

## 1. ENVIRONMENT MANAGEMENT PLAN

The Environment Management Action Plan (EMP) is required to ensure sustainable development of the proposed Sewerage System in Begusarai town, Bihar. The project components include:

- **Sewage Treatment Plant (STP) of 17 mld capacity at Raja Dumari Village;** The 17 MLD capacity is proposed based on projected population of 2046 (30 years from the date commencement i.e. 2016). No construction started yet.
- **Intermediate Pumping Station (IPS-I)** at Andhi reshama department begusarai site yet to be identified.
- **Intermediate Pumping Station (IPS-II A)** at Pipara begusarai. The Drawing & design is not submitted for approved by the agency hence no progress.
- **Intermediate Pumping Station (IPS-II B)** at Pokharia begusarai. The Drawing & design is not submitted for approved by the agency hence no progress.
- Laying Sewage Network of 104.9 kilometres;

The laying of Sewage Network is at its construction stage and it is necessary that mitigation measures are taken up to sustainably implement the project. Project specific EMP is given in table 1.1.

In general, Bihar Urban Infrastructure Development Corporation (BUIDCo) (with assistance from Contractor and Independent Engineer/Supervision Consultant) is responsible for ensuring that the mitigation measures as suggested in the EMP are carried out.

### 1.1 Specific activities by BUIDCo

The role of BUIDCO in the implementation of EMP involves the following activities:

- EMP clearance from NMCG and World Bank and disclosure as required;
- Integrating the EMP in the bid document of contractor;

- Tree plantation around the STP;

### 1.2 Specific activities by Contractor

The activities to be performed by the contractor to implement the EMP shall comprise the following:

- Obtain consent to establish from state pollution control board under water act for the STP;
- Implementation of other mitigation measures, as recommended in EMP and DDR.

### 1.3 Implementation of EMP

The contractor shall be responsible to implement the EMP primarily in assistance with the Project Implementing Agency team. The Environmental Specialist from the Independent Engineer/ Supervision Consultant shall monitor the compliance of the EMP and all the design drawings of various civil structures shall be implemented after his approval.

The present project includes construction of new STP **of 17 MLD capacity** and construction of 3 IPSs. The IPSs are proposed close to the populated areas. The implementation team through contractor and supervision consultant shall ensure that:

- The digested sludge from the STP having manure value may be used having a clean plan on how it can be stored or disposed. The sale of digested sludge as manure may also be promoted;
- Project design does not have provision for holding of untreated sewage in case of STP breakdown, this need to be included in the overall design; one day provision is available in the existing STP system.
- Specific site shall be identified for intermittent storage of biodegradable and non-biodegradable waste at each IPS and shall be disposed in the designated site;

- Tree plantation shall be made on the periphery of the STP site which will help aesthetically as well as to control bad odour. According to DPR, 33% of the STP area is to be developed into green belt ;and,
- The boundary wall in the STP site actually is obstructing the natural flow and hence it is necessary to clarify the same and suitable drainage arrangements shall be made to ensure natural flow of storm water.

The organogram for the implementation and monitoring of EMP is presented in figure 1-1. Contractor shall report the implementation of the EMP to the Environmental Expert of Supervision Consultant as well as to BUIDCO and SPM Go through monthly reports. Further a quarterly report is required to be prepared and required to be given to NMCG for the progress made in implementing the EMP.

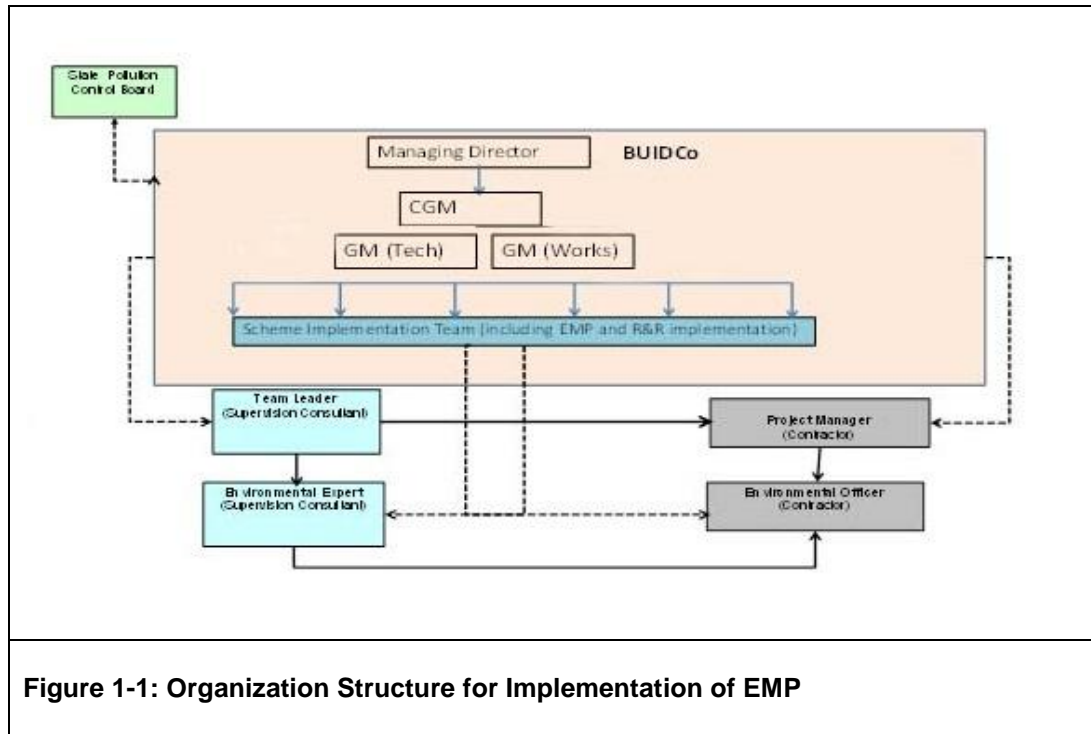


Table 1-1: Environment Management Plan

Activity	Potential Negative Impact/Concern	Duration of impact	Mitigation Measures	Responsible agency	
<b>A. Design and Development Phase</b>					
Sewage Treatment plant	Treated water disposal into nearby stream	<ul style="list-style-type: none"> <li>Pollution of stream water and other water bodies receiving STP discharges due to reduction in efficiency or non-working of STP</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>The treated water quality need to comply with the prescribed standards by the state pollution control board.</li> </ul>	BUIDCo/Contractor
	STP Breakdown	<ul style="list-style-type: none"> <li>Otherwise in case of STP breakdown there is possibility that untreated sewage will flow to river and pollute it.</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>A provision of holding of untreated sewage is required to be made so that during the STP breakdown the untreated sewage does not flow to river Ganga</li> </ul>	BUIDCo /Contractor
	Sludge disposal	<ul style="list-style-type: none"> <li>Disposal of sludge leading to contamination of land and water.</li> </ul>	Permanent	<ul style="list-style-type: none"> <li>Shifting from current manner of unplanned sludge disposal to disposal in a scientific manner or sale of sludge as manure;</li> </ul>	BUIDCo/ Contractor
	Provision for accidental leakages/ bursts	<ul style="list-style-type: none"> <li>Low lying areas in the site, which can get flooded during monsoons</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>Provide proper drainage arrangements so that the water does not stagnate on the site especially for new STP and IPS building site.</li> </ul>	ULB/ Contractor
	Location of STP	<ul style="list-style-type: none"> <li>Noise/Odour/fly nuisance hazards to neighboring areas.</li> </ul>	Permanent	<ul style="list-style-type: none"> <li>Pump station in STP to ensure minimum noise generation;</li> <li>Tree plantation and landscaping along the periphery of the STP site to prevent spread of bad odour;</li> <li>Accumulated sludge and solid waste to be cleared within 24 hours;</li> <li>Spraying of herbicides like <b>Maple</b> and <b>Gtechon</b> accumulated sludge/solid waste to reduce odour.</li> </ul>	BUIDCo/ULB/ Contractor
Sewerage Network (Trunk sewer line)	Accidental leakages/ bursts	<ul style="list-style-type: none"> <li>Flooding of nearby areas due to leakage/bursts</li> <li>Backlogging due to unexpected heavy flow rates</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>Designing sewers with adequate capacity and flow velocity</li> <li>Regular inspection and maintenance of the sewer lines.</li> </ul>	BUIDCo/ Contractor

Construction of Intermediate Pumping Stations (IPSs)	Pumping of sewage from various zones through the proposed IPSs to the proposed STP	<ul style="list-style-type: none"> <li>Noise and odour nuisance to surrounding areas.</li> </ul>	Permanent	<ul style="list-style-type: none"> <li>Pumping station to ensure minimum noise generation by locating within a noise reducing structure or in an enclosed space (such as concrete/brick structure)</li> <li>Use of less noise generating equipment such as submersible pumps, enclosed generators</li> <li>Regular maintenance and switching off equipment when not in use;</li> <li>Equipment's need to meet the noise standards as prescribed by CPCB<sup>1</sup>.</li> <li>Regular clearance of sludge and solid waste to minimize odor nuisance.</li> <li>Spraying of herbicides like <b>Maple</b> and <b>Gtech</b> on accumulated sludge/solid to reduce odour.</li> </ul>	BUIDCo/ Contractor/ ULB
<b>B. Construction phase</b>					
Sewerage (laying of sewers)	Excavation, cutting, back filling and compaction operations	Generation of substantial debris, top soil and muck during construction of IPS and STP	Temporary	Instead of disposing top soil to low lying areas: <ul style="list-style-type: none"> <li>Top soil may be used for agricultural purpose or development of city parks.</li> <li>Soil and debris may be managed for planned land filling and landscaping;</li> <li>Debris may be suitably stored to filling back the excavated areas after placing the trunk sewer lines.</li> </ul>	Contractor /BUIDCo/ CS&QC
		Accidents/ damages due to erosion/ sliding of vertical sides of excavated trenches while places the pipes	Temporary	<ul style="list-style-type: none"> <li>Maintaining the excavation by shoring trench sides by placing sheeting, timber shores, trench jacks, bracing, piles, etc.</li> <li>Exposed surface will be resurfaced and stabilized.</li> </ul>	Contractor /BUIDCo/ CS&QC
		Dust Generation due to excavation, cutting, back filling and compaction operations	Temporary	As suggested in the DDR the ambient air quality is expected to be within the prescribed limits. Still following actions shall be taken during construction stage like: <ul style="list-style-type: none"> <li>Water sprinkling to be done in the construction and excavation areas;</li> <li>Additionally, it is recommended to wet and cover excavated material transported by trucks.</li> </ul>	Contractor /BUIDCo/ CS&QC

<sup>1</sup><http://moef.gov.in/citizen/specinfo/noise.html>

		Noise and vibration disturbances to residents and businesses	Temporary	<ul style="list-style-type: none"> <li>Construction activities to be done in day time after giving prior intimation to local residents/shop keepers;</li> <li>Construction near schools and hospitals colleges to be carried out during vacations with prior information;</li> <li>Use of low noise and low vibrating equipment to be encouraged;</li> <li>Instruments need to meet standards of CPCB<sup>2</sup>.</li> <li>Provision of PPE to construction workers; like ear muffs and plugs;</li> </ul>	Contractor /BUIDCo/ CS&QC
		Temporary flooding due to excavation during monsoons or blockage of surface drains	Temporary	<ul style="list-style-type: none"> <li>Stockpiled areas to be bordered by berms;</li> <li>Stockpiles to be done in high areas to avoid flow in storm water run-off channels and erosion;</li> </ul>	Contractor /BUIDCo/ CS&QC
		Increased traffic inconvenience (emissions, congestions, longer travel times, blockage of access)	Temporary	<ul style="list-style-type: none"> <li>Alternate traffic routing to be adopted in consultation with traffic police authorities.</li> <li>Construction works at business and market area must be completed earlier to minimize business loss.</li> </ul>	Contractor /BUIDCo/Traffic police
		Settlement of backfilled area after construction	Temporary	<ul style="list-style-type: none"> <li>The backfilling material shall be free from petroleum products, slag, cinders, ash or other material.</li> <li>Backfilling activity should follow the construction schedule like completing 1 km stretch of within 5 days.</li> <li>Proper compaction as per the soil condition and retain the original level/ alignment.</li> </ul>	Contractor /BUIDCo/ CS&QC
		Spillage of fuel and oil	Temporary	<ul style="list-style-type: none"> <li>Care to be taken to store fuel and oil (if required) at a place away from any drainage channel/halla preferably to be stored in drums mounted on a concrete paved platform.</li> <li>Any spillage of oil is to be checked.</li> </ul>	Contractor /BUIDCo/ CS&QC

<sup>2</sup><http://moef.gov.in/citizen/specinfo/noise.html>

Sewage treatment plant and Sewage pumping station	Excavation	Damage to topsoil due to excavation activities.	Temporary	<p>The STP and IPS expansion are to be done at existing sites.</p> <ul style="list-style-type: none"> <li>Careful excavation is thus needed so that the existing structures does not get damaged;</li> <li>Top soils to be stockpiled and may be reused for the preparation of green belt development</li> </ul>	Contractor /BUIDCo/ CS&QC
		Construction waste	Temporary	<ul style="list-style-type: none"> <li>All the associated construction waste should be properly managed by storing and disposing off at identified refusal sites.</li> </ul>	Contractor /BUIDCo/ CS&QC
		Sludge Disposal	Temporary	Instead of disposing digested sludge opting for <i>sailing</i> the digested sludge to local farmers or to the authorities for maintaining the land escaping in city level parks to be done.	Contractor/ULB/ Forest Department
		Dust Generation due to construction activities	Temporary	<ul style="list-style-type: none"> <li>Excavated material transported by trucks will be covered and/or wetted to prevent dust nuisance.</li> <li>Suppressing dust generation by spraying water on stockpiles</li> </ul>	Contractor / BUIDCo
		Temporary flooding due to uneven dumping of construction waste	Temporary	<ul style="list-style-type: none"> <li>Waste materials to be stored on the high laying areas and storing near to storm water run-off channels or any low lying areas to be avoided.</li> </ul>	Contractor / BUIDCo
General: safety during construction		Safety hazards to labors and public. Workers are seen to working without any PPE even at height.	Temporary	<ul style="list-style-type: none"> <li>Comply with the Occupational health and Safety act of India</li> <li>Workers working at height need to be given proper PPE;</li> <li>Workers near high noise equipment's to be given PPE;</li> <li>Handrails on both sides of walkways close to deeper tanks and STPs need to be ensured;</li> <li>Ensure that the contact details of the police or security company and ambulance services nearby to the site.</li> <li>Smaller on and off switches at STP units to be installed with protection from rain water to minimize electrical short circuit;</li> <li></li> </ul>	Contractor /BUIDCo

<b>C. Operation phase</b>						
Sewer line	Leakage/ overflows	Water pollution and possibility of mixing with water supply line	Permanent	<ul style="list-style-type: none"> <li>Regular monitoring of sewer line and manholes for visible leakages/ overflows.</li> <li>Immediate repair operation for the damaged portion of sewer line.</li> <li>De-siltation of blocked sewers/ manholes with sewage pumping machines-storing and disposal at appropriate refusal area after treatment.</li> <li>Ensure proper covering of manhole and avoid dumping of solid waste to prevent chocking of sewer line.</li> </ul>	ULB / Contractor	
Sewage treatment plant and Intermediate pumping station	Noise pollution from operation activities		Permanent	<ul style="list-style-type: none"> <li>Proper handling and regular maintenance of operating machines including pumps, generators, air diffusers, etc.</li> </ul>	Contractor & ULB	
	Treatment and Disposal	Impairment of receiving water quality in surface/sub-surface source due to inadequate /inefficient treatment. Contamination of groundwater supplies due to leaching and impact on soil and agriculture	Permanent	<ul style="list-style-type: none"> <li>Monitor the treated sewage/effluent quality and ensure compliance with PCB standards for effluent disposal into surface water bodies, on land or for the agricultural use.</li> </ul>	Contractor & ULB	
	Treatment and Disposal	Problems arising due to bad odour, insects, polluted air, noise pollution, etc.		Permanent	<ul style="list-style-type: none"> <li>Provide buffer zones in the form of green belt around the STP; to be ensured during the design and construction phase itself.</li> </ul>	Contractor /BUIDCo
		Indiscriminate disposal of sludge leading to contamination of land and soil.		Permanent	<ul style="list-style-type: none"> <li>Prepares a sludge disposal plan and adheres to the same.</li> <li>Ensure proper functioning of STP for digestion of sludge and ensure adequate functioning of dewatering units for efficient functioning of system</li> </ul>	Contractor /BUIDCo
		Reduced land values in nearby areas and aesthetics affected.		Permanent	<ul style="list-style-type: none"> <li>Adequate buffer zones during development and construction phase should mitigate the affect considerably.</li> </ul>	Contractor /BUIDCo





General Safety	Workers exposed to toxic gases in sewers and hazardous materials	<ul style="list-style-type: none"> <li>• Serious/health/ safety hazards</li> <li>• The toxic gases are likely to contract communicable diseases from exposure to pathogens present in the sewage.</li> </ul>	Temporary	<ul style="list-style-type: none"> <li>• During cleaning/ maintenance operation, the sewer line will be adequately vented to ensure that no toxic or hazardous gases are present in the line.</li> </ul>	<p>BUIDCo / ULB / Contractor</p>
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