



Rev. 10 August 2018

Tender No. 2018/CSAPC/FNJOR/100231

INVITATION TO BID (ITB)

CLOSING DATE: 17 September 2018 – 17:00 hrs (Rome, Italy time)

The Food and Agriculture Organization of the United Nations (“FAO” or “Organization”) is an intergovernmental organization with more than 194 member countries. Since its inception, FAO has worked to alleviate poverty and hunger by promoting agricultural development, improved nutrition and the pursuit of food security - defined as the access of all people at all times to the food they need for an active and healthy life.

To achieve its goals, FAO cooperates with thousands of partners worldwide, from farmers’ groups to traders, from non-governmental organizations to other UN agencies, from development banks to agribusiness firms (further and more detailed information on FAO can be found on the internet site: <http://www.fao.org>).

In preparing your bid, you should take into account the international status and activities of FAO by submitting your best commercial terms. You should also be aware that FAO enjoys certain privileges and immunities which include exemption from payment of Value Added Tax ("VAT" or "IVA"), customs duties and importation restrictions.

FAO intends to award a Contract for services, specifically:

“Design, construction and commissioning of a co-digesting sludge/ biowaste biogas plant (50 kW CHP) in Mafraq, Jordan”

You are hereby invited to submit your best offer in connection with the award of such works.

The following procedures have been established by this Organization for the award of this Agreement:

1. PROCEDURES

- 1.1. You are invited to submit an offer for the above-mentioned works. A description of the requested works is provided in **Appendix A**;
- 1.2. In submitting your offer you are supposed to have considered all aspects relevant to the performance of the proposed contract and to have obtained all necessary information and data as to risks, contingencies and other circumstances which may influence or affect your offer;
- 1.3. It is understood that all documents, calculations, etc. which may form part of your offer will

become the property of the Organization, who will not be required to return them to your firm;

- 1.4. All costs incurred to prepare your bid have to be borne by you; FAO will not be liable to reimburse any or all of such cost;
- 1.5. The Organization reserves the right to publish the details of awards, including supplier name and country, total Contract value and a brief description of the services. In all cases, unsuccessful bidders will be notified;
- 1.6. Consortium of firms will be accepted provided that the companies indicate which firm will be the main Contractor and will be responsible for the signature of the relevant contract. Bidders adhering to the Consortium will have to notify FAO of their acceptance to participate in the Consortium;
- 1.7. Registration as a vendor in the UN Global Marketplace (UNGM), www.ungm.org, is a prerequisite for receiving an award from FAO. Please register your firm with UNGM. If you have any difficulties registering, please contact UNGM team using the Help button on the web site www.ungm.org.
- 1.8. The Organization has adopted a zero tolerance approach to fraud, and it prohibits firms from engaging in corrupt, fraudulent, collusive, coercive, unethical and obstructive practices when participating in procurement activities. As provided by the Vendor Sanctions Procedures (http://www.fao.org/fileadmin/user_upload/procurement/docs/FAO_Vendors_Sanctions_Policy_-_Procedures.pdf), if the Organization determines that a firm has engaged in such conduct, it will impose sanctions and may share information on sanctioned firms with other Intergovernmental or UN Organizations;
- 1.9. A firm and its affiliates, agents and subcontractors should not be suspended, debarred, or otherwise identified as ineligible by any Intergovernmental or UN Organization, including any organization within the World Bank Group or any multi-lateral development bank, or by the institutions and bodies of economic integration organizations (e.g., the European Union). You are therefore required to disclose to the Organization whether your firm, or any of your affiliates, agents or subcontractors, is subject to any sanction or temporary suspension imposed by any such organization or National Authority at any time during the three years prior to the contract or at any time throughout the execution of the contract. You acknowledge that a breach of this provision will entitle FAO to terminate its contract with your firm, without any liability for termination charges or any other liability of any kind of FAO, and that material misrepresentations on your status constitute a fraudulent practice;
- 1.10. Bidders must certify that their firm is not associated, directly or indirectly, with entities or individuals (i) that are associated with terrorism, as in the list maintained by the Security Council Committee established pursuant to its Resolutions 1267 (1999) and 1989 (2011), or (ii) that are the subject of sanctions or other enforcement measures promulgated by the United Nations Security Council. Selected bidders also agree to undertake all reasonable efforts to ensure that none of the funds received from FAO under the awarded contract are used to provide support to individuals or entities associated with terrorism or that are the subject of Security Council sanctions. This provision must be included in any subcontracts, sub-agreements or assignments entered into under the awarded contract. The Bidder acknowledges and agrees that this provision is an essential term of the awarded contract and any breach of these obligations and warranties shall entitle FAO to terminate the Contract immediately upon

notice to the Contractor, without any liability for termination charges or any liability of any kind of FAO;

- 1.11. Bidders must certify that their company and/or subcontractors are not associated, directly or indirectly, with the consultant or any other entity who prepared the terms of reference or other bidding documents for this tender;
- 1.12. Please note that Bidders who use an independent consultant to assist in the preparation of offers may risk engaging in unacceptable practices if the same consultant assists another Bidder to prepare an offer for the same tender. Bidders are reminded that they are fully responsible for the conduct of any consultant who may be used to prepare offers for FAO tenders and they should take all measures to ensure that any independent consultant engaged to assist in the preparation of an offer for an FAO tender has not and will not be involved in the preparation of an offer for another Bidder for the same tender process.

Bidders are kindly requested to disclose to the best of their knowledge whether their company has any personal or professional relationships with FAO. The disclosure shall include all relevant details and should include, but not be limited to:

- **ANY** current or past employment relationship with FAO of your company's representatives and employees;
- **ANY** current or past relationship with any FAO staff member (family members, spouses, etc.) of your company's representatives and employees.

- 1.13. Fairness and transparency are fundamental principles for FAO procurement activities. Firms that believe that the procurement process was not fair and transparent may request feedback from the office that issued the tender. If a satisfactory response is not received, a firm may present a protest following the bid protest procedures detailed in the following link: <http://www.fao.org/unfao/procurement/codedeconduitethique/protests/en/>. To report allegations of fraud or misconduct in the procurement process, bidders may submit information, also anonymously, to the Office of the Inspector General Hotline: <http://www.fao.org/aud/69204/en/>.

2. DOCUMENTS ENCLOSED

The following documents are enclosed:

- 2.1 The "**Bid Summary**" form, to be used for submitting your offer;
- 2.2 **Appendix 'A'** to the Letter of Invitation, with the detailed description of the services and specifications, including its Annex I, "*Methane potential test for organic waste and WWTP sludge Zaatari refugee camp samples analysis*".
- 2.3 **Appendix 'B'** to the Letter of Invitation - Price list
- 2.4 **Appendix 'C'**, for assessing the **financial status the Bidder**.
- 2.5 The "**Site Visit Statement**", detailed in **paragraph 3.2.a)** below.

2.6 A sample of the **Contract** that the Organization intends to award.

3. **DOCUMENTS TO BE SUBMITTED AND MANDATORY REQUIREMENTS**

Your bid should consist of the following clearly identified items:

3.1 The duly completed and signed "**Bid Summary**" mentioned in paragraph 2.1 above, along with the Mandatory Requirements set out below;

3.2 **Mandatory Requirements:** Bidders should provide the information/documents listed below which are essential to being eligible for the participation to the tender and evaluation of the submitted offer. Failure to provide such information/evidence will result in the disqualification of the bidder from the tender evaluation process:

a) SITE VISIT: Site visit is mandatory. The Bidder shall submit a statement duly signed by the Bidder, certifying that the Bidder inspected the site of work and obtained all necessary information related to risks, contingencies and other circumstances, which might influence or affect the provision of the goods or execution of the works. The Site Visit Statement form is attached to this Letter of Invitation as detailed in paragraph 2.5 above.

b) LEGAL STATUS: Please provide (i) The certificate of registration of the bidder's firm or company (business license, articles of incorporation or equivalent document); (ii) Tax Payer Identification Certificate;

c) PROVEN EXPERIENCE:
Profile of the company, detailing the experience of the Bidder. It is required a minimum experience of **three (3) contracts** for execution of works of a similar nature (biogas turnkey projects of 50 kW **CHP** or higher **electricity output** capacity) and comparable value to the bid submitted (or of a higher value) executed by the Bidder during the last **three (3) years**. **Please include a list detailing** the specs of the biogas system delivered, the value of each contract and the name and address of the employer in each case for reference purposes;

d) FINANCIAL STRENGTH:
Audited financial statements for the years 2016 and 2017 (full report, including Audit Opinion Letter). In absence of audited financial statements, please complete **Appendix C** (detailed in paragraph 2.4 above) duly signed by Chartered Accountant (CA/CPA). The Altman Z-Score of each Bidder will be calculated; if a Bidder's Z-score is equal or less than two (2), the offer may be rejected by FAO.

e) QUALIFICATION OF ASSIGNED PERSONNEL:
The Bidder shall provide a description of the organizational unit(s) that will become responsible for this Project, and the general management approach for a project of this kind. The Bidder will provide CVs and evidence of academic credentials of key personnel. As a minimum:

i. One (1) Biogas expert:

a. Academic degree in mechanical engineering, process engineering or related field (minimum BSc or equivalent).

b. Experience: at least ten (10) years, designing, constructing and commissioning medium to large-scale biogas plants for power generation.

- ii. One (1) Mechanical or Civil engineer:
 - a. Academic degree in mechanical or civil engineering or related field (minimum BSc or equivalent).
 - b. Experience: at least ten (10) years in constructing and commissioning medium to large-scale construction projects.
 - iii. One (1) Electrical engineer:
 - a. Academic degree in electrical engineering (minimum BSc or equivalent).
 - b. Experience: at least five (5) years in designing and implementation of electrical installations of small to medium-scale electricity generation systems.
- f) **TECHNICAL OFFER**: Document covering the Bidder’s **technical offer**, which shall consider all elements detailed in **Appendix A**. The Bidder must include a work-plan/ activity schedule (Gantt chart) for completing all the required services and works within **fifteen (15)** months from contract signature, detailing the dates for completing the deliverables required in **Appendix A**.
- g) **QUALITY**: Warranty Statement against defects in design, construction, equipment and workmanship (backed by the manufacturer’s guarantee on the main equipment), with a duration of at least two (2) years **in operation**.
- h) **FOR CONSORTIUM OF FIRMS**: Notarized Agreement among the legal entities confirming they have designated one party to act as the lead entity, duly vested with authority to legally bind the rest of the members jointly and severally. This document shall also indicate that if they are awarded the contract, the contract shall be entered into, by and between FAO and the designated lead entity, who shall be acting for and on behalf of all entities that comprise the joint venture, consortium or association.

3.3 The duly completed **PRICE LIST** set forth as **Appendix B** to the Letter of Invitation.

4. EVALUATION PROCEDURE (APPLICABLE TO EACH LOT).

4.1 Pass/Fail methodology will be applied to each mandatory requirement detailed in **paragraph 3.2** above. Bids that successfully pass all mandatory requirements will be further assessed according to the criteria detailed below:

Criteria	Maximum Points
Additional experience to the minimum required in paragraph 3.2.c) in the execution of works of a similar nature (biogas turnkey projects of 50 kW CHP or higher electricity output capacity). 2 points for each evidence of delivered project.	10
Extended warranty against defects in design, construction, equipment and workmanship (backed by the manufacturer’s guarantee on the main equipment) beyond the minimum required in paragraph 3.2.g) . 2 points for each additional year.	10
Technical evaluation	20

- 4.2 The assessment of the technical criteria detailed in the table above accounts for 20% of the overall evaluation. The Rating of the Technical Offer (TO) will be obtained through the following formula:

$$\text{TO Rating} = (\text{Total Points Obtained by the Offer} / \text{Max. Obtainable Points for TO}) \times 20$$

- 4.3 **The Financial offer represents 80% of the overall evaluation.** Offers will be evaluated according to the pricing information provided through **Appendix 'B'** (bills of quantities) for the total price for the goods and works required. The Rating of the Financial Offer (FO) will be then obtained through the following formula:

$$\text{FO Rating} = (\text{Lowest Priced Offer} / \text{Price of the Offer Being Reviewed}) \times 80$$

- 4.4 A Contract will be awarded to the offer with the highest Total Combined Score, which will be obtained through the following formula:

$$\text{Total Combined Score} = \text{TO Rating} + \text{FO Rating}$$

FAO reserves the right to consider, and disqualify firms based on, documented prior poor performance, including but not limited to poor quality of goods or services provided, late delivery and unsatisfactory performance. FAO also reserves the right to have further discussions/negotiations with the Bidder prior to issuance of the contract.

5. **COMPLETENESS OF BID**

Bids will only be considered if they contain all of the above information and documents and observe the provisions of the enclosed sample contract as otherwise it will not be possible to evaluate them on an equal basis. Since this Organization is not allowed to sign contracts which do not specify its maximum financial liability, proposals which do not allow us to calculate such liability may be rejected.

6. **PARTICIPATION BY THE ORGANIZATION**

You should examine carefully the nature and extent of the participation in the contract performance by the Organization as set out in Annex II of the enclosed contract since such contract assumes that all other requirements for its successful completion are provided at the cost of the Contractor. **You should therefore state in the appropriate space provided in the "Bid Summary" (Part II) any additions or modifications of the said Annex II which you suggest for a satisfactory performance of the contract.**

7. **CURRENCY OF BID AND OF CONTRACT.**

Your proposal should be expressed in **Jordanian Dinar (JOD)** or **US Dollars (USD)**.

8. FORM OF SUBMISSION AND CLOSING DATE.

8.1 Your offer should be submitted as follows:

1. Uploading your Bid on UNGM:

Please login and upload all the documents requested in **paragraph 3** of this Letter of Invitation in the designated placeholders in the UNGM portal and within the indicated deadline.

It is the exclusive responsibility of the bidders to ensure that the files are uploaded before the tender deadline. The system will reject any bid received after the deadline.

Please follow the instructions below to upload the electronic files in the UNGM portal:

- a) **Log in the UNGM website** with your e-mail and password;
- b) Click on MY TENDERS and select the tender;
- c) Click on VIEW DOCUMENTS (green button on the left of the specific tender notice you are interested in);
- d) Click on the INVITATION TO BID tab of the tender notice;
- e) Click on the “OPT IN” button;
- f) To upload all the files, click on the relevant “UPLOAD DOCUMENT” red buttons under the “MY TENDER RETURN”.

NOTE: It is highly recommended that the size of the files does not exceed 5MB.

IMPORTANT: Once all files are uploaded, please remember to click on the red button “SUBMIT MY RETURN” to send your offer. If the submission is properly completed, you will be able to view and download a receipt under the “HISTORY” tab.

SUBMISSIONS BY E-MAIL OR FAX ARE NOT ALLOWED.

2. Modification or Withdrawal of Bid:

A bidder may, without prejudice, modify or withdraw an offer before the deadline with the “MODIFY RETURN” function. No offer may be modified after the deadline for submission.

3. No Bid Notice:

In the event that your company is not interested to participate in this tender, the Organizations would appreciate your feedback with a brief explanation. In this case, you are kindly requested to click on the “OPT OUT” button displayed in the UNGM portal to send your reason for non-participation.

8.2 Your offer should reach this Organization no later than:

CLOSING DATE: September 17, 2018 – 17:00 Hrs (time in Rome, Italy)

9. COMMUNICATIONS CONCERNING THIS TENDER.

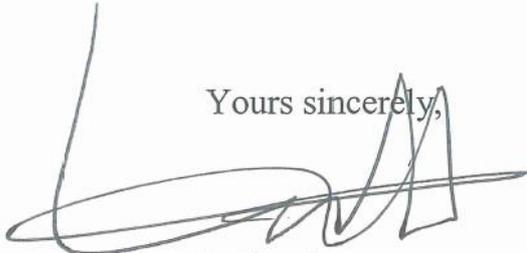
- 9.1 All communications concerning this tender (questions, comments, requests) should mention the tender number **(2018/CSAPC/FNJOR/100231)**. Bidders may request clarification of any of the tender documents described in paragraph 2 above. Such request must be sent in writing via email to the following address: CSDA-Contracts-Group@fao.org

IMPORTANT: Deadline for questions is September 5, 2018.

- 9.2 FAO shall endeavour to provide answers to clarifications in an expeditious manner and not later than **seven (7) calendar days before the closing date of the tender**. Any delay in such response shall not cause an obligation on the part of FAO to extend the submission date of the Bid, unless FAO deems that such an extension is necessary.

I take this opportunity to express my appreciation for your interest in assisting this Organization in the implementation of its activities.

Yours sincerely,



Arslan Bounemra
Chief, CSDA
Administrative Services

BID SUMMARY

Instructions: Please complete the spaces left blank below.

PART I: Mandatory Requirements

I certify that I have provided documentation as evidence of meeting the **Mandatory Requirements** set forth in **paragraph 3** of the Letter of Invitation:

PART II: Commencement of Contract Performance

- I undertake to commence the performance of the contract immediately upon receipt of the contract duly signed by both Parties.
- I certify that I have submitted a detailed work plan and schedule confirming completion of works **within fifteen (15) months from contract signature, and the provision of two (2) years of warranty against defects (defects liability period).**
- I certify that the following documents will be provided **within two (2) month from signature of the contract:**
 - Performance Bond;
 - Bank Guarantee (in case advance payment is requested);
 - Detailed work schedule;

PART III: Participation by the Organization in the contract performance (see Annex V of the Contract). Either:

- I certify that the inputs to be provided by the Organization, as set out in **Annex V** of the sample Contract, are adequate and sufficient for a satisfactory contract performance;
- or
- For a satisfactory contract performance, the following would have to be provided:

PART IV: Completeness of Bid

- I confirm having obtained all relevant data and information as regards risk, contingencies, and any other circumstances which may influence or affect the performance of the contract, which have been duly taken into account in the formulation of this bid.
- I understand that the contract resulting from this Tender will be a **lumpsum contract** (not ad-measurement) based on the total amount of the bid submitted, the amount of which will represent the maximum financial liability of the Organization.

- I understand that items for which no price is entered by the Bidder will not be paid for by the Organization when executed and shall be deemed covered by the other prices in the Bill of quantities and included in the total lumpsum.

PART V: Certification of Proper Procedures

- I certify that my firm/organization (including all members of a consortium, if applicable) and its subcontractors are not associated, directly or indirectly, with the consultant or any other entity who prepared the terms of reference or other bidding documents for the project.
- I acknowledge that my firm is responsible for any consultant, including independent consultants, who assists in the preparation of offers and confirm that my firm has taken all measures to ensure that any independent consultant engaged to assist in preparing this offer has not and will not be involved in the preparation of another bid for another bidder for the same tender process.

PART VI: Conflict of Interest Disclosure. Either:

- To the best of my knowledge, I confirm that none of my firm’s representatives or employees have a current or former employment relationship with FAO, and none of my firm’s representatives or employees has a current or past relationship with an FAO staff member (family members, spouses, etc.).

or

- I have provided below details regarding the following representatives or employees of my firm who have a current or former employment relationship with FAO and/or who have a current or past relationship with an FAO staff member:

PART VII: Contract Provisions:

- I confirm that the terms and conditions of the contract/s as enclosed with the letter of invitation are acceptable except for the reservations explicitly set out in this offer.

- I certify that my firm has not and will not engage in corrupt, fraudulent, collusive, coercive, unethical or obstructive practices during the selection process and throughout the negotiation and execution of the contract.

- I confirm that my firm, including any affiliates, agents or subcontractors, is not subject to any sanction or temporary suspension imposed by an Intergovernmental or UN Organization, including any organization within the World Bank Group or any multi-lateral development bank, or by an institution or body of an economic integration organization (e.g., the European Union). If my firm, or any affiliates, agents or subcontractors, has been subject to

any temporary suspension or sanction by any such organization or National Authority within the preceding three years, I have provided further information below:

- I certify that my firm is not associated with any individual or entity appearing on the 1267/1989 list of the UN Security Council or with any individual or entity subject to any other sanctions or enforcement measures promulgated by the UN Security Council.

PART VIII: Validity of Bid:

This offer is valid for acceptance for a period of SIX (6) MONTHS as from the deadline for the submission of the offer indicated in the letter of invitation.

Name of Firm: _____

UNGM Number: _____

Mailing Address: _____

Tel: _____

Email: _____

Person(s) to contact:

Signature: _____

Date: _____

Name & Title: _____

Company seal: _____

Appendix A. Scope of Works. Specifications

1. Background.

The “Improving Rural livelihoods and the environment through the integral utilization of residues of treated wastewater and organic solid waste for the production of renewable energy and compost in Mafraq Governorate of Jordan” (GCP /JOR/017/EC) is an FAO project funded by the European Union aiming at enhancing the economic growth potential of the local economy of Mafraq Governorate.

One track of the project is the valorisation of organic waste and residues as well as faecal and wastewater sludge to generate biogas (for electricity production) and compost via a biogas plant located in the Zaatari refugee camp. Expected benefits: 1) Create employment, 2) Reduce cost of transporting waste from the camp to landfills, 3) Create a foundation for integrated waste management in the camp, and 4) Reduce greenhouse gas emissions.

2. Objective.

The objective of this procurement instrument is design, construction and commissioning of a Biogas systems consisting of Digester, Biogas CHP unit, Biogas Treatment, Control and Monitoring Equipment, Substrate and co-substrate reception and pre-treatment, post-treatment and storage of digestate, and auxiliary equipment and the provision of training and documentation on the operation and maintenance of the installed systems.

The project is considered instrumental for the dissemination of this technology. Thereby, FAO aims for the highest standards in workmanship and equipment, and the evaluation of the bids will be performed with the highest attention to detail and without any compromise on quality of service, to ensure the success of the project.

The main intention of the biogas plant is the use of waste generated from the camp as sewage or faecal sludge and organic matter. The plant concept was supposed to perform daily the treatment of 27m³ of faecal sludge or sewage sludge and 4MT manually pre-sorted organic bio waste from a sorting facility (MSW) as turnkey project.

The produced biogas should primarily cover the own energy demand of the biogas plant and the excess transferred to neighbouring users or loaded to the national grid. That means, that the biogas is transformed into electricity via a Combined Heat and Power (CHP) unit, and the surplus of generated electricity will be sold.

3. Project Site.

Zaatari Refugee Camp – Mafraq – Jordan. Zaatari Camp is located approximately 10km east from Mafraq, adjacent to National Road No. 10 and presently accommodates near 80,000 Syrian refugees. To address the camp sanitation challenge, a wastewater treatment plant (WWTP) is installed southwest of the camp and the future biogas plant will be installed in its neighbourhood (approximate location [32°17'20.3"N 36°18'45.9"E](#)) with the compost and a solid waste sorting station.



4. Required Deliverables.

The following presents the list of required deliverables. These are inclusive of labour, tools, machinery, equipment, spare parts and ancillary services, needed for the supply and installation of these deliverables.

4.1 Deliverable 1: two (2) months after contract signature.

- 4.1.1 Installation shop drawings, including electrical, mechanical and civil works drawings (Three hard copies and one soft copy, in PDF and AutoCAD formats);
- 4.1.2 Detailed system design and technical report (describing the final solution and methodology);
- 4.1.3 Detailed Planned Schedule of works **and shipments**;
- 4.1.4 A concise Environmental Statement specifying waste disposal, **dust and noise protection** arrangements during installation;
- 4.1.5 A description of the proposed performance and acceptance testing procedure and templates (**commissioning period**);
- 4.1.6 A letter certifying the requirements on warranties, spare parts and standards **for the first two (2) years of operation**.

4.2 Deliverable 2: **eight (8) months after contract signature**.

- 4.2.1 **On-site** supply and delivery of the complete Biogas plant with all components needed for its operation as well as the connections needed for the supply of biogas input that ensures full plant operation.
- 4.2.2 **Delivery of inception report (after 6 month)**.

4.3 Deliverable 3: **twelve (12) months after contract signature**.

- 4.3.1 Installation **end**, start up and commissioning of the complete Biogas plant with all

components needed for its interconnection to the existing installations, operation, and all related performance testing.

4.3.2 Delivery of **performance test** report.

4.4 Deliverable 4: **fifteen (15) months after contract signature.**

4.4.1 Training on Operation and Maintenance of the Installed Equipment for the operators representatives, as well as provision of training manuals, end user manuals, checklists, as-built drawings for both the client and the operator, open workshop for interested parties on the operation and maintenance of the sites. Spare parts, tools and supplies for the warranty period must be considered.

4.4.2 The selected Bidder will provide support to FAO during the requested warranty period of two (2) years, in order to answer any technical or non-technical questions. The Bidder shall be present on site when FAO performs functional tests and relevant inspections in order to confirm that all technical requirements have been fulfilled.

4.4.3 **Delivery of final training and commissioning report.**

4.4.4 **The selected Bidder shall provide post commissioning as-built drawings; technical documentation; operational and maintenance manuals including operational hours and internal power consumption of delivered equipment; comprehensive maintenance plan for the complete project duration including elaboration on the operational expenditure.**

4.4.5 **Final versions of technical key-documentation on operation, maintenance and safety instructions should be made available in English and Arabic.**

5. Terms of Execution.

5.1 Timeframe: The selected Bidder shall start activities upon signature of Contract (draft attached). The overall term of execution of the Contract is spread over **fifteen (15)** months, effective from Contract signature date, and 24 months of defects liability period (guarantee period). The execution of the Contract includes the supply and delivery of the equipment to site, the installation and commissioning of the equipment, the testing of the assembled systems, the training of personnel and the hand-over (turnkey project). The selected Bidder shall have all deliverables completed and approved before the deadline indicated for each item detailed in paragraph 4 above.

5.2 Shipment and Storage: The selected Bidder is responsible for clearing delivered equipment from Akaba port and/or Queen Alia International Airport. The selected Bidder will be also responsible for ensuring an adequate **insurance and** interim storage space for all delivered equipment.

5.3 Branding Display: All labelling related to the equipment's brand name, model or other, has to be highly discreet and unobtrusive, and readable only from very near distances of less than 1m.

5.4 Replacement and Spare Parts: Spare parts **or adequate replacements units** need to be available for at least 10 years after the date of **commissioning**. As part of its offer, the Bidder shall

include a plan of maintenance (minor and major) and **recommended** equipment replacement **over expected lifetime**.

5.5 Guarantees: The supplied installations shall be tested, commissioned and handed over complete and in perfect operating condition and shall be covered under a defects liability (parts and labour) for a minimum period of 24 months (2 years) from the date of commissioning. This warranty covers all manufacturer / workmanship defects only. The selected Bidder shall be available to answer any request that comes from FAO or designated entity within 48 hours and be available to repair or replace any defective component within seven (7) calendar days.

6. General Scope and Specifications.

Bidders are requested to submit a draft configuration and design, taking into consideration the capacities, specifications and components as specified within this document. The awarded Bidder will be requested to submit a detailed design as part of **Deliverable 1**, as indicated in paragraph 4 above.

6.1 Scope of turnkey project.

This project consists of supplying all the systems' components, installing, testing, commissioning and handing over in good operating conditions the following systems:

- CHP unit
- Digester and purification system
- **Biogas** storage system
- Pump **System**
- **Biogas** Flare
- **Biogas** treatment
- **Co-substrate reception and pre-treatment**
- **Digestate post-treatment and storage**
- Control and monitoring equipment
- Other auxiliary facilities

The Contractor shall provide all necessary components, and accessories as well as **labour**, civil works, scaffolding, etc., at the Contractor's own expense, in order to install complete operational units.

The Biogas systems shall be installed in Zaatari Refugee Camp as will be indicated by FAO. The equipment furnished to these specifications must meet or exceed all requirements herein. Bidders are cautioned to read the specifications carefully, as there may be special requirements not commonly offered by all manufacturers. Nevertheless, the technical specifications presented herein are not to be interpreted as necessarily defining a particular manufacturer's product, model or features. The equipment shall conform in capability, strength, quality and workmanship to the accepted industry standards and relevant international quality standards. It should be noted that the equipment offered should be suitable for operation at **380-400V or 220V**, 50 Hz and there may be voltage sags and voltage surges from the utility grid side during storms.

6.2 General Conditions.

The Bidder shall state the manufacturers' guarantee on the different components as well as local representation available for service and technical support.

The selected Contractor shall secure a team of specialized engineers, technicians and skilled workers qualified to carry out the requested tasks successfully. The number of teams shall be sufficient to carry out the required works within the specified period of the contract. **Temporary working permit and resident's authorization for international staff will be provided as under Jordan law.**

The components delivered to the site shall be considered under the selected Contractor's responsibility until the final Biogas plant is handed over to FAO, **intended after three 3 month commissioning period.** It may be noted that the road conditions may be adverse and the packing shall therefore protect the equipment thoroughly from vibrations.

The selected Contractor shall remove the waste of works undertaken including the trash and dirt resulting from the works following Employer disposal recommendations. The selected Contractor shall conduct a verification test for the **CHP** in the presence of a qualified inspector of the purchaser and the required biogas expert. The test procedure shall be submitted prior to any test for review and approval. The Contractor shall instantly fix any malfunction resulting from the test and repeat the test.

6.3 Scope of services. Design and alignment of design with related components.

The selected Bidder shall perform site inspection(s) prior to the start of all further activities. The selected Bidder will submit for FAO's approval detailed design based on plot properties, capacity of equipment and guaranteed performance to reach the specified output. In addition, the selected Contractor will submit a time schedule and Gantt chart for the execution of the deliverables detailed in paragraph 4 above.

6.4 Scope of services. Installation, commissioning and training.

- Supply of materials & equipment necessary for turnkey operation biogas plant; construction, fabrication, installation & commissioning.
- Post commissioning operation of the plant including stabilization & performance monitoring & training on operation & maintenance of the biogas plant and the delivered components.
- Spare parts and consumables for the system guarantee period from start of biogas production. Spare parts and consumable usage after this period shall be specified in the maintenance plan.
- Site safety – The selected Contractor shall comply with all relevant safety regulations during all the phases of the project.
- A safety plan shall be submitted with reference to the German Biogas Association (Guidelines for the safe use of biogas technology¹), or higher standards.
- A plan on the operation of the plant shall be provided, including:

¹ https://biogas-safety.com/Download/biogas_safety.pdf

- Expected duration of labour on daily or weekly basis;
 - Roles, skills and expertise of operators;
 - Operational risk estimation and related mitigation measurements.
- The bidder has to give declaration in their offer to ensure compulsory use of all necessary Personal Protective Equipment like **construction site vests, helmet**, safety shoes etc. by all of his personnel; **and provide helmets for official visitors.**
 - The responsibility of organizing and conducting a training of the beneficiaries will rest on the successful Bidder. The training will be organized in consultation with both beneficiaries and FAO. A training plan will be prepared and sent for approval by FAO two (2) months prior to the proposed training date. The training program will focus on operation and maintenance of the biogas plant. Technical documentation on operation, maintenance and safety instructions should be made available in English and Arabic.

6.5 Scope of services. Service and availability of spare parts.

- The bidder shall include spare parts and consumables for a period of two (2) years.
- A system guarantee period of at least two (2) years shall be given.
- Guarantee for all electrical and mechanical equipment of at least two (2) years.
- **Civil work guarantee of at least ten (10) years.**
- The Bidder shall prepare a maintenance plan (regular and major) covering a period of at least ten (10) years **over expected lifetime.**

6.6 Other specifications to be confirmed by the Bidder in its design.

- The bidder has to provide the following information together with the project documentation to be handed over to FAO upon starting of operation:
- Data sheets and technical documentation and manuals necessary to understand the general design of the Plant.
- The Contractor shall provide user easy-to-use guides for the beneficiaries use in Arabic and English.
- **List of temporary buildings, equipment, installations, sanitation and safety measures during construction period.**
- List of all installed equipment: including specification like dimension, capacity, place of ordering/ construction etc.
- Estimated biogas generation, Nm³/day **(The bidder is invited to make his own Biomethane Potential tests).**

6.7 Technology.

- Electricity generation through a 50 kW electricity CHP unit with a daily running time of up to 22 hours.
- Energy Demand - Own process consumption of the produced electricity should be prioritized, while excess could be sold to the grid or surrounding facilities.
- Water – Jordan is a water scarce country. The biogas plant shall be designed to use the less clean water possible.

6.8 System Components.

Over all, the scope of supply concerns the provision, installation and start-up of a turnkey biogas electricity plant, including the following plant components. Bidder shall include in his bid, full data sheets of all components:

- i. An anaerobic digester, complete with co-substrate reception, pre-treatment and feeding system, heating system, agitation, digestate post-treatment and storage, and biogas collection/storage.
- ii. A containerized CHP unit producing 50 kW electricity output continuously during 22 hours per day.
- iii. Biogas treatment system capable of bringing the biogas to CHP unit at the conditions required by the CHP.
- iv. System monitoring, switch cabinets, and control facilities required for controlling biogas plant equipment, and for measuring and recording of biogas production and electricity production.
- v. A flare for burning off excess biogas.
- vi. All piping and cabling required for connecting the different plant components and transformer for connecting the system to the grid.
- vii. Safety installation, equipment and warnings
- viii. Gender specific toilet and sanitary building for operational staff, workers and visitors
- ix. Spare parts and consumables for 2 years of plant operation.

6.9 Technical Specifications.

Here are some general guidelines about biogas plant buildings that should be met:

- Building construction should be designed to match fire-proof and anti-seismic level, anti-seismic;
- Soil ground bearing strength should be 200kPa;
- Poured concrete should be harder than 1.2N/mm;
- Tank, vessel and pressure pipe should undergo the water/pressure test and the acceptance should follow the corresponding regulation;
- Anti-corrosive measure are to be taken;
- Materiel and equipment should be designed for ambient temperature -15-90°C and
- Grounding, thunder proof and equal potential connection have be considered.

6.10 Environmental concerns

The biogas plant will have various emissions affecting the environment in the vicinity of the plant. Training foreseen in this project shall equip personnel with familiarity of general guidelines, biological and chemical processes in the plant, technical procedures, safety measures, service periods and evacuation exercises to reduce the impact of these risks.

6.11 Emissions.

One objective of the biogas project, its design and operation, is to reduce or even prevent emissions as best as possible to protect the environment. There are at least four key possible emissions to be noted:

- Air pollution due to odorous substances or exhaust gas

- Water emissions can pollute the groundwater;
- Soil emissions due to unsealed tanks;
- Noise emissions due to machinery like pumps or generators.

6.12 Safety Standards.

There are numerous risks, which can occur in biogas plants, from the formation of explosive gases to hazardous substances or mechanical risks. Appropriate measures shall be taken to avoid accidents; the bidder should refer first to Jordanian rules, regulations and standards available for similar industrial plants, construction of tanks, electrical connection, fire protection, fire resistance of building, liability insurance, intoxication and risks within the explosion zone, just to name but a few. A safety plan shall be submitted with reference to the German Biogas Association (Guidelines for the safe use of biogas technology¹), or higher standards.

6.13 Greenhouse effects.

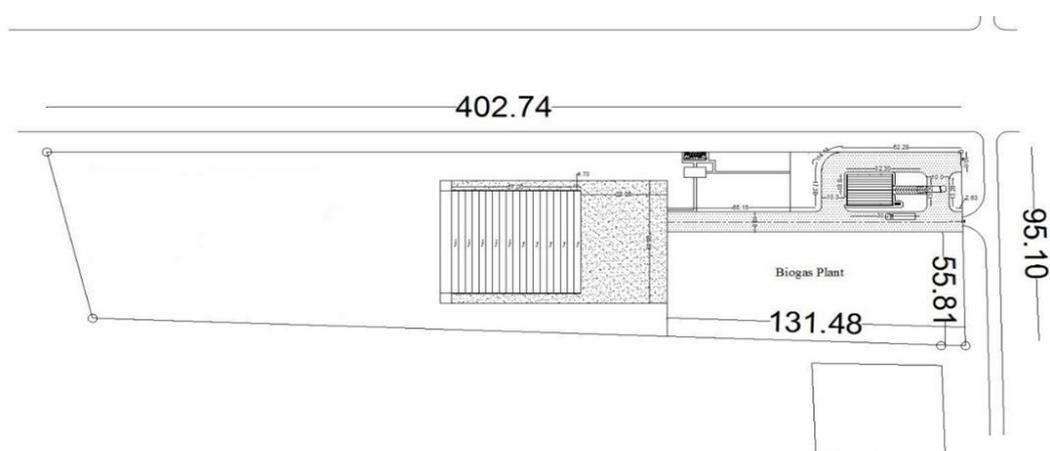
Biogas plants count with two major positive impact concerning climate relevant greenhouse gas mitigation:

- Substitution of electricity produced from fossil resources, hence, reduction of CO₂-emissions by clean energy from organic waste.
- Controlled utilization of methane (CH₄), which has a **25**-times higher “greenhouse effect potential” than CO₂ and avoidance of uncontrolled methane emissions.

7. Site description.

7.1 Site overview.

The project beneficiary is FAO Zaatari project located inside the Zaatari Refugee camp in Mafraq (approximate location [32°17'20.3"N 36°18'45.9"E](#)). Zaatari Camp is located approximately 10km east from Mafraq, adjacent to National Road No. 10. To address the camp sanitation challenge, a wastewater treatment plant (WWTP) is installed south west of the camp and the future biogas plant will be **best** installed in its neighbourhood. The project site master plan of the plot below shows all the facilities including biogas plant location which area available is **55m** x 131m = 7,205 m



¹ https://biogas-safety.com/Download/biogas_safety.pdf

It is estimated that the biogas plant will require a surface of 0.5 ha (5,000m). The site foundation ground comprises of silty clay with patches of marl and gravel and cobbles of limestone and basalt. The percentage of gravel and cobbles increases below the depth of circa 3 – 4 metres. The allowable bearing pressure is 1.92 kg/cm

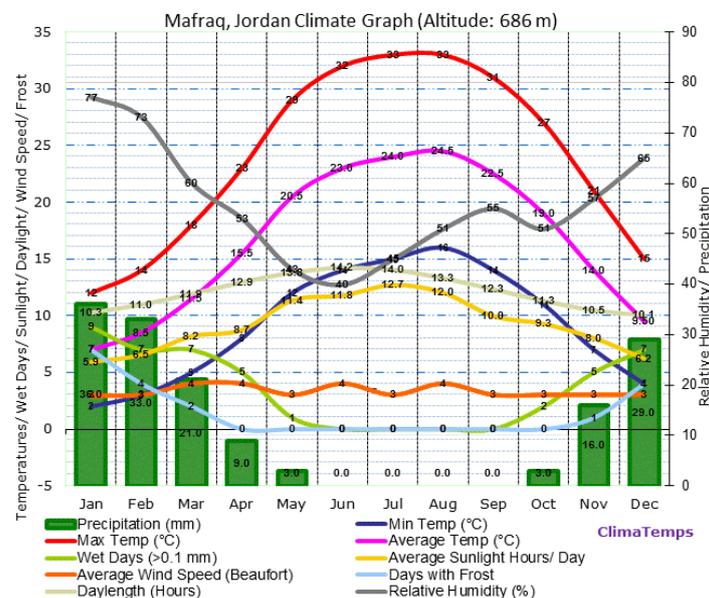


Plant space – Waste Water Treatment Plant (WWTP) shown in the background

The distance between the WWTP and the proposed biogas plant site is a single lane street (10 m) and the balance would be assumed position of the reception tank.

7.2 Environmental & climatic conditions.

The climate is a mid-latitude desert/arid cool climate. According to the Holdridge life zones system of bioclimatic classification Zaatari is situated in or near the subtropical desert. The annual mean temperature is 16.6°C – refer to the following scale graph. Average monthly temperatures vary around 17.5 °C. This indicates that the continentality type is oceanic, subtype truly oceanic. Total annual precipitation averages 150 mm, equivalent to 150 litres/m . On average, there are 3,435 h of sunshine per year.



7.3 Available feedstock

Zaatari Camp generates around 250m³ of faecal sludge per day. Of this, 27m³ shall be targeted for the biogas plant. On the other hand, approximately 16MT of organic solid waste is collected daily. The project will utilize 4MT daily. The biogas plant shall be designed with buffer capacity that it could be dealing with increasing input amount up to 25% without modification or extension required.

Characteristics of substrates for the Biogas Plant

Substrate	Amount	DM %	BMP (m ³ CH ₄ /kg VS)
Faecal or Sewage Sludge	27 m ³ /d	2,7 %	0.15
Organic Waste	4 t/d	20 %	0.38

The German Jordan University investigated the biogas potential from a mixture of sludge produced at the **Wastewater** Treatment Plant (close to the project's site) and the organic waste portion of the municipal waste, generated at the Zaatari refugee camp.

The two methods selected were 1) the automatic biogas potential test using the Swedish system APMTS II, and 2) the anaerobic digestion system at predefined climate room conditions. The first method gives a fast indication of the possible process variables with less standardized procedures. The second method simulates the reality of the pilot plant with high level of standardization. For the latter method, German Association for Engineers (VDI) norms were applied. The output of the study should give an indication of the possible biogas production from the used feedstock, and it will be used as basic data reference for the biogas plant dimension. The full report is attached as **Annex I**.

The main conclusions of the report are:

- The values ranged from circa 269 Nml·g⁻¹·VS⁻¹ for samples with only wastewater to about 884 Nml·g⁻¹·VS⁻¹ for 100 % organic waste.
- The volume of the biogas produced increases with increased ratio of organic waste.
- Mixing the sludge with organic waste boost the biogas production.
- The composition of the biogas was about 60% to 68% of CH₄ (methane), and CO₂, with some traces of H₂S (up to 300 ppm).
- The pH of the mixture was almost neutral to slight basic at a value of ~7.6-8.2.
- An average mixing ratio 60% - 80% which should produce (21-65 m³·ton⁻¹ FM) is recommended to tackle both energy and environmental challenges of the camp.

7.4 Applicable Jordan construction code and ISO Standards.

The selected Bidder shall consider in its offer the applicable Jordanian law and legislation and understand relevant authorities' requirements for its engineering design and construction services. Below are non-exhaustive laws to adhere to (Ref: 6 May 2018):

- i. Law No.12 of 1987 /Land Acquisition Law
- ii. Law No. 7 of 1993/Jordanian National Building Law
- iii. Law No. 13 of 1987/Construction Contractors Law

- iv. Law No. 15 of 1972/Engineers Association Law
- v. <http://www.mpwh.gov.jo/English/Laws/Pages/Forms/DispForm.aspx?ID=3>
- vi. <http://mpwh.gov.jo/English/Pages/law7.aspx>
- vii. <https://mit.gov.jo/EchoBusV3.0/SystemAssets/PDFs/AR/Departements/ForeignTradePolicy/Constructio n.%20A%20and%20E%20Services.pdf>
- viii. https://www.researchgate.net/publication/280805272_Green_Building_Guideline_of_Jordan
- ix. https://www.iso.org/files/live/sites/isoorg/files/archive/pdf/en/iso_din_essay_contest_2016.pdf

ISO standards help to make the construction industry more effective and efficient by establishing internationally agreed design and manufacturing specifications and processes. Here some of the relevant international used relative to building materials and products, structures, energy performance and sustainability, fire safety and firefighting:

- i. ISO/TC 59, Buildings and civil engineering works
- ii. ISO/TC 98, Bases for design of structures
- iii. ISO/TC 167, Steel and aluminium structures
- iv. ISO/TC 205, Building environment design
- v. ISO/TC 21, Equipment for fire protection and fire fighting
- vi. ISO/TC 92, Fire safety
- vii. ISO 7240, Fire detection and alarm systems

8. Technical Specifications and Design Criteria.

8.1 General considerations.

Bidders are requested to submit a draft configuration and design, taking into consideration the capacities, specifications and components as specified within this document. The selected Bidder will be requested to submit a detailed design as part of Deliverable 1, as indicated in paragraph 4 above.

The main intention of the biogas plant is the use of waste generated from the camp as faecal sludge and organic matter. The plant concept was supposed to perform daily the treatment 27m³ of faecal sludge and 4MT manually sorted organic bio-waste from MSW as turnkey project

A 1,100 m³ covered lagoon digester is proposed as core technology of biogas generation, which could in average produce about 500 m³ /day of biogas. It is expected electricity (1,090 KWh) generation through a 50 kW CHP unit with a daily running time of 22 hours,

The produced biogas should primarily cover the own energy demand of the biogas plant and the nearby wastewater treatment plant and thereby assure self-sufficiency. That means, that the biogas is transformed into electricity via a Combined Heat and Power (CHP) unit, and the surplus of generated electricity will be sold “internally”.

At this stage of the project, the interface is the gate of the biogas plant:

- that means that for the selling the produced electricity to the national grid, necessary equipment such as the transformer, breaker cell, metering, power lines are not yet considered. These component specifications and requirements have to be given by the power (electricity) grid company.

- Pumps and pipes to send the effluent to the wastewater treatment or to the compost station are also not yet considered, these has to be properly designed and added based on the layout and topography of the area.

8.2 Energy Yield and Expected Generator Capacity.

Total Biogas Production per Day	486	m ³ /day
Total Biogas Production per Year	177,443	m ³ /year
Available Energy Per year	408	MWh/year
CHP Working per day	22	h/day
CHP Working	8,000	h/year
CHP Electrical Efficiency	36	%
CHP Electrical Power output	50	KW el.
Process heat used	18	KW th.

8.3 Pond and Digester Dimensioning.

To increase the solubilisation of the complex molecule matrices in order to accelerate the hydrolysis step, which is the slowest and limiting process for complex substrates, a two-phase anaerobic digestion process is recommended for co-digestion of a mixture of two or more different substrates.

Biogas will be produced in the digester under anaerobic conditions with a volume of at least 1,100 m³ to be in accordance to a retention time of about 35 days. The long retention time is necessary due to the total solid concentration and the characterization of wastewater sludge as slowly degradable co-substrate material. Other buildings, such as settling poll, discharging pit, serve merely as through flow. The brick filter bed will be described separately as post-treatment step in the layout.

The volume of the gas storage shall be at least 300 m³. This storage space will be provided by the membrane coverage of the lagoon digester (about 500 m³), and can be extended again by covering later the storage lagoon as well.

Digestion Step	Volume
Settling poll	30 m
Discharging pit 1	20 m
Homogenization pond	70 m
Covered Lagoon Digester	1,100 m
Discharging pit 2	20 m
Storage lagoon	700 m
Brick Filter	210 m
Gas membrane foil	500 m

8.4 Process Description.

At the project site, several sewage trucks can simultaneously discharge 27 m³ faecal sludge in a settling poll. There are two polls, each of 15 m³, to be used alternatively. The faecal sludge contains valuable organic substrate as well as inorganic material such as sand, condoms, plastic, hair and other long fibres. Therefore, a separation of the valuable organic substrate has to take place.

Inlets and end side of the poll are equipped with grilles from different mesh size for separation of inorganic material so that human faecal sewage, free of grit and impurities, is directed to the adjustment basin. The removal of the sand will be done manually during the maintenance cycle; a sand trap will be integrated so that sand could be piled. It will be considered that more than 95% of the sand will be removed after the discharging pit.

The co-substrates (well sorted biowaste from MSW expected to be about 4t/d) have to be pre-treated by crushing before sloping by gravity into the adjustment pond where a central mixer homogenizes the feeding material before being pumped for digestion into the lagoon digester. The retention time in the basin allows the first step of hydrolysis process.

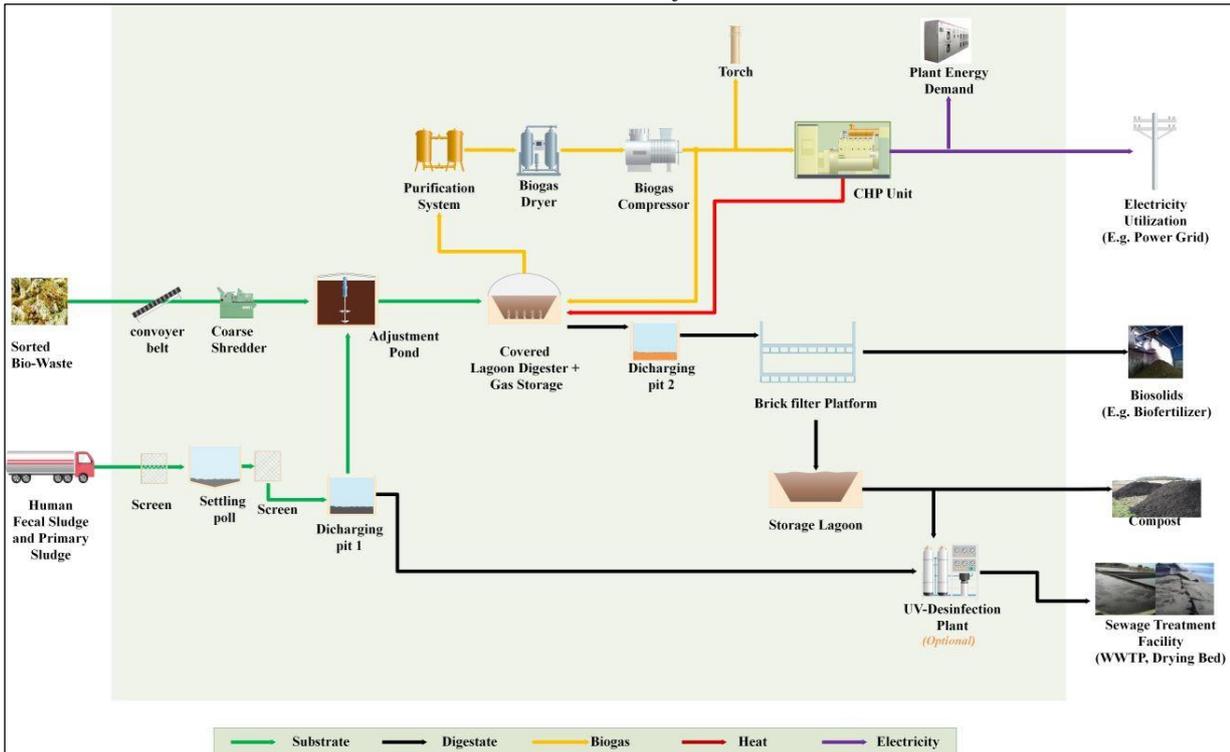
A covered lagoon with a volume of 1,100m³ is installed. The substrate coming from the adjustment pond is directly pumped to the lagoon, which serves as main fermentation place. The lagoon is periodically mixed by a kinetic stirring system. Part of the produced biogas are via a bypass compressed and injected at the lagoon bottom through nozzles distributed on the bottom surface so that a good homogeneous mixing of the substrate takes place.

The produced biogas is buffered in the integrated gas storage in the membrane cover of the lagoon. Overpressure protection system is considered. Before the biogas is used for electricity generation, it needs to undergo purification and pre-conditioning steps. The purification includes desulfurization which is happening in two stages. The first stage of desulfurization takes place in the lagoon through controlled air injection. The air desulfurization is followed by an external activated carbon desulfurization. Subsequently, the biogas is cooled and compressed. The Combined Heat and Power (CHP) unit transforms the biogas into electricity and heat.

In case of emergencies, maintenance work or other unpredictable incidents, biogas can be burned by the torch installed prior the CHP unit. The effluent overflows in a discharging pit before being pumped to the post-treatment step. Additionally, and if necessary to increase the plant capacity, flocculants will be added at this stage to coagulate suspended material.

The digestate will be filtered through brick filtering bed, dried and scrapped into piles for the composting unit. The filter bed allows air to flow up the brick surfaces which will dry the solids and allow effective composting; drained leachate will flow to a storage lagoon. A UV plant shall be considered as optional to ensure that all pathogens are killed.

Process flow:



8.5 Specification of Main Components.

8.5.1 Faecal sludge reception system. The human faecal sewage is discharged by trucks directly into the unloading chute.

8.5.1.1 Truck Reception Platform. A reception platform for vacuum trucks is needed for discharging of faecal sludge into the settling pond, and should be able to permit the unloading of three (3) tank trucks at once. This platform has to have a slope of at least 2.5% so that the rear of the trucks has to be down so the tank could be emptied completely by gravity. Eventually a ramp should be considered as trucks may have different sizes and heights. Stoppers have to be considered to avoid that the settling poll could be damaged by the trucks.

Minimum technical specifications of truck reception platform:

Technical Requirement	Heavy load truck reception
Structure	C25 Concrete with waterproof seal structure
Additional Components	Truck stopper, drainage
Volume	45 m ³
Size	12 x 5 x 0.2m
Amount	1

8.5.1.2 Settling Poll. The reception platform apron has space for three (3) dumper vacuum trucks to discharge sewage in the settling poll. The discharge chutes are semi-closed slots with slabs on it and are separated by a certain distance for a convenient discharge. The rear part of the discharging channel will be connected with the

adjustment pond. Between the discharging channel and the pond, mechanical bar screens are installed to remove large particle impurities in the sewage to prevent their entering into the system. A worker will remove inert parts with a gardening rake during the delivering steps. Additionally, direct pumping from the wastewater treatment plant to the biogas plant discharging channel should be envisaged.



Picture: Settling poll and grilles

Minimum Technical requirements of faecal sludge reception system:

Technical Requirement	Faecal sludge reception, inert matter separation
Structure	Brick masonry, Concrete with waterproof seal structure
Additional Components	Truck Reception platform. Screen bars with different mesh wire
HRT	0 d
Volume	15 m ³
Size	6 x 6 x 0.6m
Amount	2

8.5.2 Pre-treatment of co-substrate. Before entering the fermentation process, cutting and grinding of the co-digestion material is necessary. A multi-functional grinder will be installed. The machine is part of a light steel pre-treatment hangar where co-substrate could be stored for up to 2 days during weekends. A shredding machine (or cutter pump) will reduce the particle size to <5 mm.

8.5.2.1 Discharging pit 1. The **faecal** sludge coming from the settling pond can decant by gravity **or by adding coagulants – but** free of inert material in the pit. The upper remaining part of water can be pumped to the sewage treatment plant. The rest continue, depending on the desired Dry Solid content in the adjustment pond, directly to the biogas process.

Minimum Technical Specifications of the discharging pit 1:

Technical Requirement	Faecal Sludge Sedimentation
Structure	Underground brick with waterproof sealing, foundation concrete structure
Additional Components	Light pump (37 m ³ /h, 10 m, 3 kW) with float switch, Gate valves, pipe

	covering
HRT	1 d
Volume	20 m ³
Size	Ø 3.7 x 1.8 m
Amount	1

8.5.3 Co-substrate Treatment. Before entering the fermentation process, shredding of the co-digestion material is necessary as the particle size of substrate influence its biogas yield production. It is transported by conveyor belt and falls after the crushing in a bypass chute that is connected by a sliding flap to the adjustment pond so that it can be regulated when it should be opened for mixing. This step will avoid the floating of organic parts and supports the homogeneity of the material up to a 5 % TS concentration before then leaving to the digester.

8.5.3.1 Co-substrate treatment workshop. A lightweight steel hangar construction with 60m volume where the shredding unit include conveyor is housed and where Co-substrate could be stored for up to 2 days for weekend and holiday service.

Minimum Technical Requirement of the co-substrate workshop

Technical Requirement	Industrial hall, substrate storage and machine setup
Structure	Steel supporting structure, saddle or pent roof frame fireproof panel cladding. Concrete strip foundation anchoring concrete structure
Additional Components	Gate flap. Ventilation system biofilter.
HRT	-
Volume	60 m ³
Size	5 x 8x4 m
Amount	1

8.5.3.2 Crushing unit. Despite the fact that the co-substrate coming from the neighbourhood municipality sorting plant is pre-selected, it is assumed that a multi-functional chopper for reduce the material with 15-20% Dry Substance (DS) to particle size <5 mm as input material consistence varies according to the seasonal consumption. In addition to acid resistance, readjusting of cutting force control and contact force should be possible. Density 1-1.1kg / dm³, 5.5 kWel, 15m / h.

Minimum Technical Requirement of the crushing unit

Technical Requirement	Chopping, shredding of co-substrate
Structure	Steel with stainless shedder, Concrete strip foundation 5,5kW, 15m / h
Additional Components	Conveyer
Amount	1



Picture: Shredder

8.5.4 Adjustment pond. In this pond the settling of solid particles in the faecal sludge will be mixed with co-substrate to reach the expected TS content of 5% before being pumped to the lagoon. A long-shaft cut pump with adjustable nozzles will be installed for mixing. Additionally, the pond is equipped with valve systems and liquid level controller. As a two-stage process (separation of fermentation stages in space and time) with beginning of acidification step will be better for the adjustment of some parameters such as pH value. The adjustment pond with a volume of twice of the received amount covers also the task of a hydrolysis pond, and further decreases significantly the retention time within the main fermentation process.

Minimum Technical Requirement of the Adjustment pond:

Technical Requirement	Homogenous of all substrate and acidification of organic matter.
Structure	Underground brick with concrete foundation structure.
Additional Components	Long shaft cut pump (35m / h, 20m, 5.5 kW) valve, liquid level controller, maintenance ladder Sliding flap covering.
HRT	2 d
Volume	70 m ³
Size	Ø 5.6 x 3.0 m
Amount	1



Picture: Long shaft cut pump

8.5.5 Lagoon digester. The main stage of digestion, the methanogenesis phase will take place in the covered lagoons as fermentation tank. The lagoon with a dimension of 38x10x2.9 m (1,100 m³) is a hole in the ground lined with a foil to prevent digestate from draining into the soil. The hole is longer than wide to avoid short cut streams of substrate and guarantees the required retention time for the organic material.

A kinetic stirring system via biogas injection at the bottom of the digester will ensure the mixing of the substrate. Biogas from the membrane gas storage will be compressed to at least 5 bar in a storage tank. From the storage the biogas is re-injected in impulses at various bottom zones of the lagoon digester. The steering and distribution pipes have drilled holes and the gas bubbles are moving through the substrate, forming vortexes and stirring it upon sudden release by magnetic valves. The time intervals are controlled by clock timers or hand and constantly adjusted during operation.

Minimum Technical Requirement of the Lagoon Digester:

Technical Requirement	Lagoon as anaerobic digester with kinematic stirrer operating at ambient temperature
Structure	Structure with gastight single membrane plastic film with gas storage covering unit
Additional Components	Pressure protector, aeration pipe (Ø 40-110, PE), 1 biogas booster pumps for mixing 7.5 kW, Temperature sensor Gate valves Blower pump
HRT	35 d
Volume	1,100 m ³
Size	38 x 10 x 2.9 m
Amount	1

The lagoon is covered with a two-layer black biogas impermeable membrane foil. By using black foil, contribution to solar heating of the digester is provided. For the proposed shape, around 500 m² of coverage foil will be required. The edges of the cover will be fixed into a water filled fitting channel made of concrete. Mixing systems will prevent layer formation and ensure full agitation of the biomass. A heating system is installed although the retention time seems to be sufficient; but as the average coldest temperature in Zaatari is around 17°C, and winter with some few night temperatures near 10°C.



Picture: Construction phase and installed covered lagoon digester.

8.5.6 Discharging pit 2. Digestate effluent is directly discharged into the discharging pit 2 by overflow according to the periodical feed-in process. A daily amount of 31 m (faecal sludge + biowaste) should be considered in the sewage treatment plant. From there, it is pumped in sequence to the post treatment system.

Minimum Technical Requirement of the discharging pit 2:

Technical Requirement	Mixing and increase of TS concentration
Structure	Underground brick with waterproof sealing, foundation concrete structure
Additional Components	Pump, valve covering
HRT	1 d
Volume	20 m ³
Size	Ø 3.7 x 1.8 m
Amount	1

8.5.7 Storage lagoon. This shallow lagoon is not sealed (gas-tight covered), offering aerobic conditions. It stores the effluents from the brick filter area as buffer tank, before the treated liquids are sent to the nearby wastewater treatment plant.

Experience in other countries with similar climate conditions have shown that such a lagoon is recommended to allow storage of a certain quantity in case of maintenance of the wastewater treatment or the compost units. The retention time, and consequently the volume, can be vary from 7 to 25 days.

Minimum Technical Requirement of the Storage Lagoon:

Technical Requirement	Lagoon as aerobic basin
Structure	Structure with rain protecting single membrane plastic film
Additional Components	gate valves pump
HRT	25 d
Volume	700 m ³
Size	38 x 10 x 2.5 m
Amount	1

8.5.8 Biogas Purification System. The first purification process is dehydration: it is required to protect plant components against corrosion. For the proposed biogas plant, physical water absorption will be applied due to its low complexity that guarantees a convenient operation. Using this method, a dewatering efficiency of 95 % can be expected. The cistern unit has 1.2 m diameter and is 1.8 m high to collect saturated water vapour from the methane.

As a second purification process, desulfurization is required to protect the gas equipment. The H₂S cleaning is necessary for reasons concerning the operational life expectancy and safety issues. Two desulfurization technologies will be adopted in line in accordance to current European biogas design standards:

1. The first desulfurization step called “in situ desulfurization” consists in blowing of a certain amount of air in the lagoons so that H₂S in the biogas fraction binds to the oxygen, will be transformed by bacteria into a solid phase and remains in the substrate.
2. The second desulfurization step is based on the strong affinity of hydrogen sulphide molecule to activated carbon. A tank of 1,5m³ volume is installed so that the requirements of the power generation equipment about biogas specification can be matched and a normal and stable operation can be guaranteed. Activated carbon will also dry the biogas.



Pictures: In Situ Desulfurizer (left) and Activated Carbon Desulfurizer (right)

8.5.9 Gas storage. The membrane is integrated to the lagoons and floating up and down according to the filling level of the gas storage. The membrane is a single membrane. PVC/PVDF coating provides flame retardant, fungicide and UV-protection functions. Strength of the membrane will be chosen according to the wind load and environmental impacts. Components like hydraulic safety valve and overpressure protection are provided for emergency cases.

Minimum Technical Requirement of the Gas Storage:

Technical Requirement	Storage for biogas produced in the lagoons
Structure	Integrated PVC/PVDF membrane
Additional Components	Safety valve. Overpressure protection
Volume	500 m ³
Size	40 x 12 m
Amount	1

8.5.10 Safety Flare. Since methane is a flammable and explosive gas, certain safety measures need to be set up. The biogas torch will burn excess gas and could be used during emergencies as well as maintenance work. In case of emergency, the torch is responsible for the entire biogas combustion treatment and avoidance of fire caused by methane leakage. The automatic gas torch has a through flow capacity of 80 m³ per hour.

8.5.11 CHP unit. A CHP with 50 kW electrical output will be installed and will cover the energy needs by the plant itself and then supply to the national grid. Generated waste heat will

heat the lagoon. The CHP unit will be mounted on segment strips of concrete blocks which can accommodate the load of approximate 20T. Between the CHP and the blocks cushions are used as vibration lowering plastic strips. It is preferred to import a CHP in a 20ft container with all the installed equipment instead to assemble it on-site. All the additional components to guarantee smooth running of the unit will be supplied.

Minimum Technical Requirement of the CHP Unit:

Technical Requirement	Conversion of biogas into electricity and heat
Structure	20 ft. container. Steel/ stainless steel/ PVC construction
Additional Components	Cooling system, heat exchanger system, exhaust pipe, gate valves, pump, compressor, H2S controller, flowmeter, cooling unit
Electrical Power	50 kW
Amount	1



Picture: CHP in Container with all accessories

8.5.12 Auxiliary Facilities. A prefabricated container as these are used in refugee camps context will be installed to serve as operation management and control room with an area of 60 m². For the guards, guard cabin of 13 m² is planned. Other facilities like rest rooms, toilets and shower rooms would be in separate containers of 30 m . They will be equipped with the Jordan national standard for accommodation issue like air condition and safety. The water necessary for the production and domestic use will be supplied. It is assumed to be about 20 m /d.

8.5.13 Landscape. The landscape and visual impacts will vary according to scale, siting and location. It is important to give full consideration to the siting, location and design of biogas plant and infrastructure in order to minimise the potential for adverse impacts. Those include painting of the building and components, odour, dust, adequate parking for cars among other.

Gardeners in semi-arid zones may consider desert garden theme that works with their soil, temperature and water availability. Beside native plants, adaptive plants like Ice plant and many sedums makes excellent ground cover and on the other hand for tall plants for shadow such as Acacia and Palm could be chosen or plant with less moisture cacti. The organic fertilizer digestate is a cost effective and eco-friendly ferti-irrigation and

replacement to conventional chemical fertilizers used for gardening and landscape purpose.

All-weather roads, 10-15 cm elevated above the ground zero level, especially important for the rainy season, have to be constructed so that a smooth operation of the production process is given including e.g. the daily unloading of trucks. A surrounding ring road will facilitate the flow of traffic and guarantee smooth logistics. The main road will be paved with 6 m width. The project site is going to be protected by a fence that is 2.0 m high with a main entry industrial area type gate and electrical barriers for stopping accessing to the site. Along the roadside, a drainage ditch will ensure the flow of rainwater.

Minimum Technical Specifications of landscaping components:

	Description	Additional	Specification
1	Rigid mesh fencing welded by steel wire	panels, posts, flanges, caps, screws, turntables, pleats	200m x 4 mm section according to EN 10244-2; Galvanizing coating; 6.0x2.0 m panel; 100 x 55 mm Mesh
2	Electric barrier system for intensive use.	Stable steel housing, Electromechanical barrier system Solar panel and battery box	7m barrier boom; Connection voltage / control voltage 230V 50 / 24V; IP55 class
3	Industrial sliding aluminium gate self-supporting without drive	Running track, guide and inlet column	7.0mx 1.5m
4	Drainage	Surface run of water drainage and leachate drainage layer; Drain well; Dive u. Drainage pump with automatic switching; cast iron grid drainage	Bubble wrap 1,5 x 20m 400g 30m with nonwoven pimple foil sealing sheet.

8.5.14 Automatic Control System. It is not intended to install a complex management and automatic (PLC) system. According to the feedback gathered from experience in other projects in developing countries, it seems that a manual operation modus is better handled as complexes interlocking control processes. But a central switch cabinet, basics sensors, **safety and overloading alarms**, and a computer for **key performance** data recording and monitoring system must be installed.

8.5.15 Safety Measures. Safety procedures and regulations will be developed and strictly followed to prevent fire and explosions. Components like fire hydrants and dry power distinguisher will be installed at strategic points in the plant area and the house.

According to explosion protection regulations, a division into three zones or different levels of explosive areas has to be undertaken. Zone 0 indicates a high risk area with a regularly and over longer time periods existing explosive atmosphere. Zone 1 show these indications occasionally and zone 2 rarely. Considering the plant layout and functions of the biogas plant constructions and buildings, zone division is as follows: management room and generator room are categorized as zone 2, Lagoons at the sealing membrane gas holder as zone 1 and surrounding areas as zone 2. In accordance to the zone division, appropriate ground fire hydrant and a water supply for terminal firefighter will be

installed. Usually, housing complex and CHP will be equipped with 2.4 kg portable ammonium phosphate dry powder MF/ABC4 extinguisher. The lagoon digester which also includes the gas holder will have 2.8 kg cart type ammonium phosphate powder MF/ABC8 extinguisher.

8.5.16 Effluent post-treatment. The design of the effluent post-treatment is governed by the goal to remove the solid from liquid part and then to treat the rest effluent so that at the discharging pond, the effluent achieves the required environmental norms. There are a lot of technologies available, but in the case the brick filter platform shows good results in practice it can be used. Flocculants could be added to increase the coagulation of suspended particles.

8.5.17 Brick Filter Compost Platform. The effluent from the discharging pit behind the lagoon is pumped in sequence to the brick filter compost platform. Digestate is filtered through brick filtering bed, dried and scrapped into piles for composting. The filter bed allows air to flow up through the bricks, which will dry the solids and allow effective composting. A roof made of transparent plastic will be installed to improve drying. Valves rotate overflowing digestate to different parts of the brick filter bed allowing solids 2 days of drying time before it is scrapped to form compost piles.

Minimum Technical Requirement of Brick Filter Platform:

Technical Requirement	Filtering out of solid phase from liquid
Structure	Reinforced concrete ring, brick walls, HDPE Liner broken bricks
Additional Components	Transparent Covering roof Leachate drainage pipe valves
HRT	2 d
Volume	210 m ³
Size	21 x10 x 1.0 m
Amount	1

8.5.18 UV Disinfection Unit. This unit shall be submitted as an option to reduce COD and NH₄. At certain intensities, UV light emits enough radiation to kill the DNA in bacteria and other microorganisms. The UV disinfection is a very mature process for water treatment and has been in use for several decades for water sterilization. For a sufficient radiation dose in addition to a sufficient lamp power, the exposition period is important. This determines the flow rate (litres / time unit) of the substrate.

Minimum Technical Requirement of UV Unit:

Technical Requirement	Reduce COD and NH ₄
Structure	Metal, Steel, UPVC
Additional Components	UV Sterilizer with electrical control, security filter, pump, UPVC pipes, dosing tanks, Covering roof valves
Specification	8 Tons/h Lifetime 12000h Lamp size:120W

	Class:IP68
Volume	210 m ³
Size	21 x10 x 1.0 m
Amount	1

9. Operational considerations.

The operation of the plant is expected to be continuous (365 days), considering scheduled interruptions due to maintenance and other activity reduction due to normal work shifts (night) and holidays. The Bidder shall include as part of its technical offer, operational guidelines for the biogas plant, including recommended staffing (including personnel profiles with academic and experience requirements), work shifts, training requirements, maintenance cycles, spare parts management, and relevant standard operating and administrative procedures.

The Bidder shall include in its **technical offer** estimates of the **annual operating costs**:

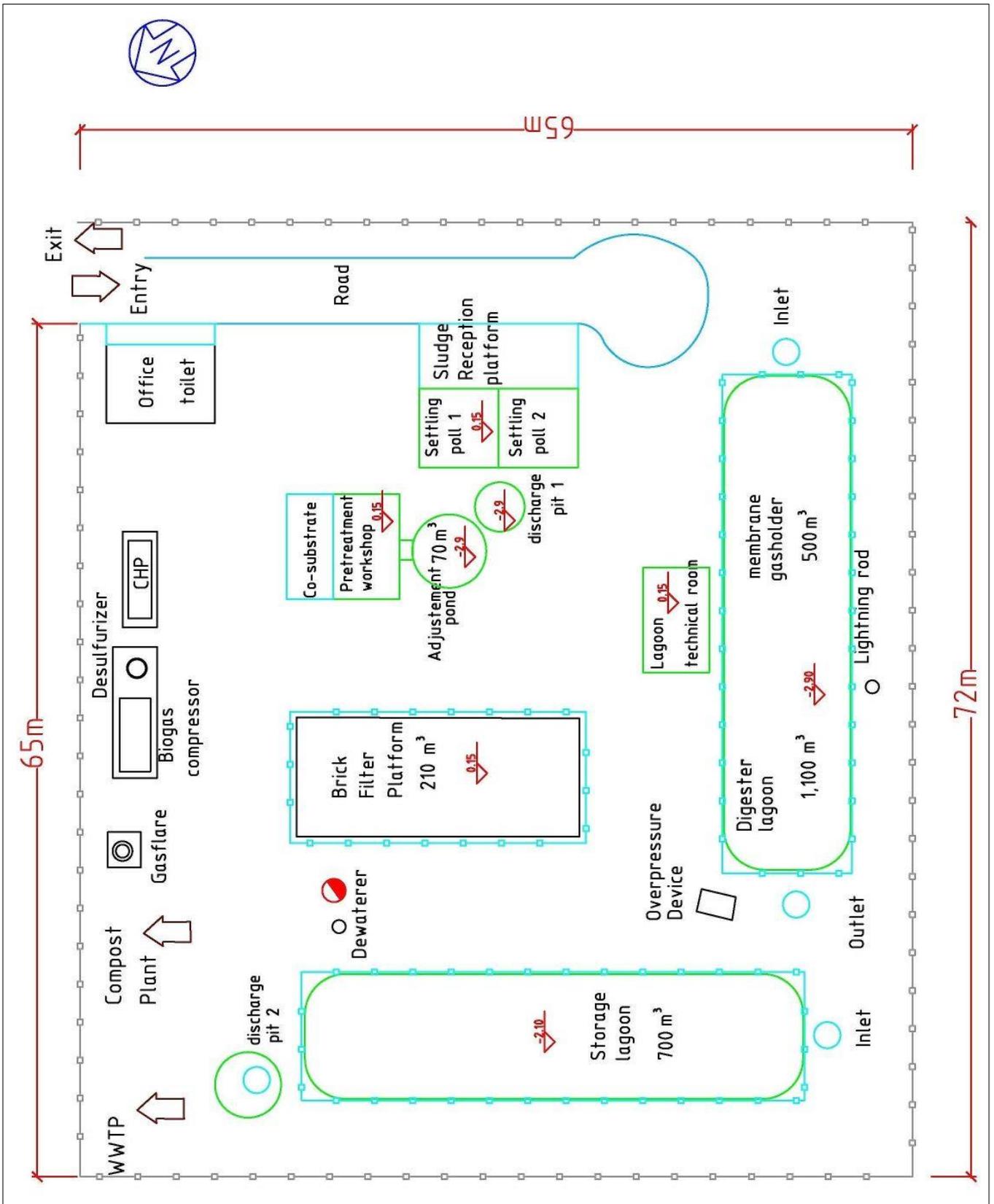
- Collection and transportation of co-substrates;
- Costs for maintenance and proper operation;
- Costs for personnel (e.g. salaries, insurances, training);
- Costs for regular and major maintenance; and
- Others, according to Bidder's experience.

The Bidder shall also include in its **technical offer**, estimates of **annual income** from the following sources:

- Biogas and electricity sale;
- Fertilizer sale;
- Others, according to Bidder's experience.

The Bidder shall provide **in a business plan model** both annual estimates (income and operating costs) for a **minimum period of five (5) years**.

10. Biogas Plant Layout (proposed).



Indicative only. The Bidder may propose a different layout according to its experience and offer.

Executive Report : Methane potential test for organic waste and WWTP wastewater Zaatari refugee camp samples analysis

With reference to the LOA of the project GCP/JOR/017/EC between FAO and GJU. The mission was to investigate the biogas potential from mixture of sludge produced at the WWTP and the organic waste portion of the municipal waste, located at the Zaatari refugee camp.

Two methods were used: 1. The APMTS II and 2. The climate room system. The first method give a fast indication of the possible process variables with less standardized procedures. The second method simulate the reality of the pilot plant with high level of standardization. For the latter method German Association for Engineers Norms were implemented.

Ten different mixing ratios of sludge to organic waste were prepared to find the best mixing ratio between the sludge

Results:

- 1) The dry solid content (TS) and the volatile solid content (VS, the portion that produce the biogas) for all used feed was experimentally evaluated
 - a) For the inoculum (anaerobic bacteria) the values for the TS were 1.1 wt% to 6.4 wt% of the fresh matter, while the VS values range from 0.3 wt% to about 3 wt%
 - b) For the organic portion of the municipal waste the TS values were in the range of 17 wt% to 22 wt , while the VS were in the range of 13.5wt% to 15.6 wt% of the fresh matter.
- 2) It was found that the sludge from the MBR settling tank contains suitable active anaerobic bacteria for the digestion process, while the one from the aeration tank or at the exit of both WWTPs located at the camp fail to give proper active anaerobic bacteria.
- 3) Eleven samples were tested for their biogas potential (range from only organic waste to only sludge) in both the APMTS II and the Climate Room Systems.
- 4) The maximum production of the biogas from the APMTS II system was from the 100% organic waste with an approximate value of 81 m³ bio-methane ton⁻¹ fresh organic waste, while the smallest quantity was for only sludge from the WWTP with an approximate value of 1.6 m³ bio-methane ton⁻¹ fresh sludge
- 5) The climate room system came with an agreement with those of the APMTS system with some slight deviations. The maximum production was found to be from the 100% organic waste with an approximate production of 153 m³ bio-gas ton⁻¹ fresh organic waste and only 5.6 m³ bio-gas ton⁻¹ fresh sludge.
- 6) The biogas produced from the organic-sludge mixture composed mainly from methane, carbon dioxide and some traces of hydrogen sulfide
- 7) The average composition of the bio-methane in the biogas was 65% the remaining are mainly carbon dioxide.
- 8) Hydrogen Sulfide was found to be present in all biogas produced with an approximate values average values of 200-350 ppm.
- 9) For both the APMTS II and the Climate Room systems the ratio between the VS of the feed and the VS of the inoculum plays a major role in the biogas production. If the values exceed 0.5, an inhibition of the biogas production were observed. The recommended value is around 0.3.
- 10) In order to benefit from the biogas produced form the biogas plant a washing unit for the carbon dioxide as well as for the hydrogen sulfide is needed.
- 11) The ratio of mixing between the municipal organic waste and the sludge from the WWTPs should be chosen carefully to satisfy the pilot plant demands (energy production) and the environmental problems associate with the sludge amount at the WWTPs. A possible ratios to start with is 60-80% organic waste which can produce 21-65 m³·ton⁻¹ FM.

Final report: Methane potential test for organic waste and WWTP wastewater Zaatari refugee camp samples analysis

1 Abstract:

With reference to the letter of agreement of the project GCP/JOR/017/EC between FAO and GJU. The latter have conducted experimental investigation of several samples for their potential of biogas production from household organic waste as well as from an activated sludge of an existing wastewater treatment plant located at Al-Zaatari refugee camp. Ten mixing ratios were reported in the previous report using the APMTS II system. In this report, ten mixing ratios are reported for their biogas potential using the climate room system. The biogas potential (bio-methane + carbon dioxide) were obtained for all mixing ratios. The values ranged from circa $269 \text{ Nml}\cdot\text{g}^{-1}\cdot\text{VS}^{-1}$ for samples with only wastewater to $824 \text{ Nml}\cdot\text{g}^{-1}\cdot\text{VS}^{-1}$ for 100 % organic waste. The value of biogas produced increases with increasing the ratio of the organic waste. With one deviation from this behavior at 80% set point. The composition of the biogas were methane and carbon dioxide with some traces of H_2S (up to 300 ppm). The values of CH_4 ranged between 61% and 68%. The pH of the mixture were almost neutral to slight basic at a value of $\sim 7.6\text{-}8.2$. based on the results and the goal of the intended biogas pilot plant, an intermediate mixing ration 60 %- 80% which should produce $(21\text{-}65 \text{ m}^3\cdot\text{ton}^{-1} \text{ FM})$ is recommended to tackle both energy and environmental problems at the camp.

2 Abbreviations:

- APMTS II: Automatic Methane Potential Tests
- FAO: Food and Agricultural Organization
- WWTP: Wastewater Treatment Plant
- DM: Dry matter
- VS: Volatile Solids
- FM: Fresh Matter
- TS: Total Solid
- MBR: Membrane Bio-Reactor
- VDI: The Association of German Engineers
- OW: Organic Waste
- WW: Wastewater

3 Introduction:

The aim of this report is to analyze the biogas potential of set of predefined ratios of sludge/organic waste from al-Zaatari refugee's camp. Based on a previous analysis using the APMTS system, the condition of the climate room experiment was defined to obtain the best results. Eleven different ratios between the organic waste and the sludge (wastewater) were analyzed for their biogas potential, biogas composition and the pH before and after the experiment. The calorific values were also measured for the organic waste as well as for the wastewater.

At the beginning the DM, VS of the provided samples were freshly measured following the VDI standards. Based on the results of the VS, the mixing ratios between the sludge of the WWTP (MBR settling tank) and the organic waste portion of the household were calculated. Based on previous experiments, the ratios between the VS of the substrate (organic waste and sludge) and that of inoculum were set to 0.3 except for sample 80% organic waste it was set to 0.5.

After that, the anaerobic digestion tests of the mixed wastes were performed using the climate room system.

The results were projected based on the total biogas production, and was normalized for one gram of fresh matter, dry matter and volatile solids.

4 Results

4.1 TS and VS of the sludge, Organic waste and the inoculum

Table 1 shows the TS and VS values of the sludge (wastewater), organic waste and inoculum used for this study. All measurements were conducted according to the VDI standards and in triplicate.

Table 1: TS and VS results for samples: 0%, 10%, 30%, 50%, 60%, 90% and 100% OW

Sample	TS[%]	VS [%]
Inoculum	0.021	0.7331
Organic Waste	0.222	0.839
Wastewater	0.029	0.761

For samples 20%, 40%, 70% and 80% the following values were used

Table 2: TS and VS results for samples 20%, 40%, 70% and 80% OW

Sample	TS [%]	VS [%]
Inoculum	0.017	0.723
Waste waster	0.018	0.704

Based on the above results the configurations of the bioreactor were calculated.

4.2 Biogas potential test (climate room system).

With respect to previous steps, ratios (based on the VS) were prepared for each set of measuring unit to investigate the bio-methane potential for different combinations. The standard procedure implies the use of blank set with the inoculum only, and reference set in which the production of known substrate (microcrystalline cellulose) is used as a measure of the acceptable inoculum activity.

Table 3: AMPTS test configuration and results (based on triplicate results)*

Sample ID	Substrate OW [g]	Sludge WW [g]	Inoculum [g]	Biogas production [Nml/g ·VS]
Inoculum	-	-	200	45
Reference	-	-	200	483
100% Waste water	-	62	200	269
100 % organic waste	3.97	-	200	824
MIX 10:90	0.37	55	200	261
MIX 20:80	1.34	80	200	291
MIX 30:70	1.20	43	200	375
MIX 40:60	1.95	25	200	520
MIX 50:50	1.98	31	200	512
MIX 60:40	2.37	25	200	562
MIX 70:30	3.51	13	200	605
MIX 80:20	5.50	20	200	455
MIX 90:10	3.56	6	200	884

*the experiment were conducted over three stages to fulfill the amount of needed samples. The value of VS of the inoculum and that of sludge were changing in each trial.

For better understanding the accumulative bio-methane produced by the samples were normalized by the fresh matter used, the dried matter and finally by the volatile solids

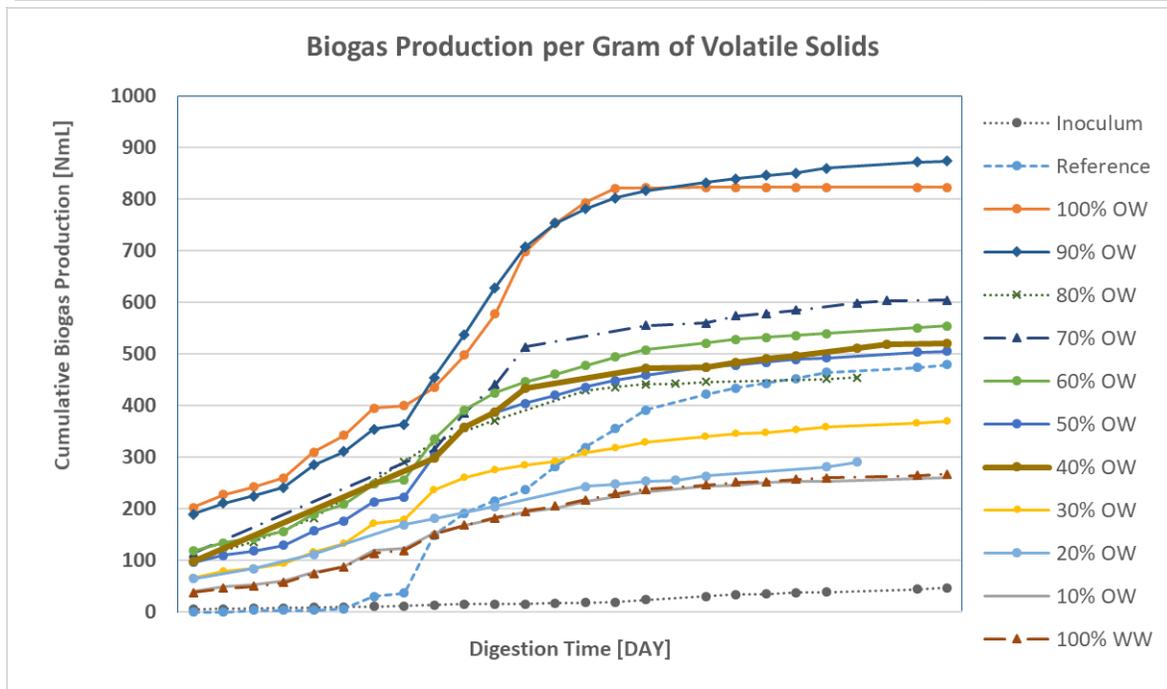


Figure 1: bio-methane production normalized by the amount of volatile solids of the substrate

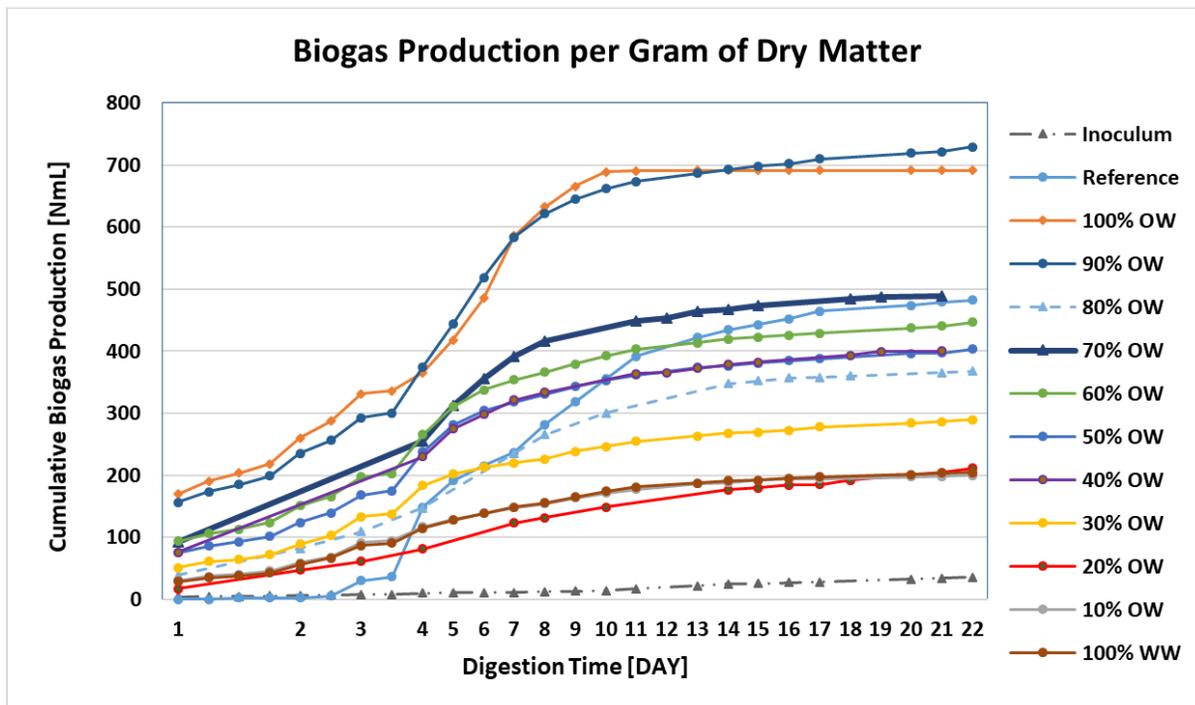


Figure 2: bio-methane production normalized by the amount of total solids of the substrate

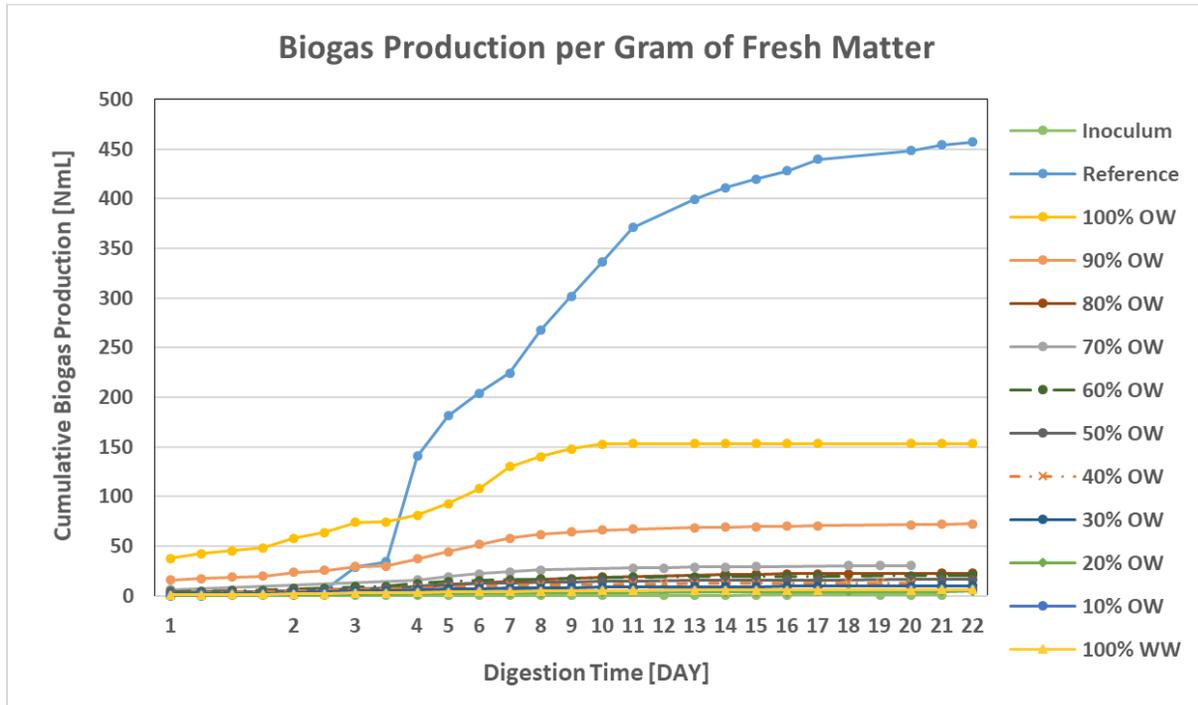


Figure 3: bio-methane production normalized by the amount of fresh matter used as a substrate

From the previous figures (figure 1-3), it is clearly seen that using organic waste can boost the bio-gas production from the wastewater (sludge). As the feeding ratio increases the amount of bio-gas obtained increases as well. Based on the above results its recommended to run the plant at the maximum possible OW ratio. However, the ratio of VS of the feeding substrate to that of inoculum should be controlled in order to prevent any inhibition of the anaerobic bacteria during the digestion process. Moreover, it can be seen that for sample 80% organic waste the behavior was not as expected since it produced less biogas than expected. For this sample the ratio between the substrate VS and the inoculum VS was set to 0.5 in contrary to the rest samples were the ratios were set to 0.3. Having such ratio can lead to an inhibition of the methanogenic stage of the fermentation and lead to a slower or even prevent the biogas production,

4.3 Biogas composition of the samples (climate room system).

The average biogas composition of the tested samples were measured using a portable biogas analyzer. For each sample the produced biogas were collected using a biogas bag. Eventually, the biogas composition were analyzed as it can be seen in table 4

Table 4: gas composition of the produced biogas

Sample	% CH ₄	% CO ₂
Reference-b	72%	28%
Inoculum-b	59%	41%
0%	66%	34%
10%	61%	39%
20%	67%	33%
30%	66%	34%
40%	67%	33%
50%	67%	33%
60%	65%	35%
70%	66%	34%
80%	62%	38%
90% - a	67%	33%
100% - b	65%	35%

All samples were producing traces of H₂S in the range of 200-350 ppm.

4.4 pH measurement before and after the experiment

Table 5 shows the pH values of the tested setup prior the anaerobic digestion and after stopping the digestion process. As it can be seen all of the samples fall within the neutral region which is expected when the all stages of digestion ran simultaneously toward the biogas production.

Sample 80% OW shows a slight shift toward the acid region, which can be the reason behind the small production of biogas in comparison with close composition of other test bioreactors.

Table 5: pH reading at the day of performing the experiment and after finishing the experiment

Sample	Commencing Date	Finishing Date
Inoculum	7.66	7.80
Reference	7.88	7.76
100% OW	7.9	8.2
90% OW	7.73	7.85
80% OW	7.64	6.83
70% OW	7.79	7.73
60% OW	7.73	7.79
50% OW	7.71	7.83
40% OW	7.75	7.81
30% OW	7.85	7.87
20% OW	7.78	7.91
10% OW	7.81	7.84
100% WW	7.80	7.87

5 Conclusion

The biogas potential (bio-methane + carbon dioxide) were successfully obtained for all proposed mixing ratios (0-100%OW) using the climate room system. The values ranged from circa 269 $\text{Nml}\cdot\text{g}^{-1}\cdot\text{VS}^{-1}$ for samples with only wastewater to about 884 $\text{Nml}\cdot\text{g}^{-1}\cdot\text{VS}^{-1}$ for 100 % organic waste. The volume of the biogas produced increases with increasing the ratio of the organic waste. With one deviation from this behavior at 80% set point. The composition of the biogas were methane and carbon dioxide with some traces of H_2S . CH_4 compose about 60% to 68% of the produced biogas. The pH of the mixture were almost neutral to slight basic at a value of ~ 7.6 -8.2.

It was found that mixing the sludge with organic waste boost the biogas production. The ratio of the feed substrate to that of the inoculum should not exceed 0.5, however an optimal ratio was found to be 0.3, in the latter setting no inhibition was observed for the digestion process. Base on the results, we recommend a mixing ration between 60 – 80% to tackle both energy (need of the camp, sewage facilities) and environmental problems (wastewater).

Appendix:

Table 6: experimental data of the biogas production normalized by the amount of volatile solids of the substrate

Day	time	Reference	100	10	30	50	60	90	0	Inoculum	70	40	80	20
1.0	11:45:00 AM	0.0	202.4	40.0	66.5	95.7	118.7	190.1	37.7	5.3	99.0	114.0	48.1	23.6
1.0	3:10:00 PM	0.0	227.5	48.7	79.1	109.9	133.7	211.0	45.9	6.5	--	--	--	--
1.0	5:50:00 PM	3.0	242.6	53.0	83.9	118.7	143.1	225.0	50.0	7.1	--	--	--	--
1.0	9:40:00 PM	3.0	260.1	60.2	93.3	129.3	156.3	241.2	56.8	7.7	--	--	--	--
2.0	7:45:00 AM	3.0	310.2	77.6	115.4	157.6	190.2	285.3	74.5	9.0	--	--	102.1	65.0
2.0	3:30:00 PM	6.1	342.8	89.2	132.8	177.0	209.0	310.8	88.1	10.2	--	--	--	--
3.0	8:30:00 AM	30.3	395.4	119.5	172.3	214.0	248.4	354.9	113.9	10.8	--	--	135.6	84.1
3.0	12:00:00 PM	36.4	400.4	123.8	178.6	222.8	256.0	364.2	119.4	11.4	--	--	--	--
4.0	6:30:00 PM	148.9	435.5	152.7	237.1	302.3	334.9	454.7	150.7	13.8	299.0	315.0	182.2	112.1
5.0	10:30:00 AM	191.4	498.1	168.6	260.8	357.0	391.4	538.2	168.4	15.0	357.0	386.0	--	--
6.0	8:00:00 AM	215.7	578.3	181.6	275.0	387.0	425.2	628.7	182.0	15.0	387.0	441.0	--	--
7.0	10:00:00 AM	237.0	698.5	193.2	284.4	404.7	445.9	707.6	195.6	15.0	434.0	514.0	291.3	169.5
8.0	9:35:00 AM	282.6	753.6	201.8	292.3	420.5	460.9	754.0	205.2	17.4	--	--	329.1	181.2
9.0	9:50:00 AM	319.0	793.7	213.4	308.1	436.4	477.9	781.9	217.4	18.6	--	--	--	--
10.0	10:20:00 AM	355.5	821.3	223.5	317.6	448.8	494.8	802.7	229.7	19.2	--	--	371.5	204.9
11.0	3:50:00 PM	391.9	822.5	232.2	328.7	459.4	507.9	816.7	237.9	24.0	472.2	555.6	--	--
12.0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
13.0	1:10:00 PM	422.3	823.8	243.7	339.7	475.3	521.1	832.9	246.0	30.0	475.0	560.2	429.8	243.2

14.0	7:45:00 AM	434.5	823.8	246.6	346.1	478.8	528.6	839.9	251.5	33.7	483.2	573.9	435.6	247.6
15.0	9:00:00 AM	443.6	823.8	251.0	347.6	484.1	532.4	846.8	252.8	34.9	491.5	578.5	441.5	253.6
16.0	7:45:00 AM	452.7	823.8	253.9	352.4	489.4	536.2	851.5	256.9	37.3	497.0	585.3	443.0	255.0
17.0	4:50:00 PM	464.9	823.8	253.9	358.7	492.9	539.9	860.8	259.6	38.5	--	--	445.9	263.9
18.0	--	--	--	--	--	--	--	--	--	--	511.0	599.0	--	--
19.0	--	--	--	--	--	--	--	--	--	--	519.0	604.0	--	--
20.0	8:50:00 AM	474.0	823.8	258.2	366.6	503.5	551.2	872.4	265.1	44.5	--	--	--	--
21.0	7:45:00 AM	480.1	823.8	259.6	369.8	505.3	555.0	874.7	267.8	46.9	520.0	605.0	451.8	281.8
22.0	8:50:00 AM	483.1	823.8	261.1	374.5	512.3	562.5	884.0	269.2	49.3	--	--	454.7	290.7

- The empty cell represent that the produced amount of biogas was not sufficient for reading or weekend.

Table 7: experimental data of the biogas production normalized by the amount of total solids of the substrate

Day	Time	Ref	100%	10%	30%	50%	60%	90%	0%	Inoculum	40%	70%	80%	20%
Day 1	11:45:00 AM	0.0	169.8	30.6	51.5	75.3	94.2	156.7	28.7	3.9	76.0	92.4	38.9	17.2
Day 1	3:10:00 PM	0.0	190.9	37.2	61.3	86.4	106.2	174.0	34.9	4.8	--	--	--	--
Day 1	5:50:00 PM	3.0	203.5	40.5	64.9	93.4	113.7	185.5	38.0	5.2	--	--	--	--
Day 1	9:40:00 PM	3.0	218.2	46.1	72.3	101.7	124.1	198.9	43.2	5.7	--	--	--	--
Day 2	7:45:00 AM	3.0	260.3	59.3	89.4	124.0	151.0	235.2	56.7	6.6	--	--	82.6	47.2
Day 2	3:30:00 PM	6.1	287.6	68.2	102.9	139.2	165.9	256.3	67.0	7.4	--	--	--	--
Day 3	8:30:00 AM	30.3	331.7	91.4	133.4	168.4	197.3	292.6	86.7	7.9	--	--	109.6	61.2
Day 3	12:00:00 PM	36.4	335.9	94.7	138.3	175.3	203.2	300.3	90.9	8.3	--	--	--	--
Day 4	6:30:00 PM	148.7	365.4	116.8	183.6	237.8	266.0	374.9	114.7	10.1	230.3	254.9	147.3	81.5
Day 5	10:30:00 AM	191.2	417.9	129.0	202.0	280.9	310.7	443.8	128.2	11.0	274.7	312.2	--	--
Day 6	8:00:00 AM	215.5	485.2	138.9	213.0	304.5	337.6	518.4	138.5	11.0	298.0	356.6	--	--
Day 7	10:00:00 AM	236.7	586.0	147.7	220.3	318.4	354.1	583.5	148.9	11.0	321.3	391.7	235.4	123.2
Day 8	9:35:00 AM	282.3	632.3	154.4	226.4	330.9	366.0	621.8	156.1	12.7	334.0	415.8	266.0	131.8
Day 9	9:50:00 AM	318.7	665.9	163.2	238.7	343.4	379.4	644.7	165.5	13.6	--	--	--	--
Day 10	10:20:00 AM	355.1	689.0	171.0	246.0	353.1	392.9	661.9	174.8	14.1	--	--	300.2	149.0

Day 11	3:50:00 PM	391.5	690.1	177.6	254.6	361.4	403.3	673.4	181.0	17.6	363.7	449.1	--	--
Day 12	--	--	--	--	--	--	--	--	--	--	365.8	452.8	--	--
Day 13	1:10:00 PM	421.9	691.1	186.4	263.1	373.9	413.8	686.8	187.2	22.0	372.1	463.9	--	--
Day 14	7:45:00 AM	434.0	691.1	188.6	268.0	376.7	419.8	692.6	191.4	24.7	378.5	467.6	347.4	176.8
Day 15	9:00:00 AM	443.1	691.1	192.0	269.3	380.9	422.7	698.3	192.4	25.6	382.7	473.1	352.1	180.1
Day 16	7:45:00 AM	452.2	691.1	194.2	272.9	385.0	425.7	702.1	195.5	27.3	--	--	356.8	184.4
Day 17	4:50:00 PM	464.4	691.1	194.2	277.8	387.8	428.7	709.8	197.6	28.2	--	--	358.0	185.4
Day 18	--	--	--	--	--	--	--	--	--	--	393.2	484.2	360.4	191.9
Day 19	--	-	--	--	--	--	--	--	--	--	399.6	487.9	-	-
Day 20	8:50:00 AM	473.5	691.1	197.5	283.9	396.1	437.7	719.3	201.7	32.6	-	-	-	-
Day 21	7:45:00 AM	479.5	691.1	198.6	286.4	397.5	440.7	721.3	203.8	34.4	400.6	488.8	365.1	204.9
Day 22	8:50:00 AM	482.6	691.1	199.7	290.1	403.1	446.6	728.9	204.8	36.2	-	-	367.5	211.4

- The empty cell represent that the produced amount of biogas was not sufficient for reading or weekend.

Table 8: Table 9: experimental data of the biogas production normalized by the amount of fresh matter of the substrate

Day	Time	Ref	100%	10%	30%	50%	60%	90%	0%	Inoculum	40%	70%	80%	20%
Day 1	11:45:00 AM	0.0	37.7	0.9	1.8	3.1	4.3	15.6	0.8	0.1	2.0	6.0	2.4	0.4
Day 1	3:10:00 PM	0.0	42.4	1.1	2.1	3.5	4.9	17.3	1.0	0.1	--	--	--	--
Day 1	5:50:00 PM	2.9	45.2	1.2	2.2	3.8	5.2	18.5	1.1	0.1	--	--	--	--
Day 1	9:40:00 PM	2.9	48.5	1.4	2.5	4.1	5.7	19.8	1.3	0.1	--	--	--	--
-Day 2	7:45:00 AM	2.9	57.8	1.8	3.1	5.0	6.9	23.4	1.6	0.1	--	--	5.1	1.0
day 2	3:30:00 PM	5.7	63.9	2.1	3.5	5.7	7.6	25.5	1.9	0.2	--	--	--	--
Day 3	8:30:00 AM	28.7	73.6	2.8	4.6	6.8	9.1	29.1	2.5	0.2	--	--	6.8	1.3
day 3	12:00:00 PM	34.4	74.6	2.9	4.7	7.1	9.3	29.9	2.6	0.2	--	--	--	--
Day 4	6:30:00 PM	140.8	81.1	3.5	6.3	9.7	12.2	37.3	3.3	0.2	8.0	16.0	9.1	1.7
Day 5	10:30:00 AM	181.1	92.8	3.9	6.9	11.4	14.3	44.2	3.7	0.2	9.0	19.0	--	--
Day 6	8:00:00 AM	204.1	107.7	4.2	7.3	12.4	15.5	51.6	4.0	0.2	10.0	22.0	--	--
Day 7	10:00:00 AM	224.2	130.1	4.5	7.5	12.9	16.3	58.1	4.3	0.2	11.0	24.0	14.6	2.6
Day 8	9:35:00 AM	267.3	140.4	4.7	7.7	13.5	16.8	61.9	4.5	0.3	11.0	26.0	16.5	2.8
Day 9	9:50:00 AM	301.8	147.8	4.9	8.2	14.0	17.4	64.2	4.8	0.3	--	--	--	--
Day 10	10:20:00 AM	336.3	153.0	5.2	8.4	14.4	18.0	65.9	5.1	0.3	--	--	18.6	3.2

Day 11	3:50:00 PM	370.8	153.2	5.4	8.7	14.7	18.5	67.1	5.2	0.4	11.9	27.9	--	--
Day 12											12.0	28.1	--	--
Day 13	1:10:00 PM	399.5	153.4	5.6	9.0	15.2	19.0	68.4	5.4	0.5	12.2	28.8	--	--
Day 14	7:45:00 AM	411.0	153.4	5.7	9.2	15.3	19.3	69.0	5.5	0.5	12.4	29.0	21.5	3.8
Day 15	9:00:00 AM	419.6	153.4	5.8	9.2	15.5	19.4	69.6	5.6	0.5	12.5	29.4	21.8	3.8
Day 16	7:45:00 AM	428.3	153.4	5.9	9.3	15.7	19.5	69.9	5.7	0.6	--	--	22.1	3.9
Day 17	4:50:00 PM	439.8	153.4	5.9	9.5	15.8	19.7	70.7	5.7	0.6			22.2	4.0
Day 18	--	--	--	--	--	--	--	--	--	--	12.9	30.2	22.3	4.1
Day 19	--	--	--	---	--	--	--	--	--	--	13.1	30.4	-	--
Day 20	8:50:00 AM	448.4	153.4	6.0	9.7	16.1	20.1	71.6	5.9	0.7	13.1	30.4	--	--
Day 21	7:45:00 AM	454.1	153.4	6.0	9.8	16.2	20.2	71.8	5.9	0.7	--	--	22.6	4.4
Day 22	8:50:00 AM	457.0	153.4	6.1	9.9	16.4	20.5	72.6	5.9	0.8	--	--	22.8	4.5

- The empty cell represent that the produced amount of biogas was not sufficient for reading or weekend.

Appendix B. Price List

Concepts and Quantities are indicative only. The Bidder must adjust according to its technical proposal and FAO requirements detailed in Appendix A.

No.	Item	Quantity	Unit	Unit Price [currency]	Total Price [currency]
I.	Civil Works				
1	Truck reception platform	45	m		
2	Settling poll	30	m		
3	Discharge pit 1	20	m		
5	Adjustment Pond	70	m		
6	Co-substrate treatment workshop	60	m		
7	Digester Lagoon	1,100	m		
8	Storage Lagoon	700	m		
9	Discharge pit 2	20	m		
10	Foundation CHP and Gas flare	30	m		
12	Brick filter	210	m		
13	Technical room	50	m		
14	Office, Control Room, toilet	90	m		
15	Landscaping	1,500	m		
16	Enclosing Fence	370	m		
17	Gate	1	Set		
18	Drainage pipe system	220	m		
	Subtotal Civil Works				
II.	Machinery and Equipment				
1	Bar Screen	2	Unit		
2	Waste Crusher System With Sieve	1	Unit		
3	Conveyor Belt	1	Unit		
4	Stirrer	1	Unit		
5	Pump With Cutter	1	Unit		
6	Biofilter	1	Unit		
7	Overpressure System	1	Unit		
8	Pressure Pump	2	Unit		
9	Digester Lagoon	1	Unit		
10	Storage Lagoon	1	Unit		
11	Kinetic Stirring System	1	Unit		
12	Air Injection	1	Unit		
13	Active Carbon Desulfurizer	1	Unit		
14	Liquid Meter	1	Unit		
15	Gas Flow Meter	1	Unit		
16	Biogas Analyzer	1	Unit		
17	Biogas Compressor	1	Unit		
18	Gas Cooling Unit	1	Unit		
19	Biogas storage membrane	1	Unit		

No.	Item	Quantity	Unit	Unit Price [currency]	Total Price [currency]
20	50kW _{el} CHP Unit with periphery	1	Unit		
21	Gas flare	1	Unit		
22	Heating system	1	Unit		
23	Electrical Distribution System	1	Unit		
24	Partly Automatic Control System	1	Unit		
25	Fire Extinguishing System	1	Unit		
26	Brick filter covering	1	Unit		
	Subtotal Machinery & Equipment				
III.	Equipment Installation Costs	1	Lump sum		
IV.	Guarantee period (2 years).				
1	Spare parts and normal maintenance items.	1	Lump sum		
2	Technical assistance (on-line or telephone)	1	Lump sum		
	Subtotal warranty costs				
V.	Other Operating Costs	1	Lump sum		
1	Commissioning and Training Costs	1	Lump sum		
2	Travel and Transportation Costs	1	Lump sum		
3	Engineering Survey and Design	1	Lump sum		
	Subtotal other operating costs				
VI.	Options				
1	UV Disinfection plant	1	Unit		
	Subtotal Options				
	Total Offer (turnkey project)				

Price expressed per deliverable:

No.	Deliverable as per Appendix A	Amount (currency)
1	Deliverable 1, as per section 4.1	
2	Deliverable 2, as per section 4.2	
3	Deliverable 3, as per section 4.3	
4	Deliverable 4, as per section 4.4	
	Total Offer (turnkey project)	

Appendix C. Bidder's Financial Status
 (If a consortium, please submit one form per company)

Company Name:			
Date:			
Accounting Method: (GAAP/IFRS)		Currency:	

We certify that to the best of our knowledge, the following financial information is correct:

	Fiscal year 2016	Fiscal year 2017
Income statement		
Net sales		
Operating income (EBIT)		

Balance sheet		
Current assets		
Total assets		
Current liabilities		
Total liabilities		
Retained earnings		

Public companies		
Market value of equity		

Private companies		
Book value of equity		

Certified by:

Name: _____
Title: Chief Financial Officer (CA/CPA)/Accountant (CA/CPA)

SITE VISIT STATEMENT

Tender Reference: **2018/CSAPC/FNJOR/100231**

Description: **Design, construction and commissioning of a biogas plant (50 kW CHP) in Mafraq, Jordan.**

Site of works visited: **Zaatari Refugee Camp, Mafraq, Jordan.**

I hereby confirm that my company has inspected the sites of the Lot(s) marked above, and that it has obtained all necessary information related to risks, contingencies and other circumstances, which might influence or affect the provision of the goods or execution of the works. In this regard, my Company acknowledges the following:

- a) Existing elements such as constructions, cables, pipes, trees, plants, shrubs, etc.;
- b) surface and sub-surface conditions, load-bearing capacity of the soil, the existence of rocks, etc.;
- c) the presence and nature of surface and subsurface water and modification of such hydrological conditions which might result from construction works;
- d) drops or gradients and slopes;
- e) meteorological and climatic conditions;
- f) means of access to the site;
- g) availability of necessary water and electricity; and
- h) availability of adequate space for the storage of building materials.

Name of the Company:	
Name and last name of company representative:	
Date, Stamp and signature	

CONTRACT No. (XXXXXXXXXX)

**FOR THE DESIGN, CONSTRUCTION AND COMMISSIONING OF A
BIOGAS PLANT (50 KW CHP) IN MAFRAQ, JORDAN**

BETWEEN

**THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED
NATIONS**

&

(Name of Contractor)

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STATEMENT OF SUBCONTRACTORS 1

THIS CONTRACT FOR THE DESIGN, CONSTRUCTION AND COMMISSIONING OF A BIOGAS PLANT (50 KW CHP) IN MAFRAQ, JORDAN is made on xx xxxxxx of 2018,

BETWEEN:

The Food and Agriculture Organization of the United Nations (“FAO”), an intergovernmental organization established on 16 October 1945 as a Specialized Agency of the United Nations, having its headquarters in Rome, Italy, and having an office in Jordan;

AND:

(Name of Contractor), a corporation organized and existing under the laws of XXXXX and having its principal offices at XXXXXXXXXXXXXXXXXXXX (the “Contractor”);

FAO and the Contractor are hereinafter collectively referred to as the “Parties”;

WHEREAS:

A. FAO, in accordance with its Constitution, cooperates with governments, civil society organizations and other partners, to alleviate poverty and hunger by promoting agricultural development, improved nutrition and the pursuit of food security.

B. FAO wishes to procure /engage the services of Specialized Companies for the “Design, construction and commissioning of a biogas plant (50 kW CHP) in Mafraq, Jordan” in support of The Project “GCP /JOR/017/EC “Improving Rural livelihoods and the environment through the integral utilization of residues of treated wastewater and organic solid waste for the production of renewable energy and compost in Mafraq Governorate of Jordan” as described in the Contract.

C. By Invitation to Bid (ITB) No. 2018/CSAPC/FNJOR/100231 dated 27 July 2018, FAO invited offers for the “Design, construction and commissioning of a biogas plant (50 kW CHP) in Mafraq, Jordan”. By bid received on xx xxxxx of 2018, the Contractor responded to ITB No. 2018/CSAPC/FNJOR/100231, representing that it is qualified, capable and willing to provide the required works.

D. FAO wishes to engage the Contractor to undertake the works, all on the terms and conditions set forth in this Contract; and the Contractor represents that it is willing to carry out the works on the same terms and conditions.

NOW, THEREFORE, the Parties hereto mutually agree as follows:

SECTION I: SPECIAL PROVISIONS

ARTICLE 1 – CONTRACTOR’S PERFORMANCE

- 1.1 The Contractor shall provide the construction works, hereinafter referred to as the “Works”, and perform the services as set out in the “**Statement of Works and Technical Specifications**”, “**Bill of Quantities**” and “**Drawings**”, attached hereto as **Annex I**, **Annex II** and **Annex III** respectively, it being understood that such works, services and technical specifications are deemed to include those which, while not specifically provided for in the said **Annexes**, are implied by generally accepted usages and standards of the trade and industry.
- 1.2 The Contractor is responsible, for the purpose of carrying out its obligations set out in paragraph 1.1 above, for providing at its own cost at the site(s) specified in **Annex I**, all necessary, plans, machinery, equipment, supplies, parts, tools, building materials, and employees, and for executing all necessary construction, erection and installation, except for such designs, drawings, plans, machinery, equipment, supplies, parts, tools, building materials, employees, construction, erection and/or installation which may be provided and/or executed by FAO as set out in Article 3 below.
- 1.3 The Contractor is also responsible for obtaining at its own cost all authorizations, licenses and permits which are required to perform this Contract according to the laws, decrees or regulations of the country concerned, by the deadline(s) for the activity specified in the Schedule of Contract Performance mentioned in Article 2 below.

ARTICLE 2 – SCHEDULE OF CONTRACT PERFORMANCE

- 2.1 This Contract becomes effective upon its signature by both Parties.
- 2.2 The Contractor shall execute this Contract in accordance with the “**Schedule of Contract Performance**”, attached hereto as **Annex IV**.
- 2.3 The Contractor shall commence the Works on the site(s) mentioned in **Annex I** within the period specified in the written order to this effect of FAO’s Resident Engineer, hereinafter referred to as the “Resident Engineer”, subject to receipt by the Contractor of the relevant authorizations, licenses and permits mentioned in Article 1.3 above.
- 2.4 The Contractor shall submit to the Resident Engineer for his/her approval within **one (1) week** of the date of signature of this Contract by both Parties a detailed work programme showing the planning of the execution of the Works by the deadlines specified for them in **Annex IV**, together with full details of the employees and labourers and of the equipment, materials and supplies the Contractor intends to assign to the execution of the Works.
- 2.5 The Resident Engineer is authorized to approve extensions of any of the deadlines mentioned in **Annex IV** except if they are caused by circumstances for which, in his/her opinion, the Contractor is responsible.

ARTICLE 3 – PARTICIPATION OF FAO

- 3.1 The Contractor has entered into this Contract in reliance upon FAO’s undertaking to provide

certain services and facilities as set out in **Annex V: “Services and Facilities provided by FAO”**.

- 3.2 In the event that for any reason the services and facilities set out in **Annex V** are not made available, the Contractor shall immediately advise the Contract Managers mentioned in Article 21 below and notify the FAO Representative, it being understood that the Contractor shall not incur expenditures beyond those authorized in this Contract to obtain the said services and facilities without the written approval of the latter.

ARTICLE 4 – FAO’S FINANCIAL LIABILITY

- 4.1 FAO’s financial liability under this Contract is limited to a lump sum amount of:

(Write out amount in USD)

being the total amount of the “**Bill of Quantities**”, attached hereto as **Annex II**.

- 4.2 It is understood that in calculating the amount mentioned in Article 4.1 above the Contractor exercised appropriate professional judgement and has given full consideration to working conditions in the countries of Contract execution, including the conditions of the construction site(s), to the participation in the performance of this Contract by FAO, as specified in Article 3 above, as well as to the availability of all relevant information and data required for the execution of this Contract. Therefore, the Contractor shall under no circumstances be entitled to any payments in excess of the total amount of FAO’s financial liability as determined in Article 4.1 above unless:

- 4.2.1 FAO has requested the Contractor in writing to undertake Works and services not included in Annex I; *and/or*

- 4.2.2 FAO has failed to meet their obligations referred to in Article 3 above which has resulted in identifiable additional costs to the Contractor.

- 4.3 When the occurrence of one or both of the events in Articles 4.2.1 and 4.2.2 above would justify that adjustments to the amount mentioned in Article 4.1 above be made, **Annex II** shall, where appropriate, be used for determining such adjustments.

- 4.4 FAO and the Contractor agree that the prices set out in **Annex II** of this Contract are firm and will not be increased under any circumstances except as provided for in Article 4.2 above.

ARTICLE 5 – SCHEDULE AND METHOD OF PAYMENT

- 5.1 In full consideration of the Works executed by the Contractor, FAO will effect payments to the Contractor, subject to the deduction of the Liquidated Damages mentioned in Article 6 below, if any, in accordance with the provisions of the “**Schedule and Method of Payment**”, attached hereto as **Annex VI**.

- 5.2 Any payment by FAO is subject to receipt at the Office of the FAO Representation of the following documents:

- 5.2.1 one (1) copy of this Contract, duly signed by the Contractor;
- 5.2.2 in case of advance payment, a bank guarantee adhering to the terms of the **Draft Bank Guarantee for Advance Payment** included as an **Annex VII**;
- 5.2.3 original invoices corresponding to the works provided by the Contractor under this Contract as per conditions set out in **Annex VI**.
- 5.3 The Organization shall withhold from each invoice a fixed percentage of **10%** of the total amount of the invoice, half of which shall become payable upon the satisfactory completion of the Contract and issuance of the “**Certificate of Completion of Works**” mentioned in **Article 16**, and the remaining half shall become payable upon the issuance of the “**Certificate of Defects Liability Period**” mentioned in **Article 19**.
- 5.4 The Contractor shall reimburse FAO in the currency of original payment or in a mutually agreed currency:
- 5.4.1 overpayments made by FAO;
- 5.4.2 costs incurred by FAO for the procurement of alternative services due to the Contractor’s default.
- 5.5 The Contractor shall be liable for any changes occurring in the cost of materials and labour during the contracted period.
- 5.6 FAO will endeavour to effect payment of the invoices submitted in accordance with **Annex VI**, within thirty (30) calendar days of the date of their receipt but shall under no circumstances be liable to pay interest on amounts not paid within such period.

ARTICLE 6 – LIQUIDATED DAMAGES

As provided for in Section II, Article 6.5, the Parties agree that FAO may withhold from any payments due to the Contractor an amount equal to two point five percent (**2.5%**) of the amount specified in Article 4.1, above as liquidated damages for each week of delay in the completion of part or all of the Works, as certified by the Resident Engineer, beyond the deadlines specified for them in **Annex IV**, provided however, that such liquidated damages shall not in any case exceed ten percent (**10%**) of the total Contract amount and it being understood that the withholding by FAO of the said amount(s) does not in any way constitute a waiver by FAO of its rights under Section II, Article 6 of this Contract.

ARTICLE 7 – PERFORMANCE BOND AND BANK GUARANTEE

- 7.1 The award of this Contract is subject to the Contractor submitting to FAO, within two (2) weeks of receipt of the Contract, duly signed by FAO, a Performance Bond issued by a Bank acceptable to FAO, for **ten (10%)** of the total amount of the Contract as specified in Article 4.1 above and valid for its full duration. It is understood that the amount of said Performance Bond may be reduced to five percent (**5%**) upon issuance of the Certificate of Completion of Works, as mentioned in Article 16 below. Such Performance Bond shall adhere to the terms of **Annex VIII: “Draft Performance Bond”**.

- 7.2 Any advance payment as specified in **Annex VI**, paragraph 2, is subject to the Contractor submitting, together with its invoice for such payment, a Bank Guarantee issued by a Bank acceptable to FAO, for the amount of such payment. Such Bank Guarantee shall adhere to the terms of **Annex VII: “Draft Bank Guarantee for advance payment”**.
- 7.3 The cost of obtaining the documents mentioned in Articles 7.1 and 7.2 above are incurred by the Contractor and reimbursed by FAO.
- 7.4 A retention clause shall be established to ensure the proper execution and completion of the Works and Defects Liability Period, in accordance with the provisions of the present Contract. Said retention will be of ten percent (10%) of the total amount of Works duly executed, to be deducted from each invoice referred to in Article 5 above, provided that the Works have been performed to the satisfaction of FAO. The amount withheld will be returned to the Contractor, at his request, as follows:
- 7.4.1 five percent (5%) up to fifteen (15) days after the date of completion specified in the **“Certificate of Completion of Works”** (provisional acceptance);
- 7.4.2 five percent (5%) up to fifteen (15) days after the expiration of the Defects Liability Period specified in the **“Certificate of Defects Liability Period”** (final acceptance).

ARTICLE 8 – INSURANCE

- 8.1 Before commencing the execution of the Works and without prejudice to the relevant provisions of Section II of this Contract, the Contractor shall insure against its liability for any material or physical damage, loss or injury from whatever cause which may occur to any property, including that of FAO as well as the Works themselves, or to any person, including any employee of FAO, arising out of the execution of this Contract.
- 8.2 If the Contractor fails to effect and keep in force the insurances referred to in Article 8.1 above, FAO may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount so paid by FAO from any moneys due or which may become due to the Contractor or recover the same as a debt from the Contractor.
- 8.3 The Contractor shall immediately notify the Resident Engineer of any accident arising from the execution of the Contract and shall provide full particulars thereof, it being understood that the Contractor shall be solely responsible for lodging claims with the insurance company(ies) concerned.
- 8.4 The Contractor shall submit to the Resident Engineer the receipts of paid premiums whenever so requested during the period of construction and shall forward, prior to taking possession of the construction site(s), the policy(ies) of the insurance(s) required by this Article for approval to:

FAO Representative in Jordan
Food and Agriculture Organization of the United Nations
Dabouq- Al-Shaab St. P O Box: 941631- Amman 11194, Jordan.

ARTICLE 9 – CONTRACTOR’S RESPONSIBILITY FOR EMPLOYEES

- 9.1 The Contractor shall provide all necessary employees and shall be fully responsible for their employment, work permits, payment and administration in strict conformity with all relevant laws and regulations, including laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.
- 9.2 The Contractor shall be responsible for the professional and technical competence of its employees and will select reliable individuals who will perform effectively in the Contract’s implementation, respect the local customs, and conform to a high standard of moral and ethical conduct. The Contractor’s employees working on FAO’s premises will comply with FAO’s rules, policies, and procedures regarding conduct, and security.

ARTICLE 10 –SUPERVISION OF THE EXECUTION OF THE WORKS

- 10.1 Supervision of the execution of the Works under this Contract is the responsibility of the Resident Engineer or his/her duly authorized representative. The Resident Engineer shall generally carry out such duties in issuing decisions, certificates and orders as are required for the satisfactory execution of the Works. It is understood, however, that the Contractor shall promptly request the Resident Engineer to provide such instructions or guidance as may be necessary or lacking and that failure to seek such instructions or guidance does not constitute a valid reason for delays in the execution of the Works or for an execution not in accordance with the Contract specifications or the standards of the trade and industry.
- 10.2 The duties and powers of the Resident Engineer are set out in the “**Statement of Duties and Powers of the Resident Engineer**”, attached hereto as **Annex IX**, it being understood that any modification of the specifications of the Works or of approved final designs or drawings or plans related thereto, or any modifications of the provisions of this Contract which may result in additional costs to FAO, do not commit FAO without the written approval of the FAO Representative to increase FAO’s financial liability as determined in Article 4.1 above.

ARTICLE 11–QUALITY OF WORKS AND GOODS

- 11.1 The Contractor shall guarantee the quality of its workmanship and follow all instructions given by the Resident Engineer, shall select qualified skilled persons and personnel with competence and experience, shall make use of construction materials of quality in accordance with the technical specifications.
- 11.2 The Resident Engineer has the right to order the Contractor to remove or demolish any elements which fail to meet required standard or which the Contractor has concealed or covered before inspection. Cost for demolition and reconstruction shall be borne by the Contractor.
- 11.3 The goods supplied and installed, including all packaging and packing thereof, conform to the specifications of the Contract, including any applicable standards provided for in the Contract or, if no applicable standards are provided, the most recent authoritative standards issued by the relevant institution in the goods’ country of origin. The goods are securely contained, packaged and marked in accordance with normal commercial standards of export packing for goods of this type and in a manner so as to protect the

goods while in storage or in transit to their ultimate destination. The Contractor further warrants that the goods are fit for the purposes for which such goods are ordinarily used and for purposes expressly made known to the Contractor by FAO, are of current manufacture and are of even quality and free from defects in design, workmanship, material and manufacture;

- 11.4 If the Contractor is not the original manufacturer of the goods, the Contractor shall provide FAO with the benefit of all manufacturers' warranties in addition to any other warranties required to be provided under the Contract;
- 11.5 The Contractor certifies that the goods are new and unused, and of the quality, quantity and description required by the Contract, including when subjected to conditions prevailing in the place of final installation;
- 11.6 All such warranties for the goods shall remain in effect for a period of two (2) years after the goods are placed in use and the Certificate of Completion of Works detailed in Article 16.1 has been issued ("Warranty Period for Goods").
- 11.7 During the Warranty Period for Goods, upon notice by FAO that the goods do not conform to the requirements of the Contract, the Contractor shall promptly and at its own expense correct such non-conformities or, in case of its inability to do so, replace the defective goods with goods of the same or better quality or, at its own cost, remove the defective goods and fully reimburse FAO for the purchase price paid for the defective goods. In the event the Contractor fails to repair or replace defective or non-conforming goods within a reasonable time, FAO may replace or repair the goods and charge or debit the Contractor for all costs connected therewith.
- 11.8 The Contractor shall remain responsive to the needs of FAO for any services that may be required in connection with any of the Contractor's warranties under the Contract. In addition, the Contractor shall provide or make available technical assistance on maintenance, service repairs, and overhaul of the goods.

ARTICLE 12 – INSPECTION OF THE CONSTRUCTION SITE

- 12.1 The Contractor's bid is deemed to have been formulated after having inspected the site(s) and having obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the execution of this Contract.
- 12.2 In particular, and without limiting the generality of the foregoing, the Contractor is deemed to have taken full account of the following:
 - 12.2.1 existing buildings, construction works, cables, pipes, trees, plants, shrubs, etc.;
 - 12.2.2 surface and sub-surface conditions, load-bearing capacity of the soil, the existence of rocks, etc.;
 - 12.2.3 the presence and nature of surface and subsurface water and modification of such hydrological conditions which might result from construction works;
 - 12.2.4 drops or gradients and slopes;

- 12.2.5 meteorological and climatic conditions;
- 12.2.6 means of access to the site;
- 12.2.7 availability of necessary water and electricity;
- 12.2.8 availability of adequate space for the storage of building materials.

ARTICLE 13 – ORGANIZATION OF THE CONSTRUCTION SITE

- 13.1 The Contractor shall take all measures necessary for FAO of the construction site(s), at its own cost, including, but not necessarily limited to, the following:
 - 13.1.1 the establishment of footpaths and builders' roads, which may be freely used by the Resident Engineer and his/her authorised agents or assistants and such other enterprises or firms as may be called upon to assist in construction works on the same site;
 - 13.1.2 the setting out of the buildings which entails the use of alignments and levelling;
 - 13.1.3 the availability of water for construction works, drinking water, and electricity for the construction works;
 - 13.1.4 the provision of fencing, lighting, signposts, cleaning, night-watchman services and repairs of the construction site;
 - 13.1.5 the renting of additional space for the storage of building equipment, materials and related implements for the Works if the construction site is inadequate for such purposes.
- 13.2 The Contractor shall take all such measures as are necessary to prevent the occurrence of accidents caused or occasioned by the execution of the Works. The Contractor is responsible for any accident or damage caused to persons, property, public and private roads and highways and constructional work arising from the transport of machinery or equipment, building materials and supplies.
- 13.3 For the duration of the construction works, the Contractor shall ensure that no unnecessary interference with traffic is caused by operations necessary for the execution of the Works.
- 13.4 The construction site shall be adequately provided with signposts and warning signals, both by day and by night. The plan of signs and signals envisaged for the site requires the prior approval of the Resident Engineer before their installation.
- 13.5 Such costs as may be incurred by the Contractor in implementing the provisions of this Article are borne by the Contractor.
- 13.6 The Contractor shall permanently keep on each site, all such instruments, tools and equipment as may be required by the Resident Engineer for the testing of materials and samples at the cost of the Contractor.
- 13.7 Failure by the Contractor to observe the provisions of Article 13.6 above shall entitle the

Resident Engineer to purchase such instruments or equipment as may be necessary and the cost thereof shall be deducted from sums due to the Contractor.

ARTICLE 14 – PRESENCE OF THE CONTRACTOR ON THE CONSTRUCTION SITE

- 14.1 Within seven (7) days of signature of this Contract by the Parties, the Contractor shall submit to the Resident Engineer, for approval, the designation of its representative who shall be empowered to conduct the execution of the Works and represent the Contractor in relations with the Resident Engineer. The designation of a representative by the Contractor shall not relieve the Contractor of its obligations under the present Contract.
- 14.2 The Contractor or its representative shall attend all meetings convened by the Resident Engineer on the construction site. The Contractor's representative shall be empowered to provide the necessary instructions forthwith to the Contractor's employees.

ARTICLE 15 – CONSTRUCTION SITE LOGBOOK

- 15.1 On each construction site, the Contractor shall maintain a logbook for the recording, upon each visit to the site, and at least on a biweekly basis, of the following:
- 15.1.1 deliveries to the construction site of machinery, equipment, building materials and supplies;
 - 15.1.2 quantities of work executed and quantities of materials and supplies employed therefore;
 - 15.1.3 decisions, instructions, observations and recommendations of the Resident Engineer;
 - 15.1.4 important facts or events which are likely to influence the progress of the Works;
 - 15.1.5 presence of construction equipment, tools, vehicles and labour.
- 15.2 The Resident Engineer shall provide the Contractor with the necessary guidance for maintaining the logbook which should have two detachable copies for each original page.
- 15.3 The site logbook shall be made available to the Resident Engineer upon his/her request and should, therefore, be kept permanently on the site. Upon completion of the Works the logbook shall be handed over to the Resident Engineer.

ARTICLE 16 – CERTIFICATE OF COMPLETION OF WORKS AND PROVISIONAL ACCEPTANCE

- 16.1 When the whole of the Works is substantially completed in accordance with the provisions of this Contract, the Contractor may give notice to that effect in writing to the Resident Engineer. Within fifteen (15) days of the receipt of such notice, the Resident Engineer shall either issue a Certificate of Completion of Works, stating the date on which the Works were so completed, or give the Contractor instructions in writing stating all Works which, in the opinion of the Resident Engineer, have to be completed by the Contractor before the issue of such Certificate, according to the conditions set forth in **Annex X: "Draft Certificate of Completion of Works"**.

- 16.2 The date of completion of the Works stated in the Certificate of Completion of Works is the operative date for the computation of delays and liquidated damages where necessary and of the beginning of the Defects Liability Period mentioned in Article 19 below.

ARTICLE 17 – CLEARANCE OF SITE ON COMPLETION OF WORKS

Within **Ten (10) days** of completion of the works, the Contractor shall clear away and remove from the site(s) all surplus materials, rubbish and temporary works of every kind and leave the whole of the site(s) and works clean and in a workmanlike condition to the satisfaction of the Resident Engineer. Failure by the Contractor to clean the site will cause FAO to do so at the expense of the Contractor.

ARTICLE 18 – HANDOVER CERTIFICATE

Upon satisfactory acceptance of the execution and completion of the works referred to in Article 16 above, FAO relinquishes control of the site and returns all responsibilities to xxxxxxxxx by means of the signature of the Handover Certificate which should be drafted in accordance the text of **Annex XI: “Draft Handover Certificate”**.

ARTICLE 19 – CERTIFICATE OF DEFECTS LIABILITY PERIOD AND FINAL ACCEPTANCE

- 19.1 For the purpose of this Contract, **“Defects Liability Period”** means a period of **two (2) years** as from the date of completion of the Works stated in the Certificate of Completion of Works mentioned in Article 16 above.
- 19.2 During the Defects Liability Period the Contractor shall execute, at its own cost, all repairs, reconstructions, rectifications and/or make good all defects of the Works, fair wear and tear excepted, which are required in writing by the Resident Engineer and are, in his/her opinion, attributable to circumstances for which the Contractor is responsible.
- 19.3 Upon completion of the Defects Liability Period, the Resident Engineer issues a Certificate of Defects Liability Period stating that the Works, except for fair wear and tear, have been completed and repaired to his/her satisfaction. If the Resident Engineer decides that he/she is unable to issue the Certificate of Defects Liability Period, the Contractor shall complete, as soon as possible and at its own cost, all such repairs as may be required in writing by the Resident Engineer. If repairs are carried out by the Contractor during the Defects Liability Period the Resident Engineer decides whether a new Defects Liability Period of thirty (30) days shall commence as from the date of completion of such repairs as certified by the Resident Engineer.
- 19.4 “Defects” as used in this Article shall mean any deficiency, omission, imperfection, error, flaw, shrinkage or other fault in the quality of the Works, fair wear and tear excepted.
- 19.5 The Certificate of Defects Liability Period shall generally follow the text of the **“Draft Certificate of Defects Liability Period”** attached hereto as **Annex XII**.

ARTICLE 20 – SUBCONTRACTORS

- 20.1 The Contractor shall not subcontract part of the Works to other companies except in

special cases where the particular work requires expertise and technical skills, which cannot be performed by the Contractor. In this case, the Contractor shall submit the names and profile (or past experiences) of the subcontracted company, indicated in **Annex XIII: “Statement of Subcontractors”**, to the Resident Engineer for consideration and final approval by FAO. FAO shall approve only if the said company meets requirements for subcontracting the particular work.

20.2 The Contractor shall perform its obligation to FAO and be responsible for the quality of the work assigned including all negligence, which may be caused by the subcontractor due to its misbehaviour or by that of its employees.

ARTICLE 21 – DESIGNATION OF THE CONTRACT MANAGERS

For the purpose of the performance of this Contract, the following persons have been designated by the Parties to represent them as far as their own individual competence and qualifications are concerned. It is understood that any decisions by such Contract Managers which would increase or decrease FAO’s financial liability as set out in Article 4.1 above will only be binding on FAO if they are the subject of a formal amendment to this Contract, duly signed by the FAO Representative.

21.1 FAO has designated as its Contract Manager the following person/s:

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21.2 The Contractor has designated as its Contract Manager the following person/s:

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ARTICLE 22 – PUBLICATION OF CONTRACT AWARDS

FAO reserves the right to publish the Contractor’s name and country, the total Contract value and a brief description of the works or services provided under this Contract.

ARTICLE 23 – CONTRACT DOCUMENTS

Only and exclusively the documents set out below are considered to be an integral part of this Contract:

23.1 Sections **I** and **II** consisting of pages 1 through 32; *and*

23.2 **Annexes I** through **XIII**.

23.3 The technical and financial offers of the Contractor, not attached hereto but in possession of the **Parties**.

SECTION II – STANDARD PROVISIONS

ARTICLE 1 – LEGAL STATUS OF THE PARTIES

FAO and the Contractor shall also each be referred to as a “Party” hereunder, and:

- 1.1 Pursuant, *inter alia*, to the FAO Constitution and the Convention on the Privileges and Immunities of the Specialized Agencies, FAO has full juridical personality and enjoys such privileges and immunities as are necessary for the independent fulfillment of its purposes.
- 1.2 The Contractor shall have the legal status of an independent contractor vis-à-vis FAO, and it shall be fully responsible, in particular, for the acts or omissions of its personnel, agents, or other representatives. Nothing contained in or relating to the Contract shall be construed as establishing or creating between the Parties the relationship of employer and employee or of principal and agent. The officials, representatives, employees, or subcontractors of each of the Parties shall not be considered in any respect as being the employees or agents of the other Party.

ARTICLE 2 – RESPONSIBILITY FOR EMPLOYEES

To the extent that the Contract involves the provision of any services to FAO by the Contractor’s officials, employees, agents, servants, subcontractors and other representatives (collectively, the Contractor’s “personnel”), the following provisions shall apply:

- 2.1 The Contractor shall be responsible for the professional and technical competence of the personnel it assigns to perform work under the Contract and will select reliable and competent individuals who will be able to effectively perform the obligations under the Contract and who, while doing so, will respect the local laws and customs and conform to a high standard of moral and ethical conduct.
- 2.2 Such Contractor personnel shall be professionally qualified and, if required to work with officials or staff of FAO, shall be able to do so effectively. The qualifications of any personnel whom the Contractor may assign or may propose to assign to perform any obligations under the Contract shall be substantially the same, or better, as the qualifications of any personnel originally proposed by the Contractor.
- 2.3 At the option of and in the sole discretion of FAO:
 - 2.3.1 the qualifications of personnel proposed by the Contractor (*e.g.*, curriculum vitae) may be reviewed by FAO prior to such personnel’s performing any obligations under the Contract;
 - 2.3.2 any personnel proposed by the Contractor to perform obligations under the Contract may be interviewed by qualified staff or officials of FAO prior to such personnel’s performing any obligations under the Contract; *and*,

- 2.3.3 in cases in which, pursuant to Article 2.3.1 or 2.3.2, above, FAO has reviewed the qualifications of such Contractor's personnel, FAO may reasonably refuse to accept any such personnel.
- 2.4 Requirements specified in the Contract regarding the number or qualifications of the Contractor's personnel may change during the course of performance of the Contract. Any such change shall be made only following written notice of such proposed change and upon written agreement between the Parties regarding such change, subject to the following:
- 2.4.1 FAO may, at any time, request, in writing, the withdrawal or replacement of any of the Contractor's personnel, and such request shall not be unreasonably refused by the Contractor.
- 2.4.2 Any of the Contractor's personnel assigned to perform obligations under the Contract shall not be withdrawn or replaced without the prior written consent of FAO, which shall not be unreasonably withheld.
- 2.4.3 The withdrawal or replacement of the Contractor's personnel shall be carried out as quickly as possible and in a manner that will not adversely affect the performance of obligations under the Contract.
- 2.4.4 All expenses related to the withdrawal or replacement of the Contractor's personnel shall, in all cases, be borne exclusively by the Contractor.
- 2.4.5 Any request by FAO for the withdrawal or replacement of the Contractor's personnel shall not be considered to be a termination, in whole or in part, of the Contract, and FAO shall not bear any liability in respect of such withdrawn or replaced personnel.
- 2.5 Nothing in Articles 2.2, 2.3 and 2.4, above, shall be construed to create any obligations on the part of FAO with respect to the Contractor's personnel assigned to perform work under the Contract, and such personnel shall remain the sole responsibility of the Contractor.
- 2.6 The Contractor shall be responsible for requiring that all personnel assigned by it to perform any obligations under the Contract and who may have access to any premises or other property of FAO shall:
- 2.6.1 undergo or comply with security screening requirements made known to the Contractor by FAO, including but not limited to, a review of any criminal history;
- 2.6.2 when within FAO premises or on FAO property, display such identification as may be approved and furnished by FAO security officials, and that upon the withdrawal or replacement of any such personnel or upon termination or completion of the Contract, such personnel shall immediately return any such identification to FAO for cancellation.
- 2.7 Within one working day after learning that any of Contractor's personnel who have access to any FAO premises have been charged by law enforcement authorities with an

offense other than a minor traffic offense, the Contractor shall provide written notice to inform FAO about the particulars of the charges then known and shall continue to inform FAO concerning all substantial developments regarding the disposition of such charges.

- 2.8 All operations of the Contractor, including without limitation, storage of equipment, materials, supplies and parts, within FAO premises or on FAO property shall be confined to areas authorized or approved by FAO. The Contractor's personnel shall not enter or pass through and shall not store or dispose of any of its equipment or materials in any areas within FAO premises or on FAO property without appropriate authorization from FAO.

ARTICLE 3 – ASSIGNMENT

- 3.1 The Contractor may not assign, transfer, pledge or make any other disposition of the Contract, of any part of the Contract, or of any of the rights, claims or obligations under the Contract except as may be provided for in this Contract or with the prior written authorization of FAO. Any such unauthorized assignment, transfer, pledge or other disposition, or any attempt to do so, shall not be binding on FAO. Any assignment by the Contractor which is not authorized by FAO will be void and FAO reserves the right in such case, without prejudice to other rights or remedies, to terminate the Contract without liability effective upon the Contractor's receipt of notification of termination. Except as permitted with respect to any approved subcontractors, the Contractor shall not delegate any of its obligations under this Contract, except with the prior written consent of FAO. Any such unauthorized delegation, or attempt to do so, shall not be binding on FAO.
- 3.2 The Contractor agrees that FAO may, at its discretion, assign, transfer, pledge, or make other disposition of this Contract or any part hereof, or any of FAO's rights or obligations under this Contract upon written notification within a reasonable period of time either prior to or following such assignment, transfer, pledge or subcontracting arrangement.

ARTICLE 4 – SUBCONTRACTING

In the event that the Contractor requires the services of subcontractors to perform any obligations under the Contract, and except as may be provided for in this Contract, the Contractor shall obtain the prior written approval of FAO. FAO shall be entitled, in its sole discretion, to review the qualifications of any subcontractors and to reject any proposed subcontractor that FAO reasonably considers is not qualified to perform obligations under the Contract. The approval by FAO of a subcontractor shall not relieve the Contractor of any of its obligations under this Contract. FAO shall have the right to require any subcontractor's removal from FAO premises without having to give any justification therefor. Any such rejection or request for removal shall not, in and of itself, entitle the Contractor to claim any delays in the performance, or to assert any excuses for the non-performance, of any of its obligations under the Contract, and the Contractor shall be solely responsible for all services and obligations performed by its subcontractors. The terms of any subcontract shall be subject to, and shall be construed in a manner that is fully in accordance with, all of the terms and conditions of the Contract. The essential terms set out in Article 26 shall be included in all subcontracting arrangements entered into under this Contract.

ARTICLE 5 – EXAMINATION AND ACCEPTANCE

- 5.1 FAO reserves the right to examine the equipment, materials and supplies and/or assess the services provided under this Contract, at any time prior to the expiry of this Contract. Without any additional charge, the Contractor shall provide all facilities for the examination and all necessary support to ensure that examinations can be performed in such a manner as not to unduly delay delivery.
- 5.2 In case of rejection by FAO of the equipment, materials, supplies and/or services provided, a new review may be carried out by the representatives of both FAO and the Contractor, if promptly requested by the Contractor and before FAO exercises any legal remedies. The Contractor shall bear the expenses of such a review.
- 5.3 If this Contract specifically requires the Contractor to procure equipment, materials or supplies on behalf of FAO, such procurement shall be of new equipment, materials or supplies unless procurement of used equipment, materials or supplies is approved in advance in writing by FAO.

ARTICLE 6 – DELAYS AND DEFAULTS

- 6.1 If there should be any delay in the performance of this Contract or any part thereof, the Contractor shall notify FAO in writing giving the cause, such notification to reach FAO no later than ten (10) days after the date on which the delay is known by the Contractor.
- 6.2 If the Contractor is unable to obtain any materials or services necessary for the performance of the Contract from its normal sources of supply, it shall remain liable for any delays when equivalent materials or services can be obtained from other sources in good time.
- 6.3 In any event, if the Contractor fails to make delivery of the materials or to complete items or services required within the time specified in the Contract, or within any extension that may be granted, FAO may, without prejudice to any further rights it may have under this Contract and in particular under Article 17:
 - 6.3.1 suspend or cancel the right of the Contractor to proceed further with any items or services - or part thereof - in which there has been a delay;
 - 6.3.2 obtain elsewhere upon such terms and conditions as may be deemed appropriate, replacement items or services similar to those which the Contractor failed to provide;
 - 6.3.3 make a corresponding adjustment to the consideration payable to the Contractor; provided, however, that the Contractor shall continue performance of this Contract to the extent not suspended or cancelled under the provisions of this paragraph.
- 6.4 The Contractor shall be liable for any excess costs or damages caused to FAO by a failure or delay on the part of the Contractor in the performance of its obligations under this Contract, except where such failure or delay is due to:
 - 6.4.1 causes which are attributable to FAO;
 - 6.4.2 Force Majeure, as defined in Article 16 below.

- 6.5 If, in the event of a default by the Contractor or a delay attributable to it, FAO is of the opinion that the determination of actual excess costs or damages, or any part thereof, incurred by FAO is not practicable, FAO may require the Contractor to pay, in lieu of or in addition to actual damages, as the case may be, the amount specified in, or to be calculated in accordance with, the relevant provision of this Contract, as fixed, agreed and liquidated damages for the duration of the delay or default.
- 6.6 FAO shall determine the effects of any delay or default particularly in regard to an adjustment of the consideration due to the Contractor and to excess costs or damages caused to FAO and its findings shall be binding, provided always that the Contractor shall have the right to avail itself of the provisions of Article 20.
- 6.7 FAO shall not be liable to pay interest on the amount(s) not paid to the Contractor within the payment schedule foreseen under the Contract, irrespective of the cause of such delay.

ARTICLE 7 – TITLE

The Contractor warrants and represents that the goods delivered under the Contract are unencumbered by any third party's title or other property rights, including, but not limited to, any liens or security interests. Unless otherwise expressly provided in the Contract, title in and to the goods shall pass from the Contractor to FAO upon delivery of the goods and their acceptance by FAO in accordance with the requirements of the Contract.

ARTICLE 8 – EXPORT LICENSING

The Contractor shall be responsible for obtaining any export license required with respect to the goods, products, or technologies, including software, sold, delivered, licensed or otherwise provided to FAO under the Contract. The Contractor shall procure any such export license in an expeditious manner. Subject to and without any waiver of the privileges and immunities of FAO, FAO shall lend the Contractor all reasonable assistance required for obtaining any such export license. Should any governmental entity refuse, delay or hinder the Contractor's ability to obtain any such export license, the Contractor shall promptly consult with FAO to enable FAO to take appropriate measures to resolve the matter.

ARTICLE 9 – INDEMNIFICATION

- 9.1 The Contractor shall indemnify, defend, and hold and save harmless, FAO, and its officials, agents and employees, and any of its member nations or member organizations ("Members") or other ultimate beneficiaries, from and against all suits, proceedings, claims, demands, losses and liability of any kind or nature brought by any third party against FAO, including, but not limited to, all litigation costs and expenses, attorney's fees, settlement payments and damages, based on, arising from, or relating to:
- 9.1.1 allegations or claims that the possession of or use by FAO of any patented device, any copyrighted material, or any other goods, property or services provided or licensed to FAO under the terms of the Contract, in whole or in part, separately or in a combination contemplated by the Contractor's published specifications therefor, or otherwise specifically approved by the Contractor, constitutes an infringement of any patent, copyright, trademark, or other intellectual property right of any third party; *or*,

- 9.1.2 any acts or omissions of the Contractor, or of any subcontractor or anyone directly or indirectly employed by them in the performance of the Contract, which give rise to legal liability to anyone not a party to the Contract, including, without limitation, claims and liability in the nature of a claim for workers' compensation.
- 9.2 FAO may, where in its opinion, the successful implementation of the Contract or the reputation of FAO, might be prejudiced, withhold or deduct from the payments due to the Contractor under this Contract such amounts as may be required to honour third party claims brought against the Contractor if these claims are connected with the supplies or services to be provided under this Contract and if, after consultation with the Contractor, FAO is satisfied that such claims have been or may become the subject of a judgement, injunction or similar court order.
- 9.3 In addition to the indemnity obligations set forth in this Article 9, the Contractor shall be obligated, at its sole expense, to defend FAO and its officials, agents and employees, pursuant to this Article 9, regardless of whether the suits, proceedings, claims and demands in question actually give rise to or otherwise result in any loss or liability.
- 9.4 FAO shall advise the Contractor about any such suits, proceedings, claims, demands, losses or liability within a reasonable period of time after having received actual notice thereof. The Contractor shall have sole control of the defense of any such suit, proceeding, claim or demand and of all negotiations in connection with the settlement or compromise thereof, except with respect to the assertion or defense of the privileges and immunities of FAO or any matter relating thereto, for which only FAO itself is authorized to assert and maintain. FAO shall have the right, at its own expense, to be represented in any such suit, proceeding, claim or demand by independent counsel of its own choosing.
- 9.5 In the event the use by FAO of any goods, property or services provided or licensed to FAO by the Contractor, in whole or in part, in any suit or proceeding, is for any reason enjoined, temporarily or permanently, or is found to infringe any patent, copyright, trademark or other intellectual property right, or in the event of a settlement, is enjoined, limited or otherwise interfered with, then the Contractor, at its sole cost and expense, shall, promptly, either:
- 9.5.1 procure for FAO the unrestricted right to continue using such goods or services provided to FAO;
- 9.5.2 replace or modify the goods or services provided to FAO, or part thereof, with the equivalent or better goods or services, or part thereof, that is non-infringing; *or*,
- 9.5.3 refund to FAO the full price paid by FAO for the right to have or use such goods, property or services, or part thereof.
- 9.6 For the purposes of this Article, the term "third party" shall be deemed to include, *inter alia*, officials, employees and other representatives of the United Nations, FAO, and other Specialized Agencies participating in the implementation of this Contract as well as any person or entity employed by the Contractor or otherwise performing services for, or supplying goods to, the Contractor.

ARTICLE 10 – INSURANCE AND LIABILITY

- 10.1 The Contractor shall pay FAO promptly for all loss, destruction, or damage to the property of FAO caused by the Contractor’s personnel or by any of its subcontractors or anyone else directly or indirectly employed by the Contractor or any of its subcontractors in the performance of the Contract.
- 10.2 Unless otherwise provided in the Contract, prior to commencement of performance of any other obligations under the Contract, and subject to any limits set forth in the Contract, the Contractor shall take out and shall maintain for the entire term of the Contract, for any extension thereof, and for a period following any termination of the Contract reasonably adequate to deal with losses:
- 10.2.1 insurance against all risks in respect of its property and any equipment used for the performance of the Contract;
- 10.2.2 workers’ compensation insurance, or its equivalent, or employer’s liability insurance, or its equivalent, with respect to the Contractor’s personnel sufficient to cover all claims for injury, death and disability, or any other benefits required to be paid by law, in connection with the performance of the Contract;
- 10.2.3 liability insurance in an adequate amount to cover all claims, including, but not limited to, claims for death and bodily injury, products and completed operations liability, loss of or damage to property, and personal and advertising injury, arising from or in connection with the Contractor’s performance under the Contract, including, but not limited to, liability arising out of or in connection with the acts or omissions of the Contractor, its personnel, agents, or invitees, or the use, during the performance of the Contract, of any vehicles, boats, airplanes or other transportation vehicles and equipment, whether or not owned by the Contractor; *and*,
- 10.2.4 such other insurance as may be agreed upon in writing between FAO and the Contractor.
- 10.3 The Contractor’s liability policies shall also cover subcontractors and all defense costs and shall contain a standard “cross liability” clause.
- 10.4 The Contractor acknowledges and agrees that FAO accepts no responsibility for providing life, health, accident, travel or any other insurance coverage which may be necessary or desirable in respect of any personnel performing services for the Contractor in connection with the Contract.
- 10.5 Except for the workers’ compensation insurance or any self-insurance program maintained by the Contractor and approved by FAO, in its sole discretion, for purposes of fulfilling the Contractor’s requirements for providing insurance under the Contract, the insurance policies required under the Contract shall:
- 10.5.1 name FAO as an additional insured under the liability policies, including, if required, as a separate endorsement under the policy;

- 10.5.2 include a waiver of subrogation of the Contractor's insurance carrier's rights against FAO;
- 10.5.3 provide that FAO shall receive written notice from the Contractor's insurance carrier not less than thirty (30) days prior to any cancellation or material change of coverage; *and*,
- 10.5.4 include a provision for response on a primary and non-contributing basis with respect to any other insurance that may be available to FAO.
- 10.6 The Contractor shall be responsible to fund all amounts within any policy deductible or retention.
- 10.7 Except for any self-insurance program maintained by the Contractor and approved by FAO for purposes of fulfilling the Contractor's requirements for maintaining insurance under the Contract, the Contractor shall maintain the insurance taken out under the Contract with reputable insurers that are in good financial standing and that are acceptable to FAO. Prior to the commencement of any obligations under the Contract, the Contractor shall provide FAO with evidence, in the form of certificate of insurance or such other form as FAO may reasonably require, that demonstrates that the Contractor has taken out insurance in accordance with the requirements of the Contract. FAO reserves the right, upon written notice to the Contractor, to obtain copies of any insurance policies or insurance program descriptions required to be maintained by the Contractor under the Contract. Notwithstanding the provisions of Article 10.5.3, above, the Contractor shall promptly notify FAO concerning any cancellation or material change of insurance coverage required under the Contract.
- 10.8 The Contractor acknowledges and agrees that neither the requirement for taking out and maintaining insurance as set forth in the Contract nor the amount of any such insurance, including, but not limited to, any deductible or retention relating thereto, shall in any way be construed as limiting the Contractor's liability arising under or relating to the Contract.

ARTICLE 11 – ENCUMBRANCES AND LIENS

The Contractor shall not cause or permit any lien, attachment or other encumbrance by any person to be placed on file or to remain on file in any public office or on file with FAO against any monies due to the Contractor or that may become due for any work done or against any goods supplied or materials furnished under the Contract, or by reason of any other claim or demand against the Contractor or FAO.

ARTICLE 12 – EQUIPMENT FURNISHED BY FAO TO THE CONTRACTOR

Title to any equipment and supplies that may be furnished by FAO to the Contractor for the performance of any obligations under the Contract shall rest with FAO, and any such equipment shall be returned to FAO at the conclusion of the Contract or when no longer needed by the Contractor. Such equipment, when returned to FAO, shall be in the same condition as when delivered to the Contractor, subject to normal wear and tear, and the Contractor shall be liable to compensate FAO for the actual costs of any loss of, damage to, or degradation of the equipment that is beyond normal wear and tear.

ARTICLE 13 – COPYRIGHT, PATENTS AND OTHER PROPRIETARY RIGHTS

- 13.1 Except as is otherwise expressly provided in writing in the Contract, FAO shall be entitled to all intellectual property and other proprietary rights including, but not limited to, patents, copyrights, and trademarks, with regard to products, processes, inventions, ideas, know-how, or documents and other materials which the Contractor has developed for FAO under the Contract and which bear a direct relation to or are produced or prepared or collected in consequence of, or during the course of, the performance of the Contract. The Contractor acknowledges and agrees that such products, documents and other materials constitute works made for hire for FAO.
- 13.2 To the extent that any such intellectual property or other proprietary rights consist of any intellectual property or other proprietary rights of the Contractor:
- 13.2.1 that pre-existed the performance by the Contractor of its obligations under the Contract,
or
- 13.2.2 that the Contractor may develop or acquire, or may have developed or acquired, independently of the performance of its obligations under the Contract,
- FAO does not and shall not claim any ownership interest thereto, and the Contractor grants to FAO a perpetual license to use such intellectual property or other proprietary right solely for the purposes of and in accordance with the requirements of the Contract.
- 13.3 At the request of FAO, the Contractor shall take all necessary steps, execute all necessary documents and generally assist in securing such proprietary rights and transferring or licensing them to FAO in compliance with the requirements of the applicable law and of the Contract.
- 13.4 Subject to the foregoing provisions, all maps, drawings, photographs, mosaics, plans, reports, estimates, recommendations, documents, and all other data compiled by or received by the Contractor under the Contract shall be the property of FAO, shall be made available for use or inspection by FAO at reasonable times and in reasonable places, shall be treated as confidential, and shall be delivered only to FAO authorized officials on completion of work under the Contract.

ARTICLE 14 – PUBLICITY, AND USE OF THE NAME, EMBLEM OR OFFICIAL SEAL OF FAO

The Contractor shall not advertise or otherwise make public for purposes of commercial advantage or goodwill that it has a contractual relationship with FAO, nor shall the Contractor, in any manner whatsoever use the name, emblem or official seal of FAO, or any abbreviation of the name of FAO in connection with its business or otherwise without the written permission FAO.

ARTICLE 15 – CONFIDENTIAL NATURE OF DOCUMENTS AND INFORMATION

All designs, drawings, specifications, reports, data, computer programs, and other technical or proprietary information compiled or developed by the Contractor or furnished or disclosed to the Contractor by FAO under this Contract (“Information”) shall be the property of FAO and shall be treated as confidential and safeguarded by the Contractor, its employees, agents and

representatives. Unless otherwise authorized in writing by FAO, the Contractor shall use such Information only in the performance of this Contract. Upon completion or termination of this Contract, the Contractor shall return such Information to FAO.

- 15.1 The Contractor may disclose Information to the extent required by law, provided that, subject to and without any waiver of the privileges and immunities of FAO, the Contractor will give FAO sufficient prior notice of a request for the disclosure of Information in order to allow FAO to have a reasonable opportunity to take protective measures or such other action as may be appropriate before any such disclosure is made.
- 15.2 FAO reserves the right to publish or otherwise make public the Contractor's name and address, any information regarding the Contract including descriptions of the goods or services provided under the Contract and the Contract value. FAO may also disclose Information to the extent as required pursuant to the FAO Constitution or consistent with or pursuant to resolutions or regulations of the Conference of FAO or rules promulgated thereunder.
- 15.3 A Party shall not be precluded from disclosing Information that is obtained by that Party from a third party without restriction, is disclosed by the other Party to a third party without any obligation of confidentiality, is previously known by the Party who has received the Information, or at any time is developed by the Party completely independently of any disclosures hereunder.
- 15.4 These obligations and restrictions of confidentiality shall be effective during the term of the Contract, including any extension thereof, and, unless otherwise provided in the Contract, shall remain effective following any termination of the Contract.

ARTICLE 16 – FORCE MAJEURE; OTHER CHANGES IN CONDITIONS

- 16.1 In the event of and as soon as possible after the occurrence of any cause constituting *force majeure*, the affected Party shall give notice and full particulars in writing to the other Party, of such occurrence or cause if the affected Party is thereby rendered unable, wholly or in part, to perform its obligations and meet its responsibilities under the Contract. The affected Party shall also notify the other Party of any other changes in condition or the occurrence of any event which interferes or threatens to interfere with its performance of the Contract. Not more than fifteen (15) days following the provision of such notice of *force majeure* or other changes in condition or occurrence, the affected Party shall also submit a statement to the other Party of estimated expenditures that will likely be incurred for the duration of the change in condition or the event of force majeure. On receipt of the notice or notices required hereunder, the Party not affected by the occurrence of a cause constituting *force majeure* shall take such action as it reasonably considers to be appropriate or necessary in the circumstances, including the granting to the affected Party of a reasonable extension of time in which to perform any obligations under the Contract or termination under Article 17. The Contractor shall be liable for any damages resulting from lack of notice of the *force majeure* event.
- 16.2 If the Contractor is rendered unable, wholly or in part, by reason of *force majeure* to perform its obligations and meet its responsibilities under the Contract, FAO shall have the right to suspend or terminate the Contract on the same terms and conditions as are

provided for in Article 17, except that the period of notice shall be seven (7) days instead of thirty (30) days. In any case, FAO shall be entitled to consider the Contractor permanently unable to perform its obligations under the Contract in case the Contractor is unable to perform its obligations, wholly or in part, by reason of *force majeure* for any period in excess of ninety (90) days.

- 16.3 *Force majeure* as used herein means any unforeseeable and irresistible act of nature, any act of war (whether declared or not), invasion, revolution, insurrection, terrorism, or any other acts of a similar nature or force, *provided that* such acts arise from causes beyond the control and without the fault or negligence of the Contractor (or on the part of its personnel, agents, other representatives, or authorized subcontractors), and proves insurmountable in spite of all due diligence. Defects in equipment, material or supplies, or delays in their availability (unless due to *force majeure*), labor disputes, strikes or financial difficulties shall not constitute an event of *force majeure*. Notwithstanding anything to the contrary herein in this Contract, the Contractor recognizes that the provision of goods and services may from time to time be performed under harsh or hostile conditions, including civil unrest. Consequently, delays or failure to perform caused by events arising out of, or in connection with, such difficult conditions shall not, in and of itself, constitute *force majeure* under this Contract. The Contractor therefore acknowledges and agrees that, with respect to any obligations under the Contract that the Contractor must perform in areas in which FAO is engaged in, preparing to engage in, or disengaging from any humanitarian or similar operations, any delays or failure to perform such obligations arising from or relating to harsh conditions within such areas, or to any incidents of civil unrest occurring in such areas, shall not, in and of itself, constitute *force majeure* under the Contract.

ARTICLE 17 – TERMINATION

- 17.1 Either Party may terminate the Contract for cause, in whole or in part, upon thirty (30) days' notice, in writing, to the other Party. The initiation of conciliation or arbitral proceedings in accordance with Article 20, shall not be deemed to be a "cause" for or otherwise to be in itself a termination of the Contract.
- 17.2 For the purposes of this Article, a "cause" include, without being limited to:
- 17.2.1 unforeseen causes beyond the control of FAO;
 - 17.2.2 repeated and/or serious noncompliance with laws and regulations related to social contribution, safety measures, pollution, prevention of injuries in the work place;
 - 17.2.3 serious contractual breaches compromising the normal performance of the services under this Contract;
 - 17.2.4 transfer to third parties, either directly or indirectly through an intermediary, of all or part of the rights and obligations pertaining to the services under this Contract, except for subcontracts duly authorized by FAO;
 - 17.2.5 gross negligence;

- 17.2.6 unjustified delay in the execution of the services, so as to substantially prejudice the achievement of FAO's objectives under this Contract;
- 17.2.7 default in the submission of the performance bond as required, if applicable.
- 17.3 FAO may terminate the Contract at any time by providing written notice to the Contractor in any case in which the mandate of FAO applicable to the performance of the Contract or the funding of FAO applicable to the Contract is curtailed or terminated, whether in whole or in part. In addition, unless otherwise provided by the Contract, upon sixty (60) days' advance written notice to the Contractor, FAO may terminate the Contract without having to provide any justification therefor.
- 17.4 In the event of any termination of the Contract, upon receipt of notice of termination that has been issued by FAO, the Contractor shall, except as may be directed by FAO in the notice of termination or otherwise in writing:
- 17.4.1 take immediate steps to bring the performance of any obligations under the Contract to a close in a prompt and orderly manner, and in doing so, reduce expenses to a minimum;
- 17.4.2 refrain from undertaking any further or additional commitments under the Contract as of and following the date of receipt of such notice;
- 17.4.3 place no further subcontracts or orders for materials, services, or facilities, except as FAO and the Contractor agree in writing are necessary to complete any portion of the Contract that is not terminated;
- 17.4.4 terminate all subcontracts or orders to the extent they relate to the portion of the Contract terminated;
- 17.4.5 transfer title and deliver to FAO the fabricated or unfabricated parts, work in process, completed work, supplies, and other material produced or acquired for the portion of the Contract terminated;
- 17.4.6 deliver all completed or partially completed plans, drawings, information, and other property that, if the Contract had been completed, would be required to be furnished to FAO thereunder;
- 17.4.7 complete performance of the work not terminated; *and*,
- 17.4.8 take any other action that may be necessary, or that FAO may direct in writing, for the minimization of losses and for the protection and preservation of any property, whether tangible or intangible, related to the Contract that is in the possession of the Contractor and in which FAO has or may be reasonably expected to acquire an interest.
- 17.5 In the event of any termination of the Contract, FAO shall be entitled to obtain reasonable written accountings from the Contractor concerning all obligations performed or pending in accordance with the Contract. In addition, FAO shall not be liable to pay the Contractor except for those goods delivered and services provided to FAO in accordance

with the requirements of the Contract, but only if such goods or services were ordered, requested or otherwise provided prior to the Contractor's receipt of notice of termination from FAO or prior to the Contractor's tendering of notice of termination to FAO.

- 17.6 The Contractor shall immediately report any change in its legal status or control to FAO. FAO may, without prejudice to any other right or remedy available to it, terminate the Contract forthwith in the event that:
- 17.6.1 the Contractor is adjudged bankrupt, or is liquidated, or becomes insolvent, or applies for a moratorium or stay on any payment or repayment obligations, or applies to be declared insolvent;
 - 17.6.2 the Contractor is granted a moratorium or a stay, or is declared insolvent;
 - 17.6.3 the Contractor makes an assignment for the benefit of one or more of its creditors;
 - 17.6.4 a Receiver is appointed on account of the insolvency of the Contractor;
 - 17.6.5 the Contractor offers a settlement in lieu of bankruptcy or receivership; *or*,
 - 17.6.6 FAO reasonably determines that the Contractor has become subject to a materially adverse change in its financial condition that threatens to substantially affect the ability of the Contractor to perform any of its obligations under the Contract.
- 17.7 Except as prohibited by law, the Contractor shall be bound to compensate FAO for all damages and costs, including, but not limited to, all costs incurred by FAO in any legal or non-legal proceedings, as a result of any of the events specified in Article 17.6, above, and resulting from or relating to a termination of the Contract, even if the Contractor is adjudged bankrupt, or is granted a moratorium or stay or is declared insolvent. The Contractor shall immediately inform FAO of the occurrence of any of the events specified in Article 17.6, above, and shall provide FAO with any information pertinent thereto.
- 17.8 The provisions of this Article 17 are without prejudice to any other rights or remedies of FAO under the Contract or otherwise.

ARTICLE 18 – NON-WAIVER OF RIGHTS

The failure by either Party to exercise any rights available to it, whether under the Contract or otherwise, shall not be deemed for any purposes to constitute a waiver by the other Party of any such right or any remedy associated therewith, and shall not relieve the Parties of any of their obligations under the Contract.

ARTICLE 19 – NON-EXCLUSIVITY

Unless otherwise specified in the Contract, FAO shall have no obligation to purchase any minimum quantities of goods or services from the Contractor, and FAO shall have no limitation on its right to obtain goods or services of the same kind, quality and quantity described in the Contract, from any other source at any time.

ARTICLE 20 – SETTLEMENT OF DISPUTES, CONCILIATION AND ARBITRATION

- 20.1 Any dispute between the Parties concerning the interpretation and the execution of the Contract will be settled by negotiation or, if not settled by negotiation between the Parties or by another agreed mode of settlement shall, at the request of either Party, be submitted to one conciliator. Should the Parties fail to reach agreement on the name of a sole conciliator, each Party shall appoint one conciliator. The conciliation shall be carried out in accordance with the Conciliation Rules of the United Nations Commission on International Trade Law (“UNCITRAL”), as at present in force.
- 20.2 Any dispute between the Parties concerning the interpretation and the execution of the Contract that is unresolved after conciliation shall, at the request of either Party be settled by arbitration in accordance with the UNCITRAL Arbitration Rules, as at present in force. Arbitrations under this provision shall be administered by the International Bureau of the Permanent Court of Arbitration.
- 20.3 The conciliation or the arbitration proceedings shall be conducted in any of the six (6) official languages of FAO (Arabic, Chinese, English, French, Spanish and Russian) in which the Contract is drafted. In cases in which the language of the Contract is not an official language of FAO, the conciliation or the arbitration proceedings shall be conducted in English.
- 20.4 The Parties may request conciliation during the execution of the Contract or within a period not to exceed twelve (12) months after the expiry or the termination of the Contract. The Parties may request arbitration not later than ninety (90) days after the termination of the conciliation proceedings.
- 20.5 Decisions of the arbitral tribunal shall be final and binding to the Parties. The arbitral tribunal shall have no authority to award punitive damages or, unless otherwise expressly provided in this Contract, to award interest in which case such interest shall not be in excess of the London Inter-Bank Offered Rate (“LIBOR”) then prevailing, and any such interest shall be simple interest only.

ARTICLE 21 – PRIVILEGES AND IMMUNITIES AND APPLICABLE LAW

- 21.1 Nothing contained in or relating to this Contract shall be deemed a waiver, express or implied, of the privileges and immunities of FAO, nor as conferring any privileges or immunities of FAO on the Contractor or its employees, nor as acceptance by FAO of the jurisdiction of the courts of any country over disputes arising out of this Contract.
- 21.2 Notwithstanding any specific provision herein, this Contract and any dispute arising therefrom shall be governed by general principles of law to the exclusion of any single national system of law. General principles of law shall be deemed to include the UNIDROIT Principles of International Commercial Contracts 2016.

ARTICLE 22 – TAX EXEMPTION

- 22.1 Article III Section 9, of the Convention on the Privileges and Immunities of the Specialized Agencies provides, *inter alia*, that FAO is exempt from all direct taxes, including any value-added tax (VAT), except charges for public utility services, and is

exempt from customs restrictions, duties and charges of a similar nature in respect of articles imported or exported for its official use. In the event any governmental authority refuses to recognize the exemptions of FAO from such taxes, restrictions, duties, or charges, the Contractor shall immediately consult with FAO to determine a mutually acceptable procedure.

- 22.2 The Contractor shall explicitly specify this tax exemption on any invoice. The Contractor authorizes FAO to deduct from the Contractor's invoices any amount representing such taxes, duties or charges, unless the Contractor has consulted with FAO before the payment thereof and FAO has, in each instance, specifically authorized the Contractor to pay such taxes, duties, or charges under written protest. In that event, the Contractor shall provide FAO with written evidence that payment of such taxes, duties or charges has been made and appropriately authorized, and FAO shall reimburse the Contractor for any such taxes, duties, or charges so authorized by FAO and paid by the Contractor under written protest.

ARTICLE 23 – MODIFICATIONS

- 23.1 FAO may at any time by written instructions make changes within the general scope of this Contract and the Contractor shall be obliged to implement such changes in a timely manner. If any such change causes an increase or decrease in the quantities of goods and/or services or the time required for performance of this Contract, an equitable adjustment shall be made in the order price or delivery schedule, or both, and the Contract shall be amended, terminated or reissued accordingly.
- 23.2 Any claim by the Contractor for adjustment under this Article must be asserted within thirty (30) days from the date of receipt by the Contractor of the notification of change; provided, however, that FAO may, at its sole discretion, receive and act upon any such claim asserted at any time prior to final payment under this Contract. A dispute arising from failure to agree to any adjustments shall be subject to the provisions of Article 20 of this Contract. However, nothing in this Article shall relieve the Contractor from its obligation to proceed with the performance of the Contract as changed.
- 23.3 No modification of or change in the terms of this Contract shall be valid or enforceable against FAO unless it is in writing and signed by a duly authorized officer.
- 23.4 Any modification of this Contract other than the changes provided for under paragraphs 23.1 to 23.3 above shall be effected by an amendment to this Contract to be mutually agreed between the Parties hereto.

ARTICLE 24 – AUDITS AND INVESTIGATIONS

- 24.1 Each invoice paid by FAO shall be subject to a post-payment audit by auditors, whether internal or external, of FAO or by other authorized and qualified agents of FAO at any time during the term of the Contract and for a period of two (2) years following the expiration or prior termination of the Contract. FAO shall be entitled to a refund from the Contractor for any amounts shown by such audits to have been paid by FAO other than in accordance with the terms and conditions of the Contract.

- 24.2 The Contractor acknowledges and agrees that, from time to time, FAO may conduct investigations relating to any aspect of the Contract or the award thereof, the obligations performed under the Contract, and the operations of the Contractor generally relating to performance of the Contract. The right of FAO to conduct an investigation and the Contractor's obligation to comply with such an investigation shall not lapse upon expiration or prior termination of the Contract.
- 24.3 The Contractor shall provide its full and timely cooperation with any such inspections, post-payment audits or investigations. Such cooperation shall include, but shall not be limited to, the Contractor's obligation to make available its personnel and any relevant documentation for such purposes at reasonable times and on reasonable conditions and to grant to FAO access to the Contractor's premises at reasonable times and on reasonable conditions in connection with such access to the Contractor's personnel and relevant documentation. The Contractor shall require its agents, including, but not limited to, the Contractor's attorneys, accountants or other advisers, to reasonably cooperate with any inspections, post-payment audits or investigations carried out by FAO hereunder.

ARTICLE 25 – LIMITATION ON ACTIONS

- 25.1 Except with respect to any indemnification obligations in Article 9, above, or as are otherwise set forth in the Contract, any conciliation proceedings in accordance with Article 20 above, arising out of the Contract must be commenced within twelve (12) months after the cause of action has accrued.
- 25.2 The Parties further acknowledge and agree that, for these purposes, a cause of action shall accrue when the breach actually occurs, or, in the case of latent defects, when the injured Party knew or should have known all of the essential elements of the cause of action, or in the case of a breach of warranty, when tender of delivery is made, except that, if a warranty extends to future performance of the goods or any process or system and the discovery of the breach consequently must await the time when such goods or other process or system is ready to perform in accordance with the requirements of the Contract, the cause of action accrues when such time of future performance actually begins.

ARTICLE 26 – ESSENTIAL TERMS

The Contractor acknowledges and agrees that each of the provisions in Articles 27 to 35 hereof constitutes an essential term of the Contract and that any breach of any of these provisions shall entitle FAO to terminate the Contract or any other contract with FAO immediately upon notice to the Contractor, without any liability for termination charges or any other liability of any kind.

ARTICLE 27 – SOURCE OF INSTRUCTIONS

The Contractor shall neither seek nor accept instructions from any authority external to FAO in connection with the performance of its obligations under the Contract. Should any authority external to FAO seek to impose any instructions concerning or restrictions on the Contractor's performance under the Contract, the Contractor shall promptly notify FAO and provide all reasonable assistance required by FAO. The Contractor shall not take any action in respect of the performance of its obligations under the Contract that may adversely affect the interests of FAO,

and the Contractor shall perform its obligations under the Contract with the fullest regard to the interests of the FAO.

ARTICLE 28 – OFFICIALS NOT TO BENEFIT

The Contractor warrants that it has not and shall not offer to any representative, official, employee, or other agent of FAO any direct or indirect benefit arising from or related to the performance of the Contract or of any other contract with FAO or the award thereof or for any other purpose intended to gain an advantage for the Contractor.

ARTICLE 29 – OBSERVANCE OF THE LAW

The Contractor shall comply with all laws, ordinances, rules, and regulations bearing upon the performance of its obligations under the Contract. The Contractor shall promptly correct any violations thereof and shall keep FAO informed of any conflict or problem arising in relation to national authorities. In addition, the Contractor shall maintain compliance with all obligations relating to its registration as a qualified vendor of goods or services to FAO, as such obligations are set forth in FAO vendor registration procedures.

ARTICLE 30 – LABOR:

30.1 The Contractor shall:

30.1.1 respect the prohibition of forced or compulsory labour in all its forms;

30.1.2 respect the freely exercised right of workers, without distinction, to organize, to further and defend their interest as well as the protection of those workers who exercise their right to organize;

30.1.3 ensure equality of opportunity and treatment in respect of employment and occupation;
and

30.1.4 ensure fair and reasonable conditions of safety, health and welfare.

30.2 The Contractor represents and warrants that neither it, its parent entities (if any), nor any of the Contractor's subsidiary or affiliated entities (if any) is engaged in any practice inconsistent with the rights set forth in the Convention on the Rights of the Child, including Article 32 thereof, which *inter alia*, requires that a child shall be protected from performing any work that is likely to be hazardous or to interfere with the child's education, or to be harmful to the child's health or physical, mental, spiritual, moral or social development.

ARTICLE 31 – MINES

The Contractor represents and warrants that neither it, its parent entities (if any), nor any of the Contractor's subsidiaries or affiliated entities (if any) is engaged in the sale or manufacture of anti-personnel mines or components utilized in the manufacture of anti-personnel mines.

ARTICLE 32 – SEXUAL EXPLOITATION

The Contractor shall take all appropriate measures to prevent sexual exploitation or abuse of any direct beneficiary of the FAO projects or programmes receiving the goods or services provided under this Contract, or to any persons related to such beneficiaries, by its employees or any other persons engaged and controlled by the Contractor to perform any services under the Contract. For these purposes, sexual activity with any person less than eighteen years of age, regardless of any laws relating to consent, shall constitute the sexual exploitation and abuse of such person. In addition, the Contractor shall refrain from, and shall take all reasonable and appropriate measures to prohibit its employees or other persons engaged and controlled by it from exchanging any money, goods, services, or other things of value, for sexual favors or activities, or from engaging in any sexual activities that are exploitive or degrading to any direct beneficiary of the FAO projects or programmes receiving the goods or services provided under this Contract, or to any persons related to such beneficiaries.

ARTICLE 33 – TERRORISM

The Contractor agrees to undertake all reasonable efforts to ensure that none of the funds received from FAO under this Contract are used to provide support to individuals or entities:

- 33.1 associated with terrorism, as included in the list maintained by the Security Council Committee established pursuant to Resolutions 1267 (1999) and 1989 (2011); *or*
- 33.2 that are the subject of sanctions or other enforcement measures promulgated by the United Nations Security Council.

ARTICLE 34 – SANCTIONABLE ACTIONS

- 34.1 The Contractor shall observe the highest standard of ethics and will certify that it has not and will not engage in Sanctionable Actions during the selection process and throughout the negotiation and execution of this Contract. The Contractor expressly agrees to abide by the UN Supplier Code of Conduct.
- 34.2 FAO, without prejudice to any other rights or remedies it may possess, may terminate the Contract forthwith if the Contractor, in the judgment of FAO, has engaged in Sanctionable Actions during the selection process or in negotiating or executing this Contract, and as appropriate, impose sanctions, as per the prevailing Sanctions Procedures (http://www.fao.org/fileadmin/user_upload/procurement/docs/FAO_Vendors_Sanctions_Policy_-_Procedures.pdf), and request full or partial restitution of sums previously paid by FAO under this Contract. FAO may also share information on the sanctioned Contractor with other Intergovernmental or UN Organizations.
- 34.3 For the purpose of this Article, Sanctionable Actions are defined as follows: “Corrupt practice” means the offering, giving, receiving or soliciting, directly or indirectly, of anything of value whether tangible or intangible to improperly influence the actions of another party; “Fraudulent practice” means any act or omission, including misrepresentation that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial and/or other benefit and/or to avoid an obligation; “Collusive

practice” is an arrangement between two or more parties designed to achieve an improper purpose, including influencing improperly the actions of another party; “Coercive practice” is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; “Unethical practice” is any act or omission contrary to the conflict of interest, gifts and hospitality or post-employment FAO policy (<http://www.fao.org/unfao/procurement/codedeconduitethique/en/>), as well as any provisions or other published requirements of doing business with the Organization, including the UN Supplier Code of Conduct; and “Obstructive practice” is an act or omission by a Third Party that may prevent or hinder the work of Investigation Unit of the FAO Office of the Inspector General.

ARTICLE 35 – DISCLOSURE OF SANCTIONS OR TEMPORARY SUSPENSION

The Contractor should not be suspended, debarred, or otherwise identified as ineligible by any Intergovernmental or UN Organization, including any organization within the World Bank Group or any multi-lateral development bank, or by the institutions and bodies of economic integration organizations (e.g., the European Union). The Contractor is therefore required to disclose to FAO whether itself, or any of its affiliates or agents, is subject to any sanction or temporary suspension imposed by any such organization or National Authority at any time during the three years prior to this Contract and at any time throughout the execution of this Contract. The Contractor recognizes that a breach of this provision will entitle FAO to terminate its Contract with the Contractor, and that material misrepresentations on its status constitute a fraudulent practice.

ARTICLE 36 – COLLABORATION WITH CERTAIN COUNTRIES

FAO reserves the right to communicate in writing to the Contractor, countries from which no goods or services shall be purchased directly or indirectly for purposes of delivery, distribution, installation, or use under this Contract. These communications shall be deemed a condition of this Contract and be incorporated by the Contractor in any contracts with authorized subcontractors.

ARTICLE 37 – NOTICES AND COMMUNICATIONS

37.1 All notices and other binding communications affecting the rights or obligations of either party to this Contract shall be in English, or the language of the Contract. They shall be deemed to be validly delivered if given in writing and delivered in person, by registered mail, by fax or by email with return receipt to the other Party at the address of either Party as indicated below:

37.1.1 To FAO:

FAO Representative in Jordan

37.1.2 To the Contractor:

.....
.....

At the Contractor's address shown in the Preamble to this Contract.

37.2 Notice shall be considered as effected on the date of delivery to the addressee.

Signed on behalf of:

THE FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS:

Name:

Title: FAO Representative in Jordan

Date:

Signed on behalf of:

THE CONTRACTOR

Name:

Title:

Date:

ANNEXES I-XIII

Contract No.

Annex I

ANNEX I. STATEMENT OF WORKS AND TECHNICAL SPECIFICATIONS

(As per Appendix A of Letter of Invitation)

ANNEX II. BILL OF QUANTITIES

(As per Appendix B of Letter of Invitation to be filled in by Bidder)

Contract No

Annex III

ANNEX III. DRAWINGS

(As per Appendix A of Letter on Invitation)

ANNEX IV. SCHEDULE OF CONTRACT PERFORMANCE

The Contractor should complete the works WITHIN TWELVE (12) MONTHS from the date of Contract signature.

Schedule of the preliminary activities

1. Signature of the Contract by FAO.
2. Signature of the Contract by the Contractor (date of entry into force of the Contract).
3. Reception of the detailed work programme by the Resident Engineer within two (2) weeks of the date of entry into force of the Contract, according to Article 2.4 of Section I.
4. Reception of the Performance Bond within two (2) weeks of the date of entry into force of the Contract, according to Article 7.1 of Section I for further approval by FAO.
5. In case of advance payment, reception of the Bank Guarantee by FAO within two (2) weeks of the date of entry into force of the Contract, according to Article 7.2 of Section I for further approval by FAO.

Contract No.

Annex IV

Schedule of construction works

(Detailed work plan and schedule as submitted by Bidder)

Contract No.

Annex V

ANNEX V. SERVICES AND FACILITIES PROVIDED BY FAO

FAO has undertaken to provide the following:

1. The Services of a Resident Engineer to supervise the supply, installation and commissioning of Works.

ANNEX VI. SCHEDULE AND METHOD OF PAYMENT

1. FAO shall effect the payments subject to the provisions of Articles 5 and 6 of Section I and upon receipt, at the FAO Office mentioned in paragraph 5 below, of one (1) copy of the Contract duly signed by the Contractor as well as a Performance Bond adhering to the terms of **Annex VIII: “Draft Performance Bond”**.
2. Any advance payment requested by the Contractor is subject to the Contractor submitting a Bank Guarantee issued by a Bank acceptable to FAO, for a maximum amount of twenty percent (20%) of the total amount of the Contract. Such Bank Guarantee shall adhere to the terms of **Annex VII: “Draft Bank Guarantee for advance payment”**, duly countersigned by the Contractor and sent within two (2) weeks of the signature of the Contract by both Parties to the FAO Office mentioned in paragraph 5 below.
3. FAO shall effect payments to the Contractor upon receipt of invoices stating the goods and services provided, accepted and duly certified by the Resident Engineer and FAO’s Contract Manager mentioned in Article 21.1 of Section I and/or FAO Representative or Authorized FAO Officer, at the office mentioned in paragraph 5 below, up to a total amount not exceeding:

.....(*Specify the total amount*)

- 3.1 Upon receipt at the office mentioned in **paragraph 5** below of an invoice in duplicate (2) duly signed by the Contractor, and the documents mentioned in **Article 7 of Section I**, and upon the acceptance of such documents by the Organization, an advance payment not exceeding **20%** (twenty percent) of the amount specified in **Article 4, paragraph 4.1 of Section I**.
- 3.2 Upon receipt at the office mentioned in paragraph 5 below of invoices in duplicate, stating the goods and services provided and duly certified by the Resident Engineer or his/her authorized representative, it being understood that **10%** (ten percent) of each invoice shall be withheld.
- 3.3 Upon receipt, at the office mentioned in paragraph 5 below, of the Certificate of Completion of Works, duly certified by the Resident Engineer and FAO Representative or Authorized FAO Officer, **50%** (fifty percent) of the amount withheld, as per paragraph 3.2, will become payable upon receipt of an invoice in duplicate.
- 3.4 Upon receipt, at the office mentioned in paragraph 5 below, of the Certificate of Defects Liability Period, duly certified by the Resident Engineer and FAO Representative or Authorized FAO Officer, a final payment equal to the amount not yet paid (remaining 50% of the amount withheld) according to paragraph 3.2 will be made upon receipt of an invoice in duplicate.
4. The Contractor shall indicate clear payment/banking instructions on all invoices which shall bear a consecutive number and indicate:
 - 4.1. Contract No. xxxxxxxxxxxx
 - 4.2. Any supporting documents attached;
 - 4.3. The certification by the Resident Engineer mentioned in Article 10 of Section I, if

required by the provisions of the present Annex.

5. The Contractor shall submit the invoices mentioned above and duly certified by the Resident Engineer, for approval to the FAO Representative to the following address:

.....
FAO Representative in Jordan
Food and Agriculture Organization of the United Nations

6. FAO will make payment to a bank account indicated by the Contractor in its invoice, providing that the bank account is in the name of the Contractor and located in the country of residence of the Contractor. Any request for payment to a bank account other than that of the Contractor or to a bank other than one located in the Contractor's country of residence should be specified in a written notice with the reasons for such deviation from standard payment terms, and authorized by FAO's Contract Manager mentioned in Article 21.1 of Section I.

ANNEX VII. DRAFT BANK GUARANTEE FOR ADVANCE PAYMENT

(To be transcribed on the official stationery of the Bank)

BANK GUARANTEE ISSUED BY*(Name of bank)*

WHEREAS

The Food and Agriculture Organization of the United Nations, hereinafter referred to as the “Organization” or “FAO”, has awarded to the Contractor, hereinafter referred to as the “Contractor”, a Contract bearing number, hereinafter referred to as the “Contract”, and

The Contractor has undertaken to perform the work and services set out in the Contract in accordance with the specifications and within the time limits set out therein for a total amount of and

The Contract has been signed by FAO on and by the Contractor on,

NOW THEREFORE

The*(Name of bank)*, hereinafter referred to as the “Bank”, having taken cognisance of the Contract, undertakes to provide to FAO, the guarantees set forth below:

Article 1

The Bank agrees that should the Contractor fail to fulfil any of the terms and conditions of the Contract, unless relieved therefrom by arbitral decision rendered in accordance with Article 20 of Section II of the Contract, then the Bank will pay to FAO upon its first written demand the amount of (*..... in letters*) being twenty percent (20%) of the total Contract amount and the amount paid by FAO as advance payment according to **Annex VI**, paragraph 2 of the Contract.

Article 2

The Bank agrees that it shall not be released from its obligations under this Guarantee in virtue of any arrangements made between FAO and the Contractor, or by any changes in the Contractor’s obligations under the Contract.

Article 3

FAO shall inform the Bank without delay as soon as it has determined that the Contractor has failed to perform any or all of its contractual obligations.

Article 4

This Guarantee shall come into effect upon its signature by the Bank and shall remain in force until FAO has received the counter value in kind of the amount specified in Article 1 above.

The Bank agrees to extend the validity of this Guarantee at the request of FAO in the event the condition mentioned in the preceding sentence has not been fulfilled by the date mentioned above and FAO has granted the Contractor an extension.

Article 5

When the validity of this Guarantee has definitely expired in accordance with the provisions of Article 4 above it shall cease to have any value whatsoever and shall be returned to the Bank by FAO.

Article 6

Any dispute between the Bank and the Organization arising out of the interpretation or execution of this Bank Guarantee shall be settled by negotiations and mutual agreement. If the Bank and the Organization are unable to reach an agreement on any question in the dispute or on a mode of settlement other than arbitration, either party shall have the right to request arbitration in accordance with the Arbitration Rules of the United Nations Commission on the International Trade Law (UNCITRAL) as at present in force. The Bank and the Organization agree to be bound by any arbitration award rendered in accordance with this article as the final adjudication of any such dispute. The arbitral tribunal shall have no authority to award punitive damages.

This guarantee shall be exclusively governed by internationally accepted general principles of law, to the exclusion of any single national legal system, and is subject to the Uniform Rules for Demand Guarantees (URDG) 2010 Revision, ICC Publication No. 758.

Article 7

Nothing in this Guarantee shall be construed as a waiver by FAO of its privileges and immunities or as its acceptance of the jurisdiction of the courts of any country.

Signed on behalf of:

..... *(Name of bank)*

(Signature)

(Name and Title)

(Date)

ANNEX VIII. DRAFT PERFORMANCE BOND

(To be transcribed on the official stationery of the Bank)

PERFORMANCE BOND ISSUED BY(Name of bank)

WHEREAS

The Food and Agriculture Organization of the United Nations, hereinafter referred to as the “Organization”, has awarded to the Contractor....., hereinafter referred to as the “Contractor”, a Contract bearing number , hereinafter referred to as the “Contract”,

and

The Contractor has undertaken to perform the work and services set out in the Contract in accordance with the specifications and within the time limits set out therein for a total amount of(... *in letters*)and,

The Contract has been signed by FAO on and by the Contractor on ,

NOW THEREFORE

The (*Name of Bank*), hereinafter referred to as the “Bank”, having taken cognisance of the Contract, undertakes to provide to FAO, in connection with the performance of such Contract, the guarantees set forth below:

Article 1

At the request of the Contractor, the Bank, hereby undertakes to pay to the Organization, or to its accredited representative on first written demand, the sum of **USD xxxxxx** (xxxxxx) or such lesser sum of money as the Organization may, by such written demand, require to be paid accompanied by a written statement that the Contractor, identified above, is in breach of its obligations under the Contract, without the need to specify the respect in which the Contractor is in breach. Such statement shall be conclusive evidence of the Organization's entitlement to payment in the amount demanded, up to the amount of this Performance Bond. **The amount of this guarantee is USD xxxxx** (xxxxxxx).

Article 2

The Bank agrees that it shall not be released from its obligations under this Performance Bond in virtue of any arrangements made between FAO and the Contractor or by any changes in the Contractor’s obligations under the Contract.

Article 3

This Performance Bond shall come into effect upon its signature by the Bank and shall remain in force until the Contract has been completed to the satisfaction of FAO, including the Defects Liability Period referred to in Section I, Article 19 of said Contract, or until xxxxx xx, 20xx, whichever comes first.

The Bank agrees to extend the validity of this Performance Bond at the request of FAO in the event the Contractor is unable to complete the Contract as stated above and FAO has granted the

Contractor an extension.

Article 4

When the validity of this Performance Bond has definitely expired, in accordance with the provisions of Article 3 above, it shall cease to have any value whatsoever and shall be returned to the Bank by FAO.

Article 5

Subject to Article 7, below, this Guarantee is governed by the Uniform Rules for Demand Guarantees, ICC Publication No. 758. The supporting statement under Article 15(a) thereof is excluded.

Article 6

Any dispute between the Bank and the Organization arising out of the interpretation or execution of this Performance Bond shall be settled by negotiations and mutual agreement. If the Bank and the Organization are unable to reach an agreement on any question in the dispute or on a mode of settlement other than arbitration, either party shall have the right to request arbitration in accordance with the Arbitration Rules of the United Nations Commission on the International Trade Law (UNCITRAL) as at present in force.

The Bank and the Organization agree to be bound by any arbitration award rendered in accordance with this article as the final adjudication of any such dispute. The arbitral tribunal shall have no authority to award punitive damages.

Article 7

Nothing herein or related hereto: (i) shall be deemed a waiver or any agreement to waive any of the privileges and immunities of the Organization, or (ii) shall be interpreted or applied in a manner inconsistent with such privileges and immunities.

Signed on behalf of:

..... *(Name of bank)*

(Signature)

(Name and Title)

(Date)

ANNEX IX. STATEMENT OF DUTIES AND POWERS OF THE RESIDENT ENGINEER

FAO’s Resident Engineer, hereinafter the Resident Engineer, shall supervise the execution of this Contract from the day it is signed by FAO until the completion of the Defects Liability Period and the signature of the Certificate of Defects Liability Period.

The Resident Engineer may at any time delegate in writing to the Resident Engineer’s representative any of the duties and powers vested in the Resident Engineer by virtue of this Contract, it being understood that he/she shall remain responsible towards FAO for the acts and omissions of his/her representative. He/She shall send the Contractor and FAO a copy of any such delegation of authority. Any decision taken by the Resident Engineer’s representative within the terms of such delegation shall bind the Contractor as though it had been taken by the Resident Engineer. The duties and powers of the Resident Engineer are the following:

1. The Resident Engineer shall in general carry out such duties as issuing instructions, decisions, certificates and orders as are required for the satisfactory execution of the Contract.
2. The Resident Engineer is, in particular, empowered to:
 - 2.1. Carry out tests of samples of materials and supplies and verify workmanship, as he/she may consider necessary at the cost of the Contractor in order to ensure their compliance with the relevant specifications and standards of **Annex I**;
 - 2.2. Approve in writing extensions of the times for completion of the Works as set out in **Annex III** except if they are caused by circumstances for which, in the opinion of the Resident Engineer, the Contractor is responsible. However, only extensions which have been formalized through a Contract amendment duly signed by the Authorized Official are considered approved by FAO;
 - 2.3. Explain, adjust and modify in case of ambiguities or discrepancies the specifications of **Annex I** and the relevant drawings of the Works, provided always that this shall not result in any additional costs to FAO beyond the amount specified in Article 4.1 of Section I;
 - 2.4. Verify progress and works completed and approve or reject invoices submitted by the Contractor for such quantities;
 - 2.5. Determine, in consultation with the Contract Manager, the amount(s) of liquidated damages and deduct them from any of the Contractor’s invoices due for payment;
 - 2.6. Issue and sign the Certificates of Completion of Works and Defects Liability Period;
 - 2.7. Authorize the execution of additional works by the Contractor, including the delivery of goods, materials and services not listed in **Annex I**. However, only additional works that have been formalized through a Contract amendment duly signed by the Authorized Official are considered approved by FAO;
3. The Resident Engineer shall immediately notify the FAO Representative and Contract Manager of any accident arising from the execution of the Contract and shall provide full particulars thereof.
4. The Resident Engineer in the project country is:

.....

ANNEX X. DRAFT CERTIFICATE OF COMPLETION OF WORKS

(To be transcribed on FAO’s official stationery and completed as appropriate)

WHEREAS

The Food and Agriculture Organization of the United Nations, hereinafter referred to as the “Organization” or “FAO”, has awarded to the firm , hereinafter referred to as the “Contractor”, a Contract bearing number , hereinafter referred to as the “Contract”, and

The Contractor has completed all of the construction works as set out in detail in the Contract and hereinafter referred to as the “Works” in accordance with the specifications and at the sites set out therein,

NOW THEREFORE

I the undersigned, in my capacity as FAO’s Resident Engineer mentioned in Article 10 of Section I of the Contract, having supervised the construction of the Works and having duly undertaken all necessary inspections and verifications of such Works in accordance with the rules and regulations of my profession, confirm that the Works mentioned below have been completed in full compliance with the relevant specifications, plans and drawings of the Contract and the laws and regulations of the country where such Works have been constructed, on the date of signature of this certificate, except for the reservations set out below, if any. This date being the date of commencement of the Defects Liability Period of such Works which will continue for the period of time mentioned in Article 19 of Section I of the Contract.

The Works completed are the following:

.....

The reservations are the following: (*)

.....

(*) (if not applicable please indicate “NONE”)

1. Signature: Name:*(Place and date of issue)*

Title: Resident Engineer of the Food and Agriculture Organization of the United Nations

Signed in :*(Place of issue)* On.....*(Date of issue)*

2. Signature:.....Name:

Title: FAO Representative or his Authorized Agent

Signed in :*(Place of issue)* On.....*(Date of issue)*

3. Signature:.....Name:

Title: The Contractor

Signed in :*(Place of issue)* On.....*(Date of issue)*

ANNEX XI. DRAFT HANDOVER CERTIFICATE

(To be transcribed on official FAO stationery)

WHEREAS

The Food and Agriculture Organization of the United Nations, hereinafter referred to as the “Organization” or “FAO” has awarded to the firm, hereinafter referred to as the “Contractor”, a Contract bearing the number.....,hereinafter referred to as the “Contract”, and the Contractor has delivered and installed the equipment and materials as detailed in the Contract and hereinafter referred to as the “equipment” in accordance with the specifications and at the sites and/or locations set out therein,

NOW THEREFORE

We the undersigned, representing FAO and have visited the site and have accepted the works executed in accordance with the relevant specifications of the Contract except for the:

Reservations set out below, if any (if not applicable please indicate “NONE”):

.....

CONSEQUENTLY

FAO relinquishes control of the site and returns all responsibilities to the *(Name of Government entity to receive the finished works)* hereby relieves FAO from all responsibilities upon signature of this certificate.

Signed:

FOR FAO:

Signed in: On: *(Place and date of the handover)*

Signature:

Name

Title: The Resident Engineer of the Food and Agriculture Organization of the United Nations or his/her authorized representative

FOR THE CONTRACTOR:

Contractor’s name:.....

Signed in: On:

Signature:

Title:

FOR THE GOVERNMENT ENTITY:

Signed in: On: *(Place and date of issue)*

Signature:

Name

Title:

ANNEX XII. DRAFT CERTIFICATE OF DEFECTS LIABILITY PERIOD

(To be transcribed on FAO’s official stationery and completed as appropriate)

WHEREAS

The Food and Agriculture Organization of the United Nations, hereinafter referred to as the “Organization” or “FAO”, has awarded to the firm *(Name of the firm)*, hereinafter referred to as the “Contractor”, a Contract bearing the number *(Contract Number)*, hereinafter referred to as the “Contract”, and

The Contractor has completed all of the construction works as set out in detail in the Contract and hereinafter referred to as the “Works” in accordance with the specifications and at the sites set out therein and has repaired such Works to the satisfaction of FAO’s Resident Engineer and in compliance with the relevant provisions of the Contract and the laws, regulations and customs of the country where such Works have been constructed,

NOW THEREFORE

I the undersigned, in my capacity as FAO’s Resident Engineer mentioned in Article 10 of Section I of the Contract, having supervised the construction of the Works and having duly undertaken all necessary inspections and verifications of such Works as required by the rules and regulations of my profession, confirm that the Works mentioned below have been repaired to my satisfaction for the prescribed period of time in full compliance with the relevant provisions and specifications of the Contract until the date of signature of this certificate. This date being the end of the Defects Liability Period of such Works mentioned in Article 19 of Section I of the Contract.

The Works which have been repaired are the following:

.....
.....

1. Signature: Name: *(Place and date of issue)*

Title: Resident Engineer of the Food and Agriculture Organization of the United Nations

Signed in : *(Place of issue)* On *(Date of issue)*

2. Signature: Name:

Title: FAO Representative or his authorized agent

Signed in : *(Place of issue)* On *(Date of issue)*

3. Signature: Name:

Title: The Contractor

Signed in : *(Place of issue)* On *(Date of issue)*.

Contract No.

Annex XIII

ANNEX XIII. STATEMENT OF SUBCONTRACTORS

FAO authorizes the Contractor to have the following work and services executed by its subcontractors as mentioned below:

1. (Works) by (subcontractor)
2. (Works) by (subcontractor)