Project Management Consultancy Services for "Modernization and Expansion of Eastern Refinery Limited" Project

Terms of Reference (ToR)

1. BACKGROUND:

Eastern Refinery PLC (ERPLC), a subsidiary of Bangladesh Petroleum Corporation (BPC), is the only state-owned petroleum oil refinery in Bangladesh. ERPLC commenced commercial production on May 7, 1968, with a refining capacity of 1.5 million metric tons per annum. At present, only 20 percent (approx.) of the refined petroleum products demand of the country is being met through ERPLC. The remaining 80% of petroleum products are mainly imported, with a small portion collected from domestic sources to meet demand. To meet the growing demand of refined petroleum products and also to strengthen the energy security of the country, BPC has undertaken a new petroleum oil refinery project titled "Modernization & Expansion of Eastern Refinery Limited (ERL)" having a capacity of 3.0 Million MT/year. Earlier, the name of the project was "Installation of ERL Unit-2".

At present, 12 (twelve) products are produced in ERPLC, of which 4 (four) are non-fuel products. Name of these products are Liquefied Petroleum Gas (LPG), Special Boiling Point Solvent (SBPS), Motor Spirit (MS), Naphtha, Kerosene, Mineral Turpentine (MTT), Jet Fuel (JET A-1), Jute Batching Oil (JBO), High Speed Diesel (HSD), Light Diesel Oil (LDO), High Sulfur Furnace Oil (HSFO) and Bitumen.

2. OBJECTIVES & DESCRIPTION OF THE PROJECT:

The objectives of "Modernization & Expansion of Eastern Refinery Limited (ERL)" Project is to establish a new petroleum oil refinery with a capacity of 3.0 MMTPA in the premises of Existing ERPLC. This will ensure the:

- Increase energy security of the country.
- Produce eco-friendly fuels, complying with stringent specifications.
- Greatly reduce the petroleum products deficit of Bangladesh.
- Reduce dependency on finished products import.

The overall targets of the Project are:

- To meet the current and future petroleum oil demand in the country by domestic facility namely, ERPLC.
- To make a greater yield of value-added products out of crude oil in a more cost-effective and eco-friendly way.

The feedstock finalized in the Front End Engineering Design (FEED) includes Arabian Light Crude (ALC) from KSA and Murban (MB) from UAE. During FEED, Technip, France proposed several additional potential crudes that shall be compatible with the unit to be built, which are Bonny Light, Iranian Light, Masila, Upper Zakum, and Dubai. The then-appointed Project Management Consultant (PMC), also investigated the assay of the potential crudes. Upon discussion, it was finalized that ALC and MB shall be the feedstock of the proposed unit, since these two crudes are already in operation in the existing facilities.

To enhance operational flexibility and optimize economic performance, it has been decided to add additional crudes to the feedstock. This can be achieved by incorporating a crude oil

blending facility at the upstream of the new unit. This facility will allow blending of various crudes with high and low API gravity, sourced from different regions of the world. A preliminary document in this regard has been prepared. The PMC shall have to review and revise this preliminary document and incorporate the said document to the EPC tender document.

The processing scheme is selected in such a way that it will produce the highest quantities of middle distillates. The scheme produces all high-value products. Being an all-hydrogen refinery, products are expected to be very clean and high quality. The scheme (HC-VB) will involve ultimate cracking of the bottom product to produce large quantities of distillates and Furnace oil. Straight run heavy distillates are strongly hydro-treated in a high-pressure Hydrocracker to produce high quality jet fuel and diesel, along with gasoline and petrochemical feedstock naphtha.

After the implementation of the proposed refinery, the import of all finished petroleum products will be significantly reduced. The refinery will produce the following products:

Serial no.	Products
1	Liquefied Petroleum Gas (LPG)
2	Gasoline (Regular)
3	Gasoline (Premium)
4	Jet propellant A-1 (JET A-1)
5	High-Speed Diesel (HSD)
6	Lube Base Oil
7	Furnace Oil
8	Bitumen
9	Sulfur

The feasibility study was done by the previous PMC in 2022. Before that, in 2009, ENAR Petro-Tech Services Pvt. Ltd has conducted another feasibility study of this project. The study was conducted based on three types of crude oils: (1) Arabian Light, (2) 50% Arabian Light & 50% Murban and (3) Gulf Medium. Later, it was decided to proceed with Arabian Light Crude (ALC) and Murban Crude.

The FEED of the project has been completed. The documents are ready to use. Technip France and Technip Geoproduction Malaysia consortium were the FEED contractor. The contract was signed in January 2017. They submitted the FEED documents in 2018. FEED has been done through a separate project named "FEED Services for the Installation of ERL Unit-2".

There are 5 (five) process licensors in the project. As the FEED contractor Technip first signed the licensing contract with all the licensors. Later, the contracts were novated in the name of BPC/ERPLC. The licensors of the project are:

Sl.no.	**Unit Name**	**Licensed process with capacity**	**Licensor**
1	Naphtha Hydrotreater (NHT)	Process-1: 18,440 BPSD	AXENS, France
	Isomerization	Process-2: 7,382 BPSD	
	Continuous Catalytic Reforming (CCR)	Process-3: 12,900 BPSD	
	Diesel Hydrotreater (DHT)	Process-4: 31000 BPSD	
2	Hydrocracker Unit (HCU)	Unicracking: 16500 BPSD	UOP, USA
	Kerosene treating Unit (KTU)	Kerosene Merox: 12500 BPSD	

Sl.no.	Unit Name	Licensed process with capacity	Licensor
	LPG Treating Unit (LTU)	LPG Merox: 3000 BPSD	
	Base Oil Unit (BOU)	MSDW: 6600 BPSD	
3	Asphalt Blowing Unit (ABU)	Biturox: 3000 BPSD	Poerner, Austria
4	Hydrogen Unit	Processing skim: 106 MTPD	TECHNIP BENELUX, Netherlands
5	Visbreaker Unit (VBU)	Visbreaking: 10000 BPSD	Shell, Netherlands

Main Processing Units of the proposed refinery:

Sl	Process Unit Name	Capacity	
1	Crude Distillation Unit	68,000	BPSD
2	Vacuum Distillation Unit	28,000	BPSD
3	Kerosene Treatment Unit	12,500	BPSD
4	Saturated Gas Plant	209	MTPD
5	LPG Treating Unit	3,000	BPSD
6	Visbreaker Unit	10,000	BPSD
7	Asphalt Blowing Unit	3,000	BPSD
8	Hydrocracker Unit	16,500	BPSD
9	Base Oil Unit	6,600	BPSD
10	Naphtha Hydrotreating Unit	18,440	BPSD
11	Isomerization Unit	7,382	BPSD
12	Continuous Catalytic Reforming Unit	12,900	BPSD
13	Diesel Hydrotreating Unit	31,000	BPSD
14	Hydrogen Production Unit	106	MTPD
15	Refinery Pressure Swing Adsorption	130	MTPD
16	Sour Water Stripper Unit	1560	MTPD
17	Amine Regeneration Unit	4800	MTPD
18	Sulfur Recovery Unit	100	MTPD (Sulfur)
19	Tail-Gas Treating Unit		
20	Liquid Sulfur Storage Unit		
21	Solid Sulfur Handling Unit		

Necessary Utility and Offsite Facilities:

S. N.	Utility & Offsites	Capacity
1	Power Generation Unit	63.6 MW
2	Steam Generation Unit	358 T/H
3	DM Water System	137 M^3/H
4	Boiler Feed Water System	368 M^3/H
5	Cooling water system	3617 M^3/H
6	Instrument air package	4876 NM^3/H
7	Plant air system	21,360 NM^3/H
8	Nitrogen Unit	2170 NM^3/H
9	Fuel oil system	34 T/H
10	Fuel gas system	29.4 T/H
11	Natural Gas system	56,011 NM^3/H
12	Flare system	439 T/H
13	Water system	414 M^3/H
14	Sea water intake	1253 M^3/H

S. N.	Utility & Offsites	Capacity
15	Fire water system	4000 M^3/H
16	Water Desalination Plant	552 M^3/H
17	Effluent Treatment Plant	400 M^3/H
18	New Storage Tanks	43 Nos.

3. BRIEF SCOPE OF SERVICES:

Set forth below is the PMC Scope of Services that the PMC is to provide, including the manpower resources in its PMC Team. Such PMC Team, using the skills, experience, and capabilities of its members, will undertake the overall project management services, including but not limited to:

A. Review of FEED and update, if necessary;
B. Review and finalization of the Licensor Phase-2 documents;
C. Review and finalization of the EPC Tender Document and preparation of Contract;
D. Preliminary Engineering Phase;
E. Engineering Phase;
F. Procurement Phase;
G. Construction Phase;
H. Pre-Commissioning, Commissioning, Start-up, Testing and Handover Phase;
I. General Phase (HSSE, Project Management, Assistance in Obtaining Statutory Approvals, Documentation); and
J. Additional Requirements.

The PMC Scope of Services describes the various work locations at which the PMC will be required to assign its PMC Team members who will perform the PMC Scope of Services, i.e. the Employer's offices (Dhaka/Chattogram), the Contractor's design office(s), the Site, and PMC Home / Branch offices.

In performing the PMC Scope of Services, the manpower resources in the PMC Team will work under the management and direction of the Employer's Project Director.

At all times, the PMC Team members shall act in the Employer's best interests in all matters related to the EPC Contract being performed by the Contractor (and any other third parties involved in the Project).

4. DETAILED SCOPE OF WORK

The scope of work for PMC is broadly mentioned as under, but not limited to:

A. Review of FEED:

1. Review the FEED document prepared for the project. The FEED has been prepared by the consortium of Technip France and Technip Geo-production Malaysia. These FEED documents have been verified & endorsed by previous PMC of the project.
2. Update the FEED Document with additional requirements as required, including any changes in applicable international codes and standards since 2018 and updates to Bangladesh environmental and safety regulations;
3. The PMC shall review and revise the preliminary **Crude Oil Blending Facility** document and shall specifically: (i) perform or review a crude compatibility and blending simulation study; (ii) prepare or review a crude assay matrix for all approved blending crudes; (iii) incorporate the complete blending facility package into the EPC tender documents.

4. PMC to arrange pre-procurement conference ensuring the participation of the vendors identified in the existing vendor list. PMC may suggest to update the vendor list by including potential vendors.

The activities mentioned in item 1-3 above shall have to be completed within 60 days from the handover of the FEED documents to the CONSULTANT.

B. Review and finalization of the Licensor Phase-2 documents:

1. Co-ordinate with Process Licensors for preparing the Licensor Phase-2 documents for licensed units, which will be prepared by the licensors.
2. Review and finalize the Licensor Phase-2 documents for licensed units. The documents will be part of the EPC tender document. It is to be noted that FEED has been prepared based on Licensor Phase-1 documents.
3. Licensor Interface Management: With five (5) simultaneous process licensors (AXENS, UOP, Poerner, Technip Benelux, Shell), the PMC shall develop and maintain a Licensor Interface Matrix identifying all cross-licensor technical dependencies

C. Review and finalization the EPC Tender document and preparation of contract:

1. Review and finalization of the prepared EPC tender document.
2. The PMC shall develop pre-qualification (PQ) criteria, issue PQ questionnaires, evaluate PQ submissions, and prepare a documented Shortlist Recommendation Report for Employer approval before the EPC tender is issued, if necessary.
3. The PMC shall prepare a Technical Bid Evaluation (TBE) report and a Commercial Bid Evaluation (CBE) report with defined scoring matrices, compliance checklists, and clarification logs for each EPC bidder. The PMC shall manage all Tender RFIs (Requests for Information) from bidders, prepare written responses approved by the Employer, and issue Tender Addenda as required.
4. Support to evaluation of EPC tender and preparation of contract document.
5. The PMC shall provide full support during EPC contract negotiations with the preferred bidder, including preparation of the Contract Agreement, Schedules, and all Exhibits.
6. Digital portal services shall have to be borne and maintained by the PMC. The digital portal / Document Management System (DMS) maintained by the PMC shall as a minimum support: controlled document distribution with version history; multi-level review and approval workflows; transmittal tracking with automated reminders; role-based access control for Employer, PMC, EPC Contractor, licensors, and vendors; and integration with the PMC's document register. The PMC shall provide training to Employer personnel on the DMS after contract commencement.

D. Preliminary Engineering Phase:

1. Review and/or assess the acceptance of all working procedures prepared by EPC CONTRACTOR based on the EPC CONTRACT.
2. Review and finalize the type and number of documents to be submitted by the EPC CONTRACTOR either for approval or for information.
3. Take all necessary steps to ensure that all Licensor's data has been correctly interpreted by EPC CONTRACTOR for Engineering Design.
4. Monitor the preparation of a Master Schedule (prepared by the EPC Contractor) and take corrective action, if necessary, identifying the major milestones per discipline and per unit.

E. Engineering Phase

The PMC Team will monitor, observe and supervise all Engineering Works performed by the EPC Contractor to ensure that the facility is satisfactorily designed to fit for purpose and engineered in accordance with the requirements of the EPC Contract.

The PMC will perform the tasks, which shall include but not limited to:

1. Review Contractor's detailed design documents and comment on all drawings, calculations and specifications developed for the Facility to ensure compliance with the FEED and EPC Contract approved by the Employer. PMC to ensure that the blending facility is also incorporated in the design documents.
2. Review of construction methodology regarding impact on design, on the contract program and on safety during construction.
3. The PMC shall conduct formal 3D model design review sessions with the EPC Contractor at 30%, 60%, and 90% model completion stages for all major process units. Review findings shall be documented in a model review report with agreed action items, and the Contractor shall demonstrate close-out of all critical items before the subsequent model review.
4. The PMC shall review and approve the EPC Contractor's Cybersecurity Plan for all industrial control systems (DCS, SIS, SCADA, Historian, OPC servers) in accordance with IEC 62443 standards. The plan shall address network segmentation, access control, patch management, and incident response. The PMC shall verify that all control system vendors comply with the approved cybersecurity requirements before equipment orders are placed.
5. Study of the detailed design, Environment & Social Impacts Assessment Report, HAZOP & SIL Report, third party studies related to detailed design, etc., and inform the client and recommend as per the findings (the approval or rejection of the findings of the Contractor).
6. Coordinate, examine, review and recommend for approval of the EPC contractor's detailed design, engineering drawings, in accordance with the appropriate schedules of documentation review.
7. Review all approvals pertaining to equipment, piping and systems, which are critical to the completion of the Facility.
8. Review and recommend for approval during Engineering the following items:
   a) Geotechnical studies.
   b) Seismic design studies and corresponding assumptions.
   c) Validation of calculations notes for: civil engineering, metal structures, piping calculations and flexibility studies, electrical installations, cathodic protection, lighting protection, etc.
   d) Validation of site engineering, as-built drawings, and 3-D model of the proposed plant.
   e) Validation of safety and environmental studies.
   f) Review and participate in the development of procedures for Commissioning, Start-up and Testing of the Facility.
9. Review and coordinate the submission to the Employer of all as-built drawings and documents from EPC Contractor and any specialist sub-contractors and vendors.
10. PMC will prepare project risk assessment & develop mitigation programme.
11. PMC will prepare CPM & PERT of project work schedule and also validate.
12. Review, evaluate and approve the detailed design submitted by contractor.
13. Third party validation, if EPC employs the Third party inspector, PMC will review/supervise

F. Procurement Phase:

PMC will monitor, observe, and supervise all Procurement and Fabrication Works to be performed by the EPC Contractor to ensure that all Equipment and materials for the Facility are purchased, inspected and transported to the Site in accordance with the requirements of the EPC Contract.

The PMC will do the tasks, which shall include, but not be limited to:

1. Verify purchase orders of all Equipment for the inclusion of various aspects related to description of goods, applicable engineering specifications, complete and approved drawings/documents/data sheets, vendor data requirements, inspection and test, marking/tagging requirements, spare parts identification requirements and supply list, vendor startup service requirements, scheduled delivery dates etc.

2. Review the Contractor's Equipment transportation plans to deliver all Equipment to the Site and prepare written recommendations regarding such transportation plans.
3. Verify that the Contractor is maintaining the Project Management Control Systems and requirements for the Project, including the Master Documentation System and the Quality Assurance/Quality Control Plan and the Inspection and Testing Plan.
4. Provide assistance, recommendations and evaluation of any Procurement requirement.
5. Recommend for approval any additional Subcontractors and Vendors proposed by the Contractor not previously pre-approved by the Employer.
6. Prepare and update the list of recommended spare parts to be purchased by the Employer.
7. Verify and report on material balance and identification of surplus material.
8. Monitor Contractor's Site procurement practices.
9. Review Vendor required submittal documentation in accordance with the EPC Contract and recommend for approval.
10. Confirm receipt and warehouse inventory control system prior to the commencement of all commissioning and pre-performance testing, providing any other services necessary to ensure the Contractor and Contractor's subcontractors are properly performing the purchase, inspection, expediting, transport and storage of Equipment for the Facility.
11. After the signing of EPC Contract, the PMC shall prepare and maintain a Long Lead Equipment (LLE) Register identifying all critical equipment items with procurement lead times exceeding 12 months. The register shall include minimum: CDU/VDU column internals, Hydrocracker reactor vessels and internals, Reformer furnace and catalyst, large reciprocating and centrifugal compressors, gas turbines and waste heat recovery units, main transformers and switchgear, and DCS/SIS systems. The LLE Register shall be reviewed monthly and potential delivery risks reported immediately to the Employer.
12. The PMC shall implement a structured expediting programme comprising desk expediting (weekly status calls) for all purchase orders, and field expediting (visits to manufacturer premises) for all Long Lead Equipment items and other critical items as identified. Field expediting reports shall be submitted to the Employer within 5 working days of each visit.

13. Procurement Inspection:

CONSULTANT will monitor the entire procurement inspection and quality assurance program of the EPC Contractor. CONSULTANT will review and recommend to Employer for approval the inspection plan to be submitted by the Contractor as part of the Procurement Manual which shall include but not limited to the following:

a) In-house inspection programs for EPC contractor.
b) Inspection procedures consistent with mandatory codes or governmental rules of the locality.
c) Procedures for material identification, post-weld heat treatment, pre-shipment cleaning, and shipping.
d) Certification of non-destructive testing results, pressure testing and cleanliness after hydrostatic testing.
e) Procedure of non-destructive testing, pressure testing and cleanliness after hydrostatic testing.

CONSULTANT will:

a) Maintain the manufacturing status for all Equipment to be inspected and provide a 2 (two) week notice to EPC Contractor before each inspection.
b) Witness the Factory Acceptance Testing (FAT) and perform other shop inspections, in accordance with the Contractor's Inspection and Testing Plan and promptly thereafter provide a written report setting forth the results of such factory acceptance testing or shop inspections.
c) Verify that Third Party Inspectors (TPI) will inspect the critical equipment ordered by Contractor.
d) Will independently inspect the critical equipment ordered by Contractor in addition to the

inspection arranged by Contractor (as per EN10204 type-3.1 and type-3.2).

e) Provide and handle all logistics with regard to factory inspection, expediting and testing services, as required.

f) Supervise Contractor to conduct management and control of shipping agencies for all transportation, handling, custom clearance, etc. for all materials delivered to site/s

g) Recommend a list of critical Equipment that should be inspected by PMC upon arrival at the Site and, perform inspections upon the arrival on Site of the critical Equipment and promptly thereafter provide a written report setting forth the results of such inspections.

h) Require and supervise Contractor to submit monthly material procurement status report and special status report of late or critical items.

i) Certify the invoices submitted by the contractor and supported by all the elements confirming the complete fulfilment of the obligations of the Purchase Order.

j) CONSULTANT supervises that Contractor provides instruction and controls that all manufacturers, fabricators, and suppliers utilize the above detailed inspection plan for the production of materials and equipment.

k) Require the Contractor to issue a list of inspections scheduled on a bi-weekly basis. CONSULTANT will ensure that adequate notice will be given by Contractor to allow CONSULTANT/EMPLOYER to participate with major Contractor inspectors in any specific inspection, test or non-destructive test.

Note: The cost for the travel expenses, food & accommodation for the CONSULTANT associated with the items b), c), d), e) will be borne by the Employer/EPC contractor, which will be reflected in the EPC tender document.

G. Construction Phase:

Tie-in Management with Existing Operating ERL Plant:

The new refinery is to be constructed within the premises of the existing operating Eastern Refinery PLC (ERPLC) facility. This creates a unique and critical requirement for systematic tie-in management. The PMC shall:

1. Require the EPC Contractor to prepare a comprehensive Tie-in Management Plan prior to any construction commencing near or interfacing with the existing operating plant. The plan shall identify all tie-in points, required isolations, safe work procedures, and the sequence of works. The PMC shall review and approve this plan.
2. Develop and enforce a Simultaneous Operations (SIMOPS) procedure governing all construction activities that occur in proximity to the existing operating refinery. The SIMOPS procedure shall define safety exclusion zones, hot work permit requirements, gas testing protocols, and communication lines with ERPLC's operating team.
3. Coordinate with ERPLC Operations to schedule tie-in activities during planned turnaround windows of the existing plant wherever possible, minimising unplanned shutdowns. The PMC shall prepare a Tie-in Schedule aligned with ERPLC's maintenance and operations calendar.
4. Ensure all tie-in designs are reviewed and approved by both the PMC and ERPLC's operations and maintenance teams prior to execution. Tie-in activities shall not commence without written clearance from both the PMC and the ERPLC Plant Manager.

Constructability Reviews and Heavy Lift Engineering

The PMC shall:

1. Conduct formal Constructability Review workshops prior to the commencement of major construction activities. Workshops shall identify construction sequencing constraints, lifting limitations, access restrictions, and site logistics issues.
2. Review and approve Heavy Lift and Rigging Engineering Studies prepared by the EPC Contractor for all critical equipment items (distillation columns, reactor vessels, compressor trains, large exchangers, etc.). Studies shall include crane selection, rigging calculations,

ground bearing pressure assessments, and lift sequence. No heavy lift shall proceed without PMC written approval of the lift study.

3. Review and approve the EPC Contractor's Underground Piping, Cabling, and Duct Inspection Plan. The PMC shall hold mandatory inspection hold-points before backfilling of all underground piping, cable ducts, and drainage systems. PMC witness of all pre-backfill inspections shall be recorded and signed off.

CONSULTANT will be responsible for the supervision of construction planning, procedures, construction schedule, quality assurance, inspection, and effective monitoring of all construction areas of the construction management services, which shall include but not limited to the following:

a) Construction Planning & Procedures:

- Finalize coordination procedures between CONSULTANT and Contractor from time to time.
- Supervision of establishing detailed construction plans and schedules with major Contractor to match the overall project schedule.
- Finalize construction codes, standards and specifications to be followed.

The deployment of CONSULTANT's personnel for the project in critical areas of engineering, construction, planning, and inspection shall be subject to review and clearance by EMPLOYER.

b) Support to Cost Control:

Performing BOM and shipping invoice checks for quality and quantity in order to support Monthly Cost Report preparations, cost trends, and change order analysis reports

c) Construction Schedule and Monitoring:

- Review the construction schedule of the Contractor
- Review the site mobilization plan of the Contractor and pursue the required mobilization for all manpower/resources/equipment, etc.
- Monitoring Contractor work schedule, progress against program, and preparation of monthly progress/exception reports highlighting percentage completion of work, areas of concern with respect to schedule/inputs to be deployed and recommend proactive corrective actions and remedial measures to re-move back log in progress. Distribution of reports/construction documents to all concerned.
- Review the construction work/progress regularly to ensure that the Contractor's allocation of numbers and type of manpower is adequate, and ensure that the construction equipment, cranes, tools, scaffolding, lighting, etc. set up by the Contractor for the execution of the work are adequate for the purpose and in safe working conditions.
- All material handling equipment shall be subjected to required load test, initially and then periodically, to ensure safe/stable operation; CONSULTANT to witness and maintain record of all such tests.
- Review and comment on the drawings and technical specifications produced at site by the Contractor to ensure compliance with the Project specification.
- Verify the actual work completed by the Contractor and recommend to EMPLOYER for the release of each progress payment according to the contract.

d) Construction Management and Quality Assurance:

- Review of construction and quality assurance plans of Contractor and confirm their compliance with approved codes/standards/ specifications, etc., under the EPC Contract.
- Supervision, inspection for certification of all tests (destructive/non-destructive) at the site.
- Monitor compliance with various statutory rules, regulations and safety measures. Arrange and coordinate site inspection, testing, etc., as required under local statutory rules and regulations prevalent in Bangladesh.
- Ensure that the Contractor takes all necessary precautions to protect construction work

and material from damage by adverse weather conditions and the impact of construction activities.

- Alert Contractor and inform Employer immediately of any use of materials not in accordance with the drawings, project specification and take corrective action thereof.
- Inspect and certify the quality and work performed by the Contractor at the site as per approved quality assurance plans.
- Review and audit approved welding procedures and welders' qualification procedures.
- Supervise and ensure that all additional works of modifications that have been approved by the Employer are performed according to approved change orders without any additional cost.
- Control that the machines, equipment, vessels, piping, instruments, structures and other materials are properly erected, installed, and maintained by Contractor according to the approved specifications/suppliers' recommendations.
- Review, recommend and monitor safety and labor relations procedures prepared by the Contractor for compliance with applicable codes, regulations and EMPLOYER requirements and advise concerning violations and injuries (including coordinating with local concerned authorities).
- A Inspect and enforce measures in ensuring quality of all of the Contractor's site activities, which include recording, field purchasing, etc. The following data and files will be collected and recorded:
    1. Engineering Data
    2. Major Contractor's daily loading reports
    3. Welder qualification certificates
    4. Material/Equipment transportation, deliveries and receiving reports.
    5. Data for as-built drawings.
- Review and comment on the major Contractor's plan at least 2 (two) weeks before for the off-loading, hoisting and transport of materials from sea-going vessels, including transport to the work site.
- CONSULTANT will request the Contractor to submit detailed scheme(s) for Heavy/Critical equipment movement/erection/lifts/rigging and review/approve them before the Contractor carries out such critical/heavy lifts/movements
- CONSULTANT will supervise and approve the alignment (hot/cold) of all rotary equipment/machinery by the contractor and also ensure their upkeep/maintenance as per the suppliers' recommendations.
- Enforce the Contractor to perform housekeeping activities, which include maintaining sanitary facilities, sweeping, clean-up, and removal of excess materials/temporary/facilities as necessary.
- Formulate a system to identify and correct the Contractor's work that may be unsatisfactory in quality, and/or is not conforming to the EPC contract. Ensure that adequate records are maintained, so that of rectification is made easy, systematic and timely.
- A quality assurance plan shall be included in the EPC contract for identifying the guidelines for supervision, inspection, and witnessing tests at the site in order to ensure quality construction work. Objectives and specific checkpoints with respect to the quality plan shall be further defined by Contractor /CONSULTANT/EMPLOYER during the KOM.
- The quality control program prepared by the Contractor will be reviewed by CONSULTANT for compliance and to ensure that it covers the following areas:
    1. Site Preparation
    2. Welding/ fabrication

3. Tie-ins
4. Clean-up, testing
5. Instrumentation installation and construction
6. Incorporation of all witness tests and hold points of the construction work.
7. Prepare overall Quality Assurance (QA) and Quality Control (QC) System for the various Phases of the Project (i.e., Engineering, Procurement, Construction and Commissioning)
8. Keep regular surveillance and audit the Quality Assurance Program of the Contractor and Vendors.
9. Prepare QA/QC report for the project complex, regularly identifying areas for action by concerned agencies.

e) Construction Inspection:

CONSULTANT will ensure that the Contractor makes arrangements for the required field inspection and tests required by the standards/specifications under the contract and by local authorities/agencies and submit inspection procedures for review/approval of CONSULTANT/EMPLOYER. The CONSULTANT will ensure that these inspection procedures will at least include the following requirements:

- A construction activity will not start until all prescribed quality pre-conditions and HSE prerequisites have been met.
- The Contractor will not proceed beyond identified witness tests and hold points without CONSULTANT's clearance. The CONSULTANT will plan their activities to prevent undue delays in inspection at these points. Construction schedules shall allow a reasonable time for inspection, as required.
- If it is observed that work is not conforming to specifications and drawings, CONSULTANT will promptly bring this information to the attention of the Contractor and will ensure that remedial works are carried out.
- In those situations where continued work would cause damage, preclude further inspection, or make remedial action ineffective, and where there is no authorized representative of the Contractor immediately available at the work location, CONSULTANT's inspector responsible for that work will have the authority to stop the work in progress. He will immediately notify EMPLOYER and the Contractor of such action.

CONSULTANT shall:

- Witness all field inspections and tests that are necessary to comply with the project specification.
- Witness, review, analyze, and certify all proof of proper construction provided by the Contractor to ensure compliance with the project specifications.
- Witness and certify the final inspections of equipment.
- Verify that the independent TPI carrying out radiographic inspection and interpretation of radiographs of welds is well qualified and acceptable to ERL.
- Verify that the number of welds to be spot checked is a true representation of the actual number of welds.
- Verify that the Contractor maintains a proper and up-to-date documentation system of the radiographs, which can identify the location of the weld and the welder concerned.
- Verify that all inspection reports and files with proper cross identification with field materials are handed over to EMPLOYER within 1 (one) month after the declaration of Mechanical Completion of any part of the project.
- Witness, monitor and verify that all field inspections by the Contractor for mechanical equipment, civil materials and electrical equipment will adhere to the procedures laid

down in the Project specification.

- Verify that erected equipment conforms to the flow diagrams, construction drawings, manufacturers and the project specification.
- Organize field engineering work, wherever necessary and provide assistance to EMPLOYER in timely resolving of Site problems.
- Witness hydro-test, pneumatic and other field tests jointly with the Contractor and confirm successful completion of the same.
- Visual inspection of materials received at site for identifying any damage during transit and to ensure inspection certificates have been received along with the equipment.
- Supervise all restoration work required as part of the project. Provide drawing, specification or any clarification required in this connection.
- Establish the effectiveness of the cathodic protection system implemented as part of the project.
- Supervise the commissioning of the DCS, SCADA, PLC, Telemetry, Custody Transfer system etc. for the facilities.

f) Material Control and Warehouse Management:

The material procured by the Contractor for the project has to be stored in the temporary Warehouse. The CONSULTANT shall supervise the correct way of storage and handling, in order to ensure the integrity of the equipment and material and correct assignment to the various construction sites.

CONSULTANT will do the following:

i. Monitor equipment and materials receipt at the site, site inspection, storage and issue by Contractor/Sub-contractors.

ii. Monitor and verify (e.g. in case of discrepancies) the material receipt status and inventory status at the Site with relation to the material delivery schedule based.

iii. Review the material control plan/procedure of contractors.

iv. Supervise and audit adherence to the QA/QC program and issue QA/QC reports identifying actions for compliance by concerned agencies.

v. Overview of various insurance policies of transit and storage-cum-erection risks.

g) Mechanical Completion:

CONSULTANT will ensure that the EPC Contractor prepares a phased mechanical completion program to facilitate sequential pre-commissioning activities in a logical manner, which will be submitted to the CONSULTANT for review and approval.

CONSULTANT will ensure that the EPC Contractor submits the System Completion Manual, which will contain checklists, forms and procedures for systems testing to achieve Mechanical Completion. CONSULTANT will review this Systems Completion Manual and recommend to the Employer for approval.

CONSULTANT will ensure that all parts of the Project have been mechanically erected as per design and that all systems testing has been carried out satisfactorily and according to the approved Systems Completion Manual and start-up schedule. CONSULTANT will review the punch list of all uncompleted work and unrectified deviations to ensure that such work is performed before the certificate of mechanical completion can be issued. CONSULTANT will then recommend to the Employer to issue a Certificate of Mechanical Completion for the relevant part of the project.

H. Pre-Commissioning, Commissioning, Start-up, Testing and Handover Phase:

PMC will monitor, observe and supervise all Pre-Commissioning, Commissioning, Start-up, Testing and Handover Works to be performed by the Contractor to ensure that the Facility is satisfactorily commissioned, started-up, tested and handed over in accordance with the requirements

of the EPC Contract.

PMC shall verify that licensor commissioning representatives (AXENS, UOP, Poerner, Shell, Technip Benelux) are contractually committed to be present on-site during start-up of their respective licensed units.

a) Pre-Commissioning

CONSULTANT shall:

- Ensure that the Operating Manuals are prepared by the Contractor for review by CONSULTANT and that comments are incorporated by the Contractor.
- Verify that all the pre-commissioning/commissioning activities of the Project are carried out by Contractor in accordance with established procedure, schedules and program, as detailed below:
    i. Equipment operation to make checks of vibration and safety devices, and other required operating tests and adjustments.
    ii. Adjustments and replacements of accessories as required.
    iii. Flushing, blowing, pickling, and cleaning.
    iv. Installation of temporary screens, strainers and blinds.
    v. Necessary purge operations, including installation of temporary purge piping or hoses to equipment connections.
    vi. Functional check on all instruments and controllers.
    vii. Instrument calibrations with standard test equipment and all required adjustments and control point settings.
    viii. Checks on all instrument loops for proper functioning.
    ix. Checks on pipes and equipment hangers, supports, and guides for hot/cold settings and necessary adjustments.
    x. Checking and recording positions of all valves.

CONSULTANT will enforce measures to ensure that all defects and deficiencies found during the course of Pre-Commissioning shall be rectified by the Contractor. CONSULTANT will advise the Employer of the satisfactory completion of the Commissioning and recommend the issuance of the Certificate Ready for Commissioning for the relevant part of the project.

b) Commissioning and Start-up:

During this phase, CONSULTANT shall provide necessary assistance to EMPLOYER in planning and organizing commissioning, start-up and performance test run of the Project facilities. The CONSULTANT's scope of work will comprise of, but not be limited to the following:

I. Review the commissioning and start-up program prepared by the Contractor.
II. Review and approve detailed operating manuals for each system/unit based on in-house data, manuals/ information, data from equipment vendors etc.
III. Review of commissioning and standard procedures for start-up, normal operation, shutdown and handling of abnormal situations.
IV. Coordinating and supervising commissioning schedules, start-up schedules, etc., with Contractors and others.
V. Preparing punch/check lists, for verifying mechanical completion. (commissioning and start-up)
VI. Conduct a safety audit of the project facilities and prepare a checklist before pre-commissioning activities can be started.
VII. Assist EMPLOYER in pre-commissioning audit by Government Bodies.
VIII. Monitor recording and maintenance of daily commissioning log sheets and preparation of weekly progress reports and Crude/ Boil-Off Gas (BOG) flaring quantities during start-up by Contractor.
IX. CONSULTANT will verify that the Contractor provides sufficient manpower, special tools and spare parts necessary for assisting commissioning activities such as:

- Operational tightness testing.
- Pre-start inspections by Government bodies, as necessary.

After the successful completion of the previous tasks, CONSULTANT can declare each specific project facility "Ready for Start-up", jointly with EMPLOYER.

c) Start-up and Test Run:

The following work will be performed by CONSULTANT until the Project is Ready for Commercial operation:

i. Supervision/monitoring of check-up and calibration of the various instruments to be used for commissioning and testing.

ii. Supervision of all activities for start-up and testing of various sub-systems and of the whole system, all in accordance with the start-up schedule.
Development of criteria for Provisional and Final Acceptance.

iv. Analysis and evaluation of the test results obtained during testing and commissioning in order to determine the actual performance of equipment against contract requirements and guarantees.

V. Preparation of a checklist of all defects, deficiencies, shortages etc., and development of a program for their correction and completion.

vi. CONSULTANT to prepare review performance test procedures and specify, among other things, the following:

- Operating Data to be recorded in a log sheet.
- Analytical methods.
- Methods of calculations
- Interpretation and measurement of tests.
- Manner of taking operating data and its frequency.
- The manner of evaluating the performance, including appropriate corrections, if any, for test conditions such as feed stock quality, etc.
- Ensure that performance tests of the facilities are performed in accordance with professional engineering standards, plant safety, and operating standards.
- On completion of performance test runs, prepare an independent report for EMPLOYER on the performance of the system with recommendations (in consultation with Contractor and EMPLOYER) on ways and means of improving performance, if necessary.
- CONSULTANT will evolve an acceptable List of Content and formats for compilation by Contractor for handing over of SPM and pipeline system to ERL, including all required documentation, completion certificates, etc., and shall recommend to ERPLC regarding taking over of facilities.

Performance Guarantee Test, Acceptance and hand-over:

- CONSULTANT will ensure that performance tests of the project facilities are carried out by Contractor. CONSULTANT will assist EMPLOYER in conducting the performance tests by way of analysis and interpretation of data gathered during performance test.
- Ensure Contractor completes Performance Tests in accordance with approved schedules and procedures.
- Witness and confirm completion of all Works and EPC contractual requirements for Partial Acceptance and Operational Acceptance.
- Witness and certify completion of all Works and EPC Contract for hand-over to the Employer.

- As a condition precedent to Provisional Acceptance and Interim Acceptance of the EPC Contract, verifying Contractor's delivery to Employer the Record Drawings and Specifications in accordance with the EPC Contract;
- Assist Employer with the enforcement of warranties and defect correction obligations of the Contractor, Subcontractors and Vendors;

I. General Phase (HSSE, Project Management, Documentation, Assistance in Obtaining Statutory Approvals, Documents):

This General Phase of the PMC Scope of Services details the requirements of the PMC Teams that will, through HSSE organizations, monitor, observe and supervise the compliance of the Contractor during the execution of the EPC Contract in the important activities related to HSSE, Contract Management and Project Services (hereinafter referred to as *"General Phase"*).

❖ Health, Safety, Security and Environment (HSSE)

PMC will monitor, observe and supervise the performance of the EPC Contract to ensure that there is full compliance with the Contractor's HSSE Plan. The HSSE Manager reports to the Employer's Director (Project Development) and also serves as a monitor on the HSSE compliance activities.

The HSSE Team will be responsible for the tasks which shall include but not limited to:

1. Provide coordination, support and advice on HSSE activities.
2. Develop and maintain process safety integrity management system, HSSE standards and safety rules.
3. Ensure that all HSSE elements of the Contractor's work and Operations activities are conducted in alignment with Process Safety Integrity Management ("PSIM") systems, Employer's safety rules and HSSE standards.
4. Ensure that specialist advice is used effectively, specifically in support of PSIM requirements including identifying the need for and making it timely available.
5. Implement, monitor and ensure compliance of Contractor's HSSE Plan.
6. Ensure alignment of Contractor's HSSE Plan with Employer's HSSE standards and implement changes to Contractor's HSSE Plan as required from time to time to address any deficiencies or special areas needing further attention.
7. Provide an auditable trail on any significant HSSE issues by action tracking systems.
8. Ensure all necessary HSSE approvals and permits are obtained and all Bangladesh's HSSE regulatory requirements are met.
9. Co-ordinate HSSE-related reviews and studies including Pre-Start-up HSSE Reviews, Quantity Risk Assessments etc.
10. Ensure that HSSE procedures, working practices and other control measures are adequately developed and implemented by Contractor, PMC and Operations team.
11. Ensure that Emergency Response Plans are in place and tested before handover.
12. The PMC shall verify that the EPC Contractor implements a comprehensive Process Safety Management programme covering as a minimum: Management of Change (MoC); Mechanical Integrity inspections; Pre-Startup Safety Review (PSSR) for each process unit; written operating procedures; employee HSSE training; incident investigation; and emergency planning and response. The PMC shall audit the PSM programme at least twice per year and report findings to the Employer.
13. The PMC shall monitor and report on the EPC Contractor's environmental performance throughout the construction phase; construction effluent discharge quality;. hazardous waste segregation and disposal; and spill prevention and response.
14. The PMC shall review the project's Quantitative Risk Assessment (QRA) conducted during detailed design and verify that all risk reduction recommendations and mitigations identified in

the QRA have been fully incorporated into the engineering design. The PMC shall prepare a QRA Action Close-Out Report for Employer approval before any pre-commissioning activities commence.

❖ **Project Management**

The CONSULTANT shall be responsible for total management of the project activities from data collection & surveying to pre-commissioning/ commissioning activities and performance test of the entire project facilities, which includes the following:

a) Planning Scheduling:

CONSULTANT shall supervise the activities and ensure that Contractor:

i. Prepare preliminary schedules for discussion and finalization of the same with EMPLOYER.
ii. Prepare an overall project schedule/network identifying critical path, priority activities and target dates for completion.
iii. Update the networks and project schedules regularly.
iv. Prepare detailed schedules for approval by CONSULTANT
v. Preparation of detail discipline wise schedule with indication of milestones
vi. Traffic study of rail/road/water ways, for transportation during construction. Phase to identify constraints in movement and suggestions for improvement.

b) Project Cost:

i. Project cost estimation/updating (the accuracy level of the estimate should be within ± 10%). The estimate will be updated at the conclusion of a complete construction phase (tentatively, two per year) or at the completion of an entire main section of the facilities
ii. Forecasting of fund requirement.
iii. CONSULTANT will assist EMPLOYER by providing data on Project technical matters, costs, schedule, progress reports and other documentation that will be required from time to time by financing institutions and other agencies involved.
iv. CONSULTANT will prepare the MR cost estimate for the items to be procured by EMPLOYER. The cost estimation/ update should be done upon completion of the award of the contract.

c) Project Procedures:

i. Develop Project procedures, including those for contract and establish formal lines of communication and coordination with EMPLOYER, and Contractor.
ii. Ensure that all information, drawings, specifications and data received or developed during the FEED phase are reflected within the EPC phase as per the agreed procedure.
iii. Develop project strategy and schedules; establish monitoring system, reporting system and Project information system.
iv. Develop a project information system for highlighting slippage and holdups for management action and control.
v. Review and approve Contractor's procedures covering mechanical completion, pre-commissioning, commissioning, start-up and performance test run of various units and their taking over from respective agencies.
vi. Verify that Contractor maintains the project procedures current through regular review/updating/ amendment.
vii. Create a Warranty tracking module that provides the specific equipment/component tag number, OEM (Original Equipment Manufacturer) name/model, acceptance sign-

off date of completion by Employer/PMC and the commencement/expiration dates of the Vendor vs Contractor warranty period (if such are not equal).

d) Co-ordination with various agencies:

i. Maintain constant interaction/surveillance with Contractor to ensure that commitments are met, schedules are maintained and the engineering work is performed as per the engineering design basis agreed for the project.
ii. Monitor the prequalification, purchasing, expediting and inspection activities of Contractor and initiate such actions as may be required for the timely delivery of purchased items to the project site.
iii. Maintain surveillance of the progress of construction of Contractor by visits to the job site for identifying and discussing field problems affecting the progress with the Resident Construction Manager of Contractor, wherever required.
iv. Co-ordinate with Contractor for initiating commissioning and start-up activities of the facility as well as performance test run of the same.
v. Verify proper documentation/drawings from Contractor/Vendor and for its timely availability and completeness, along with mechanical completion.
vi. Documents/Drawings Distribution System identifying review/approval information types.
vii. Ensure that all facilities have been installed/incorporated in the project and to take necessary corrective action for the incorporation of those left out facilities, if any, for completion of the project.

e) Review/ Approval/ Certifications:

i. Certification with respect to as-built drawings, supply of material, construction activities, etc.
ii. Certification of invoices of the Contractor for payments.
iii. Ensure review/approval of all designs/drawings/specifications, etc. as per the Document Review Procedures, submitted by Contractor within the time frame stipulated for the contract.
iv. Verify implementation of all stipulations/ suggestions of statutory/ advisory bodies and recommendations/ suggestions in Risk Analysis / Environmental Impact Analysis/HAZOP/SIL/HAZID/ENVID Study Reports. Before commissioning each facility, CONSULTANT will issue a Compliance Certificate, undersigned by the Contractor, indicating that the new facilities are meeting all the standards/norms of all the statutory/advisory bodies.
v. Ensure review/ approval of operation and maintenance manuals.

f) Project Reviews:

i. Hold regular project review meetings with Contractor and Client.
ii. Evaluation of progress of work with respect to the schedule and submit monthly progress reports to EMPLOYER.
iii. Review and comment on CPM/ PERT/ networks/ 'S' Curves for project monitoring, prepared by Contractor.
iv. CONSULTANT shall provide necessary documents/reports/charts and assistance for review of the progress of the project with various agencies from time to time.

g) Assistance:

i. Provide Techno-Commercial assistance for responding to queries of various agencies of Bangladesh.
ii. Assist EMPLOYER to obtain various clearances for the project from Local Bodies/Authorities, Statutory Authorities, and other Agencies as required for Project

implementation.

iii. All required data for the Project will be furnished by CONSULTANT with the collaboration of the EPC Contractor.

iv. Maintain the project risk register and ensure that the Contractor is maintaining its Risk Management system and procedures to ensure satisfactory project execution in accordance with the Contract Programmes.

v. Assess and certify all payment applications, issue payment certificates, and recommend for approval invoices received.

vi. Manage any claims that are received from the Contractor and evaluate, assess and recommend to the Employer how to respond.

vii. Handle any disputes that may arise between the Employer and the Contractor or any other third parties involved with the Project.

viii. Suggest ERP software for the operation of EMPLOYER's activities, which include but not limited to: plant operation and planning, maintenance, electrical, finance, accounts, procurement, inventory management, inspection, R&D, audit, HR etc.

h) Organization and Training:

i. CONSULTANT will evaluate and identify management requirement, the plant operation organization structure, and training program for EMPLOYER staff, for incorporation in the Training Program, which is in the Scope of the CONTRACTOR.

ii. CONSULTANT will study the facilities required by EMPLOYER for effective supervision of construction and operation of facilities and recommend to EMPLOYER for procurement of those facilities. The procurement action for such facilities will be undertaken by the CONSULTANT upon approval by EMPLOYER.

iii. CONSULTANT will arrange training program for EMPLOYER personnel for project management, Detailed engineering, procurement, construction supervision of EPC work.

❖ **Documentation Certification**

As-built drawings/documents/reports are to be prepared by EPC Contractor in English and CONSULTANT will approve prior submission to EMPLOYER.

❖ **Assistance in Obtaining Statutory Approvals**

The task will include the following activities:

a) Envisage the various statutory approvals required for the project.

b) Provide all technical assistance and necessary inputs for the same.

c) Attend all the meetings along with EMPLOYER in order to obtain timely approval

d) CONSULTANT shall design and supervise facilities identified and agreed by EMPLOYER as a part of the environmental clearance conditions stated in EIA and ECC.

The PMC shall support the Employer in obtaining and maintaining the following (not limited to) Bangladesh-specific regulatory approvals. For each, the PMC shall identify the required documentation, prepare technical inputs, attend regulatory meetings, and track approval status:

1. Department of Explosives (Chief Inspector of Explosives) – Approval for storage and handling of flammable and explosive materials; pressure vessel registration; approval of fire and gas detection systems.
2. Department of Environment (DoE) – ECC condition compliance monitoring; effluent discharge approvals; air emission approvals; waste management plan approvals.
3. Department of Fire Service and Civil Defence (FSCD) – Fire safety plan approvals; fire fighting system design approval; pre-commissioning fire safety audit.
4. Chittagong Port Authority (CPA) – Approvals for seawater intake, marine infrastructure modifications, and oversized equipment transport through port facilities.

5. Bangladesh National Building Code (BNBC) – Structural design compliance certification for all buildings and structures within the facility.
6. Bangladesh Energy Regulatory Commission (BERC) and Ministry of Power, Energy and Mineral Resources – All required licences and approvals for refinery operation.
7. Local Authorities of Chittagong – Chittagong City Corporation (CCC), Chittagong Development Authority (CDA), Civil Aviation of Bangladesh (CAB), etc. for all necessary approvals.

J. ADDITIONAL REQUIREMENTS

1. Safety Incident Reporting

The PMC shall provide the Employer with an electronic and/or hard copy (as requested by the Employer) of all safety incident reports within 24 (twenty-four) hours of any incident involving its personnel. However, for incidents involving significant non-scheduled events—such as hazardous material releases, fires, explosions, mechanical failures, or unusual over-pressurizations—the report shall be submitted to the Employer within 8 (eight) hours of occurrence. Notwithstanding the foregoing, immediate notification shall be given to the Employer if the incident is of such magnitude that it threatens public or employee safety, causes significant property damage, results in major injury, or interrupts the Services or Works.

Notwithstanding anything to the contrary, all safety Incident reports provided to Employer will meet the timing and content requirements of Applicable Law.

2. Weekly and Monthly Progress Meetings

Weekly and Monthly progress meetings shall be held for the purpose of keeping Employer and Contractor fully informed of all aspects of the performance of the Services and Works, and for reviewing execution plans, technical or financial concerns, progress status and scheduling of the Works and Services, remedial actions, quality concerns, safety concerns, interfaces, and Employer and Contractor plans for resolving issues.

During the Engineering Phase, weekly progress meetings will be held at the Contractor's design offices with participation from the Employer's personnel via video/teleconference. Additional quarterly review meetings will be conducted at Contractor's design offices and attended by Employer's senior management personnel to review the status of the engineering, design and procurement efforts and to verify implementation of any Recovery Plan that may have initiated during the quarterly period.

Commencing with the Construction Phase, Site weekly and monthly progress meetings will be held among the Employer Representative or his designee, Contractor, and any other Persons designated by Employer at the Employer-designated Site or off-Site location. Additional progress meetings may be held at the Employer's written request and at a location of the Employer's specification in order to update the Employer on the progress of the Works. The project manager shall coordinate the attendance of Persons requested by the Employer to attend this meeting.

The PMC will be required to submit a Monthly Progress Report that will advise the Employer on the progress made with regard to the performance of the PMC Scope of Services, the utilization of the manpower resources in the PMC Team and balance remaining and identify any key issues that the PMC wishes to bring to the Employer's attention. The format of such Monthly Report shall be jointly agreed upon between the Employer and the PMC.

3. Spare Parts

Procurement of Spares for the Project

CONSULTANT will review and recommend to EMPLOYER for approval the major list and quantity of spares for commissioning and for 2 (two) years of operation and mandatory spares & special tools recommended by the vendors for the complete project and will supervise that

Contractor then procures and hands over the same to EMPLOYER after commissioning of the project.

a) CONSULTANT will control that Contractor will submit the quotations for 2 years operational spares and that all material requisition documents for such spares are prepared by EPC Contractor and made available to EMPLOYER for their subsequent procurement. CONSULTANT will assist in evaluating and assessing the competitiveness of the prices quoted for these O&M spares. CONSULTANT will supervise through Contractor that all identified/ordered spares are procured by Contractor and delivered in time for start-up/commissioning.

b) CONSULTANT will review and control that Contractor provides all required spares/replacement components that may be required during commissioning and start-up activities of the plants within the overall contract value. If, however, any such commissioning spares are to be used by Contractor out of the O&M spares ordered separately by the EMPLOYER, then CONSULTANT will supervise that Contractor supplies timely and identical replacement for the same free of cost.

4. Clean up

The PMC shall, to the Employer's satisfaction, ensure that the Contractor maintains the Site at all times free from waste materials and rubbish arising from Site activities. Upon completion of all Punch-List Items, the PMC shall arrange for the EPC Contractor to promptly remove all Temporary Facilities, as well as any waste materials and rubbish generated or brought onto the Site. The Site shall be restored to the extent required by Applicable Law, including all applicable Permits. If the Contractor fails to remove any such waste materials or rubbish generated or brought onto the Site by its personnel or its Sub-consultants, the Employer may direct the PMC to undertake the removal, and all costs incurred by the PMC in doing so shall be charged to the Contractor's account.

5. Contractor Requested Variation Order

PMC shall receive and review claims for Requested Variation Orders or otherwise, for additional time and additional compensation, or other changes from Contractor or other third-party contractors. With respect to such claims, PMC shall request additional information and seek clarification of such claims as it believes appropriate and as allowed or required under the applicable EPC Contract. PMC shall make recommendations to the Employer's Representative about accepting or rejecting such claims within an adequate period of time to allow the Employer's Representative to review and respond to such claims within the time limits set forth in the EPC Contract. If instructed by the Employer's Representative in writing to do so, the PMC shall negotiate Variation Orders with the Contractor regarding their claims. PMC shall not be authorized to independently execute Variation Orders on behalf of Employer for the EPC Contract or otherwise agree to, settle upon, or dispose of any claim made by a Contractor.

6. Applicable Law

PMC shall advise Employer as to the scope and requirements of Applicable Law and the jurisdiction and interaction of the various Governmental Instrumentalities so that the Services and all Works can be performed in accordance with Applicable Law in effect for the applicable portion of the Services and Works.

7. Project Close-Out

Following Provisional Acceptance up to Operational Acceptance, PMC shall assist the Operations Manager in the final reconciliation and documentation of all Project contracts executed by Employer during the Project period. PMC shall ensure all documentation by non-Contractor/third-party contractors has been entered into the Master Documentation System and, as applicable, into the Facility O&M manuals.

K. Defect Liability Period (DLP) Support

Following issuance of the Operational Acceptance Certificate and throughout the Defect Liability Period (DLP), which shall be as defined in the EPC Contract, the PMC shall:

1. Maintain a Defect and Punch List register tracking all outstanding defects and warranty items. The register shall record each item's description, responsible party (Contractor, Sub-contractor, or Vendor), target rectification date, and current status.
2. Monitor the EPC Contractor's rectification of all defects identified during the DLP and certify satisfactory completion of each defect rectification prior to DLP expiry.
3. Assist the Employer in processing and enforcing warranty claims against the EPC Contractor, its sub-contractors, and equipment vendors during the DLP, including preparation of formal claim notices and supporting technical documentation.
4. Advise the Employer on the release of retention monies and performance bonds in accordance with EPC Contract terms following satisfactory DLP completion.

L. Asset Integrity, Reliability and Maintenance Readiness

To support ERPLC's readiness for safe and reliable operation of the new refinery, the PMC shall:

1. Review and advise on the Asset Integrity Management Strategy for the new refinery, including the risk-based inspection (RBI) programme, statutory inspection schedule, and initial integrity baseline data requirements.
2. Review and advise on the selection and configuration of a Computerised Maintenance Management System (CMMS) appropriate for a refinery of this complexity, ensuring integration with the Employer's existing systems (if applicable). The PMC shall verify that the EPC Contractor populates the CMMS with all vendor-recommended maintenance data, spare parts data, and equipment history before handover.
3. Review the EPC Contractor's proposed Reliability, Availability and Maintainability (RAM) analysis and Reliability-Centred Maintenance (RCM) programme for rotating and critical static equipment.

8. Key & Non-Key Personnel

a. Key Personnel:

Sl.	Position	Minimum Qualification	Minimum Experience
1	Team Leader	Bachelor in Engineering, PMP/MCIPS or equivalent	15 years as per (Note-1)
2	Lead Engineer-Process	Bachelor in Engineering	10 years as per (Note-2)
3	Installation/Site Lead Engineer	Bachelor in Engineering	10 years as per (Note-2)
4	Lead Engineer- Civil	Bachelor in Engineering	10 years as per (Note-2)
5	Lead Engineer- Mechanical	Bachelor in Engineering	10 years as per (Note-2)
6	Design Engineer	Bachelor in Engineering	10 years as per (Note-2)
7	Lead Engineer- Instrument & Control	Bachelor in Engineering	10 years as per (Note-2)
8	Lead Engineer- Electrical	Bachelor in Engineering	10 years as per (Note-2)
9	Financial Specialist	CA/CMA or equivalent	10 years as per (Note-3)
10	HSSE Specialist	Bachelor in Engineering	10 years as per (Note-4)
11	Contract and Procurement Specialist	Master's/MCIPS/equivalent in procurement management	15 years as per (Note-5)

12	Commissioning & Test Run Specialist	Bachelor in Engineering	10 years (Note-6)

Note: The CONSULTANT is encouraged to recruit at least 3 key personnel from the Employer's own country.

Note-1: The Personnel proposed against the Team Leader shall be at least graduated in Chemical/Petroleum/Mechanical engineering and shall have experience in Petroleum Oil Refinery/Chemical/Petrochemical project.

Shall have experience in preparation/review of FEED documents for both licensed and non-licensed units, details and itemized costing, risk assessments and mitigation measures. Preparation of bid documents for selection of EPC contractor, evaluation & recommendation for selection of EPC contractor, project management consultancy and supervision of Engineering, Procurement, Construction, Start-up, Pre-commissioning, Commissioning, Test Run and Handover activities.

Shall be capable of preparing the technical & managerial reports on projects and other related operations.

Shall have experience as a team leader of construction in PMC.

Note-2: The Personnel proposed against Lead Engineer (Process/Civil/Mechanical/Instrument /Electrical), Installation/ Site Lead Engineer, Design Engineer shall be at least a graduate Engineer in respective discipline and shall have experience in Petroleum Oil Refinery/Chemical/Petrochemical/Fertilizer project.

Shall have experience in the preparation/review of FEED documents for both licensed and non-licensed units, risk assessments and mitigation measures. Preparation of bid documents for selection of EPC contractor, evaluation & recommendation for selection of EPC contractor, project management consultancy and supervision of Engineering, Procurement, Construction, Start-up, Pre-commissioning and Commissioning activities.

Note-3: The Personnel proposed against financial specialist shall have the experience in preparation of Detail and itemized Cost estimate of minimum accuracy level of Class 2 as per Association of Cost Engineers (ACostE).

Note-4: The Personnel proposed against HSSE Specialist shall have the experience of preparation of Initial Environmental Examination, Environmental & Social Impact Assessment, and Risk Analysis etc. in Oil and Gas sector; supervision of the performance of the EPC Contract to ensure that there is full compliance with the Contractor's HSSE Plan. The HSSE Specialist will be responsible for- develop and maintain process safety integrity management system, HSSE standards and safety rules, ensure alignment of Contractor's HSSE Plan with Employer's HSSE standards and implement changes to Contractor's HSSE Plan as required from time-to-time to address any deficiencies or special areas needing further attention, ensure all necessary HSSE approvals and permits are obtained and all Bangladesh's HSSE regulatory requirements are met and ensure that Emergency Response Plans are in place and tested prior to handover.

Note-5: The Contract & Procurement Specialist shall possess at least a Master's degree/ MCIPS/ or an equivalent qualification in procurement, supply chain management, or a related discipline. The expert shall have substantial experience in planning, supervision, and administration of procurement and contract management functions for large-scale international projects, preferably in the oil and gas or infrastructure sector. Proven expertise in international competitive bidding, contract negotiation, claims management, and compliance with

recognized procurement frameworks (e.g., multilateral development bank guidelines or national regulations-will be required.

Note-6: The Personnel proposed against Commissioning & Test Run Specialist shall be at least graduate Engineer and shall have experience in supervision of Start-up, Pre-commissioning, Commissioning, Test Run and Handover activities for Petroleum Oil Refinery/Petrochemical project.

Special Note:

The information of the Personnel[s] mentioned is to be submitted as per attached format of CV. The CV shall be appended with photograph and each page must be signed by the respective person and the signature must be followed by current date. Certificates in support of academic qualification must be attached with CV of the Personnel concerned. Experience of the Personnel must be certified by the authorized person of the consulting Firm submitting the proposal. Otherwise, evaluation points against the relevant item will not be awarded to the Personnel.

Only one CV may be submitted for each Professional staff category. If alternate Professional staff is proposed by the firm for one position, the lowest rating among the Professional staffs shall be considered during evaluation.

b. <u>Non-Key Personnel:</u>

Sl.N.	Position	Minimum Qualification	Minimum Experience
Non-Key Experts			
01	**Project & Engineering Team**		
	1. Project Coordinator	Bachelor in Engineering	10 years
	2. Project Engineer	Bachelor in Engineering	08 years
	3. Process Engineer	Bachelor in Engineering	08 years
	4. Planning Engineer	Bachelor in Engineering	08 years
	5. Contract Engineer	Bachelor in Engineering	08 years
	6. Inspection	Bachelor in Engineering	08 years
	7. QC/QA	Bachelor in Engineering	08 years
	8. Cost Engineer	Bachelor in Engineering	08 years
	9. Instrumentation Engineer	Bachelor in Engineering	08 years
	10. Electrical Engineer	Bachelor in Engineering	08 years
	11. Piping Engineer	Bachelor in Engineering	08 years
	12. Civil/Structure Engineer	Bachelor in Engineering	08 years
	13. Mechanical Engineer (Static/Fired Equipment/Materials)	Bachelor in Engineering	08 years
	14. Mechanical Engineer (Rotating/Packaged Equipment)	Bachelor in Engineering	08 years
02	**Construction & Commissioning Team**		
	1. Area Coordinators	Bachelor in Engineering	10 years
	2. Planning Engineer	Bachelor in Engineering	08 years
	3. QA Manager	Bachelor in Engineering	08 years
	4. Mechanical Supervisor	Bachelor in Engineering	08 years
	5. Welding Inspector	Bachelor in Engineering	08 years

Sl.N.	Position	Minimum Qualification	Minimum Experience
	6. Electrical Supervisor	Bachelor in Engineering	08 years
	7. Instrumentation Supervisor	Bachelor in Engineering	08 years
	8. Civil Supervisor	Bachelor in Engineering	08 years
	9. HSSE Officer	Bachelor in Engineering	08 years
	10. Officer (Admin/Accounts)	Masters in relevant discipline	08 years
	11. Document Controller	Bachelor in Engineering	

Note: The CONSULTANT has to recruit at least 15% (Fifteen percent) of Non-key personnel from the Employer's own country (encouraged to recruit 30% of Non-key personnel from the Employer's own country).

09. Duties of The Client- Services, Facilities and Property to be Provided by the Client:

The Client will provide the following to the consultant without any cost:

a) Assistance to get permissions & licenses for the consultant to work in the Client's country only.
b) Available documents, drawings, maps, data, and information related to the project. The consultant shall not disclose such information, materials and documents to any person or group without written permission of the client as deemed confidential.
c) The Consultant shall entirely be responsible for all such facilities as arranging office, accommodation of staff, vehicles, equipment, computers, support/secretarial services and other logistics required for providing the services specified in the ToR.

10. Duration of Performance:

The assignment is to be completed within 66 (sixty-six) months from the effective date of the contract. All the phases specified in the scope of works for the CONSULTANT shall take place within this time period.

11. Key Deliverables:

The key deliverables are as follows, including but not limited to:

1. FEED Review Report,
2. Review Report of Licensor Phase-2 Documents,
3. Final EPC Tender Document after reviewing the draft prepared by the Employer,
4. Evaluation Report of Tender Documents.
5. Report on Detailed Engineering Design, HAZOP and SIL Study of the Project.
6. Report on Procurement Inspection & Testing
7. Vendor and contractor coordination
8. Cost estimate reports
9. Construction supervision and site management
10. Schedule tracking and milestone monitoring
11. Site supervision reports, including quality control and HSSE compliance
12. Pre-commissioning and commissioning oversight reports
13. Variation/change management reports, and claims analysis
14. Provisional Acceptance Certificate
15. Final project close-out and handover support

16. Operational Acceptance Certificate
17. Monthly Progress Report
18. Annual Report
19. Safety Incident Reporting
20. Access to Digital Portal for Document Transmission
21. Documentation control and as-built verification

12. Distribution of Man-months:

The distribution of man-months for the assignment is as follows:

Sl.N.	Position	No of personnel	Duration (months)	Total Man-months
Key Experts				
1	Team Leader	1	66	66
2	Lead Engineer-Process	1	60	60
3	Installation/ Site Lead Engineer	1	48	48
4	Lead Engineer- Civil	1	48	48
5	Lead Engineer- Mechanical	1	60	60
6	Design Engineer	2	24	48
7	Lead Engineer - Instrument & Control	1	60	60
8	Lead Engineer - Electrical	1	60	60
9	Financial Specialist	1	48	48
10	HSSE Specialist	1	60	60
11	Contract and Procurement Specialist	1	48	48
12	Commissioning & Test Run Specialist	1	10	10
Sub-total (Key Experts)		**13**		**616**
Non-Key Experts				
12	**Project & Engineering Team**			
	1. Project Coordinator	1	66	66
	2. Project Engineer	2	60	120
	3. Process Engineer	1	36	36
	4. Planning Engineer	1	36	36
	5. Contract Engineer	1	36	36
	6. Inspection	1	36	36
	7. QC/QA	1	48	48
	8. Cost Engineer	1	42	42
	9. Instrumentation Engineer	1	48	48
	10. Electrical Engineer	2	48	96
	11. Piping Engineer	1	36	36
	12. Civil/Structure Engineer	2	36	72
	13. Mechanical Engineer (Static/Fired Equipment/Materials)	2	36	72
	14. Mechanical Engineer (Rotating/Packaged Equipment)	2	36	72
Sub-total (Project & Engineering Team)		**19**		**816**
13	**Construction & Commissioning Team**			
	1. Area Coordinators	1	42	42
	2. Planning Engineer	1	42	42

	3. QA Manager	1	42	42
	4. Mechanical Supervisor	2	42	84
	5. Welding Inspector	2	42	84
	6. Electrical Supervisor	2	42	84
	7. Instrumentation Supervisor	2	42	84
	8. Civil Supervisor	2	42	84
	9. HSSE Officer	1	42	42
	10. Officer (Admin & Accounts)	2	42	84
	11. Document Controller	1	60	60
	Sub-total (Construction & Commissioning Team)	**17**		**732**
Sub-total (Non-Key Experts)		**36**		**1548**
Grand Total (Key + Non-key)		**49**		**2164**

Note: The man-month calculations given above are indicative only. Based on the scope of works, the CONSULTANT shall propose the required man-month and level of engagement at different stages of the project.