## **Practcal_Action_Logo_RGB_400px**Terms of Reference

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| --- | --- |
| 1. **Assignment title:** | **Detailed structural design and supervision of construction works for a single use thin plastic Recycling Plant (demonstration phase) to produce pyrolysis oil and black carbon by pyrolysis method** |
| 1. **Description:** | Practical Action, RiverRecycle, Lamor Oy and Society Development committee (SDC) made a consortium for implementing the project titled “Increasing employment by creating value from plastic waste in Bangladesh”. The consortia is on its first phase and this phase will continue up to December 2025. The consortia is going implement a demonstration project in Faridpur Municipality for single use thin plastic management through pyrolysis process aim to produce pyrolysis oil and black carbon from single use thin plastic waste subsequently reduce plastic pollution load in environment as well as to reduce CO2. Major equipment for pyrolysis plant based on foreign technologies, origin in abroad and will be brought to Bangladesh by leasing and import according to its plan. The consultant will prepare detailed design for structures, electrical and mechanical plan for instrumental set up.  Single use thin plastic waste will be collected from household, market, street side, river, riverside, instates, etc. Then the plastic will be clean and dry  By mechanical and automatic system. The clean and dry plastic will feed to pyrolysis plant to convert these to pyrolysis oil. The produced pyrolysis oil will be stored to ISO tank. The stored oil will supply to the customer by carrying tanks.  The approximately site dimension of the proposed pyrolysis plant is 47.9 m x 55.47 m. In this project, there are three communal roads, one temporary office building, one offloading area for incoming trucks with plastic, one pre-sorting area for waste plastic (manually washing, cleaning, drying, and bundling the plastic), gas tanks for LPG and Pyrolysis off gas, 50-60 kg per hour feedstock (plastic) capacity of pyrolysis unit, underground water tank, internal roads, oil reserve tanks, and two char storage sheds will be in the demonstration recycling plant. The layout of this proposed plant is in Annex 1. |
| 1. **Location:** | Faridpur Municipality |
| 1. **Duration and timing:** | 15 September to 15 October 2022 for preparation of final design and drawings.  The detailed timeline of the assignment is available in ***Annex-2***. |
| 1. **Number of working days:** | 31 calendar days for final design and drawings. |

1. **Background and purpose of the assignment:**
   1. **Background**

Practical Action is an innovative international development organization that puts ingenious ideas to work to change the lives of people living in poverty. We help people find solutions to some of the world's toughest problems, namely catastrophic climate change, and persistent gender inequality. Our modality is that to start small can grow big and bring people together in bold collaborations, combining knowledge with innovation to change the systems that keep people poor and vulnerable. We partner with communities to develop ingenious solutions for water and waste management, agriculture, climate resilience, and access to clean energy. We then share what has been proven to work with others so that many more people can change their world and we also believe in the power of small to change the big picture.

Proper management of waste and sludge is a critical problem worldwide today, especially in cities. City dwellers, mainly in low-income communities, typically discharge untreated waste and sludge into sewers and water bodies, emitting greenhouse gas about 2.19 million tons of CO2/year. The total amount of waste generated worldwide is expected to be double from nearly 2 billion tons in 2016 to about 4 billion tons by 2050[[1]](#footnote-1). Access to safe disposal of faecal sludge (FS) and solid waste (SW) is very limited and almost non-existent for low-income communities. National water policy identified untreated indiscriminate disposal of waste and sludge as one of the leading causes of water pollution and water quality degradation. The Bangladesh Government's (GoB) Seventh Five Year Plan also identified unsafe waste disposal as one of the main reasons for clogged sewers and flooding, which disproportionately affect the health and economic well-being of the community.

Practical Action is implementing two waste management projects in Faridpur. One of the projects is funded by Danida Market Development Partnerships (DMDP) – Danish Foreign Ministry of Foreign Affairs (DMFA)–, entitled "Increasing employment by creating value from plastic waste in Bangladesh". The project aims to transform the lives of informal waste workers by creating a new market for a stream of plastic that currently has no commercial value. The project will support waste workers to collect single-use plastics and process it through pyrolysis into saleable light synthetic fuel oil and black carbon. The collection of plastic will generate work/jobs and income for the waste workers and its processing will generate income for the enterprises running the pyrolysis plant through the sale of the oil. The aims to create and improve waste works jobs, increase respect of them, reducing plastic pollution in environment and develop a public-private partnership (PPP) business model.

The project include different approaches to achieve the objectives. For example, design and construction of physical infrastructures for a pyrolysis plant to recycle single-use plastics from various sources (rivers, households, roadside, markets, etc) through pyrolysis into light synthetic and saleable fuel oil. Besides, to raise awareness in communities to participate in doorstep waste and sludge collection services, Practical Action is moving forward with integrated planning, multi-stakeholder PPP-led inclusive development of green business models, and comprehensive social mobilization. Local capacity for sustainable operation and maintenance of plants, women's economic empowerment through value chain development, and market promotion of recycled products will be enhanced through the interventions of the project. Also in these areas, Practical Action is working to create a decent working environment and social inclusion of waste and sanitation workers and the capacity of municipalities through ICT-based monitoring to track consumer satisfaction. We involved multiple key stakeholders including municipality, private sector, and both commercial and institutional consumer communities who participated in improved services. In this situation, Practical Action is planning to construct a demonstrable recycling plant to recycle single use thin plastic waste through pyrolysis process aim to produce saleable pyrolysis oil and black carbon. Hence, we are inviting qualified consultants or group of individuals for detailed design for structures, electrical and mechanical plan for instrumental set up for this demonstrable recycling plant.

* 1. **Objectives**

i. To develop a detailed layout plan for a proposed thin plastic recycling demonstration plant in Faridpur.

ii. To carry out detailed engineering design of all categories of infrastructure works including the landscape development works and prepare the corresponding detailed drawings includes plan/view, X – section, elevation, etc. and cost estimates. The design pack shall contains all relevant engineering information to satisfy the relevant agencies for approval to construct, installation and operate.

iii. Supervision during construction phase of the demonstration recycling plant and quick response and immediate steps to correction in design if arise in during correction.

* 1. **Methods of design**

The consultant will prepare the detail design in participatory consultation with Practical Action, RiverRecycle and Faridpur Municipality and its key departments.

1. **Scope of services**

Scope of services

The scope of the consultancy services includes

1. Conduct topographical survey of the proposed site to accurately measure, prepare a detailed layout plan for the demonstration plant and carry out design works in accordance with the detailed layout plan. The categories of infrastructure must include, but not limited to:
2. a) Landscaping and compound boundary wall and fencing
3. b) Road Networks
4. c) Water supply and distribution system
5. d) Electrical system (electrical drawing and design, Compound lighting, recommendation on the capacity of the substation and back up generator)
6. e) A temporary office
7. f) Security guard services (guard house and security gate)
8. g) Parking area
9. h) Fire hydrant system and facilities
10. i) Sewerage system / Drainage Networks within the project site (sewerage lines and treatment plant)
11. j) Waste management facility

In addition, the consultant is required to conduct

1. On approval of the preliminary designs (in consultation with Practical Action), prepare detailed architectural and structural engineering designs and drawings of all infrastructure works in conformity with Bangladesh National Building Code (BNBC) 2020 and others and get the approvals from the competent authority (here Faridpur Municipality).
2. Prepare detailed cost estimates and segregated Bill of Quantities (BoQ) for each category of infrastructure using the latest market rates. Prepare rates analysis and shall be submitted and suggest Practical Action a quality Brand List which are reputed in national and international market shall serve as a reference. The incorporation reputed brand construction materials in the designs, estimates, and the (BoQ) is also compulsory.
3. Support and guide the Practical Action and its partners till the completion of the development of the recycling plant. This shall involve clarification of doubts that may arise during the construction of infrastructure and installation of equipment’s related to the contents of the Final Report and may also require site visits for proper implementation.

The consultant shall be wholly responsible for all data, design, and drawings provided, including details the execution methodology, and various other parameters, incorporation of soil test data in design parameters. All data utilized in preparation of the reports shall be presented indicating the sources of the data and also the basis of assumptions, if any. The consultant shall visit the proposed site and study the environment to prepare and submit the proposal at their own cost. The final design and drawings will be evaluated and reviewed by an independent Engineers (IE) appointed by Faridpur Municipality. In addition, the consultant shall include the cost of carrying out all the above responsibilities including the payment of IE, inter alia, in their Financial Proposal.

1. **Deliverables**

The consultant will submit all necessary drawings including (i). layout, plan, (ii). elevation, section, and view from different sides (west, east, south and north), column design, beam design, roof slab design, and cross section of individual structures in both soft (Auto Cad) and hard copies for boundary wall, temporary office, guard room, temporary road, water tank and roof slab. The consultant will supply at least 11 copies printed drawings in A0 format/ A1 paper size as appropriate.

After completion of construction, the consultant will submit the corrected version of drawings in both soft (Auto Cad) and printed copies (4 copies). The consultant will bear the cost of printings.

The specific delivery will be as follows but not limited to this list.

1. Site visit
2. Soil test for load bearing capacity
3. A detailed layout plan
4. Detailed engineering design of all categories of infrastructure including architecture, structures, electrical layout, mechanical installation plan. The infrastructure list contains boundary wall, temporary road, temporary office, guardroom, water tank with roof slab, etc.
5. BoQ for sand filling
6. BoQ (detailed cost estimates and segregated BoQ for each category of infrastructure using the latest market rates
7. Cost estimates including rates estimates and suggest brand
8. Site supervision
9. correction of design if arise in during construction
10. Reviewed by an independent Engineers (IE) and payment to Independent Engineers

**More detailing of deliverables are as follows.**

1. i. Landscaping and compound fencing
2. ii. Road Networks
3. iii. Water supply and distribution system
4. 1v. Electrical system (electrical drawing and design, Compound lighting, recommendation on the capacity of the substation and back up generator)
5. v. Temporary office
6. vi. Security guard services (guard house and security gate)
7. vii. Parking area
8. viii. Fire hydrant system and facilities
9. IX. Sewerage system /Drainage Networks within the project site (sewerage lines and treatment plant)

X. Waste management facility

1. **Supporting documents**

Practical Action will support the consultant by providing following documents after awarding the contract.

1. Practical Action will provide site dimension, site description and surrounding land use of the proposed recycling plant
2. Practical Action will provide the technology description, list of equipment’s, both dead and live loads of equipment’s, dimension of equipment’s, process flow diagram, etc. which are necessary for the services.
3. Any other relevant documents available with the Practical Action that deemed necessary for carrying out the services by the consultant.
4. **Qualification of the consultant/Firm:**

* Team leader must have at least B.Sc. in Civil Engineering degree from reputed university with proven track record of at least 5 years’ experience in the design, construction of industrial complex, factory buildings, academic building, campus, etc.
* Team leader must have valid membership of Institution of Engineers, Bangladesh.
* Good understanding plan and design approval process in governmental authorities in municipality, etc.
* The consultant has the ability to conduct physical survey, topographic survey and soil test independently.

1. **Application and submission procedure:**

Interested party(ies) (consultants/firm) are requested to submit their technical and financial proposals separately with the details organisational profiles including reference of relevant work experience (applicable for consulting firm), relevant experience including activities and milestones, budget details, time frame and CVs of experts and contact details.

The proposal from individuals/firms shall contain the following sections:

* Understanding of the assignment
* Methodology
* Work plan and schedule
* Team composition
* Detailed Budget

The consultants/firm must submit the following documents along with Technical & Financial Proposal (including VAT and TAX) separately, as appropriate:

*For Consultancy Firm:*

* Maximum 3-pages Firm profile highlighting related assignment completed with client name, contract person and contact number
* Lead Consultant’s (who will lead the assignment) CV with maximum 3-pages highlighting related assignment completed, role in the completed assignment
* List of key team members (who will be involved in the assignment) along with their short CV (maximum 3 pages for each member) highlighting related assignment completed and role
* Firm’s Certificate, TIN and VAT registration

*For Individual Consultant:*

* Maximum 3-page profile highlighting related assignment completed with client name, contract person and contact number along with detailed CV
* TIN certificate and any other relevant document (if necessary)
* Team composition and list of key team members (who will be involved in the assignment) along with their short CV (maximum 3 pages for each member) highlighting related assignment completed and role
* TIN certificate and any other relevant document of each member (if necessary)

Electronic copy of the proposal duly signed should be submitted to: procurement.bd@practicalaction.org.bdwith the subject line: “**Proposal for** **detailed structural design and supervision of construction works for a single use thin plastic Demonstration Recycling Plant”** by no later than **15 August 2022.**

1. **Terms of Payment for the consultant/firm:**

The payment will be made according to the following time frame/arrangement:

| **Instalments** | **Amount** | **Timeline** |
| --- | --- | --- |
| 1st instalment | 25% of the total amount | After contract signing and submission of preliminary designs (in consultation with Practical Action), and conduct relevant studies such as topographic survey, soil test, etc. |
| 2nd instalment | 45% of the total amount | After submission of the detailed architectural and structural engineering designs and drawings, electrical layout plan, equipment installation plan, detailed cost estimates and segregated Bill of Quantities (BoQ) for each category of infrastructure, market price, rate analysis, brand list and payment of IE and approval of the Plan from Faridpur municipality. |
| 3rd Instalment | 30% of the total amount | After completion of the plan with necessary correction in design and required site visits to construction site in order to supervise the team during the construction phase and submission of the final report along with relevant documents |

***Note:*** *Tax and VAT will be deducted at source from the bills payable to the selected consultants/firm. In all cases, consultants/firm may only be paid their fees upon satisfactory completion of services.*

1. **Resignation and cancellation/termination of contract:**

The employment may be cancelled/terminated by either party as mutual agreement giving reasonable time. The services of the consultant/firm will be governed by the Human Resource and Administration policy of Practical Action in Bangladesh, as applicable for an employee of part time employment.

Annex 1. Proposed site layout



**Annexure**

**Annex-2: Duration of the assignment**

Upon completion of the assignment, the final reports will have to be submitted within 30 calendar days starting from the date of assigning relevant task. Proposed starting date is 15 September 2022 and to be completed by 15 October 2022.

| **Activity** | **Time Frame** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **1st**  **week** | **2nd week** | **3rd week** | **4th week** | **Time required till construction** | | |
| Contract signing, document review, site visit, topographic survey, layout plan, preliminary design and estimates |  |  |  |  |  |  |  |
| Detailed engineering design, BOQ, Cost estimate, brand suggestion, finalization of design, review by IE, submission for plan approval, etc. |  |  |  |  |  |  |  |
| Plan approval, Site supervision, Construction supervision, design correction, submission of corrected design |  |  |  |  |  |  |  |

1. <https://unstats.un.org/sdgs/report/2019/goal-11/> [↑](#footnote-ref-1)