reports.

All reports shall be submitted as Draft, and will receive comments from the Client and World Bank. Where not defined otherwise, the Consultant is obliged to present the final version of any report not later than 2 weeks after receiving the Client’s and World Bank’s comments to the respective Draft Report.

### 5.2.1 Milestones for Task 1 (Feasibility Study)

- Kick-off – Within one month after contract signing
- Feasibility Study Inception Report to be produced within one month after contract signing
- Documents review expected to commence at kick-off.
- Existing infrastructure review expected to start off immediately after Feasibility Study Inception report submission.
- Progress meeting expected every calendar month from Kick off meeting.
- First Workshop on Feasibility Study expected within a month after submission of inception report
- Final Workshop on Draft Feasibility Study Report expected to be held together with submission of Draft Feasibility Study Report
- The Final Feasibility Study Report expected to be submitted with 4 weeks after Final Workshop.
- Total period for Feasibility Study is defined as maximum of 10 months.

**Table 1: Details of key deliverables and time lines for Task 1 (Feasibility Study)**

Item	Deliverables	Minimum content requirements described in	By When	No. of hard copies
1.	Draft Inception Report	See below	Within 1 month after contract signing	05
2.	Draft Documents Review Report	Task 3.1.1.1	Within 1 month after contract signing	05
3.	Draft Infrastructure Assessment	Task 3.1.1.2 (1 single report for all sub-	Within 2 months after	05

	Report	tasks)	contract signing	
4.	Draft Wastewater Flows, Loads and Reuse Report	Tasks 3.1.1.3, 3.1.1.4, 3.1.1.5	Within 2 months after contract signing	
5.	Draft Network Modelling Report	Task 3.1.1.6	2 months after approval of Infrastructure Assessment Report & of Wastewater Flows, Loads and Reuse Report	05 reports and 2 CD
6.	Draft Recommended Measures Report	Task 3.1.1.7	2 months after approval of Network Modelling Report	
7.	Draft Feasibility Study Report	Task 3.1.1.11	6 months after contract signing	10
8.	Final Feasibility Study Report	Tasks 3.1.1.11	1 month after approval of Draft Feasibility Study Report	10 and 1 CD

### ***Inception Report***

An Inception Report has to be submitted within 1 month after the signing of the contract. The Inception Report shall present an updated and well-defined work plan and the schedule for completing all components of this contract, planned staffing and outline indications of any reports to be provided or services planned. The Inception Report shall also include the extent of and details on the surveys to be carried out..

### **5.2.2 Milestones for Task 2 – Tender Management (Bidding Documents)**

- The elaboration of Bidding Documents should start as soon as the “Recommended Measures Report” of Task 1 is approved.
- The Draft Notice of Prequalification and Draft Prequalification (PQ) documents should be submitted for approval not later than 1 month after approval of the “Recommended Measures Report” of Task 1.
- Progress meeting expected every calendar month from Kick off meeting.
- Draft Design-Build Bidding Documents expected to be submitted 5 months after approval of the “Recommended Measures Report” of Task 1.
- Draft Bid Evaluation Report expected to be submitted 2 months after Bid opening.

**Table 2: Details of key deliverables and time lines for Task 2 (Bidding Documents)**

<b>Item</b>	<b>Deliverables</b>	<b>Minimum content requirements described in</b>	<b>By When</b>	<b>No. of hard copies</b>
1.	Draft Notice of Prequalification and Draft Prequalification (PQ) documents	Task 3.1.2.1	1 month after approval of the “Recommended Measures Report” of Task 1	05 and 1 CD
2.	Draft Design-Build Bidding Documents	Task 3.1.2.2	5 months after approval of the “Recommended	05 and 1 CD



			Measures Report” of Task 1	
3.	Final Design-Build Bidding Documents	Task 3.1.2.2	1 month after approval of Draft Design-Build Bidding Documents	10 and 1 CD
4.	Draft Bid Evaluation Report	Task 3.1.2.2	2 months after Bid opening	05 and 1 CD

### 5.2.3 Milestones for Task 3 (Construction Supervision)

- The Consultant’s staff for Task 3 should be mobilized within a maximum of 4 weeks after signature of the DB contract.
- The Draft Inception Report should be submitted for approval not later than 6 weeks after signature of the DB contract.
- Monthly Progress Reports: within one week after the end of each calendar month, starting in month #3.
- Semi-annual Reports to the World Bank: within one week after the end of every 6 calendar months, starting in month #7.
- Mambo WWTP Operation Report should be submitted within 30 days after completion of the initial 6 months O&M of Mambo WWTP, exclusively by WUC personnel, without contractor involvement.
- Final Workshop on Lessons Learnt from the Mambo DB project, together with the submission of the Mambo WWTP Operation Report
- Project Completion Report should be submitted within 30 days after completion of the commissioning of Mambo WWTP, or physical completion of any other construction package (such as the urgent refurbishment package).

**Table 3: Details of key deliverables and time lines for Task 3 (Construction Supervision)**

Item	Deliverables	Minimum content requirements described in	By When	No. of hard copies
1.	Draft Inception Report	Task 3.1.3.1	6 weeks after signature of the DB contract	05 and 1 CD
2.	Monthly progress reports	Tasks 3.1.3.2, 3.1.3.3, 3.1.3.5	within one week after the end of each calendar month	05 and 1 CD
3.	Semi-annual Reports to the World Bank	Task 3.1.4	within one week after the end of every 6 calendar	05 and 1 CD
4.	Mambo WWTP Operation Report	Task 3.1.4	30 days after completion of the initial 6 months O&M of Mambo WWTP, exclusively by WUC personnel	10 and 1 CD
5.	Final Workshop on Lessons Learnt	Task 3.1.4	(together with submission	---

	from the Mambo DB project		of item 3 of this table)	
6.	Project Completion Report	Task 3.1.3.5	30 days after completion of the commissioning of Mambo WWTP or of any other construction package	10 and 1 CD

### 5.3 Reporting and Communications

All communications between Client and Consultant shall be done through the Client's Project Manager and the Consultant's Team Leader(s) for the various tasks. (For more details see subsequent sections on Client's and Consultant's obligations.

The Consultant shall submit all deliverables in a report form (hard copies and CD format and make presentations to the Client. All communication and reports shall be in the English language and in 'A4' format; drawings shall be in A3 format and bound with clear plastic covers.

## 6. OBLIGATIONS OF THE CLIENT

The Client shall:

- (a) The Corporation shall be represented in the project by the Project Manager (PM) who shall be appointed by the Technical Services Director. The Project Manager shall maintain continuous and direct liaison with the Project Team. The day to day running of the project will be coordinated and all communications shall be done through the Project Manager.
- (b) A Project Steering Committee will be formed with representatives from the Corporation, who will assist and provide guidance to the Client Project Manager.
- (c) Supply free of charge all available pertinent data and information requested by the Consultant that is in its possession. This will include reports of previous studies both for the Corporation and other organisations which are relevant to this assignment and are stored in the Corporation Technical Library. The Client however, shall not be held responsible for their accuracy and correctness. The Consultant, where necessary, shall verify the accuracy and correctness of such data supplied to him.
- (d) Assist the Consultant to obtain required approvals, licenses and permits from central or local government departments or statutory authorities having any jurisdiction over or connection with the Works and services.
- (e) Give prompt consideration to all reports, proposals, recommendations, , and any other documents relating to the Project submitted by the Consulting Engineer to the Client so as not to cause delay to the performance of the services of the Consulting Engineer.
- (f) Assist in facilitation of prompt clearance through customs of any property required for the Services.
- (g) The Corporation will attach staff to the project that will assist the Consultant on the assignment. The attached staff will be for assistance only, any failure or delays on the study the attached staff will not be held responsible, all risks remains on the hands of the Consultant. The Client also expects capacity building of the attached staff by the Consultant.

- The Client shall make available to the Consultant free of charge such professional and support counterpart personnel, to be nominated by the Client. However the Client reserves the right to withdraw their services.
- Professional and support counterpart personnel shall work under the exclusive direction of the Consultant. If any member of the counterpart personnel fails to perform adequately any work assigned to such member by the Consultant that is consistent with the position occupied by such member, the Consultant may request the replacement of such member. The Client shall reserve the right to replace such personnel.

## 7. OBLIGATIONS OF THE CONSULTANT

The obligations of the Consultant are below:

- a) The Consultant shall provide a team leader for the various tasks described in this TOR, who will be the Consultant's representative for the duration of the respective task, and he/she will consult and liaise with the Client project manager on all matters.
- b) The Consultant will be responsible for the application for work permits for all staff and all associated risks will remain with the Consultant. None approval of work permits shall not attract costs to the Client or relieve the Consultant of the contractual obligations.
- c) Health insurance of the Consultant staff will be covered under the Consultant's expenses.
- d) The Consultant shall provide professional indemnity insurance for the Consultant Staff.
- e) The Consultant must make sure that all staff that require registration with relevant bodies must be registered before commencement of the project, e.g. engineers must be registered with Engineers Registration Board (ERB), The following are contact details for ERB: Engineers Registration Board, Plot 145, Unit 3, Kgale Terrace, Opposite Game City, P O Box 1909, AAD Poso House, Gaborone, Botswana, Tel: +267 3914446, Fax: +267 3973626, Email: enquiries@erb.org.bw, <http://www.erb.org.bw/content/id/42/registration-categories-and-sub-categories/>
- f) The Consultant is liable to monitor the quality of the project. All quality controls must be set by the Consultant and approved by the Client.
- g) The Consultant must adhere to all the relevant standards and make sure that the designs meet the national standards or internal standards or best practices where there are no national standards.
- h) The Consultant will be responsible for the accommodation and transportation of their staff.
- i) The Consultant must include all activities to be covered by the assignment.
- j) The Consultant shall provide appropriate expert professional personnel and exercise all reasonable skill, care and diligence in the performance of the Services. The Consulting Engineer shall carry out all his responsibilities in accordance with the highest ethics and general practices of his profession.
- k) The Consultant shall in all professional matters act as a faithful adviser to the Client.
- l) The Consultant shall arrange regular meetings with the Client to keep him abreast of the Consultant's progress in the performance of his duties.
- m) The Consultant shall obtain Client's approval to engage specialist consultants or contractors directly to perform services necessary to enable the Consultant to perform the services required of him.

- n) The Consultant shall sign all drawings and other documents certifying to their correctness and bear responsibility for their work.
- o) The copyright of all documents prepared by the Consultant in connection with this Assignment rests with the Client.
- p) All reports, maps, drawings, notes, calculations, computer software developed for this study, aerial photographs, specifications, statistics and other technical data compiled or prepared and other material used in performing the services shall be the property of the Client and shall be delivered to the Client before final payment can be made and shall not be used for any purpose not related to the services under this Agreement without the prior written approval of the Client.
- q) The Consultant shall establish an office in Francistown, Botswana, during the execution of the project.
- r) During the construction works at Mambo WWTP, the Consultant shall additionally establish a supervision site-office at Mambo WWTP's premises.
- s) The following standards and regulatory requirements shall be applicable for the purposes of this contract:

Reference	Definition
OHS Act 31 of 1973	Occupational health and safety act of Botswana
OHS Act 85 of 1993	Occupational health and safety act of RSA
ANSI/ISA-95.00.01	Enterprise – Control system integration.
ANSI/ISA-S5.1-1984	Instrumentation Symbols and identification
IEC62305-4:2006	Protection against lightning
IEEC 802.3	Standard for information Technology
BOS 93: 2012 2nd ed.	Waste water – Physical, microbiological and chemical requirements – Specification
BOS 32:2009	Water Quality – Drinking Water Specification
Factories Act of 1973	Factories Act
EA Act of 2011	Environmental Assessment Act

# Appendix 1: Map of Botswana



**Appendix 2: Google Map of Mambo WWTP, Francistown, Botswana**

