

09 CHAPTER
COMPREHENSIVE OPERATION AND MAINTENANCE OF
WATER TREATMENT PLANTS (GENERAL)

PART A: SCOPE OF WORKS

- 1.0 The contract includes **comprehensive operation and maintenance** of entire Water Treatment Plant (deemed to include all units/items/equipment within the scope of work including clear water sump & pump house, ESR, etc.) **on round the clock basis for a period of 60 Calendar Months (Five Years) after successful completion of trial run of three months and acceptance of Plant.** Guidelines stipulated in Manual on Water Supply and Treatment, Latest Edition, published by Central Public Health and Environmental Engineering Organization (CPHEEO), Ministry of Urban Development, New Delhi, shall be followed. The O & M period starts after completion of three months of trial run and acceptance of plant by engineer-in-charge. Additional information is given in the following sections to facilitate the monitoring works. Contractor shall note that preparation of Operation and Maintenance Manual for the WTP designed and set up by them is included in Scope of Work. This manual shall be duly got approved from Employer prior to commissioning.

The same may be extended for the further period if the client so desires at mutually agreed terms & conditions. However, scope of work will remain unchanged.

- 2.0 The Water Treatment Plant set up on turnkey basis shall be operated and maintained by the contractor including all works. **CONTRACTOR HAS TO INCUR ALL THE COSTS, TAXES, VAT, DUTIES, TRANSPORTATION, LABOUR, MACHINING, WELDING, REPAIRING, REPLACING AND MAKING GOOD ANY AND ALL PARTS / PLANT EQUIPMENT INCLUDING SAPRES & CONSUMABLES FOR ENTIRE PLANT UNDER THE SCOPE OF THIS TENDER, ANY OTHER CONSUMABLES, CHEMICALS FOR LABORATORY, ETC. TO SUMMARIZE, ONLY RAW WATER, POWER, ALUM & CHLORINE (WITHIN WTP PREMISES AT ONE POINT) & DIESEL FOR DG SET SHALL BE SUPPLIED FREE OF COST BY CLIENT AND REST ALL COST INCURRED WITH RESPECT TO OPERATION & MAINTENANCE INCLUDING ANY STATUTORY APPROVALS (PAYMENT OF FEES FOR STATUTORY APPROVAL & ISSUING REQUIRED AUTHORIZATION / LETTERS SHALL BE BY CLIENT BUT LIASIONING & REST ALL REQUIREMENTS FOR OBTAINING APPROVAL SHALL BE BY THE CONTRACTOR) DURING SPECIFIED PERIOD OF O&M CONTRACT SHALL BE BORNE BY SUCCESSFUL BIDDER (CONTRACTOR).**
- 2.1 Average Power Factor for the supply company Power Bill must be greater than 0.95 and if any Penalty/Charge levied due to low Power Factor, then the same shall be recovered from the contractor without any reasons in addition to the penalty for each instance of non-maintenance of desired power factor of 0.95 or better as per specifications at HT side / Supply Company Meter (or Bill) each month as mentioned separately below. All capacitor panel/s must be kept in working condition to maintain power factor generally of 0.98 lag or better by the contractor. Penalty on account of poor power factor by power supply company and as explained elsewhere will be recovered from the contractor from his monthly O&M bill.
- 3.0 The Contractor will be held responsible for O&M and satisfactory performance of the WTP. Major components and works shall include the following but not limited to:
- a) Operate the plant efficiently for FIVE years (24 hours/day & 365 days/year) including all consumables, parts or components, labor transportation and other charges, except for cost of power, chlorine, PAC / Alum and supply of raw water. Power cost would be borne by Employer. Raw water shall be supplied by employer. PAC / Alum and chlorine and Diesel for

DG Set (during Trial run as well as during O&M period) shall be supplied free by employer. However, bidder shall supply any other chemical/coagulant, etc. as required (DWPE, etc.) in order to achieve the treated water quality as per tender.

PAC / Alum & Chlorine shall be made available at one point within proposed WTP premises. However, all cost pertaining to loading / unloading and transportation up to required place, loading, etc. of PAC/Alum and Chlorine Tonners (Filled and empty as applicable & including loading/unloading of empty tonners returned for filling) shall be in bidder's scope and included in bidder's price.

- b) Operate and maintain all units and equipments of the Water Treatment Plant as per the requirement of the process to meet continuously and consistently desired treated water characteristics in conformity with specifications and CPHEEO guidelines; maintain all equipment in good working condition as per the O & M manual as prepared by the contractor and duly approved by the Employer.
- c) Attend breakdown of civil, mechanical, electrical, piping and instrumentation works and maintain the plant and equipment through out the Contract Period.
- d) The operation and maintenance service provided by the Contractor for the period specified in the Contract shall ensure the continuous operation of the Plant and that the breakdown or deterioration in performance, under normal operating conditions, of any items of Plant and equipment and component parts thereof is kept to a minimum.

The contractor shall determine operating parameters, select settings (chemical dosages, etc.) and generally optimize the process, and working of the treatment plant. Excessive chemical dosing i.e. dose more than / less than normal should be avoided.

- e) The Contractor shall adhere to the manufacturers' recommendations with respect to equipment maintenance, consumables, the types and grades of lubricants to be used, frequency of lubrication, adjustments to be made regularly and recommended spares to be held in store.

The contractor shall provide **timely planning and regular procurement of all required spares and consumable including chemicals, chlorine tonners, grease, lubricating oil, cleaning agents, laboratory reagents etc.** Contractor shall arrange for the requirement well in advance.

- f) Maintaining Logbooks / Records of the work carried out to keep them in good working condition. He shall obtain approval of the format of logbooks and records from Employer.
- g) The Contractor shall prepare and implement an effective plant maintenance program in consultation with the Employer. It is absolutely the Contractor's responsibilities to look after all sorts of maintenance whether routine, preventive or break down or any other type of maintenance. The Contractor will be responsible to carry out day to day as well as periodic maintenance necessary to ensure smooth and efficient performance/running of all equipment.
- h) Submission of daily and monthly O & M report in the format as mutually agreed between client and contractor.
- i) Carry out regular and frequent sampling, analysis and result recording of raw, clarified, treated water & any other intermediate process parameters as per the procedures laid out by the Owner and in conformity with standard methods.
- j) Employ appropriate and skilled manpower, provide all tools, tackles, spares, consumables, equipment, laboratory instruments, glassware and chemicals, reagents etc. required for effective implementation of the Services detailed above.

- k) Area lighting - Daily on/off operation and routine cleaning of all type of lighting / electric fixtures including fans / exhaust fans, etc. Replacement of lamps / Tubes / Fans in case of failure at contractor's cost.
- l) Maintenance of garden – Normally watering the trees once a day or more if required. Grass cutting, removal of shrubs, weeds, around tree to be done as directed. Remarking the ponds around the tree after loosening with soil with supply of additional earth, if required. Cutting of branches, if required, for straight growth of tree/plant and development of garden.
- m) All buildings, bathroom, toilet to be kept, swept, cleaned and washed daily. Consumable requirement for cleaning such as acid, harpic, phenyl, air freshner, washing powder, brooms, wire brushes, duster, bamboos, toilet soap, kharata (broom) shall be provided and used as required. All ventilators, windows/doors to be cleaned and to kept in good aesthetic condition.
- n) To keep watch on overflowing of sump. If such overflow takes place the agency shall make it good and shall have to bear the damages caused to surrounding properties.
- o) Maintaining laboratory and its all equipments. All materials, equipment and labour shall have to be employed by the agency to maintain the same.
- p) Contractor shall ensure that the treatment plant is run on continuous basis and shut down if any subject to obtaining prior permission / approval of the employer. Generally major repair encountered in any unit shall be attended as quickly as possible.
- q) Contractor shall submit six copies of the O & M Manual for approval of Employer, which may be modified, if required by Employer, and two copies would be returned by Employer duly approved and signed.
- r) The contractor shall monitor the performance of the Water Treatment Plant, conduct the analysis of various parameters as indicated in tender specifications / requirements for the inlet raw water, clarified water, & treated water (Filter outlet / CWPH / Treated Water Pump Outlet). Contractor shall initiate and take adequate actions to ensure smooth and satisfactory performance/ running of the plants on a 24 hours/ round the clock basis.
- s) For the smooth running of the plant all the required equipment, machineries, fittings & accessories, major and minor spares, consumables including chemicals, greases, lubricants, luminaires, all cleaning agents, packing, rubber sheet, laboratory reagents, all hardware, required quantity of white wash, oil paint color, all types of synthetic enamel / epoxy paint, material required for house- keeping and cleaning etc. are to be brought by the contractor. The quality of all consumable and spare etc. i.e. technical requirements as per manufacture recommendation shall remain unchanged.
- t) Deleted
- u) The contractor shall carryout painting for exterior finish of civil units & interior of all buildings / pump house with paint type as per tender specifications once before the end of third year of O & M of the plant and shall also carry out painting on mechanical equipment / above ground pipe lines / hand railing before the end of third year of O & M of the plant.
- v) The contractor shall hand over the plant back to CLIENT on expiry of his contract in fully working condition satisfying the requirement of treated water. All the electrical, mechanical and instrumentation including standby shall be in perfect working condition.

- 4.0 The Contractor shall procure, keep at site and use necessary tools, tackles and safety equipments for day to day routine maintenance, preventive maintenance and break down maintenance. Also minor and major repairs to the equipment involved in the plant have to be carried out by the contractor during the O&M period. Contractor shall submit report, discuss and finalize with the Employer on the major repairs required to be carried out and how these repairs will be undertaken, to the satisfaction of the Employer and obtain written approval from the Employer before carrying out any major repairs.
- 4.1 The scope also includes cleaning of various units, clariflocculator, removing of foreign materials like debris, sand, fish, frogs or any other dead or live animals and also cleaning of strainers of each pump quarterly so that required quantity of water is treated properly.
- 4.2 The disposal of the foreign particles like sand, dead or alive animals etc. from all the units of the plant to suitable place as shown by CLIENT is in the scope of contractor.
- The scope of works also includes the calibration of all meters as required e.g. pressure gauge, Ammeter, voltmeter, relay, trivector meter, Energy meters, temp scanners, flow meters etc. for measurement of accurate readings.
- The scope of work of contractor also includes operation & maintenance of 11 KV Power Supply Company incoming line, Lighting Arrestors, D.O. fuse, earthing works, or any other maintenance required on two/four pole D P structure.
- 5.0 Scope of CLIENT will be only to the extent of supplying raw water and bear the energy charges to be paid to Power Supply Company and supply of alum and chlorine at on point within WTP premises.

PART B: OPERATION AND MAINTENANCE SPECIFICATION

1.0 SUFFICIENCY OF TENDER

- 1.1 The prices entered in the Price Schedule shall, except in so far as it is otherwise provided, be deemed to cover all the Contractor's obligations under the Contract and all matters and things necessary for the operation and maintenance of the Plant. Particular requirements set forth in the Specification are given without prejudice to the aforementioned general obligations of the Contractor.

2.0 DOCUMENTS / INSTRUCTION FURNISHED BY THE EMPLOYER

- 2.1 The Employer may issue at such times as he may think proper during the contract period instructions as may appear to him to be necessary for the guidance of the Contractor in the operation and maintenance of the Plant. The Contractor shall be bound by the same, obey and execute.
- 2.2 The Contractor shall acknowledge the receipt of such instructions in writing or by fax / e-mail. The Contractor shall carefully check all such instructions before commencing any Works. The Contractor shall inform the Employer in writing, within 3 (three) days from the receipt of the same, of any errors or omissions discovered, or of the difficulty to execute any Works or part thereof in compliance with the written instructions received from the Employer. Failing to do so contractor shall be liable to execute at their own cost the necessary alterations to any Works resulting from these errors or omissions.
- 2.3 The Contractor will also be furnished with two copies of all instructions as may be issued by the Employer. One copy of all such O & M manuals and instructions issued to the Contractor shall be kept in his office at the site. The O & M manuals or instruction shall be considered valid only if the Employer has signed it.

3.0 CONTRACTOR'S ORGANISATION & ADMINISTRATION OF THE CONTRACT

- 3.1 The Contractor shall provide experienced administrative, managerial, technical, supervisory, non-technical personnel and labour necessary to operate and maintain the plant properly, safely and efficiently on a continuous 24 hours basis for the full term of the O & M Contract Period. During O & M period if any expert / technically knowledgeable / specialized persons or manpower needed, he shall have to arrange & bear / pay any and all cost, charges, fare, allowances etc. for the same. The employer will not pay any cost / charges for the same.
- 3.2 The qualifications and capability of the Contractor's personnel shall be appropriate for the task they are assigned to perform. The staff provided shall be fully trained in the operation of the various units of the Treatment Plant before being given responsibility for operating any part of the Plant. If in the opinion of the Employer, any member of the Contractors staff is considered to be insufficiently skilled or otherwise inappropriate or not doing the work properly he is required to perform, he shall be replaced by the Contractor with a person with the appropriate skills and experience for the task, to the satisfaction of the Employer. The Contractor will be required to submit to the Employer the Schedule of 'Manpower' and 'Organization Chart'. The contractor shall keep all the details, bio-data, photograph, references, application, and all such records with him even after he is removed or resigned from work of this site. Guilty person or indiscipline person shall not be employed by the Contractor.
- 3.3 The CV/Resumes of the Contractors personnel shall be submitted to the Employer for acceptance at least 7 days before the anticipated commencement of the O & M period. Any change of personnel shall be promptly informed to the Employer within a day's time. Normal time duty hours for the contractors' operation & maintenance personnel may be modified as

necessary and agreed by the Employer. A rotating shift schedule shall be established by the Contractor and agreed by the Employer which will ensure that an adequate number of the Contractor's staff, fluent in Hindi as well as Gujarati is on duty at Plants 24 hours per day, 7 days per Week, including all holidays. The contractor shall have to issue **identity cards** with photographs to all the state employed for O & M. All the employees of contractor should be in specified **uniform indicating contractor logo**.

- 3.4 The Contractor shall submit a diagram showing the structure of the organization for his administration of the Contract. The structure shall include a Team consisting of Project / O&M Manager. The O&M Manager shall be stationed locally. The Project Manager shall have authority and powers to take decisions on the spot and/or incur expenditure(s) in the interest of the work whenever required by the Employer.
- 3.5 All correspondence and communication between the Employer and the Contractor including the Contractor's sub-contractors shall be directed through the Project Manager.
- 3.6 The sub-contractors proposed by the Contractor shall be subject to the approval of the Employer.
- 3.7 Contractor shall provide following minimum manpower as per qualification and experience mentioned below:

Sr. No.	Designation	Category	No. per Shift	Total No. of Personnel
1	Chemist / Plant Supervisor	Skilled	1 per General Shift	01
2	Pump / Plant Operator	Semi Skilled	1 per Shift	03
3	Helper / Mali	Unskilled	4 per Shift	12
4	Computer Operator	Semi Skilled	1 per General Shift	01
			TOTAL PERSONNEL	17

Note:

- Security Guards shall be deployed by RMC during O&M period.
- The staff as per required qualification to suit the job description / work and in specified numbers shall be deployed by contractor as a minimum at the time of commencement of O&M.

- 3.8 Deleted
- 3.9 Relaxation in qualification shall not be allowed. Relaxation in number of staff to be provided as a minimum as mentioned above shall not be allowed. The above / agreed staff shall be distributed in general and three shifts. General shift shall be considered as 09:00 Hrs to 18:00 Hrs. Preferable timing of shift shall be 06:00 Hrs to 14:30 Hrs, 14:00 Hrs to 22:30 Hrs and 22:00 Hrs to 06:30 Hrs (with half an hour of overlap). **The arrangement of reliever for weekly off/ all holidays etc. shall be made by the Contractor over and above the required persons mentioned in 3.8 above (except for Plant In-Charge. Reliever is not envisaged for Plant In-Charge but He / She or equivalent personnel shall be available on round the clock basis including holidays / weekly off days in case of any emergency / requirement in the plant and as directed by engineer-in-charge of client).**

As per agreement, the No. of staff in each shift should always remain present; otherwise penalty towards absence of any staff shall be levied and recovered from the contractor as decided by

Engineer-in-Charge of Client. The arrangement of reliever for weekly off/holiday/leave etc. shall be made by the contractor. Absence on any ground like weekly off or holiday shall not be considered. The presence of staff in each shift should be marked in register to be maintained at office of Engineer of the Client at Water Treatment Plant; which shall be considered as final. The contractor's staff must mark their presence & sign in this register. The contractor may maintain a separate register for his own purpose.

3.10 The staff of Contractor will always remain in contact with Employer and follow his instructions. The Contractor shall have to issue identity cards with photograph to all the staff employed for operation and maintenance; otherwise they will not be allowed to enter the plant premises.

3.11 The Contractor shall employ all the required staff (and in no case less than the number specified in the tender which is mandatory) within 7 days of award of the Contract, otherwise full payment will not be made. In such case, the commencement of the Contract Period and payment thereof shall be reckoned only from the date of employment of full numbers of staff. If at any stage it is felt necessary that additional manpower over and above the specified minimum manpower is required for the proper operation of the treatment plant, contractor shall employ necessary additional manpower at quoted rates within 7 days from the date of issue of notice by engineer-in-charge.

In addition to above **contractor shall arrange visit of their treatment plant expert once every month** to study the plant and take stock of situation and provide his suggestions and guidance to O&M staff. He shall submit his visit report to client including his observations for each month prior to or along with the monthly O&M bill submitted by contractor to client.

3.12 The Contractor will comply with all safety rules and regulations and all inter-disciplinary measures as followed by the Employer. The Employer will not be responsible for any accident / injury to the staff or any person of the Contractor or loss or damage to any property. Further, the Employer will not provide any insurance or free medical facility to the staff of Contractor.

Providing necessary security arrangement for safety of the plant and contractor's personnel will be the responsibility of contractor.

3.13 All Central / State Government / Semi-Government / Local Body's rules and regulation pertaining to this contract, all legal formalities pertaining to provident fund, factory act, all legal formalities shall be followed and observed by the Contractor without any extra cost to the Employer. Please note that failure in complying so, all liabilities arising as per laws will be to the Contractor's account.

3.14 No accommodation / guesthouse / transportation facility will be provided by the Employer to the Contractor. No staff or any person shall reside in the plant premises and any such person found shall be driven out immediately.

3.15 Due to strike by the Contractor's employees, the operation and maintenance of plant must not be affected and the property of CLIENT should not be damaged. In such case any dispute / discrepancy occurs, the decision of Engineer-in-Charge of client will be final and will be binding to the contractor. Also if any expense will be made by CLIENT, it will be deducted from Contractor's bill/ SD.

3.16 The duration of O&M contract shall be **05 (FIVE) Years** from the date of issue of completion certificate / taking over certificate. However, client reserves the right to terminate the contract at any time by giving 3 months notice to the contractor.

3.17 Stacking / Storage (Alum / PAC, Chlorine & other chemicals) and day to day preparation of solution shall be arranged by the contractor. Disconnecting and removal of empty tonners and reconnection of filled tonners shall be carried-out by the contractor. All the required spares /

consumables for disconnection/reconnection i.e. clamp/'O' rings/washers shall also be arranged by the contractor.

- 3.18 Plant shall be handed over on “**as is where is basis**” to contractor on the award of contract. Thus, the contractor has to takeover the plants for said contract without any insistence for any change in the plants.
- 3.19 The scope of work also includes **regular cleaning of complete plant area including floor, railing, door, windows, light fixtures and ceiling etc.** Similarly, minimum 3-5 mts. from the construction boundary on the outside of the plant area shall also be cleaned and maintained by the contractor.
- 3.20 This work is inclusive of but not limited to **operation, maintenance, house keeping, cleaning, removing sludge by its own carrier arrangement, painting, white colour washing, preparing data, recording, correspondence work to the client and Government Departments, etc.** All this work should be done as per standard practices and by following labour, factory, electrical, and all other old and new law and order, Indian standards etc. as applied of Local, State and Central Govt. of India.
- 3.21 Nothing is to be provided by the client excluding electricity, raw water supply & chemicals mentioned above in these specifications. All the formalities to all government authorities for factory, electrical, etc. for having NOC, water consent, Hazard waste concern, approval etc. shall be done by the contractor. However, necessary legal fees to all government authorities shall be borne by the client.
- 3.22 Monitoring shall be done as per guidelines given by Engineer-in-charge. Contractor has to maintain all the parameters of treated water within the stipulated limits or he will be penalised for not maintaining the parameters given as per tender conditions. Penalty as decided by Engineer-in-Charge shall be deducted from his pending bills or Security Deposit.
- 3.23 The Contractor shall have to test the water samples of the raw and treated and from intermediate stage from each of the treatment units at every hour (i.e. 24 samples / day) through the laboratory provided at the plant; as per the schedule fixed by the Engineer in charge. The same have to be verified and checked by the Client once a week by taking parallel sample from the same point and at the same time and analysing the same at the client's laboratory. Proper register/record shall have to be maintained by the contractor and any modification /rectification, on the basis of analytical results of samples if required, in performance of each unit shall be carried out immediately. The daily analysis report along with steps for the rectification / modification taken, if any, shall also be reported to the client with the daily report. The weekly report shall also be submitted to the Engineer-in-Charge of the Client, with remarks and the steps taken for modification, if any, taken during the period of report.
- 3.24 No equipment shall remain idle or unrepaired or damaged or unutilized for the period exceeding 3-7 days and not exceeding 15 days in case of standby equipment (i.e. provided no. of working equipment as per design are available). If any equipment is not repaired, rectified and or replaced within specified duration, the contractor shall be penalised **with no limit at the rate of Rs. 1000/- per day of delay per each individual equipment of the plant.**
- 3.25 If a man on the duty remains absent and there will not be any reliever / replacement in his place i.e. if the contractor fails to depute no. of persons and of qualifications as specified in tender, the contractor will be penalised at the rate of Rs. 1000/- per man per day **upto no limit.**
- 3.26 The successful bidder shall have to enter into a contract agreement for O&M on successful completion of 3 Months satisfactory trial run, PGR and acceptance of plant and deposit an amount equal to 5% of total order value for O&M contract towards O&M security deposit.

- 3.27 The quoted rate shall remain firm and valid for five years of O&M contract.
- 3.28 The payment of O&M charges will be made as per Special Conditions of Contract for O&M.
- For the O&M period of five years 10% amount from each monthly O&M Bill shall be retained.
- All security deposits/retention money for O&M shall be released on successful completion of O&M period of 5 years.
- 3.29 The other terms and conditions described in this tender documents, wherever applicable, shall remain unchanged.
- 3.30 However, **during O&M period, the contractor has to supply all the spares, at his cost during major-minor breakdown and also maintenance works.**
- 3.31 The penalty for various non-compliances due to reasons attributable to bidder shall be applied as under:

Sr. No.	Description	Penalty
1	Due to negligence or any such other reason of contractor's staff, raw water is not processed / treated in average quantity as per Client's demand (subject to availability of raw water and upto to maximum design capacity of WTP) & treated water quality to the tender requirements, in such a case penalty per case shall be recoverable from contractor.	Mini.Rs.25,000/- per case or higher as per tender
2	All the pumps & electro-mechanical equipment / machineries should be kept ready for operation. If it is not ready for operation more than no. days as specified in tender, than Client will deduct penalty from the bill.	Rs.1000/- per day / equipment
3	If the Contractor does not recruit/deploy the 'Personnel' identified as per the schedule or remain absent then Liquidated Damages will be deducted from the bill	Rs.1000/- per person/day for each case
4	It is Bidder's responsibility on daily basis for cleaning of pump house, sub-station room, transformer yard and compound of WTP, office, laboratory etc. from inside & outside. Removal of rain water from pump house, all buildings, sub-station and compound of WTP. If any it is not done than Penalty will be deducted from the contractor's bill.	Rs.1000/- Per case
5	Maintaining power factor as per tender and to avoid power factor penalty.	Rs.5000/- + If power factor penalty penalized by power supply company (PSC) monthly bill, than the same shall be deducted by RMC from the contractor's monthly bill

4.0 MAINTENANCE

- 4.1 The maintenance service provided by the Contractor for the period specified in the Contract shall ensure the continuous operation of the Plant and that the breakdown or deterioration in performance, under normal operating conditions, of any items of Plant and equipment and component parts thereof is kept to a minimum.
- 4.2 The Contractor shall carry out the Maintenance of the plant installations in accordance with the requirements of the O & M Manual and also to the approved Maintenance Plan as mutually agreed.
- 4.3 The Contractor shall adhere to the manufacturers' recommendations with respect to equipment maintenance, the types and grades of lubricants to be used, frequency of lubrication, adjustments to be made regularly and keep in safe custody recommended spares, which may be required for smooth & trouble-free operation of the plant on day to day basis.
- 4.4 The Contractor to operate and maintain all equipment as recommended in the O & M manual and maintain logs and records of the work carried out to keep them in good working condition. The Employer shall approve the format of logs and records.
- 4.5 The Contractor shall prepare and implement an effective plant maintenance programmed in consultation with the Employer. It is absolutely the Contractor's responsibilities to look after all sorts of maintenance whether routine, preventive or break down or any other type of maintenance. The Contractor will be responsible to carry out day to day as well as periodic maintenance necessary to ensure smooth and efficient performance / running of all equipment.
- 4.6 The contractor shall the O & M Manual covering requirements for smooth & trouble-free operation & maintenance of the Plant.
- 4.7 Contractor shall set-up and maintain laboratory at plant site complete with all equipment, testing instruments, glassware, weigh scale, chemicals, reagents, consumables and carry out necessary calibration from time to time to conduct tests as required to check the water quality parameters (raw / intermediate stage / final treated) as specified in tender as a minimum.

5.0 DOCUMENTATION / REPORTS

- 5.1 The Contractor will be furnished with two copies of O & M manuals (prepared by him & approved by Employer). The Contractor will also be furnished with two copies of all instructions as may be issued by the Employer. One copy of all such O & M manuals and instructions issued to the Contractor shall be kept in his office at the site. The O & M manuals or instruction shall be considered valid only if the Employer has signed it. The Contractor will be responsible for keeping & updating record of documents including History Card for equipment and maintaining every day logbook. The Contractor shall maintain and update logbook and details of operational parameters like pumping hours, aerator operation hours, Amperes, Flow meter reading, H.T. Voltage, Power Factor, energy meter reading, pressure and other reading required are recorded in every shift at regular interval e.g. hourly or as agreed mutually (by CLIENT).
- 5.2 Computerized Printing of log sheets, registers and all necessary stationery required for maintaining records of operations and maintenances has to be arranged by the Contractor at his cost, duly approved by Employer. Format of log sheets, registers will be made available to the contractor by the CLIENT. All reports shall be in computerized format.
- 5.3. The Contractor shall submit to the Employer every week and within first seven days of every month, a copy of the weekly/ monthly O & M report. This report format and activity shall be as per O&M manual and as directed by engineer-in-charge from time to time. It shall also indicate the following:

Preventive maintenance work carried out during the month.

Preventive maintenance work that will likely to be carried out in the next week.

Maintenance carried out due to fault / breakdown of equipment.

The details of each equipment that was not available for operation due to preventive maintenance or breakdown of equipment related to that pump equipment, giving the reason for breakdown. The details shall include number of hours the pump equipment could not be operated and whether standby capacity was available and put into operation.

Details of parts and consumable replaced.

6.0 TELEPHONE FACILITY

- 6.1 The Contractor shall have to arrange for mobile telephone to two personnel of his Key Staff to be available at site from the start date of O&M. Any cost to the repair to the telephones and the telephone bills will be borne by the Contractor. Internet facility having broad band connection also to be provided till completion of O&M for ease of communication with employer during O&M.

7.0 SAFETY, HEALTH AND ENVIRONMENT

- 7.1 The Contractor shall be responsible for safety on Site during the O & M of the Works by the Contractor. Health of workers shall be protected against infectious and contagious diseases. Medical check-up at every six months shall be done. Environmental protection shall also be given priority so as to conserve the environment.
- 7.2 The Contractor's duties with respect to Safety shall include the following:
- (a) Utilise safety awareness procedures in every element of operation and maintenance.
 - (b) Give emphasis to safety including:
 - i. Safe working and safety procedures as per rules and regulations of Department of Explosives, factory inspector, electrical inspector regarding use of protective clothing, gloves, boots and helmet etc.
 - ii. Cleanliness of the Plant as a whole
 - iii. Awareness of hazardous conditions and accident reporting and necessary compliance
 - iv. Safe practice in Treatment Plant
- 7.3 The Contractor shall be responsible for all safety measures and those procedures adopted shall comply with the Indian regulations pertaining to such work and local safety codes currently in force. Where such codes do not adequately cover the Plant then the Contractor shall ensure that proper safety procedures are followed. Those given below are minimum standards and the works shall not be limited to these, if higher standards prevails. The Contractor will comply with all safety rules and regulations and all interdisciplinary measures as followed by the Employer. The Employer will not be responsible for any accident/ injury to the staff of the Contractor. Further, the Employer will not provide any insurance or free medical facility to the staff of Contractor.
- 7.4 If the work in the vicinity of electrical equipment has to be carried out after connection has been made to the electricity supply the Contractor shall comply with any "Permit to Work" system approved by the Employer.
- 7.5 Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from

ladders. When a ladder is used an extra man shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and hand holes shall be provided on the ladder.

- 7.6 All necessary safety equipment as considered adequate by the Employer shall be available for use of persons employed on the Site and maintained in a condition suitable for immediate use. The Contractor shall take adequate steps to ensure proper use of the equipment by those concerned, in the following manner:
- (a) Those engaged in handling any material which is injurious to eye shall be provided with protective goggles.
 - (b) Those engaged in welding shall be provided with welder's protective eye-shields.
 - (c) Those involved in works in areas where there is a risk of drowning shall be provided with life jackets.
 - (d) Electrician, wiremen and helper shall be provided with shock-proof shoes.
- 7.7 Adequate provision shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work. When work is done near any place where there is risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps taken for the prompt rescue of any person in danger. Only after arranging such equipment, tools/ tackles etc. at site work shall be started.
- 7.8 To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the Contractor shall be open to inspection by the Employer or his Representative and the inspecting officers.
- 7.9 Notwithstanding the provisions made above the Contractor is not exempted from the operation of any Act or rule in force.

8.0 TOOLS AND TEST EQUIPMENT

- 8.1 A complete set of necessary tools and test equipment required for operation & maintenance of the plant shall be available with the Contractor. This shall enable erection, dismantling, repairing, replacing or testing to be carried out on any part of the Plant whether of an electrical, mechanical or other nature, during the contract period. All tools and test equipment shall be procured, kept at site in good condition and used properly by the Contractor at his expense. The contractor shall prepare and implement an effective plant maintenance program in consultation with the Employer. It is absolutely the contractor's responsibilities to look after all sorts of maintenance whether routine, preventive or break down or any other type of maintenance. The Contractor will be responsible to carryout day to day as well as periodic maintenance necessary to ensure smooth and efficient performance/ running of all equipment.

9.0 INSURANCE CERTIFICATES

- 9.1 Within 14 days of the acceptance of this tender the Contractor shall produce to the Employer a certificate or certificates signed by the Contractor's insurers or their duly authorised agents covering all the persons with accidental policy of sufficient amount as per their grade (30 times monthly salary or higher as applicable as per statutory requirement) with disability benefit provision for them stating that insurance's complying with the requirements of the contract have been effected. No such certificate shall relieve the Contractor of his obligations under the Conditions of Contract to produce to the Employer if required by him the insurance policies and the receipts for payment of premiums.

10.0 ASSISTANCE FOR THE EMPLOYER'S STAFF

10.1 The Contractor shall provide all necessary assistance to the Employer and his staff in carrying out their duties of checking setting out, inspecting and measuring the Works. The Contractor shall provide staff, office attendants, labourers and other help as may be needed from time to time by the Employer.

10.2 The Contractor shall provide for the Employer and his staff such protective clothing, safety helmets and rubber boots of suitable sizes, 440 volts series hand lamps and the like as may reasonably be required by them. These articles shall remain the property of the Contractor.

11.0 FIRST AID BOX

11.1 The Contractor shall at his own cost provide and maintain at the Site of Works standard first aid boxes at minimum six locations as directed and approved by the Employer for the use of his own as well as the Employer's staff on Site as stipulated by local regulations. Contractor shall arrange to train all their staff in first aid treatment within 3 months.

12.0 NOTICE BOARDS / DISPLAY BOARDS

12.1 The Contractor shall provide a Notice Boards/Display Boards at appropriate locations detailing precautions to be taken by operation and maintenance personnel in work in conformity with Industries and Labour Regulations and Department of Explosives.

13.0 APPLICATION

13.1 These general conditions of the contract shall apply to the extent that they are not superseded by provision in other parts of the contract.

14.0 GENERAL ROUTINE MAINTENANCE

To operate and maintain the water treatment plant and equipment in accordance with the aim and purpose of treatment. The plant and equipment covered under the above contract will be promptly attended by the contractor including any "Trouble shooting" to ensure smooth and trouble free operation. The contractor will be responsible for smooth and satisfactory operation and maintenance of the Water Treatment Plant on the round the clock basis for **05 (FIVE) Years** period from the date of taking over the plant after 3 months trial run period is completed and on acceptance of plant.

A Technical expert of the contractor shall visit the plant on every fortnight and will suggest if required, to improve the efficiency and working of the plant. The visit must be recorded at Employer's document and out come of the visit/ minutes of meeting should be got signed by Employer's authorized representative without which the visit shall not be considered.

The employer shall check the operation of the plant or designate an organization of his choice to carryout inspections. The employer or the organization appointed by him shall check that the Contractor is performing the tasks for which he is responsible with due diligence.

- 14.1
- (1) Checking Alignment, tightening of fasteners, and lubrication of gear and other moving parts of various plant equipment / machineries.
 - (2) Checking of all pumps, motors, gears etc. for it's proper operation.
 - (3) Observing/monitoring sludge quality / level in clariflocculator unit.
 - (4) Setting SV & Telescopic valve on sludge withdrawal line of clariflocculator to suit with the sludge consistency by sample analysis.
 - (5) Observing/monitoring the performance of filter beds.
 - (6) Checking all the pipelines for preventing choking, water tightness etc.
 - (7) Safe disposal of screening, sludge, etc. waste on daily basis.

(8) Watering of plants and trees

14.2 General routine maintenance schedule for various plant units shall be adopted from O&M Manual. However, the general routine maintenance to be carried out by the Contractor's personnel will include but not limited to the following:

- a) If it is observed that power consumption per MLD of water treated is increased, the contractor has to trace out the fault and rectify the same to bring to the standard Value.
- b) De-weeding and cleaning of the Transformer yard and other places.
- c) Checking and refilling of silica-gel in the breather of the transformer and checking temperature gauge, vent pipe, voltage tap changing switch
- d) Regular watering in the earth-pits.
- e) Check for any oil leak in the transformer and intimating and repairing of the same.
- f) Opening of end cover & cleaning of dust by Air blowing of induction motors, PMCC and other panel & PCC
- g) Checking and replacement of bulbs, tubes, chokes, starters, switches, control etc. throughout the plant and including outdoor lights and high mast pole installation.
- h) Replacement of LT panel fuse base, links, fuse, relay, contactor kit (main and auxiliary) and timer.
- i) Replacement of HT panel C/T or PT whenever required.
- j) Check for any loose connection in electrical equipment and rectification of the same.
- k) Monitoring power factor, take corrective steps and ensure optimum power consumption.
- l) Replacement of gland packing for the pump, sluice valves etc. whenever required.
- m) Greasing of bearings and lubricating all moving parts as per the schedule
- n) Tightening of all loose nut-bolts and other fasteners
- o) Cleaning of sump / tanks / reservoirs
- p) Lubricating and test operation of the valves
- q) General cleaning of all equipment and building
- r) Replacement of pump rubber bush, gland packing, sleeve, bearing, oil seal, shaft, liquid ring and impeller.
- s) Replacement of motor bearings and terminal plate and rewinding of motor when needed.
- t) Replacement of non-return valve T bolt, hinge pin, flap/ gate.
- u) Any other as required for proper operation of treatment plant facility

15.0 PREVENTIVE MAINTENANCE CHECKS

15.1 The Contractor shall adopt a preventive maintenance check's schedule as agreed mutually between the Contractor and the Employer.

15.2 The following checks as a minimum to be performed daily by the Contractor's personnel

- a) Whether there is a change in the sound of a running pump, abrupt changes in bearing temperature and seal leakage?
- b) The pump capacity, pressure, power consumption and vibration level to check if outage is required to address deterioration of specified performance values.
- c) Rise in temperature of bearings in motor, in moving parts and other units, etc.
- d) Working of gauges, sensors and other flow measuring devices
- e) Average power factor, kVARH, kWH consumed

15.3 The following checks as a minimum to be performed weekly by the Contractor's personnel

- a) Pipeline and valve leakage
- b) Functioning of non-return valve
- c) Tightness of all electrical connections of PMCC/MCC, APFC, ICP/LCP panel etc.
- d) Tightness all cable connections

- e) Temperature rise due to loose connections
- f) Operation of valves and sluice gates.
- g) Current and voltages in all electrical equipment
- h) Average power factor, kVARH, kWH consumed

15.4 The following checks as a minimum to be performed monthly by the Contractor's personnel

- a) Battery voltage, battery charger, topping of distilled water, tightness of terminations etc.
- b) Gland packing
- c) Wear and tear of moving parts
- d) Adoption of Electrical energy conservation methods and energy consumption
- e) Electrical contacts
- f) Motors
- g) Meggering of electrical equipment
- i) Watering of earthing pits

15.5 The following checks as a minimum to be performed quarterly by the Contractor's personnel

- a) Relay testing and calibration if possible of meters, gauges, instruments
- b) Speed of motors
- c) Level gauges and flow meters signals
- d) Cleaning, checking/tightening of L.T. Circuit/Panel
- e) Tightening of PMCC components
- f) Auxiliary DB, Capacitor bank
- g) Battery and Battery charger

15.6 The following checks as a minimum to be performed bi-annually by the Contractor's personnel

- a) Free movement of stuffing box glands, gland bolts to be cleaned & lubricated and packing to be inspected to determine whether it requires replacement.
- b) Pump and motor alignment should be checked and corrected if necessary.
- c) Grease lubricated bearings should be checked to see that they contain the correct amount of grease and that it is still of suitable consistency.

15.7 The following checks as a minimum to be performed annually by the Contractor's personnel

- a) Vibration should be reviewed. If the pump is tending towards unacceptable vibration levels:
 - i. The bearing should be removed, cleaned and examined for flaws and wear.
 - ii. The bearing housing should be carefully cleaned.
 - iii. Rolling element bearings should be examined for scratches and wear.
 - iv. Immediately after cleaning, rolling element bearings that are considered acceptable for reinstallation should be coated with grease. If the bearings are damaged it shall be replaced with new bearing of the correct size and type as per O&M manual.
- b) Shaft sleeve and shaft should be examined for wear.
- c) When coupling halves are disconnected for an alignment check, the vertical shaft movement of a pump with sleeve (journal) bearing should be checked at both ends with packing or seals removed. Any movement exceeding the original design clearance should be investigated to determine the cause. Endplay allowed by bearings should also be checked. If it exceeds that recommended by the manufacturer, the cause should be determined and corrected.
- d) Stuffing boxes should be repacked and the pump & motor should be realigned and reconnected
- e) Overhauling requirement of all equipment
- f) Improvement required if any in operation of plant
- g) Testing and Calibration of all instruments
- h) Transformer cleaning, checking silica gel, oil checking filtering/replacing

15.8 **The scope also includes disposal of sludge generated within WTP premises at site identified by client within 10Km radius of the WTP premises.**

16.0 MINOR REPAIR GENERALLY ENCOUNTERED IN THE PLANT

16.1 The minor repairs which have been most often encountered are as given below:

- Electrical works
- a) For H.T. Installations
 - i) Replacement of jumpers
 - ii) Replacement of insulator (Porcelain)
 - iii) Replacement of Air-Break Switch
 - b) For Both H.T. & L.T. Installations
 - i) Replacement of no-volt coil for VCB
 - ii) Replacement of Cable lugs including terminations
 - iii) Replacement of burnt out HRC fuses
 - iv) Replacement of moving and fixed contacts or contractors
 - v) Repairs to isolators and switch fuse units and replacement of it and fuse base units.
- Pump sets
- a) Replacement of coupling bolt and nuts including rubber bushes
 - b) Replacement of worn out impeller nut
 - c) Replacement of spindle nut in the sluice valve.
 - d) Replacement of terminal plate in the motor
 - e) Replacement of faulty/dead spares in the battery charger and battery control panel.
 - f) Replacement of gland packing, graphite packing from the pump sets.

17.0 ADDITIONAL SCOPE OF WORK

17.1 For other incidental additional work, if any, the Contractor on authorization in writing from the Employer shall execute which is not specifically mentioned in the scope at present.

18.0 ELECTRIC POWER AND WATER

18.1 Client shall directly pay all the power bills but the Contractor will be required to furnish Electricity Consumption in the Schedules provided. If the average power factor in the electric (power) supply company bill is less than 0.95, the PENALTY / CHARGE for the same as applicable plus Rs.5000/- shall be recovered from CONTRACTOR/THEIR BILL per occurrence of such incident.

19.0 PLANT INSPECTION AND VISITS

19.1 The Employer shall check the operation of the plant or designate an organisation of his choice to carry out inspections. The Employer or the organisation appointed by him shall check that the Contractor is performing the tasks for which he is responsible with due diligence. The Contractor shall at his cost provide all the assistance required by the Employer to complete these inspections.

19.2 Before any inspection, the Employer shall give prior notice of three days to the Contractor, indicating the name(s) of the person(s) empowered to carry out such inspection in the name of the Employer. In case of surprise visit, vigilance or other checks, such notice shall not be given.

19.3 At the end of each quarter period, or at the initiative of the Employer, a JOINT VISIT shall be organised so that both parties can check the condition of the installation at the plant.

19.4 A report shall be drawn up to record the suggestions and opinions of both parties. The Employer reserves the right to call in equipment manufacturers or specialised technicians for these visits.

19.5 These visits shall provide an opportunity for examining maintenance programs and operating procedures and improvements requiring therein..

19.6 In addition to the above, the Employer reserves the right to arrange the visits of. VIP's dignitaries and other persons of Social or Political repute, as and when necessary, at the Treatment Plant. The Contractor shall offer full cooperation to the Employer on the occasions of such visits.

20.0 MEASUREMENT AND ANALYSIS

20.1 The Employer has the right to perform any analysis or inspection he deems necessary.