

**Environmental Impact Assessment**

**&**

**Environmental Management Plan**

**Sewage Treatment Plant**

**For**

**Thuthukkudi Municipality**

**Contractor**

**M/S. Sekhar Deepak Constructions Ltd**

# Chapter-1 Introduction

## 1.1 Basis of This Report

The Thoothukudi Municipality has secured funds for putting up their first ever Sewage Treatment Plant (STP) with funds from the TUNIFISIL under the World Bank and this report is to be prepared by the contractor, namely M/S Sekhar Deepak Constructions Limited (SDCL).

## 1.2 Location of Thoothukudi



The place is the headquarters of the administrative district of the same name in Tamilnadu state of India as shown in Fig. 1. It has a population of 2,16,033 (as of 2001). It is fairly urbanized. The district has a literacy of 73.05%, and is a port city with petrochemical industries. It is situated at 8-81 North latitude and 78-14 east longitude with an area of 353 Sqkm. It has a hot climate temperature ranging from 23 C to 38 C a relative humidity of 80% to 90% and rainfall of about 800 mm in a year.

## 1.3 Objectives of this Report

As required under the contract, the objective of the report is (a) to identify any negative impacts of the STP on the 10 km radius environment around the STP, (b) to document the negative impacts if any

and (c) come up with mitigation & management plans and (d) implement a monitoring programme

#### 1.4 Scope of the Report

- (a) Statutory status of the project in regard to local acts, rules, regulations etc
- (b) A broad documentation of the baseline data in a macro environment of 10 km radius around the STP with specific reference to possible impact between the STP ~~per se~~ and the macro environment for either negative or positive impacts of one over the other.
- (c) A precise documentation of the possible impact between the STP and the micro environment around the STP for either negative or positive impacts of one over the other
- (c) Evolving the mitigation and management plans as needed to mitigate negative impacts
- (d) Outstanding issues needing resolution

### **Chapter-2- Statutory status of the project**

The statutes broadly applicable to public infrastructure projects STP are

(a) Water (Prevention and Control of Pollution) Act, 1974 and Tamil Nadu Water (Prevention And Control of Pollution) Rules, 1974 which seeks to control and enhance the quality of water. Under this law, it is mandatory to obtain consent for discharge of effluents and pay consent fees to Tamil Nadu Pollution Control Board (TNPCB) for any municipal projects causing water pollution.

(b) The Water (Prevention And Control of Pollution) Cess Act, 1977, which provides for levy and collection of a cess by local authorities on water consumed by persons or industries to augment resources for Pollution Control Boards.

(c) Air (Prevention and Control of Pollution) Act 1981 and Tamil Nadu Air (Prevention of Control of Pollution) Rules 1983 which address the prevention and control of air pollution. Accordingly the entire state of Tamilnadu has been declared as air pollution causing area and all the STP projects may cause odour nuisance if proper measures are not taken. Hence these laws would be applicable. If air pollution is caused, immediate remedial action will be taken.

(d) Environmental & Social Framework (ESP) & TNUDF which require EA and approval of World Bank prior to implementation. The projects comply with the environmental resettlement and social standards set forth in the TNUDF's Environmental and Social Framework.

(e) Environment (Protection) Act, 1986 which addresses pollution and natural resource issues. It seeks to supplement existing laws on pollution control and also lays down standards for air quality and noise. The Central Government in pursuance of its rule-making powers under the Act, has passed notifications regulating location of industry and operations.

(f) Public Liability Insurance Act (PLIA) of 1991 mandates that business owners operating with hazardous substances take out insurance policies covering potential liability from an accident and establish Environmental Relief Funds to deal with accidents involving hazardous substances.

(g) Operation Policy & Directorate of the World Bank-Environmental Assessment - OP/BP 4.01 Requirements which requires the borrower to screen projects upstream in the project cycle for potential impacts. Thereafter, an appropriate EA approach to assess, minimize / enhance and mitigate potentially adverse impacts is selected depending on nature and scale of project. The EA needs to be integrated in the project development process such that timely measures can be applied to address identified impacts. The policy requires consultation with affected

groups and NGOs to recognize community concerns and the need to address the same as part of EA. TNUIFSL has adopted the principles of the above policy and has evolved a management framework to address the environmental issues in its lending operations.

Cultural Property - OP 11.03 Requirements - World Bank's Operational Policy Note 11.03 which aims at preserving and avoiding the elimination of structures having archaeological (prehistoric), paleontological, historical, religious and unique natural values. Projects that could significantly damage non-replicable cultural properties are declined for funding and the Bank will in turn assist protection and enhancement of cultural properties encountered in the project rather than leaving that protection to chance.

Natural Habitats – OP/BP 4.04-Operational Policy 4.04 which sets out the World Bank's policy on supporting and emphasizing the precautionary approach to natural resource management and ensuring opportunities for environmentally sustainable development. As per this policy, projects that involve significant conversion or degradation of critical natural habitats are not supported by the Bank.

Forests – OP/BP 4.36 which sets out specific policy on protection of forests through consideration of forest related impacts of all investment operations, ensuring restrictions for operations affecting critical forest conservation areas, and improving commercial forest practice through use of modern certification systems. The policy requires consultation with local people, the private sector and other stakeholders in forest area. In the context of TNUP operations, these issues are relevant for the projects that pass through or require diversion of forestland.

Though there are elaborate provisions in these statutes for a specific provisions of the statutes in so far as the public infrastructure projects are concerned, the specific statutes in so far as the STP are as in Table-1

Table-1  
Statutes Relating to STP

| Project   | Applicable Legislations  | Obligations  | Responsibility   |
|---|--------------------------|--|--|
| Sewerage Network, Pumping station and Treatment plant | Water (P & CP) Act, 1974 | Secure the following from TNPCB for sewage treatment plant: <ul style="list-style-type: none"> <li>• Consent to Establish.</li> <li>• Consent to Operate</li> <li>• Ensure air and noise quality is within the stipulated limits of TNPCB</li> </ul> | ULB / Project implementing Agency.<br>ULB / operating Agency.<br>Contractor during construction and ULB/ operating agency during operation |

Thus, the status and compliance to the above are described hereunder.

### **Chapter-3-Status of Consent from TNPCB**

The TNPCB as a matter of procedure inspects the site and reviews the proposed works and issues a No Objection Certificate (NOC) as a prelude to the full-fledged consent to establish for any public sector infrastructure. As long as the conditions of the NOC are satisfied, it virtually becomes the consent to establish which comes up over a period of time. The same issued to the Thoothukudi Municipal STP with the conditions and their status is in Table-2

Table-2 Status of compliance to TNPCB for Thoothukudi STP

| Sl. No | Conditions in the NOC issued by the TNPCB   | Compliance Status   |
|--------|---|---|
| 1      | The municipality shall declare the land for a radius of 100 m as no development activities in consultation with DTCP.   | The only available land is of 1.8 Ha out of which 0.9 Ha is allocated to STP and balance land will be treated as green belt zone. |
| 2      | The Municipality shall develop green belt of 25 meters width all around the proposed STP.   | This is met in three sides and only for 10 m on the remaining side and is the best possible.                                      |
| 3      | The Municipality shall furnish full-fledged sewage treatment plant proposal with design and drawing while applying for consent for establishment under the Water (P&CP) Act, 1974 as amended.   | Furnished while applying for consent for establishment  |
| 4      | The Municipality shall provide STP components of grit chamber, distribution chamber, aeration tank, secondary settling tank, chlorination tank and sludge drying beds along with any other components proposed by Tamilnadu Water Supply and Drainage Board.                                      | These are provided for  |
| 5      | The Municipality shall obtain consent for establishment for the discharge of sewage effluent under section 25 of the Water (P&CP) Act, 1974 and for the installation of sewage treatment plant and underground sewerage system from the District Environmental Engineer, TNPC Board, Thoothukudi. | This is being pursued   |
| 6      | No flooding of untreated effluent is permitted  | This will be observed fully   |

|    |   |   |
|----|---|---|
| 7  | The municipality shall create and maintain sewage treatment plant to satisfy the standards prescribed by the Board before discharging into sea.   | This is already incorporated in the STP designs   |
| 8  | The Municipality shall remit the consent fee while applying for consent for establishment to the District Environmental Engineer, TNPC Board, Thoothukudi.                                      | Consent fee remitted to DEE/TNPCB/ Thoothukudi  |
| 9  | The Municipality shall get CRZ clearance for laying pipeline in the CRZ area and disposing the treated sewage into the sea  | It is reported by the local body that the laying of pipe line area is away from 500 m of HTL. hence it is not required to get CRZ clearance |
| 10 | The Municipality shall conduct a study through National Oceanographic Institute, Goa for disposal of the of treated sewage into sea before establishing the Sewage Treatment Plant.             | This is agreed to   |
| 11 | The Municipality shall develop thick green belt with tall trees along the circumference of the Sewage Treatment Plant so as to have a buffer between the residences and Sewage Treatment Plant. | This is agreed to as there is enough space around the STP   |
| 12 | The Municipality must provide compound wall along the boundary of the proposed Sewage Treatment Plant area.   | This is agreed to   |



## Chapter-4-Baseline Data of Environment

The sites for measuring the baseline have been identified and samples of water, air, soil and noise have been collected. The results are awaited from the laboratory. This chapter will be drafted at that time based on the results and its foreseeable impacts.

## Chapter-5-Precise Localized Baseline around the STP site

Though the present STP site is farther from the town, yet there is domestic activity though sporadically around the STP site on one side. Besides, there are no trees to be cut up in the STP site, which is barren. Moreover, there are lands available contiguous to the STP site which are belonging to the municipality. The area to STP is 130m \* 70 m or 0.9 ha. The total area held by the local body is 1.82 Ha as in Fig. 15. The 0.9 Ha of free territory is proposed to be developed in this contiguous area as a green belt in addition to the trees plantation all around the STP boundary.

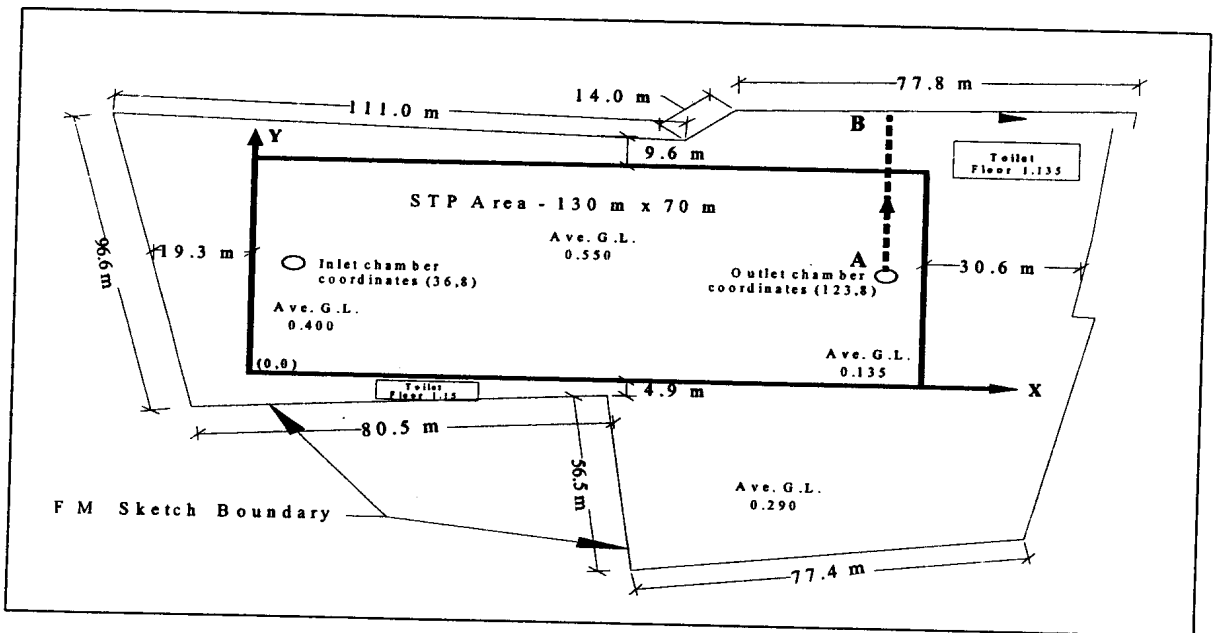


Fig. 15 FMB Sketch showing Green Belt area around the STP site

As such, the requirements of long term mitigations of possible negative impacts resulting from the STP do not get envisioned. Some requirements

of mitigations will be needed during the pre-construction and construction stages, which can be easily identified and pursued.

## **Chapter-6-Possible Impacts and mitigation Measures**

The possible temporary impacts during the pre-construction, construction and O&M stages have been identified as in Table 18 as related to the details of the STP as in Annexure-I. This tabular column is listed in its attributes to the same ones as in the tender document for the STP and which has been concluded as a contract. It may be seen that there are no major concerns of any adverse impacts on the environment by the STP. The tree planting drive as specified in the tender document will be addressed by way of planting trees outside the STP boundary in the freehold area and will be fit into the master plan for this vacant area. One realistic issue is to plant trees along the boundary off the open land, which constitutes the three mandatory rows of tree planting besides peripheral planting. All the same planting inside the STP boundary becomes rather improbable as the land area is very tight even for the movement of men and O&M vehicles inside the STP. As such, this EA and EMP may have to be taken as meeting the objectives and requisites of the tender document in these aspects. The cost of monitoring plan is in Table 19. Public consultation has been held by the local officials on 25-9-2008 and based on overwhelming response the municipality has handed over the STP site on 29-9-2008.

Table 18

## Project EA and EMP in Preconstruction, Construction and O&amp;M Stages

| No | EA & Issues in various stages of the project                           | EMP and Mitigation  | Responsible agencies | Stages       |
|----|--|---|----------------------|--------------|
| 1. | Site clearance and flora & fauna                                       | The entire site is barren and virgin land devoid of any fauna or flora and only sparse dry grass. Hence, no EMP is necessitated in this aspect.   | Contractor           | Construction |
| 2. | Storage of materials   | The materials used for the civil construction are brought to site only to the extent of transit storage and used up in the works as and when arrived. Mass storage Doesn't arise, as the stockyards of material vendors are easily available in the city. The mechanical and electrical equipments are kept in safe custody in a regular storeroom. | Contractor           | Construction |
| 3. | Noise & Dust   |   |                      |              |
| 3a | Ear plugs to operators of heavy machinery and workers in near vicinity | Heavy machinery is not used except JCB, which is manufactured to comply with noise emission standards. Provision of earplugs can be a hazard as operator may not be able to hear if some labour trespasses JCB and raises an alarm.   | Contractor           | Construction |

| No | EA & Issues in various stages of the project   | EMP and Mitigation   | Responsible agencies | Stages       |
|----|--|--|----------------------|--------------|
| 3b | Preventive Maintenance of construction equipment and vehicles to meet emission standards and to keep them with low noise.  | The only equipment used at site is the JCB in civil works and EOT during equipment erection and these are branded, licensed manufactured items with already compliance in manufacturing process to standards of emission and noise before marketing them.  | Contractor           | Construction |
| 3c | Provision for fixing of generators and concrete mixers at site. Where residences are located within 200m from construction sites and insensitive areas like hospitals, schools and zoological parks, etc, noisy construction work shall be undertaken during day time only (7.30 hrs to 18.00 hrs) | Generators are not used at site. If electrical supply is tripped in the grid, the work is suspended during the outage times.<br><br>Concrete is procured as ready-mix and use of on-site concrete mixers will be only as fillers for small patch works and the timings will be only in broad daylight. Moreover, these mixers used are branded, licensed manufactured items with already compliance in manufacturing process to standards of emission and noise before marketing them. | Contractor           | Construction |

| No | EA & Issues in various stages of the project  | EMP and Mitigation   | Responsible agencies | Stages              |
|----|---|--|----------------------|---------------------|
| 3d | Sound barriers in inhabited areas shall be installed during the construction phase. | This will be provided on the one side where the inhabited area though sporadic is present. These barriers will be of non-corrodible temporary nature till compound wall is completed.  | Contractor           | Construction        |
| 3e | During night, material, transport should be uniformly distributed to minimize noise | Night work is not contemplated   | Contractor           | Construction        |
| 3f | Prior information to be provided in blasting if significant                         | Blasting is neither needed nor envisioned  | Contractor           | Construction        |
| 3g | Blasting in accordance with the Explosives Act 1984 and Explosive Rules 1983        | Blasting is neither needed nor envisioned  | Contractor           | Construction        |
| 3h | Dust contamination at construction sites  | Dust arises only if stone is crushed at site for concrete. It is directly procured from authorized quarry. Unloading of sand is by automatic tippers. If shoveled in extraneous circumstances. This will be controlled to a drop of about a meter at best. | Contractor           | During construction |

| No | EA & Issues in various stages of the project   | EMP and Mitigation   | Responsible agencies | Stages              |
|----|--|--|----------------------|---------------------|
| 5. | <b>Disposal of construction debris-Land</b>  |  |                      |                     |
| 5a | Daily inspection at haul roads and sites for construction debris for safe collection and disposal to land fill sites | The haul is by trucks equipped with tight top wrap tarpaulins and no such losses are envisioned. If at all, it happens, the same is retrieved to site for consumption. | Contractor           | During construction |
| 5b | Collection and disposal of refuse  | There is no refuse in civil construction. The only refuse is the formwork and shuttering materials which are taken back  | Contractor           | During construction |
| 5c | Minimize construction refuse by balancing cut and fill requirement   | This has already been accounted for in design engineering  | Contractor           | During construction |
| 6  | <b>Social disruptions-</b>   |  |                      |                     |
| 6a | Minimize interruptions to utility services though proper planning and  | There are no utilities in the project site of the STP  | Contractor           | During construction |

| No | EA & Issues in various stages of the project                              | EMP and Mitigation  | Responsible agencies | Stages              |
|----|---|---|----------------------|---------------------|
|    | scheduling of activities & interdepartmental co-ordination.               |   |                      |                     |
| 6b | Construction of temporary road/ access & diversion of traffic.            | There is a regular public road and there is no need for temporary roads in public domain and hence not needed | Contractor           | During construction |
| 6c | Preference to local labour skilled persons during construction and O&M    | This is precisely what is practiced to keep a harmony in the social setting                                   | Contractor           | During construction |
| 7. | <b>Aesthetics</b>   |   |                      |                     |
| 7a | Aesthetic enhancement through proper house keeping of construction sites. | This is complied with as a standard practice by the contractor in all his works                               | Contractor           | During construction |
| 7b | Immediate trench closure after pipe                                       | Will be followed  | Contractor           | During construction |

| No | EA & Issues in various stages of the project   | EMP and Mitigation  | Responsible agencies | Stages              |
|----|--|---|----------------------|---------------------|
|    | laying/ completion of work   |   |                      |                     |
| 7c | Repair pavements immediately following construction of pipe & appurtenant structure  | Pavements will come up only after civil works are completed & as such repairs to pavements does not arise                                   | Contractor           | During construction |
| 7d | Complete construction activity by removing all temporary structures restoring the project and surrounding area as near as possible to the preconstruction. | The whole site is a barren virgin land and restoration does not arise. In fact, the site gets occupied and beautified by the STP activities | Contractor           | During construction |
| 8. | <b>Conservation-Land-Soil</b>  |   |                      |                     |
| 8a | Farmland and forest belts shall not be used for materials borrow sites.  | Sand, quarry dust & gravel are procured from authorized outlets. No import of earth. No borrow pits.  | Contractor           | During construction |



| No | EA & Issues in various stages of the project   | EMP and Mitigation   | Responsible agencies | Stages              |
|----|--|--|----------------------|---------------------|
| 8b | <p>Arable land shall not be selected a borrow sites as must as possible. If excavation has to be done in arable land, top soil layer (30 CM) shall be saved and returned after construction work is completed, so as to minimize impacts on eco system, agriculture and animal husbandry</p> | <p>Borrow sites are not contemplated. Sand and quarry dust and gravel are procured from authorized outlets. Import of earth in not practiced. Topsoil will be redeployed at site</p> | Contractor           | During construction |
| 8c | <p>Education of construction workers shall be strengthened to protect national resources, wild plants and animals.</p>   | <p>There are no such national resources or wild plants or wild animals at the project site of STP</p>  | Contractor           | During construction |

| No   | EA & Issues in various stages of the project   | EMP and Mitigation   | Responsible agencies | Stages              |
|------|--|--|----------------------|---------------------|
| 9    | Construction labour-Social   |  |                      |                     |
| 9.   | Planning of labour camps needs to be done to ensure adequate water supply, sanitation and drainages etc., in conformity with laws. | No labour camp is required nor provided at site as the labour are all native force & transit from their homes elsewhere and bring their lunches. A vehicle equipped with first-aid is always stationed for rushing needy labour to medical center. Protected water is tankered and stored at site. Toilets are with septic tank & leach trench and will be for use even after STP is over. | Contractor           | During construction |
| 10   | Water & Sewer Lines-Water, Land  |  |                      |                     |
| 10 a | Laying of sewer lines should be realigned wherever possible to minimize tree feeling   | Sewer lines are not part of the STP and hence need not be done by contractor. Even otherwise, there are no trees in the project site of the STP.   | Doesn't arise        | Doesn't arise       |
| 10 b | Laying Sewerage system- Adequate precautions should be taken while laying the sewer lines to avoid                                 | Sewer lines and water supply lines are not part of the STP and hence need not be done by contractor.   | Doesn't arise        | Doesn't arise       |

| No      | EA & Issues in various stages of the project   | EMP and Mitigation   | Responsible agencies | Stages              |
|---------|--|--|----------------------|---------------------|
|         | possibility of cross connection with the water supply lines.   |  |                      |                     |
| 10<br>c | Locating of vents of sewer system, Low cost Sanitation and Sewage Pumping stations- While placing the vent shafts, precautions to minimize odor nuisance to residents be taken | Sewer lines are not part of the STP and hence need not be done by contractor | Doesn't arise        | Doesn't arise       |
| 11      | Accidents and Safety-Social  |  |                      |                     |
| 11<br>a | In order to guarantee construction safety, efficient lighting & safety signs shall be installed on temporary roads with adequate traffic                                       | Agreed to  | Contractor           | During construction |

| No      | EA & Issues in various stages of the project   | EMP and Mitigation   | Responsible agencies | Stages              |
|---------|--|--|----------------------|---------------------|
|         | regulations for temporary roads.   |  |                      |                     |
| 11<br>b | In construction, effective safety and warning measures be adopted to reduce accidents. | Agreed to  | Contractor           | During construction |
| 11<br>c | Provide temporary crossing / bridges to facilitate normal life and business            | The site is exclusive for STP and hence temporary crossings and bridges need not be built by the contractor. | Doesn't arise        | Doesn't arise       |
| 12      | Traffic and Transportation-Social  |  |                      |                     |
| 12<br>a | Use major roads to avoid traffic congestion and insist compliance by the Contractor    | Agreed to  | Contractor           | During construction |

| No      | EA & Issues in various stages of the project  | EMP and Mitigation   | Responsible agencies          | Stages              |
|---------|---|--|-------------------------------|---------------------|
| 12<br>b | Local construction materials, especially earth and stones be used as much as possible to avoid long distance transportation   | Agreed to  | Contractor                    | During construction |
| 12<br>c | Adequate actions to direct and regulate traffic be taken in consultation with municipality to prevent jamming of roads during construction. While planning alternative routes, care to be taken to minimize congestion and negative impacts at sensitive receptors as schools and hospitals | Such dense transportations not at all arise in a work of this nature and a maximum of some four truckloads alone will be in plying over a day. However, this will be sorted out. | Traffic Police/<br>contractor | During construction |

| No      | EA & Issues in various stages of the project  | EMP and Mitigation   | Responsible agencies          | Stages              |
|---------|---|--|-------------------------------|---------------------|
| 12<br>d | Traffic control diversions marked with signs, lights & other measures (flags) be provided   | Such dense transportations not at all arise in a work of this nature and a maximum of some four truckloads alone will be in plying over a day. However, this will be sorted out. | Traffic Police/<br>contractor | During construction |
| 12<br>e | Prior to creating diversions and detours the citizens be consulted in advance through citizen's meetings. It should be an informed decision taken through public participation. | No such detouring is ever foreseen   | Doesn't arise                 | Doesn't arise       |
| 12<br>f | Diversion works be dismantled to restore area to original condition after construction.   | No such diversions are warranted, as a maximum of some four truckloads alone will be in plying over a day.   | Doesn't arise                 | Doesn't arise       |

| No | EA & Issues in various stages of the project  | EMP and Mitigation | Responsible agencies | Stages              |
|----|---|--------------------|----------------------|---------------------|
| 13 | Cultural relics- Social   |                    |                      |                     |
| 13 | <p>If fossils, coins, articles of value/antiquity, structures &amp; other remains of geologic or archeological interest are found, the local Govt be immediately informed of such discovery &amp; excavation be stopped until identification of cultural relics by authorized institution and clearance is given.</p> | Agreed to          | Contractor           | During construction |

| No      | EA & Issues in various stages of the project  | EMP and Mitigation  | Responsible agencies | Stages     |
|---------|---|---|----------------------|------------|
| 14      | Environmental Pollution   |   |                      |            |
| 14<br>a | Prevent loss of chlorine and other chemicals and ensure prescribed safety measures for their storage, handling and application.       | Agreed to   | Contractor           | During O&M |
| 14<br>b | The treated water quality shall comply with the standards of TNPCB before let out into the river                                      | Agreed to   | Contractor           | During O&M |
| 15      | HRD-Social  |   |                      |            |
| 15      | Implementations of a well-planned programme of human resource development aimed at increasing competence and capabilities of echnical | Training of ULB/TWAD staff during the commissioning period of the STP | Contractor           | During O&M |




| No | EA & Issues in various stages of the project  | EMP and Mitigation   | Responsible agencies | Stages       |
|----|---|--|----------------------|--------------|
|    | & administrative personnel at all level   |  |                      |              |
| 16 | <b>Air Quality Sampling</b>   |  |                      |              |
| 16 | Sampling Once before start of work & once every season of the year during construction period & upto 18 months (operation Period) | Though the tender document specifies sampling for SPM, RPM, SO <sub>2</sub> , NO <sub>x</sub> , CO & Pb, in actual fact, only the SPM and RPM can be associated with this construction activity and SO <sub>2</sub> , NO <sub>x</sub> , CO & Pb are not even remotely linked to it. In the O&M stage, even these two do not arise given the nature of the biological STP. Accordingly, the SPM and RPM will be monitored in the construction stage.  | Contractor           | Construction |
| 17 | <b>Water Quality Sampling.</b>  |  |                      |              |
| 17 | Sampling Twice a year (pre monsoon and post monsoon seasons) during the construction period                                       | Though the tender document specifies for pH, BOD, COD, DO, TDS, Pb, Oil & Grease and Detergents for Surface water and pH, TDS, Total hardness, Sulphate, Fluorides, Chloride, Fe, Pb for groundwater, in actual fact, only the pH, BOD, COD, TDS, Oil & Grease and Detergents (Measured as ABS) can be associated with the treated sewage in the O&M stage. Moreover, surface & ground water is not impacted by construction activity. The PCB consent of pH, BOD, COD & SS will be measured in the treated sewage in the O&M stage. | Contractor           | O&M          |

| No | EA & Issues in various stages of the project  | EMP and Mitigation   | Responsible agencies | Stages               |
|----|---|--|----------------------|----------------------|
| 18 | <b>Noise Level Monitoring</b>   |  |                      |                      |
| 18 | Sampling once every seasons for each year of construction                             | The tender document specifies the Noise level on dB (A) scale and this will be monitored at the periphery of the STP | Contractor           | Construction and O&M |
| 19 | <b>Soil Quality Monitoring</b>  |  |                      |                      |
| 19 | Sampling in pre and post monsoon seasons each year for the entire construction period | The tender document specifies the Pb, SAR and Oil & Grease which will be monitored at the STP                        | Contractor           | Construction and O&M |

**Table -19 Cost of Monitoring plan**

| No                | Monitoring of | Frequency   | Parameters                  | Location      | Cost in Rupees |
|-------------------|---------------|---|-----------------------------|---------------|----------------|
| 1                 | Air           | Once before start of work & once every season of the year during construction & operation                     | SPM and RPM                 | STP boundary  | 30000          |
| 2                 | Water         | Twice a year (pre monsoon and post monsoon seasons) during the construction period & monthly during operation | pH, BOD, COD,SS             | Outlet of STP | 60000          |
| 3                 | Noise         | Once every seasons (except monsoon) for each year of construction   | Noise level on dB (A) scale | STP boundary  | 30000          |
| 4                 | Soil          | During the pre monsoon post monsoon seasons each year for the entire construction period                      | Pb, SAR and Oil & Grease    | STP boundary  | 30000          |
| <b>Total Cost</b> |               |   |                             |               | <b>150000</b>  |

*[Handwritten signature]*

  
**Executive Engineer**  
**TWAD Sewerage Division**  
**Thoothukudi.**