ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT FOR UPGRADATION OF EXISTING 240 MLD STP AND ASSOCIATED INFRASTRUCTURE INCLUDING ONE TERMINAL SEWAGE PUMP STATION AT VASNA

(Revised)

GUJARAT RESILIENT CITIES PARTNERSHIP: AHMEDABAD CITY RESILIENCE PROJECT (G-ACRP)

2022

Prepared by

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For

AHMEDABAD MUNICIPAL CORPORATION

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Note:

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Abbreviations

Abbreviation	*Expansion*
ACRP	Ahmedabad City Resilience Project
AMASR	Ancient Monuments and Archaeological Sites and Remains Act
AMC	Ahmedabad Municipal Corporation
AMSL	Above Mean Sea Level
AUDA	Ahmedabad Urban Development Authority
APD	Assistant Project Director
ASI	Archeological Survey of India
ASP	Activated Sludge Process
BDW	Biodegradable Wastes
BIS	Bureau of Indian Standards
BMC	Biodiversity Management Committee
BMW	Bio Medical Waste
BNR	Biological Nutrient Removal
BOD	Bio Chemical Oxygen Demand
BOQ	Bill of Quantities
BP	Bank Procedures
BPL	Below Poverty Line
C&D	Construction and Demolition
CBD	Convention on Biological Diversity
CBMWTF	Common Biomedical Waste Treatment Facility
CBO	Community-Based Organization
CC	Climate Change
CMS	Conservation of Migratory Species
COD	Chemical Oxygen Demand
CPA	Critically Polluted Area
CPCB	Central Pollution Control Board
CPHEEO	Central Public Health & Environmental Engineering Organization
CRZ	Coastal Regulation Zone
CTE	Consent to Establish
CTO	Consent to Operate
CVCA	Critically Vulnerable Coastal Areas
DG	Diesel Generator
DBOT	Design Build Operate Transfer
DO	Dissolved Oxygen
DPR	Detailed Project Report
DTP	Directorate of Town Planning
DWMP	Disaster Waste Management Plan
EA	Environmental Assessment
EAP	Externally Aided Project
ECoP	Environmental Codes of Practice
EC	Environmental Clearance
EE	Environmental Engineer
EHS	Environmental Health and Safety
ESIA	Environmental and Social Impact Assessment

Abbreviation	*Expansion*
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
EPR	Extended Producer Responsibility
ERT	Emergency Response Team
ESA	Environmentally Sensitive Areas
ESS	Environmental and Social Standards
SDU	Sustainable Development Unit
ESF	Environmental and Social Framework
ESHS	Environmental and Social Health & Safety
ESZ	Eco-sensitive Zone
ETP	Effluent Treatment Plant
FI	Financial Intermediary
FGD	Focus Group Discussions
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GIS	Geographic Information System
GoI	Government of India
GoG	Government of Gujarat
GPS	Global Positioning System
GRC	Grievance Redressal Committee
GRCP	Gujarat Resilient Cities Partnership
GPCB	Gujarat Pollution Control Board
GUDM	Gujarat Urban Development Mission
Ha	Hectares
HH	Households
HR	Human Resources
HFL	High Flood Level
ICB	International Competitive Bidding
IEC	Information Education Communication
IEE	Initial Environmental Examination
IESSR	Initial Environmental and Social Screening Report
IFC	International Finance Corporation
IPF	Investment Project financing
IUCN	International Union for Conservation of Nature
IS	Indian Standards
KGP	Knowledge, Governance and Policy
LB	Local Body (Urban or Rural)
LMP	Labor, Machinery and Plant
LU	Land Use
LULC	Land use and Land Classification
LPCD	Liters per Capita per Day
LFPR	Labor Force Participation Rate

Abbreviation	*Expansion*
MAM	Majur Adhikar Manch
M&E	Monitoring and Evaluation
MoEFCC	Ministry of Environment, Forests and Climate Change
MLD	Millions of litres Per Day
MBR	Membrane Bioreactor
MPN	Most Probable Number
N	Nitrogen
NCB	National Competitive Bidding
NDZ	No Development Zone
NEP	National Environmental Policy
NH	National Highway
NGO	Non-Governmental Organization
NGT	National Green Tribunal
NMA	National Monuments Authority
NOC	No Objection Certificate
NPDM	National Policy on Disaster Management
NTDNT	Nomadic Tribes and De-Notified Tribes
O&M	Operations and Maintenance
OD	Operational Directives
OHS	Occupational Health and Safety
OP	Operational Policies
P	Phosphorus
PAF	Project Affected Family
PAP	Project Affected Person

Abbreviation	*Expansion*
PD	Project Director
PDO	Project Development Outcome
PIU	Project Implementation Agency
PM	Particulate Matter
PMC	Project Management Consultant
PPE	Personal Protective Equipment
SCADA	Supervisory Control and Data Acquisition
SC/ST	Scheduled Caste/Scheduled Tribe
SEP	Supplemental Environmental Project
STP	Sewage Treatment Plant
SIRT	Systematic Incident Reporting Tool
SBR	Sequential Batch Reactor
SPS	Sewage Pumping Station
SPM	Suspended Particulate Matter
SPCB	State Pollution Control Board
SUDU	Sustainable Urban Development Unit
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
WB	The World Bank
WRIS	Water Resources Information System
ULB	Urban Local Body/ies
VEC	Valued Environmental Components

Summary

1. Introduction/ Project background

The Government of Gujarat (GoG) intends to utilize financial support from the World Bank (WB) for Gujarat Resilient Cities Partnership: Ahmedabad City Resilience Project (G - ACRP). The project will support (i) the AMC in addressing key institutional, financial, and service delivery constraints to strengthen the resilience and sustainability of priority urban services, and (ii) the GoG state government to enhance its institutional capacities to support ULBs across the state with executing their resilient infrastructure development functions, and to develop a knowledge generation, curation and dissemination system to leverage the innovations of the state's leading Municipal Corporations (mainly Ahmedabad and Surat). The project will provide a combination of technical and financial assistance to AMC in pivoting towards an integrated service delivery approach – one that is resilient, green, sustainable, and inclusive. It will also focus on enabling AMC to shift towards a more professional, performance-oriented, and efficient utility approach for service delivery. To this end, the project comprises three components: (i) strengthening AMC's financial systems and performance, (ii) improving AMC's urban infrastructure and services, and (iii) developing GoG institutional systems and capacities. ESMF has been prepared for the G - ACRP project and disclosed on the AMC website[1].

2. Status of the subproject development at the time of ESIA

Feasibility study/ detailed project report preparation is underway and the subproject will be bid out for implementation on a Design-Build – Operate – Transfer (DBOT) mechanism. ESMP prepared through this ESIA will be included in bid documents so that the contractor can plan and arrange the required resources for implementing and managing the E&S aspects.

3. Sub-project Description & Analysis of Alternatives

The existing Sewage Treatment Plant (STP) of 240 MLD capacity at Vasna is proposed for Technology upgradation under the G - ACRP project. This STP was built in the year 2011 and over the years, its functioning is deteriorated as evident from the quality of treated sewage, and much of the infrastructure is dilapidated. The process used in the existing STP is the Activated Sludge Process (ASP). AMC proposes to (i) change the treatment process to enable it to accept and treat the sewage generated by all occupants in its catchment optimally, (ii) ensure higher efficiency and achieve service level benchmark set by National agencies and regulators, (iii) achieve a better quality of treated sewage as suggested by the National Green Tribunal (NGT). This will ensure better sewage management in its catchment and area of influence, by reducing discharge and bypass of untreated or suboptimal treated sewage in waterbodies and land (reused for irrigation), thereby reducing the contamination of surface and ground water sources and supporting overall improvement in the health of the environment and the society.

The construction work will be carried out in phases to reduce the E&S impacts and address issues related to diversion of sewage flow during construction. FR mentions the detailed Phasing of works including construction of new units, modification/upgrading of units, demolition of units which are presented in tabular form. FR also mentions that the units to be upgraded shall be emptied and disinfected before doing any modification works. The sewage within the units also shall be over pumped to other units without causing nuisance. DBOT contractor shall prepare and submit schedule for diversion of sewage for treatment during construction & operation after proposed upgradation and rehabilitation. The work shall be carried out phase wise to ensure diversion and treatment of sewage. FR proposes that in order to keep running the plant till the final commissioning, It is considered to overload the 3 modules of 60 MLD units to 67 MLD each

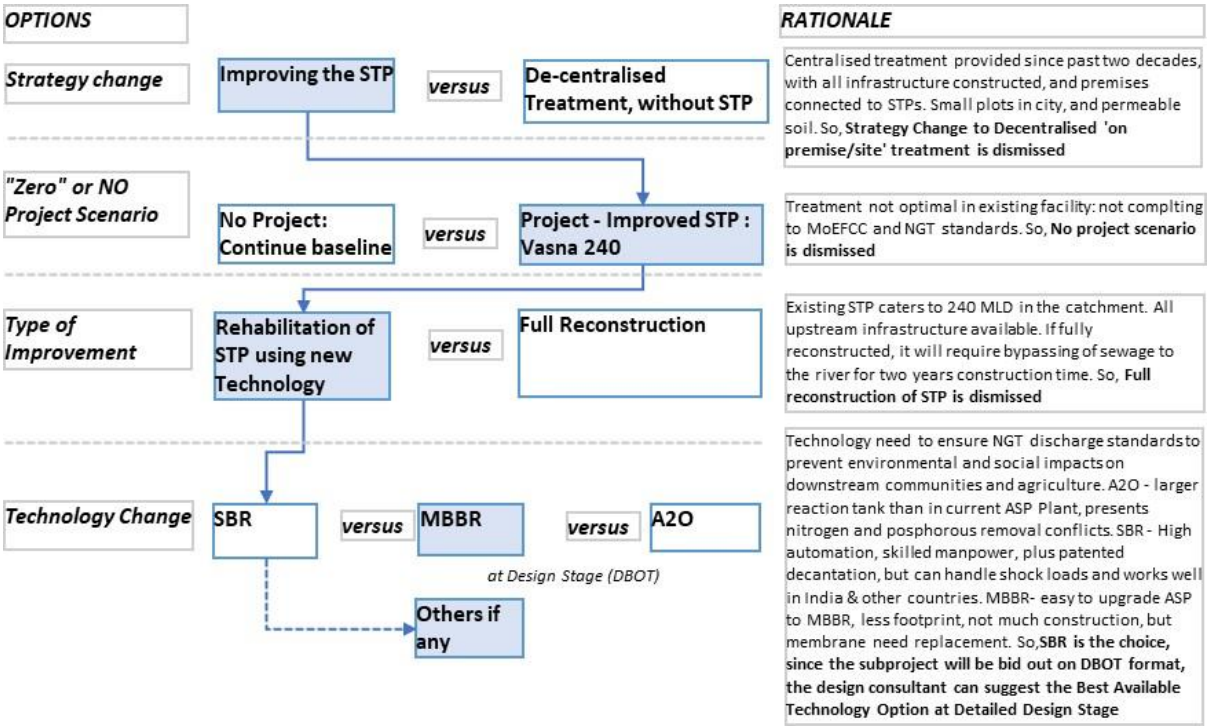
[1]https://ahmedabadcity.gov.in/portal/web?requestType=ApplicationRH&actionVal=viewAttachment&queryType=Select&screenId=2900003&AttachmentFileName=ESMF.pdf

(200 MLD/3no). Thus each module will be overloaded by 10%. Based on the consultants' experience and as mentioned in CPHEEO manual, the Plant could be overload by 15% and notes that Plant is hydraulically adequate with the 3 modules of 60 MLD with 15% overloading.
The proposed subproject has no long-term impact on land use, erosion, or sedimentation and there is no additional land requirement.

Analysis of Alternatives

The Analysis of Alternatives is structured to follow a 'narrowing approach' involving a series of logical steps, starting with the high-level strategy alternatives followed by the description of more detailed technology alternatives considered. Using this commonly adopted narrowing approach, the Analysis of Alternatives considers alternatives in the following sequence:

- Strategy Alternative: Abandoning the Existing Centralised Treatment to follow decentralized treatment 'on site'. Here, a scenario where existing STP would be abandoned, and residents will be using onsite decentralized treatment in septic tanks is considered against the proposed subproject
- 'Zero' or 'No Project' alternative: Here, without project scenario i.e., continuing the existing situation compared with the scenario where the proposed project rehabilitation is implemented
- Complete reconstruction of Existing Plant: Demolition of existing plant to reconstruct a new STP in its place
- Design/Technology Alternatives: Technologies to achieve the stringent discharge standards suggested by NGT are compared with the current one. During Detailed design, this will be subject to further scrutiny and the best environmentally suitable alternative will be adopted.



This alternative is for the proposed 240 MLD STP upgradation and rehabilitation. To achieve the effluent standards (BOD- 10 mg/l, TSS – 20 mg/l and TN – 10 mg/l) prescribed by the NGT guide lines, an advanced wastewater treatment with Biological Nutrient Removal (BNR), using

an appropriate technology will be considered. The present STP process is not designed to meet the treated effluent norms prescribed by NGT in terms of BOD, COD, TSS and Biological Nutrient Removal (BNR). Upgradation and rehabilitation will on the whole ensure better environment and health in the city and the region by ensuring full treatment of sewage from the its generator catchment, improve quality of water in the river Sabarmati to which the treated sewage is discharged, and improve the reusability of treated sewage.

4. Applicable Regulatory and Guidance Framework

The applicable regulatory framework for the ESIA is comprised of the following:

- Applicable national, state, and city-level environmental and social policies, regulations, and guidance's (including environmental policy and acts, water and air acts, noise rules, regulations on various types of wastes, wetlands, and Eco-sensitive areas, tree cutting, biodiversity, Dam Safety, The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act, The Sexual Harassment of Women at Workplace Act and others)
- Indian labor and related laws (including The Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, The Factories Act, Child Labour (Prohibition and Regulation) Act, Minimum Wages Act, Workmen's Compensation Act & Rules, The Street Vendors Act
- World Bank ESF and the ESSs: Apart from ESS 7 & ESS9 all other ESSs are relevant for this project. ESS5 stipulates that project-related land acquisition and land-use restrictions impacts (physical displacement, economic displacement, or both on communities and persons) be addressed. However, as no land acquisition and resettlement will be required in this sub-project and as there is no expected livelihood impacts due to economic displacement, ESS 5 is not relevant for this specific sub-project. The adverse social impacts (if any) to adjacent communities/ squatters will be addressed through ESS1 and ESS4, World Bank Group ESHGs and other World Bank Guidance

This ESIA is prepared as guided by the Environmental and Social Management Framework for G-ACRP prepared by AMC based on the regulatory and guidance framework above. The proposed project will comply with national and state regulations, as well as the WB ESF and WBG EHS guidelines and for specific standards the most stringent among these will be complied with.

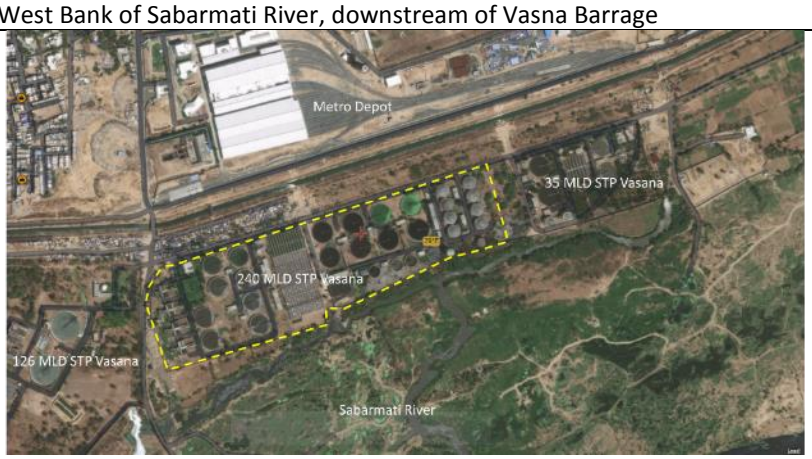
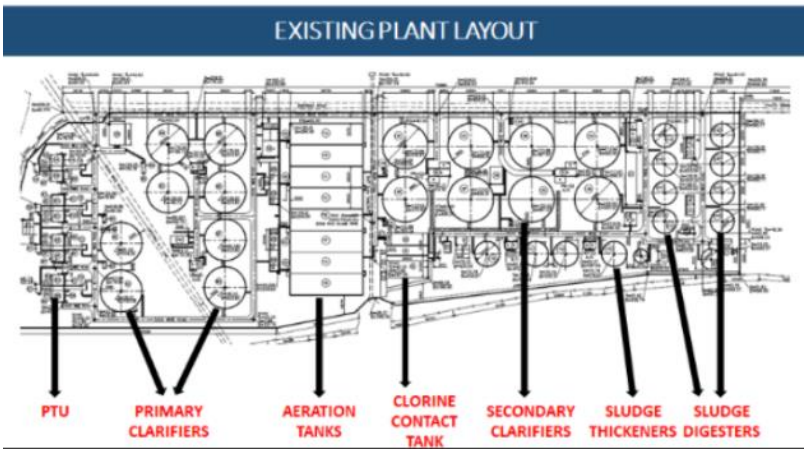
5. Baseline environmental and social conditions

E&S Audit of existing facilities proposed for upgradation or integration with the sub-project

The E&S audit was conducted for 240 MLD STP with the objective of Physical assessment of the STP and units' operation status & Identification and assessment of environmental & social management practices. E&S audit highlights the defunct units/ parts of the STP and general environmental & Safety practices which are not being followed i.e., use of PPEs, no designated storage area for chemicals, etc. Public consultations also highlighted the settlement/ encroachments around the STP (outside of STP premises) are temporary structures and are devoid of any municipal facility.

Baseline environmental and social aspects are presented in the following tabulated summary,

Aspects	**Description: Vasna 240 MLD STP**
Location	
Co-ordinates	Latitude: 22°58'52.07"N Longitude: 72°31'35.73"E

Aspects	**Description: Vasna 240 MLD STP**
Details of Administrative/ Physical occurrence	Ward No 52 Sarkhej, Ahmedabad, Gujarat State of India West Bank of Sabarmati River, downstream of Vasna Barrage
Location Map	
Physiography, Microclimate, and Surrounding land use	
Topography, Slope, and Soil	Ahmedabad city area is monotonously flat except for small patches. Land surface elevation is from 40 m to 60 m AMSL with a master slope towards the south. The site is flat, sloping from 42 – 46m. HFL is 41.7m.
Microclimate	Hottest month- May (Maximum Temperature 41.6°C) Coldest Month- January (Minimum Temperature 27°C)
Surrounding land use and activities	East: 35 MLD STP West: 126 MLD AMC STP North: Fatehwadi canal road, access road with squatter settlements, sewage pumping station, and Ahmedabad metro depot South: Sabarmati River
Any land use or structure, or any proposed land use which makes nearby safety of which is important	Vasna Barrage is located 3 km upstream, two parallel bridges across Sabarmati downstream of the Barrage which is 1km upstream of the site
Site Details	
Site Plan	
Approach to site	The approach to the site is through the canal side road connected through an unpaved (*Kuccha*) road.
Description of main and subsidiary access ways	Canal side road connecting Narol- Sarkhej road to NH 751 The plant has secured access through Gate Security- Yes Used for accessing the site by officials, for all goods/materials movement, firefighting others: Yes
Area and shape	214117 sq. m. Rectangle plot

<table>
<tr><th>Aspects</th><th>Description: Vasna 240 MLD STP</th></tr>
<tr><td>Ownership</td><td>AMC</td></tr>
<tr><td>Historic land use</td><td>STP, Sewage Farm before constructing STP</td></tr>
<tr><td>Current land use</td><td>Existing STP</td></tr>
<tr><td>Natural features</td><td>None on site, Sabarmati River to South of the site</td></tr>
<tr><td>Impact during any historic event</td><td>Flooding</td></tr>
<tr><td>Description of the existing facility if any</td><td>Capacity: 240 MLD
Technology: ASP</td></tr>
<tr><td>Condition of existing plant & safety</td><td>The existing STP is almost 12 years old and many of the project components are defunct and not working at full capacity. All the civil structures and Internal roads are in good condition. STP is guarded by a concrete wall around it to stop any encroachment.</td></tr>
<tr><td colspan="2">Baseline Environmental Quality</td></tr>
<tr><td>Quality of Treated sewage</td><td>
<table>
<tr><th>Parameters</th><th>Agreed Standards as per Consent to Operate from GPCB</th><th>Baseline quality</th><th>NGT suggested discharge standards (for comparison)</th></tr>
<tr><td>BOD (mg/l):</td><td>20</td><td>16</td><td>≤ 10</td></tr>
<tr><td>COD (mg/l):</td><td>100</td><td>72</td><td>≤ 50</td></tr>
<tr><td>SS (mg/l)</td><td>30</td><td>807</td><td>≤ 10</td></tr>
<tr><td>pH</td><td>6.5 to 8.0</td><td>7.8</td><td>6.5-9.0</td></tr>
<tr><td>Fecal Coliform MPN/ 100 ml</td><td>1000-10000</td><td>61</td><td><230/ <100</td></tr>
<tr><td>N</td><td>Nil</td><td>14.1</td><td>≤10</td></tr>
<tr><td>P</td><td>Nil</td><td>1.83</td><td>≤1</td></tr>
</table>
</td></tr>
<tr><td>Noise</td><td>Noise levels are high which are due to the existing ongoing construction of Metro Depot (which is expected to be completed by April 2022)</td></tr>
<tr><td>Ambient air quality</td><td>All parameters are within the permissible limits</td></tr>
<tr><td>Plant related air quality issues</td><td>Gases are emitted from the sewage and sludge. Gases like Methane are released from sludge. Gas holders are in place. The movement of vehicles in an existing plant is very minimum and emissions of dust and other vehicular pollutants are negligible.</td></tr>
<tr><td>Ambient water quality (Ground & Surface)</td><td>Ground Water: Considering the monitoring results mentioned Drinking water quality standards as per the latest CPHEEO & IS code 2012, the water from these sources cannot be used for drinking without treatment
Surface Water: The sampling was carried out for surface water at Sabarmati near 240 MLD STP at Vasna. It is observed from the monitoring that, BoD, Chlorides, and Coliform in the water samples are exceeding the CPCB 1979 and BIS 1982 standards of surface water quality criteria for drinking purposes.</td></tr>
<tr><td>Soil quality</td><td>No sludge disposal on the ground observed</td></tr>
<tr><td>Fauna & Flora</td><td>There are 200-250 numbers of trees on site, mainly of Acacia & Neem species; and planted shrubbery. The existing site has a green area that harbors a variety of common birds and insects. Outfall has the growth of Euchornia sp. (invasive) in the Sabarmati River.</td></tr>
<tr><td colspan="2">Proposed Rehabilitation works</td></tr>
<tr><td>Proposed activity (including Upstream and downstream linked infrastructure proposed for upgradation)</td><td>Changing the Treatment Technology and required structural/other changes to meet better discharge standards (NGT suggested norms). Electric works include replacing transformer and LED lights. Solar sludge drying proposed
Existing upstream infrastructure will be retained, with minor repair at TSPS
Outfall will be strengthened</td></tr>
</table>

Aspects	**Description: Vasna 240 MLD STP**
Key environmental issues to be considered to design mitigation measures	Poor discharge quality. Quality needs to be brought to satisfy NGT standards. Some of the existing units and machinery are not functioning well such as drum screens, rake classifier, detectors of grit chamber, Parshall flume flow indicator, sludge recirculation pumps, excess sludge pumps, etc. Discharge qualities need to be brought to better standards and Consent to be received from GPCB incase this is to be discharged into Fatehwadi for reuse, bypass quality reuse without chlorination not to be done, material storage shall be made proper, waste and sludge storage, reuse to be improved. The site has no land required for large-scale upgradation, access to be topped, discharge line to be improved, and others. TSPS needs to be repaired.

Social Baseline

The baseline socioeconomic predictions used and discussed in the ESIA study are provided from the Master planning consultant, for ward level data in which STP is located. The ward as sewerage catchment area comprises of 28% of the total city area and Ward number 52 for Sarkhej in which the STP is located as the sub project of upgradation of 240 MLD STP relate to sewer network and the treatment of sewage water for Ahmedabad city to achieve the NGT requirements. Ahmedabad (urban) is one of the fast-growing cities of India with 27.82% decadal growth observed between 2001-2011. The area within 10 kms of existing STP site is under ward 52 and has been discussed for risks and impacts in adjoining areas. It is a gated and secured property under the ownership of AMC, exclusively used for STP purposes. There are no occupants at the proposed expansion site and no disadvantaged/ vulnerable groups.

Contributing population estimated in FR for YR 2021 is 866840; FR 2024 - 987588, FY 2029 - 1216073, FR 2034 -1495301 and FY 2039-1817084.

There is a squatter settlement which is located near the STP between the Fateh wadi canal and the STP boundary. There are roughly 600 to maximum 700 households residing in temporary structures in the squatter settlement. The settlement comprises of mainly migrants.
Migrants in Ahmedabad, living in squatter settlements, comprise of two groups of workers – seasonally migrant construction workers who migrate from the tribal belt comprising of Dahod in Gujarat and Jhabua and Banswara in neighbouring states and long-term migrants from the Nomadic Tribes and De-Notified Tribe (NTDNT) communities. The government does not enumerate these settlements and does not provide any public services to these settlements. Majur Adhikar Manch (MAM), a trade union of informal workers, has been working with the residents of these squatter settlements. The settlements will experience temporary impacts related to dust, traffic movement, labor movement and related issues which will be mitigated during project implementation. Impacts and mitigation measures discussed in details in the relevant chapters.

Demographics & ethnic composition In the Sarkhej ward, there are 14,740 households with a total population of 72,727 with 37,746 males and 34,981 females. The average household size is 5.4 and the sex ratio is 927 which is higher than the city sex ratio.

Gender-based issues/ concerns - Women in the nearby settlement are working, mainly in the unorganized sector as semi-skilled and unskilled labour, domestic workers, construction/ masonry work. Safety and security concerns for women/ children were raised due to the labour influx for construction activities, open defecation, lack of street lights and similar issues as the settlement is informal. This has been addressed in the mitigation measures through community health and safety measures, employment of labour, for both men and women from the informal settlement, setting up labour camp at suitable site to prevent any disturbance to the settlement, SEA/ SH measures and provision of services such as drinking water supply and sanitation for the settlement through government schemes and programs.

Assessment of Risks and Impacts

The project is a brownfield project comprising of rehabilitation of existing STP and improvement/ repair to pumping station. Some of the environmental & social impacts are given below;

- Generation of substantial debris, and muck during construction and demolition activities.
- Dust and Noise Generation and emission to air due to demolition, excavation, cutting, back filling, compaction operations, and other construction activities and Operations and maintenance works.
- Noise and vibration and other disturbances to residents and businesses during material movement, construction demolitions, and laying of rising main
- Temporary flooding due to excavation during monsoons
- Land and water contamination and impacts on people, fauna/flora due to construction waste and sludge handling; and discharge of treated sewage/bypass
- Spillage of fuel and oil
- Safety hazards to labours (Occupational Health and Safety) and public (Community Health and Safety)
- Increased traffic inconvenience (emissions, congestions, longer travel times, blockage of access), especially the approach road connecting the STP also is a connecting road from NH 64 to the nearby areas
- Impacts of discharge from STP on adjoining communities, especially during construction phase, and discharge of treated sewage on downstream communities/ river users.
- Adverse social impacts on adjacent communities and squatters (e.g., security of women and girls due to labor influx)

Based on the relevance of each ESS, as identified in the chapter on Legal, Regulatory, and Institutional Framework, ensuing sections summarize the environmental and social risks and impacts likely due to the proposed interventions followed by the mitigation measures considered, for each relevant Standard. The table below presents the Risk and impacts grouped in respect of the applicable ESS identified in chapter 3:

Applicable ESS	Risk and Impacts assessed
ESS1: Assessment and Management of Environmental and Social Risks and Impacts	ESIA assessed all risks and impacts as applicable to ESSs 2-10
ESS2: Labour and Working Conditions	Various types of laborers employed and impacts and risks due to their working conditions
ESS3: Resource Efficiency and Pollution Prevention and Management	Minimal risks and Impacts on Physiography, land use, Geology, Soil, biodiversity, and people due to proposed rehabilitation of existing STP Risks and Impacts on Water Resources, Water Quality due to construction activities, operation and maintenance, and discharge of treated sewage Risks and Impacts on Air Quality, Noise levels during construction, operations Risks and Impacts due waste generation/ disposal due to proposed rehabilitation activities and operation of existing/ rehabilitated STP Aspects to ensure better resource efficiency include reuse of treated sewage, energy-efficient mechanisms, and machinery
ESS4: Community Health and Safety	Risks and Impacts on Community Health and safety during construction, pollution, also considering flooding related aspects of the upstream barrage; Impacts of discharge from STP on adjoining communities, especially during construction phase; increased risk of gender-based violence, sexual exploitation and abuse and sexual harassment (GBV and SEA/ SH) for women and girls due to larger labor presence and; other labor influx related risks.

Applicable ESS	Risk and Impacts assessed
ESS5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Not current relevant as no land acquisition is envisaged and no impact on squatter settlement is envisaged. Land use will not change due to the proposed project upgradation and rehabilitation of STP
ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	Risks and impacts on ecology and biodiversity of the site, and nearby modified habitat of the non-perennial river, Sabarmati
ESS7: Indigenous Peoples/ Sub-Saharan African Historically Underserved Traditional Local Communities	Not relevant for this sub-project as there are no communities meeting the criteria of ESS7 in sub-project's area of influence.
ESS8: Cultural Heritage	Risks and impacts on potential cultural heritage during construction activities
ESS9: Financial Intermediaries	Not relevant as no FIs are involved in this project.
ESS 10: Stakeholder Engagement and Information Disclosure	Risks and impacts due to lack of stakeholder engagement Risks and impacts due to non-disclosure of information regarding project activities Risks and impacts due to failure to redress grievances and concerns of project-affected parties in a timely and satisfactory manner and failure to provide feedback.

Assessment and Management of E&S Risks and Impacts (ESS 1)

As all the proposed structural interventions are within the STP site or its structure, no direct adverse impacts are envisaged on physiography or land use. Laying of the proposed rising main (around 2 km) for the 375 MLD STP under ACRP is along the road adjoining the boundary of 240 MLD STP. Trenchless method is proposed across the kuccha roads or lanes to prevent disturbance. The proposed construction of the rising main and repairs of access road may create temporary disturbances to people and traffic during the construction and maintenances stages, which could be managed through traffic diversions, information to communities, barricading and safety precautions (for communities and workers), and watch and ward in important areas. The proposed subproject involves civil, electromechanical, and paint work mainly; labour-intensive in the odorous area near sewage/ wastewater, and their stay and work at or near the site for about 3 years. Treatment of sewage along with new construction/ modifications required for technology upgradation, discharge of treated water and disposal of sludge and other wastes including large quantities of construction and demolition (C&D) wastes, use of resources such as water and power during construction, pollution from storage and handling of materials, use of paints and other chemicals for construction activities, transportation of raw materials, wastes and sludge, disposal and/or reuse of treated sewage for irrigation will pose risks and impacts. Work requires very detailed and clear sequential planning, scheduling as the existing operations shall not suffer during construction works. The activities will be labour-intensive with risks of accidents such as working at heights, excavations, work in enclosed areas, and activities near ponded sewage in large tanks. Impacts and risks are moderate and can be managed by following regulations, adopting best practices for similar projects, training of staff and manpower; and ensuring implementation of avoidance, monitoring, and implementation of mitigation measures. As per ESS 1, ESSs will apply to allied facilities such as improvement to access road, and repairs at Terminal Sewage Pumping Station. These have also been included in the subproject and impacts assessed.

As all the proposed structural interventions are within the STP premises or its structure, there may be some positive and negative impacts on communities such as increased traffic and pedestrian movement due to improved access road, increased labor opportunities, and increased safety due to project related and availability of lights during evening and nights, especially as the Project will

need to make extra efforts to reach out through stakeholder engagement and effective GRM, to the disadvantaged or vulnerable people to involve them in both preparation and implementation.

Labor and Working Conditions (ESS 2)

Labor and employment opportunities will be generated during the construction period. Unskilled and semi-skilled labor work can be sourced from the squatter settlement as per availability and willingness of labor. Women can also be hired for specific tasks from the squatter settlement. Since the settlement is nearby some women may be willing to work on-site as labor.

Proposed construction works will require labor for construction activities for almost 3 years and a labor camp will need to be set up for accommodating the workers who are not local. Risks and impacts such as OHS/EHS are identified on construction activities and includes workers working at height, confined spaces, gaseous place, working with electrical equipment and closed environments getting exposed to potential accidents. Workers near high noise equipment may experience health issues such as hearing loss if no care is taken. Considering the vegetation growth, snake or scorpion bite may occur during site clearance or construction. Labour will also require sanitary facilities at the construction site, drinking water, PPEs, shade for resting, first aid, etc. Labour compliances will also be required to be met under various local laws such as labor licenses, permission, training, payments, insurance as mandated under law, etc. All engagement of laborers will follow the project level Labor Management Procedure (LMP). Child labor and forced labor will be prohibited. All workers will have access to project's worker's grievance redress mechanism (GRM).

Area and site under AMC for labor camp within accessible distance from STP to be identified by DBOT contractor and necessary permission/ approval to be taken from AMC. Workers in the labor camp will need sanitary facilities such as toilets, washing areas, and sanitary waste disposal areas. If improperly managed, sewage can cause waterborne diseases and environmental and health hazards. Adequate and safe accommodation with proper ventilation, comfortable stay, sanitation, first aid facilities, water, fire safety, protection from weather conditions and extreme events, facilities including cooking and lighting is essential. Covid- 19 precautions for such camps to be planned and implemented.

Resource Efficiency and Pollution Prevention and Management (ESS 3)

With respect to Resource Efficiency, the project preparation and the ESIA process will identify feasible measures for efficient (a) energy use; (b) water usage and management to minimize water usage during construction, conservation measures to offset total construction water demand and maintain balance for the demand of water resources; and (c) raw materials use by exploring the use of local materials, recycled aggregates, use of innovative technology to minimize project's foot prints on finite natural resources. The project would also need to address the management of solid and liquid waste generated during the construction and operation phases.

Pollution of water bodies receiving STP discharges due to reduction in efficiency or non-working of STP due to breakdowns, routine maintenance, and impacts on downstream users is important. Other pollutants include dust, chemicals materials transported and used without care, sludge, and other wastes generated during rehabilitation and O&M. The project being upgradation of the sewage treatment plant will enhance the sewerage treatment and help control pollution and its impacts on all environmental components. This also ensures conservation of resources through their reuse and recycling, use of better energy and water-efficient appliances and mechanisms. Adoption of best environmentally appropriate technology to ensure the quality of treated sewage as per Consent Conditions and regulations, and minimization of Green House Gas (GHG) emissions, adoption of the best standard in case the treated water is to be reused for agriculture based on detailed study and consultation, are important also considering overall pollution loads due to multiple discharges into the river. Temporary construction stage pollution impacts on

water, soil, fauna/flora, OHS, and CHS are moderate and can be managed by following regulations, adopting best practices, training; and ensuring implementation of avoidance, monitoring, and implementation of mitigation measures.

Community Health and Safety (ESS 4)

Community health and safety issues may result from poor quality of treated sewage, or discharge of untreated sewage/ bypass during maintenance or extreme events and its impacts in downstream villages. Community Health and safety risk during construction may also be due to air pollution (dust & air emissions), odor, traffic movement, congestion & Safety, noise, others). Impacts due to flooding of STP premises during monsoons also need consideration. Impacts and risks on nearby communities (especially squatter settlements) are expected during the construction phase and can be avoided, and managed by proper work activity planning, scheduling, training, and adopting mitigation measures.

Impact on downstream users due to release of untreated sewage is also identified. This may happen due to failure of the functioning and during the construction phase. After the upgradation of the STP, there will be an improvement in the quality of the treated water released in the Sabarmati River which will benefit downstream users. Appropriate mitigation measures such as a Traffic Management plan and diversion of wastewater during construction will be required to avoid and minimize the impacts occurring and potentially identified on downstream users.

Settlements are located across the highway from the STP cluster. There is a squatter settlement that has come up after the STPs were commissioned, located along the service road and the Fatehwadi canal that may experience impacts largely related to dust & air emission traffic and related movement of material, equipment, and labor during construction. The present access road to the STP is 'kutcha' (mud road) and is not suitable for the movement of heavy vehicles and equipment. Road repair and upgradation, as part of the project, has been recommended to mitigate dust and air pollution during the construction phase of the project. This suggestion of the ESIA has been incorporated, and the proposed access road improvement is included as part of the project: Upgradation of existing 240 MLD STP and associated infrastructure including One Terminal Sewage Pump Station at Vasna". .

Women and girls in the adjacent settlements and communities may face increased risk of gender-based violence, sexual exploitation and abuse and sexual harassment (GBV and SEA/SH) for women and girls due to larger labor presence and other labor influx related risks. The sub-project will implement the project level SEA/SH action plan (to be prepared by AMC prior commencement of civil work) to minimize and mitigate these risks. The project's GRM will have specific processes to handle grievances related to SEA/SH.

Considering the disaster proneness of the area, especially the flooding and safety aspects of the Vasna Barrage it is proposed to undertake hydrological and flood assessment, including a study on Dam Break Analysis & Flooding Stimulation, Preparation of Inundation and Emergency Action Plan for Vasna Barrage, Ahmedabad, Gujarat prior to the design of the investments (STPs) and associated structures. Outcome/output of this assessment shall be incorporated in the design of all STPs which might be impacted and subsequently assessed in C-ESIA & mitigation measures if required included in C-ESMP. Emergency Preparedness and Response Plan and Disaster Management Plan will be part of C-ESIA/C-ESMP.

Land Acquisition, Restrictions on Land Use and Involuntary Resettlement (ESS 5)

The augmentation and upgradation of technology are proposed to be carried out within the existing STP premises boundary. An Informal settlement is located near the STP which will not be impacted due to road construction or any of the STP related activities during construction or operation. The nearest settlements are 1 km away. The nearest settlements are 1 km away.

There are no potential involuntary resettlement issues identified, as there is no land acquisition of private land or alienation of additional government land for the proposed upgradation. There are no restrictions to access the river or public infrastructure or change in land use due to the proposed rehabilitation of the STP. No families are located within boundary premises.

Biodiversity Conservation and Sustainable Management of Living Natural Resources (ESS 6)

The nearest key biodiversity area for this site is Thol Wildlife Sanctuary (man-made) in Mahesana district, which is around 20 km from the project site, with 10 km of intervening urban high density mixed land use. The lake received water from rains and Narmada Canal, westward of the city and is not affected by outflows or air, noise, dust or vibration during construction and operations of the proposed STP.

Neem and acacia trees are common in this area. No endangered fauna / flora are observed on existing STP site. Measures to protect old trees will be considered during designing of the project. Clearing of shrubs will not have any impact on natural vegetation of the region. The proposed project may also require tree planting based on the number of trees cut. It was observed that the entire stretch of Sabarmati is infested with the Pistia sp. and Eichhornia crassipes which has altered the natural habitat. Sabarmati River stretch is a modified habitat as the water is being sourced from Narmada canal and stored at the river front stretch using the shutters of the Vasna Barrage. The riparian zone of the Sabarmati is converted into the riverfront in the Ahmedabad city. The region around is heavily industrialised, and fast converting into urban land uses, with pollutants reaching the already dry river. However, Hon'ble NGT has constituted River Rejuvenation Committee which has initiated the process of river rejuvenation, but curtailing pollution, monitoring e-flow, undertaking plantations etc, through various stakeholder departments. No tree cutting has been envisaged on STP site, as the construction will occur within footprint and site of existing STP.

Temporary Construction stage impacts are expected on the existing flora and fauna on-site, due to air and water pollution and noise due to construction activities. However, the existing site is in the noisy neighbourhood where Metro Depot Construction work is ongoing. No uprooting of trees on site is expected, as proposed activities will be carried out on existing premises and/or structures. The proposed area is an existing STP and is a modified habitat hence the impacts on ecological aspects of the site are not envisaged.

Discharge of untreated/ sub-optimally treated sewage and waste into the waterbodies (mainly Sabarmati and Fatehwadi Canal) may impact the biological process of macrophytes and aquatic fauna. River Sabarmati is already an altered area/ modified habitat due to decades of low water flow as it is non-perennial, and inflow of water from Narmada Canal. There are no critical species here, and there will be no impact since the site is not natural and is a modified habitat with no ecological importance presently. NO RET species are recorded from the study area. However, The subproject interventions to improve the discharge quality and will thereby improve the biodiversity in the river and the region downstream of the discharge point, thus supporting overall biodiversity improvement.

Indigenous Peoples/ Sub-Saharan African Historically Underserved Traditional Local Communities (ESS 7)

There are no indigenous people in the project area. However, local consultations were conducted for this project.

Cultural Heritage (ESS 8)

Assessment for heritage structures and cultural places was carried out. The nearest monument is the Fateh Baug Fort at a distance of 1.6 km from the STP which will not be impacted by the

proposed activities in the existing STP site. Chance finds procedure to be implemented considering the status of the historic core of Ahmedabad as a World Heritage City.

Stakeholder Engagement and Information Disclosure (ESS 10)

Consultations were held with stakeholders including squatter settlement inhabitants, STP operators, AMC officials during the preparation of ESIA for sub-project and SEP for G - ACRP project. The key findings from consultation with the residents of the squatter settlement reveal that the squatter households do not have access to municipal services. They live in temporary structures in poor conditions. The slum dwellers do not have access to sanitary toilets and piped water. Many complained about mixing of drinking water with drain water. They experience odor from the STP and thus expect that the rehabilitation of the STP will help remedy this issue. The slum residents feel that labor influx may cause insecurity for them and they are not aware of grievance mechanism of AMC. The sub-project will implement the project level SEP to engage with relevant stakeholders including the poor and vulnerable groups. Any grievances regarding the sub-project activities will be processed through the project level GRM as specified in the SEP. AMC will conduct awareness campaign to inform the settlement dwellers about the GRM.

The ESIA for Upgradation of Vasna 240 MLD STP addresses the above suggestions of the stakeholders by including mitigation measures for issues raised in consultations. Public consultation was conducted on 07/06/2022 by AMC in Pandit Dindayal Upadhyaya Auditorium, Bodakdev, Ahmedabad. The key concerns raised by stakeholders have been incorporated in the ESIA for 240 MLD STP. The suggestions of the stakeholders by including monitoring of noise, sludge, air and water and its analysis for defining the baseline and mitigation measures. The project suggests improved management of all wastes and treated water quality to confirm with latest NGT suggested standards. Labour health and safety will be given high priority and appropriate measures to follow and monitor labour regulations have been suggested in the ESMP.

Cumulative Impacts

The cumulative impact assessment shows that the upgradation of 240 MLD sub-project and its adjoining 126MLD STP (which is planned for capacity augmentation to 375 MLD, within site boundary), and Pirana 180 MLD STP will have positive impacts on all the environmental parameters particularly the water quality of the Sabarmati River and/ or Fatehwadi Canal and downstream uses[2].

Existing operating STP BOD, COD, TDS, concentrations load were found higher which after treatment and meeting the NGT guidelines would significantly decrease these loads and will have positive impacts on the Sabarmati River water quality. It can be expected that the biological diversity may increase in this non-perennial river in the long run, and ground water quality in the region would improve.

The Vasna 240MLD capacity plant treats about 17.52% of the total sewage generated in AMC. Its upgradation will reduce the environmental load on BOD by 23.76%, COD by 36.16%, and TSS by 37.5.

Existing sewer lines and TTPS caters to this STP. Minor improvements to TSPS are proposed as part of the rehabilitation of the STP.

Air quality during construction may have a temporary cumulative impact due to the ongoing construction activities at the Gyaspur metro depot situated to the northern side of the proposed sub-project site. The project was expected to be completed by April 2022, which might get delayed due to the ongoing third wave of Covid 19. However, it is expected that the construction would

[2] In case GPCB provides consent for disposal of treated sewage into Fatehwadi Canal to reuse for irrigation

get completed before initiating site works for the proposed Vasa 240 MLD STP rehabilitation. The augmentation project of adjoining STP of 126 MLD (to 375 MLD) will also contribute to the incremental air pollution due to construction activities if carried out simultaneously. However, demolition activities at Vasna 240 MLD STP would begin before demolition activities at Vasna 126 MLD STP where new STP is proposed to be constructed first before demolition of the existing STP. Hence such cumulative impact is expected to be for a limited period during overlapping construction periods if any. Since the site is surrounded by STPs Metro Depot, and the river; sensitive receptors of noise and dust impacts are the squatter settlements along the access road. Short-term impacts on receptors are associated with the impacts due to increment in air pollutants like dust, and emissions from vehicles and machinery, increment in noise levels due to movement of vehicles, and operation of machinery which could be mitigated by adopting best practices and mitigation plans.

Upgradation and repairs to access road of 6.0m width starting from the culvert over Fatehwadi canal upto the entrance gate of the 240 MLD STP is also suggested to be made part of this sub-project. The construction of all-weather roads will significantly mitigate air pollution during the construction phase.

Sabarmati River carries discharges from multiple sources including industries, STPs, effluent treatment plants, 'mega line' carrying treated effluents from CETPs of industrial areas, commercial/ residential areas, storm water drains, canals etc., in the city of Ahmedabad, and the region upstream (which has agricultural areas, and city of Gandhi Nagar and other local bodies), and downstream (agricultural areas and industrial centers).

Currently, the quality of treated sewage from the Vasna 240 MLD STP is suboptimal as it is old, obsolete, not able to treat to the required discharge standards as per the Consent to Establish and Operate Conditions laid down by GPCB. AMC aims to achieve the stringent quality of treated effluent in its new STPs and those proposed under ACRP, and at the same time reuse treated effluents to ensure resource efficiency and reduce Biological Oxygen Demand (BOD) load on receiving water bodies. It is estimated that the subproject with upgradation of technology for treating sewage to meet NGT prescribed stringent standards and WB EHS) can ensure reduction in BOD, Suspended Solids, Phosphate and Nitrate pollution load due to this facility if implemented. Therefore, it is not expected that the proposed Vasna 240 STP project will be resulting in negative cumulative impacts for the receiving body but will contribute to improving the quality of water in the receiving water body.

6. Environmental and Social Management Plan (ESMP)

ESMP for the design/ pre-construction, construction, and operation stages of the project has been developed based on the assessment conducted. It presents the management of environmental and social impacts adopting mitigation hierarchy - (a) Anticipate and avoid risks and impacts;
(b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable
levels; (c) Once risks and impacts have been minimized or reduced, mitigate; and (d) Where significant residual impacts remain, compensate for or offset them, were technically and financially feasible. ESMP will be incorporated in the bid documents while bidding out DBOT contracts so that the contractor allocates the required resources and mechanisms to implement these measures.

The treated sewage quality for discharge into Sabarmati shall comply with the standards suggested in this ESIA (NGT prescribed standards) and/ or most stringent standards prescribed by the GPCB/ NGT/ regulators at any point of time. Treated sewage disposed into Sabarmati River following the existing Consent conditions of the GPCB. At present there is no consent from GPCB

for discharge of treated sewage in Fatehwadi canal for irrigation use. In case AMC proposes to dispose treated sewage to Fatehwadi Canal, consent for such discharge shall be obtained from GPCB. This shall be informed by AMC to Irrigation Department and Department of Agriculture as currently treated sewage is being discharged into Fatehwadi Canal as requested by Irrigation Department, without permission from the regulatory authority, namely GPCB. (Infrastructure for such discharge; i.e. outflow channel to Fatehwadi Canal and the canal itself for carrying sewage for irrigation is currently existing in STP). In case AMC and irrigation department decides to continue reuse of treated sewage for agriculture from the bank supported project, (i) permit for the same shall be obtained from GPCB (and that AMC has already informed irrigation department that they can continue discharge into the canal only after receiving permit for this from GPCB), (ii) AMC & Irrigation Department shall discuss & decide on the quantity of water required for such discharge after obtaining permit; and alternate arrangements if any required to be arranged for irrigation (so as to help with lesser available water for irrigation) as this discharge will be stopped till permit is obtained; (iii) AMC with the support of Irrigation Department shall undertake a study on reuse of treated effluent for irrigation in line with the Central Pollution Control Board's Guidelines of Reuse of Treated Water for Irrigation, 2018, through reputed Agricultural University with stakeholder consultations as per the Guidelines and after agreement with stakeholders and permit from GPCB discharge the treated sewage so as to avoid any negative environmental and health issue on downstream communities.

AMC has to ensure the safety measures and emergency preparedness to protect the STPs from flood impacts; based on the Dam Break Analysis & Flooding Stimulation, Preparation of Inundation and Emergency Action Plan for Vasna Barrage, Ahmedabad, Gujarat which AMC will conduct and make available to the Contractor before the design phase. Provision to hold untreated sewage or diversion to other STPs is required to be made so that during any STP breakdown/ shutoff, the untreated sewage does not flow into the water body or nearby premises. Prepare plan for diversion of the untreated sewage during construction period to prevent any issue and concern in the vicinity or downstream communities.

Responsibility to prepare Sludge Management Plan is with the Contractor, and will be approved by the AMC. Contractor will have the responsibility to store, test, transfer sludge for disposal appropriately based on the monitoring results & existing regulations, as agreed in writing with AMC during construction and operation. Mechanical cleaning will be recommended strongly and any manual cleaning will be avoided in the STP and all sludge management mechanisms. In case sludge is tested and found non-hazardous, it will be sent to existing AMC Sludge Hygienization Facility which is this is a Cobalt 60 Gamma Irradiation Facility. If tested hazardous it shall be sent to the nearest appropriate Hazardous Waste TSDF for disposal following the Hazardous Waste Management Rules of Govt of India, 2016.

Regular cleaning/ removal of sludge and solid waste to minimize odor nuisance and its disposal shall be ensured by AMC, in their facilities as per existing regulations. Solar lighting/ use of solar energy as much as feasible (provided disposal of hazardous and e-waste including solar panels is arranged as per regulations, proper storage and use of PPEs while working with damaged panels are ensured). Energy saving fixtures (LED lighting) and equipment, motors shall be fitted with variable frequency drive (VFD).

Special attention to include vulnerable groups in project benefits and continuous stakeholder engagement to ensure such inclusion. Preparation of Standard Operating Procedure (SOP) for various activities which includes training, PPEs use, templates for permissions, recording and reporting, by contractors/PIU. IEC materials shall be planned, printed and displayed during construction, creating awareness, display of posters etc. Training and capacity building of the designated persons for implementing of various plans.

7. Monitoring Plan

During the construction phase, Environmental and social monitoring will be carried out to check the quality of the environment and triggering of social impacts during ongoing construction activities. It will be carried out through a contractor and PIU will be responsible for the review of the implementation of monitoring. Monitoring will include assessment of Ambient air quality, Intake sewage quality, outfall treated water quality, Ambient noise, Ground water quality, soil quality, and sludge quality. This monitoring shall also include OHS aspects, community safety, and workers safety, labor and working conditions, livelihoods impacts, consultations as part of Construction Supervision and Quality Control by the PMC.

During the operation phase, environmental monitoring will be conducted to understand the impacts on environmental attributes due to project activities. It will be carried out through the DBOT / O&M contractor and AMC will be responsible for the review of implementation. Monitoring will include Ambient air quality, Inlet sewage quality, outlet treated water quality, Ambient noise, Ground water quality, Soil quality & sludge quality.

To ensure adherence to the ESMP, maintenance of the plant and CTE conditions E&S audit shall be conducted by a third party during the operation phase.

The annual E&S audit to include:

1. Physical assessment of the STP and units' operation status and premises
2. Identification and assessment of environmental management practices
3. Health and safety risks including GBV, SEA/SH risks for workers and communities
4. Compliances to ESS, National, State, and Local laws and mandatory and statutory compliances including permissions, consent conditions, labor health, safety, security, welfare, etc
5. Implementation of EHS, GRM, various action plans at the site.
6. Maintenance of documents, records, and reports required for the site.
7. LMP compliances.
8. Assessment of capacities, technology in achieving NGT standards and for design specification
9. Environmental monitoring analysis pre and post-treatment
10. Sludge generation and treatment.
11. General work safety records and incident reporting
12. Compliance to CTE (in the construction phase) and CTO (in operation phase) conditions or other regulatory conditions.

8. Capacity Building

Capacity building will be required at all stages including planning, construction, and operation. It will include various workshops and seminars for AMC project staff, concerned PIU, Contractors staff, supervisors, consultants, environmental and social experts, laborers, stakeholders, etc. The topics for training will include Health and Safety, Environmental management and ESMP implementation, regulatory requirements, Monitoring requirements, Gender equality, biodiversity and wildlife awareness, and others.

9. Grievance Redressal Mechanism

The types of grievances stakeholders may raise include, but are not limited to:

- Construction related impacts – cracks, damages to structures; dust damaging crops/ trees
- Health and safety risks.
- Negative impacts on the environment.
- Negative impacts on communities, which may include, but not be limited to financial loss, physical harm, GBV, SEA/SH and nuisance from construction or operational activities.

AMC has a functional complaint system (CCRS, http://www.amccrs.com) which includes a web portal and a toll-free number. It records almost 40-50 thousand complaints every month. Any complaint registered in the system is forwarded to respective zones for action. Each complaint has a proper system by which it can be escalated if one is not happy with the resolution. If some complaints come directly to the zonal office (mostly from the urban poor) they are recorded in the main system. The CCRS is synced with the Gujarat Government's CM Helpline and any complaints coming there are also recorded in the system.

10. Implementation Arrangements

This ESIA is prepared at the Feasibility stage of the proposed subproject. At this stage, Feasibility for rehabilitating the STP and its implementation mechanism has been examined and the Feasibility Report suggests bidding out the proposed subproject in a technology-agnostic manner under Design - Build - Operate (DBOT) Format, where the bidder can suggest the best environmentally appropriate technology to ensure the suggested discharge standards. In this case, since the technology is not finalized at this stage, it is proposed to include the ESMP in the procurement documents to enable the DBOT contractor to understand the E&S requirements and include required resources and implementation mechanisms to ensure the management/ mitigation measures. Once the design is finalized during the implementation stage, the DBOT contractor will get the ESMP updated based on actual technology/ design. Sustainable Urban Development Unit (SUDU) of the PIU constituted at AMC, along with PMC will review and send the document for World Bank review and approval. PMC will supervise E&S aspects and OHS/ CHS as part of construction supervision and quality control. The third-party audit will be conducted annually during each year of the project, also including a review of all E&S aspects during construction including ESMP implementation, OHS/ CHS and environmental monitoring. The E&S audit will be shared with the World Bank for review and comments, and finalised based on comments/ suggestions and corrective/ improvement measures will be implemented in a time bound manner. . Subproject details will be monitored through ESMIS.

11. Estimated Budget for Implementation and supervision of ESMP

Total project cost for design and rehabilitation of STP to meet NGT standards, Solar drying plant for sludge, Grid-connected Solar Roof Top system, odor control unit, construction of bituminous road, setting up of contractors' yards, contingences is INR 350 Crores (INR 35 million). ESIA, CESMP updation by separate ESIA consultant, and E&S specialists with the Contractor to oversee implementation shall be made part of project design & Human Resources Fee; in addition to green belt development cost, labour camp establishment (if required), permits/ licence/ consent fees. The total residual cost of ESMP implementation during design/preconstruction (6 months to 1 year), construction (3 years) and operations stages (15 years) is INR 3.65 crores (INR 36.58 million, USD 470654.5) during preconstruction/ construction stages; and annual cost of INR 18.31 lakhs (INR 1.831 million, USD 117412.5) every year of O&M. This includes Monitoring Costs and ESMP Residual Costs (other than those made part of Contractors Works Costs such as labour camp, green belt, PPEs etc, C-ESIA/ CESMP cost, Permit/ Licence Costs and Human Resources Cost).

12. Aspects for compliance with ESCP

Disclosure and consultation of this ESIA, inclusion of the ESMP prepared here in procurement documents for agreement from the contractor on E&S requirements, and Updation of ESIA and ESMP for the subproject after finalizing the detailed design shall be in compliance with ESCP. A detailed study on flooding and its impact on investments shall inform the building of resilient infrastructure. C-ESIA, C-ESMP shall be prepared by the DBOT contractor for the design prepared, incorporating the recommendations of the assessment on flooding. In addition, AMC shall have adequate capacity to implement and monitor the sub-project E&S requirements, ESMP, Monitoring Plan, and Capacity Building requirements identified here, as stipulated in ESCP.

Design should be responsive to the quality of sewage received at the inlet, and measures shall be incorporated to meet the suggested standards. Bidding documents and contracts to include ESMP and Monitoring Plan to enable the DBOT contractor to allocate appropriate time, resources (manpower and budget) for implementing ESMP Update as required, get approvals, disclose and implement the Environmental and Social Management Plan (ESMP) for Proposed upgradation and upgradation of Vasna 240 MLD STP subproject.

A detailed study on flooding and its impact on investments shall inform the building of resilient infrastructure. C-ESIA, C-ESMP shall be prepared by the DBOT contractor for the design prepared, incorporating the recommendations of the assessment on flooding. In addition, AMC shall have adequate capacity to implement and monitor the sub-project E&S requirements, ESMP, Monitoring Plan, and Capacity Building requirements identified here, as stipulated in ESCP.
Monitor all emissions/ discharges/ disposal of wastes from project facilities during construction and operation stages and ensure that the discharges from project facilities into the environment are as per the latest limits suggested by MoEFCC, GPCB, WB EHS and National Green Tribunal whichever is stringent for each parameter. The technology shall be upgraded to meet the directions of GPCB in the consent orders, and any stringent standards suggested by regulators. Conduct disaster evaluation and extreme weather conditions assessment considering earthquake proneness, and flooding/ other risks if any due to presence of Barrage or any disasters; and incorporate avoidance, mitigation, and management measures and Prepare Disaster Management Plan including Standard Operating Procedures for each STP (as part of DPR, ESIA). Operations shall also follow the latest Disaster Management Plan for Gujarat.

13. Stakeholder consultations

Consultations were carried out for the preparation of the draft ESIA report. Consultations have been carried out with various stakeholders including squatter settlement inhabitants, STP operators, AMC officials during the preparation of ESIA for sub project. Stakeholder consultation is a dynamic process and consultations will be carried out during the life cycle of the G- ACRP project in accordance with SEP. Draft and Final ESIA, ESMPs (in English, with translated summary in Gujarati) were disclosed on the website of the implementing agency, namely AMC, and in the external website of the World Bank. Consultations were also be carried out after a month of disclosure of ESIA and ESMP on the website of AMC. Post disclosure consultations were carried out in Feb and March 2022. Public consultation was conducted June 2022 by AMC in Pandit Dindayal Upadhyaya Auditorium, Bodakdev, Ahmedabad. Invitations (in English and Gujarati) was circulated to various stakeholders such as elected representatives (Councillors), Mayor, Deputy Mayor, CSO, NGOs, Municipal Commissioner, Deputy Municipal Commissioner, heads of Committees and others. Notices were also published in the newspapers in both languages.

The key concerns raised by stakeholders have been incorporated in the ESIA for 240 MLD STP. The suggestions of the stakeholders by including monitoring of noise, sludge, air and water and its analysis for defining the baseline and mitigation measures. The project suggests improved management of all wastes and treated water quality to confirm with latest NGT suggested standards. Labour health and safety will be given high priority and appropriate measures to follow and monitor labour regulations have been suggested in the ESMP. There will be increased labour opportunities during implementation.

14. Recommendations and the Way Forward

This ESIA /ESMP shall be updated once the detailed sub-project design is finalized during the implementation stage. ESIA has assessed and outlined important points which shall be included in the Procurement Documents and the detailed design during the implementation stage; for ensuring environmentally and socially beneficial works and operations. The key impact of the

subproject will be overall benefits due to the improved quality of treated sewage discharged into the Sabarmati River, resulting in an overall improvement in the environment and health of the people in the city and its region. The ESIA highlights the moderate level of risks and impacts on environmental and social parameters due to the proposed sub-project. These are not long-term – irreversible; but mostly expected to occur during the construction phase and can be avoided, mitigated, and managed. There is no involvement of land acquisition for this project as the proposed activities will be conducted within the existing boundary. There will be minor to moderate construction and operation stage risks and impacts on (i) Noise and Air quality due to construction and demolition, transportation activities, (ii) Occupational and Community Health and Safety risks and impacts, (iii) minor disturbances to local/ onsite flora and fauna and nearby locally important cultural assets (graveyard) during construction phase, (iv) generation of sludge and wastes including (solid waste, non-biodegradable wastes, E-wastes, Hazardous Wastes, and C&D Wastes) which need to be managed well to minimize risks and impacts, (iv) accidental discharge of sub-optimally treated sewage or flooding v) Impacts of discharge from STP on adjoining communities, during construction phase and downstream communities during operations phase; vi) increased risk of gender based violence, sexual exploitation and abuse and sexual harassment (GBV and SEA/SH) for women and girls due to larger labor presence and; other labor influx related risks. ESMP lists out mechanisms to avoid, mitigate and manage these risks and impacts through good design, adoption of stringent discharge standards and regulatory compliance; and following good international industry practices. Mitigation measures for the same are provided. There will be cumulative impact due to the outflow of treated sewage from this and other STPs proposed to be upgraded through G-ACRP which will be highly beneficial given the project objective to ensure stringent discharge standards. After implementation of the subproject treated water quality will be improved and the same will help improve the ecological balance of the Sabarmati River which is currently a modified habitat with no water during most of the year, thereby resulting in an overall better environment and health of the city and its region.

સારાંશ

૧. પ્રોજેક્ટનું વર્ણન :

ગુજરાત સરકાર **ગુજરાત રેસિલિયન્ટ સીટીઝ પાર્ટનરશીપ : અમદાવાદ સીટી રેઝીલિયન્સ પ્રોજેક્ટ (જી-એ.સી.આર.પી.)** માટે વિશ્વ બેંકની નાણાકીય સહાયનો ઉપયોગ કરવા માંગે છે જેનો હેતુ અમદાવાદ મ્યુનિસિપલ કોર્પોરેશનમાં શહેરી સેવા વિતરણ (મુખ્યત્વે ડ્રેનેજ) માટેસંસ્થાકીય સેવા વિતરણ વ્યવસ્થા અને નાણાકીય વ્યવસ્થાને મજબુત કરવાનો અને શહેરી વિસ્તારોમાં સેવાઓના સંચાલન માટે રાજ્યની સંસ્થાકીય ક્ષમતા અને ઈન્ફ્રાસ્ટ્રક્ચર ને મજબુત કરવાનો છે.

સૂચિત પ્રોજેક્ટ માં ત્રણ મુખ્યઘટકોનો સમાવેશ થાય છે.

ઘટક – ૧ :

અમદાવાદ મ્યુનિસિપલ કોર્પોરેશનની (એ.એમ.સી) નાણાકીય વ્યવસ્થા અને કામગીરી ને મજબુત બનાવવી : આ ઘટક એ.એમ.સી. ને તેની નાણાકીય કામગીરી અને ઝડપથી વિસ્તરી રહેલી શહેરી વસ્તીને સારી ગુણવત્તાની સેવાઓ પહોંચાડવા અને ટકાવી રાખવાની ક્ષમતાને અસર કરતા મુખ્ય અવરોધોને સંબોધવા માટે તકનીકી સહાય પુરી પાડશે. આ પ્રવૃત્તિનું ધ્યાન લાંબા ગાળાના મૂડી રોકાણ આયોજન, ધિરાણ અને બજેટિંગ, મ્યુનિસિપલ આવક પેદા કરવા અને જમીન આધારિત ધિરાણનો લાભ લેવા માટે અ.મ્યુ.કો. ની સિસ્ટમને મજબૂત કરવા પર રહેશે.

ઘટક – ૨:

શહેરી સેવાઓમાં સુધારો : આ ઘટક પસંદગીની શહેરી સેવાઓ - કચરો - પાણી વ્યવસ્થાપન સેવાઓ, સ્ટ્રોમ વોટર ડ્રેનેજ (નોંધપાત્ર ઇન્ફ્રાસ્ટ્રક્ચર ગાબડા, નબળા સેવા સ્તરો અને નકારાત્મક પર્યાવરણીય અને સામાજિક બાહ્યતાઓની દ્રષ્ટિએ પ્રાથમિકતા)ની ગુણવત્તા, સરળતા, ટકાઉપણું અને સ્થિતિસ્થાપકતામાં સુધારો કરવા માટે અ.મ્યુ.કો. ને વ્યાપક સમર્થન પ્રદાન કરશે.

ઘટક – ૩:

સંસ્થાકીય પ્રણાલીઓ અને ક્ષમતાઓ વિકસાવવી : આ ઘટક અમદાવાદમાં શહેરી વ્યવસ્થાપન, સેવા વિતરણ અને ધિરાણ માટે એકંદર સંસ્થાકીય અને શાસન માળખાને મજબૂત કરવા પર ધ્યાન કેન્દ્રિત કરશે, અને ગુજરાતના અન્ય ઉભરતા શહેરોને ક્ષમતા-નિર્માણ સહાય પૂરી પાડવા માટે અ.મ્યુ.કો. ની સારી પદ્ધતિઓનો લાભ લેવા માટે એક પ્લેટફોર્મ વિકસાવશે.

૨. એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ ના સમયે પેટા પ્રોજેક્ટ ડેવલપમેન્ટની સ્થિતિ

પેટાપ્રોજેક્ટ શક્યતા અભ્યાસ / વિગતવાર પ્રોજેક્ટ રિપોર્ટ નિર્માણ હેઠળ છે. આ એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ દ્વારા તૈયાર કરવામાં આવેલ ઈ.એસ.એમ.પી. સહિત ડિઝાઇન - બિલ્ટ - ઓપરેટ - ટ્રાન્સફર (ડી.બી.ઓ.ટી.) મિકેનિઝમ પર અમલીકરણ માટે પેટા પ્રોજેક્ટનું વીડીંગ થશે.

જેથી કોન્ટ્રાક્ટર ઈએન્ડએસ પાસાઓના અમલીકરણ અને સંચાલન માટે જરૂરી સંસાધનોની યોજના બનાવી શકે અને ગોઠવી શકે.

૩. સબપ્રોજેક્ટનું વર્ણન

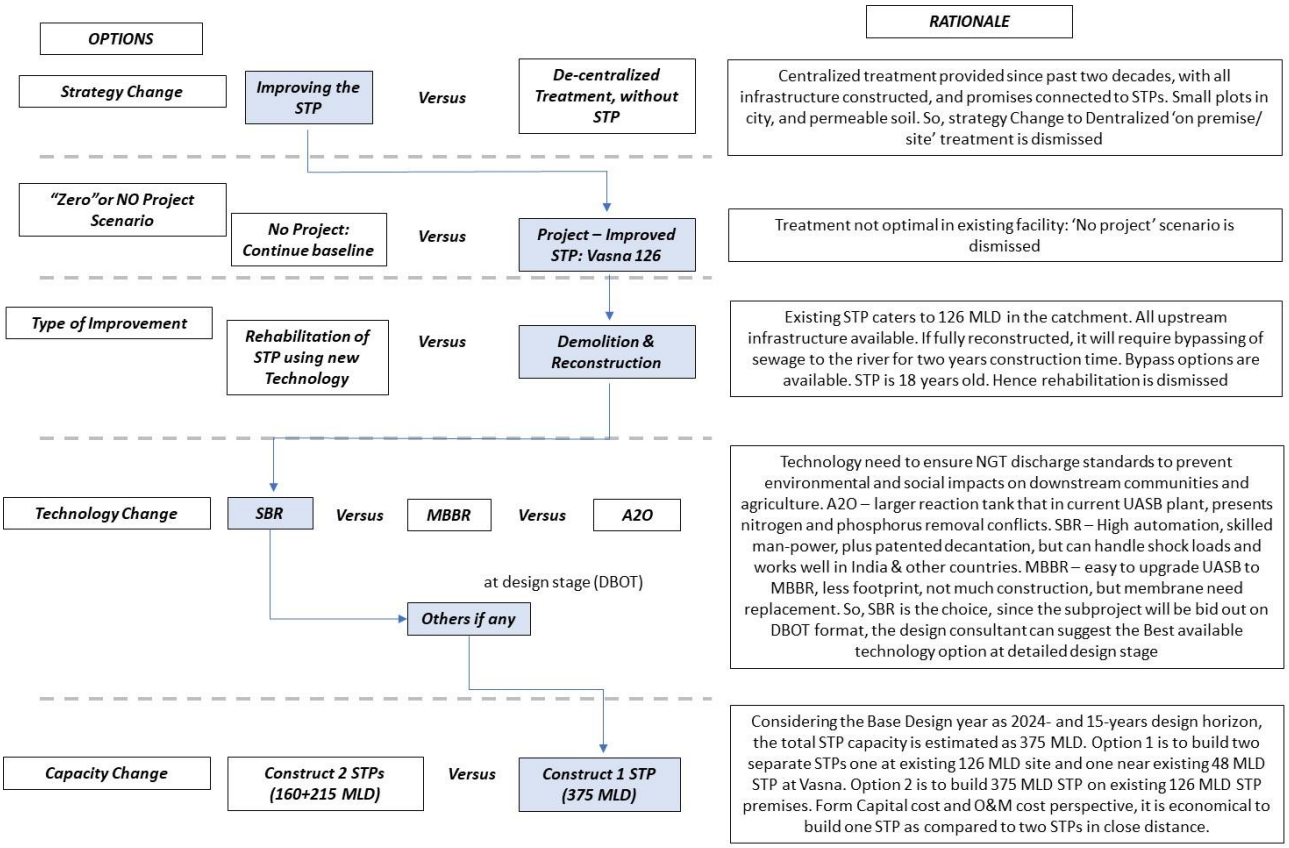
વાસણા ખાતે ૧૨૬ એમ.એલ.ડી. ક્ષમતાના હાલના સુએજ ટ્રીટમેન્ટ પ્લાન્ટ (એસ.ટી.પી.) ને જી-એ.સી.આર.પી. પ્રોજેક્ટ હેઠળ અપગ્રેડેશન માટે પ્રસ્તાવિત કરવામાં આવ્યો છે. આ એસ.ટી.પી. વર્ષ ૨૦૦૪ માં બનાવવામાં આવ્યું હતું અને વર્ષોથી, તેની કામગીરી બગડેલી છે કારણ કે ટ્રીટેડ ગટરની ગુણવત્તા પરથી સ્પષ્ટ થાય છે, અને ઘણી માળખાકીય સુવિધાઓ જર્જરિત છે. હાલના એસ.ટી.પી. માં વપરાતી પ્રક્રિયા અપફ્લો એનારોબિક સ્લજ બ્લેન્કેટ રીએક્ટર છે યોગ્ય થી શકે. (યુ.એ.એસ.બી.) એએમસીનો પ્રસ્તાવ (i) ટ્રીટમેન્ટની પ્રક્રિયામાં ફેરફાર કરવા જેથી ટ્રીટમેન્ટ તેમજ કેચમેન્ટમાં રહેતા તમામ રહેવાસીઓ દ્વારા ઉત્પાદિત સુએજની ટ્રીટમેન્ટ થઇ શકે. (ii) ઉચ્ચ કાર્યક્ષમતા સુનિશ્ચિત કરવી અને ઉચ્ચ સેવા સ્તર પ્રાપ્ત કરવું. (iii) નેશનલ ગ્રીન ટ્રિબ્યુનલ (એન.જી.ટી.) દ્વારા સૂચવ્યા મુજબ ટ્રીટેડ સુએજની ગુણવત્તા પ્રાપ્ત કરવી. આનાથી જળસ્ત્રોત અને જમીન (સિંચાઈ માટે પુનઃઉપયોગ) માં ટ્રીટ ન કરાયેલ અથવા સબઓપ્ટીમલ ટ્રીટેડ સુએજના નિકાલ અને બાયપાસને ઘટાડીને, સરફેસ અને ભૂગર્ભ જળ સ્ત્રોતોનું પ્રદુષણ ઘટાડીને અને એકંદર સુધારણાને ટેકો આપીને તેના કેચમેન્ટ અને પ્રભાવના ક્ષેત્રમાં વધુ સારું સુએજ વ્યવસ્થાપન પર્યાવરણ અને સમાજના સ્વાસ્થ્યનું સુનિશ્ચિત કરશે. જે માટે

૪. વૈકલ્પિક વિશ્લેષણ

વિકલ્પોના પૃથ્થકરણ માટે કન્ઝર્વેટીવ અભિગમને અનુસરવા માટે નિર્દેશિત કરવામાં આવે છે જેમાં તાર્કિક પગલાઓની શ્રેણીનો સમાવેશ થાય છે, ઉચ્ચ-સ્તરના વ્યૂહરચના વિકલ્પોથી કરી વધુ વિગતવાર તકનીકી વિકલ્પો ધ્યાનમાં લેવામાં આવે છે. આ સામાન્ય રીતે અપનાવવામાં આવતા કન્ઝર્વેટીવ અભિગમનો ઉપયોગ કરીને, વિકલ્પોનું વિશ્લેષણ નીચેના ક્રમમાં વિકલ્પોને ધ્યાનમાં લે છે:

- વ્યૂહરચના વૈકલ્પિક સાઇટ પર ડીસેન્ટ્રલાઈઝ ટ્રીટમેન્ટને અનુસરવા માટે હાલની સેન્ટ્રલાઈઝ ટ્રીટમેન્ટ ને છોડી દેવી. અહીં, હાલના કાર્યરત એસ.ટી.પી. ને છોડી દઇ રહેવાસીઓ સેપ્ટિક ટાંકીમાં ઓનસાઇટ ડીસેન્ટ્રલાઈઝ ટ્રીટમેન્ટનો ઉપયોગ કરશે જેને સૂચિત પેટાપ્રોજેક્ટ ગણવામાં આવે છે.
- શૂન્ય અથવા નો પ્રોજેક્ટ વિકલ્પ:અહીં, પ્રોજેક્ટ વિના એટલે કે, સૂચિત પ્રોજેક્ટ તથા અપગ્રેડેશનની પરિસ્થિતીની તુલનામાં હાલની પરિસ્થિતિને ચાલુ રાખવી.

- હાલના પ્લાન્ટનું સંપૂર્ણ પુનઃનિર્માણ : નવા એસટીપીનું પુનઃનિર્માણ કરવા હાલના એસ.ટી.પી. ને તોડી પાડવો.
- ડિઝાઇન / ટેક્નોલૉજી વિકલ્પો: એન.જી.ટી. દ્વારા સૂચવવામાં આવેલા કડક ડિસ્ચાર્જ ધોરણો મેળવવા માટેની ટેક્નોલૉજીની સરખામણી વર્તમાન ટેકનોલોજી સાથે કરવામાં આવે છે.
- વિગતવાર ડિઝાઇન દરમ્યાન વધુ તપાસને આધીન તથા પર્યાવરણીય શ્રેષ્ઠ વિકલ્પ અપનાવવામાં આવશે.
- વૈકલ્પિક ક્ષમતા : બે અલગ-અલગ એસટીપી (હાલના ૪૮ એમએલડી એસટીપીની નજીક ૧૬૦ એમએલડી અને વર્તમાન ૧૨૬ એમએલડી એસટીપીના સ્થાન પર ૨૧૫ એમએલડી) અને એક સિંગલ એસટીપી (હાલના ૧૨૬ એમએલડી એસટીપીના સ્થાન પર ૩૭૫ એમએલડી એસટીપી) ની ક્ષમતાનો વૈકલ્પિક મૂલ્યાંકન કરવામાં આવ્યું હતું.



૫. લાગુ પડતાનિયમનકારી અને માર્ગદર્શન માળખું.

એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ માટે લાગુ પડતા નિયમનકારી માળખામાં નીચેનાનો સમાવેશ થાય છે:

લાગુ પડતી રાષ્ટ્રીય, રાજકીય અને શહેરી સ્તરની પર્યાવરણીય અને સામાજિક નીતિઓ, વિનિયમો અને માર્ગદર્શન (પર્યાવરણ નીતિ અને કાયદાઓ, જળ અને વાયુ અધિનિયમો, ધ્વનીના નિયમો, વિવિધ પ્રકારના કચરાના વ્યવસ્થાપનના નિયમો, વેટલેન્ડ્સ અને ઇકો સેન્સિટિવ વિસ્તારો, વૃક્ષો

કાપવા, જૈવવિવિધતા, ડેમ સલામતી સહિત) , જમીન સંપાદન, પુનર્વાસ અને પુનર્વસન અધિનિયમ, અનુસૂચિત જાતિ અને અનુસૂચિત જનજાતિ (અત્યાચાર નિવારણ) અધિનિયમ, કાર્યસ્થળ પર મહિલાઓની જાતીય સતામણી અધિનિયમ અને અન્યમાં વાજબી વળતર અને પારદર્શિતાનો અધિકાર.

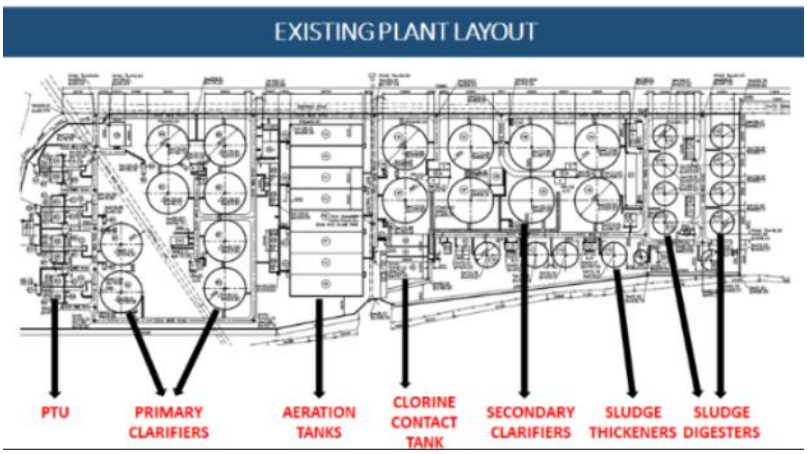
ભારતીય શ્રમ અને સંબંધિત કાયદાઓ (મકાન અને અન્ય બાંધકામ કામદારોનાં (રોજગાર અને સેવાની શરતોનું નિયમન) અધિનિયમ, કારખાનાઓ અધિનિયમ, બાળ મજૂરી (પ્રતિબંધ અને નિયમન) અધિનિયમ, લઘુત્તમ વેતન કાયદો, કામદાર વળતર અધિનિયમ અને નિયમો વગેરે.
વિશ્વ બેંક ઈ.એસ.એફ. અને એ.એસ.એસ.એસ. : એ.એસ.એસ.૫ અને એ.એસ.એસ.૯ સિવાય અન્ય તમામ એ.એસ.એસ. સબપ્રોજેક્ટ માટે લાગુ પડે છે. એ.એસ.એસ.૫ એ નિર્ધારિત કરે છે કે પ્રોજેક્ટ - સંબંધિત જમીન સંપાદન અને જમીન ઉપયોગ પ્રતિબંધોની અસરો (ભૌતિક વિસ્થાપન, આર્થિક વિસ્થાપન અથવા સમુદાયો અને વ્યક્તિઓ બંને પર) સંબોધવામાં આવશે. કારણ કે ત્યાં કોઈ જમીન સંપાદન નથી અને પુનર્વસન એ.એસ.એસ.૫ લાગુ પડતું નથી. એ.એસ.એસ.૯ એવા પગલાં પૂરા પાડે છે કે જેના દ્વારા નાણાકીય મધ્યસ્થીઓ (એફ.એલ.એસ.) તેમના પોર્ટફોલિયોના પર્યાવરણીય અને સામાજિક જોખમો અને અસરોનું નિરીક્ષણ અને સંચાલન કરવા માટે જરૂરી છે. પ્રોજેક્ટની પ્રકૃતિને ધ્યાનમાં લેતા એ.એસ.એસ.૯ લાગુ પડતું નથી.
વિશ્વ બેંક જૂથ એ.એસ.એચ.જી. અને અન્ય માર્ગદર્શન

એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ ઉપરના નિયમનકારી અને માર્ગદર્શન માળખાના આધારે જી-એ.સી.આર.પી. માટે પર્યાવરણીય અને સામાજિક વ્યવસ્થાપન માળખા દ્વારા માર્ગદર્શન મુજબ તૈયાર કરવામાં આવે છે.

૬. મૂળભૂત પર્યાવરણીય પરિસ્થિતિઓ
અપગ્રેડેશન માટે પ્રસ્તાવિત અથવા પેટા-પ્રોજેક્ટ સાથે સંકલિત વર્તમાન સુવિધાઓનું ઇએન્ડએસ ઓડિટ.
ઈએન્ડએસ ઓડિટ 240 એમ.એલ.ડી. એસ.ટી.પી. માટે એસ.ટી.પી. અને એકમોની કામગીરીની સ્થિતિ અને પર્યાવરણીય અને સામાજિક વ્યવસ્થાપન પ્રેક્ટિસની ઓળખ અને આકારણીના ભૌતિક મૂલ્યાંકનના ઉદ્દેશ્ય સાથે હાથ ધરવામાં આવ્યું હતું. ઈએન્ડએસ ઓડિટ એસટીપીના નિષ્ક્રિય એકમો / ભાગો અને સામાન્ય પર્યાવરણીય અને સલામતી પ્રથાઓ પર પ્રકાશ પાડે છે. જેમ કે પી.પી.ઈ. નો ઉપયોગ, રસાયણો માટે કોઈ નિયુક્ત સ્ટોરેજ વિસ્તાર વગેરે જાહેર પરામર્શ પણ એસટીપીની આસપાસના વસાહતો / અતિક્રમણોને પ્રકાશિત કરે છે. જે કામચલાઉ માળખાં અને કોઈપણ મ્યુનિસિપલ સુવિધાથી વંચિત છે.

બેઝલાઇન પર્યાવરણીય અને પાસાઓ નીચેના ટેબ્યુલેટ સારાંશમાં રજૂ કરવામાં આવ્યા છે.

કો-ઓર્ડિનેટ્સ	અક્ષાંશ: ૨૨*૫૮'૪૪""એન';રેખાંશ: ૭૨*૩૧'૨૨""ઈ"
વહીવટી/ભૌતિક ઘટનાની વિગતો	વોર્ડ નં. ૫૨, સરખેજ, અમદાવાદ, ગુજરાત, સાબરમતી નદીની પશ્ચિમ બાજુ.
સ્થાન નકશો	
	ફિઝિયોગ્રાફી, માઇક્રોક્લાઇમેટ અને આસપાસની જમીનનો ઉપયોગ
ટોપોગ્રાફી, ઢાળ અને માટી	અમદાવાદ શહેર વિસ્તાર નાના પેચ સિવાય એકવિધ રીતે સપાટ છે. જમીનની સપાટીની ઊંચાઈ ૪૦ મીટરથી ૬૦ મીટર એ.એમ.એસ.એલ. સુધી છે અને દક્ષિણ તરફ સ્લોપ છે. સાઇટ સપાટ છે, ૪૨ – ૪૬ મી. થી ઢાળવાળી છે. એચ.એફ.એલ.૪૧.૭ મી છે.
સૂક્ષ્મ આબોહવા	સૌથી ગરમ મહિનો - મે (મહત્તમ તાપમાન ૪૧.૬*સી) સૌથી ઠંડો મહિનો - જાન્યુઆરી (લઘુત્તમ તાપમાન ૨૭*સી)
આસપાસની જમીનનો ઉપયોગ અને પ્રવૃત્તિઓ	પૂર્વ: ૨૦ મી ના અંતરે ૨૪૦ એમ.એલ.ડી. એસ.ટી.પી. પશ્ચિમ: એસ.ટી.પી. ને અડીને રહેણાંક વિસ્તાર ઉત્તર : કેનાલ અને રોડ અનુક્રમે ૫૦ મીટર અને ૭૦ મીટર દુર. દક્ષિણ: સાબરમતી નદી લગભગ ૨૪૦ મીટર
કોઈપણ જમીનનો ઉપયોગ અથવા મહત્વની રચના	વાસણા બેરેજ 3 કિમી ઉપરની તરફ સ્થિત છે, બેરેજના ડાઉનસ્ટ્રીમમાં સાબરમતી પર બે સમાંતર પુલ છે જે સાઇટની ઉપરની તરફ ૧ કિમી છે.

સાઇટ વિગતો	
સાઇટ યોજના	
સાઇટનો અભિગમ	સાઇટ પર પહોંચવા માટે નહેર બાજુના રસ્તા દ્વારા એક પાકા રસ્તાથી જોડાયેલ છે.
મુખ્ય અને પેટાકંપની ઍક્સેસ માર્ગોનું વર્ણન	નારોલ-સરખેજ રોડને એન.એચ. ૭૫૧ સાથે જોડતો કેનાલ બાજુનો રસ્તો. પ્લાન્ટે લગભગ ૫ મીટરની પહોળાઈવાળા ગેટ દ્વારા પ્રવેશ સુરક્ષિત કર્યો છે. સુરક્ષા - હા અધિકારીઓ દ્વારા સાઇટને ઍક્સેસ કરવા માટે, તમામ લોકો તેમજ સામગ્રીની હિલચાલ માટે, અગ્નિશામક વહન તથા અન્ય માટે વપરાય છે: હા
વિસ્તાર	214117 ચો.મી., લમ્બચોરસ
માલિકી	અ.મ્યુ.કો.
ઐતિહાસિક જમીનનો ઉપયોગ	એસ.ટી.પી., એસ.ટી.પી. બાંધતા પહેલા સુએજફાર્મ
હાલની જમીનનો ઉપયોગ	હાલની એસ.ટી.પી.
કુદરતી લક્ષણો	સાઇટ પર કોઈ નથી, સાબરમતી નદી સાઇટની દક્ષિણ તરફ

કોઈ ઐતિહાસિક ઘટના દરમિયાન અસર?	પૂર
જો કોઈ ક્ષમતા હોય તો હાલની સુવિધાનું વર્ણન:	૨૪૦ એમ.એલ.ડી. ટેકનોલોજી: એ.એસ.પી.
હાલના પ્લાન્ટની સ્થિતિ અને સલામતી	હાલની એસટીપી લગભગ ૧૨ વર્ષ જૂની છે અને પ્રોજેક્ટના ઘણા ઘટકો નિષ્ક્રિય છે અને સંપૂર્ણ ક્ષમતા પર કામ કરી રહ્યાં નથી. તમામ સિવિલ સ્ટ્રક્ચર્સ અને આંતરિક રસ્તાઓ સારી સ્થિતિમાં છે. કોઈપણ અતિક્રમણને રોકવા માટે એસટીપી તેની આસપાસ કોંક્રિટ દિવાલ દ્વારા રક્ષિત છે.
હાલની સુવિધાનું વર્ણન	સારવાર ક્ષમતા: ૨૪૦ એમ.એલ.ડી. ટેકનોલોજી: એ.એસ.પી. એકમો: ૧. ઇનલેટ ચેમ્બર એ) બાર સ્ક્રીન (મેન્યુઅલ) બી) મિકેનિકલ સ્ક્રીન (ઓટો) સી) ગ્રિટ અને ક્લાસિફાયર મિકેનિઝમ ડી) પાર્શલ ફ્લુમ ૨. પ્રાઇમરી કલેરીફાયર ૩. એરેશન ટાંકીઓ ૪. સેકન્ડરી કલેરીફાયર ૫. સ્લજ થીકનર ૬. કલોરીનેશન ૭. બાયોગેસ હોલ્ડર
બેઝલાઇન પર્યાવરણીય ગુણવત્તા	

સારવાર કરેલ સુએજની ગુણવત્તા	પરિમાણો	જી.પી.સી.બી. તરફથી સંચાલન કરવા માટેની સંમતિ અનુસાર સંમત ધોરણો	બેઝલાઇન ગુણવત્તા	એન.જી.ટી. એ ડિસ્ચાર્જ ધોરણો સૂચવ્યા
	BOD(mg/l):	20	૧૬	≤ 10
	COD(mg/l):	100	૭૨	≤ 50
	SS (mg/l)	30	૩૫	≤ 10
	pH	6.5 to 8.0	7.56	6.5-9.0
	Fecal Coliform MPN / 100 ml	1000-10000	48	<230/ <100
	N	Nil	14	≤ 10
	P	Nil	1.83	≤ 1
ઘોંઘાટ	ઘોંઘાટનું સ્તર ઊંચું છે જે મેટ્રો ડેપોના હાલના ચાલુ બાંધકામને કારણે છે (જે એપ્રિલ ૨૦૨૨ સુધીમાં પૂર્ણ થવાની ધારણા છે)			
આસપાસની હવાની ગુણવત્તા	બધા પરિમાણો અનુમતિપાત્ર મર્યાદામાં છે			
છોડ સંબંધિત હવા ગુણવત્તા સમસ્યાઓ	સુએજ અને સ્લજમાંથી વાયુઓ ઉત્સર્જિત થાય છે. સ્લજમાંથી મિથેન જેવા વાયુઓ મુક્ત થાય છે. ગેસ હોલ્ડર જગ્યાએ છે. હાલના પ્લાન્ટમાં વાહનોની અવરજવર ખૂબ જ ન્યૂનતમ છે અને ધૂળ અને અન્ય વાહનોના પ્રદૂષકોનું ઉત્સર્જન નહિવત છે.			
આસપાસના પાણીની ગુણવત્તા (જમીન અને સપાટી)	ભૂગર્ભ જળ: તાજેતરના સી.પી.એચ.ઈ.ઈ.ઓ. અને આઈ.એસ. કોડ ૨૦૧૨ મુજબ પીવાના પાણીની ગુણવત્તાના ધોરણોનો ઉલ્લેખ કરી મોનીટરીંગના પરિણામોને ધ્યાનમાં રાખીને, આ સ્ત્રોતોમાંથી પાણીનો ઉપયોગ ટ્રીટમેન્ટ વિના પીવા માટે કરી શકાતો નથી. સપાટીનું પાણી: વાસણા ખાતે 240 એમ.એલ.ડી. એસ.ટી.પી. નજીક સાબરમતી ખાતે સપાટીના પાણી માટે નમૂના લેવામાં આવ્યા હતા. મોનિટરિંગ પરથી જણાયું છે કે, પાણીના નમૂનાઓમાં બી.ઓ.ડી., ક્લોરાઇડ્સ અને કોલિફોર્મ પીવાના હેતુ માટે સપાટીના પાણીની			

	ગુણવત્તાના માપદંડના સી.પી.સી.બી. ૧૯૭૯ અને બી.આઈ.એસ. ૧૯૮૨ ના ધોરણોને ઓળંગી રહ્યા છે.
માટીની ગુણવત્તા	જમીન પર સ્લજનો કોઈ નિકાલ જોવા મળ્યો નથી
પ્રાણીસૃષ્ટિ અને વનસ્પતિ	સાઇટ પર ૪૫૦ - ૫૦૦ વૃક્ષો છે, જેમાં મુખ્યત્વે બાવળ અને લીમડાની પ્રજાતિઓ છે; અને ઝાડીઓનું વાવેતર કર્યું. હાલની સાઇટમાં લીલો વિસ્તાર છે જે વિવિધ પ્રકારના સામાન્ય પક્ષીઓ અને જંતુઓને આશ્રય આપે છે. સાબરમતી નદીમાં યુકોર્નિયા (આક્રમક) ની વૃદ્ધિ છે.
	સૂચિત પુનર્વસન કાર્યો
સૂચિત પ્રવૃત્તિ (અપગ્રેડેશન માટે પ્રસ્તાવિત અપસ્ટ્રીમ અને ડાઉનસ્ટ્રીમ લિંક્ડ ઈન્ફ્રાસ્ટ્રક્ચર સહિત)	વધુ સારા ડિસ્ચાર્જ ધોરણો (એન.જી.ટી. સૂચવેલા ધોરણો) ને પહોંચી વળવા નવા એસ.ટી.પી. નું નિર્માણ; હાલની એસટીપી, ગંધ નિયંત્રણ સિસ્ટમનું ડિમોલિશન ત્રણ ટી.એસ.પી.એસ. પર ઇલેક્ટ્રિકલ, મિકેનિકલ, ઇન્સ્ટ્રુમેન્ટેશન, નાના સિવિલ સ્ટ્રક્ચર રિપેર સાથે, હાલનું અપસ્ટ્રીમ ઇન્ફ્રાસ્ટ્રક્ચર જાળવી રાખવામાં આવશે. ગ્રીડ સાથે જોડાયેલ સોલાર રૂફ ટોપ અને ગ્રીન હાઉસ મોડલ - સોલર સ્લજ ડ્રાયિંગ ઉમેરવામાં આવશે વાસણા ૨૪૦ એમ.એલ.ડી. એસ.ટી.પી. અપગ્રેડેશન માટે પ્રોજેક્ટ અને ખર્ચ અંદાજમાં એપ્રોચ રોડનો સમાવેશ; કારણ કે તે બંને સાઇટ્સ દ્વારા શેર કરવામાં આવે છે
મીટીગેશન મેઝર માટે મુખ્ય પર્યાવરણીય મુદ્દાઓ	ડિસ્ચાર્જ ધોરણો એન.જી.ટી. પ્રમાણે લાવવાની જરૂર છે સૂચવેલા ધોરણો અને જી.પી.સી.બી. પાસેથી પ્રાપ્ત કરવાની થતી કન્સેન્ટ, બાયપાસ ગુણવત્તાનો પુનઃઉપયોગ ક્લોરિનેશન વિના ન કરવો, સામગ્રીનો સંગ્રહ યોગ્ય બનાવવો, વેસ્ટ અને સ્લજ સંગ્રહ, પુનઃઉપયોગમાં સુધારો કરવો. ટી.એસ.પી.એસ. ને રિપેર કરવાની જરૂર છે.

૭. સામાજિક આધારરેખા

જાન્યુઆરી ૨૦૦૧ માં ગુજરાતના વિવિધ ભાગો સાથે અમદાવાદમાં ભારે ભૂકંપ આવ્યો હતો જેથી તમામ શહેરી સ્થાનિક સંસ્થાઓ અને રાજ્ય સરકાર માટેભૂકંપ પ્રતિરોધક ઇમારતબનાવવું પણ જરૂરી બન્યું હતું. વિભાગ.

એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ અભ્યાસમાં ઉપયોગમાં લેવાતી અને ચર્ચા કરવામાં આવેલ મૂળભૂત સામાજિક - આર્થિક સ્થિતિ સરખેજ માટે વોર્ડ નંબર ૫૨ માટે વસ્તી ગણતરી ૨૦૧૧ ના ડેટામાંથી હતી જેમાં એસ.ટી.પી. સ્થિત છે. ૨૦૦૧ - ૨૦૧૧ વચ્ચે અમદાવાદ (શહેરી) માટે દશકની વૃદ્ધિ ૨૭.૮૨% છે.

વર્ષ ૨૦૨૧ માટે એફ.આર. માં અનુમાનિત વસ્તી ૮૬૬૮૪૦ છે; એફ.આર. ૨૦૨૪ - ૯૮૭૫૮૮, એફ.આર. ૨૦૨૯ - ૧૨૧૬૦૭૩, એફ.આર. ૨૦૩૪ - ૧૪૯૫૩૦૧ અને એફ.વાય. ૨૦૩૯ - ૧૮૧૭૦૮૪.
વસ્તી વિષયક - શહેરની વસ્તી ગીચતા ૧૧૯૪૮ ચો.કી.મી. છે. ૨૦૧૧ ની વસ્તી ગણતરી મુજબ કુલ વસ્તી ૫૫૭૭૯૪૦ (૨૪,૦૨,૫૨૩ પુરૂષો અને ૧૯,૭૩,૮૭૦ સ્ત્રીઓ) છે. લિંગ ગુણોત્તર પ્રતિ ૧૦૦૦ પુરૂષો ૮૯૮ હતો જે રાષ્ટ્રીય ગુણોત્તર ૯૪૩ પ્રતિ ૧૦૦૦ પુરૂષો કરતા ઓછો છે. ૨૦૧૧ માં અમદાવાદ શહેરનો સરેરાશ સાક્ષરતા દર ૮૮.૨૯% હતો. શહેરમાં એસ.સી. / એસ.ટી. વસ્તી અનુક્રમે ૧૦.૬૬ અને ૧.૨ ટકા છે. ૨૦૧૧ ની વસ્તી ગણતરી મુજબ, હિંદુઓ શહેરમાં મુખ્ય ધાર્મિક સમુદાય છે જેમાં ૮૧.૫૬% વસ્તીનો સમાવેશ થાય છે, ત્યારબાદ મુસ્લિમો (૧૩.૫૧%), જૈનો (૩.૬૨%), ખ્રિસ્તીઓ (૦.૮૫%) અને શીખો (૦.૨૪%) છે. ૨૦૧૧ સુધીમાં, લગભગ ૬૬% વસ્તી ઔપચારિક આવાસમાં રહે છે અને બાકીની ઝૂંપડપટ્ટી અને ચાલમાં રહે છે. સરખેજ વોર્ડમાં ૧૪,૭૪૦ ઘરો છે જેની કુલ વસ્તી ૭૨,૭૨૭ છે જેમાં ૩૭,૭૪૬ પુરૂષો અને ૩૪,૯૮૧ મહિલાઓ છે. સરેરાશ ઘરનું કદ ૫.૪ છે અને લિંગ ગુણોત્તર ૯૨૭ છે.

અમદાવાદમાં સ્થળાંતર કરનારાઓ, સ્ક્વોટર વસાહતોમાં રહેતા, કામદારોના બે જૂથોનો સમાવેશ કરે છે મોસમી સ્થળાંતરિત બાંધકામ કામદારો કે જેઓ ગુજરાતના દાહોદ અને પડોશી રાજ્યોમાં ઝાબુઆ અને બાંસવાડાના આદિવાસી પટ્ટામાંથી સ્થળાંતર કરે છે અને વિચરતી જાતિઓ અને વિચરતી જનજાતિઓમાંથી લાંબા ગાળાના સ્થળાંતર કરે છે. સૂચિત જનજાતિ (એન.ટી.ડી.એન.ટી.) સમુદાયો. કામદારો તેમના પરિવારો સાથે સ્થળાંતર કરે છે અને શહેરભરમાં ખાલી પ્લોટ, રેલ્વે ટ્રેક અને ક્યારેક ફૂટપાથ પર સ્ક્વોટર વસાહતોમાં રહે છે. સરકાર આ વસાહતોની ગણતરી કરતી નથી અને આ વસાહતોને કોઈ જાહેર સેવાઓ પૂરી પાડતી નથી. મજુર અધિકાર મંચ (એમ.એ.એમ.), અનૌપચારિક કામદારોનું ટ્રેડ યુનિયન, આ સ્ક્વોટરના રહેવાસીઓ સાથે કામ કરી રહ્યું છે.

જાતિ આધારિત મુદ્દાઓ - સરખેજ વોર્ડમાં, પુરૂષોની સરખામણીમાં મહિલાઓ માટે સાક્ષરતા દર ઓછો છે. પુરૂષ સાક્ષર કુલ પુરૂષોના ૮૮.૨૮% અને સ્ત્રી સાક્ષર કુલ સ્ત્રીઓના ૭૪% છે. સ્ત્રીઓમાં બિન-કામદારોની શ્રેણી ૩૦,૫૬૭ સ્ત્રીઓ (૮૭.૩૮%) પર ખૂબ ઊંચી હતી જ્યારે ૧૬,૮૯૭ પુરૂષ બિન-કામદારો માત્ર ૪૪.૭૭% છે. તમામ બિન-કામદારોમાં લગભગ ૬૪% મહિલાઓનો સમાવેશ થાય છે.

૮. જોખમો અને અસરોનું મૂલ્યાંકન

આ પ્રોજેક્ટમાં હાલના એસ.ટી.પી. અને પમ્પિંગ સ્ટેશનના અપગ્રેડેશનનો સમાવેશ થાય છે. કેટલીક પર્યાવરણીય અને સામાજિક અસરો નીચે આપેલ છે;

- નવા એસ.ટી.પી. ના નિર્માણ અને હાલના એસ.ટી.પી. ના તોડી પાડવાની પ્રક્રિયા દરમ્યાન નોંધપાત્ર ભંગાર, ટોપસોઇલ અને કાદવનું જનરેશન.
  ડિમોલિશન, ખોદકામ, કટીંગ, બેક ફિલિંગ, કોમ્પેક્શન કામગીરી અને અન્ય બાંધકામ પ્રવૃત્તિઓને કારણે ધૂળ અને અવાજનું પ્રદુષણ.
- રહેવાસીઓ અને વ્યવસાયોને અવાજ અને કંપન અને અન્ય ખલેલ.
- ચોમાસા દરમિયાન ખોદકામને કારણે કામચલાઉ પુરની સ્થતિ.
- બાંધકામના કચરા અને કાદવ તેમજ બળતણ અને તેલના સ્પિલેજને કારણે જમીન અને પાણીનું પ્રદુષણ.
- મજૂરો અને જાહેર જનતા માટે સલામતીનાં જોખમો.
- વધતી જતી ટ્રાફિક અસુવિધા (ઉત્સર્જન, ભીડ, મુસાફરીનો લાંબો સમય, પ્રવેશમાં અવરોધ), ખાસ કરીને એસટીપીને જોડતો એપ્રોચ રોડ પણ એન.એચ. ૬૪ થી નજીકના વિસ્તારોને જોડતો રસ્તો છે.

કાનૂની, નિયમનકારી અને સંસ્થાકીય ફ્રેમવર્ક પરના પ્રકરણમાં ઓળખાયા મુજબ દરેક ધોરણની સુસંગતતાના આધારે, આગામી વિભાગો દરેક સંબંધિત ધોરણો માટે ધ્યાનમાં લેવામાં આવતા મીટીગેશનના પગલા દ્વારા અનુસરવામાં આવતા સૂચિત હસ્તક્ષેપોને કારણે સંભવિત પર્યાવરણીય અને સામાજિક જોખમો અને અસરોનો સારાંશ આપે છે. નીચેનું કોષ્ટક, અગાઉ પ્રકરણ ૩ માં ઓળખાયેલ લાગુ ઇ.એસ.એસ. ના સંદર્ભમાં જૂથબદ્ધ જોખમ અને અસરો રજૂ કરે છે:

લાગુ પડતું ઇ.એસ.એસ.	જોખમ અને અસરોનું મૂલ્યાંકન કર્યું
ઇ.એસ.એસ.૧	એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ એ ઇ.એસ.એસ.એસ. ૨-૧૦ ને લાગુ પડતા તમામ જોખમો અને અસરોનું મૂલ્યાંકન કર્યું

ઇ.એસ.એસ.૨ - શ્રમ અને કામ કરવાની શરતો	વિવિધ પ્રકારના મજૂરો નોકરી કરે છે અને તેમની કામ કરવાની પરિસ્થિતિઓને કારણે અસર અને જોખમો
ઇ.એસ.એસ. ૩ - સંસાધન કાર્યક્ષમતા અને પ્રદૂષણ નિવારણ અને વ્યવસ્થાપન	ભૌતિકશાસ્ત્ર, જમીનનો ઉપયોગ, ભૂસ્તરશાસ્ત્ર, જમીન પરના જોખમો અને અસરો જળ સંસાધનો, પાણીની ગુણવત્તા પર જોખમો અને અસરો, હવાની ગુણવત્તા, અવાજના સ્તર પર જોખમો અને અસરો, કચરાના ઉત્પાદન / નિકાલને કારણે જોખમો અને અસરો, સારી સંસાધન કાર્યક્ષમતા સુનિશ્ચિત કરવાના પાસાઓ
ઇ.એસ.એસ. ૪ : સમુદાય આરોગ્ય અને સલામતી	બાંધકામ દરમિયાન સામુદાયિક આરોગ્ય અને સલામતી પર જોખમો અને અસરો, પ્રદૂષણ, ઉપરવાસના બેરેજને ધ્યાનમાં લેતા પૂર.
ઇ.એસ.એસ. ૫ : જમીન સંપાદન, જમીનના ઉપયોગ પરના નિયંત્રણો અને અનૈચ્છિક પુનર્વસન	લાગુ પડતું નથી કારણ કે કોઈ જમીન સંપાદનની સંકલ્પના કરવામાં આવી નથી અને સ્ક્વોટર વસાહત પર કોઈ અસરની કલ્પના કરવામાં આવી નથી. સૂચિત પ્રોજેક્ટ અપગ્રેડેશન અને એસટીપીના પુનર્વસનને કારણે જમીનનો ઉપયોગ બદલાશે નહીં
ઇ.એસ.એસ. ૬ : જૈવવિવિધતા સંરક્ષણ અને જીવંત કુદરતી સંસાધનોનું ટકાઉ સંચાલન	ઇકોલોજી અને જૈવ વિવિધતા પર જોખમો અને અસરો કુદરતી રહેઠાણ પર જોખમ અને અસરો.
ઇ.એસ.એસ. ૭ : સ્વદેશી લોકો / સબ-સહારન આફ્રિકન ઐતિહાસિક રીતે બિનસલાહિત પરંપરાગત સ્થાનિક સમુદાયો	લાગુ પડતું નથી. તે વિજાતીય વસ્તી ધરાવતું શહેરી વાતાવરણ છે.

ઇ.એસ.એસ. ૮ : સાંસ્કૃતિક વારસો	બાંધકામ પ્રવૃત્તિઓ દરમિયાન સ્થાનિક રીતે મૂલ્યવાન સાંસ્કૃતિક પાસાઓ અને તકો પરના જોખમો અને અસરો
ઇ.એસ.એસ. ૯ : નાણાકીય મધ્યસ્થી	લાગુ પડતું નથી
ઇ.એસ.એસ. ૧૦ હિતધારકનીસંલગ્નતા અને માહિતીની જાહેરાત	હિતધારકોની સંલગ્નતાના અભાવને કારણે જોખમો અને અસરો પ્રોજેક્ટ પ્રવૃત્તિઓ સંબંધિત માહિતી જાહેર ન કરવાને કારણે જોખમો અને અસરો પ્રોજેક્ટ અસરગ્રસ્ત પક્ષોની ફરિયાદો અને ચિંતાઓને કારણે જોખમો અને અસરો

ઇએન્ડએસ જોખમ અને અસરનું મૂલ્યાંકન અને સંચાલન (ઇ.એસ.એસ.૧)

સૂચિત પેટા પ્રોજેક્ટ્સમાં નવા એસટીપીનું બાંધકામ અને હાલના એસટીપીનું ડિમોલિશન, ટીએસપીએસમાં સમારકામ અને નવા ગ્રીનહાઉસ મોડલ સ્લજ ડ્રાઇંગ, સોલાર રૂફટોપ, ઓડર નિયંત્રણ સિસ્ટમ, ટ્રંક પાઇપલાઇન નાખવાનો સમાવેશ થાય છે - તમામ જરૂરી સિવિલ, ઇલેક્ટ્રોમિકેનિકલ અને પેઇન્ટ વર્ક જેમાં શ્રમ સઘન કામોની જરૂર પડે છે. ગટર / ગંદા પાણીની નજીકનો વિસ્તાર, અને તેઓ લગભગ ૨ વર્ષના સમયગાળા માટે સ્થળ પર રોકાણ કરે છે. હાલના એસ.ટી.પી. માં સુએજની ટ્રીટમેન્ટ ચાલુ રહેશે, નવા બાંધકામની સાથે ટ્રીટેડ પાણીના નિકાલ અને સ્લજ અને અન્ય સુએજનો નિકાલ, બાંધકામ દરમ્યાન પાણી અને પાવર જેવા સંસાધનોનો ઉપયોગ, સામગ્રીના સંગ્રહ અને હેન્ડલિંગમાંથી પ્રદૂષણ ઉત્પન્ન થવું, પેઇન્ટનો ઉપયોગ અને બાંધકામ પ્રવૃત્તિઓ માટેના અન્ય રસાયણો, કાચા માલનું પરિવહન, કચરો અને સ્લજ, સિંચાઈ માટે ટ્રીટેડ પાણીનો પુનઃઉપયોગ વગેરે હકારાત્મક અને નકારાત્મક જોખમો અને અસરો પેદા કરી શકે છે. કામ માટે ખૂબ જ વિગતવાર અને સ્પષ્ટ અનુક્રમિક આયોજનની જરૂર છે, શેડ્યૂલિંગ કારણ કે બાંધકામના કામો દરમિયાન હાલની કામગીરીને કોઈ અસર થશે નહીં અને ઊંચાઈ પર કામ, ખોદકામ, કન્ફાઈડ વિસ્તારોમાં કામ અને ગટરની નજીકની પ્રવૃત્તિઓ જેવા અકસ્માતોના જોખમો સાથે શ્રમ સઘન છે. એસ.ટી.પી. માટેના તમામ સૂચિત માળખાકીય હસ્તક્ષેપો એસ.ટી.પી. પરિસરમાં હોવાથી, ટી.એસ.પી.એસ, નું સમારકામ તેની હાલની જગ્યામાં જ મર્યાદિત રહેશે. જો કે, સૂચિત એલાઇમેન્ટ સાથે નવી ટ્રંક મેઈન નાખવામાં આવશે. વંચિત અથવા સંવેદનશીલ લોકો સહિત સમુદાયો પર કોઈ સીધી પ્રતિકૂળ અસરોની કલ્પના કરવામાં આવી નથી. જો કે, સમુદાયો પર આડકતરી અસર

થઈ શકે છે, ખાસ કરીને પ્રોજેક્ટથી વંચિત જૂથો સુધી પહોંચવા માટે તેમને તૈયારી અને અમલીકરણ બંનેમાં સામેલ કરવા માટે વધારાના પ્રયત્નો કરવાની જરૂર પડશે.

શ્રમ અને કામ કરવાની શરતો (ઇ.એસ.એસ. ૨)
સૂચિત બાંધકામ અને તોડી પાડવાના કામો માટે લગભગ ૨ વર્ષ કે તેથી વધુ સમય માટે બાંધકામ પ્રવૃત્તિઓ માટે મજૂરોની જરૂર પડશે અને સ્થાનિક ન હોય તેવા કામદારોને રહેવા માટે લેબર કેમ્પની સ્થાપના કરવાની જરૂર પડશે. ઓ.એચ.એસ. / ઈ.એચ.એસ. જેવા જોખમો અને અસરોને બાંધકામ પ્રવૃત્તિઓ સંબંધિત ઓળખવામાં આવે છે અને તેમાં ઊંચાઈ, મર્યાદિત જગ્યાઓ, વાયુયુક્ત સ્થાન, વિદ્યુત ઉપકરણો સાથે કામ કરતા કામદારો અને સંભવિત અકસ્માતોના સંપર્કમાં આવતા બંધ વાતાવરણનો સમાવેશ થાય છે. ઉચ્ચ અવાજવાળા સાધનોની નજીકના કામદારોની સ્વાસ્થ્ય સમસ્યાઓ જેમ કે સાંભળવાની ખોટ અનુભવી શકે છે. વનસ્પતિ વૃદ્ધિને ધ્યાનમાં લેતા, બાંધકામ દરમિયાન સાપ અથવા વીંછીનો ડંખ થઈ શકે છે. મજૂરને બાંધકામના સ્થળે સેનિટરી સુવિધાઓ, પીવાનું પાણી, પીપીઈ, આરામ કરવા માટે છાંયડો, પ્રાથમિક સારવાર વગેરેની પણ જરૂર પડશે. મજૂર અનુપાલન પણ વિવિધ સ્થાનિક કાયદાઓ જેમ કે મજૂર લાયસન્સ, પરવાનગી, તાલીમ, ચૂકવણીઓ હેઠળ ફરજિયાતપણે પૂર્ણ કરવાની જરૂર પડશે. કાયદો, વગેરે

અ.મ્યુ.કો. / ઔડા હેઠળનો વિસ્તાર અને એસ.ટી.પી. થી સુલભ અંતરની અંદર લેબર કેમ્પ માટે ડી.બી.ઓ.ટી. કોન્ટ્રાક્ટર દ્વારા ઓળખવામાં આવશે અને અ.મ્યુ.કો. / ઔડા પાસેથી જરૂરી પરવાનગી / મંજૂરી લેવાની રહેશે. મજૂર શિબિરમાં કામદારોને સેનિટરી સુવિધાઓ જેવી કે શૌચાલય, વોશિંગ એરિયા અને સેનિટરી વેસ્ટ નિકાલ વિસ્તારોની જરૂર પડશે. જો અયોગ્ય રીતે વ્યવસ્થાપન કરવામાં આવે તો, ગટરનું પાણી પાણીજન્ય રોગો અને પર્યાવરણ અને આરોગ્ય માટે જોખમો પેદા કરી શકે છે. યોગ્ય વેન્ટિલેશન સાથે પર્યાપ્ત રહેઠાણ, રસોઈ અને લાઇટિંગ વગેરે માટે ફાયર શેફટી વગેરે. આવા શિબિરોનું આયોજન અને અમલીકરણ કરવા માટે કોવિડ- ૧૯ સાવચેતીઓ.

સંસાધન કાર્યક્ષમતા અને પ્રદૂષણ નિવારણ અને વ્યવસ્થાપન (ઇ.એસ.એસ. ૩)
સંસાધન કાર્યક્ષમતાના સંદર્ભમાં, પ્રોજેક્ટની તૈયારી અને એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ પ્રક્રિયા કાર્યક્ષમ (એ) ઊર્જાના ઉપયોગ માટે શક્ય પગલાં (બી) બાંધકામ દરમિયાન પાણીનો વપરાશ ઓછો કરવા માટે પાણીનો ઉપયોગ અને વ્યવસ્થાપન, બાંધકામની કુલ પાણીની માંગને સરભર કરવા અને જળ સંસાધનોની માંગ માટે સંતુલન જાળવવા સંરક્ષણ પગલાં; અને (સી) કાચા માલનો ઉપયોગ સ્થાનિક સામગ્રી, રિસાયકલ કરેલ એગ્રીગેટ્સ, નવીન તકનીકનો ઉપયોગ કરીને અન્વેષણ કરીને ઉપયોગ કરે છે જેથી મર્યાદિત કુદરતી સંસાધનો પર પ્રોજેક્ટના ફૂટ પ્રીન્ટને ઓછી

કરી શકાય. પ્રોજેક્ટનાં બાંધકામ અને કામગીરીના તબક્કાઓ દરમિયાન પેદા થતા ઘન અને પ્રવાહી કચરાના સંચાલન અને પુનઃઉપયોગને પણ સંબોધિત કરવાની જરૂર પડશે.

ભંગાણ, નિયમિત જાળવણીનાં અભાવ અને ડાઉનસ્ટ્રીમ વપરાશકર્તાઓ પરની અસરને કારણે એસ.ટી.પી. નાં ડિસ્ચાર્જ મેળવતા જળસ્ત્રોતનાં પાણીનું પ્રદૂષણ મહત્વપૂર્ણ છે. હાલના એસટીપીને તોડી પાડવાનો અને નવા એસટીપીના નિર્માણનો પ્રોજેક્ટ, આ ગટર વ્યવસ્થાના કવરેજ / ક્ષમતા અને ગુણવત્તાને વધારશે (એનજીટીના પ્રસ્તાવિત ધોરણો, જે વિશ્વ બેંકના પર્યાવરણીય આરોગ્ય અને સલામતી માર્ગદર્શન દ્વારા સૂચવવામાં આવેલા કેટલાક પરિમાણોની સમકક્ષ છે. ,પી, એન, તેલ અને ગ્રીસ) અને બી.ઓ.ડી., સી.ઓ.ડી., ટી.એસ.એસ. ના કિસ્સામાં કડક) અને તમામ પર્યાવરણીય ઘટકો પર પ્રદૂષણને નિયંત્રિત કરવામાં મદદ કરે છે. આ તેમના પુનઃઉપયોગ અને રિસાયક્લિંગ, વધુ કાર્યક્ષમ ઉપકરણો અને મિકેનિઝમ દ્વારા સંસાધનોનું સંરક્ષણ પણ સુનિશ્ચિત કરે છે.

સામુદાયિક આરોગ્ય અને સલામતી (ઇ.એસ.એસ. ૪)
સામુદાયિક આરોગ્ય અને સલામતીના મુદ્દાઓ પ્રત્યક્ષ કે પરોક્ષ પ્રદૂષણને કારણે ઉભા થઈ શકે છે અને પરિણામે ડાઉનસ્ટ્રીમના ગામડાઓમાં ટ્રીટેડ સુએજના પાણીની ગુણવત્તા અથવા સબ-ઓપ્ટિમલી ટ્રીટેડ સુએજના નિકાલને કારણે પાણીની ગુણવત્તાનાં મુદા ઉભા થઈ શકે છે. બાંધકામ દરમિયાન સામુદાયિક સ્વાસ્થ્ય અને સલામતીનું જોખમ વાયુ પ્રદૂષણ (ધૂળ અને હવાનું પ્રદુષણ), ઓડર, ટ્રાફિકની અવરજવર, ભીડ અને સલામતી, અવાજ, અન્ય)ને કારણે હોઈ શકે છે.

જમીન સંપાદન, જમીનના ઉપયોગ પરના નિયંત્રણો અને અનૈચ્છિક પુનર્વસન (ઇ.એસ.એસ. ૫)
સદર પ્રોજેક્ટમાં કોઈ સંભવિત અનૈચ્છિક પુનર્વસન મુદ્દાઓ ઓળખવામાં આવ્યા નથી, કારણ કે સૂચિત અપગ્રેડેશન માટે ખાનગી જમીનનું કોઈ જમીન સંપાદન અથવા વધારાની સરકારી જમીનની આવશ્યકતા નથી. નદી અથવા જાહેર ઈન્ફ્રાસ્ટ્રક્ચર સુધી પહોંચવા માટે કોઈ પ્રતિબંધો નથી અથવા સૂચિત પુનર્વસનને કારણે જમીનના ઉપયોગમાં ફેરફાર નથી. એસટીપી. બાંધકામના સમયગાળા દરમિયાન શ્રમ અને રોજગારીની તકો ઉભી થશે. સૂચિત અપગ્રેડેશનમાં કોઈપણ બાંધકામ પ્રવૃતિઓ માટે હાલમાં પ્લાન્ટ સાઈટમાં કાર્યરત શ્રમિકોનો સમાવેશ થશે. અકુશળ અને અર્ધ-કુશળ મજૂરી કામ માટે શ્રમિકો આસપાસની સ્કવોટર વસાહતમાંથી મેળવી શકાય છે. સ્કવોટર સેટલમેન્ટમાંથી મહિલાઓને ચોક્કસ કાર્યો માટે પણ રાખી શકાય છે. સેટલમેન્ટ નજીકમાં હોવાથી કેટલીક મહિલાઓ મજૂર તરીકે સ્થળ પર કામ કરવા તૈયાર થઈ શકે છે.

જૈવ વિવિધતા સંરક્ષણ અને જીવંત કુદરતી સંસાધનોનું ટકાઉ સંચાલન (ઇ.એસ.એસ. ૬)

પેટાપ્રોજેક્ટ કોઈપણ જટિલ અથવા કુદરતી વસવાટને અસર કરશે નહીં. જો કે, કાર્યસ્થળની આસપાસ નીચેની અસરોની અપેક્ષા રાખી શકાય છે:

- બાંધકામ પ્રવૃત્તિઓને કારણે હવા અને જળ પ્રદૂષણ અને અવાજને કારણે સંભવિત અસરો.

આક્રમક પ્રજાતિઓના કારણે સંભવિત અસર: સાઇટ પર પહેલાથી જ પિસ્ટિયા એસ.પી. જેવી વિદેશી પ્રજાતિઓ છે. Lantana Camara, Eucalyptus sp., Eichhorniacrassipes વગેરે. લેન્ડસ્કેપિંગ માટે ટોપસોઇલ ખાતરનું ટ્રાન્સફર વિદેશી પ્રજાતિઓના બીજથી થઇ શકે છે. વાવેતર માટે રોપાની કોથળીઓના સ્થાનાંતરણ દરમિયાન અનિચ્છનીય બીજ / રોપ આવી શકે છે.

- સાપ અને વીંછીના કરડવાથી આકસ્મિક ઇજાઓ, જળાશયોમાં કચરો નાખવાથી મેક્રોફાઇટ્સ અને જળચર પ્રાણીસૃષ્ટિની જૈવિક પ્રક્રિયાને અસર થઈ શકે છે તે પોષક ચક્રમાં દખલ કરીને મેક્રોફાઇટની રચનામાં ફેરફાર કરી શકે છે.

સ્વદેશી લોકો/ સબ-સહારન આફ્રિકન ઐતિહાસિક રીતે અન્ડરસર્વ્ડ પરંપરાગત સ્થાનિક સમુદાયો (ઇ.એસ.એસ. ૭)

પ્રોજેક્ટ વિસ્તારમાં કોઈ સ્થાનિક લોકો નથી. જો કે, આ પ્રોજેક્ટ માટે સ્થાનિક પરામર્શ હાથ ધરવામાં આવ્યો હતો.

સાંસ્કૃતિક વારસો (ઇ.એસ.એસ. ૮)

હેરિટેજ સ્ટ્રક્ચર્સ અને સાંસ્કૃતિક સ્થળો માટે આકારણી હાથ ધરવામાં આવી હતી. સૌથી નજીકનું સ્મારક એ એસટીપીથી ૧.૬ કિલોમીટરના અંતરે આવેલ ફતેહ બાગ કિલ્લો છે, જે સૂચિત કાર્ય પ્રવૃત્તિઓમાંથી કોઈપણને કારણે પ્રભાવિત થશે નહીં.

હિતધારકની સંલગ્નતા અને માહિતીનું ડિસ્ક્લોઝર (ઇ.એસ.એસ. ૧૦)

પેટા પ્રોજેક્ટ માટે એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ અને જી-એ.સી.આર.પી. પ્રોજેક્ટ માટે એસ.ઈ.પી. ની તૈયારી દરમ્યાન સાબરમતી / ફતેહવાડી કેનાલના ડાઉનસ્ટ્રીમમાં એસ.ટી.પી.એસ. નજીકના વિસ્તારના રહેવાસીઓ, એસ.ટી.પી. ઓપરેટરો, અ.મ્યુ.કો. અધિકારીઓ અને સમુદાયો સહિત વિવિધ હિતધારકો સાથે એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ તૈયાર કરવા માટે પરામર્શ હાથ ધરવામાં આવ્યો હતો.

સંભવિત સામાજિક અસરો

પ્રવર્તમાન એસ.ટી.પી. બાઉન્ડ્રીની અંદર ટેક્નોલોજીનું વર્ધન અને અપગ્રેડેશન કરવાની દરખાસ્ત છે. પ્રોજેક્ટ માટે જમીન સંપાદનની જરૂર નથી. પ્રોજેક્ટ વિકાસ માટે વિસ્થાપન અને સહવર્તી મુદ્દાઓની કલ્પના કરવામાં આવી નથી. નજીકની વસાહતો ૧ કિમી દૂર છે.

એસટીપી ક્લસ્ટરથી હાઇવે પર વસાહતો આવેલી છે. સર્વિસ રોડ અને ફતેવાડી કેનાલની બાજુમાં એસટીપી કાર્યરત થયા પછી એક સ્ક્વોટર વસાહત છે જે મોટાભાગે ધૂળ અને હવાના ઉત્સર્જન ટ્રાફિક અને બાંધકામ દરમિયાન સામગ્રી, સાધનસામગ્રી અને મજૂરની સંબંધિત હિલચાલને લગતી અસર અનુભવી શકે છે. એસટીપી સુધીનો હાલનો રસ્તો કાચો છે અને ભારે વાહનો અને સાધનોની અવરજવર માટે યોગ્ય નથી. પ્રોજેક્ટના બાંધકામના તબક્કા દરમિયાન ધૂળ અને વાયુ પ્રદૂષણને ઘટાડવા માટે પ્રોજેક્ટના ભાગ રૂપે આ તમામ હવામાન માર્ગ હોવા જરૂરી છે.

ટ્રિટમેન્ટ વિનાના ગંદા પાણીને છોડવાને કારણે ડાઉનસ્ટ્રીમ વપરાશકર્તાઓ પરની અસર પણ ઓળખવામાં આવી છે. એસટીપીના અપગ્રેડેશન પછી, સાબરમતી નદીમાં છોડવામાં આવતા ટ્રીટેડ પાણીની ગુણવત્તામાં સુધારો થશે જેનો લાભ ડાઉનસ્ટ્રીમના વપરાશકારોને થશે. ટ્રાફિક મેનેજમેન્ટ પ્લાન અને બાંધકામ દરમિયાન ગંદાપાણીનું ડાયવર્ઝન જેવા યોગ્ય પગલાંની જરૂર પડશે જેથી ડાઉનસ્ટ્રીમ યુઝર્સ પર થતી અને સંભવિત રીતે ઓળખાતી અસરોને ટાળવા અને ઘટાડવાની જરૂર પડશે.

સંચિત અસરો

મૂલ્યાંકન દર્શાવે છે કે ૨૪૦ એમ.એલ.ડી. પેટા-પ્રોજેક્ટનું અપગ્રેડેશન અને હાલના ૧૨૬ એમ.એલ.ડી. એસ.ટી.પી. ની જગ્યા પર નવા ૩૭૫ એમ.એલ.ડી. એસ.ટી.પી. નું બાંધકામ (અને પછી હાલના એસ.ટી.પી. ને તોડી પાડવું), અને પીરાણા ૧૮૦ એમ.એલ.ડી. એસ.ટી.પી. નું અપગ્રેડેશન તમામ પર્યાવરણ પર હકારાત્મક અસર કરશે. પરિમાણો ખાસ કરીને સાબરમતી નદી અને/અથવા ફતેહવાડી કેનાલ અને ડાઉનસ્ટ્રીમ ઉપયોગની પાણીની ગુણવત્તા પર પડશે.

હયાત એસટીપીનાં બીઓડી, સીઓડી, ટીડીએસ, સાંદ્રતાનો ભાર વધુ જોવા મળ્યો હતો જેની સારવાર અને એનજીટી માર્ગદર્શિકાને પૂર્ણ કર્યા પછી આ લોડમાં નોંધપાત્ર ઘટાડો થશે અને સાબરમતી નદીના પાણીની ગુણવત્તા પર હકારાત્મક અસર પડશે. એવી અપેક્ષા રાખી શકાય છે કે લાંબા ગાળે આ બિન-બારમાસી નદીમાં જૈવિક વિવિધતા વધી શકે છે અને આ પ્રદેશમાં ભૂગર્ભ જળની ગુણવત્તામાં સુધારો થશે.

વાસણા ૧૨૬ એમ.એલ.ડી. ક્ષમતાનો પ્લાન્ટ અ.મ્યુ.કો. માં ઉત્પાદિત કુલ ગટરના લગભગ ૯% પાણીને ટ્રીટ કરે છે. હાલના એ જગ્યાએ ૩૮૫ એમ.એલ.ડી. ક્ષમતાનો નવો એસ.ટી.પી. બીઓડી, સીઓડી અને ટીએસએસ પર પર્યાવરણીય ભારણ (જેમાં ટ્રીટમેન્ટ ન કરાયેલ / સબ-શ્રેષ્ઠ રીતે ટ્રીટેડ ગટરનું પાણી સીધું / આડકતરી રીતે નદી સુધી પહોંચતું હોય તે સહિત) લગભગ ૭૦ થી ૮૦% ઘટશે.

હાલની જે સુએજ લાઈનો અને ટી.એસ.પી.એસ. આ એસ.ટી.પી. ને મળે તે એસટીપીના અપગ્રેડેશનના ભાગ રૂપે ટી.એસ.પી.એસ. માં નાના સુધારાની દરખાસ્ત કરવામાં આવી છે.

પ્રસ્તાવિત પેટા-પ્રોજેક્ટ સાઇટની ઉત્તર બાજુએ આવેલા ગ્યાસપુર મેટ્રો ડેપોમાં ચાલી રહેલી બાંધકામ પ્રવૃત્તિઓને કારણે બાંધકામ દરમિયાન હવાની ગુણવત્તા પર કામચલાઉ સંચિત અસર પડી શકે છે. આ પ્રોજેક્ટ એપ્રિલ ૨૦૨૨ સુધીમાં પૂર્ણ થવાની ધારણા હતી, જે કોવિડ ૧૯ ની ચાલી રહેલી ત્રીજી લહેરને કારણે વિલંબમાં પડી શકે છે. જો કે, એવી અપેક્ષા રાખવામાં આવે છે કે સૂચિત નવા વાસણા ૩૭૫ એમ.એલ.ડી. એસ.ટી.પી. બાંધકામ માટે સાઇટના કામો શરૂ કરતા પહેલા આ બાંધકામ પૂર્ણ થઈ જશે. વાસણા ૨૪૦ એમએલડી એસટીપીનું અપગ્રેડેશન પણ જો એકસાથે હાથ ધરવામાં આવે તો બાંધકામ પ્રવૃત્તિઓને કારણે વધતા વાયુ પ્રદૂષણમાં ફાળો આપશે. જો કે, વાસણા ૨૪૦ એમએલડી એસટીપી ખાતે ડિમોલિશનની પ્રવૃત્તિઓ વાસણા ૧૨૬ એમએલડી એસટીપી ખાતે ડિમોલિશન પ્રવૃત્તિઓ પહેલાં શરૂ થશે જ્યાં હાલના એસટીપીને તોડી પાડવા પહેલાં નવા એસટીપીનું નિર્માણ કરવાની દરખાસ્ત છે. આથી ઓવરલેપિંગ બાંધકામ સમયગાળા દરમિયાન આવી સંચિત અસર મર્યાદિત સમયગાળા માટે અપેક્ષિત છે. સાઇટ એસટીપી મેટ્રો ડેપો અને નદીથી ઘેરાયેલી હોવાથી; ધોંધાટ અને ધૂળની અસરોના સંવેદનશીલ રીસેપ્ટર્સ એ એક્સેસ રોડની બાજુમાં આવેલી સ્ક્વોટર વસાહતો છે. રીસેપ્ટર્સ પરની ટૂંકા ગાળાની અસરો ધૂળ જેવા વાયુ પ્રદૂષકોમાં વધારો, અને વાહનો અને મશીનરીમાંથી ઉત્સર્જન, વાહનોની હિલચાલને કારણે અવાજના સ્તરમાં વધારો, અને મશીનરીના સંચાલનને કારણે થતી અસરો સાથે સંકળાયેલી છે જેને શ્રેષ્ઠ પદ્ધતિઓ અપનાવીને ઘટાડી શકાય છે.

વાસણા ૨૪૦ એમએલડી એસટીપીના પુનર્વસનમાં ૨૪૦ એમએલડી એસટીપી અને ૧૨૬ એમએલડી સુધીના એપ્રોચ રોડનાં સરફેસિંગનો સમાવેશ કરવામાં આવ્યો છે. સર્વ-હવામાન રસ્તાઓનું નિર્માણ બાંધકામના તબક્કા દરમિયાન વાયુ પ્રદૂષણમાં નોંધપાત્ર ઘટાડો કરશે.

૯. પર્યાવરણ અને સામાજિક વ્યવસ્થાપન યોજના (ઈ.એસ.એમ.પી.)

આયોજિત આકારણીના આધારે પ્રોજેક્ટની ડિઝાઇન/પૂર્વ બાંધકામ, બાંધકામ અને કામગીરીના તબક્કાઓ માટે ઈ.એસ.એમ.પી. વિકસાવવામાં આવી છે. જે મીટીગેશન મેઝર્સ અપનાવીને પર્યાવરણીય અને સામાજિક અસરોનું સંચાલન રજૂ કરે છે - (એ) જોખમો અને અસરોની ધારણા કરો અને ટાળો; (બી) જ્યાં ટાળવું શક્ય ન હોય ત્યાં, લઘુત્તમ જોખમો અને અસરોને સ્વીકાર્ય સ્તરે ઘટાડે (સી) એકવાર જોખમો અને અસરો થઈ જાય તે ઘટાડી અને. ડીબીઓટી કોન્ટ્રાક્ટની બિડ કરતી વખતે ઈ.એસ.એમ.પી. ને બિડ દસ્તાવેજોમાં સામેલ કરી કોન્ટ્રાક્ટર આ પગલાંને અમલમાં મૂકવા માટે જરૂરી સંસાધનો અને મિકેનિઝમ્સ ફાળવે. તેની ખાતરી કરો.

૧૦. મોનીટરીંગ પ્લાન

બાંધકામના તબક્કા દરમિયાન, ચાલુ બાંધકામ પ્રવૃત્તિઓ દરમિયાન પર્યાવરણની ગુણવત્તા ચકાસવા માટે પર્યાવરણીય દેખરેખ હાથ ધરવામાં આવશે. કોન્ટ્રાક્ટર દ્વારા હાથ ધરવામાં આવશે અને પી.આઈ.યુ. મોનીટરીંગના અમલીકરણની સમીક્ષા માટે જવાબદાર રહેશે. મોનીટરીંગમાં એમ્બિયન્ટ એર ક્વોલિટી, ઇન્ટેક સીવેજ ગુણવત્તા, આઉટફોલ ટ્રીટેડ વોટર ક્વોલિટી, એમ્બિયન્ટ નોઈઝ, ગ્રાઉન્ડ વોટર ક્વોલિટી, સોઈલ ક્વોલિટી અને સ્લજ ક્વોલિટીનું મૂલ્યાંકન સામેલ હશે. આ દેખરેખમાં પી.એમ.સી. દ્વારા બાંધકામ દેખરેખ અને ગુણવત્તા નિયંત્રણના ભાગરૂપે ઓ.એચ.એસ. પાસાઓ, સમુદાય સલામતી અને કામદારોની સલામતીનો પણ સમાવેશ થશે.

કામગીરીના તબક્કા દરમિયાન, પ્રોજેક્ટ પ્રવૃત્તિઓને કારણે પર્યાવરણીય લક્ષણો પરની અસરોને સમજવા માટે પર્યાવરણીય દેખરેખ હાથ ધરવામાં આવશે. તે ડીબીઓટી / ઓએન્ડએમ કોન્ટ્રાક્ટર દ્વારા હાથ ધરવામાં આવશે અને અ.મ્યુ.કો. અમલીકરણની સમીક્ષા માટે જવાબદાર રહેશે. મોનીટરીંગમાં એમ્બિયન્ટ એર ક્વોલિટી, ઇનલેટ સીવેજ ક્વોલિટી, આઉટલેટ ટ્રીટેડ વોટર ક્વોલિટી, એમ્બિયન્ટ નોઈઝ, ગ્રાઉન્ડ વોટર ક્વોલિટી, સોઈલ ક્વોલિટી અને સ્લજ ક્વોલિટીનો સમાવેશ થશે.

ઇએસએમપી નું પાલન સુનિશ્ચિત કરવા માટે, પ્લાન્ટની જાળવણી અને સીટીઈ શરતો એએન્ડએસ ઓડિટ કામગીરીના તબક્કા દરમ્યાન થર્ડ પાર્ટી દ્વારા હાથ ધરવામાં આવશે.

ઇએન્ડએસ ઑડિટમાં સામેલ છે:

૧. એસટીપી અને એકમોની કામગીરીની સ્થિતિ અને જગ્યાનું ભૌતિક મૂલ્યાંકન
૨. પર્યાવરણીય વ્યવસ્થાપન પદ્ધતિઓની ઓળખ અને મૂલ્યાંકન
૩. કામદારો અને સમુદાયો માટે આરોગ્ય અને સલામતીના જોખમો
૪. ઇએસએસ, રાષ્ટ્રીય, રાજકીય અને સ્થાનિક કાયદાઓનું પાલન અને પરવાનગીઓ, સંમતિની શરતો, શ્રમ સ્વાસ્થ્ય, સલામતી, સુરક્ષા, કલ્યાણ વગેરેનું ફરજિયાત અને વૈધાનિક પાલન
૫. સ્થળ પર ઈએચએસ, જીઆરએમ, વિવિધ કાર્ય યોજનાઓનું અમલીકરણ.
૬. સાઈટ માટે જરૂરી દસ્તાવેજો, રેકોર્ડ્સ અને રિપોર્ટ્સની જાળવણી.
૭. એલ.એમ.પી. પાલન.
૮. ક્ષમતાઓનું મૂલ્યાંકન, એન.જી.ટી. ધોરણો હાંસલ કરવા માટેની તકનીક અને ડિઝાઇન સ્પષ્ટીકરણ
૯. પર્યાવરણીય દેખરેખ વિશ્લેષણ અને સારવાર
૧૦. સ્લજનું ઉત્પાદન અને સારવાર.
૧૧. સામાન્ય કાર્ય સલામતી રેકોર્ડ અને ઘટના અહેવાલ

૧૨. સી.ટી.ઈ. (બાંધકામના તબક્કામાં) અને સી.ટી.ઓ. (ઓપરેશન તબક્કામાં) શરતો અથવા અન્ય નિયમનકારી શરતોનું પાલન.

૧૧. ક્ષમતા નિર્માણ

આયોજન, બાંધકામ અને કામગીરી સહિત તમામ તબક્કે ક્ષમતા નિર્માણની જરૂર પડશે. તેમાં અ.મ્યુ.કો. પ્રોજેક્ટ સ્ટાફ, સંબંધિત PIU, કોન્ટ્રાક્ટર સ્ટાફ, સુપરવાઈઝર, કન્સલ્ટન્ટ, પર્યાવરણીય અને સામાજિક નિષ્ણાતો, મજૂરો, હિતધારકો વગેરે માટે વિવિધ વર્કશોપ અને સેમિનારનો સમાવેશ થશે. તાલીમ માટેના વિષયોમાં આરોગ્ય અને સલામતી, પર્યાવરણ વ્યવસ્થાપન અને ઈ.એસ.એમ.પી. અમલીકરણ, નિયમનકારી બાબતોનો સમાવેશ થશે.

૧૨. ફરિયાદ નિવારણ પદ્ધતિ

હિતધારકો જે પ્રકારની ફરિયાદો ઉઠાવી શકે છે તેમાં નીચેનાનો સમાવેશ થાય છે, પરંતુ તે આટલા સુધી મર્યાદિત નથી:

- વળતરની ચૂકવણી ન કરવી અને પ્રોજેક્ટ અસરગ્રસ્ત લોકોને બળજબરીથી કાઢી મુકવા.
- બાંધકામ સંબંધિત અસરો - તિરાડો, માળખાને નુકસાન; ધૂળ પાક/વૃક્ષોને નુકસાન છે
- આરોગ્ય અને સલામતીના જોખમો.
- પર્યાવરણ પર નકારાત્મક અસરો.
- સમુદાયો પર નકારાત્મક અસરો, જેમાં બાંધકામ અથવા ઓપરેશનલ પ્રવૃત્તિઓથી નાણાકીય નુકસાન, ભૌતિક નુકસાન અને ઉપદ્રવનો સમાવેશ થઈ શકે છે, પરંતુ તે પૂરતો મર્યાદિત નથી.

અ.મ્યુ.કો. પાસે કાર્યરત ફરિયાદ નિવારણ સિસ્ટમ (CCRS, http://www.amccrs.com) છે જેમાં વેબ પોર્ટલ અને ટોલ-ફ્રી નંબરનો સમાવેશ થાય છે. તે દર મહિને લગભગ ૪૦-૫૦ હજાર ફરિયાદો નોંધે છે. સિસ્ટમમાં નોંધાયેલી કોઈપણ ફરિયાદને કાર્યવાહી માટે સંબંધિત ઝોનમાં મોકલવામાં આવે છે. દરેક ફરિયાદમાં એક યોગ્ય સિસ્ટમ હોય છે જેના દ્વારા જો કોઈ નિરાકરણથી ખુશ ન હોય તો તેને આગળ વધારી શકાય છે. જો કેટલીક ફરિયાદો સીધી ઝોનલ ઓફિસમાં આવે છે (મોટાભાગે શહેરી ગરીબોની) તો તે મુખ્ય સિસ્ટમમાં નોંધવામાં આવે છે. સીસીઆરએસ ગુજરાત સરકારની સીએમ હેલ્પલાઈન સાથે સમન્વયિત છે અને ત્યાં આવતી કોઈપણ ફરિયાદો પણ સિસ્ટમમાં રેકોર્ડ કરવામાં આવે છે.

૧૩. અમલીકરણ વ્યવસ્થા

આ એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ સૂચિત પેટા પ્રોજેક્ટની ફિઝીબિલીટી તબક્કે તૈયાર કરવામાં આવે છે. આ તબક્કે, એસટીપીના પુનઃસ્થાપન માટેની સંભવિતતા અને તેના

અમલીકરણની પદ્ધતિની તપાસ કરવામાં આવી છે અને સંભવિતતા અહેવાલ ડિઝાઇન - બિલ્ડ - ઓપરેટ (ડીબીઓટી) ફોર્મેટ હેઠળ પ્રસ્તાવિત પેટાપ્રોજેક્ટને ઓપન ટેક્નોલોજી રીતે બિડ કરવાનું સૂચન કરે છે, જ્યાં બિડર શ્રેષ્ઠ સૂચન કરી શકે છે. સૂચવેલ ડિસ્ચાર્જ ધોરણોને સુનિશ્ચિત કરવા માટે પર્યાવરણીય રીતે યોગ્ય ટેકનોલોજીને આ કિસ્સામાં, આ તબક્કે ટેક્નોલોજીને અંતિમ સ્વરૂપ આપવામાં આવ્યું ન હોવાથી, ડીબીઓટી કોન્ટ્રાક્ટરને ઇએન્ડએસ જરૂરિયાતોને સમજવા અને વ્યવસ્થાપન / શમનના પગલાંની ખાતરી કરવા માટે જરૂરી સંસાધનો અને અમલીકરણ પદ્ધતિઓનો સમાવેશ કરવા સક્ષમ બનાવવા માટે દસ્તાવેજોમાં ઈ.એસ.એમ.પી. નો સમાવેશ કરવાનો પ્રસ્તાવ છે. એકવાર અમલીકરણના તબક્કા દરમિયાન ડિઝાઇનને આખરી ઓપ આપવામાં આવે, ત્યારે ડી.બી.ઓ.ટી કોન્ટ્રાક્ટર વાસ્તવિક ટેકનોલોજી / ડિઝાઇનના આધારે ઈ.એસ.એમ.પી. અપડેટ કરાવશે. અ.મ્યુ.કો. ખાતે રચાયેલ પી.આઈ.યુ. ના સસ્ટેનેબલ અર્બન ડેવલપમેન્ટ યુનિટ (એસ.યુ.ડી.યુ.) પીએમસી સાથે મળીને વિશ્વ બેંકની સમીક્ષા અને મંજૂરી માટે દસ્તાવેજની સમીક્ષા કરશે અને મોકલશે. પી.એમ.સી. બાંધકામ દેખરેખ અને ગુણવત્તા નિયંત્રણના ભાગરૂપે ઇ.એન્ડ.એસ. પાસાઓ અને ઓએચએસ / સીએચએસ ની દેખરેખ કરશે. થર્ડ પાર્ટી ઓડિટ પ્રોજેક્ટના દરેક વર્ષ દરમિયાન વાર્ષિક ધોરણે હાથ ધરવામાં આવશે, જેમાં બાંધકામ દરમિયાનના તમામ ઇ.એન્ડ.એસ. પાસાઓની સમીક્ષા અને ઓ.એન્ડ.એમ. અને ઓ.એચ.એસ. / સી.એચ.એસ. નો સમાવેશ થાય છે. ઈ.એસ.એમ.આઈ.એસ. દ્વારા સબપ્રોજેક્ટ વિગતો પર નજર રાખવામાં આવશે.

૧૪. ઈ.એસ.એમ.પી. ના અમલીકરણ અને દેખરેખ માટે અંદાજિત બજેટ

એન.જી.ટી. ધોરણોને પૂર્ણ કરવા માટે એસ.ટી.પી. ની ડિઝાઇન અને પુનર્વસન, સ્લજ માટે સોલાર ડ્રાયિંગ પ્લાન્ટ, ગ્રીડ-કનેક્ટેડ સોલાર રૂફ ટોપ સિસ્ટમ, ઓડર નિયંત્રણ એકમ, એપ્રોચ રોડ, કોન્ટ્રાક્ટર યાર્ડની સ્થાપના, આકસ્મિક ખર્ચ માટે કુલ પ્રોજેક્ટ ખર્ચ આઈએનઆર ૧૦.૫૯ મિલિયન છે, (યુએસડી ૦.૧૪ મિલિયન) અને ઑપરેશન ખર્ચ (આઈએનઆર ૨.૩૩ મિલિયન, યુએસડી ૦.૦૩૧ મિલિયન / વર્ષ, આઈએનઆર ૧૧.૬ મિલિયન, યુએસડી ૧.૫૬ મિલિયન પાંચ વર્ષ માટે) આઈએનઆર ૨૨ મિલિયન, યુએસડી ૦.૨૯ મિલિયન હશે. તેમાં ઇએન્ડએસ સ્ટાફ તરફના ખર્ચ, ઈ.એસ.એમ.પી. મુજબ પર્યાવરણીય દેખરેખ, ગ્રીન બેલ્ટ ડેવલપમેન્ટ, વૈધાનિક ફી એટલે કે સીટીઇ વગેરેનો સમાવેશ થશે.

૧૫. ઈ.એસ.સી.પી. માં સમાવેશ માટેના પાસાઓ

આ એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ ની જાહેરાત અને પરામર્શ, ઇએન્ડએસ જરૂરિયાતો પર કોન્ટ્રાક્ટર પાસેથી બીડ માટે અહીં તૈયાર કરેલ ઈ.એસ.એમ.પી. નો સમાવેશ, અને વિગતવાર ડિઝાઇનને આખરી રૂપ આપ્યા પછી સબપ્રોજેક્ટ માટે એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ અને ઈ.એસ.એમ.પી. નું અપડેટ ઈ.એસ.સી.પી. માં સામેલ કરવામાં આવશે. પૂર અંગેનો વિગતવાર અભ્યાસ અને તેની રોકાણો પરની અસર સ્થિતિસ્થાપક ઈન્ફ્રાસ્ટ્રક્ચરના નિર્માણની જાણ કરશે. આ

ઉપરાંત, અ.મ્યુ.કો. પાસે પેટા-પ્રોજેક્ટ ઇએન્ડએસ જરૂરિયાતો, ઈ.એસ.એમ.પી., મોનિટરિંગ પ્લાન, અને ક્ષમતા નિર્માણ જરૂરિયાતોને અમલમાં મૂકવા અને મોનિટર કરવા માટે પૂરતી ક્ષમતા હોવી જોઈએ જે અહીં ઓળખવામાં આવેલ છે અને ઈ.એસ.સી.પી. માં સમાવિષ્ટ છે.

૧૬. સ્ટેકહોલ્ડર પરામર્શ

ડ્રાફ્ટ એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ રિપોર્ટ તૈયાર કરવા માટે પરામર્શ હાથ ધરવામાં આવ્યો હતો. પેટા પ્રોજેક્ટ માટે એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ ની તૈયારી દરમિયાન સ્કવોટર વસાહતના રહેવાસીઓ, એસટીપી ઓપરેટરો, અમ્યુકો અધિકારીઓ સહિત વિવિધ હિતધારકો સાથે પરામર્શ હાથ ધરવામાં આવ્યો છે. હિસ્સેદારોની પરામર્શ એ ગતિશીલ પ્રક્રિયા છે અને જી-એ.સી.આર.પી. પ્રોજેક્ટના સમયગાળા દરમ્યાન પરામર્શ હાથ ધરવામાં આવશે. ડ્રાફ્ટ અને અંતિમ એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ, ઇએસએમપીએસ અમલીકરણ એજન્સી, એટલે કે અ.મ્યુ.કો. ની વેબસાઇટ પર અને વિશ્વ બેંકની વેબસાઇટ પર જાહેર કરવામાં આવશે. અ.મ્યુ.કો. ની વેબસાઈટ પર એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ અને ઇએસએમપી જાહેર કર્યાના એક મહિના પછી પરામર્શ પણ હાથ ધરવામાં આવશે. પરામર્શ પછી, હિતધારકોના સૂચનો સામેલ કરવામાં આવશે, અને દસ્તાવેજો ફરીથી જાહેર કરવામાં આવશે.

૧૭. ભલામણો અને આગળનો માર્ગ

એકવાર અમલીકરણના તબક્કા દરમિયાન વિગતવાર પ્રોજેક્ટ ડિઝાઇન તૈયાર થઈ જાય પછી આ એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ / ઇએસએમપી અપડેટ કરવામાં આવશે. એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ એ મહત્વના મુદ્દાઓનું મૂલ્યાંકન અને રૂપરેખા આપી છે જે અમલીકરણના તબક્કા દરમિયાન દસ્તાવેજો અને વિગતવાર ડિઝાઇનમાં સમાવવામાં આવશે; પેટાપ્રોજેક્ટની મુખ્ય અસર સાબરમતી નદી અને/અથવા ફતેહવાડી કેનાલમાં છોડવામાં આવતા ટ્રીટેડ સુએજની ગુણવત્તામાં સુધારો થવાને કારણે એકંદરે લાભ થશે, જેના પરિણામે શહેર અને તેના પ્રદેશના લોકોના પર્યાવરણ અને આરોગ્યમાં એકંદરે સુધારો થશે. એન્વાર્યમેન્ટ સોશીયલ ઇમ્પેક્ટ એસેસમેન્ટ સૂચિત પેટાપ્રોજેક્ટને કારણે પર્યાવરણીય અને સામાજિક બાબતો પર જોખમો અને અસરોના 'નોંધપાત્ર' સ્તરને પ્રકાશિત કરે છે. જે મોટાભાગે બાંધકામના તબક્કા દરમિયાન થવાની અપેક્ષા રાખવામાં આવે છે અને તેને ટાળી શકાય છે, ઘટાડી શકાય છે અને સંચાલિત કરી શકાય છે. આ પ્રોજેક્ટ માટે જમીન સંપાદનની કોઈ જરૂરિયાત નથી કારણ કે સૂચિત પ્રવૃત્તિઓ હાલની પ્રોજેક્ટ સીમામાં હાથ ધરવામાં આવશે. ત્યાં મધ્યમથી નોંધપાત્ર બાંધકામ અને કામગીરીના તબક્કાના જોખમો અને (i) એસટીપી સાઇટના ખુલ્લા ભાગને નવી સુવિધામાં રૂપાંતરિત કરવા તથા હાલના એસટીપીનું ડિમોલિશન, જેને ડિકન્ટમિનેશનની જરૂર પડી શકે છે, (ii) બાંધકામને કારણે અવાજ અને હવાની ગુણવત્તા અને ખાસ કરીને, સૂચિત ડિમોલિશન, પરિવહન પ્રવૃત્તિઓ, (iii)

વ્યવસાયિક અને સામુદાયિક આરોગ્ય અને સલામતી જોખમો અને અસરો, (iv) સ્થાનિકોને ખલેલ વનસ્પતિ અને પ્રાણીસૃષ્ટિ અને નજીકની સ્થાનિક રીતે મહત્વપૂર્ણ સાંસ્કૃતિક અસ્કયામતો (કબ્રસ્તાન), (v) સ્લજ અને કચરો જેમાં (ઘન કચરો, બિન-બાયોડિગ્રેડેબલ કચરો, ઇ-કચરો, જોખમી કચરો અને મોટા પ્રમાણમાં સીએન્ડડી કચરો) દૂષિત હોવું જે જોખમો અને અસરોને ઘટાડવા માટે સારી રીતે સંચાલિત કરવાની જરૂર છે, (vi) ઉપ-શ્રેષ્ઠ રીતે સારવાર કરાયેલ સુએજ અથવા આકસ્મિક પુર ઇએસએમપી સારી ડિઝાઇન, કડક ડિસ્ચાર્જ ધોરણો અપનાવવા અને નિયમનકારી અનુપાલન દ્વારા આ જોખમો અને અસરોને ટાળવા, ઘટાડવા અને સંચાલિત કરવા માટેની પદ્ધતિઓની યાદી આપે છે; અને સારી આંતરરાષ્ટ્રીય ઉદ્યોગ પ્રણાલીઓને અનુસરે છે. તેના માટે મીટીગેશનના પગલાં આપવામાં આવ્યા છે. આમાંથી ટ્રીટેડ ગટરના પ્રવાહને કારણે સંચિત અસર થશે અને અન્ય એસટીપીને જી-એ.સી.આર.પી. દ્વારા અપગ્રેડ કરવાની દરખાસ્ત કરવામાં આવશે જે કડક ડિસ્ચાર્જ ધોરણોને સુનિશ્ચિત કરવાના પ્રોજેક્ટના ઉદ્દેશ્યને ધ્યાનમાં રાખીને અત્યંત ફાયદાકારક રહેશે. પેટાપ્રોજેક્ટના અમલીકરણ પછી, ટ્રીટેડ પાણીની ગુણવત્તામાં સુધારો થશે અને તે સાબરમતી નદીના પર્યાવરણીય સંતુલનને સુધારવામાં મદદ કરશે. જેના પરિણામે એકંદરે વધુ સારું પર્યાવરણ અને આરોગ્ય પ્રાપ્ત થશે.

પ્રારંભિક રોકાણ માટે ESMF અને ESIA કોર્પોરેશનની વેબસાઈટ https://ahmedabadcity.gov.in/portal/web?requestType=ApplicationRH&actionVal=viewAttachment&queryType=Select&screenId=2900003&AttachmentFileName=ESMF.pdf and https://ahmedabadcity.gov.in/portal/web?requestType=ApplicationRH&actionVal=viewAttachment&queryType=Select&screenId=2900003&AttachmentFileName=ESIA-240-MLD-STP.pdf પર જાહેર કરવામાં આવ્યા હતા અને 10 ફેબ્રુઆરી, 2022 ના રોજ વિશ્વ બેંકની વેબસાઇટ પર મુકવામાં આવેલ હતા. ડિસ્ક્લોઝર પછી લાર્જ સ્કેલ કન્સલટેશન તારીખ 7 જૂન 2022 ના રોજ પંડિત દીનદયાળ ઉપાધ્યાય ઓડિટોરિયમ બોડકદેવ ખાતે યોજવામાં આવેલ જેમાં અમદાવાદ મ્યુનિસિપલ કોર્પોરેશનના માનનીય મેયરશ્રી, ડેપ્યુટી મેયરશ્રી, કમીટી મેમ્બર્સ, કોર્પોરેટરશ્રીઓ, કોર્પોરેશનના મ્યુનિસિપલ કમિશનરશ્રી તથા અધિકારીઓ, એનજીઓ, વિષય નિષ્ણાતો, સામાન્ય પ્રજા વગેરેની હાજરીમાં સદર તમામ એન્વાયરમેન્ટ સોશીયલ ઇમ્પેક્ટ અંગે ચર્ચા કરવામાં આવેલ તથા તેઓના સૂચનો માંગવામાં આવેલ. ચર્ચા દરમિયાન પૂછવામાં આવેલ તમામ પ્રશ્નો ના સંતોષકારક જવાબો આપવામાં આવેલ તેમજ સૂચનો આવકારીને તને પ્રોજેક્ટ મેનેજમેન્ટ માં આવરી લેવામાં આવેલ છે.

CHAPTER 1. INTRODUCTION

1.1 Background

The Government of Gujarat (GoG) has requested the Bank to support the Ahmedabad Municipal Corporation (AMC) in developing resilient urban infrastructure to address the evolving needs of the rapidly expanding urban population in the city, through the Gujarat Resilient Cities Partnership: Ahmedabad City Resilience Project (G-ACRP). The city which is a key economic growth centre for the state has expressed that there are key gaps in basic urban infrastructure relating to wastewater management/recycling and reuse, storm water drainage, lake, and water body rejuvenation, and flood risk management. Further, there are several institutional, planning, financing, and governance issues related to service delivery including lack of integrated multi-sector approach for sustainable and resilient municipal service delivery, primarily across various service sectors.

The proposed development objective of G- ACRP proposed to be supported by the World Bank's Investment Project Financing (IPF) is to develop resilient and sustainable urban service delivery and financial systems in Ahmedabad. As a first phase of a programmatic partnership, G-ACRP will provide financing and technical support to Ahmedabad city for implementing reforms and investments to improve service delivery and establish a solid foundation to extend support to other cities in Gujarat. G-ACRP will support AMC in addressing key institutional, financial, and service delivery constraints to improve the resilience and sustainability of priority urban services. G-ACRP project consists of three major components which will strengthen AMC's institutional and financial systems and revenue performance; Improving wastewater management services; and develop state level institutional systems and capacities. The proposed subject is upgradation of existing 240 MLD STP, access road improvement and upgradation of one pumping station being undertaken under the ACRP project. Details of the sub project are discussed in section 1.3 below.

G-ACRP AMC intends to implement this subproject in a Design-Build-Operate – Transfer format and is in the process of preparing Feasibility Report for this subproject Upgradation of existing 240 MLD STP and associated infrastructure including One Terminal Sewage Pump Station at Vasna. AMC intends to implement this subproject in a Design-Build-Operate – Transfer format and is in the process of preparing a Feasibility Report for this subproject. Royal Haskkoning DHV Consulting Pvt. Ltd. in consortium with TTI Consulting Engineers (India) Pvt. Ltd. has been appointed as consultant to prepare the Feasibility Report with a preliminary design for the project.

AMC has appointed TATA Consulting Engineers Limited (TCE) to prepare ESIA reports for the subprojects which would be taken up under Phase I of G-ACRP. This report is the ESIA prepared by TCE for the proposed subproject: **Upgradation of existing 240 MLD STP and associated infrastructure including One Terminal Sewage Pump Station at Vasna.**

1.2 The rationale for the Proposed Sub-Project: Upgradation of existing 240 MLD STP and associated infrastructure including One Terminal Sewage Pump Station at Vasna

Ahmedabad city is unique in its geographic features (such as almost flat terrain, Sabarmati and Khari rivers draining the city and its region, presence of lakes), climatic conditions (hot-semi arid with less rainfall, scorching summers, and very cold winters), and environmental characteristics; and is prone to extreme events (such as floods and earthquake). The population of Ahmedabad the fifth largest city in India was 5.57 million in 2011 (Census) estimated to be 6.3 million by 2020. With the increasing opportunities for trade and

commerce and as a centre for higher education, this heavy growth continues. It is highly industrialized, with a high-density population living hand in hand with a beautiful heritage. Water availability is less mainly dependent on Narmada waters, while the demand for industrial effluent and wastewater management, sanitation, and waste management are increasing day by day. Today, with its status as a predicted megacity, upgrading and developing sustainable urban environmental infrastructure is very important for its people and environment.

There are six (6) Sewerage (drainage) zones in Ahmedabad. The city has 98 percent water supply network coverage with adequate bulk water treatment capacity. The current per capita water supply is estimated to be 150-160 lpcd[3], which is slightly more than the national benchmark level of 150 lpcd as per the CPHEEO manual. AMC is divided into 6 sewerage catchment areas, three of these are on the eastern side and the other three are on the western side of the River Sabarmati. There are 68 sewage pumping stations, out of these 10 are terminal sewage pumping stations.

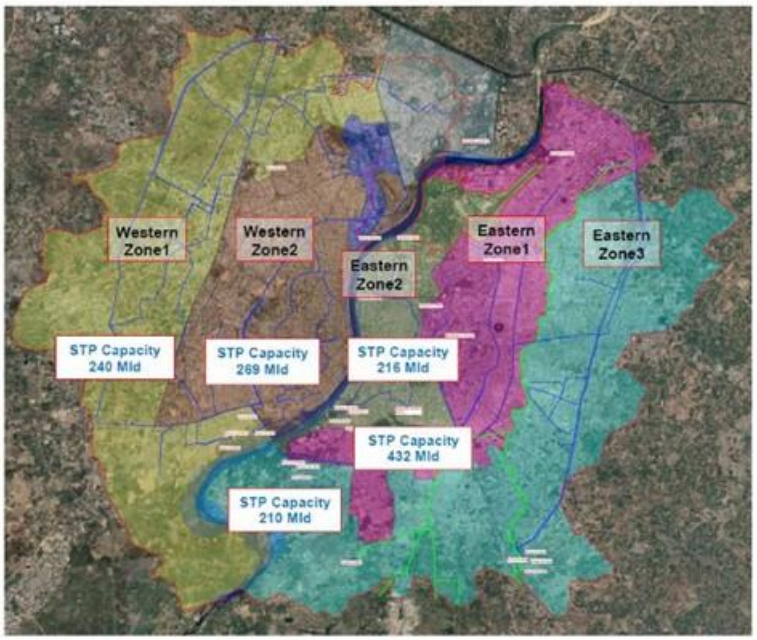


Figure 1: Sewerage Catchments in AMC

Figure 2: Location of STPs including Vasna 240 MLD

[3] *Liters per capita per day*

The City has a 3302 km sewer network with 1.27 million house connections, 64 Sewage pumping stations, and 18 Sewage Treatment Plants with a total treatment capacity of 1248 MLD. Around 90% of the city area is served by the existing sewer network.

Population in the catchment area of the Vasna STPs Including Vasna 240 MLD, Vasna 126 MLD, Vasna 35 MLD and Vasna 48 MLD STPs) will increase from 1.5million in 2021 to 2.3 million in 2039 which will increase the sewage quantity to be treated from 209.26 to 315.15 MLD in the same period.

Ahmedabad was granted the status of a Metropolitan city in 2014. Accordingly, the per capita water supply to Ahmedabad is 150 lpcd. Thus, the sewer network design and treatment capacity of STPs would have been based on 122 lpcd of sewage generation as shown in ***Table 1*** below. The additional quantity of about 7% of the sewage shall be allowed on account of infiltration into the sewers. The CPHEEO Manual restricts the infiltration flow to a maximum of 10%.

Table 1: Sewage Generation Details

Sl. No	Description	Prior to 2014 (lpcd)	After 2014 (lpcd)
1	Water Supply to residents (Excluding UFW)	135	150
2	Allow supply for commercial institutional & Civic amenities (minimum)	7.5	7.5
3	Total per Capita water supply	142.5	157.5
4	Sewage generation (80% of water supply)	114	126
5	Infiltration- 7% (Maximum 10%)	7.98	8.8
6	Total per capita sewage generation	122	135

The sewage generation is based on 150 lpcd water supply and the estimated population of 7.13million in 2021 is 963 MLD. Not all sewage generated in the catchments reaches the STPs for treatment as some of the sewers in the trunk sewer network of the catchments are dysfunctional or partially defunct. However, when the problematic sewers in the network are rehabilitated, the STPs are expected to receive the full amount of sewage.

Western Zone -1 sewage catchment covers approximately 150 sq. km. area of AMC. The area of Southwest Zone and North West Zone between SG Highway and SP Ring Road, Motera, Chandkheda, Chenpur, Gota, Jagatpur, Bopal, Shilaj, Bhadaj, and newly added AUDA area in AMC falls under this zone. The estimated contributing population for this zone is about 7.6 lakh. As per the SCADA records, about 220 MLD sewage is generated at present in this zone. The entire sewage from this zone is ultimately conveyed to a centralized 240 MLD STP at Vasna. The 240 MLD STP received sewage from 285 MLD TSPS.

As stated above, there is a gap between the amount of sewage generated within the AMC limits and the total amount of wastewater treated. Existing large STPs established more than 10 - 12 years back have been working in a suboptimal manner due to operation and maintenance issues, which has also contributed to increasing the pollution load in the river Sabarmati to which they discharge the treated water as suggested in the Consent Conditions issued by the regulator, namely Gujarat Pollution Control Board (GPCB). At various locations along the Sabarmati River, it has been observed that wastes, domestic wastewater, sewage, and effluent from a few industries are being directly discharged into the river. This has affected the quality of water in the Sabarmati River, the farmlands and communities downstream which are dependent on the river, and the ground water quality in the nearby localities.

This plant is based on Activated Sludge Process (ASP) and follows Consent Conditions based on MoEFCC 2017 discharge standards. AMC aspires to upgrade the plants to meet stringent standards put forth by NGT. The earlier design parameters did not consider the Biological

Nutrient Removal i.e., BNR capability which affects the quality of treated effluent for discharge. Hence, the existing Sewage Treatment Plant (STP) of 240 MLD capacity at Vasna is proposed for Technology upgradation under the G-ACRP project. AUDA had setup this STP in 2010 under JnNURM at INR 842 million to treat sewage at Vasna site with four modules of 60 MLD each. Many of the systems and equipment in the STP require upgradation and replacement. This STP is not functioning optimally as evident from the quality of treated sewage. AMC proposes to (i) change the treatment process to enable it to accept and treat the sewage generated by all occupants in its catchment optimally, (ii) ensure higher efficiency and achieve service level benchmark set by National agencies and regulators, (iii) achieve a better quality of treated sewage as suggested by the National Green Tribunal (which would meet the prevailing MoEFCC 2017 discharge standards as well). This will reduce discharge, and bypass untreated or suboptimally treated sewage and sludge in waterbodies and land in its catchment and area of influence minimize contamination of surface and ground water sources, and overall improvement in the health of the environment and the society.

1.3 Proposed Sub-project Details

The existing Sewage Treatment Plant (STP) of 240 MLD capacity at Vasna is proposed for Technology upgradation under the G-ACRP project, within existing premises of existing STP. This STP was built in the year 2011 and over the years, its functioning is deteriorated as evident from the quality of treated sewage, and much of the infrastructure is dilapidated. Majority of existing Electro-mechanical and instrumentation assets will become defunct after commissioning of upgraded STP and TSPS. The handling and disposal of same is in Contractor's scope. Exact details of defunct Civil structures would be known only at the Design stage after the contract is awarded. Construction period is considered for 3 years and O&M period – 15 years.

The process used in the existing STP is the Activated Sludge Process (ASP). AMC proposes to:

(i) change the treatment process to enable it to accept and treat the sewage generated by all occupants in its catchment optimally,
(ii) ensure higher efficiency and achieve service level benchmark set by National agencies and regulators,
(iii) achieve a better quality of treated sewage as suggested by the National Green Tribunal (NGT).

This will ensure better sewage management in its catchment and area of influence, by reducing discharge and bypass of untreated or suboptimal treated sewage in waterbodies and land (reused for irrigation), thereby reducing the contamination of surface and ground water sources and supporting overall improvement in the health of the environment and the society.

Following are the components proposed in this sub-project –

(i) STP Rehabilitation– STP will be upgraded with new technology to meet at the minimum, the NGT suggested discharge standards. Electric Work includes replacing existing transformers with new transformers of higher capacity i.e., 2500 KVA. New LED Street Light poles with LED fixtures are proposed for street lighting.
(ii) Terminal Sewage Pump Station – There are minor defects like seepage/ leakage in the structures, corrosion of reinforcement, spalling of concrete, minor cracks, damaged railing, damaged waterproofing, spalling of plaster, etc in the structure observed during the visual inspection of the structures. All these minor defects will be repaired for the intended use by grouting, repair mortars, etc, as per the rehabilitation methodology. Also, internal roads, storm water drainage facilities will be restored.

(iii) Solar Roof Top (Grid Connected) and Solar Sludge management- Solar grid-connected roof top system is proposed. A solar drying facility is proposed within the site which will reduce the moisture content to 20%.

(iv) Approach Road – Existing unpaved (*Kuccha*) approach road will be converted to a bituminous road of 6.0 m width starting from the culvert over Fatehwadi canal upto the entrance gate of the 240 MLD STP

The estimated cost for the proposed rehabilitation works is as approximately 350-375 croes

Table 2: Cost Estimate bases for the Proposed STP Rehabilitation and allied facilities

Sl. No	Description of Item	Qty
1	Investigation survey by total station, Geotechnical survey, Hydraulic designs & drawings. Structural designs &drawings, detailed estimates/BOQs. Completion of all necessary reports (Preliminary and Detailed Design reports, any technical notes as required) including As-Built drawings, etc. complete as per directions of Engineer in Charge.	Lot
2.	Terminal Pump Station: Upgrading of 285 MLD TerminalPump Station Design, Supply, Install, Commissioning of Step screens, Pumps, motorized valves, local PLC system, electromagnetic flow meters, street lighting, etc. complete to accommodate the existing pump station of 285 MLD capacity including all Civil, mechanical, Electrical, and Instrumentation works, etc. Complete.	1 Lot
3.	Designing, constructing, hydraulic testing, commissioning and giving satisfactorily trial runs of 240 MLD STP of Advanced modern Sequential Batch Reactor Technology which can be accommodated in the limited identified land space consisting of Preliminary, Secondary and tertiary units as per the requirement of NGT Standards with relevant national/international codes etc. necessary piping work with required valves, gates, drains, path Ways, Administration Block cum Laboratory, Blower house and watchmen quarters as necessary, Laboratory Equipment, Internal Roads, Pathways, Tools and plants, Treated effluent arrangements etc. complete as turnkey job with all involved Civil, electrical, Instrumentation and mechanical works, units as per detailed specifications for civil, electrical, Instrumentation and mechanical components complete to achieve latest NGT discharge standards BOD < 10ppm, TSS <20ppm, COD < 50ppm for disposal to river (for 240 MLD) as mentioned in the employers requirements in the bid documents. The plant should be completely automated with SCADA etc complete.	240 MLD
4	Supplying, Fixing, commissioning, trial run, operating, and maintaining solar sludge drying plant to dry the sludge generated from the STP to a moisture content of 20%.	Lot
5	Grid Connected Solar Roof Top System with net metering –400 KWp	Lot
6	Supply and install Odor Control Unit consisting of Bio Trickling Filter followed by Activated Carbon filter including all equipment, instruments, enclosures, and connecting pipes,etc. complete as per specification.	Lot
7	Approach Road for STP	Lot
8	Preliminary Items such as setting up offices for contractorand client, Contractor's yard, Contingencies, etc.	5%

1.4 Objectives and Scope of the ESIA

The subproject must comply with the Environmental and Social Framework (ESF) of the World Bank (WB) and its Environment and Social Standards (ESS). The sub-project also needs to comply with various Central and State Government standards, guidelines, and statuary requirements. As per the Environmental and Social Management Framework (ESMF) prepared by AMC for the G-ACRP, all proposed subproject activities shall be screened, and

risks categorized, to determine the extent of E&S due diligence required. Hence, for the proposed Rehabilitation of the existing 240 MLD STP at Vasna, Initial Environmental and Social Screening (IESS) was conducted using the screening format in the ESMF, and risk level was determined. Since the rehabilitation of the existing Vasna 240 MLD STP was identified as a moderate risk sub-project, it requires assessment of E&S risks and impacts along with the preparation of Feasibility Report/ Detailed Project Report. The subproject will be bid out for implementation on a Design-Build – Operate – Transfer (DBOT) mechanism, also integrating the ESMP prepared through this ESIA in the procurement documents, so that the contractor can plan and arrange the required capacities and resources for implementing and managing the E&S aspects. At this Feasibility Report Stage, before the detailed design of the proposed rehabilitation works, it is established that the location of the facility will not change. Suggested technological options and plans for upgradation are outlined in the Feasibility Report. Based on this and the regulatory requirements, the ESIA assesses the potential risks and impacts of this subproject. While the location will not change, majority of existing Electro-mechanical and instrumentation assets will become defunct after commissioning of upgraded STP and TSPS. The handling and disposal of same is in Contractor's scope. The exact details of defunct Civil structures would be known only at the Design stage after the contract is awarded. and the existing infrastructure will be put to maximum use while rehabilitating the STP, the DBOT contractor once onboard will further update the ESIA and ESMP based on the final technology which would be adopted, and the detailed design which will be prepared for the subproject.

Proposed rehabilitation activities i.e., Demolition of existing structures, construction, remodelling, upgradation of existing structures to, preparing access roads, High-pressure wash water screening, installation of equipment such as TSS analyser, replacement of screens, belt conveyor, SCADA system, upgradation of laboratory, screenings and sludge management, etc. must adhere to the best standards for sustainable environment, social acceptability, and economic viability. As per the World Bank ESF, before investing in such development projects the Environmental and Social Impact Assessment is to be carried out.

Tasks are undertaken by TCE while preparing the ESIA:

- Supporting the Client in updating the ESMF Stage 1 & 2 Screening
- Environmental & Social Audit of the existing STP
- Review of key environmental & social legislations applicable to this project and necessary regulatory requirements, Word Bank ESF, ESMF for G-ACRP, and other guidance.
- Assessing the baseline status of air, water, noise, soil, land, ecology, cultural heritage, and socio-economic aspects. To assess these impacts baseline monitoring was conducted for the sub-project site and its immediate surroundings and areas within a 5 km radius.
- Conducting stakeholder consultations for environmental & social issues.
- Assessing the Social and Environmental risks and impacts of the subproject due to the upgradation/ construction and operational phases including cumulative impacts due to other STPs and other activities nearby; and climate change vulnerability
- Socio-economic assessment to identify the vulnerable groups (e.g., elderly, female-headed households, migrants/ squatters/ urban poor, extremely poor,) that may be affected by the sub-project activities
- Analysis of proposed project site, technology, design, and operations from the perspective of likely environmental and social risks and impacts and develop the ESMP to mitigate/ offset/ reduce the impacts & risks.
- Preparing the E & S monitoring plan, cost estimate/budget for ESMP implementation and monitoring, and institutional arrangements for managing and mitigation of the E&S risks and impacts

The surrounding areas of the STP are also affected (positively & negatively) by the various developmental activities. It is also necessary to take into account the public views and their involvement through public consultations for defining the approaches to initiate the site-related work.

1.5 Environmental and Social Risks: An overview

The subproject is the rehabilitation of the existing 240 MLD capacity STP at Vasna, the capacity of the STP will remain the same i.e., 240 MLD. This will ensure full treatment of sewage from western zone 1 of the city additionally covering 0.76 million people (in addition to those already connected) who are being discharged into individual septic tanks (most of which are poorly designed/ unsanitary and without soak pits) or into open *nallas*[4]. AMC intends to follow the best available discharge standards namely, the discharge standards suggested by the Hon'ble National Green Tribunal (NGT) while rehabilitating the STP, to ensure the best effects on the water body River Sabarmati, where treated sewage is discharged by the existing facility as per the Consent Conditions of the regulator; GPCB. This will result in a better quality of 240 MLD sewage reaching Sabarmati, with benefits on the environment, overall health, and economy of the inhabitants in western zone 1 of the city, people near around nallas, and downstream villages to the south of Ahmedabad, on both sides of the Sabarmati flow path.

1.6 Structure of the Report

The ESIA has been structured as follows:

EXECUTIVE SUMMARY	NON-TECHNICAL **SUMMARY of the ESIA Report**
CHAPTER 1.	**INTRODUCTION** provides project (G-ACRP) description, project components and the rationale for the proposed Subproject (This Chapter).
CHAPTER 2.	**POLICY AND REGULATORY FRAMEWORK** discusses applicable National / State/ local regulations, WB ESF/ESSs, and applicable standards/guidance applicable for the proposed subproject
CHAPTER 3.	**ENVIRONMENTAL AND SOCIAL BASELINE** provides the present status of environmental & social parameters which will be affected due to the proposed development. This includes an Environmental Audit conducted for the existing STP.
CHAPTER 4.	**ANALYSIS OF ALTERNATIVES** looks at possible alternatives to the proposed subproject including a 'no' project scenario
CHAPTER 5.	**ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS:** describes potential impacts and risks due to the proposed subproject and related activities in line with applicable regulations and WB ESSs
CHAPTER 6.	**ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN AND MONITORING PLAN** presents the need to avoid certain risks and impacts on valued environmental components, mitigation/management measures for identified risks and impacts, with institutional responsibility for implementing these
CHAPTER 7.	**INSTITUTIONAL ARRANGEMENTS** discuss the proposed intuitional arrangements to implement, review and supervise subproject risk and impact mitigation
CHAPTER 8.	**PUBLIC CONSULTATION AND INFORMATION DISCLOSURE** presents the consultations undertaken and proposed to be undertaken, institutional responsibility, mechanisms, and schedules to disclose the subproject E&S documents

[4] *'nalla' refers to Canals or open water channels*

CHAPTER 2. POLICY AND REGULATORY FRAMEWORK

There are various national, state-level policies and regulations applicable to proposed subprojects. The Ministry of Environment, Forests and Climate Change (MoEFCC) and the Central and State Pollution Control Boards (CPCB and SPCBs) together form the regulatory bodies in India; while the National Green Tribunal (NGT) is tasked with providing an effective and expeditious remedy in cases relating to environmental protection, conservation of forests and other natural resources, and enforcement of any legal right relating to the environment.

Applicable regulations include international environmental treaties to which India is party, National and State regulations, laws and procedures applicable for the sub project encompassing environmental Conservation and management, regulations related waste management, Acts/ Rules applicable to Land Acquisition, RoW use, Encroachments on municipal drains, Acts and legislation with respect to various labor acts and labour welfare, Other regulations/ Policies/ Guidelines applicable to various construction/ implementation activities and other miscellaneous acts. The important legislations are included in the ESMF for the ACRP project in Annexure II. Guidelines pertaining to the sub-project specifically are discussed below:

Key Guidelines

- Guidelines for Management of Sanitary Waste, 2018; CPCB
- Guidelines on Environmental Management of Construction & Demolition (C & D) Wastes, CPCB
- Guidelines for Utilisation of Treated Effluent in Irrigation, September 2019, CPCB
- National Building Codes (Part IV Fire and Life Safety), Bureau of Indian Standards
- AMC Building Byelaws

2.1 Technical Guidelines on Sewerage and Drainage at National Level

Central Government agencies have issued various guidelines for various aspects and associated aspects of sewerage and drainage projects. Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development (MoUD) has the responsibility of

i) Preparation of Technical Guidelines in the form of Manuals in the field of Public Health & Environmental Engineering which are used as basic documents by the State Public Health Engineering Departments / State Water Boards/ UTs/ Urban Local Bodies in

their functions of planning, designing, construction and operation & maintenance of water supply and sanitation schemes in the above sectors.

ii) Technical scrutiny of water supply, sanitation including solid waste management, and stormwater drainage schemes submitted by the States/ UTs/ Urban Local Bodies for urban sector seeking assistance from external funding agencies such as World Bank/ JICA/ ADB and Bilateral agencies, etc.

iii) Technical assistance to other Central Ministries/ Departments like Ministries of Environment, Forests & Climate Change, Economic Affairs, Jal Shakti, New & Renewable Energy, Social Justice & Empowerment, Health & Family Welfare, Commerce & Industry, Labour & Employment, Steel, Mines, etc. in respect of various projects and problems referred to by them.

The most important guidance applicable to this subproject is listed here, with a description of the guidelines presented in ***Annexure-II***.

- Manual on Sewerage and Sewage Treatment Systems, 2013
- Manual on Storm Water Drainage Systems, 2019: Applicable as the manual states that combined stormwater and sewage in the same pipeline has resulted in several adverse effects in the process of treatment, operation, maintenance, and also on the environment. Manual recommends that sewage should be separated from the stormwater drainage system as it is currently in practice all over the world
- Manual on Operation and Maintenance of Water Supply System, 2005
- Manual on Solid Waste Management (applicable to screenings, sludge, grit, other wastes from premises)
- Manual on Municipal Solid Waste Management – 2016
- Manual on Water Supply and Treatment -1999

Guidelines and Advisories are issued by the CPHEEO and MoUD. Though water supply and sanitation are a State subject, CPHEEO provides policies, strategies, and guidelines to the States & UTs Governments including Municipal Corporations / Committees. It acts as an Advisory body at the Central level to advise the concerned State agencies and Urban Local Bodies (ULBs) in the implementation, operation & maintenance of urban water supply, sanitation, and solid waste management projects and helps to adopt the latest technologies in these sub-sectors. CPHEEO also provides technical assistance to central ministries including MOEFCC in respect of various projects and problems referred by them. The advisories cover various thematic areas including environment, health, safety, public. The below-mentioned guidelines and advisories are issued by CPHEEO which are relevant to the designing, planning, and implementation of the project.

- Guidelines for Decentralized Wastewater Management
- Standard Operating Procedure (SOP) for Cleaning of Sewers and Septic Tanks
- Advisory note on Septage Management in Urban India
- National Policy on Faecal Sludge and Septage Management
- Advisory on Public and Community Toilets
- Advisory on Tariff for Water supply and Sewerage
- Recent Trends in Technologies in Sewerage System.

Details of applicable regulations are presented in ***Annexure-II***.

2.2 Standards for Discharge of Treated Sewage

Standards for Discharge of Treated Effluents was initially published in India by MoEFCC under Environment (Protection) Act, 1986. MoEFCC in 2015 and 2017 revised the standards to be followed for disposal of treated sewage. Sewage discharge standards for disposal into water bodies were also discussed by the National Green Tribunal, the environmental watch agency

of the country in its many important judgments. The following ***Table 3*** presents a comparison of sewage discharge standards.

Table 3: Comparison of Sewage Discharge Norms/ Orders in India

S. No.	Parameters	General Norms[g] 1986				Draft Norms Nov. 2015**	MoEF&CC notification, Oct. 2017**	NGT Order 2019**
		Inland Surface Water	Public Sewer	Land Irrigation	Marine Coastal Areas			
1	BOD (mg/l)	30	350	100	100	10	30 20 (in metro cities[h])	10
2	COD (mg/l)	250	-	-	250	50	-	50
3	TSS[i] (mg/l)	100	600	200	100 (process water)	20	100 50 (metro cities)	20
4	pH	5.5-9	5.5-9	5.5-9	5.5-9	6.5-9	6.5-9	5.5-9
5	TN[j] (mg/l)	100	-	-	100	10	-	10
6	Ammoniacal Nitrogen as N	50		-	50	5[k]	-	-
7	Free NH3 (mg/l)	5			5	-	-	-
8	Nitrate (mg/l)	10			20	-	-	-
9	Diss. PO4 as P (mg/l)	5	-	-	-	-	-	1[l]
10	Faecal Coliform (MPN/100 ml)	-	-	-	-	<100	<1,000	<230

[g] standards set in 1986 cover in total 40 parameters, which are not depicted in this illustration. NOTE: industrial wastewater standards are regulated under CETP (Common Effluent Treatment Plant) set, which is not focus on this study.

[h] Metro Cities, all state capitals except in the state of Andhra Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, Sikkim, Himachal Pradesh, Uttarakhand, Jammu and Kashmir and Union Territory of Andaman and Nicobar Islands, Dadar and Nagar Haveli, Daman and Diu and Lakshadweep Areas/regions.

*** Standards applicable for discharge into water bodies and land disposal/applications, while reuse is encouraged.*

[i] As SS in (mg/l) in General Norms, 1986.

[j] As Total Kjedahl Nitrogen in General Norms, 1986

[k] As NH4-N

[l] Valid for Phosphorus Total (for discharge into ponds and lakes)

Existing STPs were designed to comply with the sewage discharge standards prevailing during the year 2017 and need process/ technology up-gradation to comply with the latest discharge standards. Consent granted by GPCB to STPs in Ahmedabad stipulates upgrading the facilities to meet the MoEFCC 2017 standards in five years whereas NGT suggested standards[5] are more stringent as presented in ***Table 3*** above. NGT has in 2017 suggested stringent standards for discharge of treated sewage. AMC aspires to follow these guidelines for all proposed activities under G-ACRP, to bring in better environmental effects.

[5] [5] NGT Order: Original Application No. 105/2019 (With report dated 19.08.2020)
Available at: http://www.indiaenvironmentportal.org.in/files/file/Kharicut-canal-pollution-NGT-order.pdf
Accessed on : July 10, 2021

Table 4: NGT suggested Discharge parameters for Treated Sewage

Sl.No.	Parameter	NGT Suggested treated effluent discharge standards for STPs, 2017	Prevailing MoEFCC 2017[6]
1	pH	5.5-9.0	6.5 -9.0
2.	BOD	<10 mg/l	20
3.	TSS	<20 mg/l	<50
5.	Total Nitrogen	< 10 mg/l	-
4.	Phosphorus – Total	< 2 mg/l	-
5.	Faecal Coliform (MPN/100 ml)	<230	<1000

Source: NGT, Original Application No. 1069/2018, (M.A. No. 1792/2018, M.A. No. 1793/2018, I.A. No. 150/2019 & I.A.No. 151/2019).

Environment (Protection) Amendment Rules, 2017. G.S.R. 1265 Dated 13th October 2017.

A comparison[7]of India's Standards with those in other countries is presented in ***Table 4*** below. It reads that NGT suggested standards for disposal of treated sewage are more stringent than that of other prevalent standards.

[6] These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.

[7] Schellenberg Tatjana, Subramanian Vrishali, Ganeshan Ganapathy, Tompkins David, Pradeep Rohinim, 2020. ***Wastewater Discharge Standards in the Evolving Context of Urban Sustainability–The Case of India****, Journal: Frontiers in Environmental Science, VOLUME-8*
Available at: https://www.frontiersin.org/article/10.3389/fenvs.2020.00030
Accessed on: September 7, 2021

Table 5: Comparison of Treated Sewage Discharge Standards across Countries

Country	PE Treated	pH	t (°C)	SS (mg SS/l)	DO (mg O_2/l)	COD (mg COD/l)	BOD (mg BOD/l)	TN (mg N/l)	Total Ammonium (mg NH4-N)	Total Ammonia (NH3-N)	TP (mg P/l)	Microbiological Indicators
EU Urban wastewater treatment Directive (UWWTD)[p]	>2,000			35/90% reduction		125/75 % reduction	25/70-90 % reduction	-			-	
	10,000-100,000							15			2	
	>100,000							10			1	
Ireland	≤10			30			20	5	20		2	
	>2,000	UWWTD apply as a minimum, but may be more stringent to comply with Water Framework Directive (WFD)										
France	<20			30			35					
	20-2000	6-8.5	<25	50%reduction		60% reduction	35, 60% reduction					
	>2000	UWWTD apply as a minimum, but may be more stringent to comply with Water Framework Directive (WFD)										
Romania	>2000	UWWTD apply as a minimum, but may be more stringent to comply with Water Framework Directive (WFD)										
Ecuador		6-9	±3[q]	130		200	100	50 TKN	30		10	<2000 FC MPN/100 ml
Tanzania		6.5-8.5	20-35	100 TSS		60	30	15 TKN			6	<10,000 TC counts/100 ml
Jordan				60 TSS	>1	150	60	70			15 as T-PO_4	<1000 E. coli MPN/100 ml Nematodes <1
India 2015		6.5-9		20 TSS		50	10	10	<5			<100 FC MPN/ 100ml
India 2017-18	Metro	6.5-9		50 TSS			20					<1000 FC MPN/ 100ml
	Non-metro			100 TSS			30					

Country	PE Treated	pH	t (°C)	SS (mg SS/l)	DO (mg O_2/l)	COD (mg COD/l)	BOD (mg BOD/l)	TN (mg N/l)	Total Ammonium (mg NH4-N)	Total Ammonia (NH3-N)	TP (mg P/l)	Microbiological Indicators
India NGT 2019		5.5-9		20 TSS		50	10	10			1	<230 FC MPN/ 100ml
India 1986[r]	Inland Water	5.5-9	<5	100		250	30	100 TKN		5 as free NH3	5 diss. PO4 as P	
	Land Irrigation			200			100					

Note to table: Coliforms represented includes E. Coli, Fecal Coli (FC) and Total Coliforms (TC)

[o] Detail for ranges of permitted consents omitted from this version for clarity

[p] TP and TN only considered in designated "sensitive" area

[q] of the receiving water body

[r] Total set covers a range of 40 parameters and three further application areas for discharge into public sewer, marine coastal areas.

In addition, as per CPCB, the designated best use class of any river in the country would be determined based on the following. Most stretches of Sabarmati were confirmed to Class B during the COVID-19 lockdown period, as per GPCB's recent report.

Table 6: CPCB Designated Best Use Classification of Rivers

Designated-Best-Use	Class of water	Criteria
Drinking water source without conventional treatment but after disinfection	A	Total Coliforms Organism MPN/100ml shall be 50 or less pH between 6.5 and 8.5 Dissolved Oxygen 6mg/l or more Biochemical Oxygen Demand 5 days 20C 2mg/l or less
Outdoor bathing (Organised)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4mg/l or more Biochemical Oxygen Demand 5 days 20C 3mg/l or less
Propagation of Wildlife and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4mg/l or more Free Ammonia (as N) 1.2 mg/l or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25C micromhos/cm Max.2250 Sodium absorption Ratio Max. 26 Boron Max. 2mg/l
	Below-E	Not Meeting A, B, C, D & E Criteria

In addition, as it is suggested in the Feasibility Report, the treated effluents will be discharged into Fatehwadi Canal, these shall meet General Discharge Standards for Irrigation, as per E(P) Rules 1986. CPCB has issued Guidelines for use of Treated Effluents for Irrigation, 2019 which suggests undertaking required studies on the suitability of treated water for irrigation, stakeholder perception studies, etc.

2.3 The World Bank ESF and Environmental and Social Standards (ESS)

- ESS-1 Assessment and Management of Environmental and Social Risks and Impacts
- ESS-2 Labour and Working Conditions
- ESS-3 Resource Efficiency and Pollution Prevention and Management
- ESS-4 Community Health and Safety
- ESS-5 Land Acquisition, Restrictions on Land Use and Involuntary Resettlement
- ESS-6 Biodiversity Conservation
- ESS-7 Indigenous Peoples
- ESS-8 Cultural Heritage
- ESS-9 Financial Intermediaries
- ESS-10 Stakeholder Engagement and Information Disclosure

Annexure III discusses the relevance of the described ESS to the project

World Bank Group General ESHS Guidelines, April 2007, and Industry-specific Guidelines (for Water, Sanitation, and other Good International Industry Practices will be applicable for this project. The General ESHS Guidelines contain information on cross-cutting environmental, health, and safety issues potentially applicable to all industry sectors. It has requirements for environmental and social health and safety issues during construction and operation. All applicable guidelines on COVID 19 also will be followed.

2.3.1 G-ACRP ESMF

Considering the National/ State Regulations and requirements and WB ESF requirements, AMC has prepared an ESMF to guide screening, scoping, identification of risk/ impacts and their assessment, and preparation of mitigation measures, monitoring plan, institutional mechanism, and budget for managing the risks and impacts associated with all subprojects under G-ACRP. The ESMF is disclosed and is available at: https://ahmedabadcity.gov.in/portal/web?requestType=ApplicationRH&actionVal=viewAttachment&queryType=Select&screenId=2900003&AttachmentFileName=ESMF.pdf

2.3.1.1 Sub-project Screening and Categorisation

All subprojects are subjected to a two-stage screening exercise, Stage 1: using the exclusion list, and Stage2: using the E&S screening checklist. The subproject sites are initially screened to determine if they are to be excluded from G-ACRP during Stage 1 screening.

Table 7: Activities Excluded from G-ACRP as per ESMF

Sl No:	*Non-permissible Activities*
1	Sub-projects in sites/ locations which should be excluded as per prevailing Rules/ Laws on Natural Habitats and Forests or Archeologically Protected Monuments (National, State, Local): (i) any construction in demarcated Forest areas or protected natural areas or their buffers, (ii) any subproject which would impact critical natural habitats, (iii) any subproject which shall be excluded as per AMASR Act, (iv) any subproject components or activities in the Historic Walled City of Ahmedabad – the UNESCO World Heritage Site
2	Sub-projects in sites/ locations which should be excluded as per applicable siting criteria prescribed by GPCB, Master Plan, Excluded Disaster Zones, or other applicable criteria set out by National, State, Local Body
3	Subprojects involving (i) Activities that impact the safety of Dams/Barrages, (ii) purchase, storage, and use of Banned Pesticides/ Insecticides/ chemicals, Asbestos
4	Sub Projects displacing more than 200 tribal households or 100 Primitive Tribal households

Since the above exclusions do not apply to the proposed subproject, Stage 2 screening was undertaken by the E&S specialists of the PIU using a combination of the literature review, stakeholder consultations, and the site reconnaissance survey.

The key steps involved in the process are briefly outlined below.

Step 1: (a) Review available project details, location map, and regulatory aspects, (b) conduct reconnaissance site visits for ground-truthing and screening

Step 2: Screen for the presence of any environmentally sensitive areas, project components of high risk, and probable benefits. Study of detailed topographic maps of the project sites with details of ecologically sensitive areas, culturally sensitive areas, archeologically sensitive areas, habitat areas, Reserve Forest, Wildlife Sanctuary, settlements, public amenities/ facilities, etc. to undertake screening exercises.

Step 3: Revisit the screening checklist and ascertain the outcomes of the screening checklist after collection of baseline data, monitoring, surveys, and consultation

Step 4: Determine the project category based on screening and E&S instruments to be prepared

As per indicative categorization of subprojects in ESMF, upgradation of existing STP may be a Moderate Risk subproject, however, this categorization is indicative, also depending on other ESS risks and sensitivities identified through the screening.

The proposed subproject is Rehabilitation of existing STP, which involves changing the Treatment process, without augmenting the capacity. As per the Feasibility Report prepared, rehabilitation activities will take place in the existing STP site. Activities involve Installation of New Transformer, replacing filter press, new construction of SBR units, new internal pipelines, sludge pipeline, etc.

Based on the proposed activities (Rehabilitation of existing Vasna 240 MLD STP, Minor repairs to the civil structures & pipes at TSPS, approach road, outfall strengthening, green house model solar drying facility for sludge and solar roof top) and as the activities will be confined to the existing STP site and footprint, existing access road RoW, this subproject is categorized as **Moderate Risk**. ESMF also presents the E&S due diligence procedures to be followed for each type of risk categorization (***Table 8***).

Table 8: Phase wise Procedures for Moderate Risk category of Projects

Sub-Project Phase	**Procedures**	**Responsibility**
	Moderate Risk Projects	
Sub-project Identification/ Pre-Feasibility	IESE of the sub-project (Using Exclusion Criteria & Screening Format (filled format in ***Annexure 1***)) Risk Categorisation	PIU
	Consultations with key stakeholders (as per SEP)	PIU
	Preparation of ToR for ESIA to be prepared along with DPR	Prepared by PIU, reviewed, and cleared by the WB
Feasibility Study/ Design	Conduct IEE/ESA or E&S Audit (in case of the existing facility) and prepare ESMP also using ECOPs by Feasibility/ Design Consultant. Update ESMP based on a design by DBOT Consultant	PIU, Consultants
	Public consultations (as per SEP)	PIU, independent consultant
	Use ECOPs or Biodiversity Management Framework/ Cultural Heritage Management Framework if applicable; to prepare ESMP	PIU, independent consultant
Detailed Design & Tendering	Ensure Mitigation measures (from ESMP) included in Design	PIU – PIU technical specialist to send documents to E&S Specialists to ensure required procedures are met, before finalizing the designs
	Ensure ESMP, Monitoring Plan, and LMP aspects are included in Bidding Documents	PIU - PIU procurement specialist to send pre-& post review documents to E&S Specialists to ensure required procedures are met, before initiating the bidding process
Construction Works	Implement and monitor ESMP	PIU
	Update IEE (and ESMP) as required	PIU, Contractor/ Consultant

During Construction Works	ESMP & ESHS Audit by external consultants (Annual Audit) Construction Supervision & OHS/ Safety Audit by CSQAC (Continuous)	PIU, External Auditors
Just before Closure/ Work exit – Post Construction	ESMP Audit (self-audit by PIU)	PIU, Consultant, Contractor

As per the ESMF, since this is a moderate risk sub-project, it is important to prepare ESIA at the Feasibility stage before the subproject is bid out on DBOT format. This report presents the ESIA for the subproject at the feasibility stage and will be updated based on the detailed design after the design is prepared by the DBOT contractor. This ESMP and its requirements will be made part of procurement documents, which contractor has to follow during design, construction and operation & maintenance stages. As the detailed designs will be prepared only during design sage, by the DBOT contractor; the ESIA, ESMP will be updated (or freshly prepared in case of much deviation from the proposal in Feasibility Report) and additional mitigation measures for construction, O&M stages will be derived from this updated /new C-ESIA.

This report presents the ESIA for the subproject at the feasibility stage, and will be updated based on the detailed design, after the design is prepared by the DBOT contractor.

CHAPTER 3. ENVIRONMENTAL AND SOCIAL BASELINE

3.1 Methodology for Environmental Baseline Data Collection

3.1.1 Area of Influence

The subproject deals with rehabilitation of existing 240 MLD STP at Vasna, and it is expected that key risks and impacts will be on OHS and waste management during construction and operation phases, which are largely manageable and reversible by adoption the best practices and vigilance. The subproject aims at adopting the Best Available/ stringent standards for discharge of treated sewage, and hence overall the impacts will be beneficial in the entire region.

The term 'area of influence' is understood as "such area where significant environmental and social impacts caused by project performance are evident on physical, biotic and socioeconomic components, in each component of such environment". In this case, all works will be confined within the existing STP site; and treated sewage discharge will be the only aspect that might impact beyond the project site: (i) discharge of treated sewage and bypasses will occur through Sabarmati and Fatehwadi Canal, and hence villages downstream till Vautha (where tidal influence and joining of Vatrak River happens) in case of Sabarmati, and villages in the command area of Fatehwadi Irrigation Project are taken as the larger region of influence for impacts from the perspective of water quality and availability; (ii) air and odor impacts are expected to occur near STP, and hence an impact area of 5km around the site is considered as the area of influence also considering impacts due to nearby Gyaspur Metro Station, which is a major influential land use in this case. Noise impacts also are expected to be confined to the site, as it is located between two other STPs, and has a larger noise-generating activity (metro depot) next door.

Accordingly, a Monitoring Plan for environmental and social parameters was prepared and agreed with the Client to finalize the parameters, number of samples required for the sub-project, and sampling locations best suited for sampling.

The environmental and social audits were conducted for the STP in August 2021, consultant's team visited the STP sites, for a physical audit of the STP and had interaction with the third party STP, O&M personnel, and collected the available data on treatment units and STP water quality monitoring, Primary monitoring of environmental parameters like Air, Water, Noise, Soil & Biodiversity were conducted in the post-monsoon season. For assessing socio-economic impacts, transect walks and consultations were conducted. Secondary data and wards maps were collected to understand the population and demographic details of the ward in which the STP is located. Information, data on issues and concerns due to the STP functioning, Sabarmati River, Fatehwadi Canal, impact on downstream users and farmers issues was also collected.

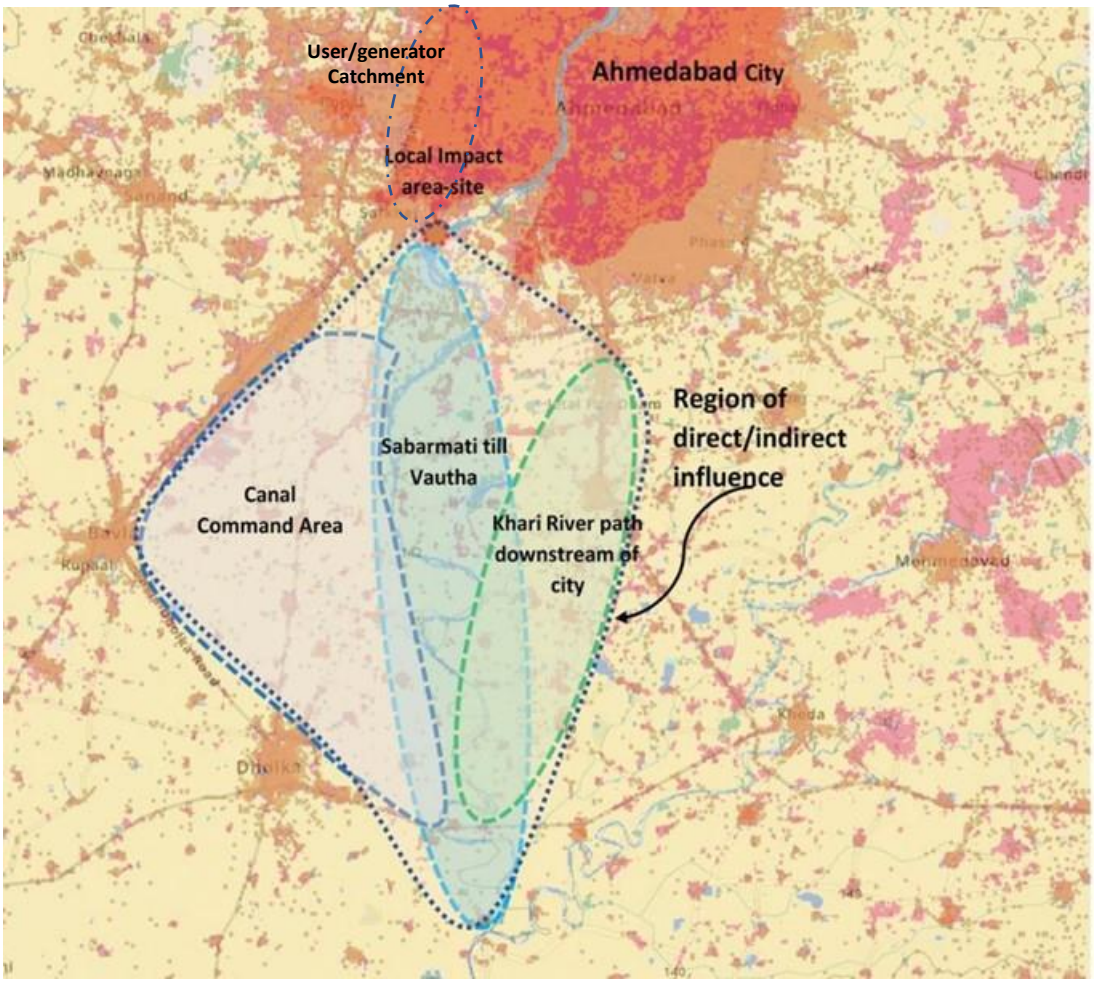


Figure 3: Region of direct & indirect influence

The sampling methodology and procedure for undertaking environmental baseline monitoring is as follows:

3.1.2 Ambient Air Quality Monitoring[8]

The ambient concentrations of PM10, PM2.5, SO2, NOx, CO, and HC in the ambient air were monitored for the area of influence, and baseline data was generated. Analysis of the baseline data was carried out and based on the interpretation mitigation measures are provided.

3.1.3 Noise Levels

Ambient noise levels near habitations were monitored for the period at various locations from the area of influence. Sensitive environmental receptors i.e., hospitals, schools, public open spaces were identified for noise monitoring. Monitoring was carried out for 24 hours to understand the noise levels throughout the day and night as per CPCB guidelines.

3.1.4 Water and Wastewater Quality Monitoring

To identify the critical aspects linked to the water pollution, baseline monitoring for water quality was conducted upstream and downstream of the river taking discharge location as a reference point. Also, the audit was conducted for STP which included monitoring the characteristics of the sewage. Methods prescribed in "Standard Methods for Examination of Water and Wastewater" prepared and published jointly by the American Public Health

[8] 2003_CPCB_Guidelines_for_Air_Monitoring.pdf (indiaairquality.info)

Association (APHA), American Water Works Association (AWWA), and Water Pollution Control Federation (WPCF).

3.1.5 Monitoring of Groundwater

The groundwater samples (Nos. 06) were collected from locations upstream and downstream and analyzed for understanding the baseline of groundwater characteristics.

3.1.6 Land Environment

Soil samples were collected from the riverbank upstream and downstream to understand the Physical, Chemical, and Biological soil characteristics and sludge contamination.

3.1.7 Sludge

Sludge samples were collected from the STP site as well as from the river bottom upstream and downstream to understand the Physical, Chemical, and Biological characteristics and sludge contamination.

3.1.8 Biological Environment

Ecologically important and sensitive locations were identified and surveyed for biodiversity. Total 17 locations were surveyed in and around the project area. Modified line Transect method was used for data collection of flora and fauna. For flora, three quadrats of dimension 10m X 10m each were laid along the line, of the length of a kilometre. In each quadrat trees, shrubs and herbs were counted. A line transect method was used for fauna with a line dimension of 100m Avifauna, mammals, Butterflies, and herpetofauna were counted. Data was recorded digitally on the tabs. GPS coordinates of each transect were recorded to prepare the maps. In places where laying line transacts was not possible, an inventory of flora and fauna was prepared. Data was compiled and analysed to obtain the frequency, density, and richness of the flora and fauna. All the observations related to ecology were noted down. Interviews of locals were conducted for information regarding the past and present status of land use, resource utilization, and status of fauna/flora, wildlife.

3.1.9 Socio-Economic Environment

Secondary data such as the Census 2011, the socio-economic profile of the district, district profile, data available on the AMC website related to city, population, city profile, and services provided by AMC was collated. Data was also collected from the Health Officer of AMC, crime statistics for the city, and other data required for the project, etc Transect walks and consultations were conducted to understand the critical issues related to the project. Socially sensitive stakeholders i.e., squatter settlement, STP staff, Contractors of AMC, officials of AMC from the concerned department, etc. were consulted during the social impact assessment. Since the upgradation is within the existing premises, no involuntary resettlement impacts are envisaged.

3.1.10 Data Analysis

The monitored data is collated, analysed, and compared with the baseline levels as established in the EIA study and the regulatory standards specified by different Government agencies. The standards against which the different environment components are compared are as per the following ***Table 9***.

Table 9: Applicable Standards for Various Environmental Parameters

Sl. No.	Aspects	Applicable Standards
1	Ambient Air Quality	National Ambient Air Quality standards, CPCB
2	Noise Quality	Ambient Air Quality Standards with With respect to Noise, CPCB
3	Surface water Quality	IS:2296: Class 'C' Water, CPCB

Sl. No.	Aspects	Applicable Standards
4	Ground water Quality	IS: 10500 Standards, BIS
5	Soil Quality	IS 1498 standards BIS
6	Sludge Quality	Schedule II of Hazardous Waste Management & Handling Rules 2016, Use as a fertilizer & manure as per CPHEEO Manual on Sewerage and Sewage Treatment System, 2013
7	Treated Sewage Water Quality	NGT Standards – Order dated Date of hearing: 30.04.2019 – Discharge into surface water NGT Standards – Order dated Date of hearing: 30.04.2019 – Discharge on land IS 3307(1974)- Discharge for agricultural use

3.2 Project Location

The STP is located at Vasna in an area of around 35 acres in **Ward No 52 Sarkhej, Ahmedabad city of Gujarat**, in between Vasna 35 MLD and Vasna 126 MLD STPs of AMC. The location map of the STP is presented in ***Figure 4*** below.

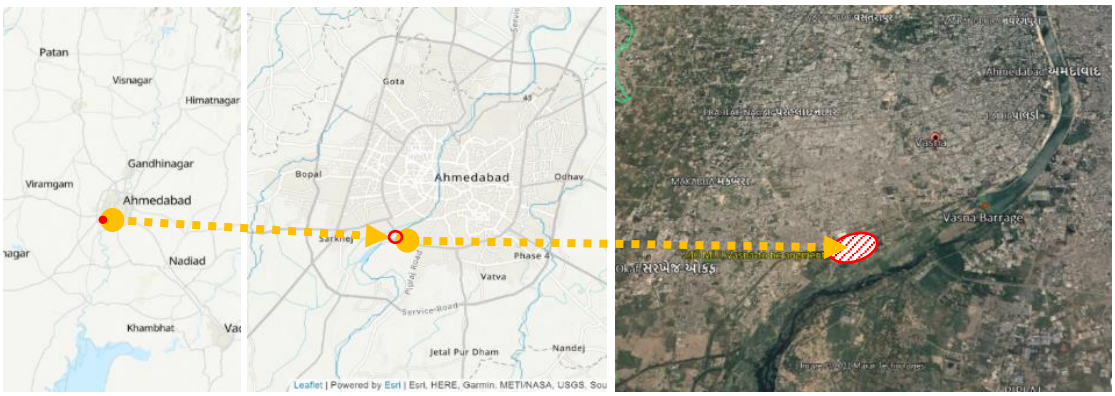


Figure 4: Subproject Location

Neighboring Landuses of the existing Vasna 240 MLD STP are presented in ***Table 10***, while ***Figure 5*** presents the site layout.

Table 10: Neighboring Land uses of Vasna 240 MLD STP

Directions	Particulars
North	Canal, road, sewage pumping station, and GMRC Gyaspur metro train depot
East	AMC 35 MLD STP Vasna, Ahmedabad West
South	Sabarmati River
West	126 MLD AMC STP

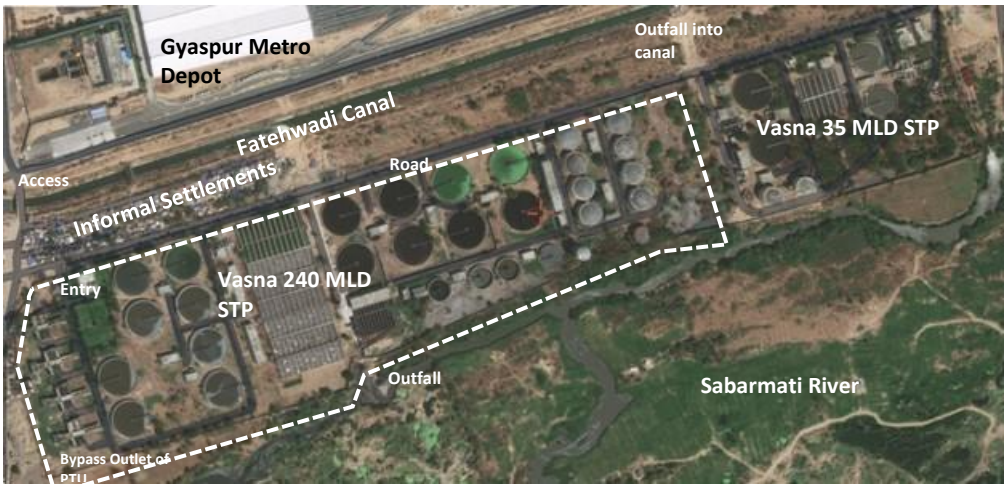


Figure 5: Site Layout and Neighboring Land use

As mentioned in ***Table 10*** above, to the north of the existing 240 MLD STP the features include access road to STPs, Fatehwadi canal road parallel to project boundary, Canal (within 5 to 15 meters). On the opposite side of the Fatehwadi canal road, there is Gyaspur metro depot and Vasna 48 MLD STP. Vasna 35 MLD STP is located within 100 meters to the east of Vasna 240 MLS STP, while Sabarmati River is located to the south within 20 meters from the boundary and Vasna 126 MLD STP is located to the west (100 m from the boundary).

3.3 Environmental Audit of the existing STP

The Vasna 240 MLD STP based on Activated Sludge Process (ASP) has Main Distribution Chamber, Inlet Chamber, Primary Treatment Units, Primary Clarifiers, Aeration Tanks, Air Blower for Aeration, Chlorine Contact Tanks, Primary Sludge Handling Units, Secondary Clarifiers, Sludge Thickeners, Sludge Recirculation Pump, Excess Sludge Pump, Digested Sludge Pump, Sludge Mixing Pump, Belt Wash Feed Pumps, Sludge Digesters, Gas Holder. The ASP treatment scheme uses a fine bubble diffused aeration system to provide the required oxygen and to keep the aerated contents in a completely mixed state.

The raw sewage is received in a common distribution chamber from a nearby pumping station, 2000 mm diameter by deep gravity and to provide uniform distribution of raw sewage to the inlet chambers of each 60 MLD. For each 60 MLD stream initially the sewage is subjected to pre-treatment which includes removal of floating material through screen and grits with the help of grit removal mechanism. Each outlet chamber of the main distribution chamber is provided with isolation gates and an adjustable weir plate for the uniform distribution of raw sewage to each 60 MLD stream. Distribution pipe carrying raw sewage to inlet chamber to each 60 MLD module has been provided with necessary appurtenances as required. It should be possible to distribute the flow uniformly to each of the four modules or lesser modules as required. Raw sewage through pipeline is received at the distribution chamber. The module has been provided in the receiving chamber which reduces the incoming velocity and gives quiescent condition to raw sewage before entry to Coarse Bar screen.

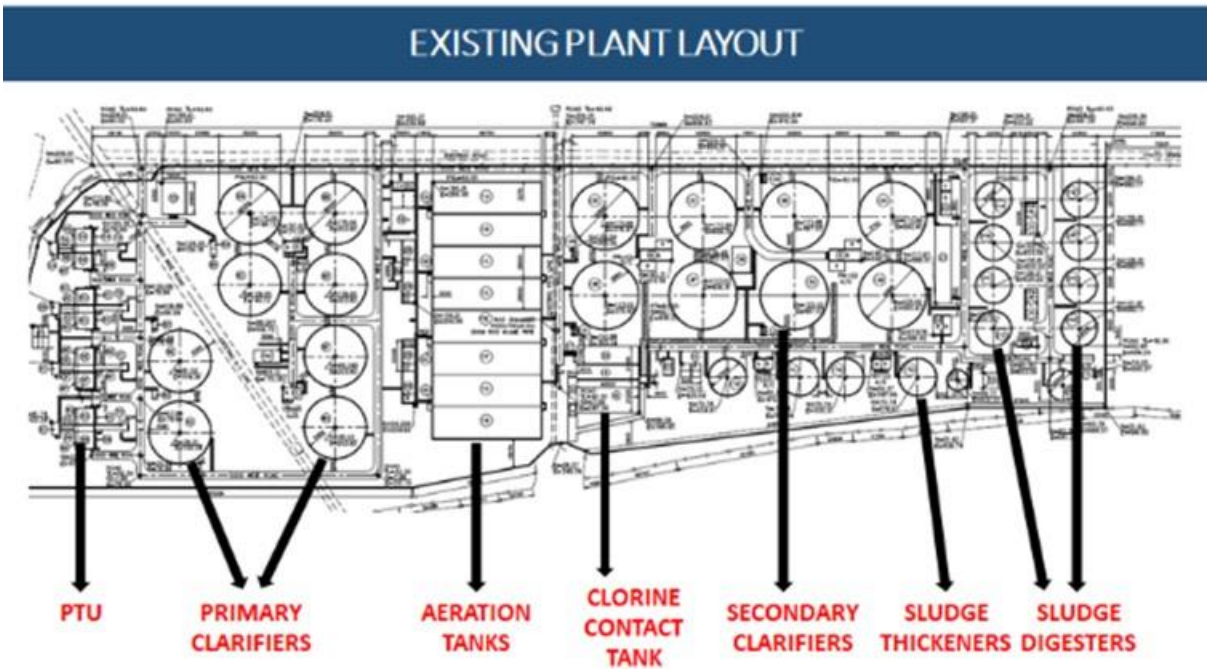


Figure 6: Existing STP Layout and Design Components

Source: AMC. 2019. Upgradation of 240 MLD STP Located at Vasna, Ahmedabad with Biological Nutrients Removal (BNR). Prepared by CC Patel and Associates.

AMC has constructed a new sewage pumping station and sewage treatment plant at Vasna for the recently merged areas in the western zones of AMC. There are 68 Sewage Pumping Stations of which 10 are Terminal Sewage Pumping Stations pumping sewage to STPs in Ahmedabad. There are 52 SPS in Eastern Area and 16 are in the Western area.

Pumping Stations for the Southwest Zone are Vasna Sewage Terminal Pumping Station (285 MLD), AUDA Terminal Pumping station, Vasna I.U.D.P. DR. Pumping Station, and the Main Sewage Pumping Station.

The technology adopted is Activated Sludge Process (ASP) with sludge digestor and Gas generation facility. Daily sewage inlet quantity was around 220 MLD. The 240 MLD flow is equally distributed in 4 streams having a capacity of 60 MLD each. At present, O&M is done by M/s. Toshiba Water Solutions Private Ltd.

Since the STP is almost 10 years old, many units and equipment of the STP are not functioning as per the design or dysfunction due to wear and tear. Following are some of the observations of the STP of the Environmental Audit conducted by the consultants in August 2021.

- Main Rising main (through which raw sewage is entering the plant) of 2 m diameter is corroded.
- There is a total of 8 drum screens and 8 manual coarse screens. Out of 8 drum screens, 2 are in maintenance and not working at the time of visit.
- Railings are corroded and require painting.
- There is a total of 8 grit chambers, 2 each for a stream.
- Rake classifiers in grit chamber, 4 are in working condition and 4 are defunct.
- The shaft of all rake classifiers is corroded.
- All 8 grit mechanism systems require overhauling.
- Deflectors not working in grit chambers at the time of visit.
- Parshall flume flows indicator not working.
- Poor treatment of sewage leading to an influx of polluted water in the river

- Communities residing downstream are affected due to polluted water

The detailed observations along with the photographs of the STP and units are given in the Audit report and the same is annexed with this report.

A detailed Audit of the existing facility is presented in Annexure VII.

3.4 Environmental & Social Baseline

3.4.1 Physiography and Climate

- **Topography**

The whole Ahmedabad city area is monotonously flat except few undulating topography owing to the presence of stabilized dunal land forms. The land surface elevation is from 40 m to 60 m AMSL with a master slope towards the southern direction. The average elevation of the city is about 48m AMSL. Isolated high grounds, with elevations more than 60m AMSL, are observed on both sides of river Sabarmati.

The major water body within Ahmedabad city is the Sabarmati River. The oldest irrigation scheme i.e., Kharicut Canal Scheme passes through the eastern part of Ahmedabad city which also serves as one of the Storm water carriers for the city during monsoon. There are many lakes within the AMC boundary namely, Kankaria, Chandola, Vastrapur, etc. which are recharged from the storm water. The slight slope from both east and west towards the south of the city and to the Sabarmati River makes Vasna and Pirana at the south at the river edge, the best suited to receive the sewage for centralized treatment. Hence, Vasa was the preferred location for the first placement of STPs on the west side of the city, while those in the east were located at Pirana.

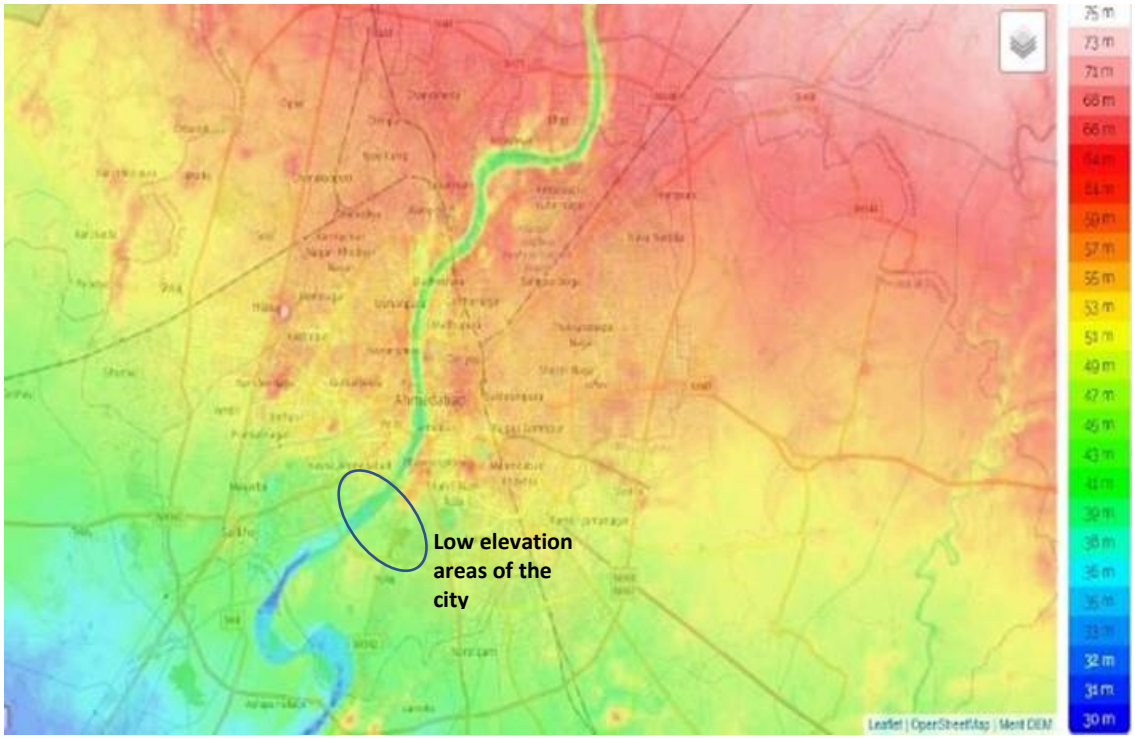


Figure 7: Topography of Ahmedabad [9]

[9] https://en-in.topographic-map.com/

Figure 8: Site Elevation

The above image shows that the highest elevation of the Vasna 240 MLD site is 44.15 m. while the lowest is around 42 m, almost at par with the HFL at Vasna barrage, which is 41.77 m [10]. This indicates the need for measures to protect the infrastructure from possible flooding during peak monsoon flows and the need to prepare a disaster management plan for the facility once the design and operational details are finalized.

Figure 9: Cross Section of Vasna 240 MLD site and the river

- **Climate**

Ahmedabad city is hot & dry in summer and humid in other seasons. As per the Indian Meteorological Department, summer days are very hot with a mean maximum temperature

[10] *http://iwai.nic.in/sites/default/files/1814791015NW-87%20Sabarmati%20Final%20FSR.pdf*

of 48°C in the hottest month (May 2016) while nights are pleasant with a mean minimum temperature of 27°C. The mean maximum and minimum temperatures in the coldest month (January) of winter are 28.1°C and 12.4°C respectively. The average annual maximum temperature is 34.4°C and the average annual minimum temperature is 21.0°C. Ever recorded maximum temperature was 47.8°C on 19th May 2016[11] and the ever-recorded minimum temperature was 2.2°C on 06th February 1920. Dust storm occurs occasionally in summer and the early part of the southwest monsoon season. Fog occurs occasionally during the winter season.

The city has faced a major heat wave in 2010 which caused many casualties. A Heat Action Plan (HAP) has been prepared by AMC and the key pillars of this action plan are as follows,

- Building public awareness and community outreach
- Initiating an early warning system and inter-agency coordination
- Capacity-building among health care professionals
- Reducing heat exposure and promoting adaptive measures such as Ahmedabad Cool Roofs Program.

The HAP provides a clear demarcation of responsibilities of various departments and agencies during heatwave days. It also includes activities and protocols to be followed for different heat alert levels. This is also important in STP operations, considering the impacts of rising temperature on digestion and dissolved oxygen.

The average annual rainfall of the area is 782 mm, although there is a considerable variation from year to year. It occurs generally from June to September through the average annual rainy days are 34. Rainfall during the southwest monsoon season is about 95% of annual rainfall. Thunderstorm from April to October is sometimes accompanied by Squall. Ever recorded the heaviest rainfall in 24 hours is 41.5 cm on 27th July 1927. The ***Table 11*** below presents the rainfall statistics for Ahmedabad district for the four monsoon months of the southwest monsoon season of the year 2018 and annual rainfall data arrived at based on the daily rainfall data from 1989 to 2018 (29 years).

Table 11: Rainfall Statistics for Ahmedabad District[12]

Period (2018)	Mean Rainfall (mm)	Coefficient of Variation (CV)
June	94.7	120.2
July	278.5	46.6
August	208.6	68.4
September	110.1	87.3
Monsoon	691.8	35.0
Annual	710.1	34.8

3.4.2 Hydrology, Hydrogeology, and Soil

- **Hydrology**

The River Sabarmati is one of the major west-flowing rivers of India and Ahmedabad and Gandhinagar are the major cities that are located on its banks. Sabarmati basin extends over the states of Rajasthan and Gujarat having an area of 21,674 Sq. km with a maximum length and width of 300 km and 150 km respectively. While 48 km of the river length is in Rajasthan, 323 km is in Gujarat. The Sabarmati basin extends over parts of Udaipur, Sirohi, Pali, and

[11] *NRDC: Ahmedabad Heat Action Plan 2017 (PDF) (niua.org)*
[12] *Observed Rainfall Variability and Changes Over Gujarat State, India Meteorological Department*

Dungarpur districts of Rajasthan, Sabarkantha, Kheda, Ahmadabad, Mahesana, Gandhinagar, and Banaskantha districts of Gujarat. The terrain of the Sabarmati basin is hilly in the early reaches up to Dharoi dam after which the river flows mostly in alluvial plains with a gentle slope. There are a total of 50 dams in the Sabarmati basin among which 17 dams fall in the Sabarmati lower sub-basin and 33 dams,10 weirs, 2 barrages fall in the Sabarmati upper sub-basin. At Ahmedabad city of upper Sabarmati basin, the river encompasses a total catchment area of 10,370sq.km., out of the total basin area of 27,820sq.km. Sabarmati enters Ahmedabad city near Karai village and exits the city near Gyaspur after passing through Ahmedabad city. A barrage has been constructed in 1976,5km downstream of Nehru Bridge Ahmedabad (at Vasna) for irrigation purposes, and water is supplied to the barrage through the Narmada canal since 2002. The length of the barrage and anicut is 610.67m. After the construction of the Sardar Sarovar Project, the water quantity in Sabarmati has reduced. Though the river is perennial, it gets dried up in the summer, leaving only a small stream of water flowing. The Narmada Canal, which crosses Sabarmati a few kilometres upstream from the city, is part of a larger canal network of Sardar Sarovar Dam. The canal feeds/siphons water to the Sabarmati River in the city area and maintains the level of water, required by the Sabarmati Riverfront Project with the help of the Vasna barrage. Effluents are released by the industries which is a source of pollution. Details of the Vasna barrage are presented in section 3.7.

Another river passing beyond the east and south boundaries of the city is River Khari. The Khari River originates near village Kesharpura of Himatnagar taluka of Sabarkantha district. In the Ahmedabad district, it enters Dahegam taluka and flows near the villages of Chekhala, Babra, Halisa, Vadvasa, and Nandol. Thereafter it enters the Dascroi taluka and passes by Pardhol, Vahelal, Huka, Navrangpura villages. The total length of this river is 160 km, of which 53 km is through the Ahmedabad district. The Khari River runs almost parallel to the Sabarmati towards the east, beyond the city limits. It joins Vehari near Kheda, downstream of the city.

The water table near the river is high, as in the case of the present site, which needs to be considered while planning STP tanks and other infrastructure and flood effects will be pronounced, as the site is along the edge of the river. The river is practically dry during most of the year (for 9 months) as it holds water received from Narmada Canal at the riverfront.

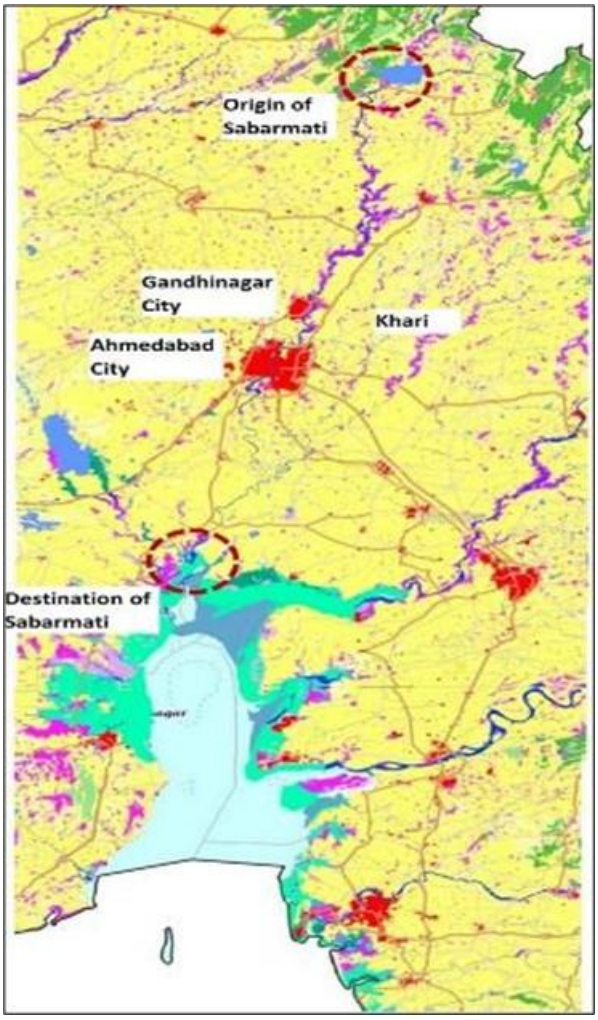


Figure 10: Hydrological Features

Water Impounding Structures: Vasna Barrage

There are many barrages on Sabarmati upstream of Ahmedabad and Vasna Barrage is at the south of the city, constructed to divert the water from Sabarmati to the Fatehwadi canal. It

holds water from Vasna Barrage (Ch 135.7 km) to Sardar Patel Ring Road Bridge (Ch 156 km). Depths of 0.5 – 1.0 m (above C.D.) are available for all round the year-360 days. Depths of 1.0 – 1.5 m are available for around 75-90 days during monsoon (75 days)

The C.D. at Subhash Bridge is nearly 2.5 m above Riverbed level at the Subhash Bridge gauging site. A part of this stretch near Sadar bazaar up to Wasna Barrage had already developed as Sabarmati waterfront by Govt of Gujarat. At upstream of Indira Bridge, released water from Narmada canal ensures all-round the year availability of water in this stretch and downstream. This stretch is feasible for navigation class II waterway.

Afterward, depths of about 5 m are available for 10 km upstream of Vasna barrage near the Sabarmati waterfront developed by Govt of Gujarat.

In the case of dams, weirs, and barrages, the maximum observed water level of the last twenty years or Maximum Water level as mentioned in CWC data has been adopted as (Highest Flood Level) H.F.L.

Chainage	Structure	H.F.L (m)
135.7 km	Vasna Barrage	41.770

Water availability

The gauge station is at Subhash Bridge is located 135.7 km upstream of the river mouth. Daily gauge- data for the period 1979 to 2010 were collected from WRIS and analysed. Only water level gauge data for the period June to October is available. The Ahmadabad city experienced a heavy flood in August 2006 when a high flood level of 47.45 m MSL was reported at this gauge for the highest observed flood discharge.

In the Monsoon period depths in the range of 0.5 m to 2m above CD will be available for periods as below.

0.50 m to 1 m and above: 114 days

1.0 m to 1.5 m and above: 75 days

1.5 m to 2.0 m and above: 36 days

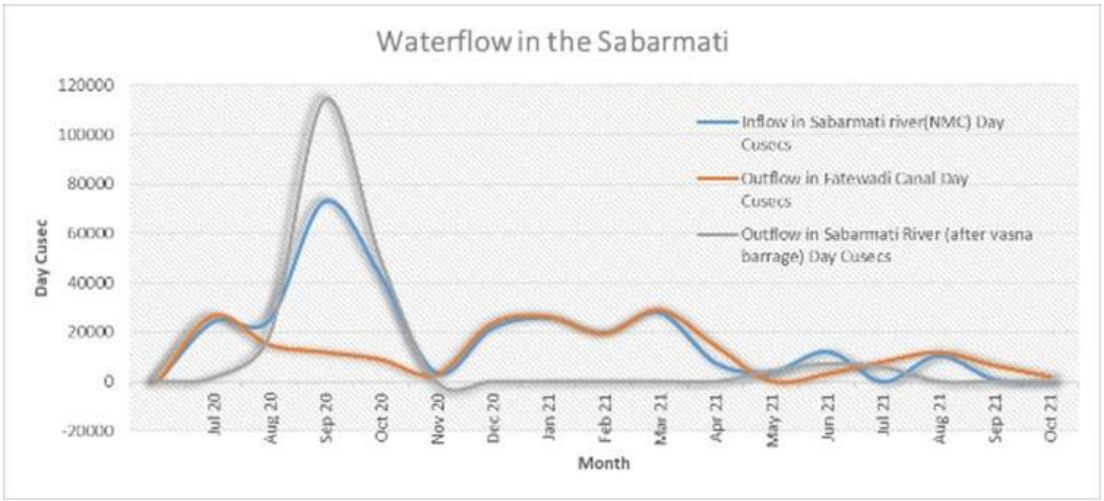


Figure 11: Water levels at Vasna Barrage

The Vasna barrage is connected to other dams and canal networks for water release during the monsoon. The release from Dharoi and Vasna is decided based on the flood conditions at each location and responsibility is designated in various documents including Irrigation Dept, various central and state depts concerned with the Irrigation department, Canal Command

and CWC. DSO, GERI has conducted studies related to dam safety of projects in Gujarat and made critical observations and recommendations for the same which are mentioned in the report. Water releases have also been addressed for dams/barrages etc by the Government of Gujarat in its Disaster Management Plan 2021: Flood Warning Arrangements (available in the public domain).

3.4.3 Land Use & Land Cover

Land use patterns under the AMC area from 1976 to 2017, indicates that the built-up area has increased by 156.93 km^2 whereas, agricultural land, open spaces, urban vegetation, and water bodies have decreased during the last 4-decades from 1976 to 2017.

The city is currently being developed as a smart city under 'Government of India's flagship Smart Cities Mission' Development of industries and industrial estates have led to the growth of residential areas around the industrial units in Ahmedabad. Its industrial history dates back to two decades of textile, chemical industries; and at present many well-established business groups like Adani Group, Reliance Industries, Arvind Mills, Bosch Rexroth (Germany) have operations in Ahmedabad city and its nearby areas. High-density residential and mixed-use developments have taken place in the Vasna area, due to the sprawl and growth of this very important city. The neighbourhood also has a very important transport infrastructure – the Gyaspur Metro depot, the terminal point, and the depot for Ahmedabad metro.

The Vasna 240 MLD STP is located on the western side of the Sabarmati River. As per the Revised Development Plan 2021 prepared by AUDA, the project area is demarcated for Sewage Treatment Plant. This area is in a low-lying part of the city earlier allotted for sewage farm. So as per Master Plan for the city, the proposed works will be in the existing STP, situated in the area allotted for sewage treatment.

Figure 12: Landuse demarcation of Vasna Area in Development Plan 2021 for Ahmedabad

3.4.4 Cultural Heritage

The walled city of Ahmadabad, founded by Sultan Ahmad Shah in the 15th century, on the eastern bank of the Sabarmati River, presents a rich architectural heritage from the sultanate period, notably the Bhadra citadel, the walls and gates of the Fort city, and numerous mosques and tombs as well as important Hindu and Jain temples of later periods. The urban fabric is made up of densely packed traditional houses (pols) in gated traditional streets (puras) with

characteristic features such as bird feeders, public wells, and religious institutions. The city continued to flourish as the capital of the State of Gujarat for six centuries, up to the present. [13] The historic walled city of Ahmedabad has it all to be the first city in India to be inscribed in UNESCO's World Heritage City list of 2017. However, the Vasna 240 MLD STP is to the west of Ahmedabad, outside the walled city. Baseline reconnaissance and monitoring established that there are no cultural heritage areas within the 500 m buffer area of this STP. The nearest notified monument is the Fateh Baug Fort at a distance of 1.5 km from the site. The subproject to rehabilitate existing STP within the demarcated project boundary, will not entail any construction and demolition outside its premises, except for road repairs and upgradation of the existing the access road of 150m from the culvert over Fatehwadi canal upto the entrance gate of the 240 MLD STP. FR mentions road construction on the current kuccha approach road to the STP. During road repairs and upgradation , it will be ensured that none of the Squatter units will be affected or dismantled. Road construction will be undertaken in manner to allow accessibility to the STP and river from the Fatehwadi canal road. To avoid access issues to river, 240 MLD STP and 126 MLD STP, trenchless method is proposed to be used laying of rising main to 126 MLD STP. Road construction will improve the general access and mobility issues on the kuccha access roads for the squatter settlement also. The image for the proposed access road repairs and upgradation is presented below in ***Figure 13***

Figure 13 Present Status of Approach Road for 240 MLD STP and proposed road Repairs and upgradation

There are some locally important religious/cultural areas like mosques (600 m) and cemeteries within the 500 m buffer area of the STP. Bag E Sukun Kabrastan (Shia Isthna Ashri Kabrastan – a cemetery of Muslim community) is located 350 m east of the STP boundary, beyond Vasna 35 STP and is accessible by Fatehwadi canal road and also through kuccha road connecting it to Highway 64 to is north.

[13] *https://whc.unesco.org/en/list/1551*

Marthoma Church Ahmedabad Cemetery is located 500 m away from the boundary and the gate, it is about 1.2 km. Impacts are not expected considering the nature of activities associated with the subproject, multiple accesses are available to the cemeteries which are different from that of STP. However, once the proposed design details are available during the implementation stage, it will be important to review the vibration impacts, work out the work schedule and pattern of movement of construction vehicles inform the communities on the work schedule, and coordinate during any emergencies.

Considering the proximity to the Heritage city, the chance finds procedure shall be framed and implemented for any such discovery for all excavation and construction activities.

Figure 14: Vasna 240 MLD STP and its 500m Buffer

3.4.5 Ecology and Biodiversity

Ecology and Biodiversity assessment was conducted during August 2021, for the 240 MLD Vasna STP and surrounding 10 km area as it is an urbanized environment. The most important natural feature here is the river Sabarmati, to which two outfalls are located – one for bypass near Primary Input Unit and the other outfall Chlorine Tank. Sabarmati is non-perennial - mostly monsoon-fed for a natural flow. However due to scanty rainfall, since 2002, this stretch from the North of the city is receiving inflow from Narmada Main Canal. However, water is held at Vasna barrage for retaining for the ambiance of the riverfront and water flow from the barrage to Fatehwadi Canal and the river is minimal. Thus, the river has become a modified habitat, also reeling under pollution from nearby industries, wastes, and other discharges, not just from the city but also from the region around. There is another bypass to Fatehwadi Canal, which serves agricultural areas downstream of the city, mostly after joining with other irrigation canal branches beyond the city limit.

The nearest key biodiversity area for this site is Thol Wildlife Sanctuary (man-made) in Mahesana district, which is around 20 km from the project site, with 10km of intervening urban high density mixed land use. As per the Notification of MoEF&CC published dated 09.02.2015, Central Government notifies Thol Wildlife Sanctuary in the State of Gujarat, as

Eco-sensitive Zone, up to 2.244 kilometres from the boundary of the Thol Wildlife Sanctuary[14]. The lake received water from rains and Narmada Canal, westward of the city. Hence this is not affected by outflows or air, noise, dust, or vibration during construction and operations,

Following are the survey locations considered for undertaking the Ecology & Biodiversity Assessment.

Table 12: Ecology and Biodiversity Survey Locations

Sl. No.	EB Site	Coordinates	Land use
1.	Thol WLS	23° 8'46.04"N 72°23'51.11"E	Wildlife Sanctuary
2.	EB STP	22°58'53.05"N 72°31'31.85"E	Project Site
3.	EB outfall	22°58'37.53"N 72°31'29.10"E	Existing project outfall in Sabarmati River. Riverbank
4.	EB Near STP	22°59'1.41"N 72°31'49.79"E	Between Fatehwadi canal & STP
5.	EB Agri	22°57'31.07"N 72°29'49.23"E	Agriculture on banks of Sabarmati (Downstream)
6.	EB 2	22°59'0.09"N 72°32'36.48"E	Sabarmati River Upstream
7.	EB River	22°59'23.14"N 72°33'4.30"E	Sabarmati River Upstream
8.	EB 3	22°57'9.21"N 72°30'57.91"E	Sabarmati River Down stream
9.	EB Downstream	22°57'6.77"N 72°30'42.88"E	Sabarmati River Downstream
10.	EB Canal	22°57'16.37"N 72°30'3.52"E	Fatehwadi Canal Downstream
11.	EB Agri	22°58'39.62"N 72°32'20.31"E	Agriculture near the outfall of STP
12.	EB Sarkhej	22°59'39.32"N 72°30'14.15"E	Sarkhej pond
13.	EB LJ	22°59'35.55"N 72°29'31.93"E	Educational institution
14.	EB lake	23° 0'24.50"N 72°32'22.01"E	Malav Lake
15.	EB Nehru Nagar	23° 1'20.50"N 72°32'31.66"E	Urban
16.	EB 1	22°58'20.05"N 72°32'58.42"E	Pirana STP
17.	EB 14 Downstream	22°55'58.90"N 72°32'14.05"E	Sabarmati River Downstream

[14] *http://environmentclearance.nic.in/writereaddata/Online/EDS/07_Dec_2016_143943053GC62JOF7MoMreply.pdf*

Figure 15: Sampling Locations for Ecology and Biodiversity

Figure 16: Location of Thol WLS with respect to Project Site

Figure 17: Location of Chandola Lake with respect to Project Site

The nearest nationally recognized wetland is Chandola Lake at 5-6 km radially from the site, across Sabarmati, on its eastern side (opposite side), also with intervening high density mixed land-use comprising other STPs to the east of Sabarmati.

It is a large lake in Ahmedabad city and has great potential to serve as a habitat for migratory birds, but the lake edges are encroached and recreational uses and settlements are developed which has polluted the lake. Lake shows the presence of invasive *Eucornia sp*. which indicates higher sewage inflow into the lake. Chandola Lake is not connected to the Sabarmati River but to the Kharicut canal, no direct discharge to any lake from STP is envisaged.

Figure 18: Location of Santej and Vasai Lake with respect to Project Site

The other two wetlands i.e., Santej talav (to the northwest) and Vasai talav (to the southeast) are outside the AMC boundary and 9.2 km and 14.5 km from the proposed project. Both the lakes are man-made, and not directly connected to Sabarmati. Santej is surrounded by residential areas and Vasai is surrounded by agricultural fields.

Flora

A floral enlistment of trees, shrubs & climbers, herbs, common crop plants in the area studied, with their scientific names, common names, and the family to which they belong are presented in ***Annexure III***. Neem and acacia trees are common in this area. In urban areas Copper pod and neem are dominant. Commonly cultivated crop plants in the study area include Wheat, Chillies, Sugarcane, Cotton, grass (Fodder) other food & non-food crops that are also grown at some places. No sightings of exotic or endangered flora have been observed in the site or its 500m buffer. No RET (Rare, Endangered & Threatened) as per IUCN Red list species are observed in the study area.

Fauna

Fauna was assessed for the study area. Having a river crossing the city Ahmedabad generally have a high number of aquatic birds which also include migratory species. Indian Peafowl and Monitor lizard are the Schedules I species as per WPA. The list of Fauna is attached as ***Annexure III***. No sightings of exotic or endangered flora have been observed in the site or its 500m buffer. . No RET species were recorded in the study area. The important bird areas (IBAs), bird migratory route through India were reviewed for the proposed project area, also considering the proposed solar grid-connected rooftop and drying facility. ***Figure 19*** depicts important bird areas and the migratory route through Asia and the migratory routes for migratory birds through India. The analysis of these routes to the proposed project site reflects this does not fall in any important bird area or the bird migratory route within a 50 Km radius of the project site. Nal Sarovar and Khijadia (in Jam Nagar) are important areas in the central Asian flyway but are away from the city. [15]

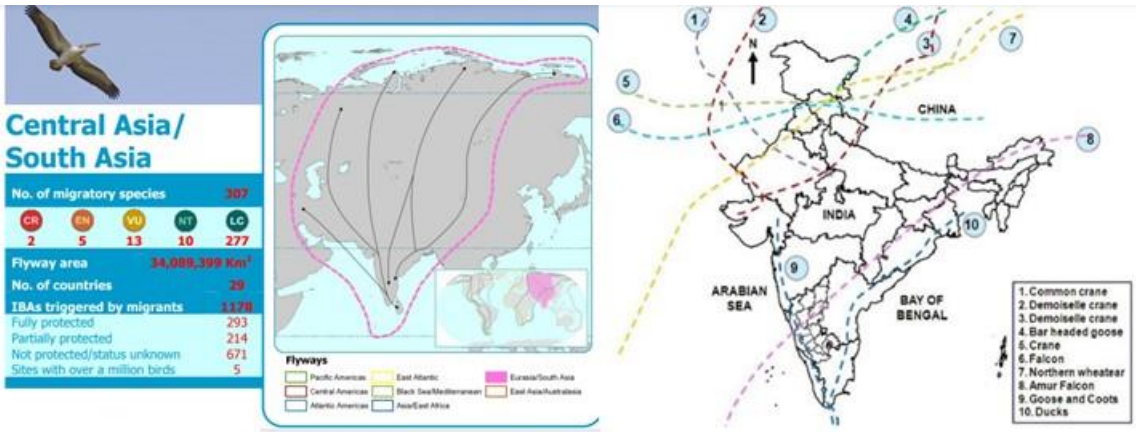


Figure 19: International Flyways and Bird Migratory Routes through India

Proposed augmentation will be implemented within the existing boundary of 240 MLD STP hence there will be no land clearing required which may harm existing flora and fauna. Activities of construction, operations, and maintenance will generate air pollutants, and noise is expected to cause temporary reversible impacts and risks on the fauna residing in the dense urban setting near the project.

As the project area is a degraded and modified habitat the impacts on flora and fauna will be very minimum. Activities like plantation and greenbelt development will enhance the

[15] *http://datazone.birdlife.org/userfiles/file/sowb/flyways/7_Central_Asia_Factsheet.pdf*

biodiversity of the area. Also, the aquatic biodiversity of Sabarmati will improve as the water quality of disposed water from STP is improved.

Aquatic Biodiversity

The aquatic biodiversity study was conducted in the Sabarmati River in the stretch of Valad village (upstream of Sabarmati River – beyond inlet from Narmada Canal) to Vanzar village (downstream after Vasna Barrage – Sabarmati River) of approximately 20Km. The stretch of the study area is given in ***Figure 20*** below.

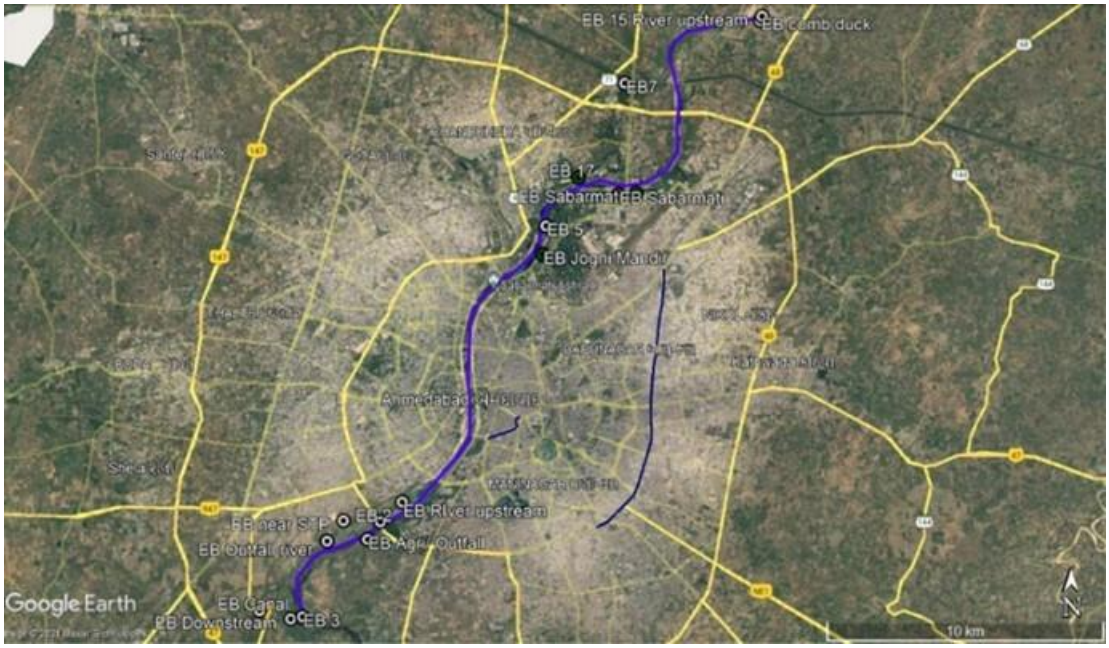


Figure 20: Study Region: Sabarmati River stretch

The biodiversity study was based on secondary data and field observations. Following are the findings of this study:

1) It was observed that the entire stretch of Sabarmati is infested with the *Pistia* sp. and Eichhornia crassipes Which has altered the natural habitat.
2) Sabarmati River stretch is a modified habitat as the water is being sourced from the Narmada canal and stored at the riverfront stretch using the shutters of the Vasna Barrage. The riparian zone of the Sabarmati is converted into the riverfront in Ahmedabad city.
3) Downstream of the river has a riparian zone with tree growth majorly Prosopis sp. The entire stretch including downstream of the river after Vasna Barrage has the presence of plants like *Pistia sp.,* Eichhornia crassipes (water hyacinth), *Ipomea sp., Typha sp., Wolffia sp.* (watermeal or duckweed), etc. These are clear bioindicators of water pollution or eutrophication. These varieties are also used effectively in phytoremediation, particularly for the rhizofiltration of effluents contaminated by heavy metals.
4) Pisces fauna of the river includes majorly *Tilapia sp., Gambusia sp., Clarius batrachus, Garra gotyala, Catla catla, Channa sp.,* etc. *Tilapia* is an invasive species that was found in the Sabarmati River, Vasna Barrage area, Fatehwadi canal, and downstream area of Sabarmati River. These are mainly contributed by Narmada Canal.
5) Aquatic birds including migratory birds were observed along the Sabarmati and Khari rivers in areas apart from the riverfront area due to no riparian zone.

6) Aquatic flora in the river and downstream provides habitat for aquatic birds like Purple moorhen, Bronze-winged jacana, white-breasted waterhen, Red Wattled lapwing egrets, herons, etc.

Pistia sp.

Euchornia crassipes

Pistia & Euchornia at Vasna Barrage

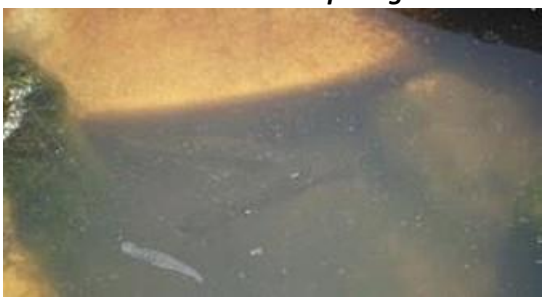
Purple Moorhen

Purple Heron

Intermediate Egret

Red Wattled Lapwing

Gambusia sp.



Tilapia sp.

Channa sp.

Figure 21: Flora and Fauna of the Project Site and its neighborhood

It can be concluded that overall aquatic ecology is influenced by invasive species. The poor water quality supports species like *Pistia, Euchornia, Tilapia,* etc, dominant in nature, which does not allow native species to grow and survive.

Downstream areas along the Fatehwadi canal area have agricultural land for which canal water is being used for irrigation. Fatehwadi canal after receiving inflow from 240 MLD STP shows a very low presence of fishes and no flora like *Euchornia* and *Pistia* were observed.

The proposed project will help in improving the water quality and in turn the diversity in the aquatic ecosystem.

3.4.6 Air Quality

Air quality monitoring is also being conducted by GPCB at various locations. This indicates that PM 10 & PM 2.5 exceeds the set standards considerably. GPCB monitoring indicates that vehicular emission is a major emitting factor in the study area.

Table 13: Air Quality in Ahmedabad City[16]

Sl.No	City	Location	Parameter(µg/m^3)			
			PM_{10}	$Pm_{2.5}$	SO_2	NOx
		National Ambient Air Quality- Standards	60	40	50	40
1	Ahmedabad East	Naroda GIDC	156	50	14.6	27.3
2	Ahmedabad City	Cadila, Narol	166	53	14.7	30.1
3		L.D.Engg. College	142	46	13.4	27.1
4		Shardaben Hospital	154	50	13.9	28.3
5		R.C. Tech. High School	143	46	13.2	28.5
6		Behrampura Referal Hospital	160	51	14.1	29.6
7		Dynowash, Pirana	188	56	15.8	32
8		Sola L.T. Chankyapuri	159	51	14	29.2
9		Rakhiyal Pumping Station	159	51	13.9	29.3
10	Ahmedabad Rural	Zydus Infratech-Changodar	134	43	14.9	27.2

It is seen from ***Table 13*** that, the readings of PM_{10} and $PM_{2.5}$ are exceeding in all the places of monitoring, attributed to the vehicular traffic-related emissions and dust generation. Since the existing air quality especially PM10 and PM2.5 is already higher in the neighbourhood, it is important to minimize such impacts from the proposed project activities.

Air quality monitoring and assessment were carried out for the subproject site. The ambient concentrations of PM10, PM2.5, SO2, NOx, CO, and HC in the ambient air were monitored at the locations finalized based on the environmental sensitivity in the area of influence. The samples were collected from 15th September to 15th October 2021. Following are the locations of the baseline monitoring,

[16] *GPCB data 2020*

Figure 22: Air Quality Baseline Monitoring Locations

Table 14: Air Quality Baseline Monitoring Locations

Sl. No.	Location Code	Location Name	Coordinates		
			Location Remark	Lat. (N)	Log.(E)
1	A 15	Vasna STP location – Project Site	200m. Away from STP Aerobic system	22°58'51.4158"	72°31'31.5978"
2	A 16	Pirana STP	150m. Away from STP Aerobic system	22°58'23.8974"	72°32'56.202"
3	A 1	Residential area near 180 MLD Pirana STP site - Against the Wind direction - Gyaspur Village	Village Location	22°58'1.041"	72°32'14.3412"
4	A 2	within 05 km of 180 MLD Pirana STP site – Windward Side – Near L J Institute of Engineering	100m. Away from Road	22°59'24.504"	72°33'8.5572"
5	A 4	within 05 km of STP site – Against the Wind direction - Chhipakuva	700m. Away from Pirana Dumping Site	22°59'27.3618"	72°34'32.916"
6	A 6	within 05 km of Vasna STP site – Against the Wind direction – V R Shah School	250m. away from the main road	23°0'30.5562"	72°33'8.5572"

Table 15: Results of Baseline Air Quality Monitoring

Location Code	Parameter Analysis Result											
	PM10 µg/m3	PM2.5 µg/m^3	SO2 µg/m^3	NO2 µg/m^3	CO mg/m3	TVOC µg/m3	HC µg/m3	Methane µg/m3	NH3 µg/m3	H2S µg/m3	Location Identify	Odour
A 15	60	24	6.57	14.5	0.56	21.5	15.4	4.7	BDL	8.7	200m. Away from STP Aerobic system Downwind	Pungent Odour
	73	31	9.15	18.7	1.15	17.8	13.1					
A 16	93	44	21.5	25.5	1.55	35.6	14.5	5.2	5.5	9.2	150m. Away from STP Aerobic system Downwind	Pungent Odour
	60	35	11.69	20.4	2.53	29.8	12.6					
A 1	40	14	< 4.0	7.4	0.25	2.4	1.2	--	--	--	Village Location Upwind	No Odour
	62	18	8.04	9.5	BDL	1.5	BDL	--	--	--		
A 2	49	25	9.5	13.8	1.18	5.2	1.9	--	--	--	100m. Away from Road Upwind	No Odour
	54	31	5.5	16.5	2	7.6	2.5	--	--	--		
A 4	90	36	20.5	17.6	2.33	11.2	4.8	--	--	--	700m. Away from Pirana Dumping Site Upwind	Light Pungent Odour
	74	25	15.2	2.8	1.15	16.3	5.7	--	--	--		
A 6	55	19	5.84	13.5	1.12	1.2	BDL	--	--	--	250m away from the main road Upwind	No Odour
	42	13	10.7	14.8	0.65	2.8	1	--	--	--		
CPCB prescribed limits	60	40	50	40	-	-	-	-	-	-	-	-

The baseline monitoring conducted shows that the air quality at the STP site and other locations is within the limits prescribed by CPCB. Though PM 10 is higher i.e., 90 µg/m^3 & 93 µg/m^3 near the Pirana dumping ground and Pirana STP respectively mostly attributed to the movement of heavy vehicles. Pungent odour is recorded at the STP locations indicating the presence of NH_3, Methane, and H_2S emissions from the treatment process and related aspects, calling for process upgradation ensuring more oxygen supply, thermal protection, better circulation of wastewater, covers, and maintenance requirements, sludge management, etc. Impacts of odour on plant workers and neighbours are important considering the communities around. The Ambient Air Quality (AAQ) levels at the project site are well below the prescribed standards by GPCB. Proposed activities may result in an increment in Particulate matter during construction activities and maintenance works.

3.4.7 Water Availability and Quality

- **Surface Water & Sewage**

Surface water quality was assessed for the upstream, downstream, and outfall from the STP into the river. Sampling was conducted during September 2021. Sewage quality was assessed at the inlet point. Sapling locations are presented in the following ***Figure 23***.

Figure 23: Sampling Locations for Surface Water Quality

Table 16: Surface Water Quality Monitoring Results

Sl. No.	Parameter	Unit of Measurement	Sampling Point Location					
			W13	W14	W4	W3	W2	
			Inlet of 240 MLD	Outlet of 240 MLD	Chandola Lake	Sabarmati River, upstream of outfall from Vasna 240 MLD	Sabarmati River, downstream of outfall from Vasna 240 MLD	Surface water standards
1	pH @ 25 ° C	--	7.57	7.8	7.6	7.33	7.63	6 to 9
2	Colour	Pt. Co. Scale	105	65	75	155	200	-
3	Odour	--	Objectionable	Objectionable	Unobjectionable	Objectionable	Objectionable	-
4	Turbidity	NTU	5	0.1	1	10	5	-
5	Temperature	° C	30	32	30	32	32	-
6	Total Dissolved Solids	mg/L	1144	1152	394	584	1296	1500
7	Total Suspended Solids	mg/L	40	6	18	316	100	100
8	Total Hardness as $CaCO_3$	mg/L	312	312	197.6	160	254	
9	Chloride as Cl^-	mg/L	246.1	276.1	56.2	88.9	294.8	600
10	Fluoride as F	mg/L	0.5	0.8	0.5	0.5	0.4	2
11	Calcium as Ca	mg/L	62.5	75	41.7	49	79.1	-
12	Magnesium as Mg	mg/L	37.9	30.3	22.8	9.2	13.8	-
13	Sulphate as SO_4^{-2}	mg/L	88.5	82.9	33.1	41.7	125.5	-
14	Nitrate as NO_3	mg/L	0.2	2.2	0.8	1.6	0.8	10
15	Total Alkalinity	mg/L	440.4	412.6	183.9	262	434.9	-
16	Oil & Grease	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	-
17	Dissolved Oxygen	mg/L	BDL(MDL:0.2)	BDL(MDL:0.2)	1.6	3.5	BDL(MDL:0.2)	Min 4

Sl. No.	Parameter	Unit of Measurement	Sampling Point Location					
			W13	W14	W4	W3	W2	
			Inlet of 240 MLD	Outlet of 240 MLD	Chandola Lake	Sabarmati River, upstream of outfall from Vasna 240 MLD	Sabarmati River, downstream of outfall from Vasna 240 MLD	Surface water standards
18	Ammoniacal Nitrogen	mg/L	18	14.1	BDL(MDL:2.0)	BDL(MDL:2.0)	15	50
19	Chemical Oxygen Demand (COD)	mg/L	472.8	40.8	36.7	265.6	136.8	250
20	Biochemical Oxygen Demand (BOD)	mg/L	160	12	10	80	40	30
21	Phenolic Compound	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	-
22	Total Residual Chlorine	mg/L	BDL(MDL:0.1)	3.1	25.2	BDL(MDL:0.1)	BDL(MDL:0.1)	1
23	Total Nitrogen	mg/L	42.7	34.7	5.7	8.7	37.2	-
24	Total Kjeldahal Nitrogen (TKN)	mg/L	24.7	20.6	4.4	7.5	22.2	100
25	Free Ammonia	mg/L	1.24	1.91	BDL(MDL:0.2)	BDL(MDL:0.2)	1.4	5
26	Sodium as Na	mg/L	247.1	250.5	47.3	115.2	317.4	-
27	Potassium as K	mg/L	13.9	13.7	2.3	10.2	18.5	-
28	Nickel as Ni	mg/L	0.047	0.051	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)	3
29	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	0.064	3
30	Lead as Pb	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	0.021	0.079	0.056	0.1
31	Iron (as Fe)	mg/L	2.288	0.104	0.262	0.934	0.608	3
32	Zinc as Zn	mg/L	0.133	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	5
33	Cadmium as Cd	mg/L	0.015	0.007	0.028	0.006	0.017	2
34	Arsenic as	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	-

Sl. No.	Parameter	Unit of Measurement	Sampling Point Location					
			W13	W14	W4	W3	W2	
			Inlet of 240 MLD	Outlet of 240 MLD	Chandola Lake	Sabarmati River, upstream of outfall from Vasna 240 MLD	Sabarmati River, downstream of outfall from Vasna 240 MLD	Surface water standards
35	Manganese as Mn	mg/L	0.143	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	0.146	2
36	Mercury as Hg	mg/L	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	-
37	Total Chromium as Cr	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	2
38	Cyanide as CN	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	-
39	Hexavalent Chromium as Cr+6	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	-
40	Cobalt as Co	mg/L	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)	-
41	Total Phosphorous	mg/L	1.89	1.83	0.085	1.27	1.8	-
42	Salinity	ppt	0.5	0.5	0.1	0.16	0.53	-
			Biological Analysis					
41	Total Coliform	CFU/100ml	79	22	32	78	80	-
42	Faecal Coliform	CFU/100ml	61	16	24	70	71	-

From the results obtained from monitoring it can be seen that the pH is alkaline which could be due to the inflow of the discharge from STP in the river. BOD & COD are higher in the upstream which is due to the inflow of multiple STPs, Mega line carrying combined treated effluents from CETPs and ETPs in the city, and other ETPs, and drains. Also, the presence of faecal coliform indicates the polluted nature of the water. It is estimated that the improvement under G-ACRP will help enhance the water quality of the Sabarmati River. The odour was observed objectionable in all cases except for the Lake. Iron, Zinc, Cadmium, Nickel, and Manganese are detected at the STP inlet, but much below the allowable limits. At outlets it is seen that there is a reduction in levels of these. DO level at Sabarmati, downstream of the outfall from Vasna STPs is a concern (BDL as against min 4 mg/l required). BOD, COD, N, and P values are much higher than the MoEFCC standards prescribed in the Consent conditions, and thus, the NGT prescribed limits. These indicate the need for upgrading the STP process to ensure a better quality of treated water.

- **Ground Water**

The district forms a part of the Cambay Basin and drains into the Gulf of Cambay of Khambat.

The depth to groundwater level (DTWL) during the pre-monsoon period (May 2019) ranged from 2.25 to 27.55 mbgl. The range of groundwater levels in the district is given below.

Table 17: Ground Water Level pre-monsoon 2019 [17]

No of wells analysed	DTWL mbg		No of well in different Depth Ranges (m)					
	Min	Max	0 to 2	2 to 5	5 to 10	10 to 20	20 to 40	>40
21	2.25	27.55	0.00%	38.00%	24.00%	29.00%	10.0%	0.00%

Groundwater samples were collected during September 2021 and quality was assessed following CPCB water quality Guidelines 2017. Sampling locations are as follows,

Figure 24: Ground Water Quality Sampling Location

[17] *DIST-WISE FRQ TEALE OF MAY2019 for website.xlsx (cgwb.gov.in)*

Table 18: Ground Water Quality Monitoring Results

Sr. No.	Parameter	Unit of Measurement	Sampling Locations							
			GW20	GW4	GW11	GW2	GW3	GW7	GW10	GW21
1	pH @ 25 ° C	--	8.3	8.66	7.74	7.86	7.24	7.98	8.17	7.48
2	Colour	Pt. Co. Scale	35	10	30	30	35	25	35	40
3	Odour	--	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable	Unobjectionable
4	Turbidity	NTU	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	0.1	0.1	BDL(MDL:0.1)	0.1	0.1
5	Temperature	° C	31	31	32	32	31	31	31	32
6	Total Dissolved Solids	mg/L	1208	876	1356	404	1198	1062	1098	1392
8	Total Hardness as $CaCO_3$	mg/L	260	179	338.4	197.4	413.6	150.4	103.4	508
9	Chloride as Cl^-	mg/L	290.1	145.1	355.6	37.4	205.9	191.9	117	285.4
10	Fluoride as F	mg/L	0.9	1.1	0.7	0.4	0.6	1.1	6	0.6
11	Calcium as Ca	mg/L	58.4	15.1	94.2	67.8	116.8	33.9	15.1	113
12	Magnesium as Mg	mg/L	27.8	34.4	25.1	6.9	29.7	16	16	54.9
13	Sulphate as SO_4^{-2}	mg/L	109.2	76.6	168.4	21.1	184.3	98.4	56.9	183.8
14	Nitrate as NO_3	mg/L	3.4	5	4.1	2.9	15.5	7.7	0.4	0.6
15	Total Alkalinity	mg/L	395.8	368	373.5	211.9	401.4	401.4	563.1	473.9
16	Oil & Grease	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)
7	Dissolved Oxygen	mg/L	5	7.4	3.5	2.5	3.1	4.2	3.8	1.7

Sr. No.	Parameter	Unit of Measurement	Sampling Locations							
			GW20	GW4	GW11	GW2	GW3	GW7	GW10	GW21
18	Ammoniacal Nitrogen	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	12.5
19	Chemical Oxygen Demand (COD)	mg/L	BDL(MDL:2.0)	BDL(MDL:2.0)	20.1	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	BDL(MDL:2.0)	16.1
20	Biochemical Oxygen Demand (BOD)	mg/L			6					
21	Phenolic Compound	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)
22	Total Residual Chlorine	mg/L	1	2.1	BDL(MDL:0.1)	0.7	2.8	0.7	BDL(MDL:0.1)	BDL(MDL:0.1)
23	Total Nitrogen	mg/L	5.7	5.3	3.7	4.9	4.6	7.2	6.3	31.5
24	Total Kjeldahal Nitrogen (TKN)	mg/L	4.4	4.1	3.1	3.7	3.4	5.3	4.4	19
25	Free Ammonia	mg/L	0.84	1.5	BDL(MDL:0.2)	BDL(MDL:0.2)	BDL(MDL:0.2)	0.54	0.71	0.85
26	Sodium as Na	mg/L	305	219.7	320.3	38.2	215.6	298.3	316.4	255.5
27	Potassium as K	mg/L	3	1.1	4	4.8	18.7	1.5	1.7	13.8
28	Nickel as Ni	mg/L	BDL(MDL:0.02)	BDL(MDL:0.02)	0.015	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)	BDL(MDL:0.02)
29	Copper as Cu	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	0.054
30	Lead as Pb	mg/L	0.015	0.079	0.065	0.038	0.057	0.059	0.045	0.069
31	Iron (as Fe)	mg/L	BDL(MDL:0.1)	0.237	0.181	0.744	0.346	0.436	0.249	0.642
32	Zinc as Zn	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	0.08	BDL(MDL:0.05)	0.13

Sr. No.	Parameter	Unit of Measurement	Sampling Locations							
			GW20	GW4	GW11	GW2	GW3	GW7	GW10	GW21
33	Cadmium as Cd	mg/L	0.022	0.007	0.02	BDL(MDL: 0.003)	0.009	0.008	0.008	0.014
34	Arsenic as As	mg/L	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL: 0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)	BDL(MDL:0.01)
35	Manganese as Mn	mg/L	BDL(MDL:0.1)	BDL(MDL:0.1)	BDL(MDL:0.1)	0.341	0.728	BDL(MDL:0.01)	0.143	0.13
36	Mercury as Hg	mg/L	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL: 0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)	BDL(MDL:0.001)
37	Total Chromium as Cr	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL: 0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)
38	Cyanide as CN	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL: 0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)
39	Hexavalent Chromium as Cr+6	mg/L	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL: 0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)
40	Cobalt as Co	mg/L	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL: 0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)	BDL(MDL:0.5)
41	Total Phosphorous	mg/L	0.04	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
42	Salinity	ppt	0.52	0.38	0.64	0.07	0.37	0.35	0.21	0.52
			Biological Analysis							
41	Total Coliform	CFU/100 ml	12	8	5	Absent	Absent	Absent	Absent	Absent
42	Faecal Coliform	CFU/100 ml	8	6	4	Absent	Absent	Absent	Absent	Absent

Lead (Pb) is present in the samples in a very small amount. Contamination of groundwater is due to the reverse boring of industrial effluents and polluted surface water[18]. pH in GW4 (8.66) exceeds the permissible limit (8.5) as per the standards BIS: IS: 10500, 1991 recommended by CGWB for domestic use. It is estimated that the improvement under G-ACRP will help enhance the water quality of the Sabarmati River.

3.4.8 Soil Quality

Soil quality sampling was conducted during September 2021. Following are the locations of the sampling,

Figure 25: Sampling Locations for Soil Quality

Table 19: Results of Soil Analysis

Sl. No.	Parameter	Unit of Measurement	Sampling Point Location				
			S1	S3	S5	S6	S14
1	pH	--	7.8	8.8	8.96	9.18	8.61
2	Electrical Conductivity	µs/cm	274.3	143.5	152.2	132.7	151.2
3	Magnesium	mg/kg	50.3	100.9	90.6	181.7	315.5
4	Sodium	mg/kg	12	18.2	182.1	116.4	208.6
5	Potassium	mg/kg	61.4	14.4	13.6	3.6	18.9
6	Phosphorous	mg/kg	2961.9	1194.2	593.8	397.2	1378.1
7	Sodium Absorption Ratio (SAR)	--	BDL(MDL:1.0)	BDL(MDL:1.0)	1.93	1.4	2.01
8	Copper as Cu	mg/kg	61.2	6.1	40.7	7.1	18.4
9	Manganese as Mn	mg/kg	82.8	45.1	178	60.6	154.8

[18] http://gujenvis.nic.in/PDF/soe-water.pdf

Sl. No.	Parameter	Unit of Measurement	Sampling Point Location				
			S1	S3	S5	S6	S14
10	Zinc as Zn	mg/kg	71.1	20	125.3	54.8	60.1
11	Nitrogen	mg/kg	252.3	37.4	91.3	59.9	111.5
12	Bulk Density	gm/cc	1.309	1.352	1.348	1.553	1.404
13	Porosity	%	52	48	50	50	52
14	Cation Exchange Capacity	meq/100g	25.6	27.1	26.4	26.6	28.2
15	Nickel as Ni	mg/kg	30.3	5.8	12.1	9.3	18.1
16	Iron as Fe	mg/kg	3383.9	2634.7	6255.1	840.6	7123.7
17	Water Holding Capacity	ml/100 gm	60	72	64	66	56
18	Permeability	Cm/Sec	0.172	0.174	0.183	0.18	0.184
19	Salinity	ppt	0.34	0.51	0.34	0.67	0.67
		Texture Class:					
20	Sand	%	18	98..6	96.3	98.6	13.8
21	Silt	%	22	0.6	2.8	0.8	18.6
22	Clay	%	60	0.8	1.2	0.6	67.6

The soil of the project site and vicinity is alluvial and disturbed. In general, the soil pH is varying from 7.8 to 8.96 which is alkaline. Higher pH at certain places can be attributed to low detritus and organic material.

The soil of the area is mostly disturbed due to large-scale construction and urban activities. Some of the published articles also indicate a higher level of heavy metals such as Chromium, Cadmium, Manganese, Lead, Zinc in soil, which can be attributed to industrial emissions in the vicinity of Ahmedabad city[19]. It is important to prevent industrial pollution from leaching into water sources and soil of the city and set up sensors to detect any such constituents in manholes and wastewater inlets. In this regard, the Hon'ble High Court of Gujarat has proactively set up a task force (in September 2021) to disconnect all connections from industrial units into the sewers and drains in the city, now from the Eastern part of the river. Till now, the task force has disconnected around 400 such connections and the units are asked to resume operations only after connecting their effluents to CETPs/ ETPs. Such due diligence and actions will curtail the illegal inflow of industrial effluents into the sewer system and STPs.

It is also important to set up semi-decadal monitoring of heavy metals in vegetables grown under wastewater irrigated soils, south of Ahmedabad city.

3.4.9 Sludge & Sediment

Sludge samples were collected from the STP, and river bed sediment samples were collected from the Sabarmati River near the STP outlet and Vasna Barrage flow. Following are the locations of the same (***Figure 26***).

[19] *Nature Environment and Pollution Technology Vol. 20 163-175 2021, Heavy Metals in Soils and Vegetation from Wastewater Irrigated Croplands Near Ahmedabad, Gujarat: Risk to Human Health*

Figure 26: Sampling Locations for Sludge and Sediment

Table 20 Sludge & Soil Quality

Sl. No	Parameter	Unit of Measurement	Sampling Locations							
				Downstream					Upstream	
			Sludge 8 - Vasna STP 240 MLD Sludge	Sediment – 1 Downstream of Sabarmati River after Vasna Barrage (at Shallow Levels	Sediment – 2 Downstream of Sabarmati River after Vasna Barrage (at Deep Levels	Sediment– 3 Downstream of Sabarmati River near outfall (at Shallow Levels	Sediment – 4 Downstream of Sabarmati River near outfall (at Deep Levels	Sediment - Upstream of Sabarmati River at Shallow Level	Sediment - Upstream of Sabarmati River at Deep Level	Sediment – Sabarmati Flowing Within the City
1	pH	--	6.9	8.52	8.9	8.05	8.02	8.48	8.5	8.32
			5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
			8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5
2	Conductivity	µS/cm	1442	155.1	156.8	107.8	109	172.3	186	186.7
3	Moisture	%	54.68	25.9	24.4	28.6	40.6	30.8	13.01	26.2
4	Calorific Value	Kcal/kg	1675.5	BDL (MDL:200)	BDL (MDL:200)	BDL (MDL:200)	BDL (MDL:200)	BDL(MDL:200)	BDL (MDL:200)	BDL (MDL:200)
5	Arsenic as As	mg/kg	BDL (MDL:0.05)	BDL (MDL:0.05)	BDL (MDL:0.05)	BDL (MDL:0.05)	BDL (MDL:0.05)	BDL (MDL:0.05)	BDL (MDL:0.05)	BDL (MDL:0.05)
6	Nickel as Ni	mg/L	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)
7	Cadmium as Cd	mg/L	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)
8	Copper as Cu	mg/L	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	1.74
9	Chromium as Cr^{+6}	mg/L	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)
10	Lead as Pb	mg/L	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)	BDL (MDL:1.0)

Sl. No	Parameter	Unit of Measurement	Sampling Locations							
			Downstream					Upstream		
			Sludge 8 - Vasna STP 240 MLD Sludge	Sediment – 1 Downstream of Sabarmati River after Vasna Barrage (at Shallow Levels	Sediment – 2 Downstream of Sabarmati River after Vasna Barrage (at Deep Levels	Sediment– 3 Downstream of Sabarmati River near outfall (at Shallow Levels	Sediment – 4 Downstream of Sabarmati River near outfall (at Deep Levels	Sediment - Upstream of Sabarmati River at Shallow Level	Sediment - Upstream of Sabarmati River at Deep Level	Sediment – Sabarmati Flowing Within the City
11	Zinc as Zn	mg/L	70.84	3.2	1.5	BDL(MDL:1.0)	1.51	BDL(MDL:1.0)	BDL(MDL:1.0)	BDL(MDL:1.0)
12	Mercury as Hg	mg/kg	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)	BDL(MDL:0.05)
13	Oil & Grease	mg/kg	8	7	9	7	8	6	8	9
14	Colour	--	Black	Black	Black	Black	Black	Black	Black	Black
15	Texture	--	Solid	Solid	Solid	Solid	Solid	Solid	Solid	Solid & Paper
16	Odour	--	Objectionable	Unobjectionable	Unobjectionable	Objectionable	Unobjectionable	Objectionable	Unobjectionable	Unobjectionable
17	Bulk Density	gm/cc	0.704	1.229	1.369	1.308	1.16	1.296	1.478	1.314
18	Water Holding Capacity	ml/100 gm	70	48	56	50	44	46	90	54
19	Total Volatile Solids	%	20.28	3.31	3.11	2.94	6.68	4.16	1.21	4.28
20	Total Kjeldahl Nitrogen	mg/kg	2798.2	218.2	217.1	242.8	299.3	312.6	107.4	264.6
21	Organic carbon	%	30.3	1.85	0.29	0.94	4.59	0.86	0.75	1.06

Sl. No	Parameter	Unit of Measurement	Sampling Locations							
			Downstream					Upstream		
			Sludge 8 - Vasna STP 240 MLD Sludge	Sediment – 1 Downstream of Sabarmati River after Vasna Barrage (at Shallow Levels	Sediment – 2 Downstream of Sabarmati River after Vasna Barrage (at Deep Levels	Sediment– 3 Downstream of Sabarmati River near outfall (at Shallow Levels	Sediment – 4 Downstream of Sabarmati River near outfall (at Deep Levels	Sediment - Upstream of Sabarmati River at Shallow Level	Sediment - Upstream of Sabarmati River at Deep Level	Sediment – Sabarmati Flowing Within the City
22	Phenolic Compounds	mg/kg	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
23	Total Phosphorous	mg/kg	3879.2	296.2	986.3	972.2	1364.1	599.1	396	793.4

At a downstream location near outfall and Vasna barrage, the pH of sediment is alkaline nature. The nitrogen and Phosphorous contents of the Sludge are high. Sludge also shows the presence of Zinc in the sediment of Downstream samples. Currently sludge is being treated at sludge hygienisation plant of AMC and testing of treated sludge is undergoing for assessing its suitability, as a manure and to get Fertilizer (Control) Order Certification. Study is being conducted by AMC.

3.4.10 Ambient Noise

Noise monitoring activity had undertaken during September 2021. Sampling locations are in ***Figure 27*** below.

Figure 27: Sampling Locations for Noise

Table 21 Sampling locations of noise levels

Sl No	Location Name	Location Code	Day Time: (6 am to 9 pm)	Night-time: (10 pm to 5 am)
1	Residential area within 05 km of Pirana STP site – Against the Wind direction	N 1	50.74	40.78
2	Within 05 km of STP site, Residential area, Faisal Nagar – Windward Side	N 9	56.27	45.80
3	Within 05 km of Vasna STP site, Residential area, Mastani Nagar – Windward side	N 10	55.94	46.68
4	Residential area within 05 km of Vasna STP site Against the Wind direction	N 2	57.79	48.00
5	Vasna STP location – Subproject Site	N 5	60.63	52.55
6	Pirana STP location	N 6	62.34	54.88
7	Near Paldi Bus stop	N 19	65.59	52.88

Primary data provided above shows that During night-time the noise levels in the residential area within 05 km (against the Wind direction) of Vasna STP site is exceeding limits of 45dB. This may be due the closeness to the highway and ongoing construction works. The rest of the noise levels as per the National Ambient Noise levels are well within the limits set as per regulations for Industrial, commercial, and residential areas in Ahmedabad.

Secondary data[20] from 10 - 23 May 2018 at 24 locations shows that the average noise level always exceeded the guidelines of the World Health Organization (WHO) for the daytime noise (75 dB(A) for Industrial area, 65 dB(A) for Commercial area, 55 dB(A) for Residential area and

[20] *Current World Environment Vol. 16, No. (1) 2021, Pg. 198-209, Monitoring and Assessing the Environmental Noise along a Busy Traffic Corridor of Ahmedabad City, India*

50 dB(A) for Silence zones), which is quite alarming. For a major portion of the traffic corridor (79.6%), even the minimum noise level was above the permissible average noise level which is a matter of great concern. The highest noise level observed was 86.0 dB (A). Traffic corridors near the central business district namely, Akhbarnagar followed by Naranpura were found the nosiest.

Vasna 240 MLD STP is located well away from residential areas except for the slums or informal settlements adjacent to the STP, along the western boundary and access road. Noise levels at the location are within the limit. It is expected that due to the proposed rehabilitation of STP, there will be a temporary localized increase in the local noise levels during the construction phase.

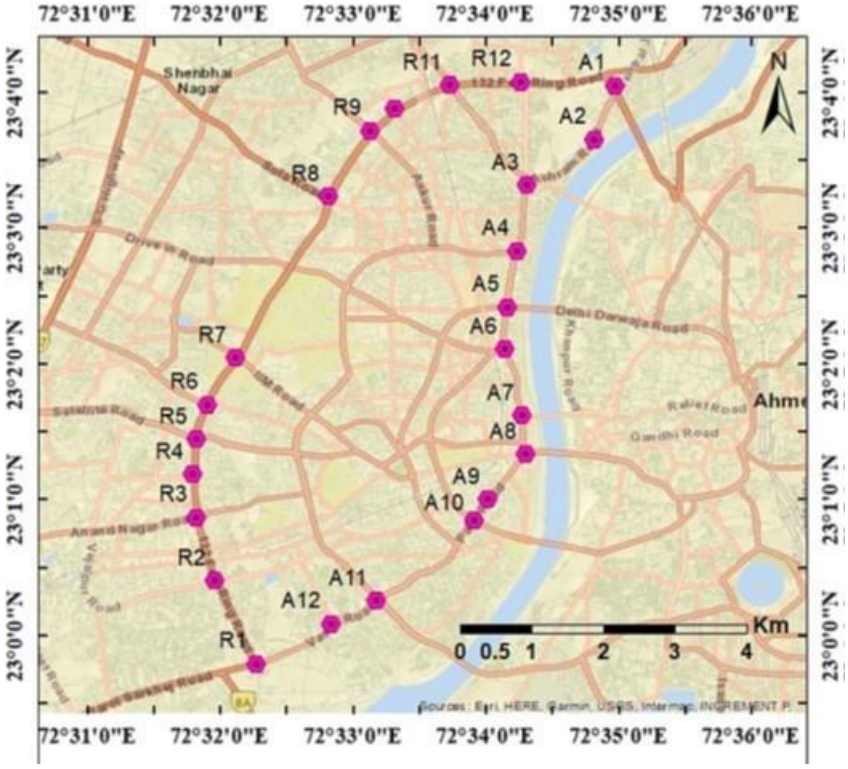


Figure 28: Noise Sampling Locations superimposed on Traffic Corridors

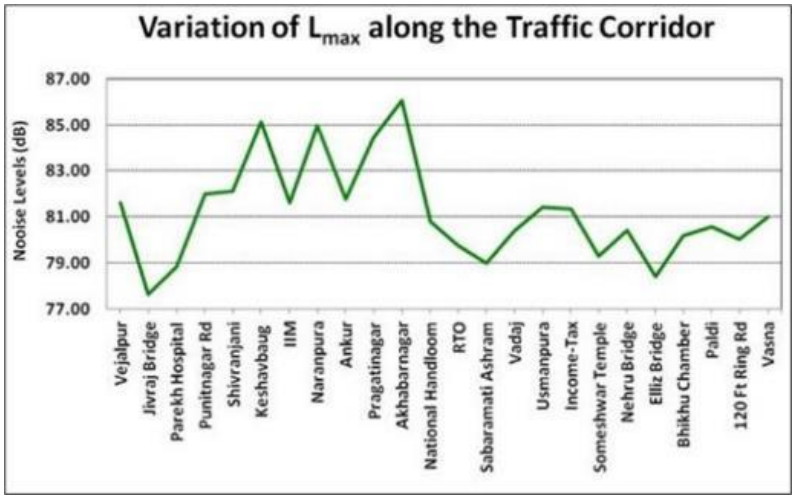


Figure 29: L_{max}along Traffic Corridors of Ahmedabad

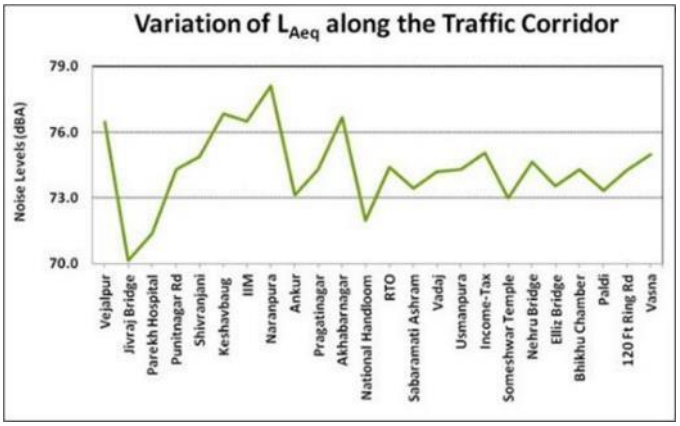


Figure 30: LAeq along the traffic corridors of Ahmedabad

3.5 Traffic Assessment

Proposed subproject activities may increase traffic movement and increased traffic may attract health and safety issues concerning accidents and emission of pollutants from increased traffic. Hence vehicular traffic in Ahmedabad was studied to understand the major concerns. The vehicular density in Ahmedabad city is increasing at 5-6% per annum, while the road length is largely constant in the last 5 years. As per the statement of vehicles registered till 31st March 2021 with COT (Commissioner of Transport Office, Gandhinagar), the number of vehicles in Ahmedabad is 45,19,181. A detailed break up is given in below ***Table 21***

Table 22: Type of Vehicles registered with COT (dated 9 June 2021)

Sl. No.	Type of Vehicles	Ahmedabad (GJ-1)	Ahmedabad (East) (GJ-2)
1	Goods Vehicles		
	A. Truck/ Lorries	50582	10400
	B. Tanker	3498	460
	C. Three-Wheeler	71246	14738
	D. Other Light Wheeler	43489	7155
	TOTAL	168815	32753
2	Passenger Vehicles		
	A. Stage Carriage	21028	0
	B. Cont. Carriage	7808	319
	C. Maxi Cab	6810	1403
	D. School Bus	1224	243
	E. Private Service Vehicles	1148	4
	F. Police Van	861	3
	Total	38879	1972
3	Ambulance	1469	15
4	A. 3 Wheeler Motor Car	11197	0
	B. 4 Wheeler Motor car	766409	98095
5	Taxi	23814	98095
6	Jeep	32337	3689
7	Auto Rickshaws	202054	967
8	Two Wheeler	0	32418
	A. Motor Cycle/ Scooter	2871138	0
	B. Moped	304210	598624
9	Tractor	56447	600
10	Trailor	29893	3788
11	Other Vehicles	12519	611
	Total	4519181	13858

Ahmedabad city traffic police jurisdiction area is divided into 14 traffic divisions. 1375 accidents were reported in Ahmedabad city from January to December 2019[21]. Out of this, 350 accidents were fatal and majorly occurred in the night-time after 9 pm. In these accidents, the pedestrian users of the city roads are also affected to a great extent.

As per the detailed study conducted by JP India Pvt Ltd. during the year 2019, the major outcomes were:

- There is a need for developing pedestrian infrastructure specifically for intersection points.
- Use of Helmets
- Road obstructions/ construction causing limited vision
- Surface road defects such as potholes/ cracks/ unevenness etc.
- Defective traffic signals & indiscipline in following traffic rules.
- Violating the vehicle speed rules
- No signage
- Lack of driving skills
- A gap in the median section
- Unmaintained vehicles causing brake failure

Traffic accidents are usually attributed to human error and violations of traffic rules. Considering the above aspects, it can be concluded that the city requires better pedestrian infrastructure, signals, and road designs.

3.5.1 Accidents Prone Locations

The major accident-prone area is depicted in ***Figure 31***. It can be seen that the Naroda Narol road and Subhash Bridge area (about the phase I) sub-projects is major accident-prone area. Other roads having accident histories in the proximity of project sites are shown in ***Table 22*** and the number of accidents and their causes are depicted in ***Table 23***, respectively.

[21] *ACCIDENT INVESTIGATION REPORT – AHMEDABAD [2019] by JP Research India Pvt. Ltd.* [22] *Ahmedabad Accident Research Report by JP Research India Pvt Ltd., Sep 2019 Report*

Figure 31: Accident-prone locations of Ahmedabad [22]

Table 23: Accidents during past three years

Road & Intersections	Years		
	2017	2018	2019
NH8 (Narol Naroda Road) Shyam Shikhar CR to Ajit Mill CR to Hatkeshwar CR to Guruji Bridge Shyam Shikhar CR to Ajit Mill CR to Hatkeshwar CR to Guruji Bridge Forensik CR to Rameshwar CR Soniya Ceramic to D Mart to MEMCO Bridge (Revised to MEMCO Bridge to Meghani Nagar)	46	63	42
Sardar Patel Ring Road Ramol Toll Tax to Auda Under Bridge	43	60	45
NH64 (Narol-Sarkhej Road) Jashoda Nagar CR to Crozy Hotel Naroda to Narol (Revised to Naroda to Jashoda Nagar Crossing)	48	58	41
132 Feet Ring Road	19	21	14
Naroda Road	17	11	20
Airport Road	18	11	11
Lal Bahadur Shastri Road	13	13	8

Table 24: Major factors for accidents along the major roads[23]

Sl. No.	Factors for accidents	NH8 (Narol Naroda Road)	Sardar Patel Ring Road	NH64 (Narol-Sarkhej Road)
1.	Helmet not used	13	14	
2.	Injuries to rider due to impact with other vehicle	12	12	3
3.	Injuries to Pedestrian due to impact with other vehicle	10	6	
4.	Runover of Two-wheeler rider/ bicyclist	8	6	
5.	Speeding - Excessive speed for conditions	5	6	3
6.	Injuries due to roadside manmade structures	5	-	
7.	Pedestrian's Dangerous Behaviour on Roadway	5	5	3
8.	Poor road marking/ signage	4	7	-
9.	Speeding Above Speed Limit	4	4	2
10.	Overtaking in undivided road	3	6	-
11.	Injuries Due to Ejection from Vehicle	3	4	-
12.	Pedestrian's Inattention	3	5	-
13.	Improper lane change/ lane usage	3	4	-

The width of the Fatehwadi canal road is sufficient to cater to the increased traffic volume as the existing traffic movement is very low. As the STPs have a separate entry/ exit it will not affect the movement of any local vehicles.

The above study of traffic signifies the management requirements during the construction and pre-construction phases of the project. As the movement of vehicles carrying personnel and raw material for this sub-project will increase traffic movement and may cause conflicts. For the proposed project major concerns related to traffic are 1). Uneven roads, 2). Non-marking of roads, 3). The width of the canal road is smaller, 4). Approach road connecting canal road and STP has a sharp turn, and 5). Absence of signages. Improvement of road

[22] *Ahmedabad Accident Research Report by JP Research India Pvt Ltd., Sep 2019 Report*
[23] *Ahmedabad Accident Research Report by JP Research India Pvt Ltd., Sep 2019 Report*

infrastructure and providing signages will be necessary. During construction, the project planning should be made in such a way that minimal bypass or diversion is required.

Apart from the above measures, AMC (through PMC) should depute their supervisory team to coordinate with residential and commercial groups for educating the masses about diversions, road blockages, and other measures. Prior information should be given to the residents in the area through various media tools such as TV broadcasts, pamphlets, etc.

3.5.2 Comprehensive Environmental Pollution Index

Comprehensive Environmental Pollution Index (CEPI) was adopted by MoEFCC for depicting the overall pollution Index of Industrialised areas. This index is the sum of all kinds of pollution viz. air, water, soil, noise, ecological status, etc. in the industrial areas of cities and is an indicator of the environmental health of the city. The CEPI Index for Naroda/ Odhav industrial cluster of Ahmedabad is comparatively better than other industrialized areas of Gujarat as given below:

Table 25: Comprehensive Environmental Pollution Index of Gujarat clusters

Sl. No.	Name of polluted industrial area (PIA)	CEPI Score
		As per monitoring during 2018 by CPCB
1	Vadodara (Critically Polluted Area - CPA)	89.09
2	Ankleshwar (CPA)	80.21
3	Vapi (CPA)	79.95
4	Surat (CPA)	76.43
5	Vatva (Vatva & Narol) (CPA)	70.94
6	Rajkot (CPA)	70.62
7	Bhavnagar (Severely Polluted Area - SPA)	61.94
8	Ahmedabad (Naroda & Odhav) (Other Polluted Area - OPA)	57.11
9	Morbi	54.24

Source: GPCB Annual report 2019-2020

Category	CEPI Score
CPA	>70
SPA	60-70
OPA	<60

For managing pollution from industrial areas and industries, collectively and cumulatively, regulatory measures, mechanisms for preventing emissions, treatment facilities for wastes, and industrial effluents need to improve.

3.5.3 Natural Disaster Assessment

Being near to Sabarmati River, the existing Vasna 240 MLD STP needs to be more vigilant for floods. This STP is also located at around 3 km from Vasna Barrage and the south end of the Riverfront. HFL of the Sabarmati River is 41.77 m at the Vasana Barrage near the project area. Thus, clear demarcation of HFL is important to identify the areas which would be impacted.

The lower promenade of the Sabarmati Riverfront got submerged in 2006, 2011, 2015, and 2017. In 2006, the low-lying slum at Vadaj experienced severe flooding, and houses and shops were half-submerged and hundreds of slum dwellers from Vadaj and riverbank areas (behind

VS hospital and Tagore Hall, Khanpur, and Shahpur, Behind NID) were relocated to schools.[24] In 2015, the release of 1.8 lakh cusecs of water from the Dharoi dam had led to the flooding of the riverfront[25]. People were evacuated from Fatehwadi, Chandrabhaga, and Indira bridge area. During 23 - 27 July 2017, Ahmedabad district, City taluka, and Bavla taluka reported 81.16%, 107.86%, and 115.60% rainfall respectively[26]. Ahmedabad received 828.2 mm rains, as against a normal level of 291.1 mm[27]. Around 200mm of rainfall was received in the city in 24 hours in 2017.[28] More than 150 factories shut down,[29] and slums in the city were waterlogged while the districts of Ahmedabad and Gandhinagar were also on alert due to the Dharoi dam releasing water into the Sabarmati River, which had already received water from the Narmada,[30] and 2800 people from low lying areas were evacuated[31].

Based on the above experiences with floods, during the worst floods scenario, potential risks identified to and in STP premises during construction and operation phases include submergence of the STP and nearby areas including access roads, structural damage of STP components and linked structures; reverse flow from outlet; Impacts on outfall points, wastes, debris, carcasses carried into the premises by floodwaters, choked machinery, inlets and outlets, the impact of monitoring equipment, submerged equipment, and electric short circuits, risks to workers and nearby communities due to flooding, disruption of construction works and material stacked, issues with stored sludge and chemicals, the possibility of waterborne disease post-flood; untreated sewage release and downstream impacts on communities, impaired functioning caused by damage to equipment and machinery.

As per the seismic map of India, Ahmedabad falls under Zone III (Moderate Damage Risk Zone). Ahmedabad along with other areas of Gujarat had experienced a massive earthquake in January 2001. It is important that the proposed rehabilitation also consider structural strengthening to make the STP resilient to earthquakes and other disasters.

3.6 Socio-Economic Baseline

The baseline socioeconomic condition used in the ESIA study and discussed has been compiled from the population estimates of Master Planning Consultants of AMC, Census 2011 data for the city and the wards and primary data collection. Other data available in the public domain has also been collated and discussed in the baseline section to understand and present the social baseline condition with respect to the area of influence and area of impact for the project, health condition, downstream impact with respect use of water from Fatehwadi canal, Sabarmati River, health issues, groundwater extraction and quality and related issues.

The immediate area of influence in ward no 52 Sarkhej where the STP is location and area of impact is larger and includes the sewerage catchment in Western zone 1 for the 240 MLD STP, downstream villages using the water from Sabarmati and Fatehwadi canal. City level data is also presented for overall understanding of municipal services provided and overall

[24] *https://www.deshgujarat.com/2015/07/29/blog-year-2006-sabarmati-flood-in-ahmedabad-i-witnessed/*
[25] *https://indianexpress.com/article/india/gujarat-floods-submerged-sabarmati-riverfront-throws-up-snakes-and-many-questions-4775653/.*
[26] *https://gidm.gujarat.gov.in/sites/default/files/educate_your_self_document/Gujarat%20Flood%202017%20-%20A%20Case%20Study%20by%20NDMA%20%26%20GIDM_2.pdf*
[27] *https://www.business-standard.com/article/current-affairs/a-rare-phenomenon-caused-gujarat-floods-117072900734_1.html*
[28] *https://www.indiatoday.in/india/story/ahmedabad-airport-gujarat-floods-heavy-rains-sabarmati-river-gandhinagar-1026704-2017-07-27*
[29] *https://www.theguardian.com/world/2017/jul/31/india-monsoon-floods-gujarat-death-toll-over-200*
[30] *https://hdrc-sxnfes.org/wp-content/uploads/2020/04/Report-Flood-Final-19_08_17.pdf*
[31] *https://timesofindia.indiatimes.com/city/ahmedabad/flood-fury-hits-gujarat-25000-people-evacuated/articleshow/59744404.cms*

improvement in the sewage collection and treatment from the Western zone 1 which comprises of 28 % of the total city area as mentioned in section 3.5.4.3.

Ward Data

STP is located in Ward Number 52 for Sarkhej which is included in 10 kms area of study of existing STP and area of influence/impact and has a significant geographic area for the sewerage catchment, in which the STP is located. Western Zone 1 comprise the sewerage catchment for 240 MLD STP and covers approximately 153 sq.km. area of AMC. The area of South-West Zone and Northwest Zone between SG Highway and S P Ring Road, Motera, Chandkheda, Chenpur, Gota, Jagatpur, Bopal, Shilaj, Bhadaj and newly added AUDA area in AMC falls under this zone. The estimated contributing population for this zone is about 7.6 lakh. Contributing population estimated in FR for YR 2021 is 866840; FR 2024 - 987588, FY 2029 - 1216073, FR 2034 -1495301 and FY 2039-1817084.

As per the SCADA records, about 220 MLD sewage is generated at present in this zone and all sewage generated will be treated with the implementation of the proposed sub project

Study area profile and limitation

A transect walk was also conducted within the STP plant area to observe specific issues related to the plant site. Consultations were also undertaken with various stakeholders with reference to the STP including AMC Officials, Operators and Squatter settlement inhabitants. Discussion were held during preparation of ESIA and ESMP, after disclosure of draft ESIA/ESMP.

There are few STPs in the Vasna within 100 to 250 m, such as the 35 MLD, 48 MLD, 126 MLD etc. At the time of development of these STPs, there were no settlements, adjoining or near STPs. Since then, some temporary squatter settlements have come up alongside the Fatehwadi canal and kuccha access road near 126 MLD STP and 240 MLD STP. Social impacts are mainly with respect to the environmental issues such as dust, traffic movement, release of untreated sewage, odour and related issues during construction and operation and discussed in section 4.6. The squatter settlement is not a notified slum and consists of kuccha or makeshift arrangements. The inhabitants are migrants (seasonal and permanent). The settlement will not be affected by the sub project activities. Impacts and risks pertaining to and on community health and safety impacts and SEA/SH impacts, impacts related to labor influx etc will be minimized and addressed through mitigation measures.

Figure 32 Location of Squatters settlement to the 240 MLD STP

Discussions with squatter settlement were undertaken in September'21 in late evening with some inhabitants living in the settlement and subsequently post disclosure in March'2022. During the preparation of the CESIA, further consultation with settlement dwellers including women and other vulnerable groups will be conducted by the implementing agency.

The issues related to crimes such as theft, dacoity etc., in the squatter settlement will reduce due to provision of street lighting during night work and movement of vehicles and labour. There will also be increased security due to movement of materials and goods to the STP during construction. Labour camp set up in the area will have enclosure and security to prevent any incidences of crime or conflicts with labour working on project. Lighting will also be provided to ensure safety and security to the labour residing in the labour camp.

Similarly, visits were also undertaken to residential areas, mainly peri urban locality just next door, Juhapura (which is a non-notified slum) to 126 MLD STP, which is accessible from the Fatehwadi canal road. The area is accessible by another route which is more commonly used as it provides easy access to schools, hospitals, markets, residential area, places of worship etc. Area adjacent to the 126 MLD STP consist of both kuccha and pucca structures, building and chawls, places of worship, schools etc. During consultations conducted in the area, issues and concerns were mentioned with respect to the public infrastructure provided in the area, such as quality of water supplied by AMC, lack of community and individual toilets, lack of pucca roads and issue of drainage and water stagnation. With respect to the STP, residents reported there is no odour issue and overall traffic movement is mainly pedestrian and two wheeler traffic on the access road to the 126 STP. Given the gap of services in the area and proposed improvement and expansion of coverage of sewerage catchment and treatment of sewage under the sub project, consultations will be carried out in Juhapura before construction activities are initiated to address issues arising of sub project activities, gaps in services and coverage of the area by providing sanitation services through Central and State government schemes under SWM.

The settlement will not be affected by the sub project activities. Impacts and risks pertaining to and on community health and safety impacts and SEA/SH impacts, impacts related to labor influx etc will be minimized and addressed through mitigation measures.

Figure 33 Juhapura Peri Urban Area near 126 MLD STP

Demographics & ethnic composition

Overview of Demographics of Ahmedabad city

City population is considered broadly while discussing the sub project as the sewerage catchment area consists of the western zone 1 which covers approximately 140 sq.km area of AMC (28% of total city area) and will improve overall coverage and accessibility to the sewage collection and treatment for Western zone 1.

Decadal growth observed for Ahmedabad (urban) is 27.82% between 2001-2011. Population density of the city was 11948/sq.km. The total population as per census 2011 was 5577940 (24,02,523 males and 19,73,870 females). Sex ratio was 898 per 1000 males. The average literacy rate of Ahmedabad City in 2011 was 88.29%. The SC/ ST Population in the city is 10.66 and 1.2 percent respectively. According to the 2011 census, Hindus are the predominant religious community in the city comprising 81.56% of the population followed by Muslims (13.51%), Jains (3.62%), Christians (0.85%) and Sikhs (0.24%). As of 2011, about 66% of the population lives in formal housing and remainder in slums and chawls.

Around 67 percent of the population are in the working-age group of 15 – 59 years. The work participation rate of the city was 37% as per the 2011 census. Among those employed, self-employed constituted 50.56 percent, regular wage/ salaried employees were 45.65 percent while 3.8% were casual labour. During the census period, 1.94 percent of the workers in the city were employed in the primary sector, 47.76% in the secondary sector, and 50.30 percent were in tertiary sectors. Primary commodities manufactured are chemicals, medicines, and cotton cloth.

According to City Development Plan (CDP) of Ahmedabad, 2006-2012, SJSRY survey conducted in Ahmedabad in 1998 showed that 32.4 percent of city's population living in the slums. The city of Ahmedabad has 710 slums and 958 chawls spread across different zones in the city. There are about 1.75 lakh households residing in the slums and 1.49 lakh households in the chawls in city.

As of 2016, there is an estimated population of over 7 million people living in Ahmedabad, and over 8 million people living in the metropolitan area. Approximately 31,000 rural families are living in Ahmedabad with about 1,700 of them living below the poverty line. The population density is approximately 9,900 people per square kilometre or around 26,000 per

square mile with 464 sq.km. (or 179.2 square miles) available in the city area[32]. As of 2020, the estimated population is expected to be 78,68,633[33] for the Ahmedabad Urban Agglomeration.

Population Density and Profile

The population density for wards as given in the map below above reflect that the population density in the western zone 1 for YR 2013 ranges from below 10000 persons/sq.km to 40000 persons/sq.m. in South West and Northwest zones. The population density was much higher for the eastern wide of the city with inner zones having higher population density ranging from 40000 persons per sq. m to above 60000 persons per Sq. Km.

In the future, it is expected that population density will increase in some of the wards which have population density in the range of 40000 per/sq.m. and below and which are rapidly being integrated within the city due to infrastructure development, improved municipal services and better connectivity.

For the estimated population increased in the respective wards, the sub project will enhance sewerage collection and treatment through the proposed sub project.

The sub project is proposed to be carried out within the existing STP premises which is enclosed within boundary. There are no occupants at the proposed expansion site, no disadvantaged/vulnerable groups, etc.

In this section, there is a brief discussion the impacts on communities near the STPs and the downstream users of Fatehwadi canal and Sabarmati river in which the treated sewage is released. land acquisition is not required for road repairs or upgradation or STP related activity with respect to the upgradation or expansion. Current width of kuccha road is large and only 8 m width will be required for road repairs and upgradation which not affect any traffic movement as the proposed road repairs and upgradation will be taken up in a manner to allow traffic movement. Each of these communities and main concerns are discussed under separate sub headings, based on primary data collection and consultations. The various communities include:

- Informal settlement opposite the 126 MLD and 240 MLD STPs. There are also scattered settlements on the Fatehwadi canal. The land belongs to the AMC and all the person/families are squatters on government land and the settlement is non-notified.
- Mixed formal/ informal settlement is adjacent to the 126 MLD which comes under Juhapura which can be described as a largely unplanned area with mix of residential buildings, schools, places of worship, etc.
- Few downstream villages/ users of Fatehwadi canal water and Sabarmati river

Squatter/ informal settlement Opposite the STPs

There are approximately 600 to 700 families (roughly 1800 to 3500 persons in the entire stretch) in the squatter settlement and numbers vary as per work availability and return of inhabitants to original villages whenever required. Inhabitants consulted mentioned that they have been living in the informal settlement opposite the STPs since the last 12 years or so. Inhabitants of the settlement are mainly from Jabhua district, Madhya Pradesh and Dahod district, Gujarat. This population living in the settlement is highly mobile and inhabitants often go back to their villages and return after 15 to 20 days.

[32] *https://worldpopulationreview.com/world-cities/ahmedabad-population*
[33] *Source: population.un.org/wpp/, 1950 to 2035 Ahmedabad city Population(UA)*

People have moved to the area, from slums and rented accommodations during Covid pandemic due to loss of income and regular work. Most of the people (men and women) work as labour in the nearby industries. Women also go for domestic work in the nearby areas such as Juhapura.

There are higher proportion of men roughly 60% men and 40% women in the settlement as women move with their families only. More males were observed on the site than women and children. While women are living in the settlement, the numbers are lesser than that of young adult males. The temporary huts put up by the people are made of plastic sheet, corrugated sheets on frames, gunny bags, cartons etc. Very few structures have lower brick walls. Most of the temporary huts put up are used of living and one shop was observed but was not functional or open during any of the visits undertaken in the area. During evening handcarts were observed selling mainly vegetables and other items to the inhabitants. These are not stationery and are used for vending for a short period of time during the evenings/ night in the settlement.

Amenities and public services such as electricity, sanitation and water supply facilities are not available in the settlement. One of the respondents reported that he had dug a well on his own, in which good quality water is available at 40 feet. People also approached the existing 240 STP for getting drinking water which is free of cost. People defecate near the highway. Health problems reported in the area includes malaria, fever and swollen hands and legs. Approximately 50% of the people are vaccinated.

There are 3 to 4 private borewells from which the people take water for drinking and domestic use on payment basis. There are few children in the settlement. Some families keep goats for personal consumption for which they take fodder from STP during monsoon. This activity is restricted as per requirement of grass cutting in the STP during monsoon. People also take the goats for grazing and watering to the river bank which are affected due to the quality of river water.

Figure 34: Location of Slum, squatter settlement with Respect to 240 MLD STP

Downstream Villagers

Earlier, Ahmedabad used to get its water from Dharoi reservoir, constructed in 1976 upstream of Ahmedabad, that controls water and protects from flooding while Vasna Barrage constructed in 1976 downstream retains water in the Sabarmati river which is monsoon fed, along the city banks and diverts it through Fatehwadi canal for irrigation. The Fatehwadi feeder canal was first built in 1976 and channels water to four major talukas Sanand, Dholka, Bavla and Daskroi. The canal system has a command area of 28,000 to 30,000 hectares. The Narmada Canal, which crosses Sabarmati a few kilometres upstream from the city, is part of a larger canal network of Sardar Sarovar Dam. After the drought from 1980 to 1989, permission was sought to get water from the Narmada canal. The Narmada canal can feed excess water to the river and maintains the level of water in the river which is retained through Vasna Barrage.

The downstream villages get drinking water from the borewell/tube well and through the Narmada canal. People also use borewell for irrigation. The villages are covered under the Jal Jeevan Mission (JJM) which envisions to provide safe and adequate drinking water through individual household tap connections by 2024 to all households in rural India. Jal Jeevan Mission (JJM) has been launched in partnership with States, to enable every household in villages to have Functional Household Tap Connection (FHTC) in the next 5 years. It is envisaged that with FHTC, each household will have potable water supply in adequate quantity. Implementing agencies include Water and Sanitation Management Organization (WASMO), Gujarat Water Infrastructure Limited (GWIL) and Gujarat Water Supply & Sewerage Board (GWSSB). GWSSB mentions that the regional water supply schemes are based on reliable sources like tube-wells (Underground sources) or Surface water sources (Dam or Narmada water). Water is fed up to village level by transmitting water from bulk water transmission lines by the GWSSB. FHTC coverage is 100 % for households' in relevant talukas (Dholka, Bavla, Detroj, Daskroi, Sanand and Dhanuka for downstream villages of Sabarmati and for Fatehwadi canal)of Ahmedabad district are covered in Jal Jeevan Mission for drinking water supply. Based on the JJM data available[34], at taluka level coverage is 100 %. See table below.

Table 26: Habitation wise FHTC Coverage(Reported Till 06/03/2022) Financial Year: 2021-2022, Ahmedabad District[35]

S. No.	Block	Total Habitations as on 01/04/2021	Non PWS Habitations	With FHTC Coverage> =50 and			With FHTC Coverage> =75 and			With FHTC Coverage> =100%		
				Habs	House Holds	House Connections	Habs	House Holds	House Connections	Habs	House Holds	House Connections
1	BAVLA	54	0	0	0	0	1	2800	2503	53	37878	37878
2	DASKROI	116	0	0	0	0	0	0	0	116	84016	84016
3	DETROJ	68	0	0	0	0	0	0	0	68	28845	28845
4	DHANDHUKA	43	0	0	0	0	1	519	517	42	17220	17220
5	DHOLERA	41	0	0	0	0	2	2650	2432	39	12347	12347
6	DHOLKA	80	0	0	0	0	1	260	258	79	54201	54201

[34] https://ejalshakti.gov.in/IMISReports/Reports/WaterQuality/rpt_WQM_GPwiseTesting_P.aspx?Rep=0
[35] https://ejalshakti.gov.in/imisreports/

S. No.	Block	Total Habitations as on 01/04/2021	Non PWS Habitations	With FHTC Coverage> =50 and			With FHTC Coverage> =75 and			With FHTC Coverage> =100%		
				Habs	House Holds	House Connections	Habs	House Holds	House Connections	Habs	House Holds	House Connections
7	MANDAL	46	0	0	0	0	0	0	0	46	23333	23333
8	SANAND	99	0	0	0	0	0	0	0	99	60741	60741
9	VIRAMGAM	97	0	1	1650	1236	0	0	0	96	43133	43133
Total		**644**	**0**	**1**	**1650**	**1236**	**5**	**6229**	**5710**	**638**	**361714**	**361714**

Based on the consultations and assessment carried out downstream villages rely on borewell/tube well or Narmada canal water for source of drinking water. Due to issues with water pollution, Sabarmati river water is usually avoided for irrigation or drinking. The implementation of the proposed sub project will improve water quality being released into the river and meet requirements as per the NGT standards. Task Force set up by the High Court of Gujarat has disconnected around 400 connections from industrial units into the sewers and drains in the city, now from Eastern part of the Sabarmati river and the units are asked to resume operations only after connecting their effluents to CETPs/ETPs to reduce Sabarmati river pollution.

Consultations conducted for the above mentioned communities and groups are presented in section 8.3, Table 51 for outcome of consultation during preparation of ESIA and post disclosure. The key concerns raised by stakeholders have been incorporated in the ESIA for 240 MLD STP. The suggestions of the stakeholders by including monitoring of noise, sludge, air and water and its analysis for defining the baseline and mitigation measures. The project suggests improved management of all wastes and treated water quality to confirm with latest NGT suggested standards. Labour health and safety will be given high priority and appropriate measures to follow and monitor labour regulations have been suggested in the ESMP. Additional consultations will be undertaken after design finalization by DBOT Contractor.

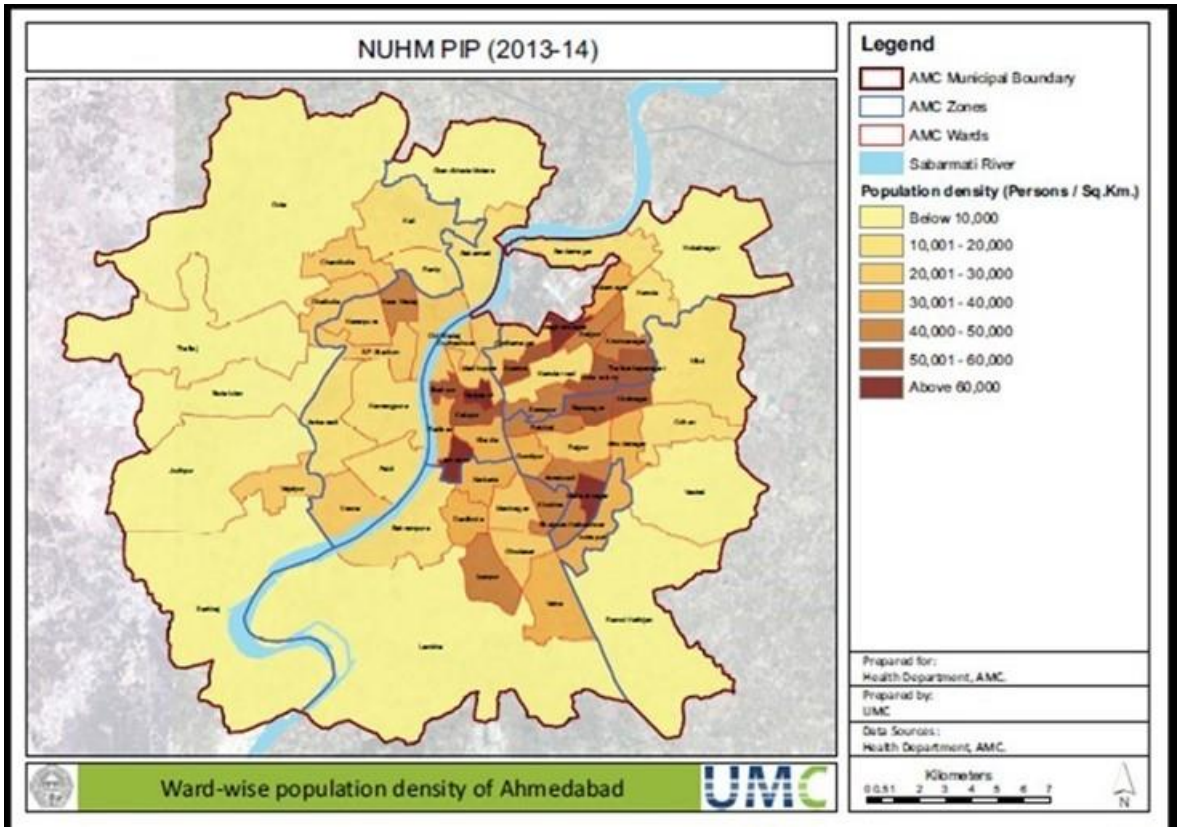


Figure 35: Population Density of Wards in AMC[36]

Demographic Profile: Sarkhej Ward

There are 14740 households in Sarkhej with a total population of 72727 with 37746 males and 34981 females. The average household size is 5 and the sex ratio is 927. Proportion of SC in total population is 10.41% and that of ST is 1.17%. Total literate population is 81.38%. Male literates comprise of 88.28% of total males and female literates are 74% of total females.

Workers and occupation

The proportion of total workers is 34.74% and main workers comprise of approximately 85% of total workers, in Sarkhej ward. More than 88.56% of the population comprises of other workers categories indicating occupation in the secondary and tertiary sectors given the presence of industries such as chemicals, petrochemicals, dairy, drugs and pharmaceuticals, power, transmission, etc in the city. Less than 0.5% is involved in household industries, 2.84% as cultivators and 5.39 as agriculture labours.

Health

The data for this section was collated from the Health Officer, AMC for Ahmedabad city and Health Aspect Study and Mitigation to improve the health in Catchment area of Identified Polluted River Stretches for the city. The proportion of cases in the west, Northwest and southwest zones was low less than 3% for AGE and fever between 2018 to 2021. For Jaundice, the proportion was higher at more than 15% for YR 2018-2021. Almost all ailments had an increase in YR 2019 before decreasing significantly in 2020.

[36] *Health Dept, AMC. City Health Plan: Ahmedabad under National Urban Health Mission (NUHM). Prepared by Urban Management Centre 2013.*

Table 27: Diseases in Ahmedabad City: 2018 - 20

Disease/ Ailment	Year	West Zone	N. West Zone	S. West Zone	Total cases for Ahmedabad city	% of cases in the Sewerage Catchment Zone
Acute Gastroenteritis (AGE)	2018	75	19	26	6767	1.77
	2019	67	13	83	6004	2.71
	2020	25	4	16	1779	2.53
	2021	22	7	34	2407	2.62
Jaundice	2018	161	162	238	3154	17.79
	2019	135	123	273	2610	20.34
	2020	31	13	45	580	15.34
	2021	60	12	57	129	1.77
Typhoid	2018	224	141	103	3286	14.24
	2019	267	104	154	4291	12.23
	2020	39	14	14	1137	5.89
	2021	66	13	32	1477	7.52
Cholera	2018	9	3	4	77	20.78
	2019	1	0	2	86	3.49
	2021	2	0	0	64	3.13
Fever	2018	75	19	26	6767	1.77
	2019	67	13	83	6004	2.71
	2020	25	4	16	1779	2.53
	2021	22	7	34	2407	2.62

Source: Health Officer, AMC for Ahmedabad city, 2021

3.6.1.1 *Gender issues/ concerns*

Women in the nearby settlement are working, mainly in the unorganized sector as semi-skilled and unskilled labour, domestic workers, construction/masonry work. Safety and security concerns for women/children were raised due to the labour influx for construction activities, open defecation, lack of street lights and similar issues as the settlement is informal. This has been addressed in the mitigation measures through community health and safety measures, employment of labour, both men and women from the informal settlement, setting up labour camp at suitable site to prevent any disturbance to the settlement, SEA/SH measures and provision of services such as drinking water supply and sanitation for the settlement through government schemes and programs.

The Labour Force Participation rate according to the current weekly status from July 2019 to September 2020 for urban areas of Gujarat is presented below and data indicates that LFPR for males were significantly lower for females in Gujarat.

Table 28: Labor Force Participation Rate (CWS) July 19 to Sept 20

State	Gujarat		India	
	Male	Female	Male	Female
Jul-Sep 2019	77.7	16.7	73.9	20.3
Oct-Dec 2019	78.8	18.5	73.8	21.1
Jan-Mar 2020	79.1	19.2	73.7	21.9
Apr-Jun 2020	74.4	17.7	71.7	19.6

State	Gujarat		India	
	Male	Female	Male	Female
Jun-Jul 2020	77.3	18.3	73.5	20.3

Source: GoI, Aug 2021, National Statistical Office, Periodic Labour force Survey (PLFS) July-September 2020, Ministry of statistics and Programme Implementation.

Institutional Set ups

Stakeholder groups identified during site assessment was STP staff, contractors and migrants living in squatter settlements in the vicinity of the STP.

Stakeholder consultations & Identified Groups

Consultations were carried out for the preparation of the draft ESIA report and the draft ESMF and SEP. Stakeholder consultation is a dynamic process and consultations will be carried out during the life cycle of the G-ACRP project. Consultations were also carried out on draft instruments and the instruments (ESIA and ESMP) will be updated based on the outcomes of consultations and redisclosed.

Due to Covid -19 pandemic and restrictions, consultations were carried out, from August to November 2021, online and as well as in-person and due precautions were followed for site activities. Additional consultations were also carried out in March 2022.

3.7 Governance & administrative context

For administrative purposes, the city is at present divided into 7 zones - Central, East, West, North, South, southwest zone, and northwest zone. Each zone is further split into wards. The area comes under the Ahmedabad Municipal Corporation, Ward no 52 Sarkhej as mentioned above In AMC, Drainage Department manages all sewerage and drainage (stormwater) related works and services. The Department applies for Consent to Establish and Operate from GPCB ad consent conditions are to be followed by all STPs. Under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 it is the responsibility of GPCB to inspect sewage or trade effluents, works, and plants for the treatment of sewage or trade effluent.

Operation and Maintenance of STPs and Pumping Stations are contracted out to various private agencies. In 1996, the Hon'ble High Court of Gujarat in their verdict directed the GPCB for the implementation of an Environmental Audit Scheme for the industries in the State of Gujarat. The scheme classified the industries which are required to submit periodical audit reports and the timetable thereof. It provides for submission of the audit reports to the GPCB first and subsequent action to be taken on. The scheme also envisages actions for failure to submit a report for industries and furnishing incorrect information on the part of auditors. Audit of STPs is carried out as per schedule and details submitted to GPCB.

3.8 Other developments in the Project Area and Sabarmati Riverfront

Gyaspur metro depot of Ahmedabad metro at the northern side of 240 MLD STP is the latest development in the project area. At present, the metro depot works in ongoing and may continue during the construction phase of the 240 MLD STP. The metro depot is across the highway and potential impacts identified are related to impacts on air quality and traffic management during the transportation of goods, material, and equipment during the construction phase. Construction was expected to be complete by 2022, with expected delays due to COVID 19. The project must check if permissions are required from Metro Authorities for any of the subproject activities.

Upcoming projects on the Sabarmati Riverfront by AMC includes road between Subhash Bridge and railway bridge on the western side, sports complex on the eastern side, sports complex behind National Institute of Design, Park between Nehru Bridge and Ellis Bridge, Multilevel parking on the western side and footbridge between Ellis bridge and Sardar bridge. None of these will qualify as Associated Facilities under ESS 1 definition.

A list of upcoming projects in Ahmedabad and their importance for identified subprojects is provided in ***Annexure VI***.

CHAPTER 4. ANALYSIS OF ALTERNATIVES

As per ESF, "The assessment [ESIA] will evaluate the project's potential environmental and social risks and impacts; examine project alternatives; identify ways of improving project selection, siting, planning, design and implementation in order to apply the mitigation hierarchy for adverse environmental and social impacts and seek opportunities to enhance the positive impacts of the project."

Analysis of Alternatives involves the following:

- Systematically compares feasible alternatives to the proposed project site, technology, design, and operation—including the "without project" situation—in terms of their potential environmental and social impacts.
- Assesses the alternatives' feasibility of mitigating the environmental and social impacts; the capital and recurrent costs of alternative mitigation measures, and their suitability under local conditions; and the institutional, training, and monitoring requirements for the alternative mitigation measures.
- For each of the alternatives, quantifies the environmental and social impacts to the extent possible, and attaches economic values where feasible.

The Analysis of Alternatives described in this chapter is structured to follow a 'narrowing approach' involving a series of logical steps, starting with the high-level strategy alternatives followed by a description of more detailed technology alternatives considered. Using this commonly adopted narrowing approach, the Analysis of Alternatives considers alternatives in the following sequence:

- Strategy Alternative: Abandoning the Existing Centralised Treatment to follow decentralized 'on site' treatment 'on site'
  Here, a scenario where existing STP would be abandoned, and residents will be using onsite decentralised treatment in septic tanks is considered against the proposed subproject

- 'Zero' or 'No Project' alternative;
  Here, without project scenario i.e., continuing the existing situation compared with the scenario where the proposed project rehabilitation is implemented

- Complete reconstruction of Existing Plant
  Demolition of existing plant to reconstruct a new STP in its place

- Design/ Technology Alternatives
  Technologies to achieve the stringent discharge standards suggested by NGT are compared with the current one. During Detailed design, this will be subject to further scrutiny and the best environmentally suitable alternative will be adopted.

4.1 Strategy Change: Abandoning Centralised Treatment in STP, to follow decentralized treatment 'on site'

Another option is the proposed development of onsite treatment in the catchment of Vasna 240 MLD STP. This involves onsite treatment in around 0.76 million units, for 240 MLD sewage.

- This is not viewed as an option by the residents of Ahmedabad, where centralized treatment was being provided by AMC for the past two decades, and infrastructure including sewer networks and sewage pumping stations have been built for this. This would mean abandoning the infrastructure built for this.

- An on-site system may not be appropriate also in existing small plot sizes, which have been developed considering that centralized treatment will be the norm.
- The soil of the region is alluvium with faster permeability, unsuited for large-scale decentralized options. This would further add to the soil pollution in this high dense industrial city.

4.2 Zero or NO project Alternative (without Project Scenario)

The existing STP was designed with ASP technology to achieve the following norms:

Table 29: STP Inlet Outlet Quality viz a viz Standards/ Norms

Sl. No.	Parameter	Unit	Designed Discharge Quality of Treated Sewage	Actual Inlet Quality, 2021	The actual quality of treated sewage at Outlet, 2021	Prevailing MoEFCC 2017[37]	NGT suggested Discharge quality, 2017
1.	BOD	mg/l	20	160	12	20	<10
2.	COD	mg/l	100	472.8	40.8		<50
3.	SS	mg/l	30	40	6	<50	<10
4.	pH	-	6.5 - 8.0	7.57	7.8	6.5 -9.0	5.5-9.0
5.	Residual Chlorine	mg/l	0.5	BDL	3.1		
6.	Fecal Coliform	MPN/100 ml	1000-10000	61	16	<1000	<230
7.	Oil Grease	mg/l	<10	BDL	BDL		
8	Total Nitrogen	mg/l		42.7	34.7		< 10
9	Total Phosphorous	mg/l		1.89	1.83		< 2

There is no provision for the removal of faecal coliform and bio-nutrients in the existing STP. With an existing treatment facility, it may not be possible to achieve the NGT suggested discharge quality. This may affect the surface water quality at Sabarmati and groundwater quality and health of the city and downstream of Sabarmati or Fatehwadi canal, in case of reuse for irrigation.

Due to the age of the STP, equipment's are not functioning as per design requirement, If the treatment plant is not upgraded, there may be impacts on the water quality of the Sabarmati River downstream which will affect any fauna, flora in the river, and also result in degradation of soil quality. If this is used for irrigation, it may have an impact on the health of the farmers and nearby communities. High chlorine content for disinfection may impact plant growth and soils. In addition, treatment costs are also high, and machinery needs upgradation. Since the proposed rehabilitation is minimal, rerouting of sewage during phased rehabilitation can be easily achieved and impacts of works near sewage can be minimized by good construction scheduling and rerouting to existing STPs in the Vasna STP agglomerate/ cluster, taking advantage of agglomerated treatment units.

STP upgradation will result in achieving the NGT suggested standards and help in improved health of the people and environment without abandoning the existing STP area.

4.3 Demolition of existing STP and Complete reconstruction of existing STP

As against proposed rehabilitation, the alternative, namely complete reconstruction of existing STP was examined. This involves the demolition of all structures on the existing STP plot, which is almost fully built. In case of such a scenario, it will be required to stop treatment and allow at least 80 percent

[37] *These Standards shall apply to all STPs to be commissioned on or after the 1st June, 2019 and the old/existing STPs shall achieve these standards within a period of five years from date of publication of this notification in the Official Gazette.*

of the sewage to bypass without treatment during the demolition period, as Vasna 240 STP is the largest among all STPs in the Vasna STP agglomerate/ cluster. This also would involve demolition and reconstruction works in un-hygienic conditions, for a longer duration during demolition and reconstruction phases. Bypass of near around 200 MLD of sewage, in this case, would have impacts on the quality of water in Sabarmati, groundwater, and downstream communities, considering the quality of sewage at the inlet. This also requires detailed investigations to further analyse the upstream infrastructure to ensure that the entire estimated sewage would eventually be conveyed to the existing 240 MLD STP location.

Considering the available capacity in Gravity Trunk and present flow (which is less than STP capacity), a strong possibility for constructing de-centralized STPs, however, using existing infrastructure with modifications makes more economic sense than fully abandoning this.

No bypass shall be allowed from WB funder facility, as per the directions of National Green Tribunal (NGT)[38] and WB EHS. AMC is updating sewer system (as part of G-ACRP) and storm water infrastructure to curtail any storm water ingress to sewer system. STP once upgraded and obsolete equipment are upgraded, it will be able to take the additional 10% load which comes into the STPs during heavy rains. FR proposes the TSPS and STP facilities under G-ACRP shall be designed to handle upto 15% additional flow over and above the design flow values to ensure that no untreated wastewater is discharged into the river during rains. AMC also takes the opportunity offered by agglomeration pf STPs at Pirana and Vasna to divert and treat peak flows.

4.4 Technology Alternatives

4.4.1 Screening of Technologies for STP

At present, the following sewage treatment technologies are the best available to arrive at NGT suggested discharge standards:

- Sequencing Batch Reactor (SBR)/ Cyclic Activated Sludge Process.
- Moving Bed Biofilm Reactor (MBBR) Process (Anoxic-Aerobic Type) with Coagulant Dosing Facility.
- Anaerobic-Anoxic-Oxic (A2O) Process (Biological Nitrogen and Phosphorous Removal Process)
- Membrane Bioreactor (MBR)

Table 30: Comparison of Various Biological Treatment Options

Sl. No	Treatment process	Advantages	Disadvantages
1	Anaerobic/ Anoxic/ Aerobic (Oxic) A2O process	• Both nitrogen and phosphorus are removed simultaneously in this process • A portion of alkalinity consumed in the aerobic tank is recovered by denitrification reaction in the anaerobic reaction tank by recycling nitrified liquor from the aerobic tank to the anoxic tank • Well-proven technology worldwide	• Generally, this process needs a larger volume of reaction tank than that used in the standard activated sludge process. • The process operating parameters of nitrogen removal, such as SRT conflict with that of phosphorus removal; therefore, the

[38] Page 20. 3 nd QUARTERLY REPORT OF THE CENTRAL MONITORING COMMITTEE (CMC) IN COMPLIANCE OF THE ORDER DATED 21.09.2020 (UPLOADED ON 26.09.2020) IN THE MATTER OA No. 673 of 2018 (on critically polluted river stretches (such as Sabarmati – see pages 20, 23); bypass of sewage is critically viewed by NGT in http://www.indiaenvironmentportal.org.in/files/file/Kharicut-canal-pollution-NGT-order.pdf)
Available at:
https://greentribunal.gov.in/sites/default/files/news_updates/Status%20Report%20filed%20by%20CPCB%20in%20OA%20No%2082%20of%202021(SZ).pdf;
Accessed on: November 2021

Sl. No	Treatment process	Advantages	Disadvantages
			optimum SRT condition needs to be set to remove both nitrogen and phosphorus.
2	Sequential Batch Reactor (SBR)	• Smaller footprint • High-quality effluent • Similar to extended aeration • Ability to handle shock loads. • Efficient use of aeration system • The successful functioning of plants in India and worldwide	• High automation • No energy production • Skilled manpower required • Decantation mechanisms are patented
3	Moving Bed Biofilm Reactor (MBBR)	• Less space requirement	• High media quantity requirement • Long shut down period for plant maintenance • will not remove phosphorous biologically • limited experience in India for much higher capacity plants.
4	Membrane Bioreactor	• Separate biological process • No tertiary treatment required	• Low sludge production • High capital & maintenance cost

Source: Options Analysis and Feasibility Assessment report Capacity Augmentation and technology upgradation of existing STPs: (Deliverable No. 2- Western Side), Nov 2021. Prepared by Royal Haskoning DHV Consulting Pvt. Ltd. For AMC

4.4.2 Factors for Selection of Treatment Technology

4.4.2.1 Compliance with the NGT standards

STP shall treat the sewage to the quality prescribed by NGT which includes biological nutrient removal. Hence there shall be the improvement of the water quality of River Sabarmati. Also, proposed upgradation shall avoid nuisance to the public due to the potential odor from the STP. It is intended to adopt a treatment technology that should be sustainable and be capable of overcoming the above-mentioned constraints and requirements. To achieve the above, it has been decided to consider Suspended Growth systems such as A2O Process, Sequential Batch Reactor (SBR), and Membrane Bioreactor (MBR).

4.4.2.2 Utilization of Existing Units and Process Reliability for Consistent Effluent Quality

The most important criterion for the selection of appropriate treatment technology is the maximum availability of the Plant to give consistent adopted treated effluent quality for discharge and reuse. The process should, preferably, be stable and resilient against shock loading i.e., it should be able to continue operation and to produce acceptable treated effluent quality under unusual conditions. Therefore, the System must accommodate the normal inflow variations as well as infrequent, yet expected, more extreme conditions. This pertains to the sewage characteristics (e.g., occasional illegal discharges, variations in flow and concentrations, high or low temperatures, etc.).

4.4.2.3 Capital Cost

The second most important criterion for the selection of appropriate treatment technology is "Not entailing excessive cost" which implies that the financial cost should not be excessive in relation to the financial capability of the Sector concerned and to the discharge standards or environmental protection envisaged.

4.4.2.4 Less Footprint Requirement

The third important criterion for the selection of appropriate treatment technology is the minimum possible footprint requirement considering scarce land resources available in the city.

4.4.2.5 Ease in Operation & Maintenance and Lower Associated Cost

The fourth important criterion for the selection of appropriate treatment technology is the ease of operation and maintenance and lower associated cost. To operate and maintain an STP, appropriate technical and managerial expertise must be available. Due to the scarcity of qualified personnel in the field of wastewater treatment, operation and maintenance of the technology should be trouble-free. In addition, the operation and maintenance cost should be the least possible to avoid excessive burden on the urban bodies.

4.4.2.6 Proven Track Record of Operation in Indian climate

The selected treatment technology should have a very good track record of operation, availability of expertise, and spare parts in India.

Recommendation

- As the SBR process is fully aerobic and will work as a perfect reactor that ensures 100% treatment, thereby there is no odor nuisance. It also gives excellent Treated Quality by Biological process alone to BOD_5<10, TSS<10, Total Nitrogen (TN) <10, Total Phosphorus (TP)≤1for municipal sewage of medium to high strength without adding Chemicals. SBR may be an option to achieve the desired NGT Discharge Norms.
- A conventional ASP can be upgraded without increasing the footprint by opting for a Moving Bed Bio Reactor (MBBR) to be inscribed in the aeration tank and duplicating the hydraulic piping and pump sets and the primary clarifiers can be modified as rim-flow clarifiers and secondary clarifiers inscribed with tube settlers. MBBR with Tertiary Treatment may be an option to achieve the desired NGT Discharge Norms consideration of disadvantages mentioned in ***Table 28*** shall be made at the design stage.
- Area requirement for Membrane Bioreactor (MBR) is less as compared to that required for other alternatives. Further Tertiary Treatment is not required for MBR. MBR technology is good and generates a high quality of effluent (5-7m years) but the capital cost and O&M cost are very high. Membrane life is also short, and membranes need to be replaced after a certain interval of time which has a high periodic cost.
- Existing ASP can be upgraded by modifying its variants such as SAF, SBR, MBBR, etc.
- The Inlet chamber should be equipped with an online sensor for managing the high variability in the inlet water quality.
- Piping and pump material should be non-corrosive material.
- High Court of Gujarat has constituted a task force that is disconnecting all illegal industrial connections to sewers. To avoid the issue of such mixing, a holding tank is recommended with online monitoring of inlet sewage to avoid the failure of the pump and treatment system.

Since the proposed subproject will be built on a DBOT model, the contractor will finalize the design and update the ESIA and ESMP after the assessment of the final technology to ensure the desired standards.

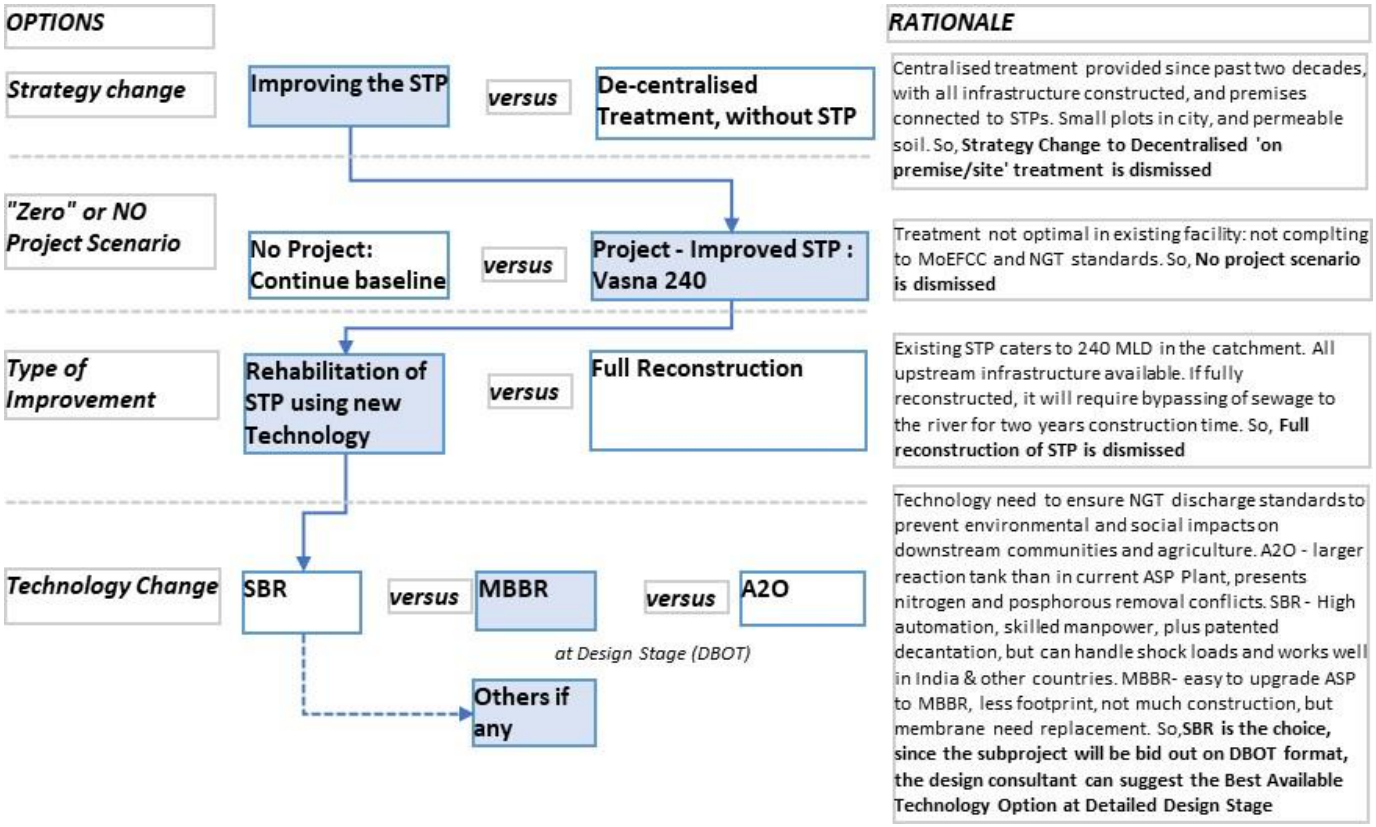


Figure 36: Analysis of Alternatives

Though Feasibility Report suggests SBR as the best alternative, considering its exorbitantly high costs, and possible issues related to required depths at existing tanks for SBR and hydraulic gradient which may impact the flow of sewage and its resultant implications on the river, and worksite, it is suggested that DBOT Procurement be Technology Agnostic – to focus on the Best Available Technology Option, taking into account environmental, social and economic considerations. Explore all possible options as well, including exploring whether existing technology can be upgraded as it is (ASP-based), with additional tertiary treatment for biological nutrient removal. SBR can be considered concerning the benefits regarding odour control, efficient sludge collection and biological process. The finalised rehabilitation option is not likely to trigger LA/ IR impacts and risks or livelihoods losses as the present site only will be utilised.

CHAPTER 5. ASSESSMENT OF ENVIRONMENTAL AND SOCIAL RISKS AND IMPACTS

5.1 Proposed Subproject details as per Feasibility Report

The sub-project is proposed for supporting efficient sewage treatment for Western Zone -1 covering approximately 153km^2 area of AMC. The area of Southwest Zone and Northwest Zone between SG Highway and SP Ring Road, Motera, Chandkheda, Chenpur, Gota, Jagatpur, Bopal, Shilaj, Bhadaj, and newly added AUDA area in AMC falls under this zone. The entire sewage from this zone is ultimately conveyed to a centralized 240 MLD STP at Vasna. The estimated contributing population for this zone is about 0.76 million. As per the SCADA records, about 220 MLD sewage is generated at present in this zone. Details are provided in section 1.3 of this report.

FR recommends limiting the capacities of STP based on the adequacy of existing Trunk outfall sewers. The additional capacity can be built in the subsequent phase once the outcome of the feasibility of allied infrastructure and end-to-end connectivity is ensured, and the ongoing Master Planning exercise is complete. The capacity of STP is recommended as 240 MLD which is the existing capacity of the STP.

FR has suggested 4 alternatives (refer to section 4.4) for the proposed STP rehabilitation of which Sequential Batch Reactor (SBR) technology has key advantages such as:

- Complete treatment in a single basin: Separate chambers are not required as in the case of an ASP-based STP.
- Very Robust and Consistent performance for changing Influent Loads
- Excellent Treated Quality by Biological process alone to BOD_5<10, TSS<10, Total Nitrogen (TN) <10, Total Phosphorus (TP)≤1for municipal sewage of medium to high strength without adding Chemicals.
- Lowest Footprint/ Land required
- Power savings at rated capacity and lower organic and hydraulic loads with the help of DO control in the SBR basin.
- Easy to operate the plant as the design provides for advancing the cycles for storm/ heavy monsoon conditions too.
- Separation of Mixing and Aeration equipment for providing separate time zones for Aerobic and Anoxic Process to achieve Denitrification/ Phosphorus reduction and BOD reduction and Nitrification respectively.
- As the SBR process is fully aerobic and will work as a perfect reactor that ensures 100% treatment, thereby there is no odor nuisance.

Though Feasibility Report suggests SBR as the best alternative, considering its exorbitantly high costs, it is suggested that the DBOT Procurement be Technology Agnostic – to focus on the Best Available Technology Option to explore all possible options and in consideration of the environmental, social and economic considerations.

5.2 Environmental and Social Risks and Impacts of the Subproject

The following list is an outline of the environmental and social impacts that are expected to occur:

- Risks and Impacts on water quality of the river
- Risks and Impacts on air quality
- Noise pollution
- Risks and Impacts on soil
- Risks and Impacts on Biodiversity

- Impact on socio-economic aspects of the surrounding community including impacts due to labor influx, community safety and increased GBV and SEA/ SH risks
- Potential impacts on health and safety
- Impacts of discharge from STP on adjoining communities, especially during construction phase
- Risks and Impacts on community health and safety due to access road construction of 150 m.

Usually, subprojects involve several interdependent facilities and activities mentioned above. The impacts of allied facilities may become relevant and will be identified during the detailed design stage and C-ESIA/ C-ESMP will be newly prepared/updated then incorporating risks and impacts on these.

This subproject is aimed at improving the environmental quality and overall quality of life of the city by improving the existing STP to ensure the latest standards/ guidelines are set as per regulations. Hence, the overall impact would be beneficial to the people of Ahmedabad and those downstream of the receiving water bodies. Most of the risks will be limited and largely localized, temporary i.e., during the construction stage.

5.3 Impact Assessment Methodology

The methodology to assess the impacts at the subproject level is presented here. Impacts are assessed based on Magnitude, Duration, Significance, and Likelihood of the impacts and Sensitivity of the receptors.

5.3.1 Magnitude and Duration of Impacts

The assessment of magnitude is undertaken in two steps. First, the key issues associated with the subproject are categorized as beneficial or adverse. Second, potential impacts shall be categorized as High, Average, Low, or negligible based on consideration of the parameters such as:

- Temporal extent (duration) and the likelihood of the potential impact;
- The spatial extent of the potential impact;
- Reversibility of the Impact;
- Likelihood of the impacts

The magnitude of the potential impacts of the subproject is identified according to the categories outlined in ***Table 31*** .

Table 31: Aspects for Determining the Magnitude of Impacts

Aspects	**Magnitude**			
Duration of the potential impact	Long term (more than 20 years)	Medium Term - The lifespan of the Program (5 years)	Short Term - 1 to 2 years or less than the lifespan of the project	Temporary - with no detectable potential impact
The spatial extent of the potential impact	Regional – much beyond project boundaries	City - Beyond immediate Project components, site boundaries, or local area	Site - Within project site boundary	Micro - A specific location within the project component with no detectable potential impact
Reversibility of potential impacts	Irreversible - Potential impact (including positive impact) is effectively permanent, requiring considerable intervention to return to baseline	Largely Reversible- Potential impact requires a year or so with some interventions to return to baseline	Reversible - Baseline returns Naturally or with limited intervention within a few months	No change - Baseline remains constant
Likelihood of potential	Certain - Commonly occurs under typical	Likely - Usually seen occurring under most situations	Occasional - Occurs under abnormal,	Unlikely to occur

Aspects		Magnitude
impacts occurring	operating or construction conditions	exceptional, or emergency conditions

5.3.2 Sensitivity of Receptor

The sensitivity of a receptor shall be determined based on a review of the population (including proximity/numbers/vulnerability) and the presence of features on the site or the surrounding area. The criteria for determining receptor sensitivity of the program's potential impacts are outlined in ***Table 30***.

Table 32: Criteria for Determining Sensitivity

Sensitivity Levels	*Description*
High	The vulnerable receptor with little or no capacity to absorb proposed changes or minimal/limited opportunities for mitigation
Medium	The vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low	The vulnerable receptor with good capacity to absorb proposed changes or/ and good opportunities for mitigation
Negligible	Non-vulnerable receptor

5.3.3 Significance of the impact

The significance of potential impacts is established using the impact significance matrix shown in ***Table 31*** below.

Table 33: Assessment of Significance of Negative and Positive Impacts

Aspects		*Sensitivity/ Vulnerability/ Importance of Resource/ Receptor*		
		Low	**Medium**	**High**
The magnitude of Negative Impact	**Negligible**	Negligible	Negligible	Minor
	Low	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major
The magnitude of Positive Impact	**Negligible**	Negligible	Negligible	Minor
	Low	Negligible	Minor	Moderate
	Medium	Minor	Moderate	Major
	High	Moderate	Major	Major

5.3.4 Environmental and Social Risks and Impacts in Local Area

5.3.4.1 ESS 1: ASSESSMENT AND MANAGEMENT OF E&S RISKS AND IMPACTS

As all the proposed major structural interventions are within the STP or TSPS sites or their structures, no direct adverse impacts are envisaged on physiography or land use. Road repairs and upgradation may create temporary impacts to people and traffic during the construction and maintenances stages, which could be managed through traffic diversions, information to communities, barricading and safety precautions (for communities and workers), and watch and ward in important areas. Proposed subproject involves construction activities including civil, electromechanical, and painting works requiring labour-intensive works in the odorous area near sewage/ waste water, and their stay at the site for about 3 years, treatment of sewage as is, along with new construction/ modifications required for technology upgradation, discharge of treated water and disposal of sludge and other wastes including construction and demolition (C&D) wastes, use of resources such as water and power during construction, pollution generation from storage and handling of material, use of paints and other chemicals for construction activities, transportation of raw materials, wastes and sludge, reuse of treated water for irrigation, will pose risks and impacts. Work requires very detailed and clear

sequential planning, scheduling as the existing operations shall not suffer during construction works. The activities will be labour-intensive with risks of accidents such as working at heights, excavations, work in enclosed areas, and activities near ponded sewage in large tanks . Impacts and risks are mainly during the construction phase and area assessed as moderate which can be managed by following regulations, adopting best practices for similar projects, training of staff/manpower; and ensuring avoidance, monitoring, and implementation of mitigation measures.

As all the proposed structural interventions are within the STP premises or its structure, no direct adverse impacts are envisaged on communities including on the disadvantaged or vulnerable people. There may be indirect impacts on communities such as increased access for traffic and pedestrian movement due to improved road, increased labor opportunities, availability of lights during evening and nights, discharge from STP on adjoining communities, especially during construction phase, impacts due to labor influx including increased risk of GBV and SEA. Therefore, project will need to make extra efforts to reach out through stakeholder engagement and effective GRM, to the disadvantaged and vulnerable persons and groups to involve them in both preparation and implementation. However, there may be indirect impacts such as better accessibility due to access road construction, enhanced safety and security due to project activities, provision of sanitation facilities in Juhapura, etc. on communities especially as the project will need to make extra efforts to reach out to the disadvantaged and vulnerable persons and groups to involve them in both preparation and implementation.

The rehabilitation proposed involves only structural upgradation of some components, replacing some machinery, and heavy maintenance. Since works will be carried out in the existing STP site, where operation of STP will go hand in hand with construction/ rehabilitation works; in this narrative, both construction and operation stage impact and risks are discussed together in this section. Since the works happen in existing STP premises, long-term impacts and risks on land use, erosion, sedimentation and biodiversity impacts are not expected. The river is practically dry during the most period of the year, and it is modified without any native riparian cover except invasive species.

The proposed subproject involves various activities during the construction and operation phases. The process of identifying potential impacts for each environmental parameter was carried out using quantitative and qualitative methods and will be used as the basis for determining the mitigation that must be carried out to minimize and prevent impacts. The potential environmental and social risks and impacts of the proposed project in the local area on water quality and quantity, air quality, soil, noise levels, and socioeconomic aspects of the area were assessed as part of ESS 1 and are as follows.

Construction and Operation stage impacts and risks under each of applicable ESSs

5.3.4.2 ESS 2: LABOUR AND WORKING CONDITIONS

AMC will contract agencies or DBOT contractors to design, undertake civil works, agencies/ firms to support core functions; primary suppliers of material/ equipment, and other implementation support partners. These agencies' contractors or consultants could be from anywhere in the country. Construction works will require a labor force and associated goods and services. Based on contract sizes and the project implementation schedule, the construction workforce/ manpower has been estimated as 200 for Vasna 240 STP rehabilitation. These will be the skilled and semi-skilled workforce of contractors who will stay in or near the site mostly (or in the city) for a construction period of 3 years this DBOT contractor (or usually subcontractors) set up their machinery and plants required at the worksite/ pre-determined and approved other sites in agreement with AMC. In addition, there will be suppliers, transporters of material, and their labor who will float in and out of the site during the work period.

The sub-project shall comprise the following types of workers:

1. ***Direct workers:*** Direct workers will include the project managers and supervisors, who are employees of AMC. As per the structure of PIU and AMC drainage Department, the estimated number of direct workers is not likely to exceed 10.
2. ***Contracted workers:*** Entire workforce deployed by the Contractors are considered as contracted workers. The Contractor(s) might further engage multiple subcontractors, whose workforce engaged will also be contracted workers. As per the current work scenario in India and Gujarat, these may also include Migrant workers
   Migrant Workers: The migrant workers are those who are employed for the subproject but do not belong to the Project region and are not normally expected to return to their places of residence after work hours. The number of migrant workers in any contract package would depend on multiple reasons including preference of contractors/ subcontractors to source labor, worker unavailability in the area for the purpose, and lack of technical skills and capacity. The migrant workers could be at all levels and include unskilled and semiskilled construction labor and may include male and women labor force. The migrant workers are either directly engaged by the contractor or through labor contractors, who supply the workforce as per the needs of the contractors.
3. **Primary Supply Workers:** No primary supplier or primary supply workers are anticipated as all goods and services essential to the core functions of the project shall be provided by the contractor as per the DBOT contract which will be agreed with AMC.
4. **Community Workers:** Community workers are not envisaged. Implementation of Emergency Action Plans (EAPs) for Disaster Management, will be supported by broader community involvement.

For the existing STP operation, there are 64 total staff/ workers including working in three shifts in the STP. There is no accommodation or arrangements of residing in the STP for STP staff and workers. Health and safety impacts on workers is expected during the construction period as STP will be in operation and construction of the new STP will be undertaken within the STP premises. There may be environment, occupational health and safety concerns. AMC/ Design consultant have proposed a 3 months period for handholding and taking over and DBOT staff will do both STP operations and construction activities to reduce risks and integrating and streamlining the operations and construction activities within the premises simultaneously.

Expected Negative Risks and Impacts

With the high population density and the metropolitan nature of the city, it has many vehicles, industrial and commercial activities which results in various sources of urban air pollution in the city. The proposed subproject activities may potentially impact the air quality during construction, operations, and maintenance of sub-projects with the addition of construction vehicles, construction activities, use of machinery, and fuel combustion. In addition, the odor may emanate from STP processes/ release of gases, use of chemicals, sludge, and treated sewage and may impact the communities near STPs, pumping stations, and discharge points.

The most significant Occupational Health and Safety (OHS) hazards associated with the Rehabilitation of existing STPs occur during the construction phase and include activities with moderate risk for workers if not managed adequately are listed below. These apply to workers/ laborers engaged in the implementation of the subproject. Expected negative impacts and risks due to various components of the proposed subproject are as follows:

Operation of Existing STP, Demolition activities and Construction of new STP

- Safety issues like injuries/ accidents leading to injuries and or fatalities due to lack of PPEs, adequate safety precautions and non-compliance with SoPs. Working at heights on the

top of STP (esp. when railing is absent or removed), falls from elevation associated with working with ladders, scaffolding, and partially built or demolished structures

- Removal of any large built structures, machinery or equipment and resultant over exertions and manual handling, potential fall of materials or tools, as well as ejection of solid particles from abrasive or other types of power tools which can result in injury to the head, eyes, and extremities.
- Use of heavy machinery, cranes, JCB, electrical equipment with non-compliance to safety procedure and SoPs for hazards like physical contact, spills, dust, emissions, and noise. Heavy equipment operators have limited fields of view close to their equipment and may not see pedestrians close to the vehicle. Center-articulated vehicles create a significant impact or crush hazard zone on the outboard side of a turn while moving.
- Slip and fall associated with poor housekeeping, such as excessive waste debris, loose construction materials, tools, liquid spills, and uncontrolled use of electrical cords and ropes on the ground
- Exposure to sludge, waste screenings, dust, during dismantling, fumes/ burns from any chemicals, etc utilized in any of the structures/machinery.
- Safety issues like injuries/ accidents leading to injuries and or fatalities due to lack of PPEs, adequate safety precautions and noncompliance with SoPs.
- Working near impounded sewage and sludge as in STP tanks with risk of fall/drown, odor nuisance, gaseous emissions (toxic gas inhalation), pathogenic agents
- Working in confined spaces, for example, during deepening of tanks; especially when water table is low. Confined spaces include: sewers, pipes, and access shafts, ditches and trenches
- Working with heavy machinery, including Thickener cum Dewatering machine (COTDM) feed sump, transformer, UV channel, Belt filter press, Construct MC3 (1 no.) consists of Transformer, Blower room, MCC Room etc.
- Working with electricity/ electrical installations, appurtenances
- Signages for proposed construction areas and operation areas to prevent access of restricted area by untrained labor/ workers.
- Working near ponded sewage as in STP tanks with risk of fall/ drown, odor nuisance, gaseous emissions (toxic gas inhalation), pathogenic agents

Repair works at TSPS

- Safety issues like injuries/ accidents leading to injuries and or fatalities due to lack of PPEs, adequate safety precautions and non-compliance with SoPs.
- Working with heavy machinery, including Thickener cum Dewatering machine (COTDM) feed sump, transformer, UV channel, Belt filter press, Construct MC3 (1 no.) consists of Transformer, Blower room, MCC Room etc.
- Working with electricity/ electrical installations, appurtenances
- Working near Sewage/ Wastewater

Green house model, Sludge drying, Solar Rooftop and connection to Grid

- Safety issues like injuries/accidents leading to injuries and or fatalities due to lack of PPEs, adequate safety precautions and non-compliance with SoPs.
- Working near sludge tanks with risk of fall/ drown, odor nuisance, gaseous emissions (toxic gas inhalation), pathogenic agents
- Works near hazardous/ electronic / electrical constituents, chords, appliances
- Multiple handling of sludge, which may have pathogens/ coliforms and working in greenhouse with high moisture, temperature, pathogens
- Generation, Storage and Disposal of end-of-life solar panels which contains hazardous constituents
- Handling of broken solar panels during repairs

- Lack of use of PPEs/ protection measures

Labour camp

- Inadequate or lack of facilities and amenities at worker camp, including drinking water, sanitation, fuel, proper ventilation, crowding, lighting, etc.
- Safety and Security issues
- Lack of medical facilities for injuries, accidents, ill health and pandemic related facilities such as treatment, isolation, testing, medical care, sanitizing quarters, etc.
- Stray animals, snake and scorpion bites related aspects for health and safety.

Common Risks & Impacts

- inadvertent or intentional trespassing, including potential contact with hazardous materials, contaminated soils and other environmental media, buildings that are vacant or under construction, or excavations and structures which may pose falling and entrapment hazards
- Using vehicles on public and project roads, resultant accidents/injuries
- Exposure to dust, noise (resulting in disturbances and hearing loss), the sun, heat and wet weather
- Working with hazardous materials such as chemicals (if in excess quantity), fuels, cement.
- Long term effects on life due to exposure to chemical/ hazardous wastes
- Exposure to illnesses, communicable diseases, COVID-19
- Exposure to mental or physical harassment, SEA/SH, and injury from interpersonal conflicts.
- Exposure to floods, earthquakes, and other natural and manmade disasters
- Considering the vegetation growth, snake or scorpion bite may occur during construction or operations. Presence of any other wildlife during any construction or demolition activities.
- Inadequate accommodation facilities and amenities at labour camps, including inadequate sanitation and health facilities at work site.
- Non-payment of wages and lack of compliance to mandatory labour related requirements
- Discrimination in Employment (e.g., abrupt termination of the employment, working conditions, wages or benefits etc.)
- Sexual harassment at work
- Security of women work force
- Absence or inadequate or inaccessible emergency response system for rescue of labour/ workforce in situations of natural calamities.
- Health risks of labour relating to HIV/ AIDS and other sexually transmitted diseases

Other risks that would be applicable for all types of workers would be as follows:

- Unclear terms and conditions of employment
- Discrimination and denial of equal opportunity in hiring and promotions/ incentives/ training opportunities
- Denial for workers' rights to form worker's organizations
- Absence of a grievance mechanism for labor to seek redressal of their grievances/ issues

Wastewater treatment facility operators may be exposed to physical, chemical, and biological hazards depending on the design of the facilities and the types of wastewater effluents managed. Examples of these hazards include the potential for trips and falls into tanks, confined space entries for maintenance operations, and inhalation of VOCs, bioaerosols, and methane, contact with pathogens and vectors, and use of potentially hazardous chemicals, including chlorine, sodium and calcium hypochlorite, and ammonia.

Project workers are likely to be exposed to the above identified risks over the estimated 3 years of construction. Workers with low experience of working on similar construction project are expected to be more vulnerable as their skillsets, experience and understanding of health and safety will probably be limited compared to the skilled workers who will have worked on similar projects and have sufficient training. However, the project site in the city of Ahmedabad with many health care facilities near the site. Here, services from emergency first-aid response to Quaternary care are available within 2 km distance.

OHS Risks of common construction activities during various work stages are presented in ***Annexure IV.*** Mitigation measures are presented in ESMP.

Positive Impacts

The subproject will provide opportunities for workers and improve their economic and overall development. It will also give a fillip to the economy through its upstream-downstream linkages, especially, material procurement, job opportunities in the surrounding area by triggering the establishment of many small local shops, and service providers during the construction period, some of which may continue after this period. Unskilled and semi-skilled labor work can be sourced from the squatter settlement as per availability and willingness of labor. Women can also be hired for specific tasks from the squatter settlement. Since the settlement is nearby some women may be willing to work on-site as labor.

It will also trigger improvement in working conditions (Use of safe work practices, Fire Safety and Disaster Management, awareness on the need to follow safe practices, health camps/checkups, Covid appropriate behavior, labor camp management, and facilities), Odor and air quality of local area will improve actually because now odor & overall odor and air quality of the local area, thus influencing the work culture of the area positively and improving health of workers in this site and neighboring STPs, and metro depot and other facilities.

OHS Risk management strategies

- Training of workers in lifting and materials handling techniques including the placement of weight limits above which mechanical assists or two-person lifts are necessary
- Planning work site layout to minimize the need for manual transfer of heavy loads
- Selecting tools and designing workstations that reduce force requirements and holding times, and which promote improved postures, including, where applicable, user adjustable workstations
- Implementing administrative controls into work processes such as job rotations and rest or stretch breaks Implementing good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths
- Cleaning up excessive waste debris and liquid spills regularly
- Locating electrical cords and ropes in common areas and marked corridors
- Use of slip retardant footwear If fall hazards exist, a fall protection plan should be in place
- Training and use of temporary fall prevention devices, such as rails or other barriers able to support a weight of 100 Kg, when working at heights equal or greater than two meters or at any height if the risk includes falling into operating machinery, into water or other liquid, into hazardous substances, or through an opening in a work surface
- Training and use of personal fall arrest systems, such as full body harnesses and energy absorbing lanyards able to support 2250 kg as well as fall rescue procedures to deal with workers whose fall has been successfully arrested. The tie in point of the fall arresting system should also be able to support 2250 kg

- Use of control zones and safety monitoring systems to warn workers of their proximity to fall hazard zones, as well as securing, marking, and labeling covers for openings in floors, roofs, or walking surfaces
- Using a designated and restricted waste drop or discharge zones, and/ or a demarcated lift/ chute for safe movement of wastes from upper to lower levels
- Conducting sawing, cutting, grinding, sanding, chipping or chiseling with proper guards and anchoring as applicable
- Maintaining clear traffic ways to avoid driving of heavy equipment over loose scrap
- Use of temporary fall protection measures in scaffolds and out edges of elevated work surfaces, such as handrails and toe boards to prevent materials from being dislodged
- Evacuating work areas during blasting operations, and using blast mats or other means of deflection to minimize fly rock or ejection of demolition debris if work is conducted in proximity to people or structures
- Wearing appropriate PPE, such as safety glasses with side shields, face shields, hard hats, and safety shoes
- Planning and segregating the location of vehicle traffic, machine operation, and walking areas, and controlling vehicle traffic through the use of one-way traffic routes, establishment of speed limits, planning traffic movement with Local traffic Police Department, and on-site trained flag-people wearing high-visibility vests or outer clothing covering to direct traffic
- Ensuring the visibility of personnel through their use of high visibility vests when working in or walking through heavy equipment operating areas, and training of workers to verify eye contact with equipment operators before approaching the operating vehicle
- Ensuring moving equipment is outfitted with audible back-up alarms
- Using inspected and well-maintained lifting devices that are appropriate for the load, such as cranes, and securing loads when lifting them to higher job-site elevations.
- Dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements
- PPE, such as dusk masks, should be used where dust levels are excessive the use of excavation dewatering, sidewalls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning
- Providing safe means of access and egress from excavations, such as graded slopes, graded access route, or stairs and ladders
- Avoiding the operation of combustion equipment for prolonged periods inside excavations areas where other workers are required to enter unless the area is actively ventilated
- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated materials (as in STP tanks, pumps)
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements Prior to dismantling or demolition for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury
- Use of waste-specific PPE based on the results of an occupational health and safety assessment, including respirators, clothing/ protective suits, gloves and eye protection
- Awareness and Use of PPEs while working with Solar panels
- Storage of end-of-life solar panels, without impact on communities
- Description of response activities for life and fire safety, in the event of a spill, release, emergencies, disasters especially floods
- Definition and implementation of permitted maintenance activities, such as hot work or confined space entries

- Provision of suitable personal protection equipment (PPE) (footwear, masks, protective clothing and goggles in appropriate areas), emergency eyewash and shower stations, ventilation systems, and sanitary facilities
- Monitoring and record-keeping activities, including audit procedures designed to verify and record the effectiveness of prevention and control of exposure to occupational hazards, and maintaining accident and incident investigation reports on file
- Fire resistant, noise-absorbing materials should be used for cladding on ceilings and walls of offices, rest areas on site
- Create safe refuges on site for people to gather safety in case of emergencies, shut down construction activities during heavy floods/ disasters and wait for authority's advice
- Provide required facilities on site and ensure livable conditions in labour camp if any: lighting, ventilation, safe structures, water, sanitation (with water supply), first aid, food/ potable water, awareness and workers shall be well trained, and emergency contacts/ support, and health checkups shall be arranged
- Proper design measures to prevent OHS impacts (example: on rotating moving, oscillating, other equipment)
- Leachate management from sludge, ventilation of Greenhouse facility and health checkup for workers
- L&FS Master Plan to be prepared, implemented

5.3.4.3 ESS 3: RESOURCE EFFICIENCY AND POLLUTION PREVENTION AND MANAGEMENT

Impact on Physiography

Expected Negative Risks and Impacts

As per the current Feasibility Report, the construction work will be minor, mainly within the existing footprint and hence impacts are not expected on physiography. During the detailed design stage, considering the lack of available space on site, it is important to see if any nearby site would be required/ used for material storage, demolition waste or setting up of labor camp. Site for material storage and labor camp shall be identified by DBOT contractor and get approval from AMC based on the quantum, duration, and type of material required to be stored. Impacts will be accordingly analysed for such sites, and ESIA updated.

Positive Impacts

There will be no significant impact on the physiography of the region due to the proposed subproject which is the rehabilitation of an existing STP within its original site. This is important considering the proximity of the site to River Sabarmati.

Impact on Land/Geology

Expected Negative Risks and Impacts

Risks and impacts on land and geology will be limited to sourcing of construction material or related to the disposal of demolition and construction waste, sludge, and other wastes only. The civil works will require different materials such as earth, aggregate, boulders, and sand, in specified quantities and will be sourced from already operational and approved quarries and suppliers. Large extent of the land dedicated for solar panel-based drying of sludge is a concern, there may be impacts on ground cover, and chances of contamination due to leachate if not properly collected and treated.

Positive Impacts

Overall positive impacts of the subproject include better resource efficiency in material sourcing; with less need for quarrying or sourcing materials as against the situation where the entire STP is reconstructed. The various 'resource efficacy' considerations during the design stage will include

recycling and optimizing usage of material, use of alternate energy, construction, and other waste generated from rehabilitation activities and thereby reduce potential impact due to dumping (example: recycling and reuse of demolished materials in the C&D waste management facility of AMC, use of recycled products from the C&D waste management facility for proposed works). These will ensure overall minimal land impacts. In addition, all wastes will be managed in line with applicable regulations and best practices.

The bidders who will require minimal electricity usage for the plant shall be given preference and the project shall ensure replacing high energy-consuming equipment.

Impact on Soil

Expected Negative Risks and Impacts

There will be minor impacts on soil due to rehabilitation and demolition works especially spillage of sewage, materials, oil, chemicals, and wastes generated including contaminated parts. There is also the possibility of contamination of soil from leakage and spillage during the handling and storage of fuels and chemicals. It is not expected that there will be good quality topsoil from excavations, as it is the reconstruction of existing STPs. In case good quality soil is excavated, these shall be stored with tarpaulins to avoid erosion. Existing components such as sludge drying beds should be emptied and disinfected if and as required before upgradation to prevent contamination and pollution of the soil. Existing sewage and sludge should be treated before disposal as per guidelines.

Demolition of some existing structures and units STP

- Spillage of sewage, materials, oil, chemicals, and wastes generated due to ongoing STP operations, and proposed upgradation during construction activities
- Storing of debris, excavated material and dismantled machinery and equipment, in inappropriate manner, leading to soil contamination and pollution
- Contamination of soil due to C&D waste
- Contaminated land due to current use, to be de-contaminated for any other future use

Construction of STP

- Spillage of sewage, materials, oil, chemicals, and wastes generated
- Contamination of soil due to solid waste disposal inappropriately, improper storage of construction materials, and goods.

Repair works at TSPS

- Spillage of sewage, materials, oil, chemicals, and wastes generated
- Contamination of soil due to solid waste disposal inappropriately, improper storage of construction materials and goods.

Green house model Solar drying of sludge, Solar rooftop

- Contractor should undertake the activity of maintenance of solar drying beds.
- Leaching of sludge in soil
- Large extent of land dedicated for greenhouse purposes
- Land/Soil contamination during maintenance and cleaning of panels, and storage of damaged solar panels used in solar roof top

Labour camp

- Contamination of soil due to inadequate facilities/amenities and unhygienic practices in labour camp

Common Risks & Impacts

- Leakage/ leachate from storage of raw material and chemicals

Positive Impacts

Minimal disturbance to soil is expected as the works are mainly rehabilitation of existing STP. However, the overall soil quality of the region will improve as the subproject aims to improve discharge quality and sludge management. All the construction debris needs to be stored well not to contaminate the soil and disposed of in a planned manner to avoid adverse impacts on soil. Waste storage, storage area for construction material and labour camp shall be identified by DBOT contractor and get approval from AMC. In the current Feasibility Report, details on storage areas for various wastes are not available. Hence, during detailed design stage, considering the limited space on site, it is important to see if any nearby site (preferably available land in STP's sites next door for material storage) and appropriate land for setting up labour camp. Impacts will be accordingly analysed for such sites by DBOT contractor and updated in ESIA & ESMP.

Impact of Material Handling and Waste Generation

During the construction phase, construction materials will be stockpiled within the existing campus. This might leach into the nearby environment through stormwater, or wind and pollute the air, nearby buildings (as dust), water bodies, or land. Waste screenings, bio, and non-biodegradable wastes, sludge are the wastes generated during the operation phase. During construction and maintenance, there will be needed to manage construction and demolition wastes, e-wastes (as in electrical parts), hazardous wastes (as in asbestos of old pipes, sheets used), or chemicals.

Expected Negative Risks and Impacts

Construction of STP

- During construction phase, construction materials will be stockpiled within the existing campus. This might leach into nearby environment through storm water, or wind and pollute the air, nearby buildings (as dust), water bodies or land.

Operation of STP

- Waste screenings, bio and non-biodegradable wastes, sludge are the wastes generated during operation phase. This will also be pertinent during construction phase, as existing STP will be operating in one part of the site
- There can be chances of spillage while working on parts of STP proposed for demolition

Repair works at TSPS

- During construction phase, construction materials will be stockpiled within the existing campus. This might leach into nearby environment through storm water, or wind and pollute the air, nearby buildings (as dust), water bodies or land.
- There is possibility of accidental flow of sewage while working in TSPS

Solid Waste and Biomedical Wastes from Labour colonies and Site

Workers, especially migrants may reside in the area during the peak construction period. The camp must not be set up in Vasna STP premises. It is suggested that stay arrangements are made at least at a distance of 100m from the existing STPs complex and 150m from the river edge. Camp, from where it is easier to access the site preferably without crossing the road or using vehicular transport. It is recommended to arrange sanitary and solid waste management facilities at the labor colonies to avoid water and land pollution, odor issues, and health impacts. There will also be an influx of laborers and other service providers into the project area. One of the areas which need close attention in this regard is the squatter settlement next door. It is essential that from the planning stage, sewage management and solid waste disposal facilities should be conceptualized to maintain the health of the people and the environment. The solid waste generated from the colonies during the construction phase will be segregated and properly stored, collected, transited, treated, and disposed of as per

Solid Wastes Management Rules, 2016, in AMCs existing facilities for bio and non-biodegradable wastes. The contractor shall arrange a first aid box at the site and shall arrange medical facilities, medical check-ups/ camps to labor at the site especially during accident/ emergency which is likely to generate bio-medical waste. Though the quantity is not expected to be significant, this needs to be channelized to the Biomedical waste management facility at appropriate intervals to avoid indiscriminate dumping.

C&D Wastes

As most of the proposed activities involve repair and renovation, it is expected that construction and demolition waste will be generated, much of this will be contaminated, as it is part of an STP. Quantities shall be estimated during detailed design by DBOT contractor; and decontamination and disposal shall be arranged as per Construction and Demolition Waste Rules, 2016.

E-wastes, metals, plastics, hazardous wastes, and Batteries

Project interventions include a substantial amount of electro-mechanical work such as transformer replacement, solar rooftop system, and sludge drying, providing standby generators; upgrading, removal, and newly installing electrical connections, machinery, decommissioning and commissioning of pump sets and other appurtenances, etc**.** These activities will generate a significant amount of waste in terms of e-waste, batteries, replaced metal and plastics parts and fixtures, packaging material, empty containers, use and disposal of oil & grease, iron scrap, etc. some of which may be hazardous. It is important to segregate and store these on-site in proper receptacles or demarcated areas, and collect, transport, recycle and dispose of as per Plastic/ E-waste/ Hazardous Waste Management Rules. AMC confirms that there is no historic asbestos use on-site or in TSPS, and no asbestos will be encountered. However, the possibility is not fully ruled out considering the age of the plant, and that the access road is proposed to be upgraded. Appropriate SOPs shall be adopted to manage asbestos waste. The subproject will not support buying of any material containing asbestos for any purpose. Solar drying and rooftop system shall be encouraged only in case proper disposal of end-of-life panels is ensured.

Pollution due to special work types

Special works near the river or canal, including strengthening of the outfall structures if included during the detailed design stage, need special considerations to minimize possible pollution. Works shall happen after information to downstream users and work area cordoning and work schedule shall be responsive to the climate, flow, and downstream uses.

Positive Impacts

The waste generation will be minimal as the subproject is on rehabilitation of existing STP when compared to a situation where the entire STP is demolished and reconstructed.

The project would also need to address the management of materials (such as construction materials, chemicals used for STP operations, fuels, paints etc.) solid (screenings, wastes, sludge, construction and demolition (C&D) wastes, e-waste from electro-mechanical equipment) and liquid waste (from construction activities, run-offs, waste water/ sewage from labour camp, leachate from sludge, treated sewage, accidental leakage of untreated sewage) generated during the construction and operation phases. Contractor will prepare management plans (OHS, CHS, Waste Management etc) and implement the same.

All wastes will be managed following National regulations and WB EHS: C&D wastes will be sent to the AMC C&D waste management facility where it is converted into useful products for recycling back for construction purposes; some of those will be used in the construction purposes and site development for this subproject thus ensuring resource efficiency. Screenings, plastics and wastes will be treated and disposed at AMCs solid waste management facility. Machines/equipment's will be

auctioned to authorised recyclers. E-waste including Solar panels will be sent to GPCB approved e-waste recyclers and all these requirements will be made part of DBOT contract. Site and material storage areas will be provided with cut off drains to collect and treat liquid wastes. Standards suggested by national guidelines for sludge quality and WB EHS will be followed. Sludge will be monitored and sent to AMCs Sludge Hygienisation facility.
The contractor and AMC will prepare and follow subproject specific debris/ waste management plan as per applicable regulations also with an attention to encourage recycling/ upcycling on-site or reuse and thus better resource efficiency. The reuse of upcycled wastes will have an overall positive impact on resources.

Impacts on Water Resources and Quality

The proposed subproject is not expected to impact drainage patterns or water resources (ground or surface) in any way as they are neither crossing, altering, disturbing drainage patterns nor using groundwater resources. The water for construction will be sourced from existing supply by AMC and as such requirements will be limited. However, the use of water resources will be optimized before the start of work through the application of Resource Efficiency and Pollution Prevention techniques which will include optimal use planning, recycle and reuse options. Possible reuse of treated water for construction after chlorination will be explored. Water may be reused for irrigation by supply through Fatehwadi Canal if treated effluent from STP meets the treated water quality prescribed by GPCB for disposal to Canal and necessary permits by the GPCB.

The DBOT contractor will prepare project-specific water use and water balance analysis based on detailed design and prepare an action plan for water conservation, recycling/ reuse, and management and submit it to PIU for approval.

No construction activity will be carried out on the river and hence physical changes on the river are not expected. No water will be sourced from rivers or wells for construction as the site already has piped water supply from AMC which or through tankers will be sourced for construction works.

Expected Negative Risks and Impacts

Possible negative Impacts and risks on water quality include:

Rehabilitation/ Upgradation of STP

- Bypass of untreated sewage during construction activities or emergencies ; from STP or TSPS. The feasibility report indicates that TSPS has a diversion mechanism for wet weather flows and that STP shall have equalization capacity for increased monsoon discharges. It is important to ensure that no water is bypassed during repairs or monsoons.

Construction of STP

- The possible flow of improperly stacked construction materials into the river
- Sediment (fine) in stormwater run-off into the river from in and around open/ exposed work areas, roads
- Sediment (fine and coarse) from spoil disposal and stockpiles (in areas selected for stockpiling & spoil disposal) carried by stormwater run-off
- High pH suspended solids from cement storage and concrete batching areas
- Hydrocarbons, heavy metals, and nutrients, from spills, deliberate discharge, and poor storage, handling, and disposal of hazardous materials, fuels, and waste oils, including those that may induce pH changes.
- Mixing of sewage with floodwaters
- Contamination due to operation of machineries near water bodies

Repairs works at TSPS

- Solid waste from littering and poor handling of waste in the workplace, labor camps

- Organic material, pathogenic bacteria, and nutrients from poor siting and management of the Contractor's sewage treatment facilities, including siting of septic tanks that could lead to seepage to rivers, groundwater
- Organic material, pathogenic bacteria, and nutrients from untreated sewage from informal settlements, camp followers, and field-based defecation
-
- discharges and disturbance of soil and sediment that drain into surface waters

Green house model Solar drying of sludge

- Mixing of sludge with flood waters
- Poor air quality due to generation of excess CO, CO2 and CH4 especially during hot weather.

Outfall facility

- Works on outfalls or river edge strengthening, if any, may lead to erosion due to inappropriate implementation.
- Mixing of sewage with flood waters
- discharges and disturbance of soil and sediment that drain into surface waters
- Contamination from construction machinery in use near water bodies

Labour camp

- Solid waste from littering and poor handling of waste in workplace, labour camps
  - Organic material, pathogenic bacteria and nutrients from poor siting and management of the Contractor's sewage treatment facilities, including siting of septic tanks that could lead to seepage to rivers, ground water
  - Organic material, pathogenic bacteria and nutrients from untreated sewage from informal settlements, camp followers and open defecation affecting host villagers Common Property Resources

Positive Impacts

Positive Impacts on water quality include:

- Minimal bypass of sewage without treatment
- Better quality of treated sewage discharged into the river
- Better groundwater quality downstream for irrigation
- No impact of mixing of sewage during floods
- Better groundwater quality
- Proposed rehabilitation would improve the quality of treated sewage, by making it more suitable for recycling. Already, the Irrigation Department sources treated sewage from Vasna STPs through Fatehwadi Canal for irrigation purposes. Thus, good quality treated water will be available for irrigation and recycling for other uses on site after disinfection and improves water availability in the water-scarce region after GPCB amends the consent condition and agrees to dispose of treated sewage in Fatehwadi Canal.

The existing plant 240 MLD Plant was constructed in four modules of 60 MLD each. The commissioning of the new plant will also be in phases with each module as 60 MLD. The existing plant could be used in a phased manner till the new plant is commissioned to avoid diversion of untreated sewage directly into the river. Also, it is suggested that the facility should have the provision of secondary containment wherever required to avoid any spill to nearby areas.

Reduction in Pollution Load on River Sabarmati due to Vasna 240 MLD STP upgradation

Currently, the quality of treated effluent is suboptimal. AMC aims to achieve the stringent quality of treated effluent in its new STPs and those proposed under G-ACRP, and at the same time reuse treated effluents to ensure resource efficiency and reduce BOD load on receiving water bodies.

Three scenarios are considered for evaluating the positive impact on the water bodies:

- Scenario 1: Strategy towards Decentralized Sewage Management - No STP Scenario: when there are no STPs to treat sewage generated in the zone, with all sewage going to toilets with/without appropriate septic tanks. In this case, the total diffused pollution load ultimately reaching Sabarmati would be high mainly as the soil is alluvium. With increased draining through open disposal, disposal into canals, septic tanks, and soak pits leaching of polluted water to the river will be high and from multiple areas. This also increases the chance of leaching pollutants from land disposed of pollutants.
- Scenario 2: 'As is' scenario – No Project Alternative: If the existing STP continues to maintain the same performance levels and standards. In this case, pollutant levels will be high in Sabarmati. This will continue to impact agricultural users downstream, near riverside, and also those receiving treated sewage for irrigation (through Fatehwadi Canal, though currently without consent).
- Scenario 3: STPs follow stringent discharge norms – Technology/ Capacity Upgradation of existing STPs: If the STP follows NGT norms and is well upgraded and maintained, as envisaged by G-ACRP the pollution load in Sabarmati will reduce. Better quality of treated water will be available for agriculture, and this will improve the overall health of the region.

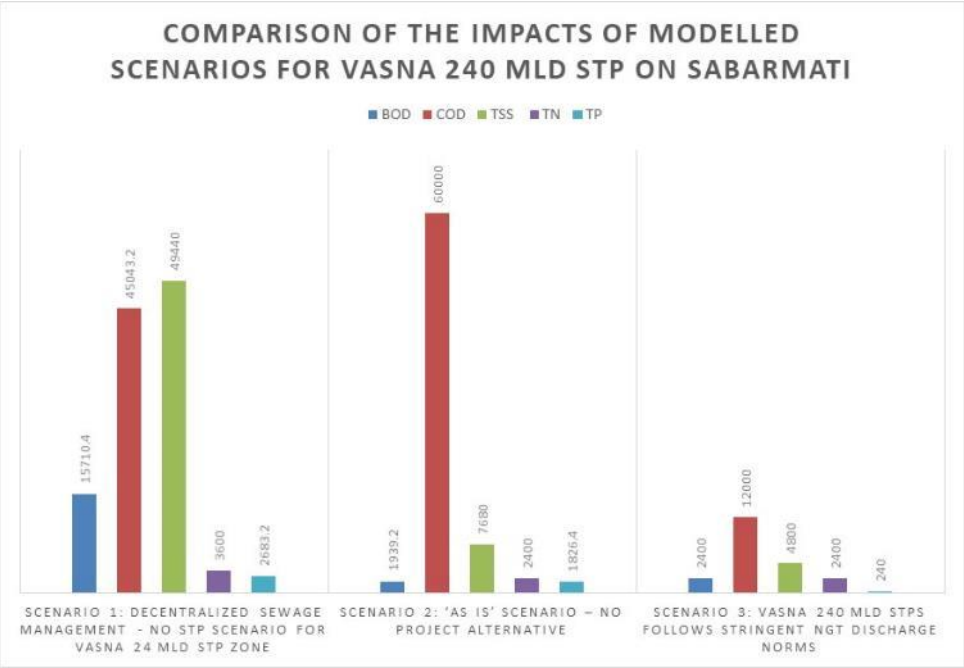


Figure 37 Pollution Impact of the modeled Scenarios on Sabarmati River

A graphical representation of the comparison of these three scenarios above is presented here in ***Figure 36.*** This graph shows that the subproject can ensure around 20 percent reduction in BOD, 40 percent in SS, and 87 percent in TP pollution load due to this facility on Sabarmati, through the proposed rehabilitation.

Impact on Ambient Air Quality

With the high population density and the metropolitan nature of the city, it has many vehicles, industrial and commercial activities which results in various sources of urban air pollution in the city. The proposed subproject activities may potentially impact the air quality during construction,

operations, and maintenance of sub-projects with the addition of construction vehicles, construction activities, use of machinery, and fuel combustion. In addition, the odor may emanate from STP processes/release of gases, use of chemicals, sludge, and treated sewage and may impact the communities near STPs, pumping stations, and discharge points.

Expected Negative Risks and Impacts

Air quality may be affected in the form of dust, particulate matter, and gas emissions from exhausts.
Dust emissions: Construction activities can give rise to dust emissions if not effectively managed and have the potential to affect receptors near to the main construction sites due to dust generated from demolition, excavation, operation of construction equipment and machinery, increased movement of vehicles, on unpaved access roads. Since the proposal is for rehabilitation of existing STP, large-scale earthworks are not expected, and hence possible impacts of wind during the night or inactive construction periods are not an issue.

Dust mainly comes from the use of roads, cleared land in the work area, material stockpiling. Particulates (other than dust) and gas are emitted from vehicles, heavy machinery, diesel generators, and asphalt processing sites for the access road. The impact of air contaminants, such as dust, can disrupt local communities (deposition in water supplies and on buildings and other facilities), while it can also affect public health. The communities most at risk are those close to the main access road as this is most exposed to dust and vehicle emissions. The main mitigation measures are covered by the Environmental Management Plan and associated sub-plans and include the management of dust, exposed soil, and material emissions; maintenance of vehicles and equipment to control emissions; avoiding burning vegetation and trash; and managing a complaint and resolution service system. The average wind is 6-8 km/hr, but the dust impact due to demolition or on-site construction is less severe as the predominant wind direction is away from the settlements nearby.

Gaseous emissions during construction will be from machinery, equipment, and vehicles used for material transportation. The operation of vehicles and equipment mostly with diesel fuel will result in emissions of carbon monoxide, sulphur dioxide, and oxides of nitrogen. The impact on air quality due to emissions from vehicles and plants will be in the areas immediate to the work area. There are multiple sources of pollution near around existing STP site. Generally, additional vehicle movements generated during the construction phase will have the potential to influence local air quality at sensitive receptors located at proximity to the road, and pollutant concentration is likely to reduce with increased distance from the road. The impacts will therefore apply mostly to the squatter settlements next to the site boundary and access roads. Impacts due to operational stage gaseous emissions and odor including H2S and SO4, CH4, etc. also would continue during the rehabilitation stage. However, due to better facilities and performance, such impacts were expected to reduce when operations of the rehabilitated STP commences.

Determination of the number of exhaust emissions generated by heavy vehicles is calculated using the basis of emissions generated by trucks. Transportation during the operation phase is estimated to be carried out by 30 heavy diesel vehicles i.e., trucks per day. Emission coefficients for trucks from CPCB[39] are as follows:

- CO = 1.5 g/km,
- NOx = 3.5 g/km,
- HC = 0.96 g/km
- PM = 0.02 g/km

Based on the emission coefficient and traffic density mentioned above, the amount of emissions by transport vehicles, for each air quality parameter, is as follows:

- CO = 0.045kg/day/km

[39] https://cpcb.nic.in/vehicular-exhaust/

- NOx = 0.105kg/day/km
- HC = 0.029kg/day/km
- PM= 0.0006kg/day/km

The main access roads and construction sites had a moderate impact significance. Mitigation to reduce the risk of negative impacts from reducing air quality is described in environmental management plans.

Demolition of STP

Decommissioning activities may generate emission of fugitive dust caused by a combination of on-site excavation and movement of earth materials, contact of construction machinery with bare soil, and exposure of bare soil and soil piles to wind. A secondary source of emissions may include exhaust from diesel engines of earth moving equipment, as well as from open burning of cut vegetation and solid waste on-site.

- Dust & gaseous emission due to transportation
- Dust emission during demolition
- Release of noxious gases/chemicals during dismantling and demolition of machinery, equipment and structures of existing STP.

Construction of STP

- Dust & gaseous emission due to transportation & machinery
- Issues and concerns to release of noxious gases/ chemicals during storage and commissioning of new units.
- Release of untreated sewage during construction activities

Repair works at TSPS

- Dust & gaseous emission due to transportation & machinery

Greenhouse model Solar drying of sludge

- Gaseous emission from sludge including CO, CO2 and CH4 especially during hot weather

Construction of Rising main

- Dust & gaseous emission due to transportation & construction activities.

Labour camp

- Dust & gaseous emission due to unhygienic practices in labour camp
- Improper ventilation and lack of separate and proper cooking facilities in the labour camp.

Positive Impacts

Access road improvement will help in reducing dust emissions. Odor emissions are expected to reduce considerably during operations with improvement in STP process and adoption of modern technology and replacement of existing machinery, which will reduce stagnation, wastes, and sludge.

Ambient Noise and Vibration

Noise is a common problem in urban areas as compared to the villages because of the mechanization and more vehicles on the road. All types of noise altogether affect the same irrespective of the sources and cause headaches to the high blood pressure and other heart diseases.

Expected Negative Risks and Impacts

The site is bounded on both north and south by STP sites; west by Gyaspur metro depot and south by the river. The area to the south of Vasna 126 STP to the south of the site is mixed-use has a dense road network, and several sensitivities such as residential areas, hospitals, schools, religious buildings, etc. However, this area may not be significantly affected by rehabilitation works on the site. The most important receptor is the squatter settlements next to the STP site and access roads.

Sources of noise will be the demolition activities, ongoing operations of the STP, vehicles, and equipment for construction at the project site. Noise levels will increase during the period of construction, and cumulative noise levels will tend to be higher especially due to nearby operations of the Metro Depot. Additionally, noise levels will increase on approach roads due to increased traffic.

Noise can impact officials and workers on-site others who reach the site for supply of materials or equipment or other services, and those residing and working nearby. Such impacts can become significant if they are exposed to high noise for long hours continuously.

The ambient air quality standards in respect of noise in different areas /zones have been notified by the Ministry of Environment & Forests, Government of India vide 'The Noise Pollution (Regulation and Control) Rules, 2000. The Schedule of ambient air quality standards in respect of noise notified in the above 'Rules' is reproduced below:

Table 34: Ambient Air Quality Standards in respect of Noise

Area Code	Category of Area/ Zone	Limits in dB(A) Leq	
		Day time	Nighttime
(A)	Industrial area	75	70
(B)	Commercial area	65	55
(C)	Residential area	55	45
(D)	Silence Zone	50	40

The subproject noise sources consist of, land clearances, earthworks, demolition of some existing facilities, construction of new structures, and vehicle movements along the access roads.

Note:
1. Daytime shall mean 6.00 a.m. to 10.00 p.m.
2. Night-time shall mean from 10.00 p.m. to 6.00.a.m.
3. Silence zone is defined as an area comprising not less than 100 meters around hospitals, educational institutions, and courts. The silent zones are zones that are declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority. [40]
5. dB(A) Leq denotes the time-weighted average of the level of sound in decibels on scale A, Leq being the energy mean of the noise level over a specific period.

Current noise levels at the Vasna STP site are 60.63 dBA and 52.55 dBA respectively during day and night times. The operation of a motor vehicle/ truck that transports materials will contribute to a noise increase of ± 70 dBA. The estimated noise in a residential area (squatter settlements along access/ boundary/ or in between STP boundary and Canal) within ±10 m from the main road through calculations with a single point spread is as follows: Ts1-Ts2 = 10

[40] *STP comes under the industrial categorisation as RC4.*
https://gpcb.gujarat.gov.in/uploads/Updated_Industrial_Categorization_CPCB_Direction_30042020.pdf

log r2/r1. Allowable further noise levels exposure for existing noise exposure of near around 60 dBA (rounded to nearest decibel) as per FTA manual is 57 dBA, which will produce the combined level of 62 dBA. This is within the permissible noise levels for a mixed-use area with Metro depot, STPs, etc. (if considered industrial limit is 75dBA, if considered commercial, it is 65dBA, considering squatter residences, this is 55dBA). Up to <61 dBA of combined noise impact exposure is considered no impact, while 61 to 66 is moderate impact and >66dBA is severe impact.

Work activities that may generate continuous noise need to be curtailed. Impulsive or impact noise is not expected from the proposed works. Permissible exposure in cases of continuous noise is presented below.

Total time of exposure (continuous short-term exposures)	Sound pressure level in or a number of dBA per day, in hours	Total time of exposure (continuous short-term exposures)	Sound pressure level in or a number of dBA per day, in hours
6	87	**1**	100
4	90	**¾**	102
3	92	**½**	105
1 ½	97	**¼**	110

1. No exposure in excess of 110 dBA is to be permitted.
2. For any period of exposure falling in between any figure and the next higher or lower figure as indicated in column 1, the permissible sound pressure level is to be determined by extrapolation on a proportionate basis.

The amount of Noise Level at 10 m from the access road is 60 dBA, and from 30m is 55 dBA. Already truck carrying materials ply through this road, for operations and maintenance of STPs in the area, and to nearby mixed land use. All machines operating in an area should produce noise within the acceptable level to maintain the well-being of people around. Adequate awareness/ information shall be provided to all nearby communities and users on the possible increase in noise levels. Noise from works at Metro Depot is identified as a potential contributor to the impact on air quality. However, works are expected to be completed by the start of STP rehabilitation. Else, it is important to discuss with Metro Contractors to plan and stagger large noise/vibration emitting activities. Tools and mechanisms which generate less noise shall be preferred, night-time restrictions on construction, Mufflers, screens, and site buffers shall be engaged. Mitigation measures are presented in the next Chapter on ESMP.

Demolition of STP

- Noise emission due to use of heavy vehicles, demolition activities & machinery.
- Noise due to use of cutting and drilling equipment.

Construction of STP

- Noise emission due to use of heavy vehicles, construction activities & machinery.

Repair works at TSPS

- Noise emission due to use of heavy vehicles & machinery

Construction of Rising main

- Noise emission due to use of heavy vehicles, excavation activities & machinery

Construction of Outfall facility

- Noise emission due to use of heavy vehicles & machinery.

Positive Impacts

Replacement of old machinery and pumps as part of proposed activities will reduce noise emanating from STP operations.

Vibration

Expected Negative Risks and Impacts

As per the Feasibility Report, the subproject does not involve quarrying or blasting and hence, vibration impacts are limited to:

- operation of vehicles along with accesses only during work hours of the day
- demolition & dismantling activities
- installation of machinery (Thickener cum Dewatering machine (COTDM) feed sump, transformer, UV channel, Belt filter press, Construct MC3 (1 no.) consists of Transformer, Blower room, MCC Room, etc.)

Considering the alluvial nature of soil in the study area dispersion of vibrations will be negligible. Demolition activities should not be using techniques which might induce large vibrations, and the Impact of Vibrations shall be studied as an essential part of the Detailed design phase, due to proximity to Vasna Barrage and river edge. Vibrations will be monitored during construction activities, and the contractor will execute the complaint management service. The contractor is expected to develop a construction method or schedule for activities that generate noise in accordance with the results of monitoring the vibration level (exceeding the noise standard limit in residential areas) or complaints from the public.

At this stage, the quantity of material that needs to be transported is unknown as the design will be finalized by the design consultant. The DBOT contractor can estimate vibration impact based on the quantity of material to be transported to arrive at impact magnitude. Vibration generated by the dump truck operation on the main road is relatively small for the receptor distance of more than 7.62m. So, this will cause impacts on the immediate row of houses along the access road. Feasibility reports present the reconstruction and demolition activities expected at aerators, which are within 10m from the nearest sensitive receptor - the squatter settlement. The magnitude of the impact of the noise will decrease as the distance of the receptors gets further.

Sensitive receptors (squatter settlement) are present immediate to the access road, but the impact is categorized as a minor negative impact with a low intensity because it is estimated that there will be a mobility of trucks of only 6 rotations/ day considering the type of upgradation proposed. The impact of the vibration will be felt for 03 years – the expected duration of the subproject.

Positive Impacts

The proposed surfacing of the access road will reduce road irregularities which in turn reduces vibrations due to all vehicle movements. Further, as the proposed rehabilitation would ensure stronger STP parts resistant to disasters like earthquakes, vibrations in those elements will be reduced.

GHG Emissions and Climate Benefits of the Proposed Rehabilitation of Vasna 240 MLD STP[41]:

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Baseline emissions have been estimated for the present year 2021. Further, two situations are examined. Situation A, which is a Business-as-usual scenario for 2039, with no intervention for process and capacity augmentation at the STP, and Situation B, where the proposed Project Intervention has been implemented for the year 2039.

[41] *AMC, 10 Jan 2022. Feasibility Report for Rehabilitation of Vasna 240 MLD STP (Draft), prepared by RH-DHV, unpublished*

Table 35 Carbon emissions from the conveyance of sewage from TSPS

Scenario	G_1 tCO_2e/yr.
Baseline Scenario 2021	7491
Business-as-usual 2039	8173
Project intervention 2039 SBR	4792
Project intervention 2039 A2O	4792

Table 36 Carbon emissions from operation of STP

Scenario	G_{E2} tCO_{2e}e/yr.	G_{CH41} tCO_{2e}e/yr.	G_{N2O1} tCO_{2e}e/yr.	G_2 tCO_{2e}e/yr.
Baseline Scenario 2021	4017	23140	35894	63051
Business-as-usual 2039	4383	63374	50297	118054
Project intervention 2039 SBR	12012	3424	2838	18274
Project intervention 2039 A2O	17407	3424	2838	23670

Table 37 Carbon emissions from handling and disposal of sludge

Scenario	G_D tCO_{2e}e/yr.	G_{CH42} tCO_{2e}e/yr.	G_{N2O2} tCO_{2e}e/yr.	G_3 tCO_{2e}e/yr.
Baseline Scenario 2021	5	383	339	727
Business-as-usual 2039	11	881	781	1673
Project intervention 2039 SBR/A2O	13	221	0	234

Table 38 Comparative Analysis

Scenario	G_1 tCO_2e/yr.	G_2 tCO_2e/yr.	G_3 tCO_{2e}e/yr.	G tCO_{2e}e/yr.
Baseline Scenario 2021	7491	63051	727	71270
Business-as-usual 2039	8173	118054	1673	127899
Project intervention 2039 SBR	4792	18274	234	23301
Project intervention 2039 A2O	4792	23670	234	28696

In a business-as-usual scenario, where the plant is not upgraded, the carbon emissions due to methane from treated and untreated wastewater alone would be 63,374 tCO2e/yr. With the proposed technologies, carbon emissions would reduce to 3,424 tCO2e/yr. from the biological treatment alone. The carbon emissions due to nitrous oxide would also reduce from 50,297 tCO2e/yr. to 2,838 tCO2e/yr. through the biological treatment process.

In a project intervention scenario, although the quantum of wastewater treated would increase in the design year, 2039, it would only result in increased GHG emissions from the use of electricity. As evidence that the new systems with higher efficiency have been incorporated at pumping sites which will reduce electricity consumption at TSPS. The energy intensity of the existing pump set up is 118.09 kWh/ML whereas the new pump set up will have an energy intensity of 69.25 kWh/ML. The technology upgradation would inevitably

increase electricity consumption at STP. However, the methane and nitrous emissions from the treatment of wastewater would significantly be reduced due to improved methane correction factors in the proposed technologies. Furthermore, project intervention would ensure that there is no discharge of untreated sewage into the water bodies, thus reducing emissions from untreated wastewater discharged into the water bodies. The improvements in sludge waste management under the overall project will also help reduce emissions. Through the project intervention, 104,063 tCO2e/yr. of GHG emissions can be saved on average.

As per FR, AMC has plans to increase their solar rooftop power infrastructure for further GHG savings. The pump set up at Terminal Pumping stations have also been enhanced with equipment with higher energy efficiency (from 118.09 kWh/ML to 69.25 kWh/ML) which will reduce emissions from electricity use to 4,792 tCO2e/yr from 8173 tCO2e/yr. Solar panels have been recommended for all administrative buildings, which can generate up to 480 MWh of electricity per year and save up to 379 tCO2e/yr.

Increased plantation will aid in carbon sequestrations. The proposed STP has a green belt around the plant with a minimum of 30%-33% of the area devoted to tree plantations. The internal roads shall have plantations. With this increased tree cover, 1783 tCO2e/yr. of emissions can be reduced.

Pollution Risk management strategies and encourage Resource Efficiency

- Follow the discharge standards based on NGT suggested and additional parameters and limits suggested in this ESIA, which is more stringent than the existing (EP Rules, 1986) standards which is suggested by WB EHS and considering the intended use of receiving water body
- To minimise pollution issues due to suboptimal treated sewage (at site, discharge points, Fatehwadi Canal), existing STP functions to be improved to treat sewage minimum as per current consent norms during construction period
- Currently AMC is supplying treated sewage water for irrigation through Fatehwadi canal through the permit from GPCB is to discharge treated sewage into the Sabarmati. In case AMC wants to discharge treated water though the Fatehwadi canal consent shall be sought from GPCB, and standards shall be fine-tuned based on additional study on reuse of treated effluent for irrigation in line with the Central Pollution Control Board's Guidelines of Reuse of Treated Water for Irrigation, 2018, through reputed Agricultural University with stakeholder consultations as per the Guidelines and after agreement with stakeholders and permit from GPCB discharge the treated sewage so as to avoid any negative environmental and health issue on downstream communities.
- Sewage diversion during the construction period and commissioning of new STP units is not clear in the FR and has to be scheduled and planned by the DBOT contractor during the design phase. AMC to inform irrigation department regarding the proposed upgradation of the Vasna 240 MLD STP and its implication on discharge of treated sewage through Fatehwadi canal and agree on the proposed plan.
- The construction and related activities should be done in phase wise manner to enable the sewage to be treated in existing or upcoming units and prevent release of untreated sewage in the Sabarmati river.
- Demolished components/ structures STP will have polluted C&D and other wastes (due to sewage), and the polluted area shall be well restored, after testing for contaminants and pathogens. Cost for this shall be included in FR/ Detailed estimate
- Store materials wastes and chemicals away from flood prone areas, or elevate such areas, and provide cut off drains

- Various wastewater streams are segregated; and it is suggested to install sensors to be alert on industrial pollution ingress
- Prevent or reduce wastewater pollution through such measures as recycle/reuse within their facility, process modification
- Open burning of solid wastes, whether hazardous or non-hazardous should be avoided, as the generation of polluting emissions from this type of source cannot be controlled effectively
- Reduce, Recycle, Reuse C&D and other wastes
- Pollution impacts of Solar panels is important, and storage, handling and disposal shall be clearly agreed. No panel shall be found stacked on site without adequate protection to prevent pollution
- Get permits for plants from GPCB under Air Act, and follow consent conditions
- Implementing a leak detection and repair (LDAR) program that controls fugitive emissions by regularly monitoring to detect leaks, and implementing repairs within a predefined time period
- Use of dust control methods, such as covers, water suppression, or increased moisture content for open materials storage piles, or controls, including air extraction and treatment through a baghouse or cyclone for material handling sources, such as conveyors and bins
- Use of water suppression for control of loose materials on paved or unpaved road surfaces
- Implement recommended engine maintenance programs
- Drivers should be provided awareness on the benefits of driving practices that reduce both the risk of accidents and fuel consumption, including measured acceleration and driving within safe speed limits
- Vibration impacts of proposed trunk main crossing the elevated metro track shall be studied, and mitigation measures shall be included in design
- Enhancement of energy efficiency measures
- Protection and enhancement of sinks and reservoirs of greenhouse gases (such a green belts)
- Limitation and/ or reduction of methane emissions through recovery and use in waste management, using better technology such as SBR
- Implement air, water, soil, biodiversity Monitoring program during construction (including project roads, and on site) and operations
- Replace old equipment, machines, pumps and electrical installations
- Use LED bulbs, fans/ star rated pumps/ equipment
- Use Solar energy as in Green house model drying; Solar lighting/ use of solar energy as much as feasible (provided disposal at TSDF is arranged, proper storage and use of PPEs while working with damaged panels are ensured)
- Energy saving fitting (LED lighting) and equipment, motors are fitted with variable frequency drive (VFD)
- Ensure sewer system capacity
- Contaminated water, leachate, rejects shall be channelled back to the treatment units
- NO reuse to be permitted before chlorination
- Sludge to be stored, disposed in hazardous facility and in compliance with local regulatory requirements, if tested so; else to be sent to BARC facility
- Use or handling of hazardous material, including asbestos to be avoided
- Training of operators on release prevention, including drills specific to hazardous materials as part of emergency preparedness response training
- Implementation of inspection programs to maintain the mechanical integrity and operability of pressure vessels, tanks, piping systems, relief and vent valve systems,

containment infrastructure, emergency shutdown systems, controls and pumps, and associated process equipment

- Preparation of written Standard Operating Procedures for safe transfer and filling of the hazardous material, and in spill prevention and response
- SOPs for the management of secondary containment structures, specifically the removal of any accumulated fluid, such as rainfall
- Identification of locations of hazardous materials and associated activities on an emergency plan site map
- Documentation of availability of specific personal protective equipment and training needed to respond to an emergency
- Documentation of availability of spill response equipment sufficient to handle at least initial stages of a spill and a list of external resources for equipment and personnel, if necessary, to supplement internal resources
- Description of response activities for life and fire safety, in the event of a spill, release, emergencies, disasters especially floods
- Select equipment with lower sound power levels, use silencers, mufflers on engine exhausts and compressor components, acoustic enclosures (minimum surface density of 10 kg/m2) to prevent noise impacts from sensitive receptors
- Re-locating noise sources to less-sensitive areas to take advantage of distance and shielding and Siting permanent facilities away from community areas if possible, or taking advantage of the natural topography as a noise buffer during facility design · Reducing project traffic routing through community areas wherever possible
- Green belts to reduce air/ odor pollution impacts

5.3.4.4 ESS 4: COMMUNITY HEALTH AND SAFETY

Heath safety and security risks and impacts on project-affected communities especially on vulnerable people are important.

Expected Negative Risks and Impacts

Though work activities would happen on the existing STP site; squatters are settled near the site boundary and access roads. The subproject construction works would involve labor, transportation through access roads and handling of material, civil construction, and machinery replacement and installation works, and such activities may directly or indirectly impact the community.

At present, there is movement of heavy vehicles on the access and service road. For the people the main issue is due to the road condition and lack of streetlights in the area. People also go to industrial area or industries for work during the daytime and movement of people is very less. There will be no restriction of access for squatters during construction or operation. Road construction for access road is proposed to be included in sub project implementation to enable smooth movements of vehicle, reduce dust and air emissions and reduce community health and safety risks. Squatter settlement will not be impacted as existing kuccha road width will be maintained. Risks and impacts will be for a very short period and temporary. There will be no impact on the access to burial grounds or the church as access roads from Fatehwadi canal road to STPs will only be constructed. Social risks and impacts are mainly with respect to the environmental issues such as dust, traffic movement, odour and related issues during construction and operation

Engagement of labor for project work and their stay near the site for about 3 years, will increase the risks of crimes including gender-based violence. Waste generation from labor camps/colonies if not handled properly, will pollute the water resources used by the community for drinking leading to health impacts. The migratory workforce may bring in infectious diseases not known to the area. There can be risks due to COVID 19 in the present circumstances.

Traffic in nearby roads may be affected by the increased movement of traffic which in turn places the community at the risk of increased noise, air emissions, and accidents. Traffic and Transport: Increased traffic inconvenience (emissions, congestions, longer travel times, blockage of access), especially the approach road connecting the STP also is a connecting road from NH 64 to the nearby areas.

Similarly, civil construction and other works will lead to pollution especially possible emergencies to bypass sewage, air emissions, and noise generation. Contaminated construction debris, sludge, and other contaminated wastes from operations, hazardous, and e-wastes if not disposed properly have the potential of impacting the communities.

Initially, the current STP site was demarcated as a sewage farm, and as the city grew nearby communities have come up long after the establishment of the STPs at Vasna. Vasna has thus become a mixed-use hub to the south of the city, where many public infrastructures such as STPs and Metro Depot also exist near formal residential estates, commercial areas, hospitals, schools, and squatter settlements. This STP is surrounded by other STPs, and access roads, with minimal impact on communities' informal residential areas, but the squatter settlement near the STP will face health and safety impacts. Possible impacts on the health and safety of the nearby communities include:

During Demolition of STP

- Odor nuisance, gaseous and particulate emissions, pathogenic agents
- Noise and vibration due to movement of heavy machinery and construction materials
- Possible spill of chemicals, sludge as they are taken through nearby roads or from the sites
- Exposure to dust, noise (vehicular movement on Kuccha access road, construction works, machinery during construction, operations, generators), the sun, heat and wet weather

During Construction of STP

- Odor nuisance, gaseous and particulate emissions, pathogenic agents
- Noise and vibration due to movement of heavy machinery and construction materials
- Possible spill of chemicals, sludge as they are taken through nearby roads or from the sites
- Working with electricity/ electrical installations, appurtenances
- Exposure to dust, noise (vehicular movement on Kuccha access road, construction works, machinery during construction, operations, generators), the sun, heat and wet weather
- Impacts of discharge from STP on adjoining communities, especially during construction phase.
- Adverse social impacts on adjacent communities and squatters (e.g. security of women and girls due to labor influx)
- Improper storage of construction material and demolition waste: This will be a cumulative effect of poorly managed construction material and construction activities which will affect working areas and managing of materials and waste on site.
- Unanticipated risks to the downstream communities in case of release of untreated sewage from STPs during construction or disruption of bypass.
- Traffic disruption or congestion due to movement of heavy vehicles for project related activities.

Repair works at TSPS

- Noise and vibration due to movement of heavy machinery and construction materials

- Working with electricity/ electrical installations, appurtenances

Green house model Solar drying of sludge

- Odor nuisance, gaseous and particulate emissions, pathogenic agents and related labour health and safety issues
- Exposure to sludge, waste screenings if not managed properly

Construction of Rising main for 126 MLD STP

- Noise and vibration due to movement of heavy machinery and construction materials
- Exposure to dust, noise (access road repairs and upgradation, vehicular movement, construction works, machinery during construction, operations, generators), the sun, heat and wet weather.
- Use of open trench method for construction which may affect the access to the 240 MLD STP.
- Pedestrian-vehicular conflict, restriction of use of right of way along the Juhapura road, and approach road to STPs during rising main construction
- Flooding issues while crossing is under construction

Labour camp

- Odor nuisance, pathogenic agents
- Improper sanitation and washing facilities leading to odor nuisance and unhygienic conditions.
- Lack of facilities at work site and worker camp, pushing workers to use common areas / facilities and resources

Operation of STP

- Working with electricity/ electrical installations, appurtenances

Common Risks & Impacts

- Using vehicles on public and project roads, accident risks
- Possible exposure to illnesses, communicable diseases, COVID-19
- Exposure to mental or physical harassment, SEA/SH, and injury from interpersonal conflicts with workers/ operators
- Impacts of flooding in subproject premises or earthquakes, and other natural and manmade disasters

Positive Impacts

Proposed improvements to STP will ensure safer and disaster resilient infrastructure which will have overall positive impacts on community health and safety especially during disasters. Proposed surfacing of access road to site will also reduce long term dust emissions, vibrations and accidents.

Disasters (including Fire), Flooding and Dam Safety

Temporary flooding may happen during monsoons in the site. As the water table is high along the river edge, excavations may be difficult and safety precautions shall be adopted. It is important to have a Disaster Management Plan and Emergency Preparedness Action Plan to deal with disasters, emergencies in case of natural or man-made disasters including Fire, and Dam Safety Considerations given the presence of Vasna Barrage 3 km upstream of the site. These impacts are also applicable to TSPS, rising mains, outfalls etc. and need to be studied as part of the proposed study on Dam Break Analysis & Flooding Stimulation, Preparation of Inundation and Emergency Action Plan for Vasna Barrage, Ahmedabad, Gujarat will be undertaken by AMC and will be made available to DBOT

contractor. The study will be incorporated in the final design of the project. The consultants for dam and flood analysis will be coordinated by AMC for influencing design of the project if required. DMP with essential actions and organisational structure is presented in Chapter 6 on ESMP.

CHS Risk management strategies

- Assess flood risks and incorporate management/ mitigation mechanisms in designs, prepare Emergency Preparedness Action Plan
- Work scheduling taking into considerate floods (STP site, rising main across Fatehwadi canal for rising main for 160 MLD ST, TSPSs), improvement to access road proposed as part of Vasna 240 MLD plant rehabilitation etc, to reduce health and safety impacts
- Include TSPSs, outfalls and allied infrastructure in the proposed flood risk assessment study and include EAP and mitigation measures in design. To be assessed in C-ESIA & mitigation measures if required and included in C-ESMP.
- Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high-risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community
- Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions such as covering openings to small, confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials
- Education and awareness-raising on CHS, and the adoption of procedures for safe use roads
- Use of specially trained personnel to identify and remove waste materials from tanks, vessels, processing equipment or contaminated land as a first step in decommissioning activities to allow for safe excavation, construction, dismantling or demolition
- Use of specially trained personnel to identify and selectively remove potentially hazardous materials in building elements
- Prior to dismantling or demolition including, for example, insulation or structural elements containing asbestos and Polychlorinated Biphenyls (PCBs), electrical components containing mercury
- Recommendations for the prevention and control of communicable and vector-borne diseases
- Use of waste-specific PPE respirators, dust masks, clothing/ protective suits, gloves and eye protection, information and awareness to communities adopt safe practices such as closure of windows and doors in case of dust emissions
- Surfacing of roads used for transport to site, and dust suppression techniques should be implemented, such as applying water or non-toxic chemicals to minimize dust from vehicle movements.
- Include SEA/SH GRM in the project GRM.

5.3.4.5 ESS 5: LAND ACQUISITION, RESTRICTIONS ON LANDUSE AND INVOLUNTARY RESETTLEMENT

There are few STPs in the Vasna within 100 to 250 m, such as the 35 MLD, 48 MLD, 126 MLD etc. At the time of development of these STPs, there were no settlements, adjoining or near STPs. Since then, some temporary squatter settlements have come up alongside the Fatehwadi canal and kuccha access road near 126 MLD STP and 240 MLD STP. The squatters' settlement is not a notified slum and consists of kuccha or makeshift arrangements. The inhabitants are migrants (seasonal and permanent). Based on google images and site visit it is estimated that 600 to 700 structures are locate in the squatter settlement.

The proposed capacity augmentation and up-gradation of technology is proposed to be carried out within the existing STP boundary. The land belongs to the Ahmedabad Municipality as per the land records. Land acquisition is not envisaged for the proposed project. Displacement and resettlement

issues are not envisaged for the subproject development as all activities will be carried out within the project boundary. There are no families living within the STP premises.

ESS5 is not currently relevant as no land acquisition is envisaged and no impact on squatter settlement is envisaged. Land use will not change due to the proposed project upgradation and rehabilitation of STP.

There are no potential involuntary resettlement issues identified, as there is no land acquisition of private land or alienation of additional government land for the proposed upgradation. There are no restrictions to access river or public infrastructure or change in land use due to proposed rehabilitation of the STP.

Loss of livelihood is also not anticipated as there are no livelihood related activities currently being undertaken within project boundary. Local labour will be hired and will be given preference during construction activities by the contractors.

Impact on downstream users due to release of untreated sewage is also identified. This may happen due to failure of the functioning and diversion of untreated sewage directly into the river or canal during construction phase. After upgradation of the STP, there will be improvement in the quality of the treated water released in the Sabarmati River which will benefit downstream users.

. There will be no restriction of access for squatters during construction or operation. Kuccha access road repair and upgradation is proposed to be included in sub project implementation to enable smooth movements of vehicle, reduce dust and air emissions and reduce community health and safety risks. Squatter settlement will not be impacted as existing kuccha road width will be maintained and no additional land will be acquired. There will be no impact on the access to burial grounds or the church as access road from Fatehwadi canal road to STPs (150 m length and 8 m width) will only be repaired and upgraded. Public infrastructure services shall be provided through government schemes and programs.

After DPR finalization, the ESIA and screening to be reviewed to include any such impacts, if additional land requirements is envisaged, AMC will prepare and implement RAP following the methodologies and principles described in the RPF.

5.3.4.6 ESS6: BIODIVERSITY CONSERVATION AND SUSTAINABLE MANAGEMENT OF LIVING NATURAL RESOURCES

As explained 3.4.5 Ecology and Biodiversity, it was observed that the entire stretch of Sabarmati is infested with the *Pistia sp.* and *Eichhornia crassipes* which has altered the natural habitat. Sabarmati River stretch is a modified habitat as the water is being sourced from the Narmada canal and stored at the riverfront stretch using the shutters of the Vasna Barrage. The riparian zone of the Sabarmati is converted into the riverfront in Ahmedabad city. The region around is heavily industrialized, and fast converting into urban land use, with pollutants reaching the already dry river. However, Hon'ble NGT has constituted the River Rejuvenation Committee which has initiated the process of river rejuvenation by curtailing pollution, monitoring e-flow, undertaking plantations, etc, through various stakeholder departments. No tree cutting is envisaged as per FR as rehabilitation occurs within the footprint and site of the existing STP. Trees majorly include *Peltophorum pterocarpum* and *Azadirecta indica* which are planted at the periphery of the site and along the internal roads. There are around 200 trees of various ages. Greenbelt is planned along the periphery of the STP site. The list of Flora and Fauna in and near the site is attached as Annexure 3.

No RET species were observed in the study area. However, The subproject intends interventions to improve the discharge quality and will thereby improve the biodiversity in or near the site and in the river and the region downstream of the discharge point., thus supporting overall biodiversity improvement.

Expected Negative Risks and Impacts

During Demolition of STP & During Construction of STP

- In case of an increased level of noise and vibration, faunal species will leave the site. Noise above 60 dB has been reported to interfere with songbird mating calls. Dust may settle on the leaves of the surrounding flora and may interfere with biological processes. The dust will also disturb the faunal species. Air Pollutants may interfere with the biological processes of plants. It may also irritate the faunal species. Dumping waste into the water bodies may impact the biological process of macrophytes and aquatic fauna. It may alter the composition of macrophyte by interfering in the nutrient cycle.
- For the proposed sub-project of upgradation of existing STP, no tree cutting is envisaged as per the Feasibility report. There are a large number of trees within the premises of the existing plant. The Design-Build Operate Transfer (DBOT) model is proposed to be implemented and based on the finalization of the design and components, at a later stage, it may be required to cut some trees and clearing of the shrubs. Tree counting will be done after the finalization of DPR for the estimation of trees required to be cut. Tree cutting will be done as per The Saurashtra Tree Felling Act, 1951, and permission from AMC or Forest Department (as the case may be) shall be obtained for the same[42]. Measures to protect old trees will be considered during designing of the project. Clearing of shrubs will not have any impact on the natural vegetation of the region. The proposed project may also require tree planting based on the number of trees cut.

Repair works at TSPS

- In case of increased level of noise and vibration, faunal species will leave site. Noise above 60 dB has been reported to interfere with songbird mating call. Dust may settle on the leaves of the surrounding flora and may interfere with biological processes. The dust will also disturb the faunal species. Air Pollutants may interfere with biological processes of plants. It may also irritate the faunal species. Dumping of waste into the waterbodies may impact the biological process of macrophytes and aquatic fauna. It may alter the composition of macrophyte by interfering in nutrient cycle.

Construction Activities on various components

- In case of increased level of noise and vibration, faunal species will leave site. Noise above 60 dB has been reported to interfere with songbird mating call. Dust may settle on the leaves of the surrounding flora and may interfere with biological processes. The dust will also disturb the faunal species. Air Pollutants may interfere with biological processes of plants. It may also irritate the faunal species. Dumping of waste into the waterbodies may impact the biological process of macrophytes and aquatic fauna. It may alter the composition of macrophyte by interfering in nutrient cycle.
- Tree cutting may/ may not be required for the final alignment. DBOT contractor shall ensure that the minimum trees shall be felled during the construction.

Solar Sludge drying &Solar rooftop

- Impacts on Micro-climate due to solar panels on roofs, especially in relation to reflectance and disturbance to fauna / flora.

Construction of Outfall facility

[42] https://forests.gujarat.gov.in/writereaddata/images/pdf/ease-of-doing-business.pdf

- Temporary discomfort to the aquatic biodiversity due to construction activities

Positive Impacts

It is expected that improvement of Vasna 240 STP to match the discharge quality standards suggested by NGT will reduce prevailing BOD, COD, N, P, load from the river which will have overall cumulative positive impacts on the water quality, biodiversity (if discharged into Sabarmati) and downstream users.

Since the proposed subproject involves rehabilitation and upgradation of existing STP which will be carried out within the site, impacts on flora and fauna of the site will be minimal and mainly during the construction period.

5.3.4.7 ESS7: INDIGENOUS PEOPLES/SUB-SAHARAN AFRICAN HISTORICALLY UNDERSERVED TRADITIONAL LOCAL COMMUNITIES

There are no indigenous people in the project area. However, local consultations were conducted for this project.

5.3.4.8 ESS 8: CULTURAL HERITAGE

Proposes activities take place in existing STP premises, surrounded mainly by other STPs, Gyaspur Metro Station, and the river. There are no cultural heritage assets (tangible or intangible) in nearby areas. Local congregation areas, party plots, parks, open spaces outside the boundary will not be used for any related activity including material storage, labor camp, or parking. This will be further confirmed during the Detailed Design Stage and impacts shall be discussed, while updating the ESIA. The chance find procedures shall be included in ESMP.

5.3.4.9 ESS9: FINANCIAL INTERMEDIARIES

Not Applicable

5.3.4.10 ESS10: STAKEHOLDER ENGAGEMENT AND INFORMATION DISCLOSURE

The existing STP site is surrounded by other STPs at Vasna, Gyaspur Metro Depot and Sabarmati. Proposed infrastructure developments may have an impact on the immediate residents near STP Vasna - squatters along the approach road mainly during construction stage.

Consultations have been carried out with various stakeholders including squatter settlement inhabitants, STP operators, AMC officials during preparation of ESIA for sub project. Stakeholder consultation is a dynamic process and consultations will be carried out during the life cycle of the G-ACRP project and will be conducted in accordance with SEP. Consultations will also be carried out after disclosure of draft ESIA and ESMP. The suggestions and views of the stakeholders will be incorporated in the report to finalise the same.

The summary of consultations is given below:

- Squatter households do not have access to municipal services. Mostly practice open defecation near highway or forest areas and other areas which are accessible to them.
- Squatter settlements along the access road did not have any specific issues related to upgradation of STP and have experienced odour issues maybe a couple of times. They

had informed the security personnel at the STP gate to report the issue to the STP officials .

- According to NGO working with labour, in Ahmedabad city, issues related to safety and security of workers are neglected by contractors at field level due to absence of monitoring mechanism.
- Construction workers need to be provided with better civic amenities at construction sites to prevent open defecation, prevent unsanitary and unhygienic conditions in the project site and labour camp and avoid potential conflict due to open defecation.
- There could be several settlements which are on encroached land or houses are on the sewerage drains drain. These will not be impacted due to sub project activities as the drains are located towards the middle of the roads and hutments are located on the pavements. Some of the slums in the city have issue of mixing of drinking water with drain water.
- In periphery slums individual connection of sewer lines is a problem. They have mostly soak pits.
- Solid waste is collected but not recycled.
- Vulnerable groups do not have access to the GRM of AMC as they are not conversant with online GRM of AMC. During sub project implementation, GRM details will be displayed at site and consultations will be carried out regularly.
- Bare minimum space requirements necessary for undertaking works are difficult to arrange and management especially if there are no alternatives.
- There is non-cooperation from localities where rehabilitation of sewer lines or MT works are undertaken and workspace is constantly challenged.
- Health issues in some workers working in STP. Issues related to odour.
- All policies and compliances are included in RFP and tender document
- Women are not very willing to work at the STP, due to travel time, remoteness of site etc.
- Issues related to STP include, old equipment, weathering of machinery and equipment. Need to assess if modification to existing features and equipment can result in better performance of the machinery and equipment.
- There are instances of ingress of industrial effluents into the sewage which may impact the durability of the structure and equipment.
- The water in Fatehwadi canal and Sabarmati River is not of good quality as its not properly treated in the STP. Villagers do not prefer to use Sabarmati water as it is not good for any use.
- The villagers use borewell and tube well water for drinking and farming.
- They expect to receive the water from Narmada Main Canal (NMC).
- Some villages (not all) experienced health issues due to water quality.
- Many industries have adopted reverse boring practices and it has completely deteriorated the ground water quality. Even borewell water is red many times. This causes skin diseases and crop damage
- Agricultural land is 100m-150m away from the banks of the Sabarmati River and has started hardening and becoming non-productive. Rainwater Harvesting is considered a feasible option for the villages downstream by the people.

The sub-project will implement the project level SEP to engage with relevant stakeholders, including the poor and vulnerable groups. Any grievances regarding the sub-project activities will be processed through the project level GRM as specified in the SEP. AMC will conduct awareness campaign to inform the settlement dwellers about the GRM.

5.3.5 Cumulative Impacts

The cumulative impacts of existing sewerage treatment systems in AMC are mainly due to the discharge of treated sewage into the rivers (Sabarmati and Khari) and Fatehwadi Canal. People of downstream villages of Sabarmati depend indirectly on the river and Fatehwadi Canal for irrigation (if AMC gets consent from GPCB for discharge into the canal). Cumulative Pollution levels due to the discharge of various STPs, CETP discharge through Megaline, other ETP, and stormwater discharges in the river are high currently. Vasna barrage across Sabarmati to the South of the city regulates water flow downstream of Sabarmati.

Screening and analysis were undertaken following the IFC Good Practice Handbook for Cumulative Impact Assessment and Management. The Handbook defines this as the process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen VECs over time, and (b) proposing concrete measures to avoid, reduce, or mitigate such impacts and risk to the extent possible.

The objectives of the study were to understand the impacts on the Sabarmati River or any other valued ecosystem component due to the project, other developments in AMC and its region, and proposed subproject activities.

Step 1 – VEC's, spatial and temporal boundaries.
VEC's were identified from the baseline environmental and social study work within the project area of influence and using literature review and field visits for the region. Screening questions considered included the following:

a. Will the rehabilitation of Vasna 240 MLD STP affect this VEC?
b. Would other identified projects/stressors in the area potentially affect this VEC cumulatively within the spatial boundary?
c. Would the impacts be potentially significant?

CIA was performed through expert opinions, checklists, and spatial analysis.

Discussion on VECs

The subproject activities include rehabilitation of an existing STP at Vasna, in the urban area of AMC and all works are confined to an existing STP site, to improve the treatment of sewage. The regional linkage is provided by River Sabarmati, which is dry for most of the year, and is a modified habitat as it receives water not from its source Dharoi Dam, but an irrigation canal – the Narmada Main Canal - intended to carry water from Sardar Sarovar Project to drought-prone areas of Gujarat. Water channeled from Narmada Canal to Sabarmati at Ahmedabad Riverfront is held there for most of the year for the ambiance of the riverfront and released through Fatehwadi canal or Sabarmati River (mainly during floods). None of the subproject works are carried out in the river or Fatehwadi Canal, except disposal of treated sewage. The river and the canal had been receiving sub-optimally treated sewage and bypasses, effluents, and stormwater for the past decade from Vasna STP, and other STPs, stormwater drains, and CETP (through Mega Line) since past two decades.

This project which would improve treatment quality to comply with stringent NGT suggested standards are expected to bring in positive impacts on water quality, availability of treated water downstream of the city, through Sabarmati and Fatehwadi Canal, and hence overall the subproject presents positive regional impacts. As the subproject activities are restricted to the existing STP site, access road immediate to it, and TSPS site (for minor repairs), no heritage feature of the city is considered as an important component for examination.

None of the floral or faunal species are identified as VECs as they are not dependent on the existing STP site, Sabarmati, or the canal to which treated water is discharged. So, there is no impact of the subproject on existing rates of habitat conversion and degradation in the area. No fish or aquatic species met the conditions for VEC because those identified through fieldwork and desk-based screening were not RET species of endemic species and the locations fall under the urbanized area and the habitats are already modified. Sabarmati River in the vicinity of the STP plant is already polluted and the riparian zone is converted into the riverfront. There are no protected habitats or forests in the immediate region which may be impacted by the subproject. Other VECs do not apply to this subproject considering the distance to these natural areas and intervening urban land use.

Identified Social VEC

Only one social/economic VEC was confirmed: the Fatehwadi Irrigation Scheme. The scheme is sensitive to water availability, through the Narmada Canal (diverted by Vasna barrage) or availability of treated water from STP.

Spatial Extent

The spatial boundary has been established based on the Sabarmati, Fatehwadi Canal, and downstream areas which may be impacted. The length of the river and villages supplied by the canal, till Vautha where the river gets tidally influenced and meets another major inflow from Vatrak is considered as the spatial limit.

Temporal Extent

The Feasibility Report states that as per the CPHEEO manual, Pumping Station (Civil Works) and Rising Mains are designed for 30 years however Pumping machinery is designed for 15 years from the base year. The temporal boundary was set at 15 years, as STP may need to be upgraded in response to regional/ city growth within this time. The feasibility report also adopted this as the timeframe.

Step 2: Scoping Phase 2 – Other Activities and Environmental and Social Drivers

The other activities and environmental drivers that are relevant were assessed as part of the iterative process of identifying VECs and spatial boundaries. Other activities which impact the river include (i) all discharges from the city and the region into the canal including all other existing and proposed STP discharges into Sabarmati, industrial effluents, treated effluents carried by Mega Line, stormwater drains; (ii) new Sabarmati Riverfront project and newly *proposed* barrage upstream of Vasna at the beginning of new Riverfront project, (iii) intensive industrialization of downstream areas of Sabarmati, to the South of Ahmedabad city which is given impetus by the nationally significant freight corridor – the Western Dedicated Freight Corridor (DFC); the mega rail transport project for freight connecting industrial areas to the west of India.

There is a significant reduction in rainfall and water availability in the catchment of Sabarmati, multiple barrages, and increased agriculture and urban uses to the north of the city, which has also resulted in less water availability in this non-perennial river. These already have a pronounced impact on in-river habitat and rendered it modified.

Table 39: Environmental Impacts on VECs (at Regional Level)

VECs that may be affected by the development	*VEC Threshold(s)*	*Spatial boundaries*	*Temporal boundary*	*Impacted by project*	*Impacted by activities and environmental drivers*	*Impacts on thresholds and Project Mitigation/monitoring measures*
River Sabarmati users	Improved water quality and better biodiversity due to better-treated sewage discharged	Till Vautha around 50 km from where it is tidally influenced	15 years is the planning period considered after which STP upgradation would be necessary	Positively impacts, as the dry river will get a well-treated discharge Quality ensured by the ongoing hon'ble high court and task force's action to disconnect all industrial connections from the sewer network	Less rainfall and the proposed (in early stages) new barrage upstream of Vasna, will have no impact on discharged treated water as it depends on the population served	Positive Impacts due to better discharge quality of treated sewage - Monitoring of quality of treated water and measuring quantity of treated water discharged and bypasses if any during construction and operation phases. - Periodic measurement of Trophic Status of the River to understand the improved quality due to the project
Fatehwadi Canal irrigation scheme users 240MLD can serve around 5000 ha in the command area (not part of Narmada Command area, but now receiving waters from the Narmada Main Canal)	Water available for irrigation as announced by GoG, and requested by Irrigation Department for the water-scarce region	Agricultural areas of villages of Daskroi, Sanand, Bavla, and Dholka – villages around 20 km aerial from Vasna.	15 years, within which the land use conversion can be expected, considering the pace of industrialization of the region, as it is in the influence region of DMIC	Positively impacts, as canal which gets less supply now from NMC and poor-quality treated water from STPs, will get a well-treated discharge for irrigation due to the project	Less demand for agriculture in the future, as the downstream region is fast getting industrialized with many industrial areas, also due to Western Dedicated Freight Corridor. Ahmedabad District is the largest inland industrial center in western India. Provides a manufacturing base for industries like chemical, textiles, agriculture, and food processing. The GDP of Ahmedabad and Gujarat depends heavily on the output and capacity of these industries.	Positive Impacts due to better discharge quality of treated sewage - Ensure Consent to Discharge from GPCB for discharge of treated sewage through the canal - A detailed study with stakeholder consultation through Agricultural University, in line with CPCB (2019) Guidelines for Discharge of Treated effluents for Irrigation to determine and manage discharge for better irrigation practices - Monitoring of quality and measuring quantity of treated water discharged during construction and operation phases

A summary of risks and impacts and their significance are presented in ***Table 38*** below:

Table 40: **Cumulative Environmental and Social Risks and Impacts of proposed STP improvements at the Local/near Site Level and Mitigation measures**

Aspects	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Status after Mitigation
Development in the city						
Improvement in Sewerage and Drainage (S&D) infrastructure and increase in population in the serving area	Increase in incoming flow to STP	Mitigation Possible, through long term master planning and planning additional STPs (ongoing)	High (negative)	Site/ Local	Long-term	Major Positive
New area development and increase in sewage flow	Increase in incoming flow to STP	Mitigation is Possible through Master plan (ongoing) and upgradation activities under G-ACRP	High (negative)	Site/ Local	Long-term	Major Positive
Increase coverage of vulnerable sections especially the urban poor, migrants, slum dwellers with no access in the serving area	Increase in incoming flow to STP	Improvement in the Sewerage network and capacity augmentation with improved technology; full coverage planned through G- ACRP	High (negative)	Site/Local	Long Term	Major Positive
Reduction in untreated sewage flow into stormwater, river or canals	Increase in incoming flow to STP	Improvement in the Sewerage network and capacity augmentation with improved technology - full coverage and Lake/canal improvement through G-ACRP, Master Plan (ongoing)	High (negative)	Site/Local	Long Term	Major Positive
Construction Phase						
Cumulative Air Quality Impacts	The subprojects (esp. two Vasna subprojects) can collectively generate construction and O&M-related air emissions. Emission from nearby Metro Depot construction	See mitigation measures in the ESMP. Mitigation Possible, through use of buffers, screens, PPEs, awareness, time restrictions/staggering of large	Low (negative)	Site/ Local	Short-term	Minor Positive (as mitigation measures will help reduce

Aspects	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Status after Mitigation
	will contribute to the emission levels.	noise/vibration generating activities at sites as detailed in ESMP				baseline impacts as well)
Cumulative Community Health & Health impacts	Health and Safety impacts due to cumulative air quality and noise impacts from dust, air emissions, movement of vehicles, etc. during the construction period. Odor during the construction period is also a major health concern for the settlement and workers of the surrounding.	See mitigation measures in the ESMP. Mitigation Possible through following ESMP, better STP design with ensured aeration, good green belt, PPEs, awareness	Low (negative)	Site/ Local	Short-term	Moderate Positive as access roads, STPs improved
Labour and working conditions	Cumulative impacts due to labor/workers on-site affecting movement of local traffic and pedestrian traffic conflicts with the local population, sanitation, and use of public amenities	See mitigation measures in the ESMP. Worker facilities, safety to be ensured, trained & monitored. Construction-related activities shall be planned to minimize large influx or movement of labor in line with Covid-19 restrictions.	Low (negative)	Site/ Local	Short-term	Positive
Cumulative Noise Impacts	Noise is a localized issue that diminishes in intensity with distance from the source. Up-gradation and construction of in the subproject area can potentially increase construction-related noise impacts on land uses directly adjacent to the construction sites, which is in industrial/mixed-use areas. However, though in an urban area, the expanse of the river on one side reduces noise accumulation from here	Such cumulative noise impacts will be temporary and will not likely occur during sensitive nighttime hours. See mitigation measures in the ESMP	Low (negative)	Site/ Local	Short-term	Positive (as existing operational noise levels also gets reduced due to planned measures)

Aspects	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Status after Mitigation
Impacts due to noise & vibrations: **Movement of vehicles Machinery such as boring machine, Concrete mixtures, Trucks, Excavators, Dumpers, etc.**	Increased level of noise and vibration. Faunal species like birds (Red vented bulbul, Tailor bird, Laughing dove, Purple sunbird, etc.), reptiles (Garden lizard), mammals (Five striped palm squirrel) will temporarily leave the site. Noise above 60 dB has been reported to interfere with songbird mating calls.	The impact will be site-specific and temporary. Revisits of faunal species are expected after the completion of the project. Buffers shall be planned and arranged as required. The development of a green belt with native herbs, shrubs, and trees is recommended. Partial mitigation possible	Low (negative)	Site/ Local	Short-term	Minor negative during the construction period
Impact due to Generation of dust & debris **Dust generation due to heavy vehicular movement & excavation Construction & Demolition debris generated due to excavation**	Dust may settle on the leaves of the surrounding flora and may interfere with biological processes. The dust will also disturb the faunal species.	Dust emission measures like water sprinkling, using prefabricated material are suggested. Buffers shall be planned and arranged as required. Partial mitigation possible	Low (negative)	Site/ Local	Short-term	Negligible negative during the construction period
Impact due to Air Pollution **Emissions from vehicles and machinery** **Air pollution due to site preparation, infrastructure development, building construction, and other related activities.**	Air Pollutants may interfere with the biological processes of plants. It may also irritate the faunal species.	Dust suppression measures are to be implemented. All the vehicles shall comply with the PUC certification requirements and the vehicles shall be maintained in good condition. Buffers shall be planned and arranged as required.	Low (negative)	Site/ Local	Short-term	Negligible negative during construction period
Dumping of waste into the lakes	Dumping waste into the water bodies may impact the biological	No dumping of any waste generated during the	Low (negative)	Site/ Local	Short-term	Positive

Aspects	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Status after Mitigation
	process of macrophytes and aquatic fauna. It may alter the composition of macrophyte by interfering with the nutrient cycle	construction in the natural water bodies i.e., lakes, rivers, and streams; as in ESMP. All wastes including during O&M of the existing facility to be managed well.				
Impact on water birds due to Construction Activities and Water quality improvement	Noise generated during the construction activities may deter water birds that may use Sabarmati banks near the STP site as feeding habitat. Water quality improvement of discharge due to technology upgradation will help improve the overall ecology and in turn, will attract the water birds.	Acoustic enclosures are recommended for high noise-generating instruments.	Low Negative due to construction activities Positive due to water quality improvement	Site/ Local	Short-term Long term	Positive
Impacts due to invasive species **Landscaping and tree plantation**	The site already has exotic species like *Lantana camara, Eucalyptus sp., Eichhornia crassipes,* etc. Transfer of topsoil/ manure for landscaping may carry seeds of exotic species. Transfer of sapling bags for plantation may carry seeds of exotic species which can later spread in the area.	Removal of invasive species. Using native species for plantation. Removal of any new growth of invasive species. ESMP to be followed	Low (negative)	Site/ Local	Short-term	Positive
Operation Phase						
Cumulative Air Quality Impacts	The subprojects can collectively result in air emissions, which will be less than baseline emissions due to technology up-gradation.	See mitigation measures in the ESMP	Low (negative)	Site/ Local	Long-term	Minor Positive

Aspects	Potential Impacts	Mitigation	Significance before Mitigation	Geographic Spatial Scale	Duration	Status after Mitigation
Cumulative Noise Impacts	Noise is a localized issue that diminishes in intensity with distance from the source. Very minimum noise will be generated during the operation of the STP	Cumulative noise impacts will be minimum also due to upgraded equipment, machinery, green belt. See mitigation measures in the ESMP	Low (negative)	Site/ Local	Long-term	Minor Positive
Community Health and Safety impacts	During operation, cumulative air and noise impacts will be confined to the STP site. Additional measures to reduce noise and air impacts by way of mitigation measures will be undertaken to keep the air and noise impacts to a minimum. Better emergency preparedness plan and facilities reduce impacts	See mitigation measures in the ESMP	Low (negative)	Site/ Local	Short-term	Positive
Cumulative Odor Nuisance	During the operation of STP, Odor nuisance is expected. It will be cumulative from all the STPs in the vicinity, near STP premises, and the water body to which treated sewage is discharged.	Improved technology and prescribed discharge standards will minimize odor emissions. Odor control system/ unit has been planned which will address odor issues after upgradation. Collection and drying of sludge proposed will reduce the odor nuisance.	Moderate	Site/ Local	Long Term	Positive (when compared to baseline)
Impacts due to eutrophication, quality of water available for downstream uses	Sabarmati, downstream of Vasna and Fatehwadi Canal will benefit from overall better discharge standards for treated sewage, which is disposed into these especially due to Nutrient Removal	Stringent discharge standards, monitoring mechanism	Major	Regional	Long term	Major Positive

A Summary of all Risks and impacts are compiled with impact significance in the following ***Table 39***, for which mitigation measures are described in the subsequent Chapter.

Table 41: Summary of Risks and Impacts and their Significance before and after Mitigation

Potential Risks and Impacts	Negative Impacts								Positive Impacts
	Duration	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Before Mitigation of Negative impacts	Negative Impacts after Considerations in the Long-Term Plan/ Mitigation	Significance of Positive Impacts
Preconstruction/ construction									
Land use changes	Long term	Project extent	Irreversible	Unlikely	Low	Low	Nil	Nil	Negligible Positive
Impact on-site and current users	Short Term	Site	Reversible	Likely	High	Low	Moderate Negative	Nil	Minor Positive
Impacts on Air	Short Term	Regional	Largely Reversible	Likely	Medium	Medium	Moderate negative	Negligible negative	Minor Positive
Impacts on Water Bodies	Short Term	Regional	Largely Reversible	Occasional	Medium	High	Minor negative	Negligible Negative	Moderate Positive
Impacts on Soil	Short Term	Project extent	Largely Reversible	Occasional	Low	Medium	Minor negative	Negligible negative	Minor Positive
Impacts of Noise	Short Term	Project extent	Largely Reversible	Occasional	Medium	Medium	Moderate negative	Minor negative	Nil
Impacts on health of Fauna, Flora (biodiversity)	Short Term	Site	Reversible	Occasional	Low	Medium	Moderate negative	Negligible negative	Moderate Positive
Occupational Health and Safety of workers involved	Short Term	Site	Reversible	Likely	Low	High	Moderate Negative	Minor Negative	Moderate Positive
Community Health and safety	Short Term	Local	Reversible	Likely	Low	High	Moderate Negative	Minor Negative	Moderate Positive
Disturbance to Cultural Heritage, Visual blight/aesthetics	Short Term	Local	Reversible	Unlikely	Low	High	Negligible negative	Nil	Minor Positive
Resettlement and livelihoods impacts	Temporary	Local	Reversible	Unlikely	Low	High	Minor Negative	N	Minor positive
Impact on Socio-Economic, Households, communities	Long and short term	Subproject or	Irreversible and reversible	likely	Ranging from low to high	Medium	Moderate negative	Moderate to minor	Moderate to high

Potential Risks and Impacts	Negative Impacts								Positive Impacts
	Duration	**Spatial Extent**	**Reversible or not**	**Likelihood**	**Magnitude**	**Sensitivity**	**Significance Before Mitigation of Negative impacts**	**Negative Impacts after Considerations in the Long-Term Plan/ Mitigation**	**Significance of Positive Impacts**
		location-specific							
Operations and Maintenance									
Impacts on Air	Short Term	Regional	reversible	Occasional	Low	High	Moderate negative	Minor Negative	Moderate Positive
Impacts on Water (bypasses in case of eventuality / discharge during floods/other disasters)	Short Term	Regional	Largely Reversible	Occasional	Medium	High	Major Negative	Moderate Negative	Major positive
Impacts on Soil	Short Term	Project extent	reversible	Occasional	Medium	Medium	Moderate negative	Minor Negative	Major positive
Impacts on health of Fauna, Flora (biodiversity)	Temporary	Site	Reversible	Occasional	Low	Medium	Minor Negative	Negligible negative	Major positive
Occupational Health and Safety of workers involved	Medium Term	Site	Reversible	Occasional	Low	High	Moderate negative	Minor Negative	Major positive
Community Health and safety	Temporary	Local	Reversible	Occasional	Low	High	Moderate negative	Minor Negative	Major positive
Flooding and Dam Safety	Temporary	Regional	Largely Reversible	Occasional	Ranging from Low to High	Medium	Moderate Negative	Minor Negative	Nil
Resettlement and livelihoods impacts	Temporary	Local	Reversible	Occasional	Low	High	Minor Negative	NIL	Minor Positive
Impacts on Cultural Heritage, Visual blight	Temporary	Local	Reversible	Unlikely	Negligible	High	Nil	Nil	Nil
Regional Impacts									
Water Quality and Availability	Long term	Regional							Major Positive

5.4 Status of Incorporation of ESIA comments in the Draft FR

The draft FR has incorporated the suggestions of ESIA to address climate change and resilience for the subproject, to address aspects as follows:

i) Increased rainfalls and flooding events: STP plant shall be designed with due consideration on the HFL of the Sabarmati River. An appropriate stormwater drainage system shall be proposed to quickly drain off the storm runoff at the site. This will minimize the impact of the flooding on the STP operations.

ii) Increased temperatures: The temperature increase will raise the likelihood of sewer corrosion and odor problems especially considering the extreme heat conditions in the city. The design shall incorporate mechanisms to reduce such impacts. To tackle the issue with odour, odour control units have been proposed as part of rehabilitating the STP.

iii) Change in flow pattern: Sewage inflow patterns may vary during various times. The Plant shall be designed following a modular approach which shall help in accommodating any changes in sewage quantity load. Equalization storage has been included in the sewage treatment plant for the flow variations to balance out the variability in the flow.

iv) Discharge Quality: The NGT norms will be followed for the treatment of wastewater. The proposed treatment train includes some flexibility to allow the system to adapt to slightly different water quality parameters.

v) Reduction of carbon emissions: The opportunities identified under this plan include carbon sequestration through green belt development (Carbon is sequestrated by plants by way of photosynthesis and storing carbon as biomass in their boles). These will be enhanced under this project. A comparison of the GHG emissions reduced through the subproject intervention is included in the FR.

vi) Reuse and recycle of water: With improved technology resulting in better-treated sewage, the opportunity to reuse treated sewage increases, also in line with the "Policy for Reuse of Treated Wastewater" announced by Gujarat government in 2018. Furthermore, treated wastewater may be sold as a reliable source of water supply to industries, and design shall incorporate the features to ensure this.

vii) Reduction in water pollution in the Region: Untreated wastewater discharged in water bodies leads to the presence of bacteria, viruses, and parasites which can cause a plethora of waterborne diseases. Through treatment, the pollutants in the raw sewage will be significantly removed thus increasing the quality of effluent, discharged into water bodies.

viii) Under the DBOT, the contractor shall provide a detailed method statement/schedule for the rehabilitation of the plant so that treatment of sewage does not get impacted by construction works on part of STP. No bypass shall be made to the river, without treatment.

ix) The proposed work involves replacing/ overhauling various units and equipment. The project shall consider the disposal of sewage, sludge, breakdown of STP, accidental leakages/ bursts of the sewage, sludge and related impacts on surface water quality and soil quality, noise generation and air emission due to running of DG sets, pumps and equipment, sourcing of material, and damage to artefacts/ archeologically important items during excavation, Tree cutting is required for any additional units' construction. The upgradation of STP will incorporate technologies and take steps to make the assets created/upgraded and resilient to climate changes such as increased rainfall and floods, increased temperatures, and change in the flow pattern. Since the STP and pumping station are existing at the site, there will not be any displacement of utilities.

x) Energy-efficient design and components: The designs adopted for 240 MLD STP upgradation shall be energy efficient or energy saving such as Solar lighting and or Energy saving fitting (LED lighting) and equipment, motors are fitted with variable frequency

drive (VFD) to reduce the energy consumption and achieve better energy efficiency. The selected equipment, installations, pumps & other machinery shall be energy efficient. To ensure energy efficiency, the bidders who will require minimal electricity usage for the plant shall be given preference and the project shall ensure replacing high energy-consuming equipment.

xi) Source of Raw Material: Material used for the construction of subproject components such as DI pipes, HDPE pipes, sand, coarse aggregate, fine aggregate, and gravel for construction works shall be outsourced from authorized vendors and authorized quarries to ensure that appropriate procedures are followed for extraction of material and sustainable practices are involved in such process. It is also suggested to source materials from AMC's C&D facility to ensure circular economy and resource efficiency.

Additional suggestions to be considered in Final FR

xii) Optimal Design: Design shall ensure minimal rehabilitation / reconstruction requirement to ensure the suggested discharge standards. Technology suggested shall be weighed in terms of environmental, social performance as well in addition to economic and other criteria. Upgradation of existing ASP technology with mechanisms to improve nutrient removal, MBBR, shall also be considered as an option in addition to the proposed SBR technology considering the technical difficulties in undertaking large scale modifications in the existing site

xiii) As against the suggestion in the feasibility report, treated sewage is not proposed for drinking purposes. Any reuse of treated water (on or off-site), will be only after Chlorination

xiv) A large solar drying facility may need a large footprint, require proper cleaning and maintenance (especially in the current location), and need arrangements to dispose of end-of-life solar panels as per applicable regulations. This may also not help in ensuring 80% dry sludge during the rainy season. Hence, alternate mechanisms shall be explored at the design stage. Solar Grid connected rooftop to be examined for impacts once the detailed design is available. All solar installations shall be away from the river and avoid bird paths. It is important to look at alternate options, other than large scale solar if adequate disposal facilities are not ensured

xv) Impacts due to flooding and discharge through the Vasna Barrage need to be studied, and Disaster Management and Emergency Preparedness Plan shall be prepared and followed by the DBOT contractor

xvi) Useful by-products: Sewage sludge in significant quantity is generated from primary and secondary treatment tanks during treatment. This by-product shall be tested for hazardous components if any, and either sent to Gamma Irradiating Facility of AMC for treatment and upcycling into soil enricher for use; or in case of hazardous content, sent to Hazardous waste TSDF arranged by AMC. This shall be included in FR, as against the current mention on using this as a manure

xvii) Consents and Permits: AMC shall renew the consent for existing and rehabilitated STP amending the Consent Condition for discharge of Treated Sewage into Fatehwadi Canal. AMC & Irrigation Department shall discuss & decide on the quantity of water required for such discharge after obtaining permit; and alternate arrangements if any required to be arranged for irrigation (so as to help with lesser available water for irrigation) as this discharge will be stopped till permit is obtained. AMC with the support of Irrigation Department shall undertake a study on reuse of treated effluent for irrigation in line with the Central Pollution Control Board's Guidelines of Reuse of Treated Water for Irrigation, 2018, through reputed Agricultural University with stakeholder consultations as per the Guidelines and after agreement with stakeholders and permit from GPCB discharge the treated sewage so as to avoid any negative environmental and health issue on downstream communities. Till such time, the release shall be through Sabarmati, as per

existing Consent. AMC shall conduct further required studies after obtaining revised consent from GPCB.

Discharge Standards for treated sewage into Sabarmati:

The discharge standards which sub-project shall comply with for discharge into Sabarmati is presented in ***Table 42.***

Table 42: Suggested Discharge Standards

Parameter	Treated Effluent Discharge Quality (mg/l) -ESIA suggestion for Sabarmati Disposal only[43]	Remarks
Biochemical Oxygen Demand (BOD)	Not to exceed 10	NGT suggested limits, improvement over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS – limit is 30 mg/l)
Chemical Oxygen Demand (COD)	Not to exceed 50	NGT suggested limits, improvement over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS – limit is 250 mg/l)
Total Suspended Solids (TSS)	Not to exceed 20	NGT suggested limits, improvement over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS – limit is 100 mg/l)
pH	Between 6.5 to 8.5	PH 5.5 to 9 as per NGT. As against the FR, treated water is not proposed for drinking. Considering the need to improve flora/fauna of Sabarmati, and outdoor bathing pH should be 6.5 to 8.5 – within NGT suggested limits, improvement over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS – limit 5.5 to 9 (as in NGT norms))
Total Nitrogen (TN)	Not to exceed 10	NGT suggested (also takes care of Ammonia, for Sabarmati discharge) limits, improvement over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS – limit (as N) 50mg/l, NH3 – 100mg/l)

[43] *(If Fatehwadi – Min. NGT std but, then Consent from GPCB, study to ascertain quality based on irrigation needs, in line with the CPCB guidelines ion Use of Treated Effluent for Irrigation)*

Parameter	Treated Effluent Discharge Quality (mg/l) -ESIA suggestion for Sabarmati Disposal only[43]	Remarks
Total Phosphorous (TP)	Not to exceed 1	NGT suggested limits, improvement over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS – Dissolved Phosphates – 5mg/l)
Faecal Coliform (Most Probable Number per 100 millilitres)	Not to exceed 100 – preferred; Not to exceed 230 - desirable	NGT suggested limits, improvement over MoEFCC Regulations 2017 (limit 1000 MPN/100ml) which was a revision by Government of India over EP Rules 1986: GENERAL STANDARDS FOR DISCHARGE OF ENVIRONMENTAL POLLUTANTS PART-A : EFFLUENTS : Discharge to Surface Water (acceptable as per WB EHS)
Additional Parameters		
TDS	Less than2100 mg/l	Norms prescribed for irrigation under Environment (Protection) Rules, 1986
DO	Min 5mg/l	To be ensured (DO is expected to be taken care of by BOD; but a standard for DO ensures aerators run for at least 5mg/l minimum; for reducing odour, necessary for preventing production of anaerobic gases (obnoxious gases) from sediments, [44]and for Propagation of Wild life and Fisheries as per Designated Best use Class of water B: suggested by NGT for polluted river stretches (Sabarmati: Kheroj (upstream of Gandhi nagar & Ahmedabad) to Vautha)
Residual Chlorine at the outlet	0.1-0.2 mg/l	if chlorination is proposed
All other parameters	As per EP Rules 1986, General discharge standards, suggested by WB EHS	In case of updating of standards by regulators, the subproject shall comply with the same In case of use in irrigation, Consent Conditions of GPCB and proposed Study on Use of Treated Sewage will inform any additional parameter limits

[44] https://cpcb.nic.in/NGTMC/T_1_a.pdf: HON'BLE NGT Orders:19.12.2018, 20.09.2018, 08.04.2018 & 06.12.2019, Prepare action plans: 351 identified polluted river stretches - Target: To fit at least for bathing purposes by 31.03.2021

CHAPTER 6. ENVIRONMENTAL AND SOCIAL MANAGEMENT AND MONITORING PLAN

6.1 Scope of ESMP

The primary objective of environmental and social management and monitoring is to record environmental and social impacts and risks as a result of project activities and identify the mitigation measures.

ESMP presents the anticipated impacts and risks, its mitigation measures, and responsibilities for the mitigation activities. Environmental management and monitoring activities for the subproject are divided into (a) design, (b) pre-construction, (c) construction, and (d) operation phases.

ESMP is developed to ensure the subproject is implemented in an environmentally and socially sustainable manner where all stakeholders understand the risks/ impacts of the subproject and take appropriate actions to manage the impacts adequately.

Proposed rehabilitation should be designed, constructed, and operated in full compliance with local building codes, local fire department regulations, local legal/insurance requirements, and in accordance with an internationally accepted Life and Safety (L&FS) standard. ESMP will be incorporated in the bid documents while bidding out DBOT contracts so that the contractor allocates the required resources and mechanisms to implement these measures.

The DBOT Contractor, through his OHS person who is also a suitably qualified L&FS professional, shall prepare and submit an L&FS Master Plan based on the proposed design, including preliminary drawings and specifications, and certify that the design meets the requirements of WBG General EHS guidelines, AMC Building Byelaws, and National Building Codes (Part IV Fire and Life Safety) of the Bureau of Indian Standards. This professional should conduct a review of L&FS systems as part of the commissioning tests for new and renovated buildings and certify that the construction of the L&FS systems has been carried out following the accepted design.

6.2 Proposed Environmental and Social Management Plan

The objective of the environmental management plan is to achieve the following objectives:

- Design and Technology implementation: Best available technologies to be implemented at site with minimum environmental and social impacts such as all equipment should adhere to environmental norms of noise, air emissions etc
- Good engineering practices are followed during construction and operational phases and to minimize environmental impacts, e.g. barricading of construction areas, signboards for hazardous area and excavated areas etc.
- To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the surrounding,
- To ensure that rehabilitation and resettlement of the affected communities if any due to the project shall be done properly,
- To ensure good occupational health and safety practices during construction and operation phases at the project. This can be implemented by regular training and SOPs at the site.
- The pollutant concentration in the workplace does not exceed the NAAQS at given time. Regular monitoring of workplace and surroundings to be carried out and record needs to be maintained

- To monitor impacts on the environment and the effectiveness of mitigation measures during operation,
- To ensure that the solid waste generated by workers during project construction and operation, is handled and disposed of in an approved manner; and the construction site is maintained free of wastes, excavation debris, concrete waste, wood, litter, plastics, and metal scraps by periodically collecting, segregating, storing, transporting and disposing of them appropriately. The Construction and Demolition (C&D) waste should be utilised to the extent possible and rest of it to be sent to the C&D facility for conversion to building materials.
- Use of recycled material to be promoted at site to the extent possible.
- To ensure that all non-hazardous wastes (such as excavation debris, concrete waste, wood, plastics, and metal scraps) are segregated at source, recycled, and reused to the extent possible,
- To ensure that Hazardous wastes (such as used fuel/paint/chemical containers, waste oil, lubricants, oil rags, contaminated soil, used batteries, etc) are segregated at source and stored in secure and leak-proof containers before transporting and disposing of them through Gujarat State Pollution Control Board (GPCB) authorized waste management agencies,
- Quantum of waste generated across various types and categories of wastes is estimated and reported to statutory authorities and when required for reporting purposes,
- Energy-efficient fittings, pumps, etc; and solar drying and rooftop solar may be adopted, only in case suitable maintenance and scientific disposal of end-of-life panels are ensured
- Rainwater harvesting and conservation mechanisms are integrated with the design,
- Use of fly ash bricks wherever, possible,
- Modern construction technologies are adopted such as pre-cast construction to reduce time and cost.
- Bypass arrangement during O&M period for TSPS maintenance and rehabilitation: The TSPS may require major rehauling or rehabilitation during 15 years O&M period. In such period, bypass arrangement should be made in a such a way that it doesn't impact the downstream water bodies. Such maintenance needs to be carried out in lean period and with proper alternative route for bypass water. A prior NOC should also be obtained from Pollution Control Board (PCB)

Environment, Health, and Safety recommendations for the subproject are recommended to be followed during the construction and operational phases of the project. ESMP for the construction phase and operation phase of the project is given in ***Table 41*** below. DBOT contractor will revise ESMP based on CESIA studies post design finalization and get it approved from AMC. DBOT contractor will implement CESMP during project implementation.

The Plan specifies measures for addressing the limited negative risks and impacts and for enhancing the beneficial impacts. In addition, proposed institutional capacity and capacity building requirements, to check and ensure the effectiveness of the plan throughout the lifecycle of the project have also been discussed.

6.3 Proposed Environmental and Social Management Plan

Table 43: ESMP for Rehabilitation of Vasna 240 MLD STP

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
PLANNING, DESIGN, & PRE-CONSTRUCTION PHASE:					
Design for rehabilitation of STP, TSPS, access road	ESS 1 & 3, 6,10	Pollution Prevention & Management, Biodiversity Conservation and Management. Adverse social impacts on the neighbouring settlements or common properties near STP and sludge disposal sites, Risk of exclusion of HHs from being engaged or covered by sewerage services in the design phase	• The treated sewage quality for discharge into Sabarmati shall comply with the standards suggested in this ESIA (NGT prescribed standards) and/ or most stringent standards prescribed by the GPCB NGT regulators at any point of time. • • Agree / Get Consent for disposal of treated sewage to Fatehwadi Canal, and Quantity to be discharged; based on a detailed study through Agricultural University based on the CPCB guidance on reuse of treated water for irrigation HFL, and hydraulic gradient, and impacts of total load on existing tanks and facilities to be considered while designing to avoid possible breakage ad blocks, and overflows that would impact the discharging water body. Flood impacts and the possibility of Disasters need assessment and detailed onsite Emergency Preparedness, and Disaster management Plan shall be part of Detailed Design. • Incorporate the safety measures and emergency preparedness measures to protect from flooding; based on the study on Dam Break Analysis & Flooding Stimulation, Preparation of Inundation and Emergency Action Plan for Vasna Barrage, Ahmedabad, Gujarat, which AMC will conduct. • Emergency measures for working with TSPS should be put in place by AMC. • Get all permits from GPCB based on Water act/ and all others for construction and operations • Incorporate the findings of the STP Audit (***Annexure VII***) while designing • Provision to hold untreated sewage or diversion to other STPs is required to be made as part of larger Master Planning of Wastewater Management of AMC, so that during any STP or	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			TSPS repair, rehabilitation works, breakdown/ shutoff, the untreated sewage does not flow into the water body or nearby premises. Detailed Design shall incorporate mechanisms to avoid diversion of wet weather flows from STP and TSPS. • Alternate mechanisms shall be explored other than solar drying which takes large footprint. In case it is considered, disposal of end-of-life panels need care; and panels shall be set up away from Sabarmati and any area of the site which hosts many birds. • Pumping station to ensure minimum noise generation from equipment like pumps, motors, blowers and DG set by locating within a noise containing structure or in an enclosed space (such as concrete/ brick structure). • Regular cleaning/ removal of sludge and solid waste to minimize odor nuisance and its disposal. Responsibility to prepare Sludge Management Plan is with the Contractor and will be approved by the AMC. Contractor will have the responsibility to store, test, transfer sludge for disposal appropriately based on the monitoring results & existing regulations, as agreed in writing with AMC during construction and operation. During monitoring, if hazardous content is detected, sludge will be sent to TSDF. Contractor shall discuss with AMC the monitoring results & manage sludge as per Sludge & Waste Management plan & present plan shall be upgraded in ESIA after finalization. • Plan will be prepared to collect sludge at constant intervals, stored properly without contaminating any environmental components, and disposal in a scientific manner or sale of sludge as manure (only if found permissible after quality tests). • Provide proper drainage arrangements and landscaping to avoid water stagnation on the site during and post-construction. • Equipment needs to meet the noise standards as prescribed by CPCB. • Use of less noise generating equipment such as submersible pumps, enclosed generators, etc.		

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Pumping station to ensure minimum noise generation from equipment like pumps, motors, blowers, and DG set by locating within a noise-containing structure or in an enclosed space (such as concrete/ brick structure). • Proposed treatment technology shall take consideration of high phenolic compounds in the sewage water and an additional treatment system needs to be employed. • Sewage sludge is generated from primary and secondary treatment tanks during treatment and its processing shall conform to the CPHEEO standards and US EPA Class A standards of Faecal coliform of <1000 MPN/g of total dry solids, Salmonella <3 MPN/g of total dry solids, Enteric viruses <1 PFU/ 4g total solids and Viable Helminth Ova <1/4 g total solids or stringent applicable National standards • Special attention to include vulnerable groups in project benefits and continuous stakeholder engagement to ensure such inclusion. • Sewage diversion during the construction period and commissioning of new STP units is not clear in the FR and has to be scheduled and planned by the DBOT contractor during the design phase. • The construction and related activities should be done in phase wise manner to enable the sewage to be treated in existing or upcoming units and prevent release of untreated sewage in the Sabarmati river. • Site layout planning before design shall clearly demarcate areas for ancillary uses such as storage and treatment of sludge from sludge beds and c&d waste, and others as required and construction shall be initiated in remaining lands. • Before starting the design plan for remediation and strengthening and reuse of areas under existing STP, required studies and measures must be finalised at design stage and pre construction stages • Labour colony location to be identified and site demarcated.		

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Site clearance.to be undertaken wherever required. • Ready mix concrete plant layout to be prepared and clearance taken		
Design to improve resource efficiency and pollution prevention	ESS3	Inefficient use of resources, high energy consumption due to inefficient functioning of existing systems.	• The designs adopted for 240 MLD STP upgradation for energy efficiency and savings such as Solar lighting, Energy saving fitting (LED lighting), and equipment, motors are fitted with variable frequency drive (VFD) to reduce the energy consumption and achieve better energy efficiency. The selected pumps, equipment, appurtenances shall be energy efficient. • The bidders who will require minimal electricity usage for the plant shall be given preference and the project shall ensure replacing high energy-consuming equipment. • The design/upgradation of STP shall also consider tertiary treatment of the sewage so that there is reuse of treated sewage and thus reducing the usage of freshwater source (also as per Gujarat government policy on reuse of treated sewage) • Sludge generated from the STP process is being treated in the Sludge hygienization plant set up for the purpose by AMC. • The design pipeline to avoid unnecessary excavation by selecting shortest route. • Solar lighting/ use of solar energy as much as feasible (provided disposal at TSDF is arranged, proper storage and use of PPEs while working with damaged panels are ensured) • Energy saving fixtures (LED lighting) and equipment, motors shall be fitted with variable frequency drive (VFD)	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design
Submission of updated ESMP, Monitoring Plan, and reporting schedule	ESS 1	Unsatisfactory monitoring of environmental and social aspects	• Submission of updated ESMP, monitoring Plans based on detailed design, before initiating any work or preparatory activity on any of the project related sites • Appoint environmental, health and safety (EHS) Supervisor and Social Specialist by Contractor to ensure ESMP implementation & providing training on management and monitoring; • Prepare and implement L&FS Plan and other SOPs • Timely submission of monitoring reports including	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			documentation of ESMP implementation (such as photographs, standardized formats for each of the monitoring parameters, GR status, etc.)		
Preparatory work for fulfilling mandatory/statutory compliances	All relevant ESSs	Non-compliance with essential environmental, safety, labour requirements, special laws and associated legal repercussion and cost and time overruns	• Discharge treated sewage into Fatehwadi Canal only after obtaining Consent to this effect from GPCB. All consent conditions to be followed strictly and reported periodically by Contractor • In case, AMC and irrigation department decides to use treated sewage for agriculture from the bank supported project, (i) permit for the same shall be obtained from GPCB (and that AMC has already informed irrigation department that they can discharge into the canal only after receiving permit for this from GPCB), (ii) AMC & Irrigation Department shall discuss & decide on the quantity of water required for such discharge after obtaining permit; (iii) AMC with the support of Irrigation Department shall undertake a study on reuse of treated effluent for irrigation in line with the Central Pollution Control Board's Guidelines of Reuse of Treated Water for Irrigation, 2018, through reputed Agricultural University with stakeholder consultations as per the Guidelines and after agreement with stakeholders and permit from GPCB, discharge the treated sewage so as to avoid any negative environmental and health issue on downstream communities. • Updating the ESMP and ESIA after finalization of design and risk prevention/mitigation plan during implementation. • Preparation of Plans as specified in the ESMP and ESMF as required by WB ESF and/or national regulations • Allocation of roles and responsibilities at AMC, Contractors and sub contractors' levels • Legal register for subproject will be formulated and implemented • Preparation of plans as required under Indians Laws • Obtaining No Objection Certificates required from mandatory and statutory bodies for construction and implementation of	DBOT Contractor & to be supervised by AMC and PMC Study on treated discharge use for Irrigation: Separate under Project Cost, by AMC PIU	DBOT Contractors Cost for Design

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			the project • Review of contractor's licenses for various purposes under various laws for mandatory and statutory compliances • Preparation of Standard Operating Procedure (SOP) for various activities which includes training, PPEs use, templates for permissions, recording and reporting, by contractors/ PIU • EC materials for traffic management, contractors' details, emergency numbers, signages, details of GRM and GO, etc shall be planned, printed and displayed during construction, creating awareness, display of posters etc. • Training and capacity building of the designated persons for implementing of various plans		
Preparatory work at existing plant	ESS 1, 2, 3 & 4	OHS risk	• Raising main is corroded. Necessary repairs shall be conducted. • Railings are corroded. Shall be replaced or repaired. Necessary signages shall be installed during preparatory work. • No storage area for screening waste. Designated storage area shall be provided. Records of waste volume shall be maintained. • New Parshall flume flow indicator shall be installed. • Designated area for grit storage shall be provided and records shall be maintained. • Oil leakage in blowers shall be addressed. Air supply line to the diffuser is damaged and shall be replaced. • Gasholder tank shall be repaired. • Laboratory instruments shall be replaced. • MLSS and DO sensors at Aeration tank shall be replaced • Alarm system shall be installed • Disaster management plan shall be revised and implemented. • Responsibility to prepare Sludge Management Plan is with the Contractor and will be approved by the AMC. In case sludge is tested and found nonhazardous, it will be sent to existing AMC Sludge Hygienization Facility which is this is a Cobalt 60 Gamma Irradiation Facility. If tested hazardous it shall be sent to the nearest appropriate Hazardous Waste TSDF for disposal following the Hazardous Waste Management Rules of Govt of	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			India, 2016.Contractor should undertake the activity of maintenance sludge drying beds during construction and operation. • Contractor will have the responsibility to store, test, transfer sludge for disposal appropriately based on the monitoring results & existing regulations, as agreed in writing with AMC during construction and operation. • For sludge drying beds, and maintenance: Mechanical cleaning is recommended strongly, and any manual cleaning will be avoided, to address workers' health and safety. • In case the detailed design proposed by the Contractor interferes with the HT line, the necessary safety measures will be undertaken and permission for clearance will be obtained by the Contractor.		
Sourcing of raw material	ESS 3	Degradation of natural resources	• For sourcing of material, the contractor shall obtain construction materials only from the existing government-approved quarries with prior approval of PIU • PIU to review, and ensure that proposed quarry sources have all necessary clearances/ permissions in place prior to approval • Use recycled material from C&D facility	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design
Accidental leakage, breakdown or failure of unit	ESS 1, 3 & 4	Untreated flow to canal/ river	• Alarm system should be designed in the STP, which may indicate any sudden emergency or accident or breakdown or power failure (for existing and proposed plant) • Provision of emergency diversion shall be made	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design
Chance Find Procedure	ESS 8	Loss/ damage of valuable, historic artifacts	• Chance finds are not anticipated on site, as the proposed work is rehabilitation of an existing STP. • Prepare and implement Chance Find Procedure, create awareness among the workers, supervisors and engineers about the chance finds during excavation work. Stop work immediately to allow further investigation if any finds are suspected. Follow chance find procedures. • Inform State Archaeological Department if a find is suspected and taking any action, they require to ensure its removal or protection in situ.	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Contractor protects the site and reports to the Engineer/ PIU, and refers to local museums and the SPMU for advice • Hand over artefacts to museum/ cultural management agency • Review to determine if the excavation can be continued • Director of Culture and Information office in the locality will be responsible for managing objects		
Snake and scorpion bite	ESS 2	Accidental snake/ scorpion bite injury during site works/ preparatory studies	• Training/ awareness programs at all the stages of the project shall be conducted • Awareness signages at all critical points and availability of first aid on site • Contact details of fire brigade, nearest hospital and forest department shall be provided on site	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design
Stakeholder engagement	ESS10	Exclusion of stakeholders in consultative process or inadequate consultations	• Undertake consultations in accordance with SEP	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors ESMP Cost
• **Construction impacts**					
Tree cutting	ESS 1 & 6	Impact on flora and fauna	• After finalization of design by DBOT, no of trees required to be cut will be finalized and must be mentioned in the CESMP • Minimize removal of trees by adapting to site conditions and with appropriate layout design/ alignment, • Obtain prior permission for tree cutting from AMC[45]. • Plant and maintain 10 trees for each tree that is removed.	DBOT Contractor & to be supervised by AMC and PMC	DBOT Contractors Cost for Design
Water logging	ESS 1, 3 & 4	Temporary waterlogging due to poor housekeeping, uneven dumping of construction waste	• Waste materials to be stored on the higher elevations/ storage areas with proper cut off drains. • Avoid storing near storm water run-off channels or any low-lying areas. • It should be made sure that excavated areas for road repairs and upgradation shall not result in waterlogging.	DBOT/ Construction Contractor	Contractor's cost for site preparation and waste/ construction material storage

[45] https://forests.gujarat.gov.in/writereaddata/images/pdf/ease-of-doing-business.pdf

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
Excavated debris, soil disposal and management	ESS 1, 3 & 4	Stockpile areas, storage areas and disposal areas	• The excavated soil shall be removed from construction area at the earliest for beneficial reuse such as land raising/ filling of excavated areas. • Soil shall be covered with tarpaulin sheets during transportation. • Soil transportation shall not be done during peak hours and should avoid narrow and heavy traffic routes and important religious or tourist sites etc. • Earthen bund, to be provided around the storage areas for excavated soil and other construction material. • Completed earthworks to be sealed and/ or re-vegetated at the earliest with the help of landscape expert	DBOT/ Construction Contractor	Contractor's cost for site preparation and waste/construction material storage
Topsoil conservation	ESS 3	Erosion of topsoil/ stockpiles	• Stockpiles shall be stored with tarpaulins to avoid erosion. • Stockpile areas to be bordered by berms. • Stockpile to be done in high/ elevated areas to avoid flow in storm water run-off channels and erosion.	DBOT/ Construction Contractor	Contractor's cost for site preparation and waste/construction material storage
C&D waste management	ESS 1 & 3	Impact on solid and water quality	• The generated C&D wastes shall be stored at a designated area inside the plant premises. In case any other area is selected for such storage, mitigation measures shall be incorporated in site specific ESMP • The waste shall be covered with tarpaulin to avoid emission from the dumping and runoff from the dumping to prevent water contamination • It shall be tried to reuse C&D waste to the maximum extent within the site for other construction works which may need additional approvals based on type of materials/ purposes • The remaining C&D waste shall be disposed as per the C&D waste rules 2016 and after consultation and approval of AMC, preferably in AMC C&D facility (1000 TPD) if it can handle the quantity (39000 Tons during the entire construction period estimated from three STP upgradations).	DBOT / Construction Contractor	Contractor's ESMP cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• As soon as the Construction schedules of sub project(s) are finalized, the PIU team of G-ACRP shall share the schedule and quantum of C&D waste to be sent to the C&D waste processing facility. This will enable the SWM Department to make necessary arrangements for handling the additional C&D waste. • Prepare C&D waste management plan with clear scheduling on storage, transfer, recycling, disposal considering cumulative quantities of all three STP upgradations which would occur at near around same time. • Check for contamination and adopt appropriate cleaning, storage and transport (C&D waste of sewage tanks)		
	ESS 1 & 3	Generation of debris, muck during construction	• Topsoil shall be stored properly and used for agricultural purpose or development of city parks • Soil and debris may be managed for planned land filling and landscaping • Debris may be suitably stored for backfilling the excavated areas and disposal of surplus excavated material at a lead up to 50m suitable site as per direction of Engineer for following depths, below natural ground/ Road top level. Remaining quantity after the filling will be sent to the C&D waste treatment plant.	DBOT/ Construction Contractor	Contractor's ESMP cost
Air quality	ESS1, 3 & 4	Dust generation and emission	• Prepare and implement dust and noise management plan for proposed demolitions • Regular Water sprinkling to be done in the construction and excavation areas in dry seasons. Water sprinkling to be undertaken for kuccha access road to prevent dust and air emissions impact on squatter settlement. • Access road which is unsurfaced (Kuccha) road should be repaired and compacted before construction to reduce dust, noise and ensure smooth movement of traffic • Wetting and covering of excavated material transported by trucks. • Provide dust containment enclosures to the site till appropriate height	DBOT / Construction Contractor	Contractor's cost for works, material transport

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• All the transportation vehicles shall be PUC checked and maintained in good condition • Works at Gyaspur as Metro Depot is identified as a potential contributor to the impact on air quality. However, works are expected to be completed by the start of STP rehabilitation. • Else, it is important to discuss with Metro Contractors to plan and stagger large noise/ vibration emitting activities. • Monitoring of air pollution in the sludge handling facilities shall be ensured to provide healthy and safe working environment for the laborers.		
Impact on biodiversity due to Generation of dust & debris	ESS 6	Dust generation due to heavy vehicular movement & excavation Construction & Demolition debris generated due to excavation Dust may settle on the leaves of the surrounding flora and may interfere with biological processes. The dust will also disturb the faunal species.	• Dust suppression through sprinkling of water is recommended, though no water should be sourced from the lakes/ river in the area. • It is suggested to provide proper covers and enclosures to prevent debris and excavated material to be air borne or flow into the water bodies while working near them. Also, a suitable management plan must be provided to ensure that no debris are left about on the site so that risk of airborne dust and surface run-off into the nearby waterbodies is reduced • No debris shall be dumped in waterbodies or any other area than designated for the purpose by AMC	DBOT / Construction Contractor	Contractor's cost for works & material transport
Impact on biodiversity due to change in air quality	ESS 6	Emissions from vehicles and machinery Air pollution due to site preparation, infrastructure development, and other related activities. Air Pollutants may interfere with biological processes of plants.	• All the vehicles used during the construction stage to have valid PUC certificate • Vehicles running on cleaner fuel such as CNG are recommended • Traffic management shall be carried out to avoid any congestion which may cause increase in pollution level	Contractor	Contractor's cost for site preparation, construction works, material transport

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
		It may also irritate the faunal species.			
Impact on biodiversity due to change in air quality	ESS 6	Emissions from vehicles and machinery Air pollution due to site preparation, infrastructure development, and other related activities. Air Pollutants may interfere with biological processes of plants. It may also irritate the faunal species.	• All the vehicles used during the construction stage to have valid PUC certificate • Vehicles running on cleaner fuel such as CNG are recommended • Traffic management shall be carried out to avoid any congestion which may cause increase in pollution level	Contractor	Contractor's cost for site preparation, construction works, material transport
Noise and vibration	ESS 1, 3 & 4	Impact on local people	• Prepare clear plan and schedule for Demolition of STPs, especially parts which will create more noise/ vibrations • Construction activities to be done in daytime after giving prior intimation to locals, mainly the squatter settlement. Generally, majority of the inhabitants go out of the area for work in the industries • Night work shall be avoided, wherever possible, which may create noise and vibration. Work may also be done on the riverside to avoid disturbance to the squatter settlement • Use of low noise and low vibrating equipment and provision of enclosures for such equipment on site to be encouraged • Instruments need to meet standards of CPCB • Provision of PPEs to construction workers; like earmuffs and plug.	Contractor	PPE under Contractor's ESMP cost Less sound emitting equipment under Equipment cost
Community and Labor Health and Safety (GBV/SEA/SH)	ESS 2 & 4	Impact on local people	• Increase risk and insecurity of women and girls • Increased risk of GBV/SEA/SH due to labor camp, influx of labor and inadequate safety and security mitigation measures. • Night work for women labor should be avoided.	AMC/Contractor	PIU Implementation cost Contractors Cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Proper lighting should be arranged in areas where women labor are working and as far as possible women should be part of work groups as a safety measure. • Plan and implement, • Complaints and grievances made by women on safety and security issues and concerns should be addressed promptly. • Implement POSH • Implement GBV COC on contractors, workers, AMC		
Impact on biodiversity due to noise and vibrations	ESS 6	Movement of vehicles, machinery such as boring machine, concrete mixtures, trucks, excavators, dumpers etc. Increased level of noise and vibration. Faunal species like birds (Black Naped Ibis, Purple Rumped sunbird, Black Drongo, Cattle egret, Red vented bulbul, Indian Robin etc.) and mammals (Grey mongoose, Five-striped palm squirrel etc.) will leave site temporarily. Noise above 60 dB has been reported to interfere with songbird mating call.	• Workers is pre-sensitized to ensure reduction of noise and vibration to the least possible levels • Machinery employed should have been pre-serviced to ensure no more than usual noise is generated during their operation • All equipment must be provided with acoustic enclosures and silencers • Provision of suitable noise barriers should be made • Prevention of interference with songbird mating by ensuring no noise during dawn and dusk (when songbirds usually make their mating calls) and attempting to keep the noise level low	Contractor	Contractors' cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
Water quality	ESS1, 2, 3 & 4	Flooding and stagnation of water	• Excavation and deep excavation are to be avoided to maximum extent during monsoon to prevent water stagnation and flooding. • Diversion of untreated sewage to other STP for treatment and prevent any sewage or untreated sewage from polluting surface or ground water. • Prepare plan for diversion of the untreated sewage during construction period to prevent any issue and concern in the vicinity or downstream villages. • Water stagnation can increase incidence of disease related to polluted water and spread of vector borne disease. Therefore, during construction period training of workers and, supervisors for management of such stagnation, if and regular spraying for prevention of vector borne diseases, to be conducted through AMC health dept to prevent health risk for workers and squatter's settlement.	Contractor	Contractors works cost
Impact on Biodiversity due to change in water quality	ESS 6	Dumping of waste into the waterbodies may impact the biological process of macrophytes and aquatic fauna It may alter the composition of macrophyte by interfering in nutrient cycle	• While working in the river area measures should be taken that no construction waste, oil etc. shall affect the rivers water • Skimming of floating waste is recommended • Use of oil & grease absorbent pads is recommended	Contractor	Contractors works cost
Soil and water quality	ESS 1, 2, 3 & 6	Impact on soil quality and fertility. Water quality degradation	• Care to be taken to store fuel and oil (as and if required at site) at a place away from any drainage channel/ nalla preferably to be stored in drums mounted on a concrete paved/ impervious platform with slightly raised edges (or suitable arrangements) so that drums do not get overturned • There shall be proper channels for any spill to flow to a secure containment	Contractor	Contractor's cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Prepare and maintain inventory of the hazardous material (incl. asbestos if found) and quantity. Also mention safety risks for fire and other incidents. PPE required for handling such wastes shall be mentioned in inventory • There shall be regular checks to determine any spillage of oil or fuel. • Workers will be trained to handle the same and train in safety, and addressing incidents and accidents • Mutually reactive/ hazardous material shall be kept away from each other. Material Data Sheet shall be checked and precautions to be followed • Regular cleaning/ removal of sludge and solid waste to minimize odor nuisance and its disposal shall be ensured by AMC, in their facilities as per existing regulations.		
Aquatic life	ESS 6,	Impact on aquatic habitat	• Prevent discharge of untreated sewage, leachate and chemicals into surface water bodies • Preservation of aquatic habitats by restricting movement of people/ equipment into them and preventing entry of sediments into water bodies • Keep noise level (e.g., from equipment) to a minimum level, as certain fauna is very sensitive to loud noise • Keep only appropriate light levels in areas near nesting sites/ flight pathways • It is recommended that dawn and dusk time when avifaunal movement is high shall be excluded from construction schedule	Contractor	Contractors' material storage, equipment and works cost
Impact on nearby communities	ESS 1, 2, 3 & 4	Land acquisition and involuntary resettlement is not envisaged. Community health and safety issues due to pollution caused by air pollution due to vehicle movement on kuccha	• Air quality improvement measures to be implemented • Phase wise development to avoid complete shut-down of the plant and diverting untreated sewage into the river • Diversion of flow to other STPs/Unit during construction phase to prevent flow of untreated water into the river/ canal • Construction of access road to reduce noise, dust and air emissions on unpaved (kuccha) road and avoid community health and safety risks. • Include SEA/ SH grievance mechanism in project GRM	Contractor & AMC	Project Cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
		road in construction phase Poor water quality in downstream villages due to poorly treated sewage Land acquisition and involuntary resettlement is not envisaged. Community health and safety issues due to pollution Poor water quality in downstream villages due to poorly treated sewage. Laying of pipeline may temporarily affect the communities in the vicinity Increased risk of insecurity as well as SEA/SH for women and girls due to labor influx	• Include SEA/ SH related clauses in contractor's CoC. • Provision of community toilets and drinking water for informal/ squatter settlements to be provided through existing AMC schemes for such settlement and various other relevant schemes depts of the District Administration with nominal payment to prevent waste of water or use for commercial purposes.		
Occupational health and safety	ESS 1, 2, 3 & 4	Occupational Health & Safety hazards to labors and public Labour camp management, Adopting EHS best practices	• Comply with the Occupational health and Safety aspects of various labor related acts of India, WB EHS guidelines and OSHA guidance. • Ensure work permit mechanism, for specialized work; especially upgradation and replacement of existing components of STP, gas evacuations, enclosed spaces, depths, foundations, tanks, TSPS etc. which may be risky • Prepare and adopt EHS plan approved by AMC/ PIU which include measures as: (i) excluding the public/ unauthorized	Contractor	Contractors Design works cost PPEs under each work costs (additional emergency PPEs under ESMP costs)

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			staff/workers from worksites; (ii) ensure all workers are provided with and required to use personal protective equipment (reflectorized vests, footwear, gloves, goggles and masks) at working times; (iii) providing (H&S) training for construction site personnel; (iv) documenting procedures to be followed for all site activities; and (v) maintaining accident reports and records • Workers working at height, confined spaces, gaseous spaces and closed environments need to be given appropriate training and proper PPE before undertaking work. SOP shall be prepared for ensuring work is carried out as per SOPs • Adequate care and training for precautions to be taken to avoid and treatments in case of scorpion and snake bites during construction activities. Ensure that anti venom is available for treatment at site or in the nearest hospital/ health care center • Power tools not in proper condition should be replaced or prepared • Workers should use face shield or Goggles while welding and cutting work • Tagging shall be displayed in the Steel Scaffolding and shall be checked by safety engineer weekly, and the working platform should be at least 400 mm width for working at heights • Ensure Electrical DB are kept inside closed shed to prevent damage from water/dust, keep CO_2 fire extinguisher outside the shed for electrical fire fighting • Lifeline shall be provided at the edges of slab and worker should wear safety harness at height work • Proper standard ladder should be provided for access to areas at a suitable/appropriate length • Crane shall only be used to lift the materials not human being which is very unsafe practice • Safety Posters must be posted at site to motivate the worker for safe work		

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Safety Engineer should be available at site to give daily pep talks and submit the report daily. • Ensure that labor colony/ camp should be periodically sanitized and kept clean and hygienic. • Workers near high noise equipment to be provided with PPEs like ear plugs and earmuffs. • Handrails on both sides of walkways close to deep tanks and STPs need to be ensured. • Ensure that the contact details of the police or security company, fire brigade, nearest hospital, forest department and ambulance services are displayed on site (in languages which are comprehensible for the workers) and workers are trained to look at them and reach out for help when required. • Smaller switches at STP units to be installed with protection from rainwater to minimize electrical short circuit. • Proper housekeeping should be done at site and all materials should be properly stacked with display board. Records shall be maintained for the same. • Cleaning/ maintenance, the inlet line and area of confined spaces like underground pumping stations shall be adequately vented to ensure that no toxic or hazardous gases are present in the line. • Ensure that there is no accumulation of solid/ construction or hazardous wastes on site, following proper plan for each for collection, treatment and disposal as per applicable rules and as agreed by the local body and PCB • Provide shaded areas for rest, mealtimes, drinking water and sanitation facilities. • Medical emergency facilities such as para medical staff. First aid facilities, isolation center for Covid -19/ or contagious health issue, ambulance service for incidences and accidents, tie up with government or private hospital for emergency services, etc. • Maintain necessary living accommodation and ancillary		

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			facilities in functional and hygienic manner in work camps. Ensure (i) uncontaminated water for drinking, cooking and washing, (ii) clean eating areas where workers are not exposed to hazardous or noxious substances; (iii) providing fire extinguisher at construction site and camps iv) fuel and cooking facilities in a safe and appropriate area (v) sanitation facilities are available at all times and (vi) waste management and segregation of wastes at camp and site. • Esp. from the perspective of this sub-project, segregation of labor camps from worksite and restricted entry to site of excavation and buildings to prevent entry of children, outsiders and stray animals. • Proper health and hygiene management plan shall be prepared for laborers who will be engaged in construction activities related to the sludge drying beds including plan for periodic health checkup, and sanitization. This should also include safety measure to be undertaken while working in these areas.		
Storage of Chlorine and polyelectrolyte	ESS 1, 2, 3 & 4	Land & water contamination by spilling	• Designated area for the storage of chlorine and polyelectrolyte shall be defined • Log for use of these chemicals shall be maintained • Chemical spill contingency plan shall be prepared and implemented • Obtain consent under Explosives Act 1884 from Petroleum and Explosives Safety Organization (PESO) for storage of chlorine cylinders	Contractor	Contractors' cost
Community Health and safety	ESS 4	Community Health and safety risk during construction due to air pollution (dust & air emissions), traffic movement, congestion & Safety, noise, others) apart from sludge disposal, impact of	• Provide safety signage at construction sites & road repairs and upgradation visible to public. • Provide signages for traffic movement and traffic related aspects such as speed limit, height requirements, noise restriction, etc. Assign Traffic wardens for heavy movement of traffic. • Advance intimation to the local communities about increased traffic movement and its duration • Ensuring movement of vehicular traffic to and from worksite at	Contractor/ Sub-contractors	Contractors' cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
		bypassing untreated water during construction phase on neighboring settlements and dependent communities downstream of Fatehwadi Canal/ Sabarmati Environment and safety risk during demolishing of the existing plant	non- peak hours. • Provide safety barriers near any trenches, and cover trenches with planks during non-work hours. • Contractor's activities and movement of staff will be restricted to designated construction areas. No access to staff/workers to other sites within the premises. • Water sprinkling on kuccha access roads and construction areas within the STP premises. • Vehicles used for the construction activities shall have the necessary PUC certificates and regular checks for ensuring compliances as per local laws. • Recycling and the provision of separate waste receptacles for different types of waste shall be maintained. • Grievance registers at gate with security. Training to be provided to contractors, PMC & AMC staff to handle grievances with respect to community. • Training of drivers transporting material to site on safety precautions, speed restrictions, other issues. • The contractor's LMP and the condition will include clauses regarding non-tolerance of GBV and SEA. Any cases of GBV and SEA will be referred to the appropriate authority following the GBV Action Plan prepared for the project. • Alternate design and/ or temporary measures, including sewage diversion plan to prevent untreated sewage from being released in the river or Fatehwadi canal during the construction period and commissioning of STP • The contractors need to prepare diversion plan for construction and operation period to ensure smooth flow of sewage for treatment in the proposed project or adjoining STP • Alternate traffic routing to be adopted in consultation with traffic police authorities. This shall be properly displayed well ahead of diversion areas. Commuters/ citizen shall be informed through signages, print and social media • Construction works at busy roads must be completed earlier to		

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			minimize inconvenience • The demolishing of the existing plant should be done in phased manner so that bypass of untreated sewage is minimized. The defunct digestors may have entrapped methane gas, the methane gas must be extracted, and air vent should be provided. • The contractor must check for the presence of the volatile material and use gas analyzer as a safety protocol to avoid any accident •		
Land acquisition Socio economic status, Labour/ employment opportunities & procurement	ESS 4, 5 & 10	Impact due to Land Acquisition, restriction on movement or access, livelihood	• There are no potential involuntary resettlement issues identified, as there is no land acquisition of private land or inclusion of additional government land for the proposed upgradation • Ensure that land within the STP compound is encumbrance free • Ensure timebound restoration of access roads to support vehicular traffic, so as to minimize inconveniences or livelihoods related impacts on neighboring squatter settlements and others using these access roads • Periodic consultations and information sharing with the local communities to ensure their engagement with the process and to manage all land and livelihoods related adverse impacts • Labor and employment opportunities will be generated during the construction period. Absorption of daily labor currently working in plant site for any construction activities in the proposed upgradation • Unskilled and semi-skilled labor work can be sourced from the squatter settlement as per availability and willingness of labor. Women can also be hired for specific tasks from the squatter settlement. Since the settlement is in close proximity some women may be willing to work on site as labor • Continued access to access road/rivers will be available. There will be no restrictions on movement of people on access road. Traffic management plan will be planned and implemented to	Contractors' scope	Contractors' cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			prevent any traffic congestion due to movement of vehicles transporting materials and labor • Ensure implementation of health and safety measures for all workers working on site given the nature of activities • If contractors' scope for existing work is being revised, then revise or give notification well in advance to enable contractors to make alternative arrangements for staff and sub-contractors • The contractor's LMP and the Condition will include clauses regarding non-tolerance of GBV and SEA. Any cases of GBV and SEA will be referred to the appropriate authority following the GBV Action Plan prepared for the project. • Access road shall be panned in such a way to avoid any disturbance to the squatter settlement.		
Labour camp	ESS 2	Undignified living conditions of labor Improper toilet facilities/ amenities Conflict with locals	• Labor camps / stay facilities shall be of acceptable living conditions and safe structures. If a camp is required, stay shall be arranged at appropriate distance from STPs. Construction of labor camp shall not be started before it is approved by the Engineer • Required facilities shall be arranged at the laborer accommodation facility • Construction of separate toilets for labor at work site and labor camp • Separation of camp from worksite is important • Separate toilets/bathing/ washing facilities for women labor, and those with families • Code of Conduct for workers • Regular inspection and health check-ups and sanitization • Adoption of Covid appropriate behavior, distancing norms and signages/ messages • Regular training & awareness programs to the workers • Regulated movement of the workers to work site • GRM awareness creation and orientation; availability of boards, registers, complaint boxes at camp • Fire-extinguishers, first-aid kits, emergency numbers at	Contractors; to be approved by Engineer, AMC PIU	Contractors' cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			different locations in the camp		
Landscaping and tree plantation	ESS 6	Impact due to introduction of Invasive species Site already have exotic species like *Pistia sp. Lantana camara, Eucalyptus sp., Eichhornia crassipes* etc. Transfer of topsoil/ manure for landscaping may carry seeds of exotic species. Introduction of unwanted seeds/ sapling during transfer of sapling bags for plantation.	• Removal of exotic species from the area to be developed shall be undertaken (for existing & proposed plant) • Use indigenous varieties for plantation of green belt in discussion with Garden Department of AMC • Plantation of local species • Topsoil/ manure required for landscaping shall be used from the local region. • Saplings bags for plantation shall be checked for presence of any exotic species, if present shall be discarded.	Contractors' scope	Contractors ESMP cost
Snake and scorpion bite	ESS 2	Accidental snake/ scorpion bite injury	• Training/ awareness programs at all the stages of the project shall be conducted. • Contact details of fire brigade, nearest hospital and forest department shall be provided on site	Contractors' scope	Contractor cost
• **Operation Impacts**					

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
Post-construction clean-up	ESS 1 & 3	Damage due to debris, spoils, excess construction materials. Impact on soil and water quality	• Remove all spoils wreckage, debris, rubbish, or temporary structures (such as buildings, shelters, and latrines, septic tanks) which are no longer required; and • All excavated roads shall be reinstated to original condition. • Road repairs in case of damage during construction works • All disrupted utilities restored • All affected structures to be rehabilitated/ compensated • The work sites to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up • The contractor must arrange the cancellation of all temporary services • Request PIU to report in writing (using prepared format) that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work • Seek feedback from neighboring settlements on clean up	Contractor	Contractor cost
Existing sewage treatment plant (STP) operation	ESS 1 & 3	Non-compliance with government regulations – no valid consent to operate (CTO) for STP operation	• Obtain CTO or amendments to existing CTO from Gujarat Pollution Control Board (GPCB) immediately.	AMC	Operating costs
Operation of STP	ESS 1 & 3	Release of untreated sewage into water bodies impacting water quality	• There shall be daily and monthly monitoring of the treated sewage/ parameters and ensuring compliance with PCB standards for effluent disposal into surface water bodies • Periodically seek feedback from neighboring settlements on STP operation and any unidentified/ unintended impacts	O&M Contractor/ AMC	Contractor cost
Screening waste	ESS 1 & 3	Unscientific storage & disposal of screening/ floating waste	• Screening/ floating waste shall be stored in the closed containers and shall be disposed through AMC with written consent • Record of the waste generated and sent for disposal at AMC designated appropriate place shall be maintained	O&M Contractor/ AMC	Contractor cost
Solid waste & E-waste, Batteries	ESS 1 & 3	Unscientific storage & disposal of wastes	• Wastes shall be segregated and stored in closed containers • Disposal shall be according to the Solid Waste Management Rules 2016, E-waste Management Rules 2016, Hazardous Waste Management Rules or Batteries Rules as applicable	O&M Contractor/ AMC	Contractor cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			• Records on wastes generated and disposed shall be maintained on site		
Sludge disposal	ESS 1	Disposal of sewage in improper manner Spillage during transit	• The sludge is being treated at Sludge Hygienization plant. Sludge will be handled by AMC as per regulations. The same shall be continued. It shall be tested and if hazardous to be sent to Hazardous Waste TSDF (follow manifest system, etc. as applicable) agreed and arranged by AMC. present plan shall be upgraded in ESIA after finalization. in AMC to prepare plan for treating / disposal in their facilities (including Hygienization facility) • Sludge shall be transported in covered containers to avoid any spillage during transit	O&M Contractor, AMC	Contractor cost
Release of unauthorized industrial effluent	ESS 1 & 3	Impacting STP operation efficiency	• No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers • Monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with GPCB	O&M Contractor/ AMC in coordination with GPCB	Contractor cost
Accidental release or malfunctioning of units	ESS 1 & 3	Discharge of untreated water into the canal/ river	• Alarm system should be provided in the STP, which may indicate any sudden emergency or accident or breakdown or power failure. • Emergency diversion facility shall used	O&M Contractor/ AMC in coordination with GPCB	Contractor cost
Air and noise environment	ESS 1 & 3	Odor and noise from STP	• Strictly follow standard operating procedures/ operational manual for operation and maintenance of STP and terminal Pumping station • Ensure that operating staff is properly trained and have clear understanding of odor issues vis a vis its relationship with operational practices. • Ensure that pumping cycles are properly followed and there is no build-up of sewage beyond design volume in the wells. • Proper handling and regular maintenance of operating machines including pumps, blowers, generators, air diffusers, etc. • The STP and pumping station shall have sufficient buffer zone in	O&M Contractor/ AMC	Contractor cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
			form of greenbelt to reduce the odor and noise impacts. • Seek feedback from neighboring settlements/ establishments		
General safety	ESS 2 & 4	Occupational health of workers of STP and residents around STP	• Cleaning/ maintenance, the inlet line and area of confined spaces like underground pumping stations shall be adequately vented to ensure that no toxic or hazardous gases are present in the line. • Ensure that there is no accumulation of solid/ construction or hazardous wastes on site, following proper plan for each for collection, treatment and disposal as per applicable rules and as agreed by the local body and PCB • Safety Posters must be posted at site to motivate the worker for safe work	O&M Contractor/ AMC	Contractor cost
Not using PPE	ESS 2	Workers may get injured due to not using PPE's at workplace. Worker's eyes may get injured due to not using of safety goggles and ace shield while welding	• PPE' s (Safety shoes, Safety helmet, Full body harness, Safety jacket, Gloves) must be provided to the workers while working at site. • Power tools which is not under proper condition should be replaced or prepared. • Worker should use face shield or goggles while welding and cutting work.	O&M Contractor/ AMC	Contractor cost
Electrocution & Fire	ESS 2	Electrocution may occur due to using of joint electrical cable.	• Standard operating Procedures (SoP) for working with electric instruments and facilities shall be defined and implemented. • Ensure Electrical DB must be kept inside closed shed to prevent from water/ dust with a gate outside. Keep CO2 fire extinguisher outside shed for electrical fire fighting. • Contact details of nearest fire brigade and hospital shall be provided on site	O&M Contractor/ AMC	Contractor cost
House keeping	ESS 2 & 4	Worker may get injured due to poor housekeeping at site. Vector borne disease may occur due to lack of poor housekeeping	• Regular housekeeping shall be conducted. Records shall be maintained for the same. • Storage area for raw material and waste shall be defined and appropriate signages shall be informed. • Working area shall be periodically sanitized and kept clean and hygienic	O&M Contractor/ AMC	Contractor cost

Activity	Ref: ESSs	Potential Negative Impact/ Concern	Mitigation Measures	Responsible Agency	Source of Funds
Lack of awareness	ESS 2 & 10	The incident may occur due to non-awareness of workers at danger zone, without displaying safety sign board.	• Safety Engineer should be available at site to give daily pep talks and submit the report daily • Training/ awareness programs at all the stages of the project shall be conducted • Mock drills shall be conducted frequently • Records of training/ awareness programs/ mock drills shall be maintained	O&M Contractor/ AMC	Contractor cost
Accidents due to working conditions	ESS 2	Persons fall from height, fall, slip, trip, fatality, property damage due to access and worker working without appropriate safety harness, Floor openings. Unsafe scaffolding has the potential to result to death or serious injury of person.	• SoPs for working conditions shall be defined and implemented • All the necessary PPEs shall be used, and checklist/ permit shall be approved prior to working at dangerous areas • Tagging should be displayed in the Steel Scaffolding and should check by safety engineer weekly, and the working platform should be at least 400 mm width • All the openings should be properly closed at walkway area • Lifeline should be provided at the edges of slab and worker should wear safety harness at height work	O&M Contractor/ AMC	Contractor cost
Snake and scorpion bite	ESS 2	Accidental snake/ scorpion bite injury	• Training/ awareness programs at all the stages of the project shall be conducted. • Contact details of fire brigade, nearest hospital and forest department shall be provided on site	O&M Contractor/ AMC	Contractor cost

6.4 Disaster Management and Emergency Preparedness

The purpose of the DMP is to identify potential foreseeable accidents/ emergency situations and establish and maintain procedures to address or prevent such situations, as well as to test the effectiveness/review/revise such procedures periodically.

The proponent will insist on development and implementation of an individual emergency response plan or disaster management plan by every contractor/ stakeholder that will be involved in the project development. This will be made as a pre-requisite for engagement in the project.

The plan for emergency and disaster preparedness contains the modalities, roles, responsibilities and overall implementation of protocols and action plan in the case of emergencies and disaster. The procedure given in the DMP is also integrated for disaster preparedness.

6.4.1 Approach to DMP

The basic approach towards preparedness for any major disaster or emergency situation will comprise of the following activities:

- Identify the potential disasters likely to occur;
- Establish a Disaster/ Emergency Response Team (ERT) to implement emergency procedures;
- Develop a detailed Emergency/ Disaster Response Plan with details regarding the course of action to be followed in order to minimize personal injury and property damage in the event of fire, flood, loss of ground, or natural disaster;
- Train the personnel in planning and responding to an emergency;
- Carry out audits of individual establishments on a regular basis to monitor the Emergency Response Plans and the corresponding procedures. The audits will include review of the following:
  - The roles and responsibilities of the respective ERT and support organizations;
  - Adherence of individual project activities to safe practices; and
  - Resource requirements, condition of equipment's and their availability.

6.4.1.1 Identified Emergency Situations

The potential hazards identified for the project include the following:

- **Natural Hazards:**
  - Floods
  - Earthquakes
  - Fire hazards
- **Technological or Social Hazards**
  - Transportation accidents
  - Hazardous materials releases
  - Social disorder
  - Food and water supply contamination

Disaster management plan of Ahmedabad District shows following identified vulnerabilities for Ahmedabad which also apply directly to this project.

Table 44 Disaster Vulnerability

Type of hazard	Vulnerability Ranking as per DDMP[46]	Vulnerable Area as per DDMP	Sub-project related risk
Earthquake	15 (High)	Entire District	Entire plant area
Flood	9 (Moderate)	Ahmedabad, Daskori, Dholka, Dholera, Dhandhuka	Entire plant area
Fire	9 (Moderate)	Ahmedabad City, Bavla, Daskroi	Plant units
Industrial Accidents i.e., Accidental gaseous emission (chlorine)	6 (Moderate)	Ahmedabad City, Bavla, Daskroi	Plant units
Droughts	6 (Moderate)	Viramgram, Detroj, Mandal	Not applicable
Food Poisoning	4 (Low)	Entire District	Construction workers & STP staff
Epidemic	4 (Low)	Entire District	Construction workers & STP staff
Building Collapse	2 (Moderate)	Mainly in city area	Plant units

6.4.1.2 Proposed Organizational Structure for Disaster Management

Disaster Management Committee

The borrower shall constitute a Disaster Management Committee (DMC) for sub-projects under G-ACRP. This committee will be headed by Commissioner, Ahmedabad Municipal Corporation and Urban Development. The DMC will be the apex planning body and will play a major role in preparedness and mitigation of any disaster. The cell will have the following key functions:

- Preparation of sub-project specific Disaster Management Plan;
- Setting up of Emergency Control Centre during emergency situations;
- Coordination with District Disaster Control Room of Ahmedabad district;
- To supervise emergency response measures in case of any emergency;
- Keep track of predictable natural hazard events such as floods etc.;
- Organize training and capacity building programs on disaster management for individual establishments in the Project Region;
- Periodic monitoring of Emergency Response Plans and the corresponding procedures of individual establishments;
- Organize post –Disaster evaluation and update DMP accordingly;
- Prepare reports and document on Disaster events and submit the same to District Control Room. The documents shall include:
  - Source & cause of Disaster
  - Description of the response efforts
  - Recommendation for preventive and mitigation measures

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- Plan for upgrading emergency preparedness and response plan

The DMC will have the following members of AMC staff:

- Unit Supervisor
- Administration Department
- Disaster management/ Safety Department
- Electrical Department
- Civil Department
- Environment Department

STP plant during construction and operation phase shall have following assets in admin building to control and communicate the disastrous conditions,

- Intercom, telephone;
- P and T telephone;
- Breathing apparatus;
- Goggles/ gloves/ helmets;
- Public address megaphone, hand bell, telephone directories (internal, P and T);
- Emergency lamp/ torch light/ batteries;
- Emergency shut-down procedures;
- List of key personnel and list of Emergency coordinators;
- Duties of key personnel;
- Address with telephone numbers and key personnel & departments i.e., police, fire brigade, hospital etc., emergency coordinator, essential employees;
- Important address and telephone numbers including Government agencies, neighboring industries and sources of help, outside experts, chemical fact sheets, population details.

Emergency Response:

The following five steps are involved in an emergency response plan of the plant:

- Discovery and Notification: An event with an imminent threat of turning into an accident must first be discovered and the discoverer quickly notifies the same to the plant safety officer.
- Evaluation and Accident Control Initiation: Based on the evaluation of available information, the safety authority makes a rapid assessment of the severity of the likely accident and initiates the best course of action.
- Control Measures: Action is first taken to control the accident by eliminating the causes which may lead to the spread of accident. Measures are also taken to minimize the damage to personnel, property and environment.
- Cleanup and Disposal: After the accident is effectively contained and controlled, the cleanup of the site of the accident and safe disposal of waste generated due to the accident are undertaken.
- Documentation: All aspects of accidents, such as its occurred sequence, control steps and the extent of the damage and injury, must be documented for subsequent

analysis of accident for prevention in future, damage estimation, insurance recovery and compensation payment. It may be noted that some aspects of documentation, such as, photographs of the site of accident and main objects involved in the accident, survey for damage estimation, etc. may have to be carried out before the cleanup and disposal phase. However, the effort in all cases is to recommence the production as soon as possible.

Following are the list of identified disasters and proposed management plan:

Table 45 Disaster Management Plan for 240 MLD STP

Type of disaster	Precautionary measure	Emergency response	Post disaster response	Records to maintain
Earthquake	Earthquake compliant design. Responsibility of Design consultant Prepare SoP: Responsibility of DBOT contractor Training & mock drills: Responsibility of DBOT contractor	Gather in Common refugee area Head count Follow protocol/ SoP prepared for earthquake related situation Communicate to fire brigade Communicate to hospital in case of any injury Communicate AMC head office Provide first aid	Audit the plant for loss and damage	Add loss and damage Register Root cause analysis Submit report stating actions taken to response or rectify the issues
Flood	Design considering flooding history and probable impact of barrage: Responsibility of Design consultant Prepare SoP: Responsibility of DBOT contractor	Gather in Common refugee area Head count Follow protocol/ SoP prepared for flood related situation Communicate to fire brigade Communicate to hospital in case of any injury Communicate AMC head office Provide first aid	Audit the plant for loss and damage	Add loss and damage Register Root cause analysis Submit report stating actions taken to response or rectify the issues
Fire	Fire compliant design: Responsibility of Design consultant Prepare Life and Fire Safety Master Plan, Fire Safety Procedures SoP: Responsibility of DBOT contractor Provide fire management system • Hydrant system for the entire plant area; • Automatic sprinkler system for STP units; • Automatic fire foam system for the fuel oil storage; • Automatic inert gas flooding fire extinguishing system for the control rooms; • Portable fire extinguishers for the entire plant area; and • Fire detection and alarm system for the STP units	Gather in Common refugee area Head count Follow protocol/ SoP prepared for fire related situation Communicate to fire brigade Communicate to hospital in case of any injury Communicate AMC head office Provide first aid	Audit the plant for loss and damage	Add loss and damage Register Root cause analysis Submit report stating actions taken to response or rectify the issues
Industrial	Leak proof design: Responsibility of Design consultant,	Gather in Common refugee area	Audit the plant	Add loss and damage Register

Type of disaster	Precautionary measure	Emergency response	Post disaster response	Records to maintain
Accidents i.e., Accidental gaseous emission (chlorine)	DBOT contractor Prepare SoP: Responsibility of DBOT contractor	Head count Follow protocol/ SoP prepared for accident-related situation Communicate to hospital in case of any injury Provide first aid	for loss and damage	Root cause analysis Submit report stating actions taken to response or rectify the issues
Accidents on Site	Implement ESMP OHS measures: Responsibility of DBOT contractor Prepare SOPs: Responsibility of DBOT contractor	Provide First Aid Move to nearest Hospital, preferably considering the type of accident and injury, inform nearest kin Provide assistance and support for treatment, hospitalisation and transport Arrange insurance claim	Root cause analysis Prepare Corrective Action Plan	Incident/ Accident Register marking all accidents – indicative, serious, severe
Food Poisoning	Prepare SoP: Responsibility of DBOT contractor	Follow protocol/ SoP prepared for accident-related situation Communicate to hospital Communicate to AMC head office Provide first aid	Audit the plant for loss and damage	Add loss and damage Register Root cause analysis Submit report stating actions taken to response or rectify the issues
Epidemic/ Pandemic	Prepare SoP, Guidelines: Responsibility of DBOT contractor	Follow protocol/ SoP prepared for accident-related situation Communicate to hospital Communicate to PIU, AMC head office Provide first aid	Audit for loss and damage	Add loss and damage Register
Agitation/ civil disorder	Prepare SoP: Responsibility of DBOT contractor	Follow protocol/ SoP prepared for accident-related situation Communicate to hospital Communicate to AMC head office Provide first aid	Audit the plant for loss and damage	Add loss and damage Register Root cause analysis Submit report stating actions taken to response or rectify the issues
Building Collapse	Prepare SoP: Responsibility of DBOT contractor Training & mock drills, Responsibility of DBOT contractor	Gather in Common refugee area Head count Follow protocol/ SoP prepared for accident-related situation Communicate to fire brigade Communicate to hospital in case of any injury Communicate with PIU, AMC head office	Audit the plant for loss and damage	Add loss and damage Register Root cause analysis Submit report stating actions taken to response or rectify the issues

Type of disaster	Precautionary measure	Emergency response	Post disaster response	Records to maintain
		Provide first aid		

DBOT contractor shall prepare the SoPs for identified disaster situations and update the DMP. DMP shall be integrated with AMCs disaster management strategies and all the concerned documents shall be submitted to AMC by DBOT contractor.

6.5 Proposed Monitoring Plan

Environmental monitoring during construction and O&M phase is an important step to assess the impacts of the proposed project and it will be help in suitably changing/ strengthening the mitigation measures in terms of air quality, water quality, noise quality etc. Following are the major impacts identified based on which the monitoring plan is prepared,

1. Air pollution due to construction activities
2. Noise pollution due to construction activities
3. Contamination of river due to diversion of untreated water & oil spill
4. Sourcing raw material from unauthorised sources
5. Chance finding of historic artefact
6. Disposal of C&D waste generated
7. Disposal of Solid waste generated
8. Removal of topsoil
9. Impact on local biodiversity due to construction activities
10. Tree cutting
11. Impact on water quality in case of discharge of sub-optimally treated sewage
12. Soil contamination due to spill and pollutants
13. Occupational Health & Safety impacts during construction & operation phase
14. Community health & Safety
15. Employment opportunities
16. Landscaping & plantation

The project will require statuary clearance, i.e., Consent to Establish (CtE) and Operate (CtO) from, State Pollution Control Board (SPCB). The CtE and CtO conditions are to be complied and report submitted to GPCB every half yearly or as suggested in Consent Conditions.

Following ***Table 46*** gives the details of monitoring plan for CtE (during construction phase) and CtO (O&M phase) to be followed for the project:

Table 46: Environmental and Social Monitoring Plan: Construction Phase

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Construction disturbances, nuisances, public and worker safety	Project site	Implementation of construction stage EMP including dust control, noise control, traffic management, and safety measures.	Weekly during construction	Contractor's staff and environmental specialists of PIU	Staff and consultant costs are part of incremental administration costs
Ambient air quality	1 location in STP	SO_2, NOx, RSPM 10µm, PM 2.5µm, CO, Volatile organic compounds (VOCs), Methane, Ammonia, H_2S, Hydrocarbon (HC)	Once before start of construction. Quarterly (except monsoon) during construction	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor
Ambient air quality	Solar sludge drying beds	CO, CO2 and methane	Twice in week (for one Month) – 8 hrs monitoring refer to NAAQS	Contractor	Cost for implementation of monitoring measures responsibility of contractor
Inlet sewage and outlet treated water parameters **Surface water**	2 locations (Intake and outfall of STP). 1 Location downstream to outfall in Sabarmati River	**Physical parameters:** Colour, Odour, Temp, pH, turbidity, Total Hardness (Mg & Ca), TSS, TDS, **Chemical parameters:** Total alkalinity, Chloride, Total Residual Chlorine, Sulphate, Nitrate, Fluoride, Na, K, TSS, TDS, Salinity, Total Nitrogen, Total Phosphorus, DO, BOD, COD, Ammoniacal Nitrogen, Total Kjeldahl Nitrogen, Free Ammonia, Phenol, Oil &Grease, Heavy metals (Copper, Nickel, Lead, Zinc, Manganese, Cadmium, Hexavalent	Once before start of construction. Quarterly (except monsoon) during construction	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
		Chromium, Total Chromium, Mercury, Cobalt, Arsenic, Cyanide, Iron) **Biological Parameters:** Total Coliform, Faecal Coliform, Phytoplankton and zooplankton			
Ambient noise	1 location in STP	Day time and night-time	Once before start of construction. Quarterly (except monsoon) during construction	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor
Ground water quality	2 locations (Inside plant and outfall of STP)	**Physical parameters:** Colour, Odour, Temp, pH, turbidity, Total Hardness (Mg & Ca), TSS, TDS, **Chemical parameters:** Total alkalinity, Chloride, Total Residual Chlorine, Sulphate, Nitrate, Fluoride, Na, K, Salinity, Total Nitrogen, Total Phosphorus, DO, BOD, COD, Ammoniacal Nitrogen, Total Kjeldahl Nitrogen, Free Ammonia, phenol, Oil &Grease, Heavy metals (Copper, Nickel, Lead, Zinc, Manganese, Cadmium, Hexavalent Chromium, Total Chromium, Mercury, Cobalt, Arsenic, Cyanide, Iron) **Biological Parameters:** Total Coliform, Faecal Coliform, Phytoplankton and zooplankton,	Once before start of construction. Quarterly (except monsoon) during construction	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor
Soil quality	1 location in STP	**Physical parameters:** Bulk density, Salinity, Porosity, Texture Class (Percentwise silt, clay & sand), **Chemical parameters:**	Once before start of construction.	Construction Contractor	Cost for implementation of monitoring measures

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
		pH, Electrical conductivity, Cation exchange capacity, Sodium, Potassium, Nitrogen, Magnesium, Phosphorous, Sodium Absorption Ratio (SAR), Water holding capacity, Iron, Copper, Zinc, Manganese, Nickel, Permeability, physicochemical analysis and relevant metals.	Quarterly (except monsoon) during construction		responsibility of contractor
Sludge analysis	**1 location in STP Follow applicable national regulations and latest recommended methodologies**	**Physical parameters:** pH, Bulk Density, Conductivity, Moisture Content and Water Holding Capacity, Colour & Texture, Odour **Chemical parameters:** Oil & Grease, Total Volatile Solids, Total Kjeldahl Nitrogen, Total Organic Carbon, Phenolic Compounds, Calorific Value, Total Phosphorus, Total Coliform, Faecal Coliform, Arsenic (As), Nickel (Ni), Zinc (Zn), Cadmium (Cd), Copper (Cu), Chromium (Cr+6), Lead (Pb), Mercury (Hg), Toxicity Characteristics Leaching Procedure (TCLP)	**Once before start of construction.** **Once in six months during construction**	**Construction Contractor**	Cost for implementation of monitoring measures responsibility of contractor
Biodiversity assessment	3 locations 1 – Site area 2 – Downstream of Sabarmati River 3 – Downstream of Fatehwadi canal	General vegetation profile, floral diversity & Faunal diversity A species wise list Assessment of Flora & Fauna species with respect to dominance, density, frequency, abundance, diversity index, similarity index, importance value index [IVI], Shannon Weiner Index etc. of the species to be provided. Methodology used for calculating various diversity indices along with details of locations of quadrats, size of quadrats etc. to be reported within the study area in different ecosystems. Flora & Fauna under RET categories should be documented using International Union for the Conservation of Nature and Natural Resources (IUCN) criteria and Botanical Survey of India's Red Data list along with economic significance. Species diversity curve for RET species. Migration information of fauna present	**Annual**	**Construction Contractor**	Cost for implementation of monitoring measures responsibility of contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
		Exotic/ Invasive species list Aquatic ecology – Fish diversity & Fisheries, Macro invertebrates, zooplankton, phytoplankton, benthic organisms, aquatic plants			
ESMF Compliance & Status report	-	ESMF Compliance, Status Report, including any issue with screening results, the status of conduct of ESIAs including required plans like CHMP, BMP; and actions taken for compliance on site	**Monthly**	**Monitoring by Construction contractor, submission by PMC/ E&S auditor**	Cost of monitoring by Construction contractor and cost of submission by PMC
Site visit report	-	Site audit	**Monthly**	**PMC**	PMC
Compliance to the CtO	-	Compliance to the conditions stipulated in the CtO	**Monthly**	**PMC**	PMC
Community Consultations	1 location – nearest residential area, 2 locations downstream of Sabarmati River	Issues due to project construction activities	**Yearly twice**	**Construction Contractor**	Cost for implementation of monitoring measures responsibility of contractor
Grievance Redressal	Project area and surrounding	Registered grievances	**Monthly or as soon as grievance registered**	**PMC**	PMC & PIU
Areas with water stagnation	Project area and surrounding	Areas with water stagnation	**Monthly**	**Construction Contractor**	Cost for implementation of monitoring measures responsibility of contractor
Health & Safety	Project area and surrounding	No: of worksite incidents in various project sites (during Construction and O&M)	**Monthly**	**Construction Contractor**	Cost for implementation of monitoring

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
					measures responsibility of contractor
Environmental & Social Audit	**Project area and surrounding**	Physical monitoring and working of all the units of STP viz., screens, grit chambers, clariflocculators, aeration tanks, secondary clarifiers, chlorine contact tank, sludge thickeners, digesters and gas holder tanks. And units like pumps, motors, blowers etc., Any Issues due to rehabilitation works in parts of STP STP inlet – outlet and unit wise quality parameters tested Any abnormalities like leakage and spillage of oil, grease, sludge etc., Assessment of quality of implementing ESMP/ environmental management practices Health and safety risks for workers and communities Complaints received from civilians/ neighbouring people General work safety records of the plant Compliance to CTE (in construction phase) and CTO (in operation phase) conditions or other regulatory conditions. Compliances to ESS, National, State and Local laws and mandatory and statutory compliances including permissions, consent conditions, labour health, safety, security, welfare, etc. Implementation of OHS, GRM, various action plans at site Maintenance of documents, records and reports requisite for site LMP compliance Assessment of capacities, technology in achieving NGT/suggested standards and for design specification Environmental monitoring analysis pre and post treatment Sludge generation, quality, treatment and disposal Generation of wastes, all biproduct and their reuse Resource efficiency Availability of staff for E&S at all levels Monitoring of Corrective Action Plan implementation in case of incidents if any	Annual	**Construction Contractor**	Cost for implementation of monitoring measures responsibility of contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
		Review of Training / Capacity Building			

Table 47: Environmental and Social Monitoring Plan: Operation Phase

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Ambient air quality	1 location in STP	Same as construction phase	Quarterly (except monsoon) during construction	O&M Contractor	O&M Contractors scope
Inlet and outlet parameters	2 locations (Intake and outfall of STP)	Same as construction phase	Monthly	O&M Contractor	O&M Contractors scope
Ambient noise	1 location in STP	Day time and nighttime	Quarterly	O&M Contractor	O&M Contractors scope
Ground water quality	2 locations (Inside plant and outfall of STP)	Same as construction phase	Quarterly (except monsoon)	O&M Contractor	O&M Contractors scope
Soil quality	1 location in STP	Same as construction phase	Quarterly (except monsoon)	O&M Contractor	O&M Contractors scope
Sludge analysis	1 location in STP	Same as construction phase	Quarterly (except monsoon)	O&M Contractor	O&M Contractors scope
Biodiversity assessment	3 Locations	Same as construction phase	Annual	O&M Contractor	O&M Contractors scope
ESMF Compliance & Status report	-	Same as construction phase	Monthly	Monitoring by Construction contractor, submission by PMC/ E&S auditor	Cost of monitoring by Construction contractor and cost of submission by PMC
Site visit report	-	Same as construction phase	Monthly	PMC	PMC
Compliance to the CtO	-	Same as construction phase	Monthly	PMC	PMC
Community Consultations	1 location – nearest residential area, 2 locations	Same as construction phase	Yearly twice	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
	downstream of Sabarmati River				
Grievance Redressal	Project area and surrounding	Same as construction phase	Monthly or as soon as grievance registered	PMC	PMC & PIU
Areas with water stagnation	Project area and surrounding	Same as construction phase	Monthly	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor
Health & Safety	Project area and surrounding	Same as construction phase	Monthly	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor
Environmental & Social Audit	Project area and surrounding	Same as construction phase	Once a year	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor

6.6 Estimated Budget for Implementation and Supervision of ESMP

Table 48: Budget for ESMP Implementation

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
A	**Monitoring staff & Updating ESIA**						
1	Environmental specialist (Civil/ Environmental Engineer) with minimum 5 years of experience in Construction & Operations	Design Pre-construction, Construction, O&M	Per month	12	50,000	600000	Contractors Cost- annual HR
2	Social specialist with minimum 5 years of experience in Construction & Operations	Design Pre-construction, Construction, O&M	Per month	12	50,000	600000	Contractors Cost- annual HR
3	C-ESIA/ CESMP preparation/ updating based on detailed design, including results of Flood Risk Assessment Study, preparation of EAP, mitigation measures	Pre-construction, Design				3000000	To be included in Design Cost of DBOT contractor
	Subtotal (A)					**NA**	
B	**Monitoring measures-**						
	Pre-Construction Phase						
1	Air quality monitoring during pre-construction phase at locations mentioned in Environmental Monitoring Plan of report. The parameters to be monitored are SPM, RPM, SO2, NOx and CO, Lead. Each monitoring schedule shall be over a duration of 24 hours (in 8-hour shifts), once	Pre-Construction	Nos.	1	8,000	8000	Monitoring Cost
2	Inlet and outlet parameters of STP	Pre-Construction	Nos.	3	10,000	30000	Monitoring Cost
3	Ground Water quality monitoring during pre-construction phase at locations mentioned in Environmental Monitoring Plan of report. The sampling shall be carried out once and cover all parameters as per IS10500 including heavy metals. 2 locations at site and 1 near labor camp	Pre-Construction	Nos.	2	10,000	20000	Monitoring Cost

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
4	Noise quality monitoring during pre-construction phase at locations mentioned in Environmental Monitoring Plan of report. Each monitoring schedule shall be over a duration of 12 hours (6AM to 6PM), once. The monitoring shall be carried out in accordance with CPCB norms.	Pre-Construction	Nos.	1	2000	2000	Monitoring Cost
5	Biodiversity assessment – Once in preconstruction stage	Pre-construction	LS	-	-	200000	Monitoring Cost
6	Sludge analysis during pre-construction phase	Pre-Construction	Nos.	1	15000	15000	Monitoring Cost
7	Soil quality as per the list of parameters mentioned in report	Pre-Construction	Nos.	1	10000	10000	Monitoring Cost
8	Revision of ESMP, Monitoring plan & reporting schedule	Pre-construction	LS	-	-	10000	Monitoring Cost
9	Consent to Establish	Pre-Construction	Nos	1	350000	350000	Statutory fee by AMC & application by DBOT contractor cost
10	Training, capacity building of staff, Finalization of ESMP (contractors, sub-contractors). Training for 20 workers/quarter.	Pre-Construction	Nos.	4	2500	10000	ESMP residual Cost
11	IEC material (pamphlets, poster, banners, etc.)	Pre-Construction	Nos.	1000 1250 10	3500 550 5000	9050	ESMP residual Cost
12	GRM (display boards/banners, details of website, documentation, etc. for Construction and operation)	Pre-Construction	Nos.	50	500	25000	ESMP residual Cost
13	Material covers, sprinkling for dust suppression, preparation of cutoff drains, platforms etc.	Pre-construction	LS			100000	To be included in Project Costs, but including here for extra coverage in case of an emergency
	Subtotal (B)					789050	
Construction Phase							

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
1	Air quality monitoring during construction phase at locations mentioned in Environmental Monitoring Plan of report. The parameters to be monitored are SPM, RPM, SO_2, NOx and CO, CO2, CH4 and Lead. Each monitoring schedule shall be over a duration of 24 hours (in 8-hour shifts), once	Construction	Nos.	3	10,000	30000	Monitoring Cost
2	Water sprinkling for dust mitigation	Construction	LS	-	-	500000	Monitoring Cost
3	Ground Water quality monitoring during construction phase at locations mentioned in Environmental Monitoring Plan of report. The sampling shall be carried out once and cover all parameters as per IS10500 including heavy metals.	Construction	Nos.	6	10,000	60000	Monitoring Cost
4	Noise quality monitoring during construction phase at locations mentioned in Environmental Monitoring Plan of report. Each monitoring schedule shall be over a duration of 12 hours (6AM to 6PM), once. The monitoring shall be carried out in accordance with CPCB norms.	Construction	Nos.	3	2000	6000	Monitoring Cost
5	Biodiversity Assessment	Construction	LS	-	-	800000	Monitoring Cost
6	Sludge analysis during construction phase	Construction	Nos.	2	15000	30000	Monitoring Cost
7	Soil quality as per the list of parameters mentioned in report	Construction	Nos.	3	10000	30000	Monitoring Cost
8	Consultations (quarterly basis)	Construction	Nos.	40/yearly		40000	Monitoring Cost
9	Tarpaulin for covering soil, storage of raw material etc.	Construction	LS	-	-	30000	Monitoring Cost
10	Solid waste management including C&D waste, MS, Plastic waste & e-waste: Contingency Cost	Construction	LS	-	-	200000	Actual Cost To be included in Works Cost. Allocation in ESMP residual Costs is for emergency/contingencies

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
11	PPEs & safety instruments for workers	Construction	LS	-	-	200000	Actual Cost To be included in Works Cost. Allocation in ESMP residual Costs is for emergency/ contingencies
12	Labor Facilities and Camp	Construction	LS	-	50000	-	To Be included in Contractors Project Work Costs. This amount here is lumpsum for any contingencies
13	Consent to Operate	End of the construction	LS	1	350000	350000	Statutory fee by AMC & application by DBOT contractor cost
	Subtotal (C)					2770000	
	Operation Phase - Per year cost						
1	CTO Renewable Fee	Operation Phase	Nos	1	5000	-	Statutory fee by AMC to be included in Project Cost application & liaison by O&M contractor cost
2	Air quality monitoring during O&M phase at locations mentioned in Environmental Monitoring Plan of report. The parameters to be monitored are SPM, RPM, SO2, NOx and CO, CO2, CH4 and Lead. Each monitoring schedule shall be over a duration of 24 hours (in 8-hour shifts), once	Operation Phase	Nos.	3	10,000	30000	Monitoring Cost
3	Inlet and outlet parameters of STP	Operation Phase	Nos.	6	10,000	60000	Monitoring Cost

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
4	Ground Water quality monitoring during O&M phase at locations mentioned in Environmental Monitoring Plan of report. The sampling shall be carried out once and cover all parameters as per IS10500 including heavy metals.	Operation Phase	Nos.	6	10,000	60000	Monitoring Cost
5	Noise quality monitoring during O&M phase at locations mentioned in Environmental Monitoring Plan of report. Each monitoring schedule shall be over a duration of 12 hours (6AM to 6PM), once. The monitoring shall be carried out in accordance with CPCB norms.	Operation Phase	Nos.	3	2000	6000	Monitoring Cost
6	Biodiversity Assessment	Operation-annual	LS	-	-	800000	Monitoring Cost
7	Sludge analysis during O&M phase	Operation	Nos.	3	15000	45000	Monitoring Cost
8	Soil quality as per the list of parameters mentioned in report	Operation	Nos.	3	10000	30000	Monitoring Cost
9	Green Belt Maintenance	Operation Phase	Nos	LS	-	500000	Greenbelt is to be included in Project Cost. Here only monitoring cost & emergency support costs included
10	Solid waste management including C&D waste, MS, Plastic waste & e-waste	Construction	LS	-	-	100000	Actual Cost To be included in Works Cost. Allocation in ESMP residual Costs is for emergency/ contingencies
11	PPEs & safety instruments for workers	Construction	LS	-	-	200000	Actual Cost To be included in Works Cost. This allocation in ESMP residual Costs is for emergency/ contingencies
					Subtotal (D)	1825000	

Sr. No.	Description	Stage	Unit	Quantity	Rate (Rs)	Amount (Rs)	Cost Covered by
	One-time cost - Preconstruction & Construction Phases (B+C)	-	-	-	-	**9099050**	excludes consent / permit fees which shall be included in project cost
	O&M Cost - Annual	-	-	-	-	**1825000**	excludes HR cost
	Recurring cost O&M period of 15 years	**-**	-	-	-	**27375000**	excludes consent / permit fees which shall be included in project cost
	TOTAL ESMP COST including all subproject phases: Monitoring Costs and ESMP Residual Costs (other than those included in Contractors Works Costs, Permit/License Costs and Human Resources Cost)					**36474050**	

1. DB period is considered as 3 years (refer G56)
2. Pre-construction phase is considered as 1 year (Refer G26)
3. O&M Period is considered as 15 years (Refer G58)
4. HR cost for Environment and Social persons for Contractor is considered for 1 year (Refer G3 and G4)

6.7 Environmental and Social Commitment Plan (ESCP) Compliance

Key measures and timeframes required for the subproject to meet the requirements of the ESSs are as follows: i) AMC will establish and maintain an E&S organizational structure in PIU with qualified staff to support the management of E&S risks including Environmental, Biodiversity, Heritage, OHS/CHS, &R, Gender experts as required to prepare E&S mitigation/ management measures; ii) AMC to prepare draft ESIA for subproject 240 MLD STP; iii) Disclose the Draft Environment and Social Impact Assessment (ESIA) in AMC website and WB external website for the 240 MLD STP; iv) Disclose Draft Stakeholder Engagement Plan; v) AMC to develop and include the subproject grievance mechanism in SEP and vi) disclosure of the approved ESCP, vii) prepare bid documents incorporating the approved ESMP requirements, before initiating the bidding process. These actions would need to be completed before the Project Appraisal. Final ESCP and ESIA, ESMPs to be disclosed before project negotiations.

- Prepare, and disclose ESIA for Vasna 240 MLD subproject for STP rehabilitation based on the Feasibility Report to initiate DBOT Contractor procurement following ESMF procedures
- DBOT contractor to update/ prepare ESIA for 240 MLD based on the proposed detailed design before initiating any work-related activities
- Design should be responsive to the quality of sewage received at the inlet of the 240 MLD STP, and measures shall be incorporated to meet the suggested standards
- Bidding documents and contracts to include ESMP and Monitoring Plan to enable the DBOT contractor to allocate appropriate time, resources (manpower and budget) for implementing ESMP
- Update as required, get approvals, disclose and implement the Environmental and Social Management Plan (ESMP) for Proposed Rehabilitation of Vasna 240 MLD STP subproject.
- Obtain environmental clearances, licenses/approvals, and permits under the existing legal framework that apply to the subproject and all its activities from relevant national and/or local authorities.
- Incorporate the relevant aspects of the ESCP, ESMS, ESIAs, ESMPs, including the relevant E&S documents and/or plans, and the Labour Management Procedures, GBV/SEA Action plan into the ESHS specifications of the procurement documents with contractors. Thereafter, ensure that the contractors comply with the ESHS specifications of their respective contracts
- Preparation of Contractors-ESMP that will include Hazardous and non-hazardous waste management plan, Waste Management Plan (including bio-degradable/non-biodegradable, C&S, biomedical, E-waste, Hazardous wastes), OHS Plan, SEA/SH Action Plan, Community Health and Safety Plan, Labour Management Plan, Traffic Management Plan, Waste Management Plan, Workers' Camp Management Plan, Cultural Heritage Management Framework, Biodiversity Management Plan, Life & Fire Safety Plan, IEC activities, etc. that will be acceptable to AMC, and the World Bank
- Prepare, adopt, and implement occupational, health, and safety (OHS) measures specified in the LMP.
- Monitor and Supervise OHS at all sites through supervision contractor as an integral part of construction supervision and Conduct OHS Audit and implement suggested actions to improve work safety.
- Contractors EHS person shall have qualification in Life & Fire Safety and prepare L&FS plan and implement the same.
- Monitor all emissions/ discharges/ disposal of wastes from sub project facilities during construction and operation stages and ensure that the discharges from project facilities into the environment are as per the latest limits suggested by MoEFCC, GPCB, and

National Green Tribunal whichever is stringent for each parameter. The technology shall be upgraded to meet the directions of GPCB in the consent orders, and any stringent standards suggested by regulators.

- In case of disposal of treated effluent for Irrigation through Fatehwadi Canal, existing Consent to Operate to be changed and a new one shall be obtained from GPCB to this effect before discharge through the Canal, following the requirements laid out in CPCBs and Central Pollution Control Board's Guidelines of Reuse of Treated Water for Irrigation, 2018 and latest (2019) Guidelines on Discharge of Treated Effluents for Irrigation: including conducting a study on reuse of treated effluent for irrigation in line with the Central Pollution Control Board's Guidelines through reputed Agricultural University with stakeholder consultations as per the Guidelines and after agreement with stakeholders and permit from GPCB discharge the treated sewage so as to avoid any negative environmental and health issue on downstream communities.
- Ensure that pollution from project facilities does not negatively impact the environmental components and downstream communities. Undertake annual Pollution audit and OHS audit as part of E&S Audit and confirm this.
- Contractor to monitor and ensure continuous and as required by consent conditions or any regulation or guidance; quality of treated sewage discharged from the facility or recycled and reused
- Prepare, adopt, and implement measures and actions to assess and manage specific risks and impacts to the community arising from Project activities (including risks related to the behavior of the project workers, labour influx, increased traffic, increased social interactions between project workers and communities, increased construction activities, etc.). Incorporate these measures in the Community Health and Safety Plan as part of Contractors ESMP.
- Outcome/ output of the hydrological and flood assessment shall be incorporated in the design of STPs at design stage, and subsequently assessed in C-ESIA & mitigation measures if required included in C-ESMP. Emergency Preparedness and Response Plan and Disaster Management Plan shall be part of sub project ESIA Operations shall also follow the latest Disaster Management Plan for Gujarat, and required SOPs and manuals are to be prepared by the contractor.
- Prepare and implement chance finds procedure described in the ESMPs and include as a requirement in ESIA/ESMP and also in the procurement documents for civil works
- Training Calendar in ESMF and specific training aspects in ESIA to be followed. Additional training will be identified during the project implementation period. Provide training for Project workers on occupational health and safety including on disaster prevention and emergency preparedness and response

CHAPTER 7. INSTITUTIONAL ARRANGEMENTS

7.1 Proposed Institutional Arrangement for Implementation of ESMP, Supervision, Monitoring

The implementing agency for this project will be Ahmedabad Municipal Corporation (AMC). The subproject will be implemented on DBOT mechanism. Compliance with the Environmental and Social requirements established in the ESMP will require a sustained intra and inter agency coordination efforts among key agencies, consultants, and other project related stakeholder.

For G-ACRP, considering the need to manage E&S aspects sewerage It is recommended to create a Separate ESF Cell in AMC named the **Sustainable Urban Development Unit (SUDU) in the PIU of AMC**, to integrate environmental and social aspects well into all operations of the drainage Department, those under G-ACRP and all other activities carried out by AMC in this sector to ensure long term sustainable outcomes and health benefits to the inhabitants. For overall project support, the services of a Project Management Consultant (PMC) will be used. The proposed Institutional Framework for E&S Management under G-ACRP is presented in ***Figure 37***.

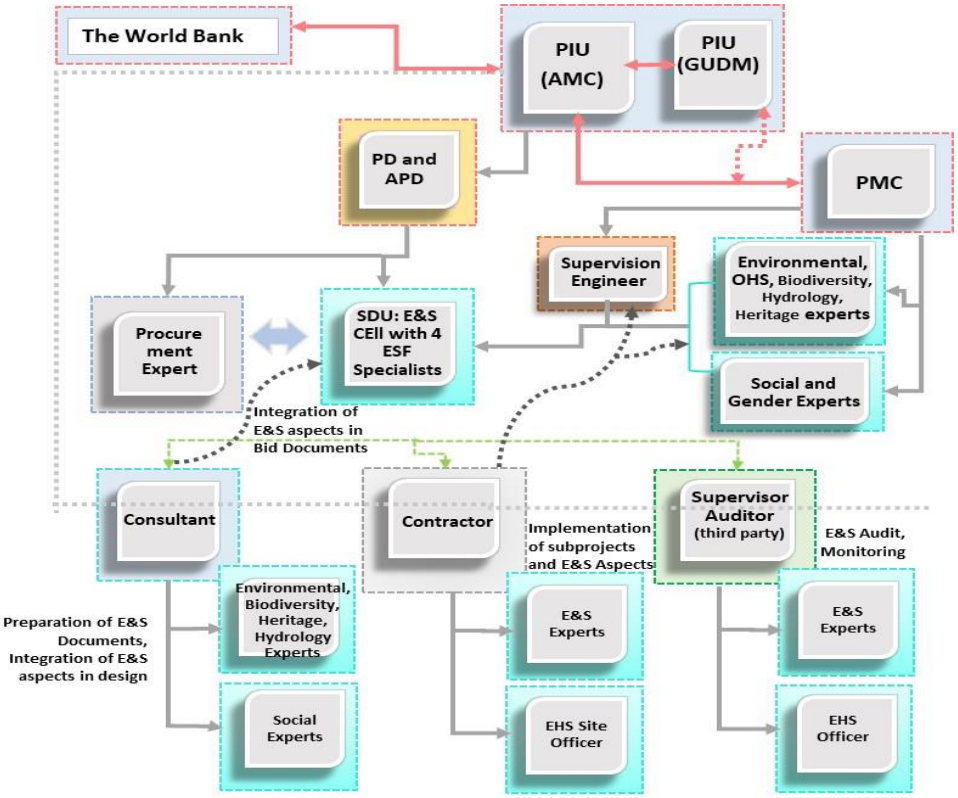


Figure 38: Proposed Institutional Framework for E&S Management

- Planning and implementation of ESMP
- Ensuring that the social and environmental protection and mitigation measures in the ESMP are incorporated in the Contractors ESMP and Construction Environmental and Social Management Plan (CESMP);
- Ensuring dedicated staff for social and environmental managers to oversee CEMP implementation

- Supervision and monitoring of the progress of activities of the consultants and contractors for the implementation of different components of ESMP
- Provide guidance to AMC, contractors in conducting subsequent monitoring and reporting and in undertaking corrective options
- Responsible for modifications to the ESMP when unforeseen changes are observed during implementation.
- Ensure submission of periodical environmental and social management and monitoring reports to the steering committee
- Submit semi-annual monitoring reports on ESMP implementation
- Ensure the establishment and implementation of an environmental and social management system;
- Implementation of environmental monitoring measures (such as environmental quality monitoring, tree plantation, landscaping, wildlife monitoring) during the O/M stage of the Project.
- Implementation of compliances for labour related aspects such as health, safety, welfare, payments, amenities, incidents and accidents, labour camp, etc
- Implementation for community health impacts a result of the project related activities such as dust, traffic movement, noise, etc during construction and operation phase.
- Implementation of management plans prepared for various aspects Chance Find Procedure, plan for SEA/SH.
- Implement Grievance Redressal Mechanism appropriately.
- Ensure that contractors have displayed all information regarding GRM, Health and safety, SEA/SH, etc at site/labour camp and at other designated sites.
- Promote improved social and environmental performance through the effective use of management systems;
- Maintaining documentation and reporting of all implemented action/ management plans.
- Conducting consultations from time to time as required under implementation.
- External communications with other government, semi-government and non-government organizations, universities, research institutes in the country on the matters of mutual interest related to environmental management and filming of activities to be carried out under the project development.

Contractor:

The contractor will be primarily responsible for preparing CESIA/ CESMP based on detailed design which he will be preparing implementing the CESMP. Each contractor will be recommended to have one Environmental Specialist and one Occupational & Social, Health and Safety (OHS) Specialist, who will be working in close coordination with the environmental staff of Supervision Consultant of PMU and PIU. The main functions of the contractor with regard to environmental and social management and monitoring are to:

- Prior to the start of construction, prepare the CESMP and other method statements and management plans according to requirements of ESMP. The borrower (AMC) shall Undertake hydrological and flood assessment, including a dam break analysis, return flood assessments (for various return flood periods) and prepare Emergency Action Plan prior to the design of the investments (STPs) and allied structure before initiating Design of STPs which might be impacted. This shall be shared by AMC with the DBOT contractor. Outcome/ output of this assessment shall be incorporated in the design of all STPs (by the DBOT contractor) which might be impacted and subsequently assessed in C-ESIA & mitigation measures if required included in C-ESMP; before finalizing the design of STP construction/ rehabilitation/ upgrading works. Emergency

Preparedness and Response Plan and Disaster Management Plan shall be part of all ESIAs.

- Recruit qualified environmental and social specialists (ESO) and OHS specialist to ensure compliance with environmental and social contractual obligations and proper implementation of CESMP;
- Provide sufficient funding and human resources for proper implementation of CESMP;
- Prepare monthly reports related to environmental and social management and monitoring for review and verification by the PIU;
- Prepare and implement an Environmental Management system according to the requirement specified in ESIA, WG EHS and ISO 14001.

The PMC will have two Environmental experts (one Environmental Engineer and EHS specialist, and another Environmental Planner/Specialist) and two (2) Social Development and Gender Experts who will coordinate and support ESF specialists of PIUs during the preparation, implementation, monitoring, and reporting of E&S aspects. Experts on Cultural Heritage, Biodiversity Conservation, Hydrology and EHS shall also be made available by the PMC as required. They will ensure that all records on E&S aspects are up to date and well maintained and easily accessible in hard and soft form.

Contractors who will implement subprojects on site will have E&S experts and EHS Site officers to prepare, update ESMPs to reflect actual site/ design aspects, to monitor, ensure, report, and maintain up-to-date documentation on the implementation of E&S aspects on site regularly. DBOT contractor or the Consultant who updates E&S documents for DBOT contractor and deliver capacity building activities shall have Environmental, Biodiversity, Heritage, R&R, Gender experts as required to update ESIA, ESMP, E&S mitigation/ management measures and work with design consultants on integrating E&S aspects in design ensure that ESMPs and other aspects are well updated.

Considering the Occupational and Community Health and Safety (OCHS) issues which would be important while upgrading existing STPs, PMC OCHS specialist/ supervision team will monitor E&S aspects and OHS aspects on-site and report regularly to PIU as part of CSQA. Annual E&S Audit will be conducted through third party E&S auditors who will monitor compliance to ESMF, OCHS on-site (may be same consultants or separate for ESMF compliance and OHS) and report with suggestive corrective actions for non – compliance.

Three types of monitoring and reporting are envisaged here including Third Party, external, and Internal. Internal monitoring is a continuous process undertaken by contractors E&S persons, PMC (who will carry out regular monitoring on all E&S aspects and special monitoring on OHS and CHS hand in hand with Civil Work Monitoring) and PIU; and a third party will undertake an annual E&S audit including ESMP compliance and OHS/CHS. Subproject level monitoring will be as follows:

Table 49: Subproject Monitoring Schedule

Subproject Stage	Category	Internal Monitoring			External Auditing		
	gencies	Contractor/ Consultant	PMC	PIU	WB	Supervision consultant	E&S Auditor
Design Stage	Inclusion of findings of ESIA in Design, Scheduling	Include ESIA findings in Design, BoQ, Bid documents	Design, BoQ, Bid documents	Clear	Design review & suggest corrective actions during semi-annual missions/ technical visits as required	Design Review	Annual E&S Audit, submit to PIU and finalize incorporating PIU, WB comments
Implementation	***Updating ESMP***	Prepare before the start of site works	Review	Clear			
	Labor Housing / Camp						
	ESMP, CHMP Implementation						
	OHS Management Plan						
	Labor Camp						
	Traffic Management Plan						
	Waste Management Plan						
	Water, Air, Noise						
	Tree cutting, compensatory plantation, and Green belt						
	Enhancement measures						
	ESMP Implementation	Daily monitor; submit a weekly report to PMC	Review weekly report of the contractor, verify on-site quarterly or as required, suggest corrective actions, prepare a monthly report with details, corrective actions	Review Monthly report of PMC, verify on-site monthly or as required, suggest corrective actions, compile QPRs and submit to WB	Review QPR, verify & suggest corrective actions during semi-annual missions/ technical visits as required	Review fortnightly and submit a monthly report to PIU	
	OHS & Incident Reporting (Incident Register)						
	Labor welfare, Labour Camp (Labor register)						
	Traffic Management						
	Waste Management (Waste quantity Register)						
	Biodiversity, Tree cutting, compensatory plantation, and Green belt (Green Register)						
	Enhancement measures	Monitor as required/ as per plan, submit as part of the week's report					
	Monitoring of environmental and social parameters						
Construction and O&M Stage	Monitoring of environmental and social parameters	Monitor as per Plan	Verify, suggest corrective actions, monitor			Review fortnightly and submit a monthly report to PIU	Compliance Audit Report to AMC, GPCB

Contractors E&S Experts and EHS specialists will monitor daily ESMP compliance on-site at the subproject level, and report weekly to the site engineer. The site Engineer will submit this to PMC E&S experts who will verify every week or as required, and compile these to prepare monthly monitoring reports to PIU. PIU also undertakes site visits to monitor once a month or as appropriate, and compile E&S reports over the quarter and submit to the Bank as part of the project's Quarterly Project Monitoring Report (QPR) or as a standalone E&S quarterly monitoring report highlighting key issues, how issues were managed, and any support required on E&S.

Designated E&S Specialists/ experts at various levels shall be responsible for overseeing compliance of the sub-projects to Bank ESF, GoI regulations, and applicable ESMF guidelines. They shall also regularly review the timely implementation of environment provisions as per the ESMP. PIUs and the World Bank review and clear E&S documents and hence, CESIA prepared/updated during design stage will be reviewed and cleared by these agencies. DBOT Contractor has to prepare his CESIA/ CESMP based on his designs, through separate consultant hired by him. This will be reviewed by AMC – moderate risk projects will be cleared by AMC, and substantial risk ESIAs will be cleared by the Bank. Updated ESIA documents incorporating the impacts and mitigation measures of the detailed design prepared should only be sent to WB for prior review after PIU's good quality initial review and sign off. It is also suggested that PIU share the ESF documents with WB by mentioning specific areas in which they need clear guidance. PIUs (with PMC support) also report on progress to the Bank during its six-monthly supervision missions. Corrective actions shall be initiated in a planned manner as appropriate to ensure compliance with the ESMF/ ESMP measures.

Reporting Formats

Reporting formats shall be developed by PIUs to get progress and results data of the project from the field. This will also help in synchronizing and streamlining reporting requirements from the various work sites. These should be part of the Project Operations Manual.

7.2 Capacity Building

Proposed Capacity Building Schedule is presented in ***Table 48.***

Table 50: Training & Capacity Building Schedule

Target Group	Subject	Trainers	Method	Time Frame
Planning and Construction Stage				
PIU Project Director/ Assistant Project Directors, other Staff, ESF/ E&S Experts of PIU, PMC other project agencies/ AMC project staff/ DBOT Contractor	**Environmental and Social Overview:** Environmental regulations, and national standards, process of impact assessment and identification of mitigation measures, importance of EMP & monitoring, and reporting	Reputed ESIA training Organizations	Training session	Half or One-day interactive (Year 1: At Project initiation; Year 2: Before Start of activities; Year 3: Mid Term Corrective) Location: Virtual
Engineers, field officers, contractors, supervision consultants, including inspectors of regulatory agencies	**Implementation of ESMPs:** Basic features of an ESMP, planning, designing and execution of social and environmental mitigation and enhancement measures, monitoring and evaluation of environmental conditions – during construction and operation. ESMP implementation which includes the mitigation measures developed for the management of the social and environmental impacts identified during the impact assessment process, implementation schedule, roles and responsibilities of various parties, reporting and monitoring requirements during construction and operation phase of the subproject. During implementation of project by design build operate transfer (DBOT) model, ESIA and ESMP will also have to be assessed and updated after finalization of the design and revisions in project footprint, additional land requirements and any other E&S impacts identified at a later stage. Module 1: Environmental Enhancement and Occupational Health and Safety - Clearance/ permits/ regulatory aspects - Cultural Heritage Management on site - Biodiversity Management on site	Reputed ESIA training Organizations	Workshops and Seminars	One day interactive, Before the Construction begins, and midpoint of approved schedule, Year 2 - end, Year 4 - start and at the close of the Project (Year 5) – near implementation completion stage

Target Group	Subject	Trainers	Method	Time Frame
Planning and Construction Stage				
	- Occupational Health & Safety Training - Staff & Labor Code of Conduct - HIV/AIDS prevention Training, Best hygiene practices - Emergency Response System - Behavioural Training - Implementation of ESMP provisions Module 2: Review of Subproject Level Environmental Actions - Review of Environmental Actions at each sub-project - Lessons learned Course Corrections			
Environmental Engineers, field officers, contractors, supervision consultants, Supervisors, Line departments, PMC	**Environmentally Sound Construction Practices:** Waste management and minimization in construction, pollution control devices and methods for construction sites and equipment, Environmental clauses in contract documents and their implications, Environmental monitoring during construction	E&S, EHS, Heritage and Biodiversity Specialists PIUs, PMCs, Consultants	Seminars, Training session and Site visits	One day interactive, Before the Construction begins, Year 2 - end, Year 4 - start and at the close of the Project (Year 5) – near implementation completion stage
Project staff dealing in social matters	**Social concerns & awareness:** Monitoring consultants/ organizations specializing in social management and monitoring to can provide training on social awareness social awareness concerns community social concerns & awareness including SWM, sanitation, alcoholism, violence, traffic diversion/ pedestrian safety; labor (management including Health, safety, security, social, welfare, SEA/SH, etc.) interaction with communities, gender and social inclusion/ citizens engagement, as and if required, grievance redressal mechanisms and addressing grievances. - Stakeholder Analysis Participation models in various projects by CBOs, Communities, Individuals, Private parties, PIUs	ULB/PIU, PMC	Training session, Workshops and Seminars	One day; Before the construction begins and Every Year during construction for refresher training.

Target Group	Subject	Trainers	Method	Time Frame
Planning and Construction Stage				
Environmental engineers, field officers, contractors, supervision consultants	**Monitoring Environmental Performance during Construction:** Monitoring, Air, Water, Soil Erosion, Noise, and effect on wild life and fisheries, Evaluation and Review of results, implementing and ensuring compliances related to Labor (Health, safety, welfare, labor camp, payment, training, health check, PPEs etc.),Preparation of Contractors ESA, revisions of ESIA and ESMP after finalization of the design for updating and revisions if and as required, Evaluation and Review of results, Performance indicators and their applicability, possible corrective actions, reporting requirements and mechanisms	Reputed National ESIA training Organizations or by hiring adequate experts	Training session, Workshop and site visits	One day; Before the construction begins and Every Year during construction for refresher training.
Contractor's staff, subcontractors	**Community & Occupational Safety and Health:** Monitoring consultants/ Organizations specializing in community & occupational, health and safety issues to provide training on this issue, mandatory and statutory compliances regarding labor, licenses, permissions and information dissemination. SOP for project activities which have identified risks and require specific training, awareness and PPEs before execution.	Reputed National OHS/CHS training Organizations or by hiring adequate experts	Workshops and seminars	One day; Before the construction begins and Every Year during construction for refresher training.
Construction laborers	Occupational health, waste handling and sanitation at construction sites/ labor camps, Health, Safety and medical procedure to be followed and mandatory PPEs required for activities undertaken.	Reputed National ESIA training Organizations or by hiring adequate experts	Training session and Workshops	One day; Before the construction begins and Every Year during construction for refresher training.
Construction laborer	All aspects and compliances related to labor rights, health, safety, security, welfare, code of conduct, amenities and facilities at camp site, labor camp management, mandatory and statutory compliances, awareness on the labor related GRM, overall contractor obligations with respect to labor management, etc. Gender awareness, grievance redressal mechanism, safety and medical services provided, payment made, and procedure followed, Gender and gender-based violence awareness during construction and operation activities.		Training session and Workshops	One day; Before the construction begins and Every Year during construction for refresher training.
Construction laborer (Camp & Site)	Safe work practices including precautions to be taken and any procedure that needs to be followed due to Covid-19 or any other health/medical emergencies, PPEs, first aid box, insurance,	Reputed National ESIA training Organizations or	Training session and Workshops	One day; Before the construction begins and Every Year during

Target Group	Subject	Trainers	Method	Time Frame
Planning and Construction Stage				
	emergency response for accidents and incidents, EHS officers on site, traffic management and pedestrian safety etc.	by hiring adequate experts		construction for refresher training.
During Operation Phase				
Environmental engineers, field officers, contractors,	**Long-term Environmental Issues in Project Management:** Designing and implementing environmental surveys for ambient air, noise, biological and water quality, data storage, retrieval and analysis, contract documents and environmental clauses, risk assessment and management, contingency planning and management and value addition. Training of staff/ workers engagement in O&M on all labor related issues mentioned above	Reputed National ESIA training Organizations or by hiring adequate experts	Workshops And seminars	One day; Before the construction begins and Every Year during construction for refresher training.
General public and bridge users	Wildlife protection and environmental protection awareness program, citizens engagement.	Reputed National ESIA training Organizations or by hiring adequate experts	Seminars, workshops	Construction and operation stage

7.3 Grievance Redressal Mechanism

One of the main requirements of the ESMP is to implement an effective grievance redress mechanism in respect of the environmental and social issues of the stakeholder. The types of grievances stakeholders may raise include, but are not limited to:

- Non-payment of compensation and forceful eviction of project affected people
- Construction related impacts – cracks, damages to structures; dust damaging crops/ trees
- Health and safety, GBV, livelihoods related risks.
- Negative impacts on the environment
- Negative impacts on communities, which may include, but not be limited to financial loss, physical harm, and nuisance from construction or operational activities and GBV, SEA/SH

AMC has a functional complaint system (CCRS, http://www.amccrs.com) which includes a web portal and a toll-free number. It records almost 40-50 thousand complaints every month. Any complaint registered in the system is forwarded to respective zones for action. Each complaint has a proper system by which it can be escalated if one is not happy with the resolution. If some complaints come directly to the zonal office (mostly from the urban poor) they are recorded in the main system. The CCRS is synced with the Gujarat Government's CM Helpline and any complaints coming there are also recorded in the system.

- There shall be separate subproject Grievance Redressal Committee (GRC) consisting of following members:
  - Project Environmental/ Social Specialist from AMC
  - Elected member from Ward/ Zone of project implementation
  - Member from PAPs/ workers of the project. Women workers will be encouraged to participate
  - Local CSO working on labour and Gender related issue.
  - Women CO/ACO from the Mission Mangalam, Urban Community Development Department of the AMC.

The main responsibilities of the GRC will be to

(i) provide support to PAPs on problems arising from land/ property acquisition;

(ii) record AP grievances, categorize, and prioritize grievances and resolve them;

(iii) immediately inform the PMU of serious cases; and

(iv) report to PAPs on developments regarding their grievances and decisions of the GRC and the PMU. Other than disputes relating to ownership rights under the court of law, GRC will review grievances involving all resettlement benefits, compensation, relocation, replacement cost, and other assistance; noise, traffic, odor, and other grievances related to the environment.

The Environmental/ Social Specialist at the project level shall carry out the following as regard to redressing grievances:

- Ensure that the GRM is in place and is functional
- The GR process/ procedure is inclusive and accessible to all stakeholders with project grievances
- GRM is accessible for those with grievance related any of the above-mentioned sub project level grievances.
- The GRM is effective is addressing grievances in a timely and appropriate manner.

Grievances of PAPs will first be brought to the attention of the site office level of the PIU which shall be redressed within two weeks from the receipt of complaints. The grievances will be received through online registration (phone/ email, etc), grievance register maintained at the security gate. Grievances not redressed by the PIU staff (field level) will be brought to the Grievance Redress Committee (GRC) which shall be redressed within four weeks from the date of receiving the complaint at PIU. The chairperson of the GRC shall communicate the committee's decision to the aggrieved party in writing and maintain a record of all decisions related to each case.

Documentation and recording for grievances shall be maintained with details of resolution at the sub project/ project/ PMU level. Records of grievances will include contact details of the complainant, the date the complaint was received, nature of the grievance, agreed corrective actions, and the date the corrective actions were affected, and the outcome.

Consolidated reports will be submitted to GRC and for status of grievances on monthly basis during construction and quarterly basis during operation phase.

Information about Project/ Sub project GRM shall be published as part of initial disclosure consultations. Brochures will be distributed during consultations and public meetings, and posters will be displayed in public places such as in government offices, project offices, at gate of the project site office, etc. Information about the GRM will also be posted online on the AMC website. The GRM details including manner of filing grievances, Grievance cell officers, Grievance officer at site, etc. will be displayed in local language (Gujarati), Hindi, at STP site, in labor camps and in contractors and sub-contractor's office at site and with supervisors. Grievance register will also be maintained at the gate/security office at gate of the STP premises and labor camp in local language (Gujarati)/ Hindi.

Complainants not satisfied with the GRM process of the sub project/AMC can approach the mandatory body/authorities such as the CPCB or the Gujarat Government's CM Helpline or take recourse in the legal system and approach the civil courts.

CHAPTER 8. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

8.1 Objectives of Public Consultation

The objectives of the public consultations for the project and for this ESIA is to:

- Inform and disclose the proposed project to the stakeholders.
- Assess the stakeholder interest and involvement with the proposed project
- Enable them to give their views and option with respect to the project.
- Ensure that appropriate project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner and format.
- Provide a means for effective and inclusive engagement with project affected parties throughout the project life cycle.

8.2 Legal Requirements

ESS 10 recognizes the importance of open and transparent engagement between the Borrower and project stakeholders as an essential element of good international practice. Effective stakeholder engagement can improve the environmental and social sustainability of projects, enhance project acceptance, and make a significant contribution to successful project design and implementation.

Consultations also have to be conducted for any mandatory land acquisition under The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013, and in Scheduled areas or if the displaced/affected population is largely from Scheduled Tribes.

8.3 Approach to Public Consultation

Consultations have been carried out for information, participation and disclosure.

Consultations have been carried out with various stakeholders including squatters' settlement inhabitants, STP operators, AMC officials during preparation of ESIA for sub project and SEP for G-ACRP project. Due to Covid -19 pandemic and restrictions, consultations were carried out, from August to November 2021, online and as well as in person and due precautions were followed for site activities. Outcome of the consultation is given below:

Table 51: Outcome of Consultations

Group	Key points raised
Urban Poor/slum dwellers/ migrants/squatters Villagers in Juhapura (adjoining 126 MLD STP, Gyaspur and Squatter settlement (adjoining Vasna, approx. distance from STP - 10 m) 14: 2 women, 12 men Disclosure for 126 MLD STP 61 females and males	• Migrants have faced loss of income and earnings due to pandemic. Income is gradually picking up. • Daily wage labour, mostly skilled and unskilled workers. • Family size is between 5 to 10 people with 3 to 10 children. • For Health and Education, they use AMC, municipal services. • Squatter households do not have access to some municipal services such as drainage and sanitation as it is a squatter settlement. People mostly practice open defecation near highway or forest areas and other areas which are accessible to them. • Some squatters have approached concerned Government depts such as electricity dept for providing meters and power supply, water supply dept for providing tap water. • Migrants are mainly working in industries and labour work, construction etc.

	• In Juhapura, formal/ informal settlement adjoining the 126 STP, there are issues with respect to lack of sanitation, infrastructure and other amenities. Odor traffic related issues were not of concern. • For resolving grievances related to municipal services such as provision of water supply and electricity, people approach local municipal staff at field level or NGOs working in the squatter settlement. • They draw water from the borewell and groundwater is of very poor quality. • People were not aware of the online GRM of the AMC and were comfortable with face-to-face interactions at local level or near habitation. • Squatter settlement did not have any specific issues related to upgradation and have experienced odour issues rarely in the past. They have informed the security personnel at the STP gate about the issue and asked them to inform the senior officials at STP for resolving the same. • Some of them have goats which fall ill when take to the Sabarmati river for drinking and bathing.
Downstream users' villages and Fatehwadi canal – sarpanch/ex-sarpanch (telephonic)	• The water is received from Fatehwadi canal and Sabarmati River is not of good quality as its not properly treated in the STP. Villagers do not prefer to use Sabarmati water as it is not good for any use. • The villagers use borewell and tube well water for drinking and farming. • They expect to receive the water from Narmada Main Canal. • In Saroda village health issues were reported due to polluted water. • Many industries have adopted reverse boring practices and it has completely deteriorated the ground water quality. Even borewell water colour is red many times. This caused skin diseases. Even the crops are damaged • Agricultural land is 100m-150m away from banks of Sabarmati River and has started hardening and non-productive. RWH is option that seems to feasible in now-a-days
3 NGOs with total of 4 women respondents.	• NGOs that are working on issue of housing for the urban poor in Ahmedabad reported that in Ahmedabad city, housing was provided to LIG/urban poor due to infrastructure development and other projects and removal of encroachments which LIG households refused and preferred staying in shanties and encroachment on roads. • Construction workers need to be provided with better civic amenities at construction sites • During pandemic time health and hygiene issues were neglected • There could be several settlements which are on encroached land or houses are on the drain. Some of the slums have issue of drainage and mixing of drinking water with drain water. • In periphery slums individual connection of sewer lines is a problem. They have mostly soak pits. • Solid waste is collected but not recycled. • Vulnerable groups do not have access to the GRM of AMC.
Contractors- 3 Nos.	Inputs from Contractors based on their past experience with similar projects: • to be on an equal platform and have equal bearing on both parties. • Time and cost increase if there are constraints in implementing • Health issues in some workers working in STP. Issues related to odour. • All policies and compliances are included in RFP and tender document

	• Lesser women work in STP in Vasna due to time duration on travel, remoteness of site etc. • Issues related to STP include, old equipment, weathering of machinery and equipment. Need to assess if modification to existing features and equipment can result in better performance of the machinery and equipment. • There are instances of influx of heavy chemical water into the sewage which may impact the durability of the structure and equipment. • For addressing any issue or concern, contractors have a day-to-day contact with AMC for taking up any issues related to their work. They occasionally speak to Exe engineers or CE if required. Since they have a specific mandate and most aspects are covered in RFP, grievances are reduced. • Solar power is not used in any of the STPs • Rainwater harvesting is not implemented in any of the STPs
Draft ESIA and ESMP (mitigation were discussed[47] with the identified communities and groups and outcomes are presented below:	
Squatter settlement	• Dust will be reduced and condition would be better for pedestrian. It would benefit for the settlement inhabitants. • Provisions of drinking water, electricity and sanitation for the settlement from AMC. • Reduction in crime if there is street lighting in the area. • Availability of labour opportunities for people in settlement during construction or operation in the STP. • Mechanism if there are any problems during construction, how can they complain and to whom. • Safety and security of the inhabitants (especially women and children) if labour camp is set up in the community.
Juhapura	• Road repairs and upgradation would benefit the people. Road repairs and upgradation should be extended as public from Juhapura use the access road by walking and by two wheelers. • Anticipate decrease in odor in Fatehwadi canal, in operation. • Anticipate decrease in mosquitoes and insects in the locality. • Anticipate Increase in noise and traffic issues during construction. mitigation of the same was discussed.
Downstream Villages	• Issue of pollution is with reference to industrial releases in the river which has impacted downstream villages. Matter should be addressed by GPCB. Villages have approached the GPCB and court. • New action of AMC disconnecting industrial outlets into river and AMC drains will help reduce pollution. • Water should be treated and good quality should be released so that farmers in the downstream villagers can benefit. • Government should initiate water/ sewage treatment plants for river water in the downstream villages. • There should be more control over factory releases as sewage water is not the issue, industrial effluents is a problem.

[47] February and March 2022

	• People want to be informed about the details of the GRM for the river pollution so that they can approach concerned authorities not necessarily AMC as issue is directly related to GPCB, not AMC. • Want to be informed about measures taken to prevent release of sewage water in river during construction or if volume is greater than plant treatment capacity.
Disclosure of the ESMF and Draft ESIA	• Institutional framework, Review project details, baseline, improvements of quality of water in Sabarmati by improved project technology. Monitoring of the E&S aspects. All these are described in the ESIA and ESMP. All bodies involved in the process, roles and responsibilities of different organizations under this projects such as AMC, PIUDC, GUDA, etc. • There is no land acquisition in these projects. • Samples are collected: noise quality, sludge, air, water etc. and analysed. Details are given in the ESIA report and mitigation measures are described in the ESMP • Findings of the project. Not ecological sensitive areas in Ahmedabad. Air pollution concerns • CND wastes, improvement of water quality and sludge post implementation. • water quality in Sabarmati river will improved due to technology and NGT standards. • PMC will be appointed for the project. Participants to give their comments, views and suggestion for the ESIA and ESMP uploaded. • Upgradation of other STPS, considering the total sewage received for city, Storm water and gutter connection was taken by residents after payment and the same has been removed by AMC. What is proposed to be done to rectify this issue. • How will the sewage generated and bypass be dealt with during construction period of 126 MLD STP? • How will the untreated industrial effluents from common ETPS be treated? • Census 2011 data has been used. Recent data should be used. • Many workers/labour will be hired. There are violations of labour standards and non-compliance in AMC projects. Many workers have lost their lives and health and safety compliances are violated especially in storm water works. • AMC gives funds for labour welfare for workers. There is committee to raise the violation. Rehabilitation of the migrants' colonies who may be affected and who don't have drinking water, sanitation and other facilities. • Are details for use of treated water in industries is available. The ESIA for Upgradation of Vasna 240 MLD STP addresses the above suggestions of the stakeholders by including monitoring of noise, sludge, air and water and its analysis for defining the baseline and mitigation measures. The project suggests improved management of all wastes and treated water quality to confirm with latest NGT suggested standards. Labour health and Safety will be given high priority and appropriate measures to follow and monitor labour regulations have been suggested in the ESMP.

8.4 Information Disclosure

The stakeholder consultations are a continuous process carried out through the project life cycle. During preparation of the ESIA, consultations were carried out in line with the SEP and key features of the project, the proposed area and components were disclosed. Based on experience with similar projects, likely impacts during the implementation stage and potential impacts were also discussed. Draft ESIA will be disclosed on the website of AMC and the World Bank before Project Appraisal. After consultations and finalisation, it will be redisclosed again in the respective websites and other accessible locations. Summaries will be provided in Gujarati. The stakeholder consultation details are presented in Annexure VIII.

ANNEXURES

ANNEXURE I: INITIAL ENVIRONMENTAL AND SOCIAL EXAMINATION

Subproject Details

Name of Subproject:	Upgradation Of Existing 240 MLD STP and Associated Infrastructure Including One Terminal Sewage Pump Station At Vasna, Ahmedabad
Subproject Components: (mention all subproject components including Networks, Treatment Plants, Disposal Arrangements, etc.)	Rehabilitation of existing 240 MLD STP at Vasna Access road surfacing Essential repairs to Terminal Pumping Station
Associated Facilities if any (Refer ESS 1 for Associated facilities)	Rehabilitation of the Existing STP is proposed. There is no capacity augmentation
Subproject Location (City/ Town/ Village with ward numbers):	Ward No 52 Sarkhej, Ahmedabad, Gujarat,

Stage 1: Exclusion List

Check the following criteria to confirm if the sub-project is excluded from consideration:

Sl No:	Non-permissible Activities	Yes/ No	Description
1	Sub-projects in sites/ locations which should be excluded as per prevailing Rules/ Laws on Natural Habitats and Forests or Archeologically Protected Monuments (National, State, Local): (i) any construction in demarcated Forest areas or protected natural areas or their buffers, (ii) any subproject which would result in untreated effluent in critical natural habitats, (iii) any subproject which shall be excluded as per AMASR Act	No	Upgradation in existing STP site for 240MLD. The consolidated Consent and Authorization (CC&A) Order No. W-WH-58671 was valid up to 28/07/2018 Since existing STP is on banks of the river, chance find procedures may be incorporated for any new construction activity for any component proposed within the premises.
3	Sub-projects in sites/ locations which should be excluded as per applicable siting criteria prescribed by GPCB, Master Plan, Excluded Disaster Zones, or other applicable criteria (National, State, Local Body)	No	Up gradation in existing STP site for 240MLD. The consolidated Consent and Authorization (CC&A) Order No. W-WH-58671 was valid up to 28/07/2018
3	Subprojects involving (i) Activities that impact the safety of Dams, (ii) purchase, storage, and use of Banned Pesticides/ Insecticides/ chemicals	No	Existing STP and no projects under 1 or 2.

(Do not proceed to Stage 2; if the subproject is Excluded as per Stage 1 Exclusion List)

Name & Designation of Designated Official in charge:

Signature:

Date:

Verified by: Environmental Specialist of PIU (mark whichever is applicable)

Excluded from the Project	Proceed to Stage 2

Name:

Signature:

Date:

Stage 2: Environmental Screening Checklist

<table>
<tr><td colspan="3">Project Details</td></tr>
<tr><td>Sl. No</td><td>Components</td><td>Details</td></tr>
<tr><td>1</td><td>Sub-project components</td><td>Upgradation of existing process

Conversion of existing process with available technology meeting the requirement of NGT standards with corresponding qualitative and quantitative parameters.</td></tr>
<tr><td>2</td><td>Details of Alignment/ Components: (main components including construction activities, environmental infrastructures like STP/ TTP and pipelines, disposal of treated/ untreated effluent, sludge, and other by-products</td><td>Upgradation of existing what process

Conversion of existing process with available technology meeting the requirement of NGT standards with corresponding qualitative and quantitative parameters.</td></tr>
<tr><td>3</td><td>Location of the Project Sites & Landuse (Provide information for all sites involved in the project; including for Disposal/ Discharge points, linked activities/ associated facilities) (attach map)</td><td>
<table>
<tr><th>Purpose</th><th>Current/ Historic Landuse</th><th>Survey No:</th><th>Geo Co-ordinates</th><th>Ownership</th><th>Area (Sqm)</th></tr>
<tr><td>STP</td><td>STP</td><td>AMC</td><td>22°58'52.07"N 72°31'35.73"E</td><td>AMC</td><td>214117 sq.m.</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Quantity of Water Required for Construction and Annual Operations with Details of Source/s (Ground/ Surface)</td><td>Approximately 25KLD from existing supply at STP

There would be limited water requirement during operation period for admin block and lab, which is about 0.5KL/ day, i.e., about 200Kl/ year.</td></tr>
<tr><td>5</td><td>Power Required and Source of Power</td><td>Temporary connection of 415V supply would be taken from Torrent Power during construction period. It will be upgraded to 11KV during actual operation of the plant.</td></tr>
<tr><td>6</td><td>Any Raw material, the chemical used for treatment</td><td>Considering the open technology tender the expected raw materials and chemicals are as below:

1. Chlorine (This may be replaced with UV technology based on the proposed technology by contractor)

2. Polyelectrolyte: This will be required for conditioning of sludge.</td></tr>
<tr><td>7</td><td>Estimated quantity of wastes, sludge, effluent (treated/ untreated)</td><td>
<table>
<tr><th rowspan="2">Quantity of Wastes (Kg/ Day)</th><th rowspan="2">Quantity of Sludge expected (Kg/ Day)</th><th colspan="2">Quantity of Effluent (litres/ day)</th></tr>
<tr><th>Treated</th><th>Untreated</th></tr>
<tr><td>-</td><td>24-25 Tons/day</td><td>228</td><td>-</td></tr>
</table>
</td></tr>
</table>

Baseline Environmental Conditions

Sl NO:	Environmental Aspects	Yes/ No	Distance in meters	Details on its Importance
1	Is the project site located on or adjacent to any of the following (Provide Distance to these features in meters)			
(i)	Cultural Heritage site, protected monuments - listed by ASI/ State/ Local Body	NO	1000	Existing 240 MLD STP functioning is proposed to be upgraded. There are no such structures or monuments with 500 metres of the STP and nearest monument is Fateh Baug fort which is at a distance of 1 km from the site
(ii)	Culturally – socially important paths, areas/ religious occupancies, burial grounds, tourist, or pilgrim congregation areas, borders, etc.	NO	-	Not applicable. Bag E Sukun Kabrastan (Shia Isthna Ashri Kabrastan) is located 50 m away from the STP boundary and is accessible by highway 64 and also through access road. It is located 750 m from the STP gate. Marthoma Church Ahmedabad Cemetery is located 500 m away from boundary and from the gate it is about 1.2 kms. Therefore, impacts on the same is not anticipated due to project activities as access roads to the cemetery and church will be from alternate route from Highway 64.
(iii)	Eco-sensitive Areas (ESAs) or Critically Vulnerable Coastal Areas (CVCAs)	NO	-	Not Applicable.
(iv)	Natural Forests/ Protected Areas/ Bio-Reserves Is the subproject in an eco-sensitive or adjoining an eco-sensitive area, with any schedule 1 species? If Yes, which are the area and species?	NO	-	Thol Sanctuary at a distance of around 20 km from site
(v)	Other Wetlands/ Mangrove/ Estuarine Region	Yes	-	Outflow of the project is connected to the Sabarmati River
(vi)	Natural Habitat areas, Ponds, Lakes, Rivers, Streams, Canals, roosting/nesting areas, spawning areas, breeding areas; areas with natural features like waterfalls, sacred groves	Yes	~40m	Located on the Banks of the River Sabarmati in Ahmedabad. Outflow of the project is connected to the Sabarmati River
(vii)	Other Sensitive Environmental Components listed in ESMF	No	-	Proposed development will be carried out within the existing STP.
(viii)	Drinking water source (Ground, Surface), upstream and downstream uses of rivers, etc.	Yes		Water is used for irrigation, During consultations issue of untreated sewage and effluents being released downstream has been raised. Drinking water and for domestic use is drawn from the borewell as per online discussion with some of the downstream village leaders/ sarpanch/ ex-sarpanch.
(ix)	Low-lying areas/ areas of Tidal Influence (provide CRZ details)	No		Not applicable. The area is around 40m from Sabarmati River and at higher elevation (approx. 44 m) than the riverbank (Approx. 34 m.)
(x)	Sensitive Receptors – a) Habitations/ Households/ Hostels, other special	No		Located in non-residential areas. Other STPs are located nearby and there is a squatter settlement near the STPs. Not applicable.

Sl NO:	Environmental Aspects	Yes/ No	Distance in meters	Details on its Importance
	areas, etc. b) School c) Religious Places d) Tourist Areas			Bag E Sukun Kabrastan (Shia Isthna Ashri Kabrastan) is located 50 m away from the STP boundary and is accessible by highway 64 and also through service access road. It is located 750 m from the STP gate. Marthoma Church Ahmedabad Cemetery is located 500 m away from boundary and from the gate it is about 1.2 kms. Therefore, impacts on the same is not anticipated due to project activities as access roads to the cemetery and church will be from alternate route from Highway 64.
2	Is the site in Critical/ Over Exploited Ground Water Block. Provide the level of the groundwater table	Yes		Ahmedabad city falls under "over exploited region" of ground water.
3	Is the site vulnerable to major natural or induced hazards such as Earthquakes, Landslides, Flooding, Storm surge, Severe wind damage, Fire, Explosion, Other (specify)	Yes		Site is vulnerable due to flooding in the and Sabarmati. Ahmedabad falls under Zone III: Moderate Damage Risk Zone. Previously occurred earthquakes were of <4.0-5.0 magnitude.
4	Describe the type of soil and vegetation on site	Yes		Trees and Shrubs observed which were planted during STP development. The site soil is predominantly alluvial.
5	Is the site present in the flood plains as recorded in the last 100 years? Provide the HFL level of the site/ region	No		Site is 40 metres from Sabarmati River. STP elevation is between 42 to 46 m which is above HFL which is 41.7 m.
6	Existing pollution/ contamination or degradation on site	No		Existing STP and related activities.
7	Any other remark on baseline condition: its suitability to proposed use?	Yes		Upgradation of STP and capacity augmentation project within existing boundary. Land use will not change. Consolidated consent and agreement from GPCB have been obtained for the project.

Anticipated Environmental Impacts: Impacts on Air, Noise, Land, Geology, and Soils

Sl NO:	Impacts on Land/ Soil Environment	Yes/ No	Area (in sqm)	Details
1	Total extent of Demolition expected on-site (footprint in sqm and volume in cubic meter)	Yes		About 50% area is expected to be demolished
2	Extend of Land to be remediated/ repurposed	No		All proposed activities will be within existing STP boundary
3	Extend of land expected to be under green belt	Yes		About 10% of the land would be under green belt.
4	Will the proposed project cause the following on Land/Soil?			
(i)	Impact on Surrounding Environmental Conditions including Occupation on Low lying lands/ flood plains	Yes		Temporary during dismantling of few existing components and construction of proposed components.
(ii)	Substantial removal of Topsoil (mention area in sqm)	No		This is existing plant and therefore, significant removal of topsoil is not envisaged.
(iii)	Any degradation of land/ eco-systems expected due to the project?	NO		Not envisaged as proposed project is upgradation of the existing STP and under the area of AMC. Temporary impacts during construction period only
(iv)	Loss or impacts on Cultural/ heritage areas/ properties	NO		Construction activity within existing STP boundary and there are no cultural properties in premises.
(v)	Does the project activity involve cutting and filling/ blasting etc.?	NO		Not envisaged. will source materials from existing quarries
(vi)	Will the project cause physical changes in the project area (e.g., changes to the topography) due to excavation, earthwork, or any other activity?	NO		Not envisaged. All construction within the existing boundary and no change in topography. There would be minor cut and fill within premises.
(vii)	Will the project involve any quarrying/ mining etc?	NO		Not applicable
(viii)	Will the project/ any of its components contaminate or pollute the Land?	No		Sludge will be sent to BARC facility for treatment, if hazardous, send to hazardous waste management facility. Sludge generated from the plant will be sundried and sent to Sludge Hygienization plant.
(ix)	Will the project contribute to any long-term significant adverse (negative), large scale, irreversible, sensitive impact at a regional scale or area broader than the project sites; in combination with other projects proposed/ existing?	No		Proposed project will enhance the quality of water being disposed off in the river thereby will improve the quality of water in the river

Sl NO:	Impacts on Air and Noise Environment	Yes/ No	Details (including any Quantity Estimation)
1	Will the project cause or increase air pollution due to dust and/ or vehicle emissions?	Yes	Very Minimum & Temporary impact on air quality due to construction vehicles is envisaged. Open Storage of construction material may also contribute to the dust generation.
2	Will the project cause or increase pollution due to GHG emissions?	No	The project will help in mitigating the GHGs emission by implementation of energy efficient equipment and machineries.
3	Will the project cause or increase odour nuisance? (Mention type of Gases expected)	No	The project would be based on best available technologies with odour control and green belt around the STP, which will mitigate odour in surrounding.
4	Is there a potential for the release of toxic gases or accident risks (e.g.: potential fire outbreaks)	No	No toxic gas emission is expected from the plant.
5	Will the project generate or increase noise levels or vibration which will impact surrounding biodiversity or communities?	No	Nature of project does not involve high level of noise & vibration.

Sl NO:	Impacts on Water Environment	Yes/ No	Details (including any Quantity Estimation)
1	Will the proposed activities at the site(s) impact water quality (surface or ground) – leachate, runoff, waste deposition, erosion, effluent disposal?	No	Proposed project will enhance the quality of water being released in the river thereby will improve the quality of water in the river
2	Will the activities proposed at the site(s) impact water resource availability and use – effluent disposal, leachate, runoff, wastes deposition, erosion?	No	Proposed project will enhance the quality of water being released in the river thereby will improve the quality of water in the river
3	Chances of Pollution of Water bodies/ groundwater wells, nearby or downstream	No	Proposed project will enhance the quality of water being released in the river thereby will improve the quality of water in the river
4	Will the activities proposed at the site(s) hinder natural drainage	No	Activities proposed are in the existing premises of the STP which will not interfere with the natural drainage of the area.
5	Will the activities proposed at the site(s) decrease permeability/ rainwater percolation	No	Activities proposed are in the existing premises of the STP which will not interfere with the rainwater percolation.
6	Will this sub-project involve creation/ use/ result in impacts on water storage structures in any way? Is this structure/ dam in concern above 15m in height?	No	Not Applicable (NA) Dam is not proposed under project
7	Will this sub-project involve the dredging of waterbodies, sea, canals, etc?	No	No dredging is envisaged in this project

Sl NO:	Impacts on Water Environment	Yes/ No	Details (including any Quantity Estimation)
8	Will the project affect the river flow pattern, stream pattern, or any other irrigation canal?	No	Activities proposed are in the existing premises of the STP which will not interfere with the river flow pattern
9	Will the project result in Stagnation of water flow or pondage or weed growth	No	Design aspects of the project will ensure that no water logging is occurred in the plant area due to the operations.

Sl NO	Impacts on Biodiversity and Host Communities	Yes/ No	Details (including any Quantity Estimation)
1	Will the project necessitates cutting of Trees/ Loss of Vegetation	No	Tree cutting in existing plant area for the proposed upgradation is not envisaged as per FR. But to design and components some trees may be required to be cut which will be estimated after DPR finalization. Some shrubs may require cutting/ clearing, however, same would be replaced after construction of STP. Existing trees will be retained as far as possible.
2	Will the project necessitate substantial removal of Topsoil (mention area in sqm)	No	Minor amount of soil from existing premises will need to be removed. Same shall be used in the garden area of the premises.
3	Any degradation of land/ eco-systems expected due to the project?	No	Not applicable
4	Will the project result in Health & Safety Risks in the neighbourhood (upstream, downstream, nearby) including heightened traffic, the release of toxic gases, untreated sewage/ drainage, accident risks	No	Proposed project will enhance the quality of water being released in the river thereby will improve the quality of water in the river. HSE risk will be identified during the ESIA preparation and mitigated. There may be possibilities of OHS issues during construction operation.
5	Potential Noise, Light Pollution/ movements causing disturbance to nearby habitats/ communities mainly during night hours	No	Activities proposed are in the existing premises of the STP hence additional disturbance to the habitat or community is not envisaged.
6	Potential disruption to common property, accessibility, traffic disruptions, conflicts, or disruption to the local community within the subproject area?	No	Very minimal disturbance will be resulted during the construction phase.
7	The potential risk of habitat fragmentation due to the clearing activities? (e.g., Hindrance to the local biodiversity like disturbing the migratory path of animals/ birds etc.)	No	Activities proposed are in the existing premises of the STP hence no disturbance to the habitat

Sl No:	Impacts due to Storage and Wastes, Pollution and Hazards	Yes/ No	Details (including any Quantity Estimation)
1	Will the project use or store dangerous substances (e.g., large quantities of hazardous chemicals used for treatment/ other uses;	Yes	The proposed project may require storage of Chlorine and polyelectrolyte.

Sl No:	Impacts due to Storage and Wastes, Pollution and Hazards	Yes/ No	Details (including any Quantity Estimation)
	materials like Chlorine, Diesel, Petroleum products; any other?		
2	Will the project produce solid or liquid wastes; including construction/ demolition wastes (including dredging, de-weeding wastes, muck/ silt, dust); polluted liquids?	Yes	Sludge will be generated during operation of the project. Treated water will be as per the NGT norms and will be disposed in the river.
3	Will the project cause or increase air pollution or odour nuisance?	No	Odorous air will be generated from the wastewater, bio solids and sludge drying treatment processes at the plant
4	Will the project generate or increase noise levels that will impact surrounding biodiversity or communities?	No	Nature of project does not involve high level of noise & vibration.
5	Will the project generate or increase visual blight or light pollution?	No	Light pollution is not envisaged.
6	Will the project generate water pollution (waterbodies/ groundwater)?	No	Proposed project will of upgradation will have a better treatment facility and will enhance the quality of water being disposed in the river thereby will improve the quality of water in the river. Treated water will be as per the norms and will be disposed in the river.
7	Will the project involve dangerous construction activities which may be a safety concern to workers/ host communities	Yes	Construction activities may involve movement of heavy parts and working in enclosed areas. Safety of workers will be prioritised.
8	Describe any other features of the project that could influence the ambient environment	No	The proposed project will not affect the ambient environment.
9	Were the probable environmental impacts discussed with stakeholders?	Yes	Continuous stakeholder consultations are being carried out and further stakeholder meetings are being conducted.

Suggested Environmental Enhancement Measures

Sl NO:	Enhancement Measures	Yes/ No	Details
1	Has the subproject considered energy conservation measures/ energy recovery options incorporated in subproject design	Yes	Proposed project will include Energy efficient blowers and Energy efficient Desludging System, diffusers, SCADA, Solar panels and other energy saving measures such as LED lighting, VFD, etc.
2	Has the subproject considered energy efficiency options or use of alternate energy	Yes	Solar power is proposed for the project for meeting the partial requirement of common lighting.
3	Has the subproject considered reducing climate impacts of GHG, other releases	Yes	The project has significant potential for reducing GHGs in terms of energy efficient machineries, equipment, lighting, solar panels and SCADA etc. Also, with the reduced contaminants to the river ecosystem, there would be indirect benefit to the environment.

Sl NO:	Enhancement Measures	Yes/ No	Details
4	Has the subproject considered no disturbance to natural flora including trees	Yes	There is no major disturbance to the existing flora from the project. Green belt is planned to enhance the flora and fauna in the project boundary.
5	Has the subproject considered water reuse/ recycle options	Yes	Treated water will be discharged in the Fatehwadi Canal for irrigation and to the river for Sabarmati River rejuvenation.
6	Rainwater harvesting, water recycling, and other water resource enhancement measures	Yes	Rainwater Harvesting (RWH) is planned in the project (Roof top RWH)
7	Has the subproject considered waste minimization or waste reuse/ recycle options	Yes	Tertiary Treatment Plant (TTP) is planned for re-use and recycle treated sewage in horticulture. C&D waste will be reused for backfilling.
8	Considerations for extreme events, drought, flood, other natural disasters	Yes	The project design would take consideration of HFL, Natural Disaster and extreme events.

Land Use, Resettlement, and/ or Land Acquisition				
Sl.no	**Components**	**Yes**	**No**	**Details**
1	Does the project involve the acquisition of private land?		√	The project is within the existing land of 240MLD STP
2	Alienation of any type of Government land including that owned by Urban Local Body?		√	The land belongs to AMC, and it is in their possession.
3	Clearance of encroachment from Government/ Local body Land?		√	Not applicable. There are no encroachments in the existing STP.
4	Clearance of squatters/ hawkers from Government/ Local Body Land?		√	Not applicable. There are no squatters or hawkers in the existing STP Premises.
5	Number of structures, both authorized and/ or unauthorized to be acquired/ cleared		√	Not applicable
6	Number of households to be displaced?		√	Not applicable. There no houses or residential structures in STP premises.
7	Common properties to be alienated/ Pastureland (acres) Acquisition/ burial ground and others specify?		√	Not applicable. Bag E Sukun Kabrastan (Shia Isthna Ashri Kabrastan) is located 50 m away from the STP boundary and is accessible by highway 64 and also through service access road. It is located 750 m from the STP gate. Marthoma Church Ahmedabad Cemetery is located 500 m away from boundary and from the gate it is about 1.2 kms. Therefore, impacts on the same is not anticipated due to project activities as access roads to the cemetery and church will be from alternate route from Highway 64. Therefore, there are no impacts or loss of access to the cemetery and burial grounds.

Land Use, Resettlement, and/ or Land Acquisition				
Sl.no	**Components**	**Yes**	**No**	**Details**
8	Existing land uses on and around the project area (e.g., community facilities, agriculture, tourism, private property) will be affected?		√	No impact on any such structures. There is a squatter settlement near Fatehwadi canal. While these are not impacted due to proposed project, temporary impacts related to community health and safety are identified due to vehicular movement on kuccha access road.
9	Will the project result in construction workers or other people moving into or having access to the area (for a long-time period and in large numbers compared to permanent residents)?		√	For construction activities labour/workers will be working within the project boundary. In urban setting the numbers estimated up to 200 at maximum are not large enough to make an impact within the area. All work will be done within the STP premises so disturbance due to workers/labour presence is not envisaged. O&M staff requirements is estimated to be 54.
10	Are financial compensation measures expected to be needed?		√	There are no impacted property, structures, CPR, cultural property or livelihood impacts and therefore compensation measures are not needed.
Loss of Crops, Fruit Trees, Household Infrastructure, and livelihood				
11	Will the project result in the permanent or temporary loss of the following?			
11.1	Crops?		√	Proposed sub project is within STP premises with no cultivation
11.2	Fruit trees? Specify with numbers		√	There are no fruit trees. Other Trees and shrubs have been planted in the STP premises. Shrubs may be required to be cut during upgradation.
11.3	Petty Shops		√	-
11.4	Vegetable/Fish/Meat vending		√	-
11.5	Cycle repair shop		√	-
11.6	Garage		√	-
11.7	Tea stalls		√	-
11.8	Grazing		√	-
11.9	Loss of access to forest produce		√	-

Land Use, Resettlement, and/ or Land Acquisition				
Sl.no	**Components**	**Yes**	**No**	**Details**
11.10	Any others - specify		√	Squatter settlement is located near Fatehwadi canal and road. Based on google map and transect walk roughly 600 to 700 temporary structures were observed although people have mentioned that there are 600 to 700 families/HHs. Temporary structures near the road may have health and safety issues due to vehicular movement during construction activities. Road construction will be taken up under sub project for smoother movement of vehicles and reduce/ prevent dust, noise and air emissions due to vehicular movement. The road will be on existing kuccha road and displacement of any temporary squatter structure is not envisaged. The existing STP is located near the river and there are no restrictions of access to river or access road due to proposed project. The existing boundary of the STP will remain unchanged. Movement of machinery, raw material and labour will be from existing approach road. The road has very limited vehicular movement and hence there will be no hinderance to the traffic movement. Movement of traffic will be in daytime when most of the inhabitants of the settlement will be at work in the industrial areas and industries.
Welfare, Employment, and Gender				
12	Is the project likely to provide local employment opportunities, including employment opportunities for women?	√		During construction period employment opportunities will be created for women and men. Some skilled employment will also be created. There will be petty business opportunities due to the presence of labour working in the STP premises
13	Is the project being planned with sufficient attention to local poverty alleviation objectives?	√		Treated sewage will enhance the water quality of river and overall ecosystem which may have positive impacts to the downstream users. Some treated sewage would also be given for Industrial uses which will have positive impact in terms of better employment to the locals. Industries dependence on ground water will also be reduced with availability of treated water for industrial use. Treated water is also proposed to be used for the Fatehwadi canal which will be an improvement from current quality with better discharge standards due to rehabilitation of the STP. Sludge from the plant is being used as manure for horticulture. This is reducing dependence on chemical fertilizer and therefore saving in terms of energy and resources

Land Use, Resettlement, and/ or Land Acquisition				
Sl.no	**Components**	**Yes**	**No**	**Details**
14	Is the project being designed with sufficient local participation (including the participation of women) in the planning, design, and implementation process?	√		Extensive consultations are being conducted to assess the prevalent issues related to sewage and wastewater.
Historical, Archaeological, or Cultural Heritage Sites				
15	Historical heritage site(s) require excavation near the same?		√	There are no such historical heritage sites identified as such, Chance find procedures will be planned and implemented for the site as Ahmedabad has been declared as Heritage city
16	Archaeological heritage site(s) require excavation near the same?		√	There are no such Archaeological heritage sites identified as such, Chance find procedures will be planned and implemented for the site
17	Cultural heritage site(s) require excavation near the same?		√	There are no such Cultural heritage sites identified as such, Chance find procedures will be planned and implemented for the site
18	Graves or sacred locations require excavations near the same?		√	Bag E Sukun Kabrastan (Shia Isthna Ashri Kabrastan) is located 50 m away from the STP boundary and is accessible by highway 64 and also through service access road. It is located 750 m from the STP gate. Marthoma Church Ahmedabad Cemetery is located 500 m away from boundary and from the gate it is about 1.2 kms. Therefore, impacts on the same is not anticipated due to project activities as access roads to the cemetery and church will be from alternate route from Highway 64. Therefore, there are no excavations, impacts or loss of access to the cemetery and burial grounds.
Tribal Population/ Indigenous People				
19	Does this project involve acquisition of any land belonging to Tribal people?		√	Not applicable as no land acquisition is involved as well as no tribal population is present
Beneficiaries				
20	Population proposed to be benefitted by the proposed project	Approx. no.:		Estimated population for 2041 of western part of the city will be 3.6 million. Estimated population of 7.1 million (Year 2020) residing in the municipal area spread over 488 sq.km, under the jurisdiction of Ahmedabad Municipal Corporation (AMC), along the eastern and western banks of river Sabarmati.
21	No. of Females proposed to be benefitted by the proposed project	Approx. no.:		Overall city population will be benefited.
22	Vulnerable households/ population to be benefitted	Approx. no.:		Overall city population will be benefited.
23	No. of Families to be benefitted	Approx. no.:		Overall catchment area population will be benefited

Impacts on Community Health and Safety				
Sr. No	**Components**	**Yes**	**No**	**Details**
1	Will the sub/ project cause any adverse impacts on the neighbourhood/ local communities? Nature of impact?	√		Squatter settlement located on Fatehwadi canal road and will be impacted due to the emissions from construction phase. The impact will be minimum, temporary and reversible.
2	Is the sub/ project likely to cause possible disruption in access to public utilities/ facilities, restrict access to residence or establishments, lead to traffic disruptions or increased traffic, conflicts over resources among the local community within the subproject area?		√	The existing STP is located near the river and there is no restrictions of access. The existing boundary of the STP will remain unchanged. Movement of machinery, raw material and labour will be from existing approach road. The road has very limited vehicular movement and hence there will be no hinderance to the traffic movement. Movement of traffic will be in daytime when most of the inhabitants of the settlement will be at work in the industrial areas and industries.
3	Are the local communities and their assets/ livelihoods likely to be adversely impacted by the assets proposed to be created under the sub/ project or their operation or both?		√	Nearest settlement is a slum (distance 10m) which is temporary and the livelihoods of communities residing in the slum will not be adversely affected due to the assets proposed to be created.
4	Is the sub/ project likely to see a large concentration of non-local labourers for an extended period of time? Estimated number of labourers expected and duration of stay	√		There will be around 200 personnel working during the construction phase (peak time). About 50-100 of them are expected to be non-local labour, with duration of stay for 6-9 months depending on phase of the project construction.
6	Are these sites of labour camps likely to be adjacent to other local communities and lead to a high interface with these communities/ residents?		√	Any land which is owned by AMC, AUDA etc shall be given temporarily for labour camp. The contractor scope will include labour camp management plan for occupation of any such land.
7	What kind of communities reside here? Are they normal empowered citizens with better capacities? Or do they largely belong to poor and socially		√	Migrants living in squatter settlements, comprise of two groups of workers – seasonally migrant construction workers who migrate from the tribal belt

Impacts on Community Health and Safety				
Sr. No	**Components**	**Yes**	**No**	**Details**
	vulnerable groups with limited capacities to cope with large labour influx? Estimated population of host community			comprising of Dahod in Gujarat and Jhabua and Banswara in neighbouring states and long-term migrants from the Nomadic Tribes and De-Notified Tribe (NTDNT) communities. There are approximately 600 to 700 households in the squatter settlement. Most of the inhabitants visit home and return after 15 to 20 days for work. There is a constant mobility from the settlement to their native places and return for work. People have moved to the area during covid pandemic due to loss of income and regular work. Most of the people (including men and women) work as labour in the nearby industries. Approximately 50% of the people are vaccinated. The electricity, sanitation and water supply facilities are not provided. People reported that good quality water is available when wells were dug at a dept 40 feet. People also approached the STP for getting drinking water which is free of cost. People defecate near the highway. Health problems reported in the area includes malaria, fever and swollen hands and legs. Respondents also reported a high crime rate in the area. Migrants avoids any conflicts with the local criminals. Local criminals intrude the area in night in autorickshaws (without licenses plates) and threatens them with knives. They are armed, and they snatch mobiles, money, and other belongings. People have already complained to the police two or three times on this.

Clearances and Permits Required

	Type	Yes/ No	Details
1.	Environmental Clearance (mention State/ Centre)	No	The project doesn't require Environmental Clearance (EC) as per EIA Notification 2006. However, it will require Consent to Establish (CtE) and Operate (CtO) from Pollution Control Board (PCB) under Air and Water Act.
2.	Consent from SPCB for establishment and operation of STP/ WTP	Yes	For proposed project augmentation, amendment in current consent, will be sought.
3.	NOC Forest Department for either the conversion of forest land or for tree-cutting	No	Activities proposed are in the existing premises of the STP. Forest Clearance is not required.
4.	Permission from AMC for Tree cutting	Yes	May be required after design finalization by DBOT contractor.
5.	NOC for the establishment of water supply intake	No	NA
6.	NOC for water withdrawal from the surface water source	No	No surface water withdrawal is proposed
7.	Mining Permit (for dredging)	No	Not applicable
8.	Labour License and related	Yes	It shall be included in the scope of contractor
9.	Permit for Batching Plant	No	Not envisaged
10.	NOC for transportation and storage of diesel, oil, and lubricants, etc.	Yes	It shall be included in the scope of contractor
11.	Others (Mention)	No	

This Screening sheet must be completed for each of the proposed sites by the respective Designated Nodal Officer on Environment and Social in the concerned department (Sewage/ Wastewater, Drainage) and forwarded to the E&S Specialist in the PIU along with the following enclosures. In the case of TA, appropriate parts of this shall be filled for areas of concern. Provide available information at the start of the subprojects to initiate assessment and update the same as required.

Enclosures: Provide maps with the geographical location of the project; and an appropriately scaled map clearly showing the project area and project sites with land use, existing buildings, infrastructure, vegetation, adjacent land use, utility lines, access roads, and any planned construction, and any other information to describe the project, locations and possible impact as required.

Project Categorisation and Need for Instruments, Oversight

Project Category	□Low (L1) ■ Moderate (M1) □Substantial (S1) □High (H1)
Key Reasons	Works include only Rehabilitation of existing STP, to adopt more stringent discharge norms, repairs to TSPS and topping of access road; all within existing footprint/premises
Instruments Required	H1, S1: Project-specific ESIA (impact assessment considering the project details & location) by Independent Consultant (with signed/ sealed Screening Form, Consultations, ESMP, Budget, Responsibilities); and/ or Environmental and Social Audit; RAP including LRP

	M1: Project-specific ESIA by DPR Consultant (with signed/ sealed Screening Form, Consultations, ESMP, Budget, Responsibilities); and/ or Environmental and Social Audit; RAP including LRP L1: signed/ sealed Screening Form, Consultations, ESMP, Budget, Responsibilities; and/ or Environmental and Social Audit
Additional Responsibilities Expected	Mention: i) Specialists to be hired for Physical/ Cultural resources, Natural Habitats/ others, GHG estimation, etc for ESIA preparation, and/ or supervision), ii) Consultations, iii) any other aspect

Status	Agency/ Official	Name, Signature with Date, and Seal
Prepared by	ULB Department (project in-charge)	
	Environmental Engineer/ Social Specialist	
Checked, categorised as **M1** (H1, S1, M1, L1) & ToR issued by:	PIU Environmental Specialist/ Social Specialist	
	Approved by PIU Project Director	

ANNEXURE II: APPLICABLE REGULATIONS

1. Environmental Regulations at National Level:

i. National Environment Policy, 2006

The National Environment Policy by the MoEFCC aims at mainstreaming environmental concerns into all developmental activities. It emphasizes the conservation of resources and points out that the best way to aid conservation is to ensure that people dependent on resources obtain better livelihoods from conservation than from degradation of the resources. It argues that environmental degradation often leads to poverty and poor health outcomes among populations. The objectives of the National Environmental Policy are-

- Conservation of Critical Environmental Resources
- Intra-generational Equity: Livelihood Security for the Poor
- Inter-generational Equity: ensure judicious use of environmental resources Integration of Environmental Concerns in Economic and Social Development
- Efficiency in Environmental Resource Use
- Environmental Governance
- Enhancement of Resources for Environmental Conservation

ii. The Environment Protection (Act) 1986 and The Environmental Protection Rules

The Environment (Protection) Act was enacted in 1986 to provide for the protection and improvement of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991. This act was passed as an overall comprehensive act "for protection and improvement of environment". Under this act, rules have been specified for the discharge/ emission of effluents and different standards for environmental quality. These include Ambient Noise Standard, Emission from Motor Vehicles, Mass Emission Standard for Petrol Driven Vehicles, General Effluent Standards, etc. in the exercise of the powers conferred under the Act, the following rules are devised

- The Water (Prevention and Control of Pollution) Act, 1974 and Water Cess Act, 1977
- The Air (Prevention and Control of Pollution) Act, 1981
- The Noise Pollution (Regulation and Control) Rules, 2000
- Environment Protection (EP) Act, 1986
- National Green Tribunal Act, 2010
- Waste Management Rules under EP Act including
  - Solid Waste Management Rules, 2016
  - Construction and Demolition Waste Management Rules, 2016.
  - Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2016, amended 2019
  - E-Waste (Management) Rules, 2016, amended 2018
  - Bio-medical Waste Management Rules, 2016, amended 2019
  - Plastic Waste Management (Amendment) Rules, 2018

- Batteries (Management and Handling) Amendment Rules, 2010

iii. Environmental Impact Assessment Notification, 2006

EIA notification 2006 and its subsequent amendments list out the type of project that requires Environmental Impact Assessment and Environmental Clearance from MoEFCC or State Environment Impact Assessment Authority before the commencement of any developmental work or project expansion. The notification gives stage-wise guidance for the processing of Environmental Clearance. The objective of the notification is to formulate a transparent, decentralized, and efficient regulatory mechanism to:

- Incorporate necessary environmental considerations at the planning stage
- Involve stakeholders through the public hearing process
- Identify developmental projects based on impact potential
- Securing provision for mitigation efforts

iv. The Water (Prevention and Control of Pollution) Act, 1974 and The Water Cess Act 1977

The Act is enacted to prevent pollution of water sources through industrial or any other construction activity and for maintaining or restoring of wholesomeness of water. The Act prohibits the discharge of pollutants into water bodies beyond a given standard and lays down penalties for non-compliance with its provisions.

The act resulted in the establishment of the Central and State Level Pollution Control Boards whose responsibilities include managing water quality and effluent standards, as well as monitoring water quality, prosecuting offenders, and issuing licenses for construction and operation of any facility. This will include the generation of liquid effluent during construction /civil engineering activities or from domestic activities in workers' colonies. Water (Prevention and Control of Pollution) Cess Act was enacted in 1977, to provide for the levy and collection of a cess on water consumed by persons operating and carrying on certain types of industrial activities. This cess is collected to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act was last amended in 2003.

v. The Air (Prevention and Control of Pollution) Act. 1981

The purpose of this act is to prevent, and control air pollution and preserve air quality. This act empowers Central and State Pollution Control Boards for managing air quality and emission standards, as well as monitoring air quality, prosecuting offenders, and issuing licenses for construction and operation of any facility. Air quality includes noise levels also. This act has notified the National Ambient Air Quality Standard for different land uses.

vi. The Noise Pollution (Regulation and Control) Rule,2000

The Noise Pollution (Regulation and Control) rules are promulgated under the Environmental (protection) Act, 1986. The noise pollution rules lay down terms and conditions as are necessary to reduce noise pollution, including during night hours. The rule provides ambient noise level standards for various types of land uses. PCB can take action if the sound level exceeds the standards by 10 dBA. Noise standard for different zones.

- Industrial zone- 75 & 70 dBA Leq during daytime and night-time respectively
- Commercial zone- 65 & 55 dBA Leq during daytime & night-time respectively
- Residential zone- 55 & 45 dBA Leq during daytime and night-time respectively
- Silence zone 50 & 40 dBA Leq during daytime and night-time respectively

vii. The Wildlife Protection Act, 1972

The Wildlife Protection Act, 1972 has allowed the government to establish several Protected Areas like National Parks and Sanctuaries over the past 37 years, to protect and conserve the flora and fauna and their habitat.

Prior recommendation of the National Board for Wildlife (NBWL) will be required

- in case any subproject activity is proposed within the boundaries of a Protected area
- in case any project requiring Environmental Clearance (under the purview of EIA Notification 2006 and its subsequent amendments) is located within the eco-sensitive zone around a Wildlife Sanctuary or National Park or in absence of delineation of such a zone, within a distance of 10 km from its boundaries

viii. The Wetlands (Conservation and Management) Rules, 2017

Wetlands (Conservation and Management) Rules, 2017 are promulgated under the Environmental (protection) Act, 1986 for prohibiting reclamation and degradation through drainage and landfill, pollution (discharge of domestic and industrial effluents, disposal of solid wastes), hydrological alteration (water withdrawal and changes in inflow and outflow), over-exploitation of their natural resources resulting in loss of biodiversity and disruption in ecosystem services provided by wetlands by conservation of wetlands.

As defined in the rule, 'wetland' means an area of marsh, fen, peatland, or water; whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed six meters, but does not include river channels, paddy fields, human-made water bodies/tanks specifically constructed for drinking water purposes and structures specifically constructed for aquaculture, salt production, recreation, and irrigation purposes. Whereas, 'wetlands complexes' means two or more ecologically and hydrologically contiguous wetlands and may include their connecting channels/ducts

The rules shall apply to the wetlands or wetlands complexes of the following types-

- wetlands categorized as 'wetlands of international importance under the Ramsar Convention
- wetlands as notified by the Central Government, State Government, and Union Territory Administration

Section 4 of the rule elaborates restrictions of activities in wetlands which includes handling or storage or disposal of construction and demolition waste covered under the Construction and Demolition Waste Management Rules, 2016; hazardous substances covered under the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 or the Rules for the Manufacture, Use, Import, Export, and Storage of Hazardous Microorganisms/Genetically Engineered Organisms or Cells, 1989 or the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008; Solid waste dumping; Discharge of untreated wastes and effluents from industries, cities, towns, villages and other human settlements; and any construction of a permanent nature.

2. Waste Management Regulations

i. Solid Waste Management Rules, 2016

The Rules shall apply to every urban local body, other areas and to every domestic, institutional, commercial, and any other non-residential solid waste generator except

industrial waste, hazardous waste, hazardous chemicals, biomedical wastes, e-waste, lead-acid batteries, and radioactive waste.

The rules define the duties of solid waste generators. The rules outline the responsibilities of line ministries, ULB's and other stakeholders, the duty of the operator of the Solid Waste Processing and Treatment Facility.

ii. Construction and Demolition Waste Management Rules, 2016

Construction and demolition waste include waste comprising of building materials, debris, and rubble resulting from construction, remodelling, repair, and demolition of any civil structure.

As per rule-

1. Every waste generator shall prima-facie be responsible for the collection, segregation of concrete, soil, and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority in consonance with these rules ((Rule 4 sub-rule (1))
2. There should be no littering or deposition of construction and demolition waste to prevent obstruction to the traffic or the public or drains (Rule 4 sub-rule (4))

iii. Plastic Waste Management Rules, 2016, amended 2018

MoEFCC issued the Plastic Waste Management Rules, 2016 to give thrust on plastic waste minimization, source segregation, recycling, and disposal effectively.

These rules shall apply to every waste generator, local body, Gram Panchayat, manufacturer, Importers, and producer. Section 6 and Section 8 of the rule explain the Responsibility of the Local Body and the Responsibility of the waste generator respectively.

iv. Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, amended 2019

The rule dictates the entity generating hazardous wastes (as defined in the rule), to take all practical steps to ensure that such wastes are properly handled without any adverse effects, which may result from such wastes. It stipulates proper collection, reception, treatment, storage, and disposal of such wastes and provides for the process/ mechanism to do so. Waste generators will need to obtain permission from the State Pollution Control Boards and other designated authorities for the storage and handling of any hazardous material.

- Schedule I of the rule lists out of processes that generate hazardous wastes.
- Schedule II of the rule provide a list of waste constituents with concentration limits

v. E-Waste Management Rule, 2016, amended in 2018

These rules shall apply to every manufacturer, producer, consumer, bulk consumer, collection centres, dealers, e-retailer, refurbisher, dismantler, and recycler involved in the manufacture, sale, transfer, purchase, collection, storage, and processing of e-waste or electrical and electronic equipment listed in Schedule I of the rule, including their components, consumables, parts, and spares which make the product operational. These rules are applicable

Two categories of electrical and electronic equipment namely (i) IT and Telecommunication Equipment and (ii.) Consumer Electricals and Electronics such as TVs, Washing Machines, Refrigerators Air Conditioners including fluorescent and other mercury-containing lamps are covered under these Rules

Section 5 of the rule defines the responsibilities of the producer of e-waste.

vi. Batteries (Management and Handling) Rules, 2001

MoEFCC under the provisions of the Environmental Protection Act, 1986 issued the Batteries (Management and Handling) Rules, 2001. The rules were enacted with the primary objective of ensuring the safe disposal of discarded lead-acid batteries. Rules mandate proper control and record-keeping on the sale or import of lead-acid batteries and recollection of the used batteries by registered recyclers to ensure environmentally sound recycling of used batteries.

vii. The Motor Vehicle Act, 1988 & Motor Vehicles Rules, 1989

The Act regulates all aspects of road transport vehicles. It provides in detail the legislative provisions regarding licensing of drivers/ conductors, registration of motor vehicles, control of motor vehicles through permits, traffic regulation, insurance, liability, offenses, and penalties, etc.

3. Regulations Related to Pesticides/ Insecticides

i. Insecticide Act 1968 and Rules 1971

The Insecticides Act, 1968 and Insecticides Rules, 1971 regulate the import, registration process, manufacture, sale, transport, distribution, and use of insecticides (pesticides) to prevent risk to human beings or animals and for all connected matters, throughout India. All insecticides (pesticides) have to necessarily undergo the registration process with the Central Insecticides Board & Registration Committee (CIB & RC) before they can be made available for use or sale.

The Act also has guidelines stipulated for the protective clothing of persons handling insecticides. Disposal of used packages, surplus material, and washing of insecticides are also included in the Act.

ii. Draft Bill on Pesticide management, 2020 introduced in Rajya Sabha in March 2020

The purpose of the bill is to minimize risk to human beings, animals, living organisms other than pests and the environment, with an endeavour to promote pesticides that are biological and based on traditional knowledge. The bill on Pesticide management seeks to regulate the manufacture, import, sale, storage, distribution, use, and disposal of pesticides, to ensure the availability of safe pesticides and minimize the risk to humans, animals, and the environment. The Bill seeks to replace the Insecticides Act, 1968

4. Acts/ Rules applicable to Land Acquisition, RoW use

i. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013

Aims to ensure, a humane, participative, informed, and transparent process for land acquisition with the least disturbance to the owners of the land and other affected families and provide just and fair compensation to the affected families whose land has been acquired or proposed to be acquired or those that are affected by such acquisition and make adequate provisions for their rehabilitation and resettlement and for ensuring that the cumulative outcome of compulsory acquisition should be that affected persons become partners in development leading to an improvement in their post-acquisition social and economic status.

ii. The supreme court order, pertaining to removal and restriction of encroachment of religious structures on the public space

Provisions of the Order: disallow/regulate the use of RoW, public spaces for the construction of temples, mosques, shrines, the church in public land, and public spaces.

5. Other Regulations/Policies/Guidelines applicable to various construction/implementation activities

i. Central Ground Water Authority- 'Guidelines to control and regulate groundwater extraction in India' September 2020

Central Ground Water Authority (CGWA), constituted by the Government of India under Section 3 (3) of the Environment (Protection) Act (EPA) of 1986, in pursuance of the Order of the Hon'ble Supreme Court of India, has been regulating groundwater development and management in the country and has proposed the guidelines for groundwater withdrawal.

The drawing/ proposing to draw groundwater through a pump of more than 2 HP and/ or through more than one functional tube well shall be required to seek NOC for groundwater withdrawal. NOC will be granted for drinking and domestic purpose only. NOC for groundwater withdrawal will be considered only in cases where the water supply department concerned is unable to supply an adequate amount of water in the area.

Government water supply agencies are also required to seek NOC from the authorized officers for existing as well as new schemes based on groundwater sources.

NOC shall not be granted for extraction of groundwater for construction activities in the project in Critical/ Over-exploited areas.

Quantum of groundwater for purposes other than drinking/ domestic use shall not exceed 25% of total groundwater abstraction

ii. The Building & Other Construction Workers (Regulation of Employment & Conditions of Service) BOCW Act, 1996

As per the Act, the employer is required to provide safety measures at the building or construction work site along with other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation, etc. to the workers.

These are comprehensive guidelines for the Occupational Health and Safety of Laborers.

iii. Child Labour (Prohibition and Regulation) Act, 1986 and Rules, amended 2016 and Child Labour (Prohibition and Regulation) Amendment Rules, 2017

The Child Labour (Prohibition and Regulation) Act of 1986 designates a child as a person who has not completed their 14th year of age. It aims to regulate the hours and the working conditions of child workers and to prohibit child workers from being employed in hazardous industries. Children between the age of 14 and 18 are defined as "Adolescent" and the law allows adolescents to be employed except in the listed hazardous occupation and processes which include mining, inflammable substance, and explosives-related work, and any other hazardous process as per the Factories Act, 1948.

iv. Minimum Wages Act, 1948

This act sets the minimum wages that must be paid to skilled and unskilled laborers. The act is legally non-binding but statutory. Payment of wages below the minimum wage rate amounts to forced labour. Wage boards are set up to review the industry's capacity to pay and fix minimum wages such that they at least cover a family of four's requirements of calories, shelter, clothing, education, medical assistance, and entertainment.

v. The Bonded Labour System (Abolition) Act 1976

The Bonded Labour System (Abolition) Act 1976: States that all forms of bonded labour stand abolished and every bonded labour stands freed and discharged from any obligations to render any bonded labour.

vi. Workmen's Compensation Act, 1923 & Rules 1924

The Act requires if personal injury is caused to a workman by accident arising out of and during his employment, his employer should be liable to pay compensation in accordance with the provisions of this Act.

vii. Interstate Migrant Workmen Act 1979

The provisions of this Act regulate the conditions of service and protect the interests of interstate migrant workers. The project requires engaging interstate migrant workers for specialized activities. The Inter-State migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, among others.

viii. Ancient Monuments and Archaeological Sites & Remains (Amendment and Validation) Act 2010

This Act is to ensure the preservation of ancient and historical monuments and archaeological sites and remains of national importance and for the regulation of archaeological excavations and the protection of sculptures, carvings, and other like objects. According to this Act, areas within the radii of 100m and 200m from the "protected property" are designated as "prohibited areas" and "regulated areas" respectively. No development activity is permitted in the "prohibited areas". Development activities are not permitted in the "regulated areas" without prior permission from the Archaeological Survey of India (ASI) if the site/remains/ monuments are protected by ASI or the State Directorate of Archaeology.

ix. Indian Treasure Trove Act, 1878

Whenever any treasure (anything of any value hidden in the soil, or anything affixed thereto) exceeding in amount or value ten rupees is found, the finder shall intimate District Collector in writing as soon as practicable.

x. Right to Information Act, 2005

Provides a practical regime of right to information for citizens to secure access to information under the control of Public Authorities. The act sets out (a) obligations of public authorities with respect to the provision of information; (b) requires designating of a Public Information Officer; (c) process for any citizen to obtain information/disposal of request, etc.; and (d) provides for institutions such as Central Information Commission/State Information Commission.

xi. Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act 1989 and further Amendments 2018.

To prevent atrocities against scheduled castes and scheduled tribes. The objectives of the Act clearly emphasized the intention of the government to deliver justice to these communities through proactive efforts to enable them to live in society with dignity and self-esteem and without fear or violence or suppression from the dominant castes. With the reported misuse of the Act, In August 2018, the parliament of India passed the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Amendment Bill, 2018, to bypass the ruling of the Supreme Court of India laying down procedures for arrests under the Act.

xii. The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013

An act that aims at providing a sense of security at the workplace that improves women's participation in work and results in their economic empowerment. It requires an employer to set up an "Internal Complaints Committee" (ICC) and the Government to set up a 'Local Complaints Committee' (LCC) at the district level to investigate complaints regarding sexual

harassment at workplace and for inquiring into the complaint in a time bound manner. The ICC need to set up by ever organization and its branches with more than 10 employees.

xiii. The Street Vendors (Protection Of Livelihood and Regulation of Street Vending) Act, 2014

The act was enacted to regulate street vendors in public areas and protect the rights of the street vendors.

xiv. The Prohibition of Employment as Manual Scavengers and Their Rehabilitation Act, 2013

An Act to provide for the prohibition of employment as manual scavengers, rehabilitation of manual scavengers and their families, and for matters connected therewith or incidental thereto.

6. Technical Guidelines on Sewerage and Drainage at National Level

i. Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, Manual on Sewerage and Sewage Treatment Systems – 2013

Part A of the manual is on the Engineering aspect related to the sewerage system.

The manual provides detailed guidelines for:

- Planning
- Design and construction of sewers
- Design and construction of sewage pumping stations and sewage pumping mains
- Design and construction of sewage treatment facilities
- Design and construction of sludge treatment facilities
- Recycling and reuse of sewage
- Decentralized sewerage system
- On-site sanitation
- Preparation of city sanitation plan

Part B of the manual is on Operation and Maintenance aspects related to sewerage systems and includes:

- Sewer systems
- Pumping station
- Sewage treatment facilities
- Sludge treatment facilities
- Electrical and instrumentation facilities
- Monitoring of water quality
- Environmental conservation
- Occupational health hazards and safety measures
- On-site systems

Part C of the manual is on the Management aspect related to the sewerage system:

- Legal framework and policies
- Institutional aspects and capacity building
- Financing and financial management

- Budget estimates for operation and maintenance
- Public-private partnership
- Community awareness and participation
- Asset management
- Management information system

Potential disasters in sewerage and management

ii. Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, Manual on Storm Water Drainage Systems, 2019

This manual has been prepared for assisting engineers, planners, designers, architects, geographers, and hydrologists working in government/ private institutions, urban local bodies, industrial and business concerns, consultancy services, etc., in planning and design of urban stormwater drainage systems in the country.

The manual is contained in three distinct Parts over two volumes.

Volume 1 contains Part A: Engineering Design,

Volume 2 contains Part B: Operation, Maintenance, and Part C: Management.

iii. Central Public Health and Environmental Engineering Organisation (CPHEEO), Ministry of Urban Development, Manual on Operation and Maintenance of Water Supply System - 2005

The manual aims to serve as a guide for strengthening the technical, operational, and managerial capabilities required of the concerned personnel to operate and maintain water supply services as per acceptable norms of quantity, quality, sustainability, reliability, and cost. This manual provides systematic guidelines that provide the details of the operation, functioning, maintenance, and safety considerations of all the technical aspects related to water supply O & M.

iv. Central Public Health and Environmental Engineering Organisation (CPHEEO) Ministry of Housing and Urban Affairs, Advisory on On-Site and Decentralized Composting of Municipal Organic Waste, June 2018

Methods to treat organic wastes, Reduce, Recycle, Reuse, Waste to Compost systems: Waste to Compost systems for Individual Households, Small Communities, Apartments, etc. up to 10 Household; Waste to Compost systems for Medium-Sized Communities, Apartments, RWAs – for 11 – 300 Households; medium-sized Offices, medium Hotels, Resorts, medium Schools, Canteens, Marriage Halls; Waste to Compost systems for large Communities, Apartments, RWAs, high rise buildings for 301 – 1000 Households; Large Offices, Large Hotels, Large Schools, Waste to Compost systems for Decentralized plants for more than 1000 Households operated by ULBs/ Institutions/ Outsourced agencies.

v. Central Pollution Control Board, Guidelines for Management of Sanitary Waste, May'18

It covers possible waste management options for such kinds of wastes. Role of various stakeholders etc.

vi. Central Pollution Control Board, Guidelines on Environmental Management of Construction & Demolition (C&D) Wastes

It discusses the Quantum & composition of C&D waste generation, Initiatives in promoting C&D waste products by GoI, C&D waste processing, Existing Guidelines on C&D waste management, Introduction to Guidelines on Environmental Management of C&D Wastes, Guidelines on Environmental Management of C & D Wastes – NOISE management, Guidelines

on Environmental Management of C&D Wastes – DUST management, Guidelines on Environmental Management of C&D Wastes – Other issues

Annexures on: Initiatives in C & D waste management in 69 cities (Literature Survey); Potential uses of C&D wastes, Global practices of the utilization of C&D wastes, Criteria for site selection of C&D waste processing facility

7. Policies and Regulations at State Level

i. The Gujarat Infrastructure Development Act, 1999

This Act provides the framework for participation by persons other than the State Government and Government agencies in the financing, construction, maintenance, and operation of infrastructure projects and for that purpose to establish a Board and to provide for the matters connected therewith.

ii. Gujarat Irrigation and Drainage Act, 2013

This Act is to provide for irrigation and drainage in the State of Gujarat. Whereas it is necessary to make provisions for the construction relating to irrigation in the State of Gujarat and for the matters connected therewith and incidental thereto.

iii. Gujarat Irrigation and Drainage Rules, 2014

It shall apply to all the works constructed and maintained relating to irrigation including drainage and water supply for drinking and industrial purpose by the State Government, State Government institutions, and Grant-in-Aid Institutions of the State and includes all services rendered thereof.

iv. The Gujarat Water Supply and Sewerage Board Act, 1978

An Act to provide for the establishment of a Water Supply and Sewerage Board for the rapid development and proper regulation of water supply and sewerage services in the State of Gujarat. It extends to the whole of the State of Gujarat excluding the areas comprised of Cities and cantonments.

v. Saurashtra Felling of Trees (Infliction of Punishment) Act, 1951

An Act to provide for heavier punishment for felling of trees and for certain other matters. Whereas it is expedient to provide for heavier punishment for the unauthorized felling of trees and certain other matters

vi. The Gujarat Highways Ac, 1955

An Act to provide for the restriction of ribbon development along highways, for the prevention and removal of encroachment thereon, for the construction maintenance and development of highways, for the levy of betterment charges, and certain other matters.

vii. The Gujarat Water and Gas Pipelines (Acquisition of Right of User in Land) Act, 2000

An Act to provide for the acquisition of the right of users in land for laying water pipelines and gas pipelines in the State of Gujarat and for the matters connected therewith.

viii. Gujarat Industrial Development Act, 1962

This act is to make special provision for securing the orderly establishment and organization of industries in industrial areas and industrial estates in the State of Gujarat and to establish commercial centres in Connection with the establishment and organization of such industries and for that purpose to establish an Industrial Development Corporation, and for purposes connected with the matters aforesaid.

ix. The Gujarat Special Economic Zone Act, 2004

An Act to provide for the operation, maintenance, management, and administration of a Special Economic Zone in the State of Gujarat and to constitute an Authority and for matters connected therewith or incidental thereto

x. The Gujarat Vacant Lands in Urban Areas (Prohibition of Alienation) Act, 1972

An Act to prohibit the alienation of certain vacant lands in urban areas in the State of Gujarat.

xi. The Gujarat Town Planning and Urban Development Act, 1976

An Act to consolidate and amend the law relating to the making and execution of development plans and town planning schemes in the State of Gujarat.

xii. The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Gujarat Amendment) Act, 2016 (effective from August 2016)

A further amendment to the "Principal Act" referred to the Right to Fair Compensation, Transparency in Land Acquisition and Resettlement and Rehabilitation Act, 2013 in its application to the State of Gujarat, enacted the Gujarat Amendment Act, 2016 with simplifying the provisions, which was commenced on 15th August 2016.; Major amendments include Power of State government to exempt public interest and SIA for certain projects mentioned in the sub section of 10A., R&R Assistance - lump sum amount equal to 50% of the amount of land compensation as determined under section 27 of principal Act to the affected families, in case of a project which are linear in nature.

xiii. The Gujarat Ancient Monuments and Archaeological Sites and Remains Act, 1965

An Act to make better provision for the preservation of ancient and historical monuments and records and archaeological sites and remains (other than those declared to be of national importance) in the State of Gujarat and for matters connected with the purposes aforesaid.

xiv. Gujarat Fisheries Act, 2003

An Act to provide for the protection, conservation, and development of fisheries in inland and territorial waters of the State of Gujarat and regulation of fishing in the inland and territorial waters along the coastline of the State and matters connected therewith or incidental thereto.

xv. The Gujarat Public Premises (Eviction of Unauthorised Occupants) Act, 1972

An Act to provide for the eviction of unauthorized occupants from public premises and for certain incidental matters.

xvi. The Gujarat Slum Areas (Improvement, Clearance, and Redevelopment) Act, 1973

An Act to provide for the improvement and clearance of Slum areas in the State of Gujarat and their development; and matters connected with the purposes aforesaid.

xvii. Gujarat Special Investment Region Act, 2009

An Act to provide for the establishment, operation, regulation, and management of large size Investment Regions and Industrial Areas in the State of Gujarat; and to especially enable their development as global hubs of economic activity supported by world-class infrastructure, premium civic amenities, centres of excellence and proactive policy framework; and for setting up an organizational structure with that purpose and for matters connected therewith or incidental thereto.

xviii. Gujarat State Disaster Management Act, 2003

An Act to provide for effective management of disaster, for mitigation of the effects of disaster, for administering, facilitating, coordinating and monitoring emergency relief during and after the occurrence of disasters, and for implementing, monitoring, and coordinating measures for reconstruction and rehabilitation in the aftermath of disasters, in the State of

Gujarat and for these purposes to establish the Gujarat State Disaster Management Authority and to specify other agencies and for matters connected therewith or incidental thereto.

xix. Gujarat Government-Policy for Reuse of Treated Wastewater, 2018

The concept of wastewater recycling and reuse and the need to include the same in all water supply and wastewater management programs is recognized by most of the policy frameworks and institutions in India.

Gujarat Government Policy for the use of treated wastewater is in force from May 2018 with a vision to maximize the collection and treatment of sewage generated and reuse of treated wastewater on a sustainable basis, thereby reducing dependency on freshwater resources and also promotes treated wastewater as an economic resource.

The Policy has the following objectives:

- To reach a minimum of 80% coverage and collection of sewage in all municipal towns
- To reach a level of 100% treatment collected sewage as per the prescribed standards
- To reuse at least 25% of total freshwater consumption from treated wastewater within the time limit set under the policy by every municipal body
- To reuse 70%of treated wastewater by 2025
- To reuse 100% of treated wastewater by 2030

The prime responsibility for the treatment of wastewater, wastewater recycling, and reuse will be with the local body. Accordingly, the creation of wastewater management and planning and implementation of wastewater reuse infrastructure will be the responsibility of the local body depending on the availability of funds. However, the state government will seek to augment these efforts.

xx. Gujarat Government-The 'Urban Sanitation and Cleanliness Policy, 2018

A comprehensive policy for solid and waste management. Under this policy, all major urban civic bodies need to ensure 100 percent waste segregation to ensure less generation of solid waste. The policy also allows civic bodies to make their laws, regulations and draw up rules concerning penalties for violators. Under the new policy, Gujarat is looking to reduce dependency on landfills and send collected waste directly to waste treatment plants. Construction waste will be recycled and reused. The main idea is to first reduce the generation of waste by encouraging segregation in households, resident welfare associations, and bulk waste generators like malls and hospitals.

This policy makes it mandatory for all households to have their drainage systems linked directly to sewage treatment plants (STPs), to avoid the direct flow of sewage into lakes or rivers.

Table 52: Applicable Regulations

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
1.	National Environment Policy, 2006	The National Environment Policy by the MoEFCC aims at mainstreaming environmental concerns into all developmental activities. It emphasizes the conservation of resources and points out that the best way to aid conservation is to ensure that people dependent on resources obtain better livelihoods from conservation than from degradation of the resources.	Prevention of pollution and degradation of resources caused due to the existing STPs functioning.	Construction and Operation phase
2.	The Environmental (Protection) Act. 1986, and the Environmental (Protection) Rules, 1987- 2002 (various amendments)	All environmental Notifications, Rules and Schedules are issued under the EPA Act	Prevention of pollution and degradation of resources caused due to the existing STPs functioning.	Construction and Operation phase
3.	Environmental Impact Assessment Notification, 2006	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994), set out the requirement for environmental assessment in India. This states that Environmental Clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects requires Environmental Clearance from the National Ministry of Environment, Forest and Climate Change (MoEFCC). Category B projects require Environmental Clearance from the State Environmental Impact Assessment Authority (SEIAA).	None of the components of this subproject falls under the ambit of the notification. and EC is not required for STP.	Not applicable
4.	The Water (Prevention and Control of Pollution) Act, 1974 and The Water Cess Act 1977	Consent required for not polluting ground and surface water during construction	Shall be applicable throughout the project cycle. Consent to Establish (CTE) and Consent to Operate (CTO) is required for new STPs. In this case,	Construction and Operation phase

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
			amendment to existing CCA will be required.	
5.	The Air (Prevention and Control of Pollution) Act. 1981	Consent required for establishing and operation of crushers, hot mix and batching plants etc.	Shall be applicable throughout the project cycle. Consent to Establish (CTE) and Consent to Operate (CTO) is required for new STPs. In this case, amendment to existing CCA will be required.	Construction and Operation phase
6.	The Noise Pollution (Regulation and Control) Rule, 2000	Construction machineries and vehicles to conform to the standards for construction	Shall be applicable throughout the project cycle.	Construction and Operation phase
7.	The Wildlife Protection Act, 1972	An Act to provide for the comprehensive protection of wild animals, birds and plants. This would cover matters concerning appointment of forest authorities, hunting of wild animals, protection of specified plants, conservation of national parks and sanctuaries, trade commerce in relation to plants and animals and prevention of any offences.	Not applicable as subprojects components are not located in designated protected area.	Not applicable
8.	Saurashtra Felling of Trees (Infliction of Punishment) Act, 1951 Amended by Sau. 28 of 1952. Amended by Sau. 27 of 1954. Amended by Sau. 21 of 1955 Adapted and modified by the Bombay (Saurashtra Area) Adaptation of Laws (State and Concurrent Subjects) Order, 1956. Amended by Guj. 9 of 1960.	The rule indicates restriction on felling the trees without due permission[48].	Applicable as the project will require felling of trees.	Applicable

[48] *https://ifp.gujarat.gov.in/DIGIGOV/StaticAttachment?AttachmentFileName=/pdf/approvals/pre_establishment_approvals/10_Tree_Cutting_Permission.pdf*

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
9.	The Wetlands (Conservation and Management) Rules, 2017	Conservation of wetlands for their ecosystem	Not applicable as the subproject is not near any wetland	Not applicable
10.	Solid Waste Management Rules, 2016	Disposal of Municipal Solid Waste as per rules	Applicable, construction workers camp and the waste generated from employees during operation will generate municipal solid waste which needs to be handled as per SWM rules.	Construction and Operation phase
11.	Construction and Demolition (C&D) Waste Management Rules, 2016	Safe disposal for C&D Waste	Applicable, construction waste shall be generated due to demolition of existing structures & construction activities.	Construction phase
12.	Plastic Waste Management Rules, 2016, amended 2018	Safe disposal of plastic/ packaging material waste	Applicable, plastic and packaging waste will be generated in vast quantities during the implementation/ construction stage. In operation phase screening/ floating waste of plastic will be generated. .	Construction and operation phase
13.	Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, amended 2019	According to the Rules, hazardous wastes are wastes having constituents specified in schedule II of the rules, if their concentration is equal to or more than the limit indicated in the said schedule.	Applicable, the generated hazardous waste like waste oil. Paint, grease etc., has to be handled as per rules. Use and storage of Chlorin will attract consent from Petroleum & Explosive Safety Organization	Construction and Operation phase
14.	E-Waste Management Rule, 2016, amended 2018	The rule dictates the entity generating hazardous wastes (as defined in the rule), to take all practical steps to ensure that such wastes are properly handled without any adverse effects, which may result from such wastes. It stipulates proper collection, reception, treatment, storage, and	Applicable as e-waste will be generated during the project construction as well as during operation.	Construction and Operation phase

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
		disposal of such wastes and provides for the process/mechanism to do so.		
15.	Bio-medical Waste Management Rules, 2016, amended 2019	To improve the collection, segregation, processing, treatment, and disposal of the bio-medical wastes in environmentally sound management thereby, reducing biomedical waste generation and its impact on the environment.	The subproject does not directly deal with bio-medical wastes or its management. However, this may be Applicable as there may be household / other biomedical waste in the screenings	Construction (Rehabilitation of existing STP) and Operation Phase
16.	Batteries (Management and Handling) Rules, 2001	MoEFCC under the provisions of the Environmental Protection Act, 1986 issued the Batteries (Management and Handling) Rules, 2001. The rules were enacted with the primary objective of ensuring the safe disposal of discarded lead-acid batteries.	Applicable as the project will involve use of batteries for vehicles and plant	Construction and Operation phase
17.	The Motor Vehicle Act, 1988 & Motor Vehicles Rules, 1989	State Transport Authority to enforce standards for vehicular pollution.	All the vehicles used for construction and operation will need to comply with the provisions of this act.	Construction phase
18.	Insecticide Act 1968 and Rules 1971	The Insecticides Act, 1968 and Insecticides Rules, 1971 regulate the import, registration process, manufacture, sale, transport, distribution, and use of insecticides (pesticides) to prevent risk to human beings or animals and for all connected matters, throughout India. It directs the usage of only approved pesticides / insecticides	Applicable in case the subproject involves purchase or use of any insecticide or pesticides in the STP premises for landscaping purpose	Applicable
19.	The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013.	Private land acquisition is guided by the provisions and procedures under this Act. Before the acquisition of any land, the Government is required to consult the concerned Panchayat or Municipal Corporation and carry out a Social Impact Assessment in consultation with them. The Act provides a transparent process for land acquisition for industrialization, development of essential	The STP is in ownership of AMC. The proposed project doesn't involve any land acquisition or livelihood impacts as the area proposed for upgradation is within existing project premises. Workers directly or indirectly engaged with AMC/Contractors are working within the existing premises	Not applicable

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
	Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement (Gujarat Amendment) Act, 2016.	infrastructural facilities and urbanization by giving adequate financial compensation to the affected people. Amendment of section 2 of 30 of 2013: Following proviso is inserted, provided also that the acquisition of land for the projects listed in Section 10A and the purposes specified therein shall be exempted from the provisions of the first provision. 10 A Power of the state government to exempt certain projects including projects vital to national security or defence of India, rural infrastructure including electrification, affordable housing and housing for poor, industrial corridors set up by State Government and its undertaking (up to 1 km on both side of railways or roads of such corridor), infrastructure projects including projects under PPP where ownership of land lies with state government	who will be absorbed during construction related activities and continue to be engaged in current tasks. For any involuntary resettlement or forced eviction from government land or encroachment on municipal drains, RFCTLARR 2016 shall be applied.	
20.	The Honourable Supreme Court of India order, pertaining to removal and restriction of encroachment of religious structures on the public space.	Banned fresh encroachment of roads, pavements and sideways by construction of religious structures or installation of statues of public figures. The order can empower municipal and government bodies to prevent unauthorized constructions being carried out under the garb of religious structures as often local political interests and religious sentiments render authorities helpless.	The project will be developed within the existing project boundary only which is enclosed.	Not applicable
21.	Central Ground Water Authority- 'Guidelines to control and regulate groundwater extraction in India' September 2020	All new infrastructure projects, who have submitted their applications prior to 24.09.2020 and propose to draw more than 20 KLD of ground water are required to submit proof of installation of STP or submit an affidavit as per format available on the website.	Not applicable. As no Ground water extraction is envisaged.	Not Applicable

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
22.	The Factories Act 1948, amended 1954, 1970, 1976 and 1987	An Act to consolidate and amend the law regulating labour in factories. WHEREAS it is expedient to consolidate and amend the law regulating labour in factories. Health, Safety, Welfare and other provisions are mentioned specifically for compliance.	Applicable as more than 10 workers are expected to be involved in any year in the project.	Construction and operation
23.	The Building & Other Construction Workers (Regulation of Employment & Conditions of Service) BOCW Act, 1996	All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government and require reporting as desired by the Registering Office in compliance to the Act - Cess should be paid at a notified rate;	• Applicable to any building or other construction work employing 10 or more workers. • Provide safety measures at the construction work and other welfare measures, such as insurance, canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc.,	Construction phase, Operations and Maintenance phases
24.	Child Labour (Prohibition and Regulation) Act, 1986 and Rules, amended 2016	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule.	No child labour will be appointed for any work related to this project.	Construction and Operation phase

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
		Child can help his family or family enterprise, which is other than any hazardous occupations or processes set forth in the Schedule, after his school hours or during vacations		
25.	Minimum Wages Act, 1948	The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act, if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.	All construction workers should be paid not less than the prescribed minimum wage.	Construction and Operation phase
26.	The Bonded Labour System (Abolition) Act 1976	The Bonded Labour System (Abolition) Act 1976: States that all forms of bonded labour stand abolished, and every bonded labour stands freed and discharged from any obligations to render any bonded labour	Applicable. Labour involved during the project will be appointed as per prevailing laws and rules.	Construction and Operation phase
27.	Workmen's Compensation Act, 1923 & Rules 1924	The Act requires if personal injury is caused to a workman by accident arising out of and during his employment, his employer should be liable to pay compensation in accordance with the provisions of this Act.	Applicable during the construction phase.	Construction phase
28.	Interstate Migrant Workmen Act 1979	The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.,	Contractor shall register with Labour Department, if Inter-state migrant workmen are engaged. Adequate and appropriate amenities and facilities to be provided to workers - housing, medical aid, traveling expenses	Construction phase

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
29.	Ancient Monuments and Archaeological Sites & Remains (Amendment and Validation) Act 2010	The Rules designate areas within a radius of 100 m and 200 m from the "protected property/ monument/ area" as "prohibited area" and "regulated area" respectively. Henceforth, no permission for construction of any public projects or any other nature shall be granted in the prohibited areas of the protected monument. In respect of regulated area, the Competent Authority may grant permission for construction, reconstruction, repair and renovation based on recommendation of the National Monument Authority duly taking note of heritage byelaws, which shall be prepared in respect of each protected monument and protected area	There is no protected monument in the subproject area. However, in case of chance finds, the contractors will be required to follow a protocol as defined in the Environmental and Social Management Plan (ESMP).	Construction phase, or Operations / Maintenance
30.	Right to Information Act, 2005	To secure access to information under the control of public authorities To promote transparency and accountability in the working of every public authority	Applicable, general public are entitled to ask information under this act related to the subproject. The project authorities shall provide necessary information.	Construction and Operation phase
31.	Gujarat (Right of Citizens to Public Services) Act, 2013	An Act to lay down an obligation upon every public authority to render public services within the prescribed time limit and provide for a grievance redressal mechanism to citizens for non-compliance and for the matters connected therewith or incidental thereto.	Applicable, general public are entitled to public services related to the subproject including access to water supply and sewerage services.	Construction and Operation phase
32.	The Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act was passed in 2014	An Act to protect the rights of urban street vendors and to regulate street vending activities and for matters connected therewith or incidental thereto.	Not applicable as STP development is within the existing boundary and no street vendors are present in the plant premises or adjacent to the plant premises	Not applicable

Sr. No.	Policy/ Act/ Rules	Key provisions and Purpose	Applicability to the Sub Project	Sub Project Phase
33.	The Constitution (Seventy-Fourth Amendment) Act, 1992	An act to strengthen the Municipal Authorities.	Applicable as the subproject is being implemented by Municipal Corporation	Construction and Operation phase
34.	The Gujarat (Panchayats, Municipalities, Municipal Corporations and State) Tax On Professions, Traders, Callings And Employments Act, 1976 Amended till 2008	An act to strengthen the Municipal Authorities.	Applicable as the subproject is being implemented by Municipal Corporation	Construction and Operation phase
35.	Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act 1989 and further Amendments 2018.	To prevent atrocities against scheduled castes and scheduled tribes. The objectives of the Act clearly emphasized the intention of the government to deliver justice to these communities through proactive efforts to enable them to live in society with dignity and self-esteem and without fear or violence or suppression from the dominant castes.	Not applicable. specifically, to project but shall be applicable to all those working indirectly and directly on the sub-project. and in AMC.	Overall applicability to all working, directly and indirectly in sub-project, during construction and operation.
36.	The Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal) Act, 2013	To provide protection against sexual harassment of women at workplace and for the prevention and redressal of complaints of sexual harassment and for matter connected therewith or incidental thereto	Applicable, to all workers, including female workers/ employees engaged in project activities to have legal protection and recourse under the act.	Construction and Operation phase
37.	The Prohibition of Employment as Manual Scavengers and their Rehabilitation Act, 2013	An Act to provide for the prohibition of employment as manual scavengers, rehabilitation of manual scavengers and their families, and for matters connected therewith or incidental thereto.	Applicable. As G-ACRP involves sub project which includes upgradation or setting up new projects which involves sewer lines and STP. As per definition in the act, it includes: - hazardous cleaning in relation to sewers and septic tanks and manual cleaning. - unsanitary latrines which require manual removal and disposal of excreta; - local authority meaning municipal bodies/ panchayat.	Construction and operation

ANNEXURE III: WORLD BANK ESSs APPLICABLE TO THE PROJECT

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
World Bank Environmental and Social Framework for Investment Project Financing	It sets out the mandatory requirements of the Bank about the projects it supports through Investment Project Financing.	• The types of E&S risk and impacts that should be considered in the environmental and social assessment. • The use and strengthening of the Borrower's environmental and social framework for the assessment, development, and implementation of World Bank-financed projects where appropriate.	Applicable to this project for the rehabilitation of STP and allied activities such as TSPS repairs and access road surfacing
ESS-1 Assessment and Management of Environmental and Social Risks and Impacts	Identify, assess, evaluate, and manage the environmental and social risks and impacts in a manner consistent with the ESF. To adopt a mitigation hierarchy approach to: (a) Anticipate and avoid risks and impacts; (b) Where avoidance is not possible, minimize or reduce risks and impacts to acceptable levels; (c) Once risks and impacts have been minimized or reduced, mitigate; and (d) Where significant residual impacts remain, compensate for or offset them, where technically and financially feasible.	• The types of E&S risk and impacts that should be considered in the environmental and social assessment. • The use and strengthening of the Borrower's environmental and social framework for the assessment, development, and implementation of World Bank-financed projects wherever appropriate.	The requirement under this component includes: i) Upgradation of STP, ii) Construction activities which include demolition and construction wastes from existing STP, new construction activities and iii) Appropriate technology application to handle the current/ future load with potential environmental and social risks and impacts. iv) Facilities or activities that are to be carried out, or planned to be carried out, contemporaneously with the project, v) Benefits occurring from the sub-project include labor opportunities, procurement of local goods, services, equipment, and materials, the release of treated water for non-domestic purposes, improvement in quality of life for city and downstream users due to better treatment of sewage water.
ESS-2 Labor-and-Working-Conditions	• Promote safety and health at work.	• Requirements of the Borrower to assess the scale, duration/timing, and nature of	Follow national, state, guidelines on OHS and WB EHGS for all works/activities

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
	• Promote fair treatment, non-discrimination, and equal opportunity for project workers. • Protect project workers, with particular emphasis on vulnerable workers. • Prevent the use of all forms of forced labor and child labor. • Support the principles of freedom of association and collective bargaining of project workers in a manner consistent with national law. • Provide project workers with accessible means to raise workplace concerns.	workers to be employed, impacts/ risks associated with their engagement, and how they will be addressed. • Provisions on the treatment of direct, contracted, community, and primary supply workers, and government civil servants. • Requirements on terms and conditions of work, non-discrimination, and equal opportunity and workers' organizations. Provisions on child labor and forced labor and prevention of SEA/SH. • Requirements on occupational health and safety, in keeping with the World Bank Group's Environmental, Health, and Safety Guidelines (EHSG). • Develop and implement written labor-management procedures applicable to the sub-project and compliance to national requirements, laws, procedures, guidelines, standards, etc.	The project will be hiring the following types of workers: i) Direct workers will include the project managers and supervisors, who are employees of AMC, GUDM. ii) The workforce deployed by the Contractors and the Project Management Consultant will be deemed to be contracted workers. The Contractor(s) might further engage multiple vendors and subcontractors; iii) Migrant laborers may be employed by the contractor. iv) Local discomfort or potential conflicts with local people, moderate risk of Gender-based Violence (GBV), social disturbance, and communicable diseases due to the low-level influx of migrant workers, including resource-related conflicts. v) Labor and employment opportunities will be increased during the construction activities and local labor will be hired as far as possible.
ESS-3 Resource-Efficiency-and-Pollution-Prevention-and-Management	• Promote the sustainable use of resources, including energy, water, and raw materials. • Avoid or minimize adverse impacts on human health and the environment caused by pollution from project activities. • To avoid or minimize project-related emissions of short and long-lived climate pollutants.	• Resource efficiency measures should be analyzed as part of the environmental and social assessment • When the project is a potentially significant user of water or will have potentially significant impacts on water quality, in addition to applying the resource efficiency requirements of this ESS, the Borrower will adopt measures, to the extent technically and financially feasible, that avoid or minimize water	To ensure Resource Efficiency, the project preparation and the ESIA process will identify feasible measures for efficient (a) Energy use; (b) Water management to minimize water usage during construction, and recycling of water used construction, treated water reuse, upcycling of wastes and byproducts such as gases (c) Raw materials use by exploring the use of local materials, recycled aggregates, the project would also need to address the management of

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
	• To avoid or minimize the generation of hazardous and non-hazardous waste.	usage so that the project's water use does not have significant adverse impacts on communities, other users, and the environment. • Efficiency in the use of raw materials and, thereby, efficiency in costs and labor, can be achieved by eliminating and/or minimizing the quantity used in the project, selecting the most appropriate raw materials possible, and reducing and recycling wastes. • The Borrower will avoid the release of pollutants or, when avoidance is not feasible, minimize and control the concentration and mass flow of their release using the performance levels and measures specified in national law or the EHSGs, whichever is most stringent. This applies to the release of pollutants to air, water, and land due to routine, routine, and accidental circumstances, and with the potential for local, regional, and transboundary impacts. • ESS-3 refers to national law and Good International Industry Practice, in the first instance the World Bank Groups' EHSGs. treated sewage and sludge	solid and liquid waste generated during the construction and operation phases. (d) Avoid the release of pollutants, avoid, minimize and control such releases and comply with regulations under nationals and local laws; especially in terms of discharge of treated effluents, sludge, screenings, and other wastes (including C&D wastes, solid wastes, plastics, hazardous, e-wastes, biomedical wastes if any in screenings) emanating from proposed rehabilitation and operation & maintenance of STP e) minimize pollution impacts (waste and wastewater (bypass) outflow, erosion of soil, construction materials, chemicals used, siltation, and other such impacts) during construction activities, maintenance, emergencies, disasters The facility has Consent to dispose of treated water in Sabarmati. Currently treated sewage is also being discharged into Fatehwadi Canal as requested by Irrigation Department, without permission from the regulatory authority, namely GPCB. In case of maintenance work of Canal, the treated water is disposed of in the Sabarmati River. Issues related to pollution from effluents, pollutants, and untreated sewage in the Sabarmati River & Fatehwadi were reported during consultations and discussions. In case AMC and irrigation department decides to continue reuse of treated sewage for agriculture from the bank supported project, (i) permit for the same shall be obtained from

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
			GPCB (and that AMC has already informed irrigation department that discharge into the canal will be done only after receiving permit for this from GPCB), (ii) AMC & Irrigation Department shall discuss & decide on the quantity of water required for such discharge after obtaining permit; and alternate arrangements if any required to be arranged for irrigation (so as to help with lesser available water for irrigation) as this discharge will be stopped till permit is obtained; (iii) AMC with the support of Irrigation Department shall undertake a study on reuse of treated effluent for irrigation in line with the Central Pollution Control Board's Guidelines of Reuse of Treated Water for Irrigation, 2018, through reputed Agricultural University with stakeholder consultations as per the Guidelines and after agreement with stakeholders and permit from GPCB discharge the treated sewage so as to avoid any negative environmental and health issue on downstream communities. The subproject shall ensure regulatory compliance, and best standards for proposed reuse, after consultations with the stakeholders. This will reduce pollution, and resource efficiency
ESS-4 Community-Health-and-Safety	• Anticipate or avoid adverse impacts on the health and safety of project-affected communities during project life cycle from routine and non-routine circumstances	Requirements on infrastructure, considering safety and climate change and applying the concept of universal access, where technically and financially feasible.	In the project, there is likely to be i) Earth excavation, use of vibratory equipment, construction debris handling and disposal, etc. during construction ii) High likelihood of direct exposure to increased construction-related traffic and

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
	• Promote quality, safety, and climate change considerations in infrastructure design and construction, including dams • Avoid or minimize community exposure to project-related traffic and road safety risks, diseases, and hazardous materials • Have in place effective measures to address emergency events • Ensure that safeguarding of personnel and property is carried out in a manner that avoids or minimizes risks to the project-affected communities	• Requirements on traffic and road safety, including road safety assessments and monitoring • Ecosystem services: Addresses risks arising from impacts on provisioning and regulating ecosystem service • Community exposure to health issues: Measures to avoid or minimize the risk of water-related, communicable, and non-communicable diseases on downstream communities • Requirements to assess risks associated with security personnel, and review and report unlawful and abusive acts to relevant authorities • Management and safety of hazardous materials • Emergency preparedness and response	equipment especially at road section connecting canal road to the highway. iii) There may be risks to and due to emergency release from the Vasna barrage, safety risks to project due to flooding, extreme events and mitigation, and impacts on downstream communities. Unanticipated risks to the downstream communities in case of release of untreated sewage from STPs during construction or bypass during emergencies, or maintenance to Fatehwadi Canal or Sabarmati River iv) Moderate dust levels from earthworks, moderate noise and emission level from traffic congestion and idling of vehicles, demolition of STP units during rehabilitation works v) There may be adverse impacts of discharge from STP on adjoining communities, especially during construction phase; vi) Women and girls in adjacent communities may face increased risk of gender-based violence, sexual exploitation and abuse and sexual harassment (GBV and SEA/SH) due to larger labor presence and; other labor influx related risks
ESS-5 Land-Acquisition-Restrictions-on-Land-Use-and-Involuntary-Resettlement	• Avoid or minimize involuntary resettlement by exploring project design alternatives • Avoid forced eviction • Mitigate unavoidable adverse impacts from land acquisition or restrictions on land use by providing compensation at	• Project design alternatives for avoiding and minimizing involuntary resettlement impacts • Applies to permanent or temporary physical and economic displacement resulting from different types of land acquisition and restrictions on access	• Land acquisition and IR will not be required for the project as the proposed project involves the upgradation of existing STP and capacity augmentation by AMC. Land use will remain the same. The land is under the Ahmedabad municipality as per land records available

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
	replacement cost and assisting displaced persons in their efforts to improve, or at least restore, livelihoods and living standards to pre-displacement levels or to levels prevailing before the beginning of the project implementation, whichever is higher • Improve living conditions of poor or vulnerable persons who are physically displaced, through the provision of adequate housing, access to services and facilities, and security of tenure • Conceive and execute resettlement activities as sustainable development programs • Ensure that resettlement activities are planned and implemented with appropriate disclosure of information, meaningful consultation, and the informed participation of those affected	• Does not apply to voluntary market transactions, except where these affects third parties • Provides criteria for "voluntary" land donations, sale of community land, and parties obtaining income from illegal rentals • Prohibits forced eviction (removal against the will of affected people, without legal and other protection including all applicable procedures and principles in ESS5) • Requires that acquisition of land and assets happens only after payment of compensation and resettlement has occurred. Envisages benefits for affected persons • Requires community engagement and consultation, disclosure of information, and a grievance mechanism	• Accessibility to roads and rivers will not change and uninterrupted. There is no livelihood loss expected from the proposed upgradation and rehabilitation of the STP. • Accessibility to the river is not restricted currently or in the proposed sub-project upgradation. There is no commercial residential or common property within the STP site. • Kuccha access road is existing and therefore road construction is proposed to enhance the access • No resettlement activities are envisaged
ESS-6 Biodiversity-Conservation	• Protect and conserve biodiversity and habitats. • Apply the mitigation hierarchy and the precautionary approach in the design and implementation of projects that could have an impact on biodiversity. • To promote the sustainable management of living natural resources.	For the sub-project, the ESIA will assess whether sub-project activities will have impacts on natural habitat and biodiversity. Impacts on the Sabarmati River due to the discharge of treated sewage from the STP will be assessed.	• Subproject areas are not protected areas or critical habitats. Sabarmati and Khari River and canals are all modified due to lack of water during most times of the year, discharge of industrial effluents and poorly treated sewage, and altered water retention and flows. • Minimal impacts include site clearance activities for rehabilitation of STP or allied activities such as material storage, which may require clearing of site overgrowths. No tree at the site is proposed to be cut or

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
			disturbed. Treated water of the STP will be discharged into the Fatehwadi canal. After upgradation of the 240 MLD STP, discharged treated sewage will confirm better quality which ultimately will benefit the aquatic life downstream. The biodiversity studies have indicated that the project will very negligibly affect biodiversity. • There are no critical habitats in the Sabarmati downstream as it is modified due to developments around, discharge of wastes and effluents from Ahmedabad and nearby regions and receives no natural flow during most of the year (9 months) and also suffer around 50 percent deficit rainfall. It gets water diverted from Narmada Canal for the past 8 years (sourcing from Sardar Sarovar Dam around 300kms away, from which water is shared between 4 States including Gujarat) which is stored at riverfront for aesthetics and tourism as envisaged under a riverfront redevelopment project. Treated water from STPs of the city is the major source of flow through the river most of the year, and to the Fatehwadi Canal which irrigates many hectares of land downstream.
ESS-7 Indigenous-People	• Ensure that the development process fosters full respect for affected parties' human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods.	• Applies when the Indigenous Peoples are present or have a collective attachment to the land, whether they are affected positively or negatively and regardless of economic, political, or social vulnerability.	Not relevant to this project.

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
	• Promote sustainable development benefits and opportunities in a manner that is accessible, culturally appropriate, and inclusive. • Improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with affected parties. • Obtain the Free, Prior, and Informed Consent (FPIC) of affected parties in three circumstances. • Recognize, respect, and preserve the culture, knowledge, and practices of Indigenous peoples, and provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.	• The option to use different terminologies for groups that meet the criteria set out in the Standard. • The use of national screening processes, providing these meet World Bank criteria and requirements. • Coverage of forest dwellers, hunter-gatherers, pastoralists, and other nomadic groups. • Requirements for meaningful consultation tailored to affected parties and a grievance mechanism. • Requirements for a process of free, prior, and informed consent in three circumstances.	
ESS-8 Cultural-Heritage	• Protect cultural heritage from the adverse impacts of project activities and support its preservation. • Address cultural heritage as an integral aspect of sustainable development. • Promote meaningful consultation with stakeholders regarding cultural heritage. • Promote the equitable sharing of benefits from the use of cultural heritage.	• The term 'cultural heritage' encompasses tangible and intangible heritage, which may be recognized and valued at a local, regional, national or global level, as follows: • Tangible cultural heritage includes movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance. Tangible cultural heritage may be located in urban or rural settings, and may be above or below land or under the water;	• Not relevant for this subproject except for Chance Finds. • The location of the subproject does not have any ancient monuments and/or archaeological site(s), a protected area of local importance. As per the Heritage Department of AMC and data available, there are no tangible or intangible Cultural heritage or protected monuments within the STP premises or adjacent to it. The nearest monument is the Fateh Baug Fort at a distance of 1.6km from the STP. • Bag E Sukun Kabrastan (Shia Isthna Ashri Kabrastan) is located 50 m away from the STP boundary and is accessible by highway 64 and also through service road. It is

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
		• Applies to all projects that are likely to have risks or impacts on cultural heritage. This will include a project which: (a) Involves excavations, demolition, movement of earth, flooding, or other changes in the physical environment; (b) Is located within a legally protected area or a legally defined buffer zone; (c) Is located in, or in the vicinity of, a recognized cultural heritage site; or (d) Is specifically designed to support the conservation, management, and use of cultural heritage. • Applies to cultural heritage regardless of whether or not it has been legally protected or previously identified or disturbed.	located 750 m from the gate of the STP compound. Outfall is located almost 730 m from the Kabristan boundary. • Marthoma Church Ahmedabad Cemetery is located 500 m away from the boundary and the gate, it is about 1.2 km. Therefore, impacts on the same are not anticipated due to project activities. • Considering Ahmedabad as a Heritage city and the banks of the river Sabarmati as being significant for potential heritage sites, the chance finds procedure will be framed and implemented for any such discovery during excavation and construction activities within STP premises.
ESS-9 Financial-Intermediaries	• Sets out how Financial Intermediaries (FI) will assess and manage environmental and social risks and impacts associated with the subprojects it finances. • Promote good environmental and social management practices in the subprojects the FI finance. • Promote good environmental and sound human resources management within the FI.	• Financial Intermediaries (FIs) to have an Environmental and Social Management System (ESMS) - a system for identifying, assessing, managing and monitoring the environmental and social risks and impacts of FI subprojects on an ongoing basis. • FI to develop a categorization system for all subprojects; with special provisions for subprojects categorized as high or substantial risk. FI borrowers to conduct stakeholder engagement in a manner proportionate to the risks and impacts of the FI subprojects.	Not relevant as there is no financial intermediary involved.
ESS-10 Stakeholder-Engagement-and-	• Establish a systematic approach to stakeholder engagement that helps	• Requires stakeholder engagement throughout the project life cycle, and	• Relevant as the subproject will involve a wide variety of stakeholders during its

ESSs	Objectives	Requirements	ESF Relevance & Extent of Relevance to the Project
Information-Disclosure	Borrowers identify stakeholders and maintain a constructive relationship with them. • Assess the level of stakeholder interest and support for the project and enable stakeholders' views to be considered in project design. • Promote and provide means for effective and inclusive engagement with project-affected parties throughout the project life cycle. • Ensure that appropriate project information is disclosed to stakeholders in a timely, understandable, accessible, and appropriate manner.	preparation and implementation of a Stakeholder Engagement Plan (SEP). • Requires early identification of stakeholders, both project-affected parties and other interested parties, and clarification on how effective engagement takes place. • Stakeholder engagement to be conducted in a manner proportionate to the nature, scale, risks, and impacts of the project, and appropriate to stakeholders' interests. • Specifies what is required for information disclosure and to achieve meaningful consultation.	project cycle. SEP has been prepared and it is a dynamic document for the G-ACRP project which will be followed for all sub-projects. Consultations have been carried out for the preparation of the draft ESIA, details are included in Chapter 8.

ANNEXURE IV: BIODIVERSITY ASSESSMENT: FLORA & FAUNA

Flora

Trees

Sl No:	Family	Scientific name	Author name	Common name		Origin	IUCN status
				English	Gujarati/Hindi		
1	Annonaceae	*Annona squamosa*	L.	Custard apple	Sitaphal	E	NA
2	Annonaceae	*Polyalthia longifolia*	(Sonn.) Thwaites	Mast tree	Asopalav	E	NA
3	Apocynaceae	*Holarrhena pubescensFfatehwadi fF*	Wall. Ex G.Don	Indrajao	Kadvo indrajav	N	LC
4	Apocynaceae	*Wrightia tinctoria*	R. Br.	Sweet indrajao	Mitho dudhalo	N	NA
5	Arecaceae	*Borassus flabellifer*	L.	Toddy palm	Taad	E	NA
6	Arecaceae	*Cocos nucifera*	L.	Coconut	Nariel	N	NA
7	Caesalpiniaceae	*Delonix regia*	(Hook.) Raf.	Flame Tree	Gulmohor	E	LC
8	Casuarinaceae	*Casuarina equisetifolia*	L.	Whistling Pine	Vilayti saru	N	NA
9	Combretaceae	*Anogeissus latifolia*	(Roxb. ex DC.) Wall. ex Guillem. & Perr.	Axle Wood Tree	Dhavdo	N	NA
10	Ebenaceae	*Diospyros melanoxylon*	Roxb.	Coromandel Ebony	Timru	N	NA
11	Fabaceae	*Albizia saman*	(Jacq.) Merr.	Rain Tree	Roto sarasdo	E	NA
12	Fabaceae	*Butea monosperma*	(Lam.) Taub.	Flame of the Forest	Palas, Kesudo	N	NA
13	Lamiaceae	*Gmelina arborea*	Roxb.	White Teak	Sivan	N	NA
14	Leguminosae	*Leucaena leucocephala*	(Lam.) de Wit	Wild tamarind	Su Baval	E	NA
15	Leguminosae	*Peltophorum pterocarpum*	(DC.) K.Heyne	Copperpod	Tamrafali	E	NA
16	Leguminosae	*Pithecelobium dulce*	(Roxb.) Benth.	Sweet Tamarind	Vilayti Amli	E	NA
17	Leguminosae	*Pongamia pinnata*	(L.) Pierre	Pongam Tree	Karanja	N	LC
18	Leguminosae	*Prosopis cineraria*	(L.) Druce	Indian Mesquite	Khijado	N	NA
19	Meliaceae	*Azadirachta indica*	A.Juss.	Neem	Limbdo	N	NA
20	Mimosaceae	*Acacia nilotica*	(L.) Del.	Indian gum Tree	Baval	N	LC
21	Moraceae	*Ficus benghalensis*	L.	Banyan Tree	Vad	N	NA
22	Moraceae	*Ficus hispida*	L.f.	Hairy fig	Dedh umbar	N	NA
23	Moraceae	*Ficus racemosa*	L.	Cluster fig	Umbar	N	NA
24	Moraceae	*Ficus virens*	Aiton	White Fig	Pepri	N	NA
25	Moringaceae	*Moringa oleifera*	Lam.	Drumstick	Mittho Saragvo	N	NA
26	Myrtaceae	*Syzygium cumini*	(L.) Skeels	Jamun	Jambu	N	NA
27	Rubiaceae	*Morinda citrifolia*	L.	Indian Mulberry	Aal	E	NA

28	Rutaceae	*Aegle marmelos*	(L.) Corrêa	Wood apple	Bili	N	NA
29	Sapindaceae	*Schleichera oleosa*	(Lour.) Merr.	Lac Tree	Kusum	N	NA
30	Sapotaceae	*Madhuca longifolia var. latifolia*	(Roxb.) A.Chev.	Indian Butter Tree	Mahudo	N	NA
31	Simaroubaceae	*Ailanthus excelsa*	Roxb.	Indian Tree of Heaven	Arduso	N	NA
32	Verbenaceae	*Tectona grandis*	L. f.	Teak	Sag	N	NA
Shrubs							
Sl no	**Family**	**Scientific name**	**Author name**	**Common name**		**Origin**	**IUCN status**
				English	**Gujarati/Hindi**		
1	Apocynaceae	*Calotropis procera*	(Aiton) Dryand.	Rubber Bush	Akdo, Nani rui	N	NA
2	Capparaceae	*Capparis sepiaria*	L.	Wild Caper Bush	Kalo kantharo	N	NA
3	Cucurbitaceae	*Cucumis sativus*	L.	Cucumber	Keshar	N	NA
4	Euphorbiaceae	*Croton bonplandianus*	Baill.	Ban tulsi	Kala Bhangra	N	NA
5	Euphorbiaceae	*Euphorbia neriifolia*	L.	Indian Spurge Tree	Thor	N	NA
6	Euphorbiaceae	*Ricinus communis*	L.	Castor oil plant	Aerendiyo	N	NA
7	Leguminosae	*Abrus precatorius*	L.	Coral bead vine	Chanothi	N	NA
8	Leguminosae	*Prosopis juliflora*	(Sw.) DC.	Algaroba	Gandobaval	E	NA
9	Lythraceae	*Lawsonia inermis*	L.	Henna	Mendi	N	NA
10	Malvaceae	*Abutilon pannosum*	(G.Forst.) Schltdl.	Ragged mallow	Khapat	N	NA
11	Rhamnaceae	*Ziziphus nummularia*	(Burm.f.) Wight & Arn.	Jhar Beri	Chania bor	N	NA
12	Rhamnaceae	*Ziziphus xylopyrus*	(Retz.) Willd.	Kath ber	Ghat bor	N	NA
13	Verbenaceae	*Lantana camara*	L.	Lantana	Gandhari	E	NA
Herbs							
1	Acanthaceae	*Blepharis integrifolia*	(L.f.) E.Mey. & Drège ex Schinz	Narrow-Leaf Blepharis	Rankklits	N	NA
2	Acanthaceae	*Elytraria acaulis*	(L.f.) Lindau	Asian Scalystem	Shat muli	N	NA
3	Amaranthaceae	*Alternanthera paronychioides*	A.St.-Hil.	Smooth Chaff Flower		E	NA
4	Amaranthaceae	*Amaranthus viridis*	L.	Pigweed	jungali chaulayi	N	NA
5	Amaranthaceae	*Chenopodium album*	L.	Bathua	Bathavo	N	NA
6	Apocynaceae	*Hemidesmus indicus*	(L.) R. Br. ex Schult.	Indian Sarsaparilla	Anantamul	N	NA
7	Asteraceae	*Sphaeranthus indicus*	L.	East Indian Globe Thistle	Gorakhmundi	N	LC
8	Asteraceae	*Blumea eriantha*	DC.	wool-flower blumea	Kapurio	N	NA
9	Asteraceae	*Cyanthillium cinereum*	(L.) H.Rob.	Little ironweed	Sahadevi	E	NA
10	Asteraceae	*Blumea viscosa*	(Mill.) V.M.Badillo	Sticky Blumea		N	NA
11	Asteraceae	*Echinops echinatus*	Roxb.	Gokhru	Shulio	N	NA

12	Asteraceae	*Pentanema indicum*	(L.) Ling	Sonkadi	Bichhloo	N	NA
13	Asteraceae	*Tridax procumbens*	(L.) L.	Tridax daisy	Pardesi Bhangro	E	NA
14	Boraginaceae	*Coldenia procumbens*	L.	Creeping coldenia	Okhrad	N	NA
15	Convolvulaceae	*Convolvulus arvensis*	L.	Field Bindweed	Nari vel	N	NA
16	Cyperaceae	*Kyllinga bulbosa*	P.Beauv.	White Water Sedge		N	LC
17	Euphorbiaceae	*Euphorbia hirta*	L.	Asthama Weed	Bara dudhi	N	NA
18	Lamiaceae	*Ocimum basilicum*	L.	Basil	Maruo	N	NA
19	Leguminosae	*Clitoria ternatea*	L.	Butterfly Pea	Garni	N	NA
20	Leguminosae	*Indigofera linnaei*	Ali	Birdsville Indigo	Leel	N	NA
21	Leguminosae	*Rhynchosia minima*	(L.) DC.	Memnonia Snoutbean	Nahnikamalvel	N	LC
22	Leguminosae	*Senna tora*	(L.) Roxb.	Stinking Cassia	Pochandio	N	NA
23	Leguminosae	*Tephrosia purpurea*	(L.) Pers.	Common tephrosia	ghodakan	N	NA
24	Malvaceae	*Abelmoschus manihot*	(L.) Medik.	Sweet Hibiscus	Kantalo bhende	N	NA
25	Malvaceae	*Abutilon theophrasti*	Medik.	Buttonweed	Bhony kanskai	N	NA
26	Malvaceae	*Sida cordifolia*	L.	Heart leaf sida	Kharenti	N	NA
27	Malvaceae	*Sida rhombifolia*	L.	Cuban jute	Khetraubat-atibala	N	NA
28	Marsileaceae	*Marsilea quadrifolia*	L.	Four Leaf Clover		E	LC
29	Menispermaceae	*Cissampelos pareira*	L.	Velvet Leaf	Pahadvel	E	NA
30	Molluginaceae	*Glinus lotoides*	L.	Lotus Sweetjuice	Mitho Okharad	N	NA
31	Molluginaceae	*Glinus oppositifolius*	(L.) Aug.DC.	Jima	Gholo Ohkrad	N	NA
32	Nelumbonaceae	*Nelumbo nucifera*	Gaertn.	Lotus	Motunkamal	N	NA
33	Nyctaginaceae	*Boerhavia diffusa*	L.	Punarnava	Nano vasedo	N	NA
34	Nyctaginaceae	*Bougainvillea spectabilis*	Willd.	Great Bougainvillea	Boganvel	E	NA
35	Papaveraceae	*Argemone mexicana*	L.	Satyanashi	Darudi	E	NA
36	Poaceae	*Alopecurus nepalensis*	Trin. ex Steud.	Nepal Foxtail Grass	Kang	N	NA
37	Poaceae	*Cynodon dactylon*	(L.) Pers.	Bermuda grass	Darbh	N	NA
38	Poaceae	*Desmostachya bipinnata*	(L.) Stapf	Daabh	Dabh	N	LC
39	Poaceae	*Eragrostis amabilis*	(L.) Wight & Arn.	Japanese lovegrass	Limor	N	NA
40	Polygonaceae	*Polygonum plebeium var. brevifolia*	R.Br.	Small Knotweed	Zinako Okhrad	N	NA
41	Polygonaceae	*Polygonum plebeium var. plebium*		Small Knotweed	Machechi		
42	Portulacaceae	*Portulaca oleracea*	L.	Purslane	Ghol Kotbo	N	NA

Fauna

Common Name	Scientific Name	Authority	Family	IUCN Status	WPA Schedule	CITES appendix	Migration Status
Avifauna							
African Comb Duck	*Sarkidiornis melanotos*	(Pennant, 1769)	Anatidae	LC	IV	II	R
Ashy prinia	*Prinia socialis*	(Sykes, 1832)	Cisticolidae	LC	-	-	R
Ashy-crowned Sparrowlark	*Eremopterix griseus*	(Scopoli, 1786)	Alaudidae	LC	IV	-	R
Asian Brown Flycatcher	*Muscicapa dauurica*	(Pallas, 1811)	Muscicapidae	LC	IV	-	WV
Asian koel	*Eudynamys scolopaceus*	(Linnaeus, 1758)	Cuculidae	LC	IV	-	R
Asian Openbill	*Anastomus oscitans*	(Boddaert, 1783)	Ciconiidae	LC	-	-	R
Asian Palm Swift	*Cypsiurus balasiensis*	(Gray, 1829)	Apodidae	LC	-	-	R
Bank Myna	*Acridotheres ginginianus*	(Latham, 1790)	Sturnidae	LC	IV	-	R
Barn Swallow	*Hirundo rustica*	(Linnaeus, 1758)	Hirundinidae	LC	-	-	WV
Baya Weaver	*Ploceus philippinus*	(Linnaeus, 1766)	Ploceidae	LC	-	-	R
Black Drongo	*Dicrurus macrocercus*	(Vieillot, 1817)	Dicruridae	LC	IV	-	R
Black-hooded Oriole	*Oriolus xanthornus*	(Linnaeus, 1758)	Oriolidae	LC	IV	-	R
Black-rumped Flameback	*Dinopium benghalense*	(Linnaeus, 1758)	Picidae	LC	IV	-	R
Blyth's reed-warbler	*Acrocephalus dumetorum*	(Blyth, 1849)	Acrocephalidae	LC	-	-	WV
Brahminy Starling	*Sturnia pagodarum*	(Gmelin, 1789)	Sturnidae	LC	IV	-	R
Cattle Egret	*Bubulcus ibis*	(Linnaeus, 1758)	Ardeidae	LC	IV	-	R
Common Babbler	*Argya caudata*	(Dumont, 1823)	Leiotrichidae	LC	IV	-	R
Common Iora	*Aegithina tiphia*	(Linnaeus, 1758)	Aegithinidae	LC	IV	-	R
Common Myna	*Acridotheres tristis*	(Linnaeus, 1766)	Sturnidae	LC	IV	-	R
Common Quail	*Coturnix coturnix*	(Linnaeus, 1758)	Phasianidae	LC	IV	-	R
Common Tailorbird	*Orthotomus sutorius*	(Pennant, 1769)	Cisticolidae	LC	-	-	R
common Woodshrike	*Tephrodornis pondicerianus*	(Gmelin, 1789)	Vangidae	LC	-	-	R
Coppersmith Barbet	*Psilopogon haemacephalus*	(Müller, 1776)	Megalaimidae	LC	IV	-	R

Eurasian collared Dove	*Streptopelia decaocto*	(Frivaldszky, 1838)	Columbidae	LC	IV	-	R
Golden-fronted leafbird	*Chloropsis aurifrons*	(Temminck, 1829)	Chloropseidae	LC	-	-	R
Green bee-eater	*Merops orientalis*	(Latham, 1802)	Meropidae	LC	-	-	R
House Crow	*Corvus splendens*	(Vieillot, 1817)	Corvidae	LC	V	-	R
House sparrow	*Passer domesticus*	(Linnaeus, 1758)	Passeridae	LC	-	-	R
Indian Golden Oriole	*Oriolus kundoo*	(Sykes, 1832)	Oriolidae	LC	IV	-	R
Indian Jungle Crow	*Corvus macrorhynchos*	(Wagler, 1827)	Corvidae	LC	-	-	R
Indian peafowl	*Pavo cristatus*	(Linnaeus, 1758)	Phasianidae	LC	I	III	R
Indian Pond Heron	*Ardeola grayii*	(Sykes, 1832)	Ardeidae	LC	IV	-	R
Indian robin	*Saxicoloides fulicatus*	(Linnaeus, 1766)	Muscicapidae	LC	-	-	R
Indian Roller	*Coracias benghalensis*	(Linnaeus, 1758)	Coraciidae	LC	IV	-	R
Indian Silverbill	*Euodice malabarica*	(Linnaeus, 1758)	Estrildidae	LC	IV	-	R
Intermediate Egret	*Ardea intermedia*	(Wagler, 1829)	Ardeidae	LC	IV	-	R
Jungle Babbler	*Turdoides striata*	(Dumont, 1823)	Leiotrichidae	LC	IV	-	R
Large Grey Babbler	*Argya malcolmi*	(Sykes, 1832)	Leiotrichidae	LC	IV	-	R
Laughing Dove	*Streptopelia senegalensis*	(Linnaeus, 1766)	Columbidae	LC	IV	-	R
Little Cormorant	*Microcarbo niger*	(Vieillot, 1817)	Phalacrocoracidae	LC	IV	-	R
Little Egret	*Egretta garzetta*	(Linnaeus, 1766)	Ardeidae	LC	IV	-	R
Little Grebe	*Tachybaptus ruficollis*	(Pallas, 1764)	Podicipedidae	LC	IV	-	R
Oriental Honey-buzzard	*Pernis ptilorhynchus*	(Temminck, 1821)	Accipitridae	LC	-	II	R
Oriental Magpie-robin	*Copsychus saularis*	(Linnaeus, 1758)	Muscicapidae	LC	-	-	R
Oriental white-eye	*Zosterops palpebrosus*	(Temminck, 1824)	Zosteropidae	LC	-	-	R
Pied Kingfisher	*Ceryle rudis*	(Linnaeus, 1758)	Alcedinidae	LC	IV	-	R
Plain prinia	*Prinia inornata*	(Sykes, 1832)	Cisticolidae	LC	-	-	R
Plum-headed Parakeet	*Psittacula cyanocephala*	(Linnaeus, 1766)	Psittacidae	LC	IV	II	R
Purple Sunbird	*Cinnyris asiaticus*	(Latham, 1790)	Nectariniidae	LC	IV	-	R
Purple-rumped Sunbird	*Leptocoma zeylonica*	(Linnaeus, 1766)	Nectariniidae	LC	IV	-	R
Red-collared Dove	*Streptopelia tranquebarica*	(Hermann, 1804)	Columbidae	LC	IV	-	R
Red-naped Ibis	*Pseudibis papillosa*	(Temminck, 1824)	Threskiornithidae	LC	IV	-	R

Red-vented Bulbul	*Pycnonotus cafer*	(Linnaeus, 1766)	Pycnonotidae	LC	IV	-	R
Red-wattled Lapwing	*Vanellus indicus*	(Boddaert, 1783)	Charadriidae	LC	-	-	R
Rock Bush Quail	*Perdicula argoondah*	(Sykes, 1832)	Phasianidae	LC	IV	-	R
Rock Dove	*Columba livia*	(Gmelin, 1789)	Columbidae	LC	-	-	R
Rose-ringed parakeet	*Psittacula krameri*	(Scopoli, 1769)	Psittacidae	LC	IV	NC	R
Rufous Treepie	*Dendrocitta vagabunda*	(Latham, 1790)	Corvidae	LC	-	-	R
Rufous-tailed Lark	*Ammomanes phoenicura*	(Franklin, 1831)	Alaudidae	LC	IV	-	R
Shikra	*Accipiter badius*	(Gmelin, 1788)	Accipitridae	LC	-	II	R
Small Minivet	*Pericrocotus cinnamomeus*	(Linnaeus, 1766)	Campephagidae	LC	IV	-	R
Southern coucal	*Centropus sinensis*	(Stephens, 1815)	Cuculidae	LC	-	-	R
Streak-throated Swallow	*Petrochelidon fluvicola*	(Blyth, 1855)	Hirundinidae	LC	-	-	R
Thick-billed flowerpecker	*Dicaeum agile*	(Tickell, 1833)	Dicaeidae	LC	IV	-	R
Tickell's Blue flycatcher	*Cyornis tickelliae*	(Blyth, 1843)	Muscicapidae	LC	IV	-	R
Whiskered tern	*Chlidonias hybrida*	(Pallas, 1811)	Laridae	LC	-	-	WV
White-breasted Waterhen	*Amaurornis phoenicurus*	(Pennant, 1769)	Rallidae	LC	-	-	R
White-browed Bulbul	*Pycnonotus luteolus*	(Lesson, 1841)	Pycnonotidae	LC	IV	-	R
White-browed Fantail	*Rhipidura aureola*	(Lesson, 1830)	Rhipiduridae	LC	-	-	R
White-browed Wagtail	*Motacilla maderaspatensis*	(Gmelin, 1789)	Motacillidae	LC	-	-	R
White-eared Bulbul	*Pycnonotus leucotis*	(Gould, 1836)	Pycnonotidae	LC	IV	-	R
white-spotted fantail	*Rhipidura albogularis*	(Lesson, 1832)	Rhipiduridae	LC	-	-	R
White-breasted Kingfisher	*Halcyon smyrnensis*	(Linnaeus, 1758)	Alcedinidae	LC	IV	-	R
Wire-tailed Swallow	*Hirundo smithii*	(Leach, 1818)	Hirundinidae	LC	-	-	R
Yellow-eyed Babbler	*Chrysomma sinense*	(Gmelin, 1789)	Sylviidae	LC	IV	-	R
Black-headed Ibis	*Threskiornis melanocephalus*	(Latham, 1790)	Threskiornithidae	NT	IV	-	R
Black-winged Kite	*Elanus caeruleus*	(Desfontaines, 1789)	Accipitridae	LC	-	II	R
Indian Thick-knee	*Burhinus indicus*	(Salvadori, 1865)	Burhinidae	LC	IV	IV	R
Greater Flamingo	*Phoenicopterus ruber*	-	Phoenicopteridae	LC	IV	II	R
Eurasian Spoonbill	*Platalea leucorodia*	-	Threskiornithidae	LC	I	II	R

Asian Openbill Stork	*Anastomus oscitans*	-	Ciconiidae	LC	IV	II	R
Painted Stork	*Mycteria leucocephala*	-	Ciconiidae	NT	IV	II	R
		-					

Butterflies

Common Name	**Scientific Name**	**Authority**	**Family**	**IUCN Status**	**WPA Schedule**	**CITES appendix**
Blue Pansy	*Junonia orithya*	(Linnaeus, 1758)	Nymphalidae	-	-	-
Common emigrant	*Catopsilia pomona*	(Fabricius, 1775)	Pieridae	-	-	-
Common Grass yellow	*Eurema hecabe*	(Linnaeus, 1758)	Pieridae	-	-	-
Common Gull	*Cepora nerissa*	(Fabricius, 1775)	Pieridae	-	-	-
Crimson tip	*Colotis danae*	(Fabricius, 1775)	Pieridae	-	-	-
Dark cerulean	*Jamides bochus*	(Stoll, 1782)	Lycaenidae	-	-	-
Gram blue	*Euchrysops cnejus*	(Fabricius, 1798)	Lycaenidae	-	II	-
Grass Demon	*Udaspes folus*	(Cramer, 1775)	Hesperiidae	-	-	-
Lesser Grass Blue	*Zizina otis*	(Fabricius, 1787)	Lycaenidae	-	-	-
Lime swallowtail	*Papilio demoleus*	(Linnaeus, 1758)	Papilionidae	-	-	-
Pioneer	*Belenois aurota*	(Fabricius, 1793)	Pieridae	-	-	-
Plain tiger	*Danaus chrysippus*	(Linnaeus, 1758)	Nymphalidae	-	-	-
Psyche	*Leptosia nina*	(Fabricius, 1793)	Pieridae	-	-	-
Common Pierrot	*Castalius rosimon*	(Fabricius, 1775)	Lycaenidae	-	-	-
Striped Pierrot	*Tarucus nara*	(Kollar, 1848)	Lycaenidae	-	-	-
Silverline	*Spindasis vulcanus*	(Fabricius, 1775)	Lycaenidae	-	-	-
Small Cupid	*Chilades parrhasius*	(Fabricius, 1793)	Lycaenidae	-	-	-
Spotless Grass Yellow	*Eurema laeta*	(Boisduval, 1836)	Pieridae	-	-	-
Striped Tiger	*Danaus genutia*	(Cramer, 1779)	Nymphalidae	-	-	-
Tawny coster	*Acraea terpsicore*	(Linnaeus, 1758)	Nymphalidae	-	-	-
Yellow orange tip	*Ixias pyrene*	(Linnaeus, 1764)	Pieridae	-	-	-

Zebra Blue	*Leptotes plinius*	(Fabricius, 1793)	Lycaenidae	-	-	-
Reptiles & Amphibians						
Common Name	**Scientific Name**	**Authority**	**Family**	**IUCN Status**	**WPA Schedule**	**CITES appendix**
Brahminy Skink	*Eutropis carinata*	(Schneider, 1801)	Scincidae	LC		
Indian Garden Lizard	*Calotes versicolor*	(Daudin, 1802)	Agamidae	-	-	-
Indian Monitor Lizard	*Varanus bengalensis*	(Daudin, 1802)	Varanidae	LC	I	I
Rat Snake	*Ptyas mucosa*	(Linnaeus, 1758)	Colubridae	-	II	-
Rock Agama	*Psammophilus blanfordanus*	(Stoliczka, 1871)	Agamidae	LC	-	-
Common Skittering Frog	*Euphlyctis cyanophlyctis*	(Schneider, 1799)	Dicroglossidae	LC	-	-
Indian Bullfrog	*Hoplobatrachus tigerinus*	(Daudin, 1802)	Dicroglossidae	LC	IV	II
Common Indian Tree Frog	*Polypedates maculatus*	(Gray, 1830)	Rhacophoridae	LC	-	-
Mammals						
Common Name	**Scientific Name**	**Authority**	**Family**	**IUCN Status**	**WPA Schedule**	**CITES appendix**
Five Striped Squirrel	*Funambulus pennantii*	(Wroughton, 1905)	Sciuridae	LC	IV	-
Grey Mongoose	*Herpestes edwardsii*	(E. Geoffroy Saint-Hilaire, 1818)	Herpestidae	LC	II	III
Northern Plains Langur	*Semnopithecus entellus*	(Dufresne, 1797)	Cercopithecidae	LC	II	I
Indian Hare	*Lepus nigricollis*	(F. Cuvier, 1823)	Leporidae	LC	IV	-

ANNEXURE V: OHS RISKS DURING VARIOUS SUBPROJECT PHASES

OHS Risks due to Pre-construction/ Construction Activities

Inherent risk during construction like fatal accidents, fire, explosion, falling from height, occupational injuries, excavation, welding, material shifting, Loading/unloading are discussed in this report and relevant mitigation measures are also suggested.

Some of the common risks during operation phase of the project, risk of fire, explosion due to LPG (if used in labour camps, canteen / kitchen on site), traffic fatal accidents, Industrial accident due to Manmade & natural calamities.

Transportation

Transportation for sourcing construction material will be required. Trucks and other vehicular movement may lead to risk of accidents and Hazards created by Air, Dust & Noise pollution. This will not only affect workman but also residents of nearby settlements. Qualitative hazards with control measure are stated in ***Table 51***.

Table 53: Construction Stage OHS Risks

Sl. No	Activity	Hazards	Likelihood/ Consequence	Control Measures
1	Raw material Stone		D	1) Work as per Safe operating Procedures 2) Use of PPE/PPA 3) Avoid Manual operation 4) Safety supervision / communication
	Crusher- coarse		C	
	Aggregate and fine aggregate capacity		C	
	Truck load 12MT		C	
2	Transportation	Road accidents	C	1) Follow strict Motor Vehicle Rules 2)PPE/PPA/First aid Box/Communication 3) Proper planning for avoiding Traffic congestion 4) Authorized & Trained Driver 5) During unloading using fluorescent coloured high visibility apparel. 6) Truck/ tipper floor Checks 7) Visual and auditory contact of the road worker
	Crusher to site	Dust evolution	D	
	Tipper/Trucks	Spillage on road	D	
3	Unloading / spreading	Fatal accident	C	1) Permanent right-of-way to provide room for materials 2) Use of PPE/PPA/ Barricade / Safety sign display on Road / Caution board Display
	Levelling	Body injury	D	
4	Site Clearance/ Borrow Pits/ Quarrying using (a)Wheeled and crawler tractors, loaders and dozers. (b) Motor graders and scrapers. (c) Self-propelled rollers and compactors	Fatal Operators may get killed in machine roll-overs	B	1)Roll-over protective structure and a seatbelt to restrain the operator 2) Provide a supplementary steering system 3) Valid approval for operating nuclear gauge from the appropriate authority

Sl. No	Activity	Hazards	Likelihood/ Consequence	Control Measures
5	Earth work	falling or sliding material or article from any bank or side of such excavation	D	1) Provide adequate piling and bracing against such bank or side 2) Provide adequate shoring 3) Excavated material not to store at least 0.65 m from the edge of an open excavation or trench 4)Provide metal ladders, staircases or ramps
6	Movement of trucks numbers 50 – 500	Fall over Tip Head	C	1)A protective beam or timber baulk should be used. 2) Back under the control of a signalman
7	Bulldozers	1) Fatal Accident 2) Injuries 3) Dusty environment 4) High Noise hazards	C	1) Avoid side hill travel 2) Avoid obstacles such as rocks or logs 3)Avoid overhanging material to fall due to vibration/ Load 4) Do not work alone in deep water
8	Excavators	1) Fatal Accident 2) Injuries 3) Dusty environment 4) High Noise hazards	C	1) When excavating trenches, place the excavated material at least 600 mm clear of the edge[49] 2) Avoid swinging your boom downhill any further than necessary 3) Maintain Stability, Watch boom clearance when travelling, Avoid jerky swings or sudden braking
9	Backhoe loader	1) Fatal Accident 2) Injuries 3) Dusty environment 4) High Noise hazards	C	1) Operate the backhoe from the correct area, never from the ground. 2) When operating on a slope, swing load uphill to dump 3) Select a level site While Parking 4) Lower bucket and backhoe to ground and block wheels 5) Engage parking brake, remove ignition key (parking)
10	Motor Grader	1) Fatal Accident 2) Toppled down 3) Physical Injury	C	1) Give the right-of-way to loaded vehicles 2) Drive at a slow speed in congested areas 3) Remove ignition key when leaving grader. 4) Ground the blade when leaving grader unattended. 5) Use coloured flags at each end of mouldboard when blading. 6) Shift blade to centre and lock it when parking.
11	Smooth wheeled tandem roller	1) Fatal Accident 2) Injuries 3) Dusty environment 4) High Noise hazards	C	1) Examine edges for soft Spots before starting work. 2) Avoid gear changes on steep sections 3) Park on the flat
12	Vibratory Roller	1) Fatal Accident 2) Injuries 3) Dusty environment 4) High Noise hazards	C	1)Use Rollover Protection safety when the machine is operated over unsafe ground 2) Use a three-point approach when entering or exiting the roller.
13	Surface courses	1) Accident.	C	1)Use proper safety equipment

49 NHAI Safety Manual July 2012 Para 4.4

Sl. No	Activity	Hazards	Likelihood/ Consequence	Control Measures
		2)Fire, severe burns, Eye Injury, 2)Inhalation of Toxic gases		2) Avoid wear rings, wristwatches, jewellery, lose or hanging apparel 3) Keep away from the machine's articulation area when the engine is running.

Note: A-Remote, B- Unlikely, C- Likely, D- Highly likely, E-Near certainty

Site excavation work

Major work during initial project phases is to level project area & provide Pipeline for water supply, Natural Drainage system, sewer lines, AWC, cables and main trunk road development. Thus, major excavation work will be required to be undertaken, as per Concept Plan.

Site excavation Risk:

- A person falling into an excavation
- A person being trapped by the collapse of an excavation
- A person working in an excavation being struck by a falling thing
- A person working in an excavation being exposed to an airborne contaminant.

To manage the risks, all relevant matters must be considered including: i) The nature of the excavation ii) The method of the excavation work, including the range of possible methods of carrying out the work

The means of entry into and exit from the excavation to be restricted/ regulated, hard barricading, cordoning etc,

Identifying the Excavation Hazards

The first step in the risk management process is to identify the hazards associated with excavation work. Examples of excavation specific hazards include:

Underground essential services including gas, water, sewerage, telecommunications

- Electricity lines - Underground services network not found as being placed on ground.
- Any storage tanks, in and adjacent to the workplace, must be established before
- Directing or allowing excavation work, Controlled by site engineer through Site supervisor
- The fall or dislodgement of earth or rock
- Falls from one level to another
- Falling objects
- Inappropriate placement of excavated materials, plant or other loads
- The instability of any adjoining structure caused by the excavation
- Any previous disturbance of the ground including previous excavation
- The instability of the excavation due to persons or plant working adjacent to the excavation
- Hazardous atmosphere in an excavation – To be checked before work vibration and hazardous noise from Excavators & Overhead essential services (power lines) and ground mounted essential services – During visit, HT/LT overhead lines noticed in proposed plot area.

Factors for suitable control measures

Excavating plan - when quantities are large, it may be effective to use for the various materials to be excavated.

Stockpiling arrangements – Proper site may need to be found for temporary stockpiling of materials. Materials should not dissolve and drained during Monsoon leading to water pollution

Material placement - The methods and plant used for excavating, transporting and compacting the material should be evaluated.

Dewatering equipment, if required, and the system to be used, transport of the excavated material - the type of plant used, length of haul, the nature of the haul route, and the conditions of tipping and/or spreading.

For Excavation planning to minimize functional Risk to workers and society following steps are required:

- Study nature and/or condition of the ground and/or working environment
- Predict weather conditions
- Consider nature of the work and other activities that may affect health and safety
- Calculate static and dynamic loads near the excavation
- Storm Water Management System
- Vibration
- Select proper type of equipment used for excavation work
- Plan for public safety
- Go through existing services and their location
- The length of time the excavation is to remain open
- Provision of adequate facilities
- Procedures to deal with emergencies

Table 54: Common hazards associated with excavation work and examples of control measures

Potential hazards	***Examples of control measures***
Ground collapse	The use of benching or the installation of ground support (e.g. shoring)
Water inrush	Pumps or other dewatering systems to remove water and prevent build-up
Hazardous manual task	Ramps, steps or other appropriate access into the excavation
Airborne contaminants	Rotating tasks between workers
Working underground or in closed structures	Appropriate ventilation arrangements shall be provided
Underground services	Obtain information from the relevant authorities on the location of underground services.

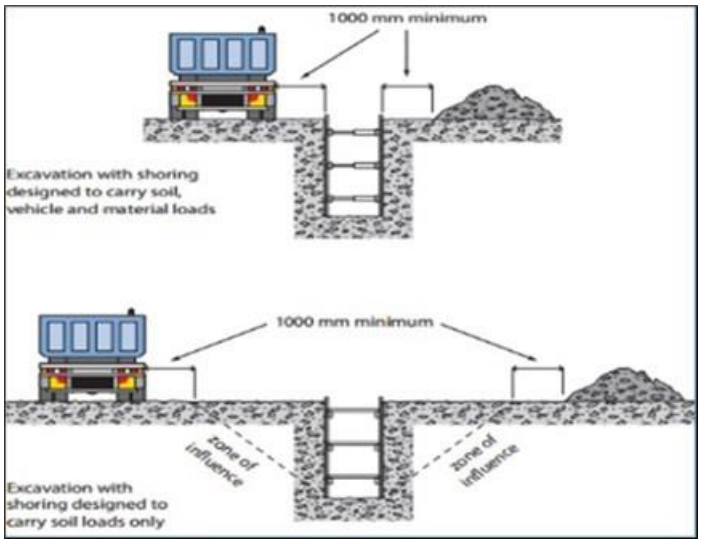


Figure 39: Safety Precautions in Excavations

Figure 38 shows an excavation with shoring that has been designed to carry vehicle and material loads. This may be required where there is limited space around the excavation for vehicle movement and /or material storage. An excavation with shoring that has been designed only to carry the load of the excavated faces and the related zone of influence.

Any material will add a load to the area where it is placed. It is important that materials are not placed or stacked near the edge of any excavation as this would put persons working in the excavation at risk. For example, the placement of material near the edge of an excavation may cause a collapse of the side of the excavation.

To reduce the risk of ground collapse, excavated or loose material should be stored away from the excavation. Excavated material should be placed outside the zone of influence. Alternatively, a ground support system should be designed and installed to carry the additional loads, including any ground water pressures, saturated soil conditions and saturated materials.

Mobile plant operator blind spots

Powered mobile plant operating near ground personnel or other powered mobile plant should be equipped with warning devices (e.g., reversing alarm and a revolving light).

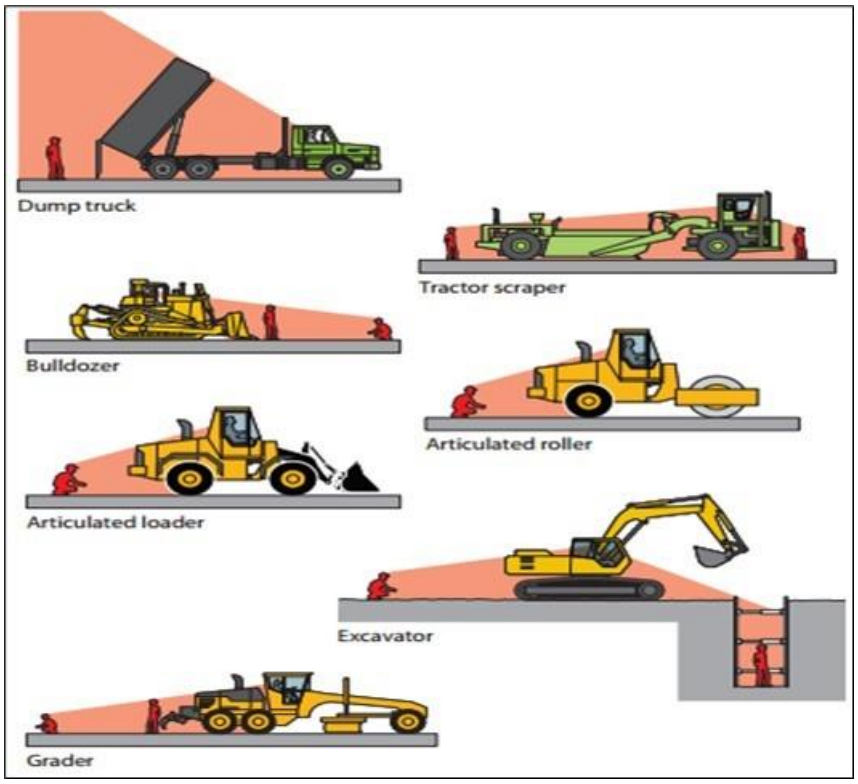


Figure 40: Mobile Plant Operator Blind Spots

An effective system of communication based on two-way acknowledgement between mobile plant operators and ground workers should be established before work commences. Relevant workers should also be trained in the procedures involved prior to the work commencing. The system should stop ground workers from approaching mobile plant until the operator has agreed to their request to approach. Similarly, the system should stop operators from moving plant closer than a set distance from ground workers until the operator has been advised by ground workers that they are aware of the proposed movement.

Mobile plant operators and ground workers should be made familiar with the blind spots of particular items of plant being used. Induction training programs should emphasis the dangers of workers working near mobile plant, and adequate supervision should be provided.

Mobile plant operators and ground workers should be provided with and required to wear high-visibility clothing. ***Table 53*** presents the risk and remedial measures during the pre and post construction phase.

Table 55: OHS Risks due to various Tools and Equipment

Sl. No	Operations	Risk/Impact
1	Tower Crane	Injury, Fatal accident. Contact with High Voltage Live wires
2	Batching Plant	Accident
3	Construction/material Hoists	Personal injury Accidents
5	Portable electrical equipment pre-& post construction	Burn/fatal
6	Pressure vessels	Pressure air-Rupture

Sl. No	Operations	Risk/Impact
7	Hazardous substances paint/ thinner, waxes Plastics sheets	Fire, explosion, toxic release, Unhygienic dust.
8	Scaffolding	Fall from Height Fatal accident
9	Ladders	Accident, Injury, Fall, Slip
10	Lifts	Accidental, Injury even fatal
11	Hoists	Accidental Injury
12	Material handling cranes	Accidental Injury even fatal
13	Rigging during erection work of STP	Accidental Injury
14	Using tools/equipment with moving part(s)	Nipping Injury to hand Electrical Shocks, Leg Injury
15	Using tools/ equipment that vibrate Electrical wiring Asbestos removal Welding	Vibration hazard Electrical shocks Asbestosis Eye, Body Burns, Toxic gases inhalation
16	Working around electrical installations/ working near traffic/ working at a height (>3m)/ Working in isolation. Working in a confined space/ demolition work	Electrical shocks, Injury Fatal accident hazard of toxic gases inhalation
17	Work environment Noise Dust/ fumes/ vapours/gases Extreme temperatures Slippery surfaces/ trip hazards Poor ventilation/ air quality A poorly designed work area for the project/ task	Accidental Injury, Occupational Hazards, Rashes Burn Skin deceases

ANNEXURE VI: DISCUSSION ON MAJOR PROPOSED/ ONGOING PROJECTS IN AHMEDABAD

Sl NO	*Project*	*Ahmedabad Metro Phase 1 and Phase 2*
1	***Proponent***	Gujarat Metro Rail Corporation Ltd (GMRC); SPV of Government of Gujarat and Government of India; earlier known as Metro-Link Express for Gandhinagar And Ahmedabad (Mega) Company Ltd.
2	***EIA /Risk Assessment***	Yes, by RITES
3	***Details***	Phase 1:

Date of Opening Phase 1	06/03/2019
Current Operational Length	6.10 Km
Current Ridership	820 Passenger/day for FY 2019-20
No. of Train	1(One)
Frequency	50 minutes
Lines operated	1 (One)
No. of Station in operation	4
Important Destinations covered by metro	Ahmedabad famous Cotton Mills near ARPK station, Ahmedabad Railway station (4.4 Km) and residential societies of Vastral Gam

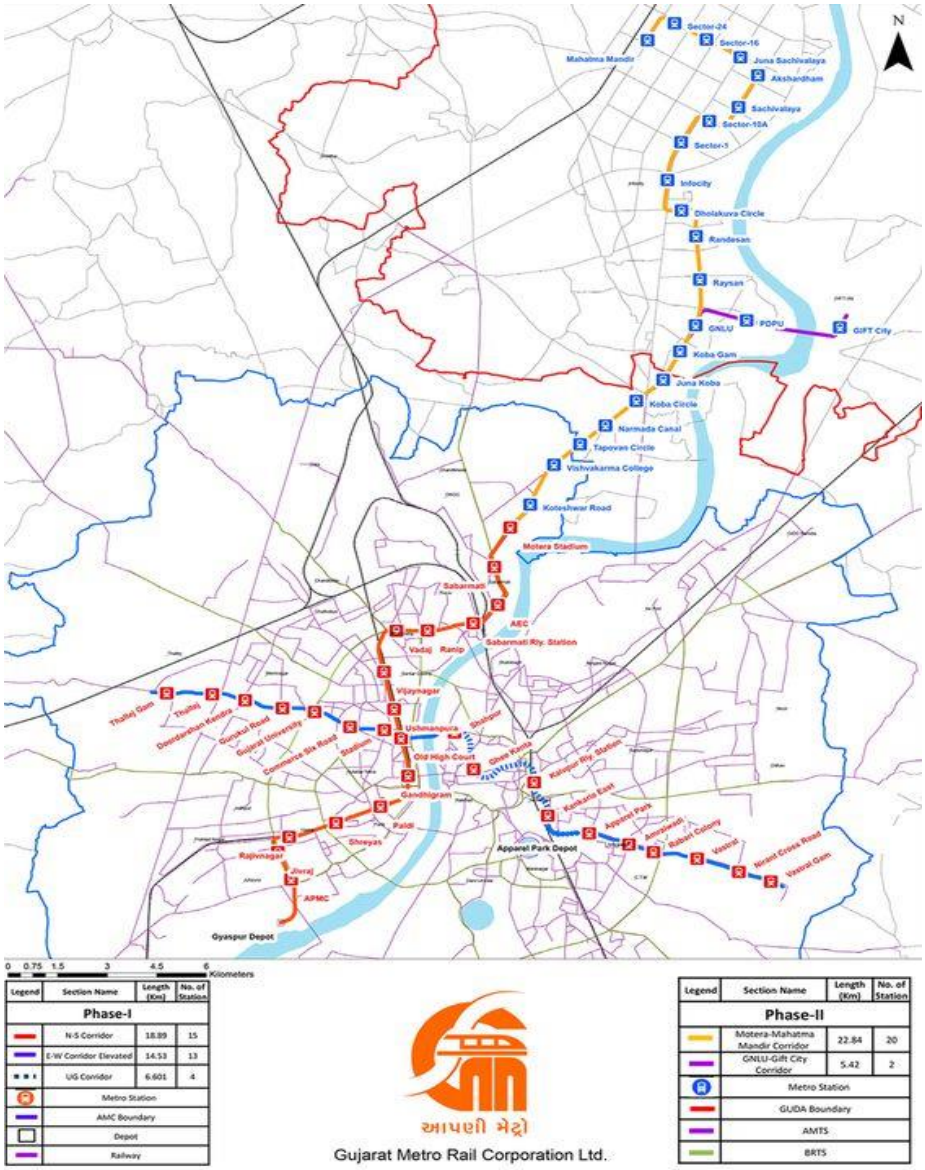
The total length of the Ahmedabad Metro Rail Project Phase-I is about 40.03 km out of which approximately 6.5 KM is underground, and the rest is elevated section. The project will connect 4 corners of the Ahmedabad city with 2 corridors and 32 stations.

The length of the East-West Corridor is about 21.16 km with 17 stations in the route. This corridor will connect Vastral Gaam to Thaltej Gaam and will be passing through Nirant Cross Road, Vastral, Rabari Colony, Amraiwadi, Apparel Park, Kankaria East, Kalupur Railway Station, Ghee Kanta, Shahpur, Old High Court, Stadium, Commerce Six Road, Gujarat University, Gurukul Road, Doordarshan Kendra, Thaltej stations. In the East-West corridor, approximately 6.5 km is the underground section with 4 underground stations and the rest is the elevated section with 13 elevated stations. Old High Court station will be an interchange station for both the corridors.

Phase 2:

Phase-2 of Ahmedabad Metro Rail Project comprises construction of 28.25 km long fully elevated corridor in 2 parts. The first part is Line-2 from Motera Stadium to Mahatma Mandir of length 22.83

		km with 20 stations while the second part is Line-3 from GNLU to GIFT City of length 5.41 km with two stations. Phase-2 received approval from Union Government in February 2019 with an estimated cost of INR 5384.17 Crores with civil construction activities started from February this year. This is expected to be complete by 2023 December.
4	***Map***	Phase 1 & 2



Legend	Section Name	Length (Km)	No. of Station
Phase-I			
	N-S Corridor	18.89	15
	E-W Corridor Elevated	14.53	13
	UG Corridor	6.601	4
	Metro Station		
	AMC Boundary		
	Depot		
	Railway		

Legend	Section Name	Length (Km)	No. of Station
Phase-II			
	Motera-Mahatma Mandir Corridor	22.84	20
	GNLU-Gift City Corridor	5.42	2
	Metro Station		
	GUDA Boundary		
	AMTS		
	BRTS		

5	***Important points for G-ACRP Subproject ESIA***	– The influence zone of 11 meter has been created as per GMRC policy. No construction shall be permitted within 5 meters from the edge of metro corridor/ station structure for the safety reasons as per GMRC NOC policy. Applicable for subprojects (STP new constructions) at Vasna – Alignment of trunk sewers along metro line to consider impacts; especially work scheduling, Occupational and Community Health and Safety, cumulative air pollution impacts – Check corridor from Koteswar to Airport; and consider impacts of Metro corridor passing near proposed Koteswar STP. Vibration, pollution. – New Metro bridge upstream o proposed Barrage for water supply to city

Sl NO	*Project*	*Smart City Project, Ahmedabad*
1	***Proponent***	Government of India and Ahmedabad Municipal Corporation
2	***EIA / Risk Assessment***	No
3	***Details***	Car parking, IT for parking, health; street lighting LED, OFC, Water supply, Anganwadi, Water & Drainage network in Ranip, Kali, STP with power plant – 100 mld; micro-tunnelling : Vadaj to Paldi, Juna Vadaj Slum Rehabilitation, Waste to Energy, BRT automated swing gates, Water SCADA, Cybersecurity, NMT, Veg supply E-Rick, GRM chatbots
4	***Map***	 
5	***Important points for G-ACRP Subproject ESIA***	– Check at subproject ESIA if any associated facility, in drainage or sewerage micro tunneling, or STP development contemporaneous to G- ACRP.

Sl NO	*Project*	*Sabarmati Riverfront Development Phase 2 From Acher – Hansol to Indira Bridge At District Ahmedabad, Gujarat*
1	***Proponent***	Ahmedabad Municipal Corporation, through its SPV Sabarmati Riverfront Development Corporation Ltd (SRFDCL)
2	***EIA /Risk Assessment***	Yes (except for newly proposed Barrage), by Kadam Enviro Group of Companies
3	***Details***	Extending existing riverfront (11 kms) to further 5 kms towards Gandhinagar, along both edges of the river Sabarmati for Rs 850 Crores (113 million USD). The newly upgraded area will have recreational facilities and pathways as in the case of existing riverfront development from Vasna Barrage to Hansol. During first phase of Riverfront development SRFDCL was provided with a seed capital of Rs. 9 crore and entrusted with the responsibility of developing the riverfront on a Build, Maintain, Operate and Transfer (BMOT) basis. The SPV model was used to avoid the delays associated with municipal decision-making. Riverbed land, which was originally held by the Government of Gujarat, was transferred to the AMC. AMC has, in turn, granted development rights to SRFDCL for this reclaimed riverbed land. Activities under Phase 2 include : 1. Construction of green embankment on both banks of the river. 2. Reclamation of approximately 108 Ha of land 3. Annual retention of water in the river 4. Development of public gardens, amenities and facilities 5. Development of wide public promenades along the entire length of river 6. Development of street network along the river for North-South connectivity 7. Development of Urban infrastructure along both the banks 8. Self-Financed mechanism for the development of the entire project

4	***Map***	
5	***Important points for G-ACRP Subproject ESIA***	– Though the location of proposed barrage (upstream of Vasna Barrage within city limits) is indicated in approved EIA, no impacts or risks identified or assessed for proposed Barrage – Disposal of treated effluent from proposed subprojects upstream of proposed barrage, or into riverfront may have health impacts considering the dead storage – New metro bridge upstream of Barrage – Safety: Vasna Barrage, Flooding

Sl NO	***Project***	***Waste to Energy Plant at Gyaspur, near Pirana***
1	***Proponent***	Ahmedabad Municipal Corporation
2	***EIA /Risk Assessment***	No
3	***Details***	Waste to Energy plant at Piplaj near Pirana, will get operational by Dec 2021. Abelleon Clean Energy is implementing this 14 MW plant on DBOT for 30 years, for a cost of 240 crore (including 8-10% for O&M annually), spread over 13 acres. Power generated from the plant will be fed into the national power grid. It will convert 1,000 metric tonnes of mixed waste into energy daily.
4	***Map***	
5	***Important points for G-ACRP Subproject ESIA***	– Pirana and Vasna areas are complexes for waste management including solid wastes and sewage. This entire area needs need comprehensive and integrated environmental management and flood /resilience approaches, considering location near Sabarmati and Earthquake Zone III. AMC has mechanisms to manage solid and mixed wastes which might also be generated during construction and operations of the subprojects

Sl NO	*Project*	*Biomining of Pirana Dumpsite*
1	***Proponent***	AMC
2	***EIA /Risk Assessment***	No
3	***Details***	Started in 2019. AMC reclaimed around 24% of the Pirana dump yard land (19 acres of the total 80 acres) by freeing it from garbage through biomining. Around 33 lakh metric tonnes of garbage have been processed and expects to remove the dump in next three years. At present, 39 trommel machine are processing about 15,000 MT of garbage daily. Construction debris and large stones, which form about 30% of the garbage, is sent to AMC C&D plant at Piplaj, Pirana for construction of paver blocks, 50% of the garbage is mud and another 20% is plastic or small clothes with plastic being almost 15%.
4	***Map***	
5	***Important points for G-ACRP Subproject ESIA***	– C&D waste from biomining is sent to C&D processing facility. AMC has made a policy to buy 25 % of Paver blocks and 50% of Manhole covers Final product of the C & D Waste processing agency in the development of different civil & infrastructures projects of AMC by the approval of competent authority. Recently, competent authority of AMC has also approved a policy of procuring Precast / Prestress wall from the agency to build compound wall for AMC's various properties. This source shall be considered in project estimates.

ANNEXURE VII: ENVIRONMENTAL AUDIT OF EXISTING VASNA 240 MLD STP, AHMEDABAD

October 2021

Prepared by

TATA CONSULTING ENGINEERS LIMITED

1. INTRODUCTION

Ahmedabad is one of the major cities in India having a population of about 5.6 million as per Census of India 2011. The city is governed by Ahmedabad Municipal Corporation (AMC) having an area of 505 sq. km. Ahmedabad city is seventh largest metropolitan city in India.

The city is located on the banks of River Sabarmati and is the administrative centre of Ahmedabad district. River Sabarmati is dividing the city in two parts i.e., Eastern and Western sides. The city is further divided in to seven zones for ease of managing the necessary Urban Infrastructure and allied facilities.

AMC has proposed list of projects which will strengthen the city's drainage and sewer lines system. Also, there is requirement of upgrading the existing STPs capacities and sewer lines in order to perform smooth functioning. AMC is exploring funding from World Bank under the Gujarat Resilient Cities Partnership: Ahmedabad City Resilience Project (G-ACRP) with an investment in the range of Rs. 3000 – Rs. 4000 Crores. Environmental & Social Impacts Assessment (ESIA) including Environmental & Social Management and Monitoring Plan (ESMP) for 30% investments in wastewater sector (USD 130mn) will be undertaken.

Objectives

The audit report is mainly focused on assessing the performance of 240 MLD STP at Vasna, Ahmedabad and its operational environmental impacts.

The objectives of audit are:

- Physical assessment of the STP and units' operation status
- Identification and assessment of environmental management practices

2. GENERAL DESCRIPTION OF 240 MLD STP AT VASNA, AHMEDABAD

AUDA had setup this 240 MLD capacity STP to treat sewage at Vasna site with four modules of 60 MLD each which now they propose to expand for future requirements. The STP is located in Vasna, the STP is spread across an area of around 35 acres.

Directions	Particulars
North	Canal, road, sewage pumping station and Ahmedabad metro depot
East	AMC STP
South	Sabarmati River
West	126 MLD AMC STP

The treatment scheme selected is based upon the aeration (Activated Sludge Process) using fine bubble diffused aeration system to provide the required oxygen and to keep the aeration contents in a completely mixed state. The 240 MLD sewage treatment plant has units as Main Distribution Chamber, Inlet Chamber, Primary Clarifier, Primary Sludge Handling Units, Secondary Clarifiers, Air Blower for Aeration, Aeration Tank, Sludge Thickeners, Sludge Recirculation Pump, Excess Sludge Pump, Digested Sludge Pump, Sludge Mixing Pump, Belt Wash Feed Pumps, Sludge Digesters, Gas Holder.

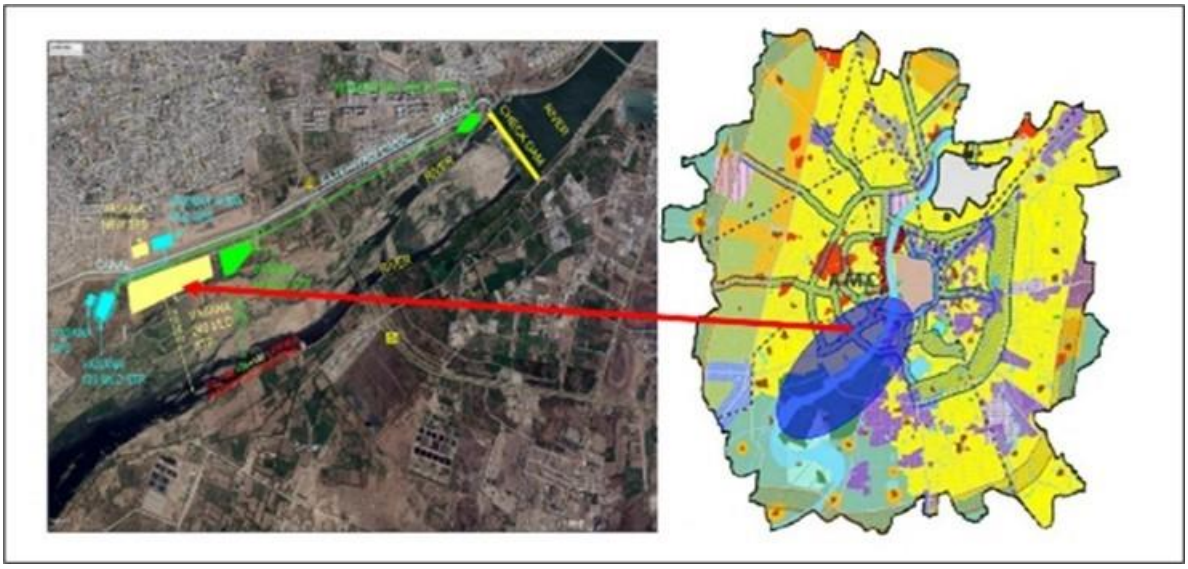
For each 60 MLD stream initially the sewage has been subjected to pre-treatment which includes removal of floating material through screen and grits with the help of grit removal mechanism. From the Inlet chamber, the sewage will overflow to 2 nos. screen channels (1 W + 1 S). Each screen channel comprising of mechanical fine bar screens has been provided for

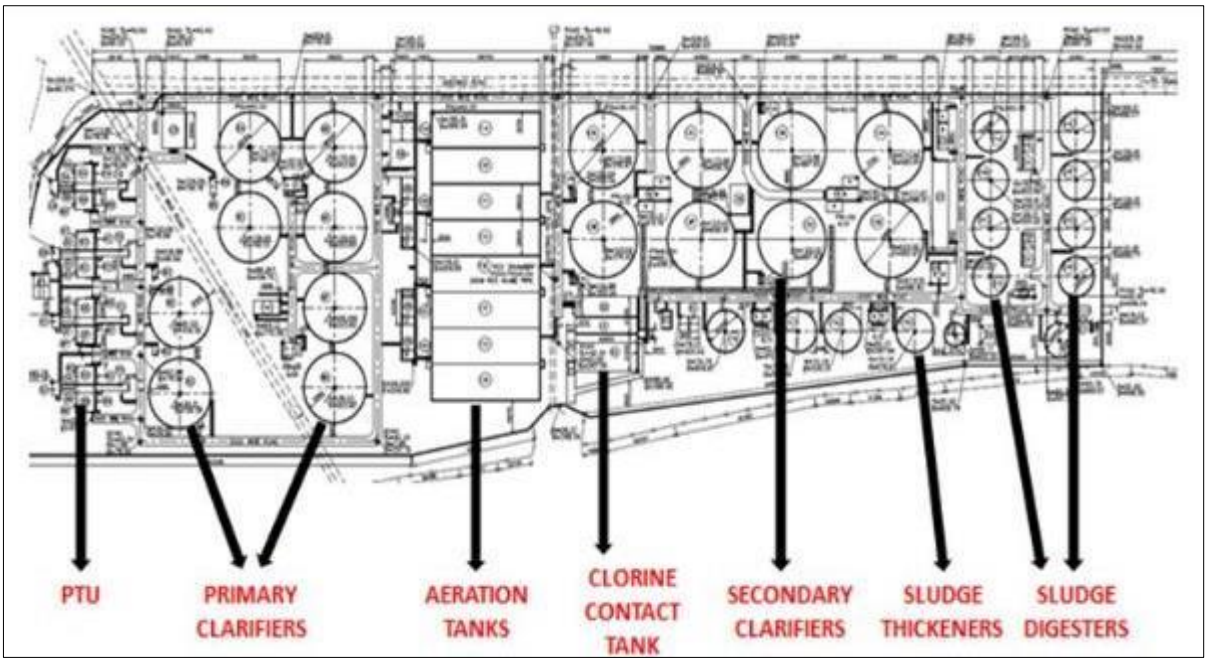
removal of floating materials in each screen channel. Mesh type screen has been provided after drum type screen for removal of residual floating material. After screening, the sewage shall flow to grit chambers (1 W + 1 S) for removal and washing of grits from the sewage. Each grit chamber shall have grit mechanism which will collect the grit and transfer the same to the discharge /collection point. Screenings from drum mechanical screens will be collected on belt conveyor and will be conveyed to wheeled trolley and after that to be disposed suitably.

Biological treatment mainly comprises of aeration chamber Division / splitter box prior to Aeration is provided to distribute primarily treated sewage water equally to 8 nos. aeration basins by means of CI gates at inlet channel to each aeration tank. Aeration will operate in parallel on cyclic activated sludge technology. Aeration biodegrades the organics present in wastewater in a single stage aeration tank. For aeration a system of air blowers & fine bubble diffusers is provided. Oxygen Uptake rate is controlled in these basins by interlocking VFD provided on air blowers with DO transmitter at each aeration basin. Biologically treated wastewater gets quiescent conditions under settling mode secondary. Here solids are settled down by gravity & settle at bottom whereas clarified water will be out to outlet channel. Return activated sludge from bottom zone is recirculated using return activated sludge pumps; 8 no's pumps.

Clarified water from Treated water channel goes to Chlorine contact tank (CCT) where Cl_2 gas is dosed using gravity type vacuum chlorinators for wastewater disinfection to bring down faecal coliform level. The disinfected / treated wastewater from Chlorine contact tank will overflow into Parshall flume to measure treated wastewater flow and finally be disposed into the River Sabarmati by gravity.

Primary sludge from Primary clarifiers 240 MLD STP is collected in sludge sump by gravity. Also, the excess activated sludge from the secondary in pumped / collected in thickener.





3. *DESIGN QUANTITY & QUALITY OF WASTEWATER:*

Below is a list of various inlet and outlet characteristics considered for the design of STP:

Design Inlet Sewage Characteristics

Sr.	Parameter	Unit	Inlet
1.	Flow	MLD	240
2.	Peak factor	-	2.25
3.	Peak flow	MLD	540
4.	BOD	mg/l	215
5.	COD	mg/l	415
6.	Suspended solids	mg/l	290
7.	pH	mg/l	6.5to8.5
8.	Total Alkalinity (asCaCO3)	mg/l	<450
9.	Chlorides	mg/l	<300
10.	Sulphates	mg/l	<200
11.	Ammoniacal Nitrogen (as N)	mg/l	<20
12.	Total Kjeldahl Nitrogen (as N)	mg/l	<30
13.	Phosphates (asP04)	mg/l	<4
14.	Oil & Grease	mg/l	<30

Design Outlet Sewage characteristics

Sr. No.	Parameter	Unit	Outlet Values
1.	BOD	mg/l	20
2.	COD	mg/l	100
3.	SS	mg/l	30
4.	pH	-	6.5 to 8.0
5.	Residual Chlorine	mg/l	0.5
6.	Fecal Coliform	MPN/100ml	1000-10000
7.	Oil & Grease	mg/l	<10

The audit represents a physical assessment of the STP and operation of the units and equipment. Along with the physical assessment, environmental aspects are also covered in this audit report.

4. PROCESS AND TREATMENT UNIT'S DESCRIPTION

As mentioned earlier, the STP is designed with ASP technology which is not functioning as per the design requirement as per the physical audit observations, other points of audit are in following sections.

The Sewage Treatment Plant comprises the following main units / equipment:

1. Inlet pipe
2. Drum Screen Unit
3. Grit Chamber and Parshall Flume
4. Primary Clarifier
5. Blowers
6. Aeration Tanks
7. Secondary Clarifier
8. Sludge Thickener
9. Digesters
10. Belt Filter Press
11. Gas Holder
12. Chlorination and chlorine contact tank (CCT)

a) Inlet Chamber

The inlet chamber is designed to take peak flow of 135 MLD of sewage. The inlet chamber has required number of puddle collars and necessary cast iron penstock gates of suitable size for flow control.

The inlet chamber receives the flow from the distribution chamber of respective module and the chamber is designed having adequate depth and free board above top water tightness of the inlet chamber has been performed.

b) Drum Screen Unit

The drum screens made of SS with diameter of 1.4m and 1.5m length and are inclined at an angle of around 35 degrees. Each screen channel is designed for a peak flow of 135 MLD. Floating impurities such as plastics, papers and other small solids are screened and conveyed through the screw which is along the centre of the drum screen.

c) Grit Chamber

Two Grit chambers each designed for 135 MLD peak flow, capable of removing grit of particle size of 0.15 mm and above and specific Gravity of 2.65. The flow from the screen channels is allowed into the grit chamber for the removal of grit matter by means of RCC square tanks each designed as per relevant IS code of practice.

The grit chamber consists of a series of vertical adjustable type fibre reinforced plastic (FRP) deflectors at the inlet as per mechanical specifications and the flow is admitted through these deflectors. The chamber is square in shape. Provision of suitable weir is made so that the flow beyond the chamber is discharged over the weir to the outlet channel. Two cast iron pen-stock gates at the inlet of each tank are provided. Grit chamber provides quiescent conditions for grit to settle at chamber bottom. To scrape the grit to chamber bottom, the scrapper mechanism is provided.

d) Primary Clarifier

After screening and Grit Chamber the wastewater goes to Primary Clarifiers for separation of solids and primary clarification. About 30% of BOD and 60% of suspended solids are expected to be removed as sludge during primary clarification. Centrally driven primary clarifier mechanism is provided to scrap the settled sludge to hopper bottom. Clarified wastewater flows in upward direction & falls into the outlet launder from V- notch.

Eight primary clarifiers are provided and each designed to handle 50% capacity. For design purpose the overflow rate considered is 30 m^3/m^2/day with a retention time of about 2.5 hours. Feed to the clarifiers is from the bottom central pier. Inlet baffles are provided to maintain proper flow conditions and reduce turbulence and short circuiting inside clarifier.

e) Aeration Tank

The primary treated sewage is designed to flow to two Aeration chambers through a splitter box, located at the inlet of aeration tank. The aeration tank equipped with air blowers, diffusers, grid piping, return activated sludge (RAS) pumps, excess sludge pumps. Inlet BOD after 5 days has been 151 (minimum), MLSS – 3000 mg/l, MLVSS - 80% of MLSS with 5 hrs retention time. Return sludge capacity is 25% to 50%.

These units treat the effluent aerobically & remove the organic load from the sewage before disposing/reusing it. Two CI penstocks are designed to divert flow equally into 2 aeration tanks.

f) Secondary Clarifier

Two secondary clarifiers are provided and each one is designed to handle 50% hydraulic load. The overflow rate considered for design is 30 MLD + flow each at average flow and 60 MLD at peak flow with a retention time of about 2.5 hours. Feed to these clarifiers is from bottom central pier. Inlet baffles are provided to maintain proper flow conditions and reduce turbulence and short circuiting.

Surface loading rate at average flow is 25 m^3/m^2/ day (max). Weir loading rate at average flow 185 m^3/ m/ day. The solid loading rate at peak flow is 210 kg /d /m^2 (Max).

g) Sludge Thickener

The sludge from primary clarifiers pumped from primary sludge sumps, excess wasted bio sludge from aeration and sludge from the secondary sumps are pumped to the sludge thickeners for thickening the sludge and reducing sludge volumes. Scraper mechanism is provided to scrap the sludge to tank bottom.

h) Sludge Digester

Eight sludge digesters are constructed for the 240 MLD STP. Biogas from each digester flows to the biogas holder.

Anaerobic digesters help reduce the volume further before the final disposal and helps recover biogas from the organic content of the sludge. They also make the sludge relatively free from objectionable odours.

i) Belt Filter Press

Six belt filter presses (4 W + 2 S) are provided with maximum of 20 m^3/hr capacity. The solids concentration of dewatered cake has been 25% by wt. dry solid basis.

Polyelectrolyte (PE) dosing is done to enhance sludge dewatering for which PE dosing tank, agitator & dosing pumps are provided. The polyelectrolyte is dosed online at the belt filter press with 0.1% solution strength. Four PE dosing tanks each suitable for 12 hours storage and equipped with turbine type slow speed mixers. Six dosing pumps (4W + 2S) are provided for online PE dosing.

j) Gas Holder

The gas holder has gas inlet and outlet piping, control valves, vacuum and pressure relief valves with flame arrestors. The CI pipeline header from the digesters feed the gas holder. All gas pipelines are provided with isolating valves and drip traps.

k) Chlorine Contact Tank (CCT)

Treated wastewater from secondary clarifiers pass through the treated water channel and enters the chlorine contact tank designed for 240 MLD flow.

Three chlorinators with 18 Chlorine tonners are provided for chlorination. One chlorinator is operational at average flow and second at peak flow while the third is a standby. Another set of 18 tonners (12 filled & 6 empty) are provided for storage.

Necessary Chlorine Safety devices such as gas leakage detector, shower & eye bath, breathing apparatus, etc are provided.

Entry to the chlorination unit is restricted to authorized personnel only. More details on chlorine handling & operational safety are available in the vendor's manual.

l) Discharge/ outlet point of STP

m) Equipment List (Civil)

Sl. No.		Unit	Dimension in m (LxBxLD+ FB)	Qty
1.		Main distribution chamber	14.225mX9.3mX1.8mLD+0.5mFB	1
2.		Inlet chamber Screen chambers - 8 nos. Mechanical + 8 nos. Manual	7.5mx5.0m x2.6mLD +0.5mFB	4
3.		Fine bar screen chamber	10.69mx2.0mx1.4mLD+0.5mFB	8(4W+4S)
4.		Inlet Chamber to grit chamber	20.8mx1.8mx1.25mLD+0.5mFB	4
5.		Grit removal chamber	10.4mx10.4m x1mLD+0.5mFB	8(4W+4S)
6.		Outlet channel to grit chamber	20.8mx1.8mx1.25mLD+0.5mFB	4
7.		Parshall flume	15mlongx3mwide	4
8.		Distribution chamber to Primary Clarifier	5.0mx3.5mx1.5mLD+0.5m FB	4
9.		Primary clarifier	39.25mDIAx3.2mSWD+0.5mFB	8
10.		Distribution chamber/splitter box to Aeration	5.0mX3.0mx1.7mLDx0.6m FB	4
11.		Aeration tank	68.75mx20mx5.0mLD+0.6m FB	8
12.		Distribution chamber for secondary clarifier	5.0mx3.6mx1.6mLD+0.5m FB	4
13.		Secondary clarifier	42.8mDIAx3.5mSWD+0.5m FB	8
14.		Chlorine Contact Tank	40.0mX21.0mX3.14mLD+0.5m FB	2
15.	a	Primary sludge sump	6.0mx2.0mx3.0mLDx2.73m FB	4
15.	b	Primary sludge pumphouse	6.0mx7.0m	4
16.		MCC–1/2/3ROOM	17.0mX8.0mX3.6m	1
17.	a	Return sludge/Sludge recirculation sump	10.0mX6.2mX5.79mLD+0.84m FB	4
16.	b	Return sludge/Sludge recirculation pumphouse	10.0mx7.0m	4
17.		Sludge thickener	23.4mDIAx3.5m SWD +0.5m FB	4
18.	a	Thickened sludge sump	6.0mx2.0mx3.02m LD +2.9m FB	4
18.	b	Thickened sludge pumphouse	6.0mx7.0m	4
19.		Dilution water sump	6.0mX4.0mX2.0m LD +0.5m FB	4
20.		Supernatant sump	10.0mX6.0mX2.6m LD+0.5m FB	1
21.		Anaerobic Sludge Digester	22m DIAx10.0m SWD +0.6mGRIT SPACE+ 0.6mFB FOR GAS STORAGE	8
22.	a	Digested sludge sump	6.9mX6.5mX2.0m LD +2.64m FB	1
22.	b	Digested sludge pumphouse	15.0mX6.5m	1
23.		Belt filter press building (FF)	51.13mX10.0m	1
23.a		PE dosing tanks & pumps (GF)	3.68mX2.75mX2.13m LD+0.5m FB	4
24.a		Belt wash water sump	12.20mX6.0mX3.6mLD+0.5mFB	1
24.		Belt wash water pumphouse	12.20mX5.0m	1

Sl. No.	Unit	Dimension in m (LxBxLD+ FB)	Qty
b			
25.	Digested mixing pumphouse	10.0mX8.0m	2
25. a	Biogas blower shed	10.0mX4.0m	1
26.	Biogas Holder	19.0mDIAX6.9m LD+ 0.5m FB	1
27.	Foundation for Flare Stack	2.25mX2.25m	2
28.	Air Blower room for Aeration	20.0mx9.0m	4
28.a	VFD room	12mx5m	1
29.	Chlorinator room	40mx11.25m	1
30.	Parshall flume in final outlet channel	28.6m longx3.0m wide	1
31.	Elevated service water reservoir	12.7mDIAx4.05m LD +0.5m FB	1
32.	Borewells	As per engg.	2
33.	Administration +Office building +conference hall +PLC/SCADA room(FF)&Lab(GF)	20.0mX15.0m (Two story)	1
34.a	Substation yard room	5.0mX10.27m	1
34.b	HT room	5.0mX4.50m	1
34.c	LTPCC room	15.0mX9.805m	1
35.	Transformer yard	11.00mX7.50m	1
36.	MCC–4/5/6Room	12.0mX17.0mX3.6m	1

5. AUDIT FINDINGS AND ENVIRONMENTAL MONITORING PLAN

It is informed by the O&M contractor that the treated sewage sampling is being analysed by third party monitoring agency every month, but the reports were not available with the contractor during the time of audit site visit, it is told that the reports are available with Ahmedabad Municipal Corporation.

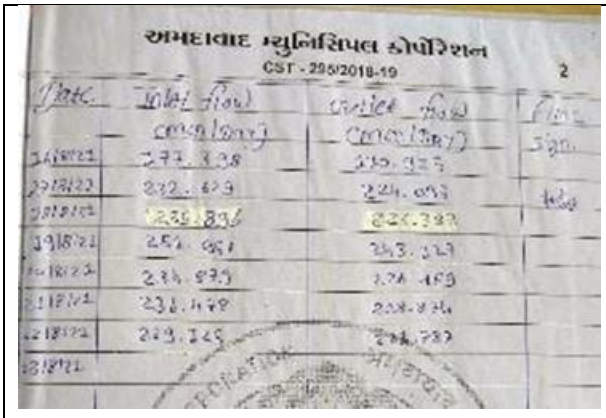
Sampling

There is in-house laboratory present at the STP. Most of the apparatus are not calibrated and some of apparatus are non-functional. Sampling is being carried out on the available equipment's.

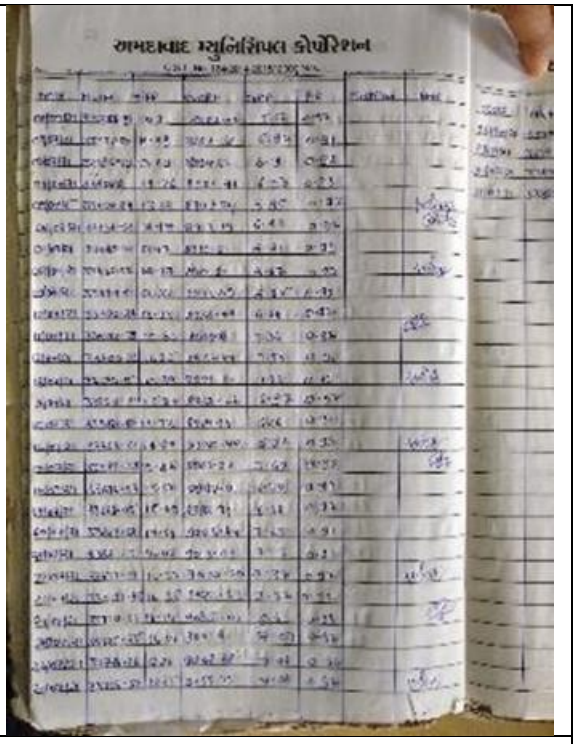
Records/ Logs

Records like flow measurement, power consumption, corrective and preventive maintenance are being maintained manually. Some of the records are produced are as under.

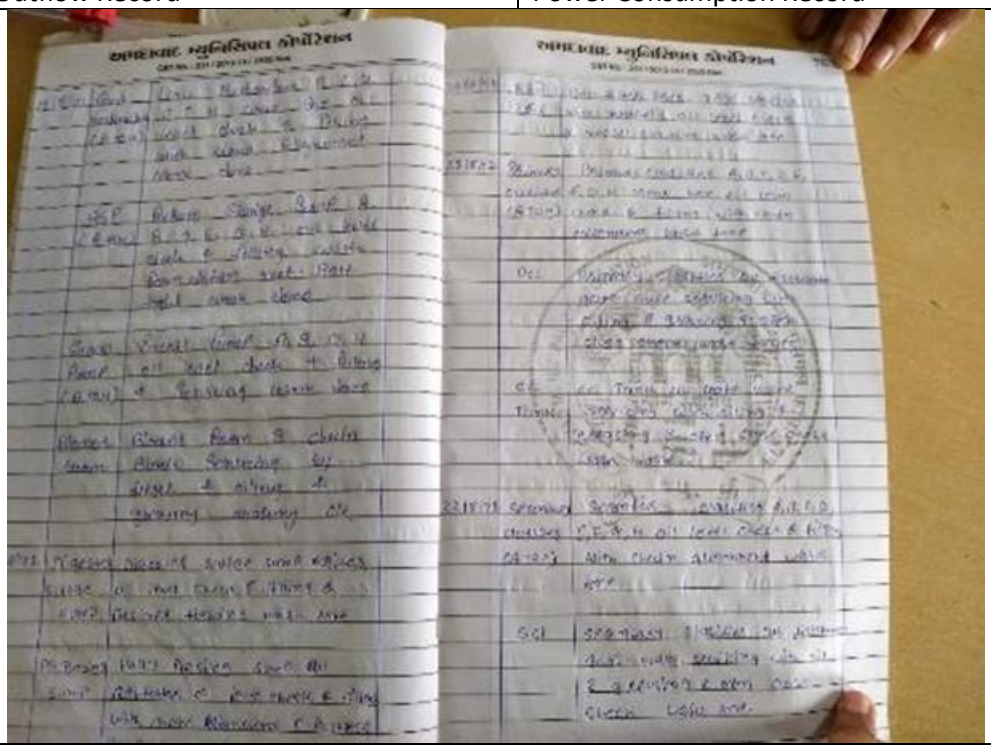
Daily logs are written and maintained by the shift in-charge for the particular shift. These shift reports contain information regarding the general operation of plant. The flow rate of the raw inlet and outlet, power consumption, maintenance details, problems encountered in any equipment is also highlighted along with the corrective measures taken or that need to be taken.



Inflow-Outflow Record



Power Consumption Record



Maintenance Record

Treatment Efficiency

As per the monitoring report of July 2021 for the STP inlet and outlet (Appendix1), the plant efficiency for BOD removal is 86% and the same for COD removal is 80%. However, since many of the STP units are not functioning as per desired STP design, the analysis shall be conducted for individual units. The audit findings/ observations made during the site visit to 240 MLD STP are given here.

Table 56: Findings of the Environmental Audit of the existing STP

Unit/ Audit finding	Photographs
Intake pipe, Inlet chamber and Screen: a. Main Rising main (through which raw sewage is entering into the plant) of 2 m diameter is corroded. b. There are total 8 drum screens and 8 manual coarse screens. Out of 8 drum screens, 2 are in maintenance and not working at the time of visit. c. Railings are corroded and require painting. d. Floating matter removal not proper. Need more water with pressure to clean screen periodically. Belt conveyor broken and civil structure also need repairs. e. Mesh Screen Damaged, Chute Damaged f. Painting also required g. The present system of storage of such floating matter & other such items on screens also needs improvement in the form of proper segregation at plant site and systematic storage. The AMC itself should get it lifted regularly instead the operator sending on random basis	  
Grit Chamber and Parshall flume: a. There are total 8 grit chambers, 2 each for a stream. b. Rake classifiers in grit chamber, 4 are in working condition and 4 are defunct. c. Shaft of all rake classifiers are corroded. d. All 8 grit mechanism systems require overhauling. e. Deflectors were not working in grit chambers at the time of visit. f. Parshall flume flow indicator not working.	

g. Scrappers and screw conveyors need to be changed.
h. At the time of upgradation, all such scraps should be properly segregated and stored and disposed off as per rules with proper record of manifests. To ensure its proper compliance, this can be a part of new tender and it shall be the duty of bidder to collect and dispose it off under the rules.
i. Also, the grit collected should be properly dried and stacked and disposed off under the rules with proper records.

Primary Clarifier

a. Clarifier Bridge, handrail corroded, painting required.
b. Lot of plastic waste seen floating in the primary clarifiers.
c. All mechanical machinery including scrappers and gearboxes corroded heavily and need to be replaced / overhauled.
d. Painting to civil work also required.
e. Again, at the time of upgradation, all such scraps should be properly segregated and stored and disposed off to recyclers as per rules with proper record of manifests. To ensure its proper compliance, this can be a part of new tender and duty of bidder to collect, segregate and dispose off under the rules

Blowers

a. There are 24 nos. (16w+ 8s) of blowers of 2350 m^3/hr capacity each. Only 6 blowers were working at the time of visit, rest were seen not operating at the time of visit.
b. Oil leakage seen in blowers.

Aeration tanks

a. Retrievable type diffusers are installed in Aeration Tank. Heavy wear and tear are observed on ropes to retrieve diffusers.
b. Most of the diffusers are not working in the tank.
c. Air supply line (Hose pipe) to diffusers is damaged / missing hence all diffusers are not getting air.
d. It was informed by plant in charge that some diffusers were last replaced in 2016
e. Main airline pipe is without insulation and painting.
f. Corrosion observed on MLSS return pipeline.
g. Diffuser connections damaged

h. Fine bubble diffuser system needs to be replaced.
i. Blowers heating issues. Need to be upgraded and VFDs to be changed

Secondary clarifier

a. Gear mechanism were not seen working at the time of visit.
b. Sludge recirculation pumps 8 nos. (4w+4s), only 4 nos. are working rest are defunct.
c. Excess sludge pumps are not in working condition at the time of visit.

Sludge Thickener

a. Out of 4 thickener units, only 1 is working, rest 3 viz., A, C and D were not functioning at the time of visit.
b. Sludge thickener no. C steps are damaged and without handrails.
c. Thickened sludge pump not in operation.
d. Primary and Secondary sludge transfer pumps as well raw sewage and activated sludge pumps need to be replaced / overhauled.
e. It shall be the duty of new bidder to dispose off all such items as per MSW / e- waste rules with proper records of manifests. Before disposal, these items shall be properly segregated and stacked in a storeroom

Digesters

a. Digester tanks are not in operation, there are total 8 tanks.

b. Digester sludge mixing pumps, there are total 24 sludge mixing pumps, only 16 are in working condition.

Belt filter press

a. Belt filter press (BFP) common for all 4 streams. There are 6 nos. of BFPs, out of them only 2 are in working condition, on rest of units some corrosion was observed and were not in operation at the time of visit.
b. It was informed that the sludge is being sent to radiation units of AMC for further processing.
c. There are 6 nos. (4w+2s) of BFP poly dosing pumps, one pump was not working and under maintenance at the time of visit.
d. There are 6 nos. (4w+2s) of BFP washing pumps, one pump was removed at the time of visit.
e. All filter presses need to be overhauled / replaced. Currently only two presses out of 6 are working . Belts gets damaged very frequently.
f. Painting to Civil works also required.
g. It would be preferred if these belt filter presses are replaced by some good quality screw presses of reputed makes.

Gas holder

a. Gas holder tank is defunct and not in operation. Corrosion is observed on outer surface.

Chlorination and chlorine contact tank (CCT)

a. Chlorine gas is used for chlorination.
b. It was informed by plant manager that chlorine consumption is 9-10 cylinders per month.
c. Out of 3 chlorinator pumps, only one was working at the time of site visit.
d. Chlorinators and toners need to be replaced / overhauled along with all related machineries.
e. Painting and maintenance to Civil work also required.
f. Require consent for storage from PESO

Laboratory instruments

Majority of the instruments are worn out and need to be replaced with new one

Again, it shall be the duty of new bidder to dispose off all such items as per MSW / e-waste rules with proper records of manifest. Before disposal, these items shall be properly segregated and stacked in a store room

SCADA Only panel is working, Computer and TOC meter is not working. Sensors need to change for quality parameters. While upgrading the SCADA, it should be ensured that when some defined parameters exceed specified limits, it should automatically shut down the operations and raise an alarm.	
Other instruments MLSS and DO sensors at Aeration tank are not working. The same should be replaced and should be properly maintained regularly as per manufacturer's instructions after replacement	
Standby Power Supply	No provision of Standby power supply is there. Some provision in the form of Silent DG sets should be made to cater for very urgent requirements in case of sudden power failure. The necessary approval of SPCB for such DG sets should be obtained, as applicable.
Alarms	Some alarms should be provided in the STP, which may indicate any sudden emergency or accident or breakdown or power failure.
Environmental Monitoring Plan	No environmental and social impact assessment study has ever been conducted since the inception of plant. An elaborate environmental monitoring plan is very essentially required to assist the operator in managing and monitoring the impacts on the environment.
Use of partially treated water for STP purpose	The treated effluent before it reaches the chlorine contact tank is used for screen cleaning and gardening etc. Only Chlorinated water should be used for consumption within plant as a safety measure.

Compliance of Conditions of Consent to operate	Online monitoring is one of the conditions of Consent to operate issued by SPCB, which is not being complied with at present. This should be complied with at the earliest.
Treatment for Heavy metals	The primary clarification needs to be upgraded to treat heavy metals (if found after testing) after suitable modification to present Primary Clarifiers by adding suitable Chemical precipitation / flocculation followed by settling. The sludge of such precipitation shall be collected and stored separately after passing through' screw presses as a hazardous waste and shall be recorded with proper manifests before being sent to hazardous waste treatment & disposal facility.
Provision of Oil & Grease traps / Skimmers	A proper oil & grease removal system be catered for before primary clarification, if the quantity of same is found appreciable during testing
Treatment of excess Nitrogen /Phosphorus	The activated sludge treatment needs to be upgraded for excess Nitrogen & Phosphorus (if found after testing) by suitably upgrading the existing aeration systems using suitable media. The excess sludge so produced from secondary treatment can be stored after drying and used as fertilizer.
Availability of land for upgradation	It shall be possible to adjust the modifications suggested in Sr No 16 &17 above in existing land itself
Sludge disposal	In view of the presence of sufficient quantity of heavy metals in the sludge, the present system of disposal of sludge for agricultural purposes needs to be reviewed. The sludge to be sent to an authorised Hazardous waste treatment & disposal facility in that case. Please refer to paras (xvi) and (xvii) in this connection.
Disaster Plan	No disaster plan has been prepared by AMC to handle any natural / other calamities. The same needs to be prepared to handle any such eventuality. The bypass arrangement needs to update and test for its functioning in case of any flood like situation.
Use of treated water for irrigation purposes	There is a proposal to use treated water for irrigation purposes. Water should be used for irrigation only after consent from GPCB is received, post upgradation & if it meets with all quality parameters as per standards and guidelines issued by CPCB.

General points

a. Treated sewage outlet is having openings to Sabarmati River and Canal
b. The treated sewage discharge to canal was having black colour with foam
c. There is no storage of chemicals
d. Workers were not wearing required PPEs
e. Internal roads are in good condition
f. All civil structures of STP are found in good condition.
g. There is a lab in the STP admin building with equipment like BOD incubator, COD digester, pH meter, hot air oven, flocculator and total organic carbon analyser etc.
h. Inlet and outlet parameters of the STP analysed by the third-party agency M/s. Supreme are attached with this note.

Sample Analysis Report

SUPREME ENVIROCARE

Support : +91-8128687822, +91-79-40084539

Email : ehs@supremeg.com

F: 40, Rudrax Complex, Opp. Annapurna Restaurant, Phase III, Vatva, Ahmedabad-382445, India

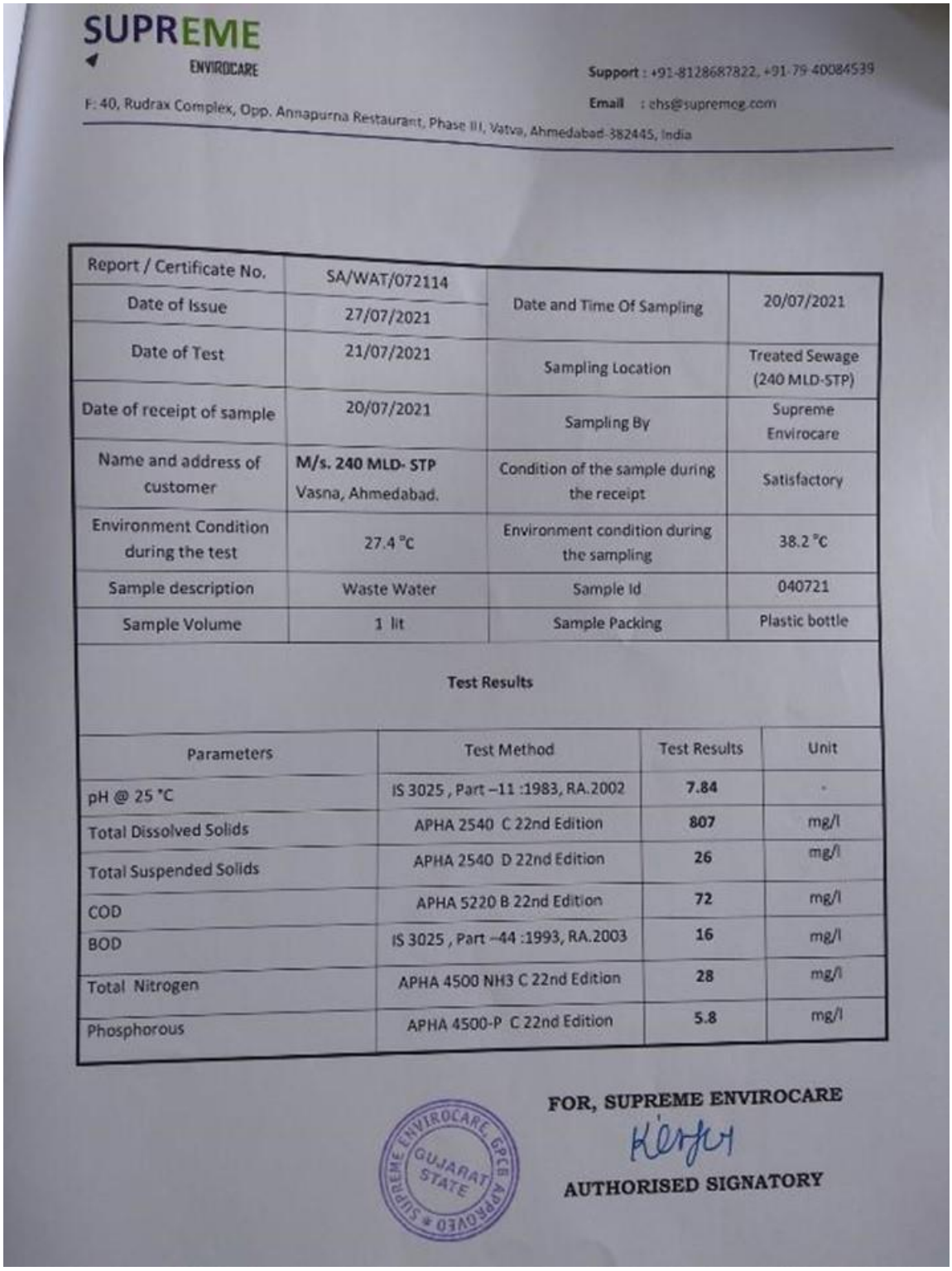
Report / Certificate No.	SA/WAT/072113	Date and Time Of Sampling	20/07/2021
Date of Issue	27/07/2021		
Date of Test	21/07/2021	Sampling Location	Raw Sewage (240 MLD-STP)
Date of receipt of sample	20/07/2021	Sampling By	Supreme Envirocare
Name and address of customer	**M/s. 240 MLD- STP** Vasna, Ahmedabad.	Condition of the sample during the receipt	Satisfactory
Environment Condition during the test	27.4 °C	Environment condition during the sampling	38.2 °C
Sample description	Waste Water	Sample Id	030721
Sample Volume	1 lit	Sample Packing	Plastic bottle

Test Results

Parameters	Test Method	Test Results	Unit
pH @ 25 °C	IS 3025 , Part –11 :1983, RA.2002	**7.21**	-
Total Dissolved Solids	APHA 2540 C 22nd Edition	**845**	mg/l
Total Suspended Solids	APHA 2540 D 22nd Edition	**244**	mg/l
COD	APHA 5220 B 22nd Edition	**368**	mg/l
BOD	IS 3025 , Part –44 :1993, RA.2003	**120**	mg/l
Total Nitrogen	APHA 4500 NH3 C 22nd Edition	**61**	mg/l
Phosphorous	APHA 4500-P C 22nd Edition	**12.7**	mg/l

FOR, SUPREME ENVIROCARE

AUTHORISED SIGNATORY



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Email : ehs@supremeg.com

F: 40, Rudrax Complex, Opp. Annapurna Restaurant, Phase III, Vatva, Ahmedabad-382445, India

Report / Certificate No.	SA/WAT/072114	Date and Time Of Sampling	20/07/2021
Date of Issue	27/07/2021		
Date of Test	21/07/2021	Sampling Location	Treated Sewage (240 MLD-STP)
Date of receipt of sample	20/07/2021	Sampling By	Supreme Envirocare
Name and address of customer	M/s. 240 MLD- STP Vasna, Ahmedabad.	Condition of the sample during the receipt	Satisfactory
Environment Condition during the test	27.4 °C	Environment condition during the sampling	38.2 °C
Sample description	Waste Water	Sample Id	040721
Sample Volume	1 lit	Sample Packing	Plastic bottle

Test Results

Parameters	Test Method	Test Results	Unit
pH @ 25 °C	IS 3025 , Part –11 :1983, RA.2002	7.84	-
Total Dissolved Solids	APHA 2540 C 22nd Edition	807	mg/l
Total Suspended Solids	APHA 2540 D 22nd Edition	26	mg/l
COD	APHA 5220 B 22nd Edition	72	mg/l
BOD	IS 3025 , Part –44 :1993, RA.2003	16	mg/l
Total Nitrogen	APHA 4500 NH3 C 22nd Edition	28	mg/l
Phosphorous	APHA 4500-P C 22nd Edition	5.8	mg/l

SUPREME ENVIROCARE, GPCB APPROVED, GUJARAT STATE

FOR, SUPREME ENVIROCARE

AUTHORISED SIGNATORY

ANNEXURE VIII: OUTCOME OF STAKEHOLDER CONSULTATIONS FOR STPs AT VASNA AHMEDABAD

Project	Gujarat Resilient Cities Project
Agency/Department	Ahmedabad Municipal Corporation
Consultant	Tata Consulting Engineers
Consultation Stage	Consultations on ESMF & Draft ESIAs
Type of Consultation	(Focus Group Discussion, Public Consultations, Virtual Consultation etc.)
Date & Time	23.3.22
Venue	Gyaspur, Bhatha.
Total no: of Participants	61
Name & Designation of Agency / Consultant Representatives	AMC PIU
Name & Designation of Other officials	Neh U. - Env. Erg. Irayat M. - ACO Akshit S. - C.O. Shaeyatta S. - NGO.
Remarks	

Key Points / Concerns raised (Heads)	Details (as bullet points)	Type of Stakeholder who raised the concern
Locality	- Daily Wage Laborers, Skilled & Unskilled Workers - family size - 5 to 10 persons with 3 to 10 children	
Health & Education	- Health & Education facilities they use are of AMC.	
Livelihood	- Lack of livelihood opportunities	
Issues	- Lack of Water, Drainage connection. (as it is informal squatters) - Houses are kuchha and mostly hutments - poor or no hygeine, - They draw water from borewell & ground water is of very poor quality - Some of them have goats and goats fall ill because of river water (drinking & bathing)	

Attendance :
(Please note that this list will be presented in the ESIA / ESMF Report. If the participant has any objection to disclosing their names or details, they can put designation / location / area / or type of stakeholder & contact number / details if ok)

Project	GRCP Project
Agency/Dept	Ahmedabad Municiapl Corporation
Consultants	Tata Consulting Engineers
Consultant Stage	Consultations of ESMF and Draft ESIAs
Type of Consultation	FGDs, Public consultations, Virtual Consultations, etc)
Date and Time	28.3.2022
Venue	AMC Community Hall
Total Participants	60
Name and Designation of Agency/Consultant	AMC, PIU
Name and Designation of other Officials	Neha U - Env Eng, Akshit-Env, Darshana, Mr. Mistry
Remarks	

Key Points/Concerns raised (Heads)	**Details (as bullet points)**	**Type of Stakeholder who**
salient points	GRCP project - pollution related aspects	
	Basis for project.	
	Prioritize the projects. City has to prioritize which projects it has to be taken up	
	The points considered for planning.	
	Waste water treatment and reducing pollution. NGT guidelines.	
	Storm water management will be dealt with separately.	
	Institutional framework and technical support	
	Monitoring and implementation	
	Strengthen Organization for undertaking such projects in the future.	
	ESMF provide frameworks for the GRCP project.	
Sub projects under 30 % investment-Priority	Brief description of the existing and proposed projects for 375 MLD and 240 MLD STPs in Vasna and 180 MLD in Pirana.	
	Identification of risks and institutional responsibilities. Plan for monitoring impacts and implementation measures and strategy of public consultations.	

	Samples are collected: noise quality, sludge, air water etc. and analysed.		
	Findings of the project. Not ecological sensitive areas in Ahmedabad. Air pollution concerns		
	Baseline data described here.		
	Samples of 126 plants. 54 acres of land within compound wall. No structures within compound		
	CND wastes, improvement of water quality and sludge post implementation.		
	In pirana 27 acres within plant boundary wall. No R&R issues. ESMP plans are prepared		
	Residential areas are more than 1 kms away.		
	In vasna there are some settlements nearby.		
	water quality in Sabarmati river will improved due to technology and NGT standards		
Link to access Draft reports/website	The reports can be accessed on the AMC website. AMC invites participants comments and suggestion.		
	PMC will be appointed for the project. Participants to give their comments, views and suggestion for the ESIA and ESMP uploaded.		
Summing up, disclosure and availability of Draft reports on AMC Website, Vote of Thanks	Mr. Mistry summed up and gave details of the disclosure of all documents on the AMC website and invited participants comments/views and suggestion on the same. He also invited comments from the participants who have accessed the reports.		

As part of the process under SEP, a public consultation was conducted on 07/06/2022 by AMC in Pandit Dindayal Upadhyaya Auditorium, Bodakdev, Ahmedabad. Invitations (in English and Gujarati) was circulated to various stakeholders such as elected representatives (Councillors), Mayor, Deputy Mayor, CSO, NGOs, Municipal Commissioner, Deputy Municipal Commissioner, heads of Committees and others. Notices were also published in the newspapers in both languages. The proceedings of the meeting key concerns raised by stakeholders and responses from AMC are reproduced in the table below, along with the photographs and the list of participants.

Project	GRCP Project	
Agency/Dept	Ahmedabad Municipal Corporation	
Consultant Stage	Consultation ESIAs and ESMF	
Type of Consultation	Stakeholder Consultations	
Date and Time	07.06.2022	
Venue	Pandit Dindayal Upadhyay Auditorium, Bokadev Ahmedabad	
Total Participants	160	
Name and Designation of Agency/Consultant Representatives	AMC, PIU,TCE, DHV	
Name and Designation of other Officials	AMC Officials and Elected Representatives: Municipal Commissioner, Dy M.C, Mayor, Dy Mayor, AMC Committees chairpersons, Councillors, Citizens,	
Remarks	Conducted in Local Language Gujarati	
Key Points/Concerns raised (Heads)	**Details (as bullet points)**	**Type of Stakeholder who raised the concern**
Introduction and welcome note by AMC Officials: G-ACRP	Welcome the participants and introduction to the G-ACRP project and Stakeholder Consultation	
Municipal Commissioner	Introduction to Project, Investment and AMC institutional arrangements	
CE, WRM,	Introduction to the GRCP:ACRP project, process followed till date, total funding to be released for the project by World Bank, preparation of reports such as ESIA, ESMF, etc and availability of these reports on AMC website	

	History of the Ahmedabad City and underground drainage system, compliance standards, population increase and the need for the project, and implementation mechanism for the project, sub projects under GRCP:ACRP, disclosure of documents ESMF &ESIA on AMC website, preparation of labour Management Procedure and Cultural & Heritage Management Framework, Resettlement Policy Framework; SEP. The process of consultations undertaken to understand issues and concerns with respect to the project and sub projects, Baseline monitoring of environmental conditions undertaken for preparing the ESIA reports. Suggestions invited on email: piugrcdpamc@gmail.com in the next 15 days.	
NGO	Will other STPS be upgraded considering the total sewage received for city, Storm water and gutter connection was taken by residents after payment and the same has been removed by AMC. What is proposed to be done to rectify this issue.	
	How will the sewage generated and bypass be dealt with during construction period of 126 MLD STP?	
	Naroda, Vatva and other areas with common ETPs there are issues with respect to the releases of effluents and it has been highlighted in various reports and studies carried out by different organizations. How will the untreated industrial be treated?	
	Data pertaining to census 2011. Data should be updated for recent areas.	
Response by CE, WRM	For all sub projects design and technology will adhere to NGT standards for discharge of treated water; these are two priority investment projects and rest of the sewage treatment also will be taken care further through other projects of new STPs and upgradation of old STPs. 126 MLD STP will be functioning till the time new stream of approximately 120 MLD in the adjacent land inside the 126 MLD STP premises is built and the flow of existing 126 MLD will be diverted to the new stream and then demolition will take place hence there will be no bypass from 126 MLD campus during construction of 375 MLD STP in campus of 126 MLD STP. Storm water project will be undertaken in other funding schemes like NRCP and Amrut; CETP discharge come under the purview of the GPCB. 3500 connections from industries removed by AMC. Data from Master planning consultants has been used for the reports.	
NGO/Association	Many workers/labour will be hired. There are violations of labour standards and non-compliance in AMC projects. Many workers have lost their lives and health and safety compliances are violated especially in storm water works.	

	AMC gives funds for labour welfare for workers. There is committee to raise the violation. Rehabilitation of the migrants' colonies who may be affected and who don't have drinking water, sanitation and other facilities.	
	Response: PIU will address the issues with help of its labour management plan. Please send suggestions on the email.	
NGO	Whether details for use of treated water in industries is available.	
Response	Discussion is ongoing with industries for reuse of treated sewage. Through Amrut, DPR is being prepared and will be shared after finalization.	
	Industries were reluctant earlier due to easy availability of groundwater. Some industries are now willing to use treated water and discussions are being undertaken with industries	
	In Fatehwadi canal, treated water was being released and studies will be undertaken for the same if we will use treated sewage from 126/375 MLD STP with help of agricultural university, subject to approvals and norms required for use of treated water for irrigation.	
Addl. City Engineer , Drainage Project	Vote of thanks to all the attendees and participants	

Invite (Eng) Issued by Deputy Municipal Commissioner

Invite (Guj) Issued by Deputy Municipal Commissioner

Public Notice published in the English Newpaper

Public Notice published in the Gujarati Newpaper

	
Welcome Address and Introduction to the Public Consultation	Brief Introduction to the project, ESMF, ESIA
	
Detailed introduction on State, city and GRCP	CE, WRM: Presentation in Gujarati on GRCP, WB funding , Process followed, Studies undertaken and Documents prepared