

Initial Environmental Examination

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India: Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project – Construction of 41 MLD Sewage Treatment Plant at Hossainpur in Ward 108 including Operation and Maintenance for 15 years

Package No.: KSHARP/ OCB/ SD/04/ 2023-24

CURRENCY EQUIVALENTS

(as of 29 July 2024)

Currency unit	–	Indian rupee (₹)
₹ 1.00	=	\$ 0.012
\$ 1.00	=	₹ 83.72

ABBREVIATIONS

ADB	–	Asian Development Bank
ASI	–	Archaeological Survey of India
CBO	–	Community based organisation
CPCB	–	Central Pollution Control Board
CRZ	–	Coastal Regulation Zone
CTE	–	consent to establish
CTO	–	consent to operate
DMA	–	district metered area
EAC	–	expert appraisal committee
EARF	–	environmental assessment and review framework
EIA	–	environmental impact assessment
EKW	–	East Kolkata Wetlands
EKWMA	–	East Kolkata Wetland Management Authority
EMP	–	Environmental Management Plan
EMS	–	environmental management specialist
ESZ	–	Eco Sensitive Zone
FGL	–	Finished Ground Level
GOI	–	Government of India
GOWB	–	Government of West Bengal
HSGO	–	Head, Safeguards and Gender Officer
HTL	–	High Tide Line
IEE	–	initial environmental examination;
KOPT	–	Kolkata Port Trust
KSHARP	–	Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project
LTL	–	Low tide line
L&LR Department	–	Land & Land Reforms Department
MOEFCC	–	Ministry of Environment, Forest and Climate Change
MSWM	–	municipal solid waste management
NEP	–	National Environment Policy
NGL	–	Natural Ground Level
NOC	–	No Objection Certificate
O&M	–	operation and maintenance
PAM	–	Project Administration Memorandum
PIU	–	Project Implementation Unit
PMDC	–	Project Management and Design Supervision Consultant
PMU	–	Project Management Unit
PWD	–	Public Works Department

REA	–	rapid environmental assessment
ROW	–	right-of-way
SCADA	–	Supervisory Control and Data Acquisition
SEIAA	–	State Environmental Impact Assessment Authority
SGC	–	safeguards and gender cell
SPS	–	Safeguard Policy Statement
STP	–	Sewage treatment plant
WBPCB	–	West Bengal Pollution Control Board

WEIGHTS AND MEASURES

m ³ /h	-	cubic meter per hour
dB(A)	-	A-weighted decibel
°C	-	degree Celsius
km	-	kilometer
km/h	-	kilometer per hour
kVA	-	kilovolt-ampere
kW	-	kilowatt
m	-	meter
µg/m ³	-	microgram per cubic meter
mg/l	-	milligram per liter
ML	-	million liters
MLD	-	million liters per day
mm	-	millimeter
MPN/100ml	-	Most Probable Number per one hundred milliliters
NTU	-	Nephelometric Turbidity Unit
km ²	-	square kilometer

NOTE

In this report, "\$" refers to United States dollar.

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CONTENTS

	Page
EXECUTIVE SUMMARY	
I. INTRODUCTION	1
A. Project Background	1
B. Purpose and Scope of Initial Environmental Examination Report	3
C. Report Structure	3
II. DESCRIPTION OF THE SUBPROJECT	3
A. Subproject Location	3
B. Existing Sewerage System	5
C. Description of Subproject Components	5
D. Proposed Sewerage works in Hossainpur	7
E. Analysis of Alternatives	10
F. Energy Efficiency Measures included in the Subproject.	12
G. Subproject Benefits	12
H. Implementation Schedule	13
III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK	24
A. ADB Safeguard Policy Statement, 2009	24
B. National and State Laws	26
C. International Conventions	31
IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)	34
A. Subproject Area of Influence	34
B. Physical Resources	34
C. Ecological Resources	41
D. Economic resources	48
E. Social and Cultural Resources	49
F. Environmental Settings of Investment Program Component Sites	49
V. ANTICIPATED IMPACTS AND MITIGATION MEASURES	53
A. Introduction	53
B. Planning and Design Phase Impacts	58
C. Pre-construction Impacts and Mitigation Measure	66
D. Construction Impacts	68
A. Operation and Maintenance Impacts	80
E. Cumulative Impacts	81
VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION	82
A. Overview	82
B. Public Consultation	83
C. Future Consultation and Disclosure	84
D. Project Disclosure	85
VII. GRIEVANCE REDRESS MECHANISM	86
A. Common Grievance Redress Mechanism	86
VIII. ENVIRONMENTAL MANAGEMENT PLAN	90
A. Environmental Management Plan	90
B. Institutional Arrangement	128
C. Institutional Capacity and Development	132

D.	Monitoring and Reporting	133
E.	EMP Implementation Cost	134
IX.	CONCLUSION AND RECOMMENDATION	136

FIGURES

Figure 1:	Areas covered under KSHARP	2
Figure 2:	Proposed STP site at Hossainpur and Command area	4
Figure 3:	Total KMC Area showing Borough boundary and Ward boundary	14
Figure 4:	Different Drainage Basins in Kolkata	15
Figure 5:	Command area of STP	16
Figure 6:	Different zones in the command areas of STP	17
Figure 7:	Water logging pockets in the subproject area	18
Figure 8:	Proposed STP site with 50m,100m,200m and 500m buffer area showing habitations and Treated Effluent discharge point at T P Canal	19
Figure 9:	Proposed STP site showing distance from nearest residential house	20
Figure 10:	Layout Plan of Proposed STP Location and Drain Diversion Plan	21
Figure 11:	Transmission of DWF from command area to proposed STP at Hossainpur	23
Figure 12:	Catchment Delineation Basins within Kolkata Municipal Corporation Area	36
Figure 13:	500m, 1 km and 5 km buffer area around the proposed sub project site along with distance from EKW area	46
Figure 14:	East Kolkata Wetland	47
Figure 15:	Grievance Redressal Process	90
Figure 16:	Institutional Arrangement for Safeguard Implementation, KSHARP	128

TABLES

Table 1:	Subproject Project Component Details	6
Table 2:	Applicable Environmental Regulations for Sewerage and Drainage Subproject	26
Table 3:	Clearances and Permissions required for Construction Activities	32
Table 4:	Near Surface Stratigraphy of the Project Area	37
Table 5:	Soil Quality	37
Table 6:	Ambient Air Quality Data at Borough XII	39
Table 7:	Noise Level data at Borough XII	39
Table 8:	Reference Noise level	40
Table 9:	Tree Species available within Sub-project Area	42
Table 10:	Fauna available within Subproject Area	42
Table 11:	Representative Aquatic Flora of the EKW	44
Table 12:	Representative Fauna of the EKW	45
Table 13:	Site Specific Environmental Features	50
Table 14:	Likelihood of Impacts from Occurrence	53
Table 15:	Parameters for Determining Magnitude	54
Table 16:	Parameters for Determining Sensitivity	54
Table 17:	Significance of Impact Criteria	55
Table 18:	Summary of Rating of Potential Impacts – STP	56
Table 19:	Treated Wastewater Characteristics for STP Design	60
Table 20:	Standards for Sludge Reuse as Manure	64
Table 21:	The details of Public Consultation in the Project area	83
Table 22:	Design-stage Environmental Management Plan – Mitigation	92

Table 23: Pre-Construction Environmental Management Plan -Mitigation	98
Table 24: Construction-stage Environmental Management Plan - Mitigation	103
Table 25: Operation-stage Environmental Management Plan - Mitigation	122
Table 26: Construction-stage Environmental Management Plan - Monitoring	125
Table 27: Operation Stage Environmental Monitoring Plan - Monitoring	127
Table 28: Training Program on Environmental Safeguards and Its Implementation	133
Table 29: Indicative Costs of Environmental Management Plan	134

APPENDICES

Appendix 1: Rapid Environmental Assessment Checklist	139
Appendix 2: Eligible Subprojects under KSHARP, KMC (Sector Loan)	145
Appendix 3: Drinking water , Ambient Air Quality, Vehicle, Diesel Generator Emissions Standards, Noise Level Standards	146
Appendix 4: Effluent Discharge Standards for STPs as per National Green Tribunal (NGT) order dated 30.04.2019	154
Appendix 5: IBAT Screening Checklist	155
Appendix 6: Guidelines for Sewerage System Operations, Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes	167
Appendix 7: IFC Benchmark Standards for Workers Accommodation	171
Appendix 8: Ward Level Stake holder consultations, consultation with Affected Person and Focus Group discussion	184
Appendix 9: Sample Grievance Registration Form	195
Appendix 10: GRC Notification Office Order	196
Appendix 11: Sample Environmental Site Inspection Checklist	199

EXECUTIVE SUMMARY

Background: Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project (KSHARP) is a key urban infrastructure initiative of the Kolkata Municipal Corporation (KMC). KSHARP is a continuation endeavour of ADB's support to improve the liveability and quality of life of the urban people in the jurisdiction of the KMC area. The Project aims to improve the urban environmental condition and quality of life in Kolkata Municipal Area through improvement of sewerage and drainage (S&D) system. The expected outcome of the project is to increase access to resilient, inclusive and sustainable urban services. The following are the outputs: **Output 1:** Climate and disaster-resilient urban infrastructure and systems developed and **Output 2:** Enabling environment for inclusive and resilient urban services improved.

The subproject. The subproject comprises of construction of 41 million liters per day (MLD) Sewage Treatment Plant (STP), with sequencing batch reactor (SBR) technology, including Operation and Maintenance for 15 years. The STP is proposed on a vacant government land. It is located at Hossainpur beside Anandapur high road in ward 108 of KMC (Borough XII of KMC) in East Kolkata. Out of a total available land area of 75.50 acres, 5.62 acres is proposed for the construction of the STP. The exact site for STP will be demarcated within the available site based on inter-departmental land transfer. For the IEE, STP layout prepared based on the technical feasibility and site access is used. This will be further reviewed and revised as needed once the exact land parcel is allocated to STP and design will be finalized. IEE will be updated accordingly.

The command area of the STP covers ward no 108 and a part of wards 107 & 109 under Borough XII. The population of the catchment for the design horizon (2058) is 318,114 and its total catchment area is approximately 811 ha, which will serve as the command area for the proposed STP. The entire command area under this STP has been divided into five zones.¹ The DWF generated from command areas will be conveyed to proposed terminal pumping station at Hossainpur (package SD 05 under KSHARP) through S & D networks. Development of sewerage & drainage (S&D) network including construction of pumping stations in ward 108 & ward 109 are considered under KSHARP (package SD 03 and SD 05) for ultimate conveyance of wastewater to the STP. From the said pumping station, DWF will be transmitted to the Inlet chamber of the proposed STP through dedicated pumping main.

Screening and Categorization. The proposed project is classified as environmental category B as per ADB's Safeguard Policy Statement (SPS), 2009, and accordingly this initial environmental examination (IEE) prepared. As per the Government of India environmental impact assessment (EIA) Notification, 2006, this subproject does not require EIA study or environmental clearance.

Description of Environment. The proposed STP will be located on a land parcel beside Anandapur Highway in Ward 108 of KMC. The site is vacant, located near TP main Canal, which will act as point of treated wastewater discharge. The general topography of the project area is flat having slope towards north to south and from west to east and elevation ranges from 1.9 to 3.6 m above mean sea level (amsl). Low lying areas are predominant within the subproject areas and the area regularly experiences water logging in rainy season. Proposed STP site is mostly flat and gently sloping and elevation ranges from 3.4 m to 3.6 amsl. For the construction of STP, the site will be developed by raising the existing level to 3.9 meters. The area is located within lower deltaic alluvial plain of the Ganges River system. The soil has cohesive characteristic and low permeability which reduces infiltration of storm water into the soil. Sub-soil water level varies from 1 to 6 m below ground level in this area.

¹ Hossainpur, Anandapur, Nonadanga, Chowbagha West and Chowbagha East.

In general climate is hot and humid between the months of March and October. An average temperature of about 13 °C in winter (December to February) and about 38 °C in summer (March to July) were recorded (refer: District Environment plan, 2023). Kolkata experiences an average relative humidity (RH) of approximately 77%, with high seasonal variations. The average annual rainfall is 1919 mm . The land use pattern in the subproject area is predominantly residential mostly built-up urban areas with few commercial activities are also observed in some parts of the project areas specially in Anandapur, Nazirbad, Madhurdaha, Hossainpur and Jagatipota.

Based on the existing topography and outfall system, the entire KMC area comprising all 16 boroughs was re-delineated into the nine (9) major S&D Basins.² Drainage system in and around Kolkata area mostly gravitated eastwards to Kulti River of Matla estuary system about 45 km downstream of Kolkata which ultimately meets with River Bidyadhari further at a distance of about 70km. The sub-project area comprising part of ward no.108 under Boroughs XII comes under Tollygunge-Pachannagram Basin (TP Basin). There are three storm water channels viz. C2-C3 (south), Mundapara canal (north) and TP Main canal (west) flowing through the project catchment area. Both C2-C3 channel and Mundapara canal meets with TP canal. TP canal terminates at Chowbhaga pumping station, from there water is pumped to Storm Water Flow (SWF) canal.

The ambient air quality and noise level were measured at Mukundapur pumping station PS during the implementation of sewer works in ward 109, borough XII under KEIIP (Tranche 3). When compared with National ambient air quality standards (NAAQS, 2009), the air quality monitoring results (24-hours monitoring) are found within the permissible limit. The concentration of all parameters is above the standard when compared with IFC-WB EHS Guidelines 2007 (the WHO Global Update 2021) prescribed standard. Noise level monitoring results indicates that both day time and night time noise levels meet the permissible limits only at one sampling location as per standards for residential areas for Indian and WHO standards. In other locations it is above the prescribed standards. Baseline environmental monitoring (air quality, noise level, surface quality) shall be conducted during pre-construction phase by the contractor.

No tree felling will be required as the site is vacant. As per IBAT Screening, the nearest protected area is East Kolkata Wetland (EKW), a Ramsar site, about 690 m from the proposed STP site, and no project components are proposed within any protected areas. The intervening region is predominantly urbanized, featuring residential, educational, and commercial establishments. No flora, fauna of threatened category has been reported at the sub-project locations.

Potential environmental impact and mitigation measures. In this draft IEE, potential impacts were identified in relation to location, design, construction and operation of the improved infrastructure. Environmental impacts due to the project design is not significant as various measures are already included in site planning and preliminary design. The proposed project area mostly comprises of urban habitation / built-up areas of KMC within city limit. The land parcel is under the ownership of local authority. No tree felling is required as the STP will be constructed in a vacant government land parcel. Access to the project locations is through public rights-of-way and existing roads. No impacts on forests or archaeological resources.

² 1. Kolkata basin 2. Bagjola basin 3. Manktala basin 4. Tolly Nullah basin 5. Topsia- Tangra basin 6. Hooghly basin 7. Monikhali basin 8. Churial basin 9. Tollygunh- Pachannagra (TP) Basin.

STP Operation. In the first phase³ a sewerage treatment plant (STP) based on sequential batch reactor (SBR) technology, with a capacity of 41 million liters per day (MLD) is proposed at Hossainpur beside Anandapur high road. Proposed site is a barren, flat, treeless land. Out of the total available land of 75.50 acres, about 5.62 acres (equivalent to 2.27 hectares) is allocated for the construction of the Sewage Treatment Plant (STP). The proposed STP land is close to habitation. As mentioned, the ground of STP will be elevated by 0.3-0.5 meters to reach the desired finished ground level. While protecting the site from flooding and water logging, raising the site elevation can potentially lead to adverse impacts on adjacent lands properties, such as flooding or prolonged waterlogging. To mitigate these impacts, an efficient stormwater drainage system for the STP will be developed to ensure that water is effectively channeled away from the raised site and adjacent properties. Approximately 7,000 cubic meters of soil will be required to raise the height STP land. The soil will be obtained from existing government licensed borrow areas. Other construction materials like stone aggregate and sand will also be sources from existing government licensed sources. As per preliminary design there are 8 nos. permanent houses in the southern side (nearest distance is 25m from the tentative boundary of the STP land) and some temporary hutments are in the North Northwest (NNW) and South -West (SW) directions, nearest distance is 10 m from the boundary of proposed STP site. The layout plan for the STP will be designed to ensure that odor-generating units, such as the inlet/raw water sump and sludge handling facilities, are situated away from residential areas. Currently, the wet well and sludge sump are approximately 100 meters and 90 meters away from the nearest houses respectively. An odour capture system will be installed during the operational stage if necessary, following CPCB guidelines on odour pollution and control, May 2008.⁴ KMC has constructed other STPs using SBR technology at Bank Plot and Joka in close proximity to residential houses. According to KMC, there have been no issues with odour or noise from these STPs.

Effluent/treated wastewater and sludge will be generated during the STP operation. Estimated dried sludge generation is approximately 32 m³/ day or 11680 m³/ year, which shall be used as fertilizer in agriculture land after proper sun drying. Any remaining can be disposed off to KMC owned landfill site at Dhapa (22°32'45.43" N and 88°25'1.98" E) which is located in about 5 km away from proposed STP site and approved by the WBPCB. Treated waste water will be used for various non-domestic purposes like gardening / horticulture, firefighting in STP premises, filling of the water tank (KMC) for road washing, car washing etc. The excess / surplus of treated effluent from STP will be discharged into nearby TP canal by gravity. Hence, will be no direct discharge of treated waste water in EKW area. TP canal terminates at Chowbhaga pumping station, from there water is pumped to Storm Water Flow (SWF) canal and meets with Kulti river at about 40 km from Kolkata. This T.P canal mainly carries untreated wastewater from nearby habitations and algal growths were visible in this part of canal and water is polluted. Once the sewerage system is implemented, the canal will no longer receive wastewater. There will be no notable impacts during the operation of STP. The residual chlorination in treated effluent may be harmful to aquatic life in the receiving water body, however, the receiving water body, TP canal, has no notable aquatic species. The operation of the proposed sewage treatment plant (STP) will prevent pollution in the drains and canals. The Irrigation department oversees the maintenance of canals, including regular dredging to ensure a free flow of water. Another important issue is of discharge of treated wastewater into TP canal leading to overflowing and flooding if the canal capacity is insufficient to take the load

³ STP is proposed to be constructed on modular basis. First phase of STP should be for 15 years but land of STP has been taken for 30 years period. For first phase capacity of the STP will be 41 MLD for 2043 & another modular type STP of capacity 14 MLD is proposed to be constructed for ultimate design period (2058). However, inlet chamber for STP will be constructed for ultimate design year (2058) including provision of diversion of 14 mld flow to the future STP.

⁴<https://cpqb.nic.in/openpdf.php?id=UmVwb3J0RmlsZXNMTmV3SXRlbV8xNDZfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==>

and safety convey in to downstream. Preliminary assessments conducted by KMC for the STP confirmed that the TP Canal has adequate capacity to carry the treated sewage from the STP. Further to evaluate the canals' carrying capacity for the KSHARP, a joint survey with the Irrigation Department and KMC is currently underway at all discharge locations. The results from this survey will be incorporated into the updated Initial Environmental Examination (IEE). Reuse plans for effluent/treated wastewater and dried sludge will be developed and implemented. Design and operation will ensure compliance with effluent/treated wastewater quality standards.

Construction impacts are likely to be significant. But these will be temporary and are common impacts of construction in urban areas, and there are well developed methods to mitigate the same. Construction activities will be confined mostly to the selected STP site. Therefore, these works unlikely to have significant impacts. The main impacts of construction activities include (i) generation of dust and noise, causing disturbances to residents, (ii) health and safety risks to the community and workers, (iii) impediments to access for nearby homes along access road to STP, (iv) increased local road traffic from hauling construction materials, waste, and equipment, which also raises concerns about dust and safety and (v) environmental effects from the mining of construction materials and disposal of construction waste. These are localized, temporary and avoidable, mitigated and/or minimized to acceptable limits with the implementation of mitigation measures in the Environmental Management Plan (EMP).

Environmental Management Plan. EMP has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate agency. Various design related measures are already included in the project preliminary design, which will be further fine-tuned as required during detailed design. For construction, the EMP includes mitigation measures such as (i) proper planning of construction works, especially linear works, to minimize the public inconvenience; (ii) barricading, dust suppression and control measures; (iii) traffic management measures for works along the roads and for hauling activities; (iv) provision of walkways and planks over trenches to ensure access will not be impeded; (v) occupation and community health and safety and (vi) finding beneficial use of excavated materials to extent possible to reduce the disposal quantity. EMP will guide the environmentally-sound construction of the subproject. EMP includes a monitoring program to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries. This draft IEE and the corresponding EMP will be included in the bidding and contract documents, which will be updated during the detailed design. The contractor will prepare a site-specific EMP (SEMP) prior to start of works, and an EMP/ approved SEMP will be always kept on sited. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

Implementation Arrangements. The Kolkata Municipal Corporation (KMC) will be the executing and implementing agencies, and the project management unit (PMU) established within KMC for the ADB-financed Kolkata Environmental Improvement Investment Program (KEIIP), will implement the project. The project will be governed by a high-level steering committee headed by the Minister-in-charge, Municipal Affair and Urban Development Department (MAUDD). The PMU, headed by a Project Director. The Project Director will be supported by Director General - Project for procurement and contract management and Deputy Chief Engineer (DCE) for safeguards implementation. The DCE, supported by a Manager – Environment, Health and Safety and Manager - Social, will be responsible for environmental and social safeguards in compliance with project agreements, government requirements and ADB SPS, 2009. Gender, Safeguard management unit (GSMU) headed by DCE and staffed with 3 Managers, 3 Deputy Managers, and 8 project assistants to implement and monitor of gender action plan, EMP, resettlement plans,

and with focus on community and occupational health and safety aspects⁵. PMU will be supported by a Project Management and Design Supervision Consultant (PMDSC). The PMDSC will have an Environmental Safeguards Specialist (ESS) and a Health and Safety Expert to support in all tasks related to environment management and monitoring activities. At contractor level, an Environment, Health and Safety (EHS) supervisor will be appointed on-site, one for each package, to assist in preparing and implementing site-specific EMP.

Consultation, disclosure and grievance redress mechanism. The public participation processes have been undertaken during project preparation stage which ensures that stakeholders are engaged during the preparation of this IEE. Informal and formal consultations were conducted with local population of the area at four places⁶ in the month of November 2023 and June 2024. Total number of attendees were 206 among which female attendees in the consultation were 163 (79% of total consulted people). This draft IEE will be disclosed to a wider audience via the ADB and KSHARP websites. The consultation process will continue during project implementation. A project-specific grievance redress mechanism (GRM), which is already in place for the ongoing ADB funded KEIP, will be expanded for KSHARP to receive, evaluate, and facilitate the resolution of social, environmental or any other project-related grievances. The GRM will provide a time-bound and transparent mechanism to resolve related grievances.

Monitoring and Reporting. The PMU and PMDSC will be responsible for monitoring and reporting. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the PMU. PMU with the assistance of PMDSC, will monitor the compliance of contractor. The PMU will oversee the implementation and compliance and will submit semi-annual environmental monitoring reports (SEMR) to ADB for Review and disclosure. The semiannual submission of Environmental Monitoring Reports (EMRs) will be required during both the construction and operation phases of the project.

Conclusion and Recommendations. The subproject is unlikely to cause significant adverse impacts, and potential impacts are mainly due to construction and can be mitigated or minimized to acceptable levels through measures included in the EMP. Location selection is based on technical feasibility, land availability, and ease of access. All subproject components are situated on government-owned lands, with no eco-sensitive or protected areas nearby. Various secondary treatment technologies were considered for the sewage treatment process, and SBR was ultimately selected for its treatment efficiency and low odour potential. The benefits arising from the project include: (i) better public health particularly reduction in waterborne and infectious diseases due to improved sewerage systems in project areas; (iv) reduced risk of groundwater contamination through appropriate sewer collection and treatment; (v) reduced risk of contamination of treated water supplies; and (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

Based on the findings of the IEE, the classification of the project as **Category “B”** is confirmed. No further special study or detailed environmental impact assessment (EIA) needs to be undertaken to comply with ADB SPS (2009) or EIA Notification (2006). KMC will obtain Consent to Establish (CTE) from the West Bengal State Pollution Control Board before commencing STP construction, and Consent to Operate (CTO) before start of operation. This IEE needs to be updated during the detailed design, and reviewed and approved by ADB, and disclosed prior to

⁵ The existing Social Safeguard Cell will function as the Safeguard and Safety Cell (SSC) for the project

⁶ (i) Ward 108 (Mukunda Bhaban), (ii) Ward 108 (Near STP land, Hossainpur), (iii) Ward 108 (Hossainpur Main Road, Madurdaha) and (iv) Ward 108 (Hossainpur STP Land).

start of construction

I. INTRODUCTION

A. Project Background

1. Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project (KSHARP) is a continuation endeavor of ADB's support to improve the livability and quality of life of the urban people in the jurisdiction of the Kolkata Municipal Corporation area. The project will provide comprehensive services in uncovered areas of Kolkata (project area under KSHARP given in (Figure 1). The project is aligned with the country partnership strategy for India, 2018–2022, which recognizes the need to address infrastructure bottlenecks and provide better municipal services for the urban poor. The project is also in line with the state of West Bengal's 20-year vision, Kolkata's sewerage, and drainage master plan (2007), Kolkata's Urban Sector Investment Plan, 2012–2022, and KMC's solid waste management master plan (2018). The expected outcome of the project is increased access to resilient, inclusive and sustainable urban services. The outcome will be achieved through two outputs:

- (i) **Output 1: Climate and disaster-resilient urban infrastructure and systems developed.** The project will support the development of climate- and disaster-resilient sewerage and drainage infrastructure and systems, which will cover unserved areas of KMC. It includes the construction of 84.0 kilometers (km) of trunk and secondary sewerage and drainage networks and 176.0 km of lateral network up to customer connections, 50,000 household sewer connections, one sewage treatment plant with a capacity of 41 million liters per day, and five pumping stations. The infrastructure solution will be supplemented by ongoing waterbody rejuvenation efforts by KMC and flood early warning and forecasting systems to be enhanced under output 2 of this project. Strengthened urban infrastructure and systems will provide better services to all people, while women, children, the poor, and the disadvantaged will especially benefit from improved urban sanitation, health, and hygiene.
- (ii) **Output 2: Enabling environment for inclusive and resilient urban services improved.** This output will build upon efforts delivered under KEIP to enhance KMC's operational capacity and resilience of urban services. Specific initiatives include support in (i) development of a comprehensive asset management system to be institutionalized in KMC. This includes formulation of an asset management policy, development of an information technology system, and establishment of an inventory of all classes of KMC assets, following physical survey, verification, and valuation. Additionally, capacity building support and training will be provided to establish processes, practices, and clear accountabilities for institutionalizing the asset management system in KMC; (ii) expansion of the flood forecasting and early warning system established under KEIP to KSHARP areas;⁷ (iii) upgrade of comprehensive web-enabled GIS for infrastructure information in KMC.⁸ The proposed upgrade includes incorporating data on all utility networks that are laid under KEIP and proposed under KSHARP. This will complement the proposed

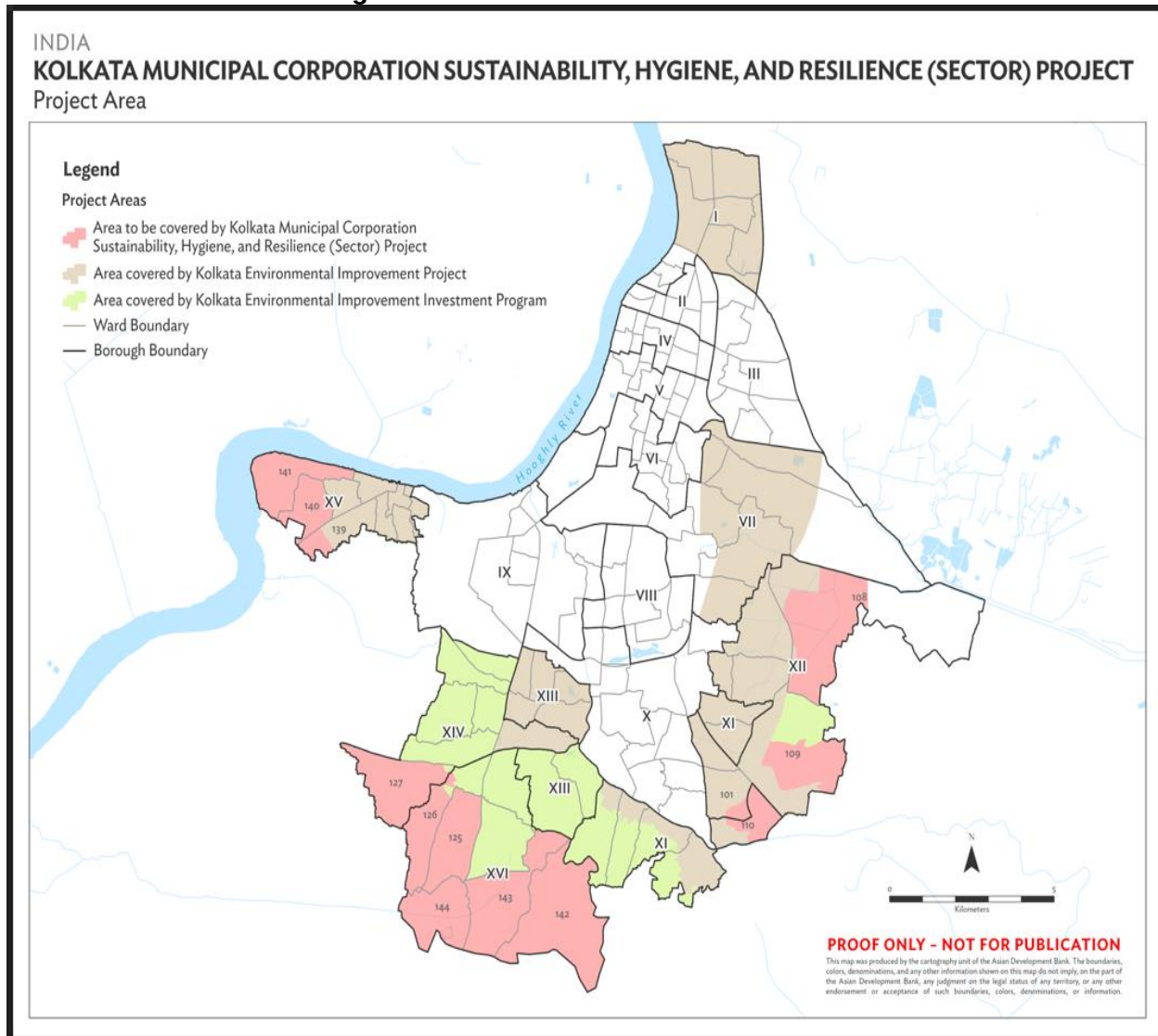
⁷ The project will consider GESI-responsive early warning systems and take into consideration the most effective channels to communicate with women, persons with disability, elderly, and other vulnerable groups taking into account the levels of literacy.

⁸ KEIP supported in establishing a web-enabled GIS by integrating information from remote sensing data and on-ground surveys to create a comprehensive infrastructure information system for Kolkata. The system covers all 144 wards of the city and provides detailed information on properties, as well as the water supply, sewerage, and drainage networks. All properties within the city have been geo-tagged, creating a digital map with precise location data for each property.

asset management system that would be established under KSHARP; (iv) training and mainstreaming women self-help groups (SHGs) in O&M of public toilets in project boroughs; (v) community outreach for improved knowledge on hygiene and sanitation, and (vi) awareness generation amongst school students on flood hazards, preparedness, and emergency evacuation procedures.

2. A series of subprojects will be implemented under sector loan for development of S&D network in the selected part of un-sewered areas of KMC. Subprojects will be selected from the 11 eligible subprojects (Appendix 2 & Figure 1) identified under the Master Plan of S&D System for Project Area under KSHARP, KMC, which are:

Figure 1: Areas covered under KSHARP



3. This draft initial environmental examination (IEE) report is prepared for S&D subproject i.e. Development of S&D Network including construction of pumping station in Anandapur area in Borough XII (Part of Ward 108) under Package no. KSHARP/ OCB/ SD 03/ 2023-24 with Operation & Maintenance (O&M) for 5 years.

B. Purpose and Scope of Initial Environmental Examination Report

4. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguards Policy Statement (2009). Accordingly, this Initial Environmental Examination (IEE) has been conducted to assess the environmental impacts and provide mitigation and monitoring measures to ensure that there are no significant impacts because of the subproject.

5. The subproject is proposed for implementation under design-build and operate (DBO) contract modality. This IEE is based on the preliminary project report, and will be updated during detailed design stage.

C. Report Structure

6. The report has been structured in compliance with ADB SPS, 2009 and contains the following sections:

Executive summary;

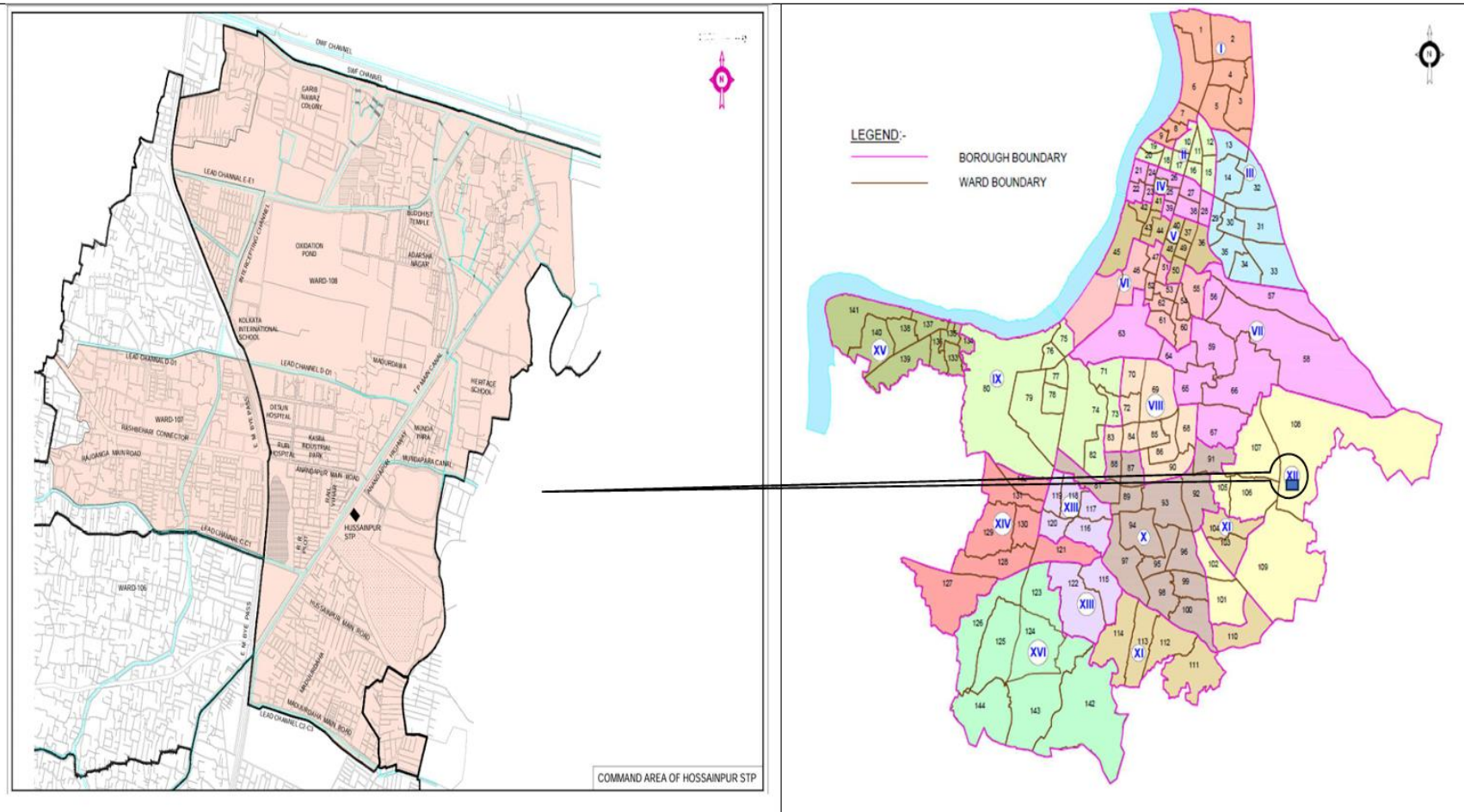
- (i) Introduction;
- (ii) Description of the project;
- (iii) Policy, legal and administrative framework;
- (iv) Description of the environment;
- (v) Anticipated environmental impacts and mitigation measures;
- (vi) Public consultation and information disclosure;
- (vii) Grievance redress mechanism;
- (viii) Environmental management plan; and
- (ix) Conclusions and recommendations.

II. DESCRIPTION OF THE SUBPROJECT

A. Subproject Location

7. The proposed STP site is located at Hossainpur beside Anandapur high road in Ward 108, an administrative division of KMC under Borough XII in East Kolkata as shown in **Figure 2**. This area comes under KMC in 1984. Anandapur high road (under PWD) and TP canal are on the west side of the selected plot. The available area for the 41 MLD STP as well as for another modular type STP of capacity 14 MLD is 1.9 hectare (ha). The selected subproject area covers rapidly developing localities with increasing number of population. The command area of the STP covers ward no 108 and a part of ward nos. 107 & 109 under Borough XII. The population of the catchment for the design horizon (2058) is 3,18,114 and its total catchment is approximately 811 Ha, which will serve as the command area for the proposed STP. Major roads in the project area are Anandapur high road, Madurdaha main road, Jagatipota main road and Hossainpur main road. The subproject area is connected with adjacent localities through Anandapur high road, Anandapur high road (27 m) and E.M. Bypass (516 m). Nearest railway station is Howrah railway Station (11 km) and nearest airport, Netaji Subhas Chandra Bose International Airport is at a distance of 16 km.

Figure 2: Proposed STP site at Hossainpur and Command area



Source: DPR 2024

B. Existing Sewerage System

8. At present, there is no defined S&D network in the command area except in a small part in Anadapur and Rajdanga area. Hence, the subproject areas largely depend on septic tank arrangements for household sanitary system. At present in the command areas of the STP (Figure 3) the DWF, generated from the major portion of the said areas is being directly discharged to canals through existing sewer lines / drains. In the process, quality of water of canals and ultimately river Kulti is getting affected by untreated wastewater reaching into the canal or rivers which in turn making the condition of living very poor.

9. The dry weather flow (DWF) generated from a small part of Anandapur and Rajdanga area is being conveyed to the existing pumping station (PS) at Anandapur through existing sewerage system. The pumping station is very old and require immediate rehabilitation and augmentation (considered under separate package SD 03 in KSHARP). The PS is maintained by Kolkata Metropolitan Development Authority (KMDA). From this PS, the flow is being transmitted to fishery pond (bheri) at Nonadanga. The excess flow is directly discharged into lead channel D-D1 under TP basin. The present practice is proposed to be discontinued and the entire DWF will be conveyed to the proposed STP at Hossainpur.

10. Following system inadequacies are observed:

- (i) Discharging of DWF into canals through existing drains/pipes
- (ii) Inadequate capacities of drains/sewers
- (iii) Poor or no maintenance of sewer lines / drains resulting in heavy siltation and substantial reduction in carrying capacities
- (iv) Chocking of drains at different stretches due to indiscriminate dumping of solid wastes and encroachment.

11. In absence of any organized drainage network, the surface drainage channels carry both sullage and storm water runoff. The combined flow carrying by these surface drains discharge into nearby canals which ultimately leads either to river Hooghly or to river Kulti causing potential health hazard and detrimental effect of river water quality. Therefore, it is urgently required to develop an adequate S&D network along with sewage treatment facility for improvement of citizen services and overall enhancement of quality of life.

C. Description of Subproject Components

12. The following table (Table 1) summarizes the proposed subproject components and details. Figures 3 to 11 present location and schematic diagrams of proposed sewerage works components in Hossainpur.

Table 1: Subproject Project Component Details

Component	Function	Description	Location
Sewage Treatment Plant	Treatment of collected sewage to meet the stipulated discharged standard	STP Capacity: 41 MLD for mid horizon of 2043 and 55 MLD for ultimate design horizon of 2058 Land Requirement: 5.62 acres (equivalent to 2.27 hectares) Components: • SBR (sequential batch reactor) based STP with primary, secondary, tertiary treatment • Disinfection of treated wastewater for reuse • Chlorination tank • Sludge management (sludge collection, thickening, dewatering and disposal) • Laying of 50m DI pumping main (inlet) of 1000 mm diameter up to the battery limit • Construction of effluent storage reservoir of capacity 20 m³ • Laboratory, and testing facilities for BOD, COD, TSS etc.,) • Necessary arrangement for Online Continuous Effluent Monitoring System (OCEMS) in the STP and integration of the same with PLC and SCADA system will be ensured. • Construction of service road within STP boundary – 450 m length of 5 m width • Road restoration – 150 m for laying of treated effluent main line	The STP is proposed in a vacant government vested land under the possession of District Land and Land Reforms (DL&LR) department (See Note 1). It is located beside Anandapur high road (25 m in the west) in the Ward 108 of KMC in East Kolkata.
Outflow sewer	Surplus/excess treated effluent that is not put to reuse will be discharged through outflow sewer	• Length of Outflow sewer / treated effluent discharge pipe: 150m • Pipe material: M S pipe • Pipe diameter: 1000mm This will be finalized during the detailed design phase	From STP to nearby T P Canal (coordinate: 22.50°N and 88.40°E) of Irrigation department (western direction) This canal terminates at Chowbhaga pumping station

Note 1: The exact site for STP yet to be demarcated within the available site (5.62 out of available 75.5 acres. For the IEE, an STP site and layout prepared based on the technical feasibility and access is used. STP layout design will be finalized based on confirmation of exact land parcel within the site and IEE will be updated accordingly.

D. Proposed Sewerage works in Hossainpur

13. The command area of Hossainpur STP covers ward 108 and part of wards 107 & 109. Total command area under Hossainpur STP is 811 Ha. For conveyance of the proposed system, the total command area has been divided into 5 zones viz. Hossainpur, Anandapur, Nonadanga, Chowbagha West and Chowbagha East as shown in Figure 6. Development of sewerage & drainage (S&D) networks including construction of pumping stations in ward 108 & ward 109 are considered under KSHARP under package SD 03 & SD 05 for ultimate conveyance of wastewater to the STP. Entire DWF, generated from the said areas is proposed to be conveyed to proposed terminal pumping station at Hossainpur through an organized S&D network (considered under KUIRIP - Package SD 05). From the said pumping station, DWF will be transmitted to the Inlet Chamber of the proposed STP. Collection and transmission of the DWF is shown in .

14. The design capacity of the STP has been determined based on the population projection and projected wastewater generation. Projections of population increase for the entire command area are 2,30,315 (Mid Horizon – 2043) and 3,18,114 (Ultimate Horizon – 2058). Based on the projection of population increase, it has been estimated that the contributing areas of all wards will have 40.9 million liters per day (MLD) & 54.6 MLD of wastewater generation during the intermediate & ultimate years respectively.⁹

15. STP is proposed to be constructed on modular basis as shown in Figure 10. The first phase of STP should be for about 15 years but land of STP has been taken for 30 years period. For the first phase capacity of the STP will be 41 MLD for 2043 & another modular type STP of capacity 14 MLD is proposed to be constructed for ultimate design period (2058). However, inlet chamber for STP will be constructed for ultimate design year (2058) including provision of diversion of 14 MLD flow to the future STP.

16. The proposed STP is located on a flat low laying land beside Anandapur High Road in Ward 108 of KMC. The site is located near TP Canal which would act as point of discharge. The allocated area of the site for the 41 MLD STP as well as future STP of capacity 14 MLD is 5.62 acres (equivalent to 2.27 hectares). The exact site for STP is yet to be demarcated, and land transfer is in process. Per land records, this land is classified as “low-lying land used for used pisciculture”, and PMU will obtain change in classification after the land transfer following the procedure laid out in West Bengal Land Reform (WBLR) Act and Rules, 1954. Natural Ground Level (NGL) near Anandapur high road is 3.6m. The land area of the project site including area for future STP shall be developed and the existing level shall be raised to finished ground level at 3.9 m.

17. The proposed STP site is 25 m away from the Anandapur high road. There is a bituminous approach road of 4.5 to 5 m width beside the proposed land. The proposed STP land is close to habitations. There are 8 nos. pucca house in the southern side (nearest distance is 25 m from the tentative boundary of the STP plot) and some temporary hutments in the NNW and SW directions, nearest distance is 10 m from the boundary of proposed STP site as per the preliminary design (Figure 9). The layout plan for the STP will be designed to ensure that odour-generating units, such as the inlet/raw water sump and sludge handling facilities, are situated away from residential areas. Currently, the wet well and sludge sump are approximately 100 meters and 90 meters

⁹ Considering 30% ICI (institutional, commercial & industrial) contribution.

away from the nearest houses, respectively. The outflow sewer/treated effluent discharge pipe to T. P. canal is 150-meter long Mild Steel (MS) pipe with a diameter of 1000mm.

The boundary of EKW area is approximately 690 m from the proposed STP site (Figure 13). A drainage channel carrying run off water during monsoon is passing through the site and connects to TP channel via a culvert under the Anandapur high road. Drain diversion proposal prepared carefully without disturbing the existing condition or drainage function of the channel and vacant land i.e. flow of water from surrounding area and vacant land into drainage channel (Figure 10). There will be uninterrupted water flow in the drain which ultimately discharge into TP canal during the monsoon. The proposed STP site is mostly flat and gently sloping and elevation ranges from 3.4 m to 3.6 amsl. For the construction of STP, the selected site of 5.62 acres site will be elevated by 0.3-0.5 meters to reach the desired finished ground level of 3.9 m. While protecting the site from flooding and water logging, raising the site elevation can potentially lead to adverse impacts on adjacent lands properties, such as flooding or prolonged waterlogging. To mitigate these impacts, an efficient stormwater drainage system for the STP, considering both elevated site and existing drain, will be developed to ensure that water is effectively channeled away from the raised site and adjacent properties.

18. Sewage treatment process. The process will involve (i) primary mechanical treatment to screen out grit, debris, oil, and grease from the influent; (ii) secondary biological and/or chemical treatment process; (iii) disinfection and (iv) sludge dewatering and disposal. For biological treatment of sewage, the STP will employ a sequential batch reactor (SBR) process which provides the highest treatment efficiency possible in a single step biological process. The incoming sewage will be fed into the cyclic activated sludge process and SBR process basins for biological treatment to remove biological oxygen demand (BOD), chemical oxygen demand (COD) and suspended solids. Thus, no additional settling unit, nor a secondary clarifier will be required. For disinfection, chlorine treatment will be used. The STP will be designed in a modular approach to optimize energy and resource consumption. SBR is an aerobic process in a compact and closed system with automated operation; thus, will have very minimal to negligible odour nuisance. Green buffer zones of 3 to 5m wide all around the STP will be established using local varieties of trees in multiple rows to serve as odour barrier and visual screen around the facility. All major odour potential units will be away from the houses as per design. There will be generation of noise at the STP from operation of machinery, utility pumps and centrifugal pump at desludging area. Acoustic enclosure will be given around this area to minimize the impact. It is proposed to design the STPs to stringent discharge standards suggested by CPCB in 2015 and order of National Green Tribunal (NGT) dated 30th April 2019 (Appendix 4). The stringent standards also facilitate maximum utilization of treated wastewater for reuse in various purposes following guidelines of Central Public Health and Environmental Engineering Organization (CPHEEO). KMC will obtain Consent to Establish (CTE) before start of construction work of STP and Consent to Operate (CTO) before operation from West Bengal State Pollution Control Board (WBPCB).

19. For sludge treatment, a sludge sump will collect thickened sludge from SBR basins. Supernatant from the sump will be returned to inlet/equalization tank for treatment. Sludge from sump will be pumped to sludge thickener, and the thickened sludge will be pumped to mechanical sludge dewatering system (such as centrifuge). Dewatered sludge cake will further air dried in a sludge storage shed for 15 days. Sewage sludge generated from the SBR process will undergo sufficient treatment for stabilization and pathogen reduction.

20. Reuse and disposal of dried sludge. Estimated dried sludge generation is approximately 32 m³/ day or 11680 m³/ year, which shall be used as fertilizer in agriculture land after proper sun

drying. It is proposed that the solid sludge cake shall be sold off to the farmers for use as manure and the revenue earned from this, will be used for O&M cost of the STP. Part of O&M cost of the STP can be recovered by selling off the sludge cake. Any remaining can be disposed off to KMC owned landfill site at Dhapa (22°32'45.43" N and 88°25'1.98" E) which is located in about 5 km away from proposed STP and approved by the WBPCB. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 will be adopted. Rules stipulate that "In order to ensure safe application of compost, the specifications for compost quality shall be met" (ref. Table 20). A sludge reuse plan will be developed and implemented by the contractor in consultation with the KMC. In the existing STPs operated by KMC, the dried sludge is sold to farmers, and excess if any is disposed in the existing landfill site.

21. Reuse and disposal of treated effluent. It is proposed to reuse the treated effluent for various non-domestic purposes by following guidelines of Central Public Health and Environmental Engineering Organization (CPHEEO). The treated effluent shall be utilized for the purpose of gardening / horticulture, firefighting in STP premises, filling of the water tank (KMC) for road washing, car washing etc. Construction of treated effluent storage reservoir of capacity 20m³ is proposed with submersible pumps set (2 nos.) of adequate capacity, electrical arrangement for power supply/control, delivery pipeline & valves including flexible piping of minimum 20m for filling of KMC tank and arranging for gardening / watering on plants complete with all valves & piping etc. In order to safeguard the interest of users of treated effluent, it is proposed to apply technology/process to achieve very low biological oxygen demand (BOD) – BOD₅ and Total Suspended Solids (TSS) in the treated effluent as per National Green Tribunal (NGT) order dated 30th April 2019 (Appendix 4).¹⁰ The treated effluent reuse plan shall be developed and implemented by the contractor in consultation with the KMC authorities.

Treated water from the STP, if excess after reused will be discharged into TP Canal flowing near the site. Preliminary assessments conducted by KMC for the STP confirmed that the TP Canal has adequate capacity to carry the treated sewage from the STP. Further to evaluate the canals' carrying capacity for the KSHARP, a joint survey with the Irrigation Department and KMC is currently underway at all discharge locations. Accordingly, the final discharge arrangements will be further confirmed.

22. An outflow sewer will be installed to discharge excess/surplus treated effluent from the STP. Treated effluent will comply with discharge standards suggested by CPCB in 2015 and order of National Green Tribunal (NGT) dated 30th April 2019 (Appendix 4). The excess / surplus of treated effluent from STP will be discharged through 1000mm diameter and 150m long MS pipe into nearby TP canal by gravity (Latitude: 22.50 N, Longitude: 88.40 E). The outflow sewer will cross existing Aandapur highway and trenchless technology is suggested. This T-P Canal ultimately terminates at Chowbagha pumping station of KMC from there water is pumped to Storm Water Flow (SWF) canal. This canal mainly carries untreated wastewater from nearby habitations and algal growths were visible in this part of canal and water is polluted. After implementation of sewerage system, the canal will not receive wastewater and operation of the proposed STP at will save the drains/canals from pollution. Preliminary assessments conducted by KMC for the STP confirmed that the TP Canal has adequate capacity to carry the treated sewage from the STP. Further to evaluate the canals' carrying capacity for the KSHARP, a joint survey with the Irrigation Department and KMC is currently underway at all discharge locations. The results from this survey will be incorporated into the updated Initial Environmental Examination (IEE).

23. KMC will obtain approval or NOC from the West Bengal Pollution Control Board (WBPCB)

¹⁰ BOD: Not more than 10 mg/l ; TSS : Not more than 20 mg/l.

for treated effluent discharge at T P Canal and dried sludge disposal to the government owned landfill site at Dhapa.

24. The STP will have a backup generator, which is an emergency diesel generator set of 400 kVA capacity (1 numbers) as emergency power for common and essential services/ utilities. The DG set(s) shall be compliant with relevant state/ central pollution control board regulation for following emission standards (Table 5 of Appendix 3).

25. **Standard laboratory** equipment shall be provided to cover the daily analysis of parameters like pH, BOD, COD, TSS, Total Nitrogen, Fecal Coliform and MLSS & DO and total Phosphorous in the STP.

E. Analysis of Alternatives

26. Location selection is guided by technical feasibility, availability of land, and ease of approach. All the subproject components are proposed in government owned land. There are no eco-sensitive or protected areas within or close to proposed project activity areas.

27. Various secondary treatment technologies have been considered in the sewage treatment process after the primary treatment consisting of screening and grit removal. Secondary treatment is the critical process that removes the organic putrescible organic matters and brings down the BOD of the effluent to meet the discharge standards. The following process technologies are considered: Extended Aeration (EA), Moving Bed Bio-Reactor (MBBR), Sequencing Batch Reactor (SBR) and Membrane Bio Reactor (MBR). A comparison of various treatment technologies is presented below in terms of merits of the process over key parameters like quality characteristics and land requirement:

Comparison of Treatment Technologies for STP

Parameters	Impact	EA	SBR	MBBR	MBR
Capital cost	Initial Investment	Medium	High	Medium	Very high
Power cost	Proportional to impact on lifecycle cost	High	Medium	Medium	Very high
Chemical cost	Proportional to impact on lifecycle cost	Least	Least	Least	High - Membrane cleaning chemicals
Operation and Maintenance Cost	Proportional to impact on lifecycle cost	Least	High - Automation maintenance	Medium	Very High - More automation maintenance and Membrane cleaning
Space Requirements	Land Requirement	Medium	Less. 60% of that required for EA.	Less. 50% of that required for EA.	Less. 40% of that required for EA.

Parameters	Impact	EA	SBR	MBBR	MBR
Periodic equipment replacement cost	Proportional to impact on lifecycle cost	Less	Medium	Less	High - Membrane replacement once in (5-7 years)
Skilled personnel Cost	Proportional to impact on lifecycle cost	Simplest to operate	Cycle time control needs higher skill	Simple to operate	MBR need higher skill
Complexity	Simpler is better	Relatively simple process	Cycle time control adds some operational complexity	Relatively simple Process	MBR TMP/ permeability monitoring, scour, back pulse, and maintenance cleaning adds some complexity
Reuse Potential	Relates to reuse applications and additional capital costs	need additional units for reuse applications	need additional units for reuse applications	need additional units for reuse applications	Highly reliable effluent quality – not need additional units

Comparison of Various Treatment Technologies for STP

Assessment Parameter/ Technology		EA*	SBR	MBBR	MBR
1.0 Performance after Secondary Treatment					
1.1	Effluent BOD, mg/L	<20	<10	<30	<5
1.2	Effluent SS, mg/L	<30	<10	<30	<5
1.3	Fecal coliform removal, log unit	upto 3<4	upto 3<4	upto 2<3	upto 5<6
1.4	T-N Removal Efficiency, %	50-60	70-80	10-20	70-80
2.0 Performance After Tertiary Treatment					
2.1	Effluent BOD, mg/L	<10	<10	<10	<10
2.2	Effluent SS, mg/L	<5	<5	<5	<5
2.3	Effluent NH ₃ N, mg/L	<1	<1	<1	<1
2.4	Effluent TP, mg/L	<0.5	<0.5	<0.5	<0.5
2.5	Effluent Total Coliforms, MPN/100 mL	10	10	10	10
3.0 Area Requirements					
3.1	Average Area, m ² per MLD Secondary Treatment + Secondary Sludge Handling	675	450	450	450
3.2	Average Area, m ² per MLD Tertiary Treatment + Tertiary Sludge Handling	100	100	100	0

Assessment Parameter/ Technology		EA*	SBR	MBBR	MBR
3.3	Total Area, m ² per MLD Secondary + Tertiary Treatment	775	550	550	450

28. SBR provides the highest treatment efficiency possible in a single step biological process. The system is operated in a batch reactor mode this eliminates all the inefficiencies of the continuous processes. A batch reactor is a perfect reactor, which ensures 100% treatment. Separate modules are provided to ensure continuous treatment. The complete process takes place in a single reactor, within which all biological treatment steps take place sequence. The complete biological operation is divided into cycles. Each cycle is of 3 – 5-hour duration, during which all treatment steps take place. SBR is therefore selected.

29. “Without” subprojects would yield the town to be continuously under-serviced that puts the health of the general public at an increasing risk and could potentially worsen the living environment. This ‘no project’ scenario would impede further social and economic development of the district and defer commitments to improve the proportion of the population with sustainable access to better drainage system and basic sanitation. Given the large-scale benefits to the population and environment, ‘With Project’ alternative is considered appropriate.

30. With the implementation of the proposed subproject, people will have convenient access to improved drainage and sewerage system. The sewerage system will remove human waste from their homes safely and quickly. As a result, good hygiene and sanitation practices will be promoted and there will be reduced health and safety risks. Improved sanitation system will create an enabling environment for local economic development and improved social services that communities within the sphere of influence of the KMC will benefit from; thus, contributing to the overall economic development of the region.

F. Energy Efficiency Measures included in the Subproject.

31. The subproject is designed with utmost consideration to energy efficiency. Accordingly, energy efficiency measures are being considered and incorporated into the subproject designs where appropriate. Gravity flow systems have been adopted.

32. Energy efficiency measures were considered in the design of the projects. Measures that will include use of gravity flow systems, energy efficient, high-performance motors and transformers, low power consuming CFL (Compact Fluorescent Lamp) /LED (Light-emitting Diode) type of luminaries for office/ all indoor areas except pump house area (HPSV or HPMV luminaries shall be used for pump house area and other outdoor areas), street/ area lighting with time switch/ photocell for automatic switching of luminaries, etc.

33. Necessary arrangement for Online Continuous Effluent Monitoring System (OCEMS) shall be provided in the STP and integration of the same with PLC and SCADA system will be ensured. Provision for connectivity with the servers of the State Pollution Control Board (SPCB) and/ or CPCB servers for 24X7 real time/continuous data transmission as and when necessary, shall also be kept.

G. Subproject Benefits

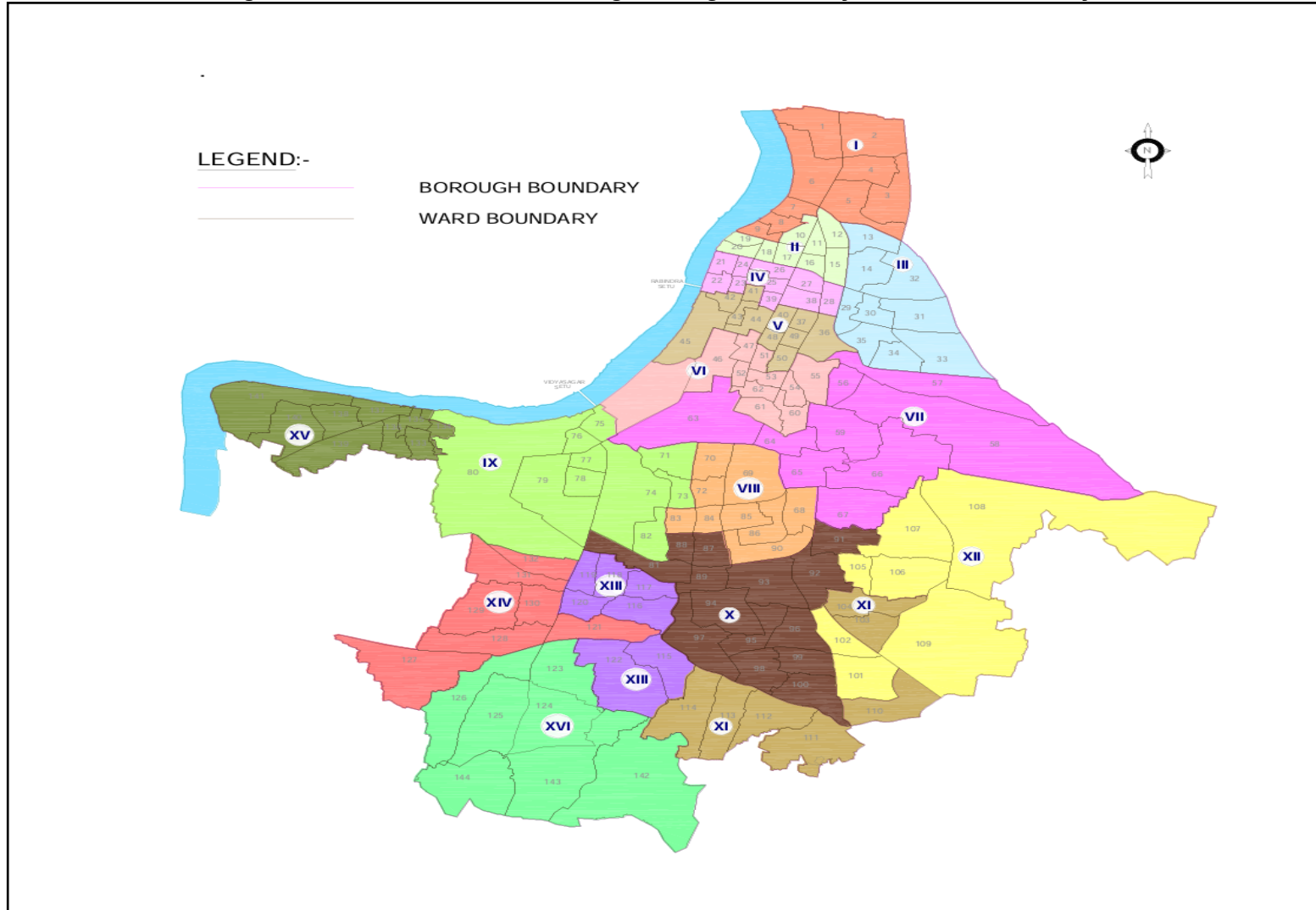
34. The subproject is primarily designed to improve environmental quality and living conditions

of people of command area through provision of sewerage system. The benefits arising from the project include: (i) better public health particularly reduction in waterborne and infectious diseases due to improved sewerage systems in project areas; (iv) reduced risk of groundwater contamination through appropriate sewer collection and treatment; (v) reduced risk of contamination of treated water supplies; and (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

H. Implementation Schedule

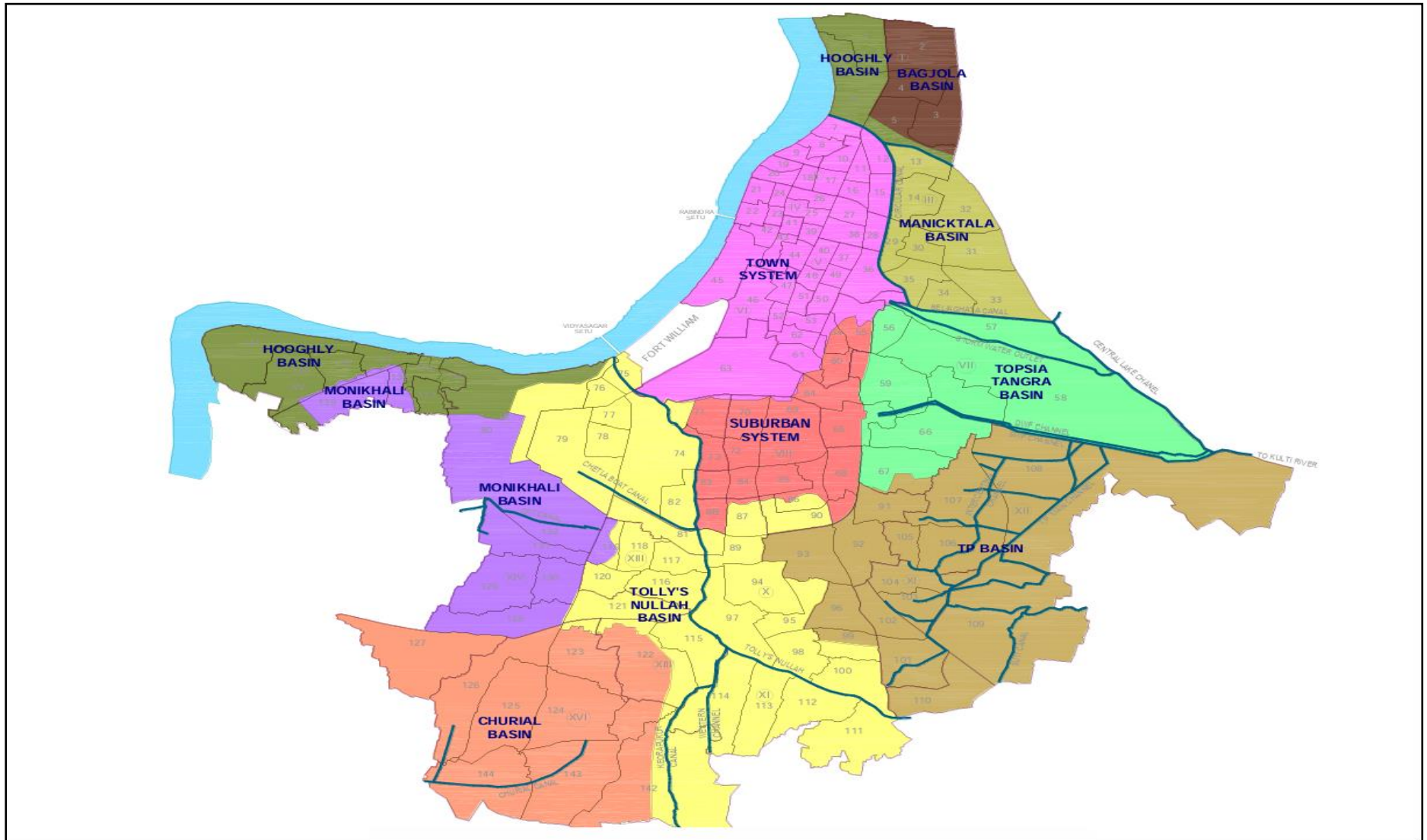
35. The contract is a “Design, Supply, Installation of Plant” (DBO) contract. The implementation schedule for the subproject involves a design and construction period of 3.5 years and 15 years of operation and maintenance after commissioning. Bids will be invited in August 2024 and the project is likely to be awarded by November-December 2024. Contractor will submit a System Improvement Plan (SIP), after carrying out detailed study of the existing system within first 3 months after award of the work.

Figure 3: Total KMC Area showing Borough boundary and Ward boundary



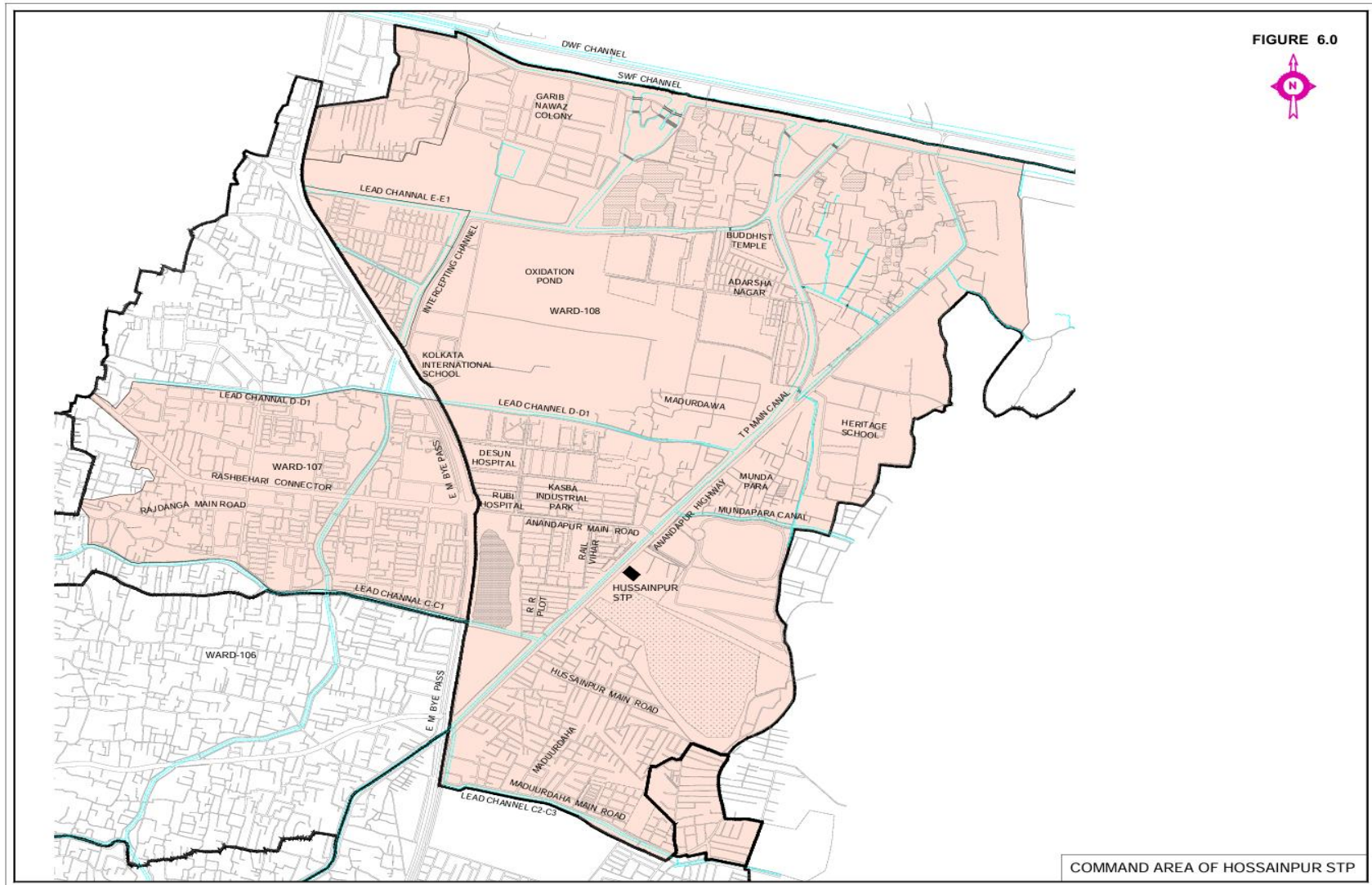
Source: DPR,2023

Figure 4: Different Drainage Basins in Kolkata



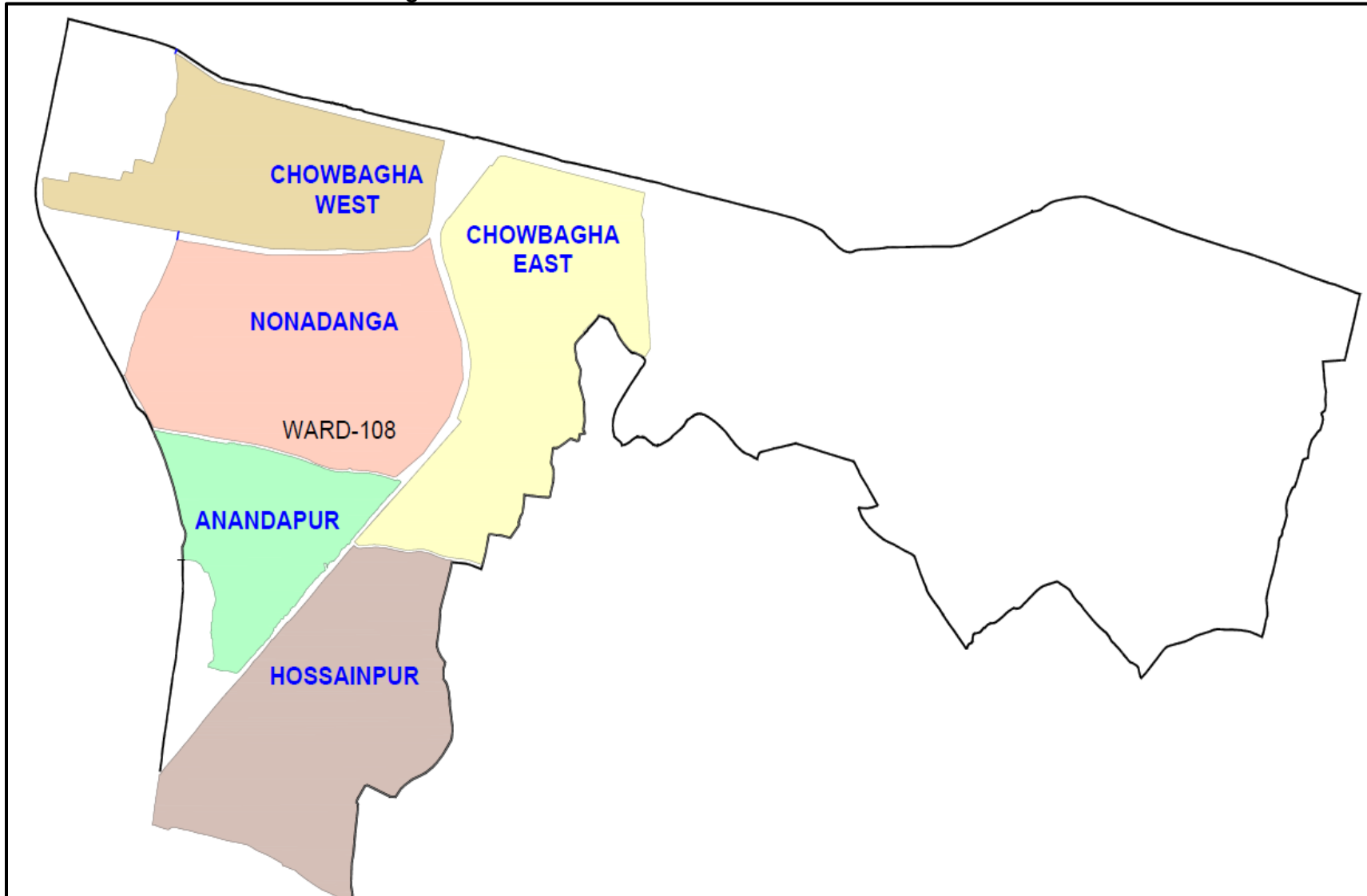
Source: DPR,2023

Figure 5: Command area of STP



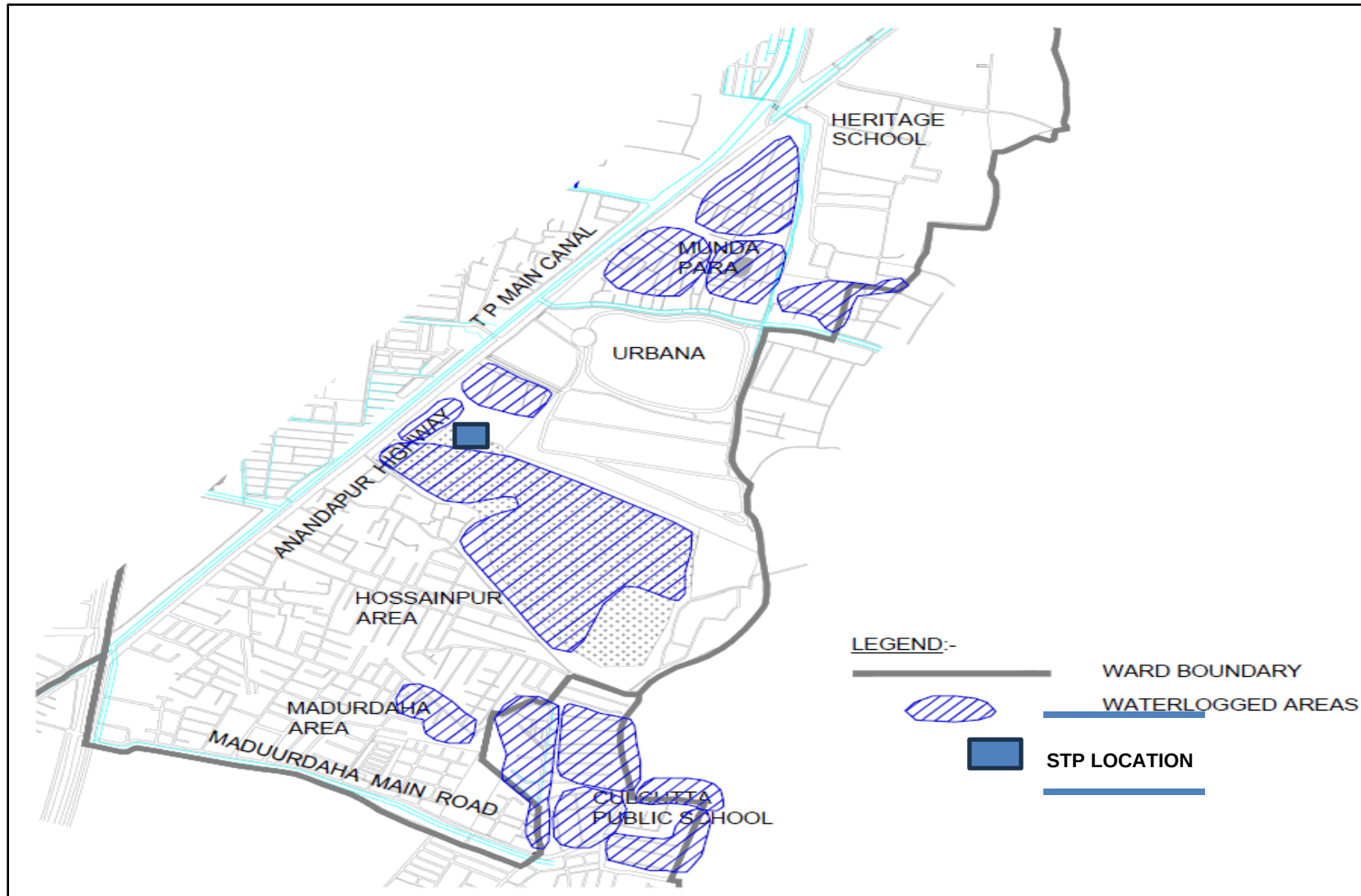
Source: DPR, 2024

Figure 6: Different zones in the command areas of STP



Source: DPR, 2024

Figure 7: Water logging pockets in the subproject area



Source: DPR,2023

Figure 8: Proposed STP site with 50m,100m,200m and 500m buffer area showing habitations and Treated Effluent discharge point at T P Canal



Figure 9: Proposed STP site showing distance from nearest residential house



Source: DPR, 2024

Note: STP site and its exact demarcation will be confirmed (5.62 out of available 75.5 acres) based on inter-departmental land transfer, which is pending.

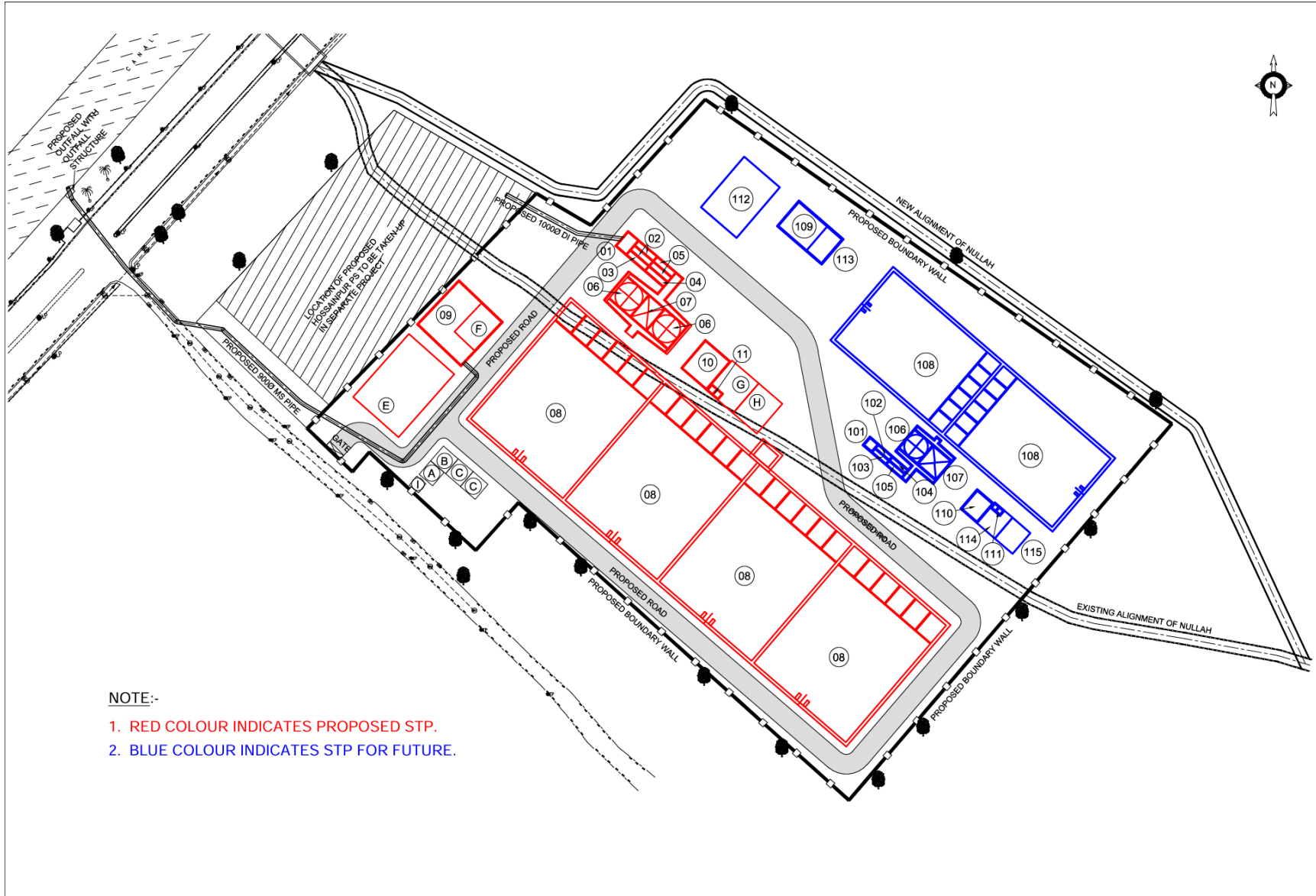
Figure 10: Layout Plan of Proposed STP Location and Drain Diversion Plan

LEGENDS

PROCESS UNIT FOR 14 MLD (FOR FUTURE)				
SL.NO.	DESCRIPTION	SIZE/CAPACITY	QTY.	MOC.
101	RECEIVING CHAMBER	2500 x 2300 x 2000 SWD.	01	RCC
102	COARSE SCREEN CHANNEL- MECHANICAL	4500 x 1000 x 900 SWD.	01	RCC
103	COARSE SCREEN CHANNEL- MANUAL	4500 x 1000 x 900 SWD.	01	RCC
104	FINE SCREEN CHANNEL- MECHANICAL	5000 x 1000 x 1400 SWD.	01	RCC
105	FINE SCREEN CHANNEL- MANUAL	5000 x 1000 x 1400 SWD.	01	RCC
106	GRIT CHAMBER	6000 x 6000 x 900 SWD.	01	RCC
107	GRIT CHAMBER MANUAL	6000 x 6000 x 900 SWD.	01	RCC
108	SBR BASINS	36200 x 23000 x 5400 SWD.	02	RCC
109	CHLORINATION TANK	14500 x 8000 x 4000 SWD.	01	RCC
110	BIOLOGICAL SLUDGE SUMP	6000 x 5000 x 3000 SWD.	01	RCC
111	DWPE DOSING TANK	1200 x 1200 x 700 SWD.	02	RCC
BUILDINGS				
112	SBR AIR BLOWER / MCC & CONTROL BUILDING/ WORKSHOP/ADMIN CUM LAB	17000 x 12000	01	G+1
113	CHLORINATOR CUM TONNER SHED (ABOVE DISINFECTION TANK)	8000 x 5000 x 3500 HT.		
114	CENTRIFUGE FEED PUMP HOUSE	7000 x 6000 x 4500 HT.	01	
115	CENTRIFUGE BUILDING	7000 x 6000 x 9000 HT.	01	G(STILT)+1

PROCESS UNIT FOR 41 MLD (FOR PRESENT)				
SL.NO.	DESCRIPTION	SIZE/CAPACITY	QTY.	MOC.
01	RECEIVING CHAMBER	4500 x 3200 x 3000 SWD.	01	RCC
02	COARSE SCREEN CHANNEL- MECHANICAL	6000 x 1300 x 1000 SWD.	02	RCC
03	COARSE SCREEN CHANNEL- MANUAL	6000 x 1300 x 1000 SWD.	01	RCC
04	FINE SCREEN CHANNEL- MECHANICAL	6000 x 1300 x 1400 SWD.	02	RCC
05	FINE SCREEN CHANNEL- MANUAL	6000 x 1300 x 1400 SWD.	01	RCC
06	GRIT CHAMBER	7000 x 7000 x 900 SWD.	02	RCC
07	GRIT CHAMBER MANUAL	7000 x 5100 x 900 SWD.	01	RCC
08	SBR BASINS	39300 x 31000 x 5400 SWD.	04	RCC
09	CHLORINATION TANK	15000 x 15000 x 4000 SWD.	01	RCC
10	BIOLOGICAL SLUDGE SUMP	9000 x 8000 x 3500 SWD.	01	RCC
11	DWPE DOSING TANK	1500 x 1500 x 1200 SWD.	02	RCC
BUILDINGS				
A	HT PANEL ROOM	5000 x 5000 x 4500 HT.	01	
B	HT METERING ROOM	4500 x 4500 x 4500 HT.	01	
C	TRANSFORMER YARD	5000 x 5000	02	
E	SBR AIR BLOWER / MCC & CONTROL BUILDING/ WORKSHOP/ADMIN CUM LAB / STAFF QTRS.	21500 x 15500	01	G+2
F	CHLORINATOR CUM TONNER SHED (ABOVE DISINFECTION TANK)	8000 x 7000 x 3500 HT.		
G	CENTRIFUGE FEED PUMP HOUSE	10000 x 9000 x 4500 HT.	01	
H	CENTRIFUGE BUILDING	10000 x 8000 x 9000 HT.	01	G(STILT)+1
I	SECURITY CABIN	3000 x 3000 x 3600 HT.	01	

Source: DPR, 2024



Note: STP layout design will be further reviewed and revised after exact land parcel allocated to STP within the available government vacant land

Figure 11: Transmission of DWF from command area to proposed STP at Hossainpur



Source: DPR, 2024

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Safeguard Policy Statement, 2009

36. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all project loans, program loans, sector loans, sector development program loans, loans involving financial intermediaries, and private sector loans.

37. **Screening and Categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

- (i) **Category A.** project likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. An EIA is required.
- (ii) **Category B.** potential adverse environmental impacts are less adverse than those of category A projects. An IEE is required.
- (iii) **Category C.** project is likely to have minimal or no adverse environmental impacts. No EIA/IEE is required although environmental implications need to be reviewed.
- (iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

38. The potential environmental impacts of the proposed improvement of roads and stormwater drainage have been screened using ADB's REA checklist for roads and urban development (see Appendix 1), and results show it is unlikely to cause significant adverse impacts. Therefore, it is classified as Category B and this IEE has been prepared in accordance with ADB SPS's requirements.

39. **Environmental Management Plan.** An EMP which addresses the potential impacts and risks identified by the environmental assessment shall be prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions will be commensurate with the Project's impact and risks.

40. **Public Disclosure.** ADB will post the following safeguard documents of **category B** on its website so that the affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:

- (i) draft environmental assessment and review framework (EARF) before project appraisal;
- (ii) draft IEE / final or updated IEE upon receipt; and
- (iii) Environmental monitoring reports submitted by the PMU during project implementation upon receipt.

41. **Consultation and Participation.** ADB SPS, 2009 require borrower to conduct meaningful

consultation¹¹ with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

42. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, ADB SPS, 2009 requires the borrower to update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address those impacts.

43. **Occupational Health and Safety.** ADB SPS, 2009 requires that the borrower to ensure that workers¹² are provided with a safe and healthy working environment, considering risks inherent to the sector and specific classes of hazards in the subproject work areas, including physical, chemical, biological, and radiological hazards. Borrower shall take steps to prevent accidents, injury, and disease arising from, associated with, or occurring during the course of work, including: (i) identifying and minimizing, so far as reasonably practicable, the causes of potential hazards to workers; (ii) providing preventive and protective measures, including modification, substitution, or elimination of hazardous conditions or substances; (iii) providing appropriate equipment to minimize risks and requiring and enforcing its use; (iv) training workers and providing them with appropriate incentives to use and comply with health and safety procedures and protective equipment; (v) documenting and reporting occupational accidents, diseases, and incidents; and (vi) having emergency prevention, preparedness, and response arrangements in place.

44. **Community Health and Safety.** ADB SPS, 2009 requires the borrower to identify and assess risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts. The borrower shall ensure to apply preventive and protective measures for both occupational and community health and safety consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. PMU shall also adhere to necessary protocols in response to benefits and opportunities, and implementation issues. In case where responsibility is delegated to subproject contractors during construction phase, borrower shall ensure that the responsibilities on occupational health and safety are included in the contract documents including non-employee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

45. **ADB SPS International Best Practice Requirements.** ADB SPS, 2009 requires that, during the design, construction, and operation of the project, the executing agency shall apply pollution prevention and control technologies and practices that are consistent with international good practice, as reflected in internationally recognized standards such as the World Bank

¹¹ Per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle 1; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

¹² Including nonemployee workers engaged by the borrower/client through contractors or other intermediaries to work on project sites or perform work directly related to the project's core functions.

Group's Environment, Health, and Safety (EHS) Guidelines.¹³ (IFC's General EHS Guidelines¹⁴ and Sector Specific [Water and Sanitation] Guidelines¹⁵). These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

B. National and State Laws

46. The implementation of the subprojects will be governed by Government of India and State of West Bengal and other applicable environmental acts, rules, regulations, and standards. These regulations impose restrictions on the activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether applicable international, national, state or municipal or local. Key standards include those related to drinking water quality, air quality, effluent discharge, and protected areas. Compliance is required in all stages of the subprojects including design, construction, operation and maintenance.

47. Environmental assessment. The Government of India EIA Notification of 2006) sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance (EC) is required for specified 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. None of the components of this subproject falls under the ambit of the EIA Notification 2006, and therefore EIA Study or environmental clearance (EC) is not required for the subproject.

48. **Other environmental regulations.** Besides EIA Notification 2006, there are various other acts, rules, policies and regulations currently in force in India that deal with environmental issues that could apply to infrastructure development. The specific regulatory compliance requirements of the subproject are shown in Table 2.

Table 2: Applicable Environmental Regulations for Sewerage and Drainage Subproject

Law	Description	Requirement
Environmental Impact Assessment (EIA) Notification	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	The proposed components of this sub projects are not listed in the EIA Notification's "Schedule of Projects Requiring Prior Environmental Clearance" and thus Environmental Clearance is not required.

¹³ World Bank Group, 2007. Environmental, Health, and Safety General Guidelines. Washington, DC.

¹⁴<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

¹⁵<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

Law	Description	Requirement
	categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects require 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).	
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Control of water pollution is achieved through administering conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge and the frequency of monitoring of effluents. Any component of the Project having the potential to generate sewage or trade effluent will come under the purview of this Act, its rules and amendments. Such projects have to obtain consent to establish (CTE) under Section 25 of the Act from West Bengal Pollution Control Board (WBPCB) before starting implementation and consent to operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.	Consent to Establish (CTE) and Consent to Operate (CTO) are required for setting of STP require and for its operation from WBPCB. Appendix 4 provides applicable effluent discharge standards.
Air (Prevention and Control of Pollution) Act of 1981, Rules of 1982 and amendments.	The subprojects having potential to emit air pollutants into the atmosphere have to obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from WBPCB before starting implementation and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the subproject, the following will require CTE and CTO from WBPCB: (i) diesel generators; and (ii) hot mix plants, wet mix plants, stone crushers, etc. if installed for construction. All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the WBPCB website (www.wbpcb.gov.in). CTE to be obtained by KMC prior to award of contract. CTO to be obtained prior to commissioning. CTO renewal to be undertaken by KMC during operations stage.
Environment (Protection) Act, 1986 and Central Pollution Control Board (CPCB) Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards notified.	Appendix 3 provides applicable standards for ambient air, air emission, effluents, receiving water bodies, and drinking water at the consumer end.

Law	Description	Requirement
		Contractors are required to ensure all emissions and discharges during civil works conform to all applicable standards
Noise Pollution (Regulation and Control) Rules, 2002 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	Appendix 3 provides applicable noise standards. Contractors are required to ensure all noise-producing activities during civil works conform to applicable standards
National Institute of Occupational Safety and Health (NIOSH) Publication No. 98-126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	Contractors are required to provide hearing-protection equipment and ensure exposures of workers to noise-generating activities are within allowed NIOSH standards.
Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016	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.	If during excavation works, the excavated material is analyzed to be hazardous, they are to be stored and disposed of only in such facilities as may be authorized by the WBPCB for the purpose
Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended	As per Rule 6, every user agency, who wants to use any forest land for non-forest purposes shall seek approval of the Central Government.	No notified forest land within the subproject area.
Wetlands (Conservation and Management) Rules, 2010 and 2017	The Rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The Central Government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.	The boundary of EKW area is 690 m from the proposed STP site. The treated effluent from STP will be discharged into TP canal which is outside of EKW area. Therefore, no permission from the EKW authority is required.
The Ancient Monument and Archaeological Sites and 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 and protected area In respect of regulated area, the Competent Authority may grant permission for construction, reconstruction, repair and renovation on the basis of recommendation of the National Monument Authority duly taking note of heritage bye-laws, which shall be prepared in respect of each protected monument and protected area	There are no protected properties in the subproject area. However, in case of chance finds, the contractors will be required to follow a protocol as defined in the Environmental Management Plan (EMP).

Law	Description	Requirement
The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 (RCTLARRA)	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 infrastructural facilities and urbanization by giving adequate financial compensation to the affected people.	No private land acquisition is required for the sub project. about 2.27 Ha government vested land are required for this purpose. the process of inter departmental transfer of land has already been initiated
West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006	The Act states that those who want to fell trees will have to obtain permission from the Forest Directorate, Government of West Bengal. Violators (means whoever fells or causes to be felled any tree or cuts, uproots or otherwise disposes of any fallen tree or contravenes the permission granted) shall be punished with imprisonment up to one year or with fine of Rs.5000/- or both. Also, until plantation of requisite number of trees is undertaken, the violators will be fined for each day of default of Rs.50/-. In case the development agency or entrepreneur fails to implement the plantation plan, the defaulter might have to face an imprisonment up to two years or fine that may extend to Rs.10,000/- or with both. Permission from the Divisional Forest Officer (Utilization Division), Forest Directorate, Government of West Bengal will be required if trees, particularly those looked upon as sacred groves, identifies as belonging to an endangered species, or given the status of heritage, will be cut/felled.	As per preliminary survey and design there is no tree felling required for the construction of STP.
East Kolkata Wetlands (Conservation and Management) Act, 2006	In August 2002, 12,500 hectares (ha) of the East Kolkata Wetland area was included in the 'Ramsar List' making it a 'wetland of International Importance'. The Ramsar convention is playing a vital role by providing certain basic guidelines to draw up suitable plans for the maintenance and sustenance of the wetlands. Among these, the three most important guiding principles are: (i) maintenance of the special characteristics of the ecosystem; (ii) wise use of its resources with an eye towards sustainability; and (iii) economic development for the wetland community.	The boundary of EKW area is 690 m from the proposed STP site. The treated effluent from STP will be discharged into TP canal which is outside of EKW area. Therefore, no permission from the EKW authority is required.

Law	Description	Requirement
	The East Kolkata Wetlands Management Authority (EKWMA) has the power to enforce land use control in the substantially water body-oriented areas and other areas in the East Kolkata wetlands.	
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	Applicable for construction as well as O&M phases.
The Child Labour (Prohibition and Regulation) Amendment Act, 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. 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	No children between the age of 14 to 18 years will be engaged in hazardous working conditions.
Construction and Demolition Management Rule 2016 of MOEF & CC (26 March 2016)	Applies to everyone who generates construction and demolition waste. Every waste generator shall segregate construction and demolition waste and deposit at collection center or handover it to the 30roject30ed processing facilities Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains.	No demolition of any structure is required for the project.
Department of Environment's direction under Air Act 1981 for control of air pollution from construction activities in West Bengal. (Department of Environment Government of West Bengal, December 10, 2009) Circular No –	West Bengal Pollution Control Board conducted a study with the help of the Asian Development Bank and it is revealed that the contribution of the construction activities is one of the source of air pollution in Kolkata and its surroundings and also suggested some guideline to minimize such impacts	Contractor will follow the guideline and KMC will ensure implementation of the guidelines.

Law	Description	Requirement
EN/3170/ T- IV-7/ 001/ 2009.		
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during the course of employment.	Compensation for workers in case of injury by accident
The Building and Other Construction Workers (BOCW) Act 1996	Labour Department, GoWB has adopted proactive approach and initiated necessary steps to implement the provisions of the BOCW Act for the welfare of construction workers	Contractors are required to follow all the provisions of BOCW Act while engaging construction workers.
Contract Labour (Regulation and Abolition) Act, 1970.	Provides for welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.	Applicable to all construction works in the project PMU on behalf of KMC to obtain Certificate of Registration from Department of Labour, as principal employer Contractor to obtain license from designated labor officer Contractor shall register with Labor Department, if Inter-state migrant workmen are engaged Adequate and appropriate amenities and facilities shall be provided to workers including housing, medical aid, traveling expenses from home and back, etc.,
The inter-state migrant workmen (regulation of Employment and Conditions of service) act, 1979.	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.,	
Payment of Wages Act, 1936 Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project All construction workers should be paid not less than the prescribed minimum wage
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and not for making discrimination against female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers

C. International Conventions

Convention	Relevance
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1971	No direct relevance, project will ensure no impacts on wetland area. The East Kolkata Wetland, a declared Ramsar site is about 690 m radial distance from the boundary of STP site, and no sub-project components are proposed within or near to EKW area. The treated effluent from STP will be discharged into nearby TP canal which is outside of EKW area. Therefore, there is no risk or impact on EKW area.

Convention	Relevance
Convention on Migratory Species of Wild Animals, 1979 (Bonn convention)	No direct relevance, project will ensure no impacts on migratory species, if any
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 1973	No direct relevance; project will ensure no impacts on endangered species, if any
Basel Convention on Trans-Boundary Movement of Hazardous Wastes, 1989	Hazardous waste if any from the construction will manager as per the provisions of Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016. No transboundary movement envisaged.
ILO Core Labour Standards	Project will ensure compliance with core labour standards

49. **Clearances / permissions to be obtained prior to start of construction.** Error! Reference source not found. shows the list of clearances/permissions required for project construction. This list is indicative, and the contractor should ascertain the requirements prior to start of the construction and obtain all necessary clearances/permission prior to start of construction.

Table 3: Clearances and Permissions required for Construction Activities

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
1	CTE / CTO for construction of proposed STP and Operation & Maintenance of the same	From WBPCB under Water Act	PMU	PMU/PMDSC
2	Hot mix plants, Crushers and Batching plants	Consent to establish and consent to operate under Air Act, 1981 from WBPCB	Construction Contractor	PMU/PMDSC
3	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016; Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from WBPPCB	Construction Contractor	PMU/PMDSC
4	Material Sourcing- Approval for sourcing stones and sand from quarries and sand mining and borrow areas	Permission from District Collector/ State Department of Mining	Construction Contractor	PMU/PMDSC
5	Temporary traffic diversion measures	Kolkata traffic police along with district traffic police	Construction Contractor	PMU/PMDSC
6	Road cutting for Sewer laying works	PWD for laying of effluent discharge line	PMU	PMU/PMDSC
7	NoC for discharge of treated effluent into TP canal	Approval or NOC from Department of Irrigation, Government of West Bengal.	PIU	PMU/PMDSC
8	Construction Waste and Demolition Debris Management	Approval from KMC if disposal site is required as per Construction and Demolition Waste Management Rules 2016	Construction Contractor	PMU/PMDSC
9	Labour License	Labour Commissioner, Government of West Bengal	Construction Contractor	PMU/PMDSC

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
10	Use of Vehicles and Equipment- Pollution Under Control (PUC) Certificate	Motor Vehicle Rules, 1989	Construction Contractor	PMU/PMDSC
11	STP Land NOC	Interdepartmental transfer from L & L R Dept.	PMU	PMU/PMDSC

IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

A. Subproject Area of Influence

50. The subproject area is situated within the Kolkata metropolis. The area of influence for potential environmental impacts extends up to 50m for the direct impact zone and between 50m to 100m for the indirect impact zone. Direct environmental impacts for the subproject include effects on ambient air quality due to dust and emissions, noise and vibration from construction works.

51. The direct impact area for the subproject encompasses the site of the Hossainpur STP location and the adjoining areas within 20 to 50 meters from its boundary. This area is expected to experience disturbances from construction activities, vehicular movements. The boundary of EKW area is approximately 690 m from the proposed STP site and no project components are proposed within or near the EKW area. The treated wastewater from STP will be discharged into nearby TP canal by gravity which is outside EKW area and is at a distance of 150m towards western direction from the proposed STP site. TP canal terminates at Chowbhaga pumping station, from there water is pumped to Storm Water Flow (S.W.F) canal system. S.W.F system passing through EKW area and gravitated towards Kulti river of Matla estuary system about 45 km downstream of Kolkata which ultimately meets with River Bidyadhari. The storm water flow is not perennial in nature. It is yielded only during the monsoon season. Sewage generated from the study areas in Borough XII through Tollygunge – Panchannagram Basin is discharged through DWF system passing through East Kolkata Wetlands (EKW) to the Kulti River.

B. Physical Resources

52. **Location, Area and Connectivity.** The proposed STP site is located in East Kolkata at ward 108 an administrative division under KMC. This area was incorporated under KMC in 1984 under Calcutta Municipal Corporation Act, 1980. The project site is bounded by the Anandapur High road and TP Canal on west side, Mundapara Canal on east and north side, and C2-C3 lead channel on south. The proposed site is 24 m away from the Anandapur main road. There is a bituminous approach road of 4.5 to 5 m width beside the proposed land. The site is 16 km from Netaji Subhas Chandra Bose International Airport, 2km from Eastern Metropolitan Bypass and 11 km from Howrah Railway Station.

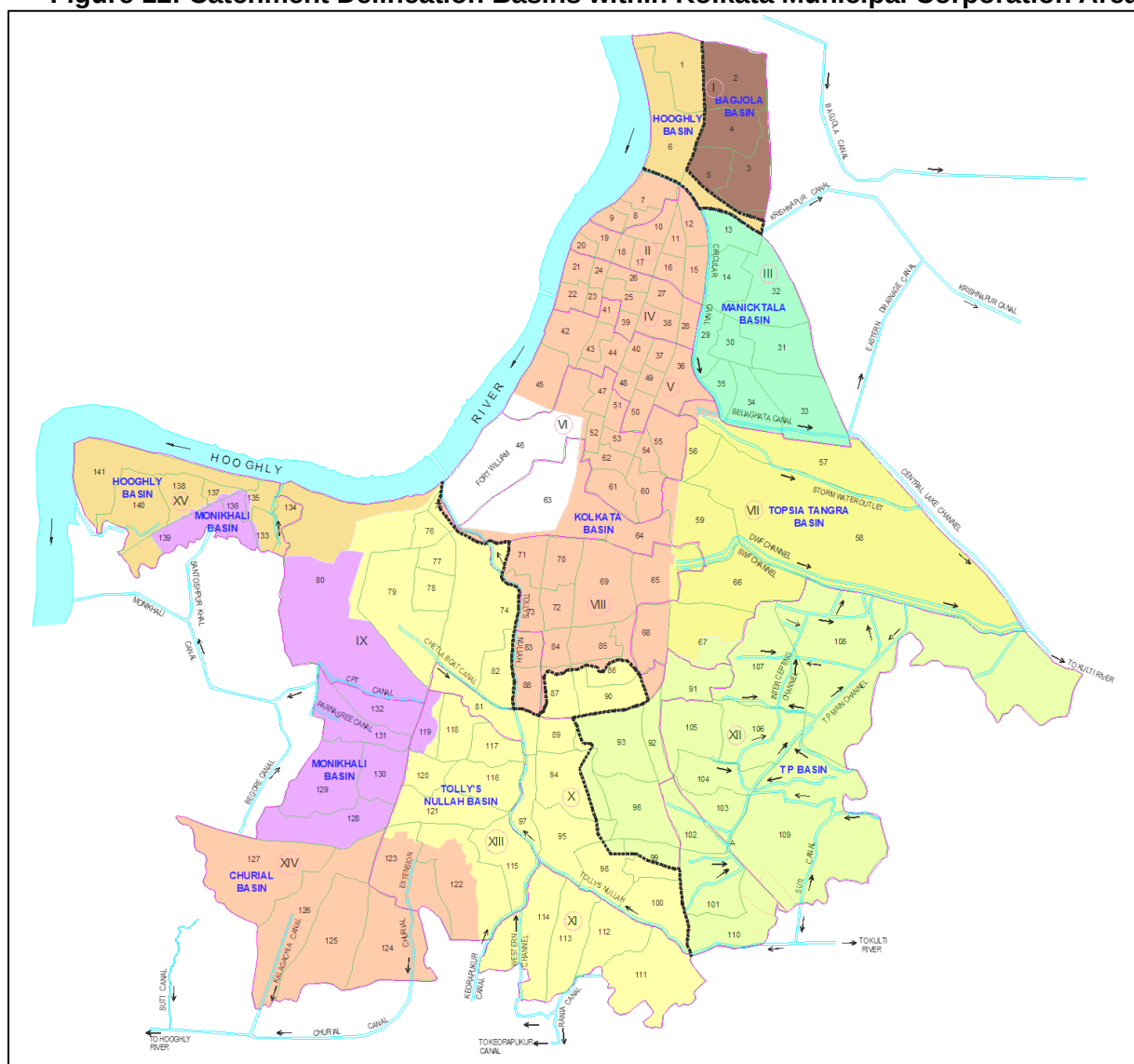
53. **Topography:** General topography of the area is flat having slope towards north to south and from west to east. The elevation ranges from 1.9 to 3.5m above MSL. The STP land is low lying and flat and vacant without any trees. The STP site is below the embankment height of Anandapur high road level, therefore, the area regularly experiences water logging during monsoon even with moderate rainfall.

54. **Drainage:** Based on the topography and river and canal system in the region, the city of Kolkata is divided into two major drainage systems – the Hooghly system and the Kulti System. The primary surface water resource in Kolkata is the Hooghly River. It forms the western boundary of the KMC area. However, the natural gradient of the city is such that storm runoff from only a small portion of the city gets discharged to the river Hooghly directly. Besides this, Bidyadhari and Kultigong rivers meander along the eastern boundaries of KMC areas and discharges directly into the Bay of Bengal. These rivers, along with an elaborate network of canal systems are the recipients of entire drainage water generated from KMC and its adjacent areas. The KMC area, with its generally flat terrain condition, receives more than 1582 mm of rainfall yearly mainly spread over a 4 months period and comprised of mainly medium density – high frequency long

duration storms. Due to the absence of an efficient drainage system to cater such an adverse condition, large areas of KMC suffer from prolonged inundation during monsoon causing severe health and economic hazards to the inhabitants.

55. Based on the existing topography and outfall system, the entire KMC area comprising all 16 boroughs was re-delineated into nine (9) major drainage basins namely Kolkata basin, Manicktala basin, Tolly's Nullah basin, Topsia - Tangra basin, Hooghly basin, Tollygunge - Panchannagram (TP) basin, Bagjola basin, Monikhali basin and Churial basin. The sub-project area comprising ward 108 under Boroughs XII comes under Tollygunge-Panchannagram Basin (T P Basin) system. The major drainage channels flowing through the sub-project area are Lead channel D-D1 from the north, Tollygunge - Panchannagram Main canal (TP canal) from the east and Lead Channel C1-C2 from the south side. Both D-D1 channel and C1-C2 channel meet with TP canal.

56. A drainage channel is passing through the STP site and connects TP canal via a culvert under the Anandapur main road. This channel acts as a conduit for seasonal water from roadside drains and collects runoff from the entire catchment area, particularly during the wet season. Furthermore, it functions as a conduit for wastewater from nearby temporary houses. The channel remains dry most of the year, except during the monsoon season when it carries runoff water. Given the low-lying nature of this land parcel and Kolkata's susceptibility to heavy rains during the monsoon, any modifications to this drainage system could trigger flooding in the surrounding areas. Drain diversion proposal is prepared carefully without disturbing the existing condition or drainage function of the channel and vacant land i.e. flow of water from surrounding area and vacant land into drainage channel. There will be uninterrupted drain flow and discharge water into TP canal during the monsoon.

Figure 12: Catchment Delineation Basins within Kolkata Municipal Corporation Area

Source: DPR 2024

57. Geology and Soil: Kolkata city, which is a part of the South Bengal Basin, is characterized by extremely flat topography. The subsurface lithological assemblages of the upper few hundred meters comprise a buried late Pleistocene landscape of paleo-channels and paleo-interfluvial deposits overlain by Holocene channel/flood plain deposits. The topographic elevation ranges between 3 and 8 m above mean sea level (msl). The area has a fluvio-deltaic depositional environment. The peat layers in the upper horizons were deposited as result of boggy and marshy conditions at the end of the sedimentation process. The irregular nature of the subsurface lithology is characterized by the filled up paleo-channels and a natural levee on both sides of the River Hugli. The KMC area is located within lower deltaic alluvial plain of the Ganges River system and is underlain by Quaternary sediments consisting of clay, silt, and various grades of sand, gravel, and pebbles deposited in deltaic environment by Ganga-Bhagirathi River system. Regional subsoil data covering a large area in subproject area reveal six levels of strata up to a depth of about 50 m below ground level. Near surface general stratigraphy of the project area is given:

Table 4: Near Surface Stratigraphy of the Project Area

Horizon I	Stratum I	Brownish grey/ light brown, silty clay/ clayey silt/ sandy silt with occasional lenses of silty fine sand; encountered from the top ground surface to a depth of about 3 to 4 m; occasionally only fill material of widely varying characteristics (about 4 m).
	Stratum II	Grey/ dark gray silty clay with semi-decomposed timber pieces, having lenses of silt and peaty clay; encountered between depths 3-4m and approximately 15m below ground level (about 10m).
Horizon II	Stratum III	Bluish grey and mottled brown/ grey, silty clay with kankar nodules and minute pockets of silt and sand (about 5.5m).
	Stratum IV	Brown/ yellowish brown, sandy silt/ silty fine sand/ clayey silt with lenses and pockets of brown/ grey silty clay (about 6m).
	Stratum V	Mottled brown/ grey, grey silty clay and brown silty clay frequently showing laminar character (about 18m).
	Stratum VI	Brown/ light brown, silty fine to medium sand (9m +).

58. On the **basis of soil types**, the Kolkata area may be divided into two groups viz. Entisols and Alfisols. The Entisols are present at the western part of the area and the other part is represented by Alfisols. These soils are typically deltaic alluvial soils. The agro-climatic zone characterization of the area is Gangetic alluvium group of soils rich in calcium. Free calcium carbonate occurs in surface soils and the soil profile shows low to medium levels of organic matter and medium levels of available phosphate and potash. Kolkata and the neighbouring areas are represented predominantly by clayey soils. Gangetic alluvium type of soils is mainly found in the project area. The soil is fertile in nature. Table 5 shows the physical and chemical characteristics of soil sampled and analyzed from the two selected locations of Ward no 108. The soil is predominantly silty in nature (53 to 58% silt content). The pH ranges from 6.5 to 7.5 at 25°C. The soil has cohesive characteristics and low permeability with specific gravity of 2.65.

Table 5: Soil Quality

Sr. No	Soil Sample Location	pH at 25 °C	Temp (°C)	Available Sulphate SO ₃ (ppm)	Natural Moisture Content (%)	Sand	Silt	Clay	Specific Gravity
1	Hossainpur Borehole No.1	7.5	33.4	54.878	26.4	33.37	58.12	11.33	2.65
2	Hossainpur Borehole No.2	6.5	33.4	ND	26.4	32.44	53.44	21.16	2.65

Date of sampling: 10th April, 2023 (Source: Package SD 32, KEIIP Tranche 3)

59. **Seismology:** Geologically Kolkata falls within Moderate Earthquake Damage Risk Zone (Zone-III) within very close vicinity of High Earthquake Damage Risk Zone (Zone-IV) of North and South 24 Parganas districts (District Survey Report_2018).

60. Kolkata is located in a seismically active zone, but significant earthquakes in the city are relatively rare. However, the region has experienced tremors from distant earthquakes. The most notable seismic event affecting Kolkata in recent history was the 1934 Bihar earthquake, which caused extensive damage and loss of life in Bihar and affected parts of Kolkata as well. Since 1970, Kolkata has had 4 quakes of magnitudes above 3 and up to 4.9 ; 3 quakes above magnitude 4 and 1 quake between magnitude 3 and 4. The city continues to take measures to improve earthquake preparedness and building resilience to mitigate the impact of future seismic events.

61. **Climate:** The climate of Kolkata is predominantly tropical wet and dry type and is highly influenced by the Bay of Bengal. There are three seasons' namely - Summer, Monsoon and Winter. The climate is hot and humid from March to October. It is somewhat cool from November to February. Rains are received principally from June to September with frequent pre monsoon showers and nor 'westers during April and May. The winter season begins in November and continues to February, followed by the summer season which continues until mid-June. The monsoon starts in mid-June and goes up to mid-September, sometimes extending up to October. April and May are the hottest months with monthly mean maximum temperature above 35 degree Celsius (°C). Mean maximum temperature is above 30°C from March to October. Relatively low monthly mean minimum temperatures occur during December (15.2°C), January (14.1°C) and February (18.1°C). Mean monthly minimum temperature is relatively high and is between 26°C and 27°C during the months of May, June, July and August. The average annual rainfall is about 1919 mm with the four monsoon months (June to September). Rainfall peaks in July with approximately 157 mm of precipitation, while January and December received the lowest rainfall, approximately 5 mm (refer: District Environment plan, 2023). Average number of rainy days is about 146 days per annum. During monsoon months it is not uncommon to receive 75 mm to 100 mm of rainfall in a 24-hour period. Such heavy rainfall may occur from 4 to 10 times in a year.

62. Kolkata experiences an average relative humidity (RH) of approximately 77%, with variations throughout the year. The humidity typically ranges from around 66% in March (Summer) to 88% in July (Monsoon). July stands out as the most humid month, with a range of 69.5% to 96.4%. Conversely, March is the least humid month, with humidity fluctuating between 22.9% and 96.2%. Wind is light to gentle with maximum monthly average speed 7.22 kilometer per hour (km/h). The post-monsoon and winter months (October-February) experience very light wind. The average monthly wind speed during pre-monsoon and monsoon are 6.10 and 5.03 km/h, respectively. The mean annual wind speed is 4.28 km/h. The prevalent wind direction was from southwest during most of the time in the year, except during winter when the northerly wind became significant. However, during cyclonic storms and depressions especially those occurring in September to October, high wind speed is not uncommon (refer: District Environment plan, 2023).

63. **Air Quality.** The concentrations of air pollutants in Kolkata are highly variable over the seasons. They are at their highest during winter months (November to February) and at their lowest during monsoon months (June to September). Seasonal variations in temperature, wind direction, rainfall, and other factors account for this. There are no ambient air quality monitoring stations in the subproject area, air quality is not monitored by West Bengal Pollution Control Board (WBPCB). Following table 6 presents ambient air quality measured at Mukundapur pumping station PS during the implementation of sewer works in ward 109, borough XII under KEIIP (Tranche 3) for the period of April, 2022 to April, 2023. Mukundapur PS is located about 1.5 km aerial distance from proposed Hossainpur STP site. When compared with National ambient air quality standards (NAAQS,2009), the air quality monitoring results (24-hours monitoring) are found within the permissible limit. The concentration of all parameters is above the standard when compared with IFC-WB EHS Guidelines 2007 (the WHO Global Update 2021) prescribed standard.

Table 6: Ambient Air Quality Data at Borough XII

Monitoring location	Monitoring stage	Date of monitoring	Parameters (µg/m ³) (24-hours)			
			PM ₁₀	PM _{2.5}	SO ₂	NO ₂
Nitai Nagar Road, Mukundapur (ward 109)	Construction Stage of KEIIP	30.04.2022	86	45	8.4	29.2
Mukundapur pump house (ward 109)	Construction stage of KEIIP	02.11.2022	92	48	9.1	31.0
Mukundapur pump house (ward 109)	Construction Stage of KEIIP	18.04.2023	89	50	7.7	32.8
NAAQS standard (2009), (24-hr) µg/m ³			100	60	80	80
IFC-WB EHS Guidelines 2007 (the WHO Global Update 2021) (24-hr) (µg/m ³)			15	45	4	25

(Source: Air Quality Monitoring report of Package SD 32, KEIIP Tranche 3)

64. **Noise.** Noise level in KMC area is high and often exceeds the national standards. Average noise level in typical residential areas away from the busy streets varies between 47.0 to 66.0 dBA during daytime with only about 20% of the measurement sites have noise level conforming to the prescribed noise level of 55 dBA (residential area; day time).¹⁶ Noise level near busy roads are relatively high but variable noise level depending on the density of vehicle moving on the roads at the time of measurements. Noise level was measured during the construction of Mukundapur PS and laying of sewer line at ward 109, borough XII under KEIIP, Tranche 3 project for the period of April, 2022 to April, 2023. Mukundapur PS is approximately at an aerial distance of 1.53 km from the proposed Hossainpur STP site. The results are shown below in Table 7 and noise level standards for different sources are provided in Table 10 for India National Noise Level Standards and WHO Standards. Noise level monitoring results indicates that both day time and night time noise levels (Table 7) meet the permissible limits only at Nitainagar main road sampling location as per standards for residential areas for Indian and WHO standards (Table 10). In other locations it is above the prescribed standards.

Table 7: Noise Level data at Borough XII

Sampling Locations- Area	Implementation Stage	Date of Monitoring	Day Time Leq dB(A)	Night Time Leq dB(A)
Nitainagar main road, Mukundapur	Construction Stage of KEIIP	30.04.2022	54.3	45.5
Mukundapur Pump house	Construction stage of KEIIP	02.11.2022	62.0	46.4
Mukundapur Pump house	Construction stage of KEIIP	18.04.2023	61.7	50.4

(Source: Noise monitoring report, Package SD 32, KEIIP Tranche 3)

¹⁶ IND: Kolkata Environmental Improvement Investment Program (Tranche 3) – Sewage Treatment Plant (SD28), July 2018

Table 8: Reference Noise level

Receptor/ Source	India National Noise Level Standards (dBA) ^a		WHO Guidelines Value for Noise Levels Measured Out of Doors ^b (One Hour Leq in dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00
Industrial area	75	70	70	70
Commercial area	65	55	70	70
Residential Area	55	45	55	45
Silent Zone	50	40	55	45

^a Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

^b Guidelines for Community Noise. WHO. 1990

65. Baseline air quality monitoring and noise level monitoring shall be conducted during pre-construction phase by the contractor are accordingly included in the contractor's contract.

66. **Surface Water Quality.** Drainage system in and around Kolkata area mostly gravitated eastwards to Kulti River of Matla estuary system about 45 km downstream of Kolkata which ultimately meets with River Bidyadhari further at a distance of about 70km. Department of Irrigation & Waterways manages the main drainage channels in EKW area namely dry weather flow (DWF), Storm Weather Flow (SWF) and Fishery Feeding canal (FFC). Fisheries get sewage from the intrinsic network of canals originating through these (DWF and FFC) channels. Maximum quantum of sewage generated from the KMC area flows into EKW where it is treated and utilized for fish and agricultural farming. Sewage generated from the study areas in Borough XII through Tollygunge – Panchannagram Basin is discharged through DWF system passing through East Kolkata Wetlands (EKW) to the Kulti River. The sewage receives partial treatment as it passes through the EKW, an extensive fishery occupying 12500 Ha of land to the east of the city. At present, 900 MLD sewage is treated naturally by EKW. However, given the fact that the Tollygunge – Panchannagram Basin and Topsia – Tangria Basin discharges directly into the SWF channel, which is then bypassed into the Kulti River, about 78% of the DWF emanating from the Kolkata city and its sub-urban areas is drained into the wetlands, and is available for nutrient recycling.

67. SWF generating from the command area discharges into T.P basin via different canal networks for disposing into Storm Water Flow (S.W.F) system passing through EKW and gravitated towards Kulti river traversing through EKW area. The storm water flow is not perennial in nature. It is yielded only during the monsoon season, and the severity, depends and varies with the intensity of storm water flow. The treated wastewater from STP will be discharged into nearby TP canal by gravity which is outside EKW area and is at a distance of 150m towards western direction from the proposed STP site. TP canal terminates at Chowbhaga pumping station, from there water is pumped to Storm Water Flow (S.W.F) canal system. T P canal mainly carries untreated wastewater from nearby habitations and algal growths were visible in this part of canal and water is polluted. After implementation of sewerage system, the canal will not receive wastewater and operation of the proposed STP at will save the drains/canals from pollution.

68. A part of storm runoff generated from catchment areas is disposed off to different canals like C2-C3 channel, Mundapara canal and T.P Main canal flowing through the catchment area at various locations by different gravity outfalls. No site-specific surface water quality data is available. Therefore, surface water quality monitoring shall be conducted for C2-C3 Channel, Mundapara canal and TP canal during pre-construction phase by the contractor and results will be appended in the updated in IEE.

69. Preliminary assessments conducted by KMC for the STP confirmed that the TP Canal has adequate capacity to carry the treated sewage from the STP. Further to evaluate the canals' carrying capacity for the KSHARP, a joint survey with the Irrigation Department and KMC is currently underway at all discharge locations. The results from this survey will be incorporated into the updated Initial Environmental Examination (IEE).

70. **Groundwater.** The aquifers that are tapped for ground water in Kolkata are under confined condition because of the presence of a thick clay layer near the surface. Such aquifers occur at various depths separated by other clay layers. Generally, the first aquifer is encountered at a depth of about 15 m followed by other aquifers with a principal one at about 90 m depth. The shallow aquifer is not used for bulk water tapping purposes and is generally only tapped for spot supply of through hand pumps. A further deep aquifer occurs at depths approximately between 150 and 200 m, and majority of deep tube wells tap this aquifer. The confined aquifers in this area are classified into two groups, spanning from the northern to the southern extremities. The upper group, located at depths between 20 meters and 160 meters, is characterized by a notable sandy gravel layer at its base, functioning as a distinctive marker bed. The ground water in general except at a few places occurring in this upper group of aquifers, is brackish to saline (chloride ranging from 1750 to 6300 ppm) and is not in use. Groundwater level varies between 1.70 m below ground level (bgl) and 6.00 m bgl during pre-monsoon period and from 0.50 m to 5.80 m bgl during post-monsoon period. Productive fresh water bearing zones are in depths ranging from 115 to 402 mbgl and are capable to yield 100 to 120 m³/h, with drawdown ranging from 2.3m to 16.5m (CGWB Report on North and South 24 Parganas and Howrah districts, West Bengal, 2021)

71. In the Eastern part of the city where the sub-project area is located, the groundwater in shallow zones occurs under unconfined conditions. Here shallow aquifers occur within 12 meter below ground level as thin lenses and groundwater occurs under unconfined condition. The groundwater in these areas including adjoining EKW region is available from an average depth from the surface at 4-8 m in pre monsoon, 1-9 m in the monsoon and 1-10 m in the post monsoon periods. Due to the shallow levels of groundwater, an alluvial media and a hydraulic conductivity, fluctuations between the groundwater levels at shallow ranges are highly variable.

72. Ground water in KMC area occurs under two principal types, viz. Bicarbonate type and Chloride type. Ground Water in the area west of a line connecting BBD Bag, Park Street and Jadavpur is of bicarbonate type whereas in the area east of this line (where current project is proposed) ground water is of chloride type. The two anionic types were further subdivided each into two types on the basis of predominance of cation concentration. These are (i) calcium–magnesium bicarbonate, (ii) sodium bicarbonate; (iii) calcium–magnesium chloride; and (iv) sodium chloride. Source of water for construction will be finalized by the contractor upon award and will obtain necessary approvals. Groundwater is not generally used for construction in this area; however, contractor will obtain necessary permits if groundwater is used. Baseline groundwater quality monitoring shall be conducted during pre-construction phase (service Improvement Period) by the contractor.

C. Ecological Resources

73. **Flora.** In KMC area, except a small part falling under East Kolkata Wetland, located in the eastern fringes, naturally found vegetation is scarce. The STP and its surrounding area is urbanized area, therefore natural vegetation is only found in few comparatively undisturbed patches such as along Canal bank roads. The STP site is very large, open, vacant, and covered with shrubs and bushes.

74. Roadside plantation orchards within the residential area offer more varied vegetation. There is no tree in the proposed STP land and no forest area within or close to subproject area. Few commonly found tree species are given below:

Table 9: Tree Species available within Sub-project Area

Sr.no	Name	Scientific Name	IUCN Status
1	Coconut	(<i>Cocos nucifera</i>)	Not Evaluated
2	Mango	(<i>Mangifera indica</i>)	Data Deficient
3	Gulmohar	(<i>delonix regia</i>)	Least Concern
4	Jarul	(<i>Lagerstroemia speciosa</i>)	Not evaluated
5	Sajina	(<i>Moringa oleifera</i>)	Least Concern
6	Kadam	(<i>Neolamarckia cadamba</i>)	Not Evaluated
7	Neem	(<i>Azadirachta indica</i>)	Least Concern

Source: Site visit during IEE preparation (February 2024)

75. **Fauna.** The subproject site is highly residential and urbanized area; therefore, no protected category faunal species are found in this area. Few commonly found species are:

Table 10: Fauna available within Subproject Area

Sr.no	Name	Scientific Name	IUCN Status
1	Small Indian civet cat	(<i>Viverricula indica</i>)	Least Concern
2	Mongoose	(<i>Herpestes edwardsii</i>)	Least Concern
3	House rat	(<i>rattus rattus</i>)	Least Concern
4	Mice	(<i>mus musculus</i>)	Least Concern
Reptiles			
5	Garden lizards	(<i>Calotes versicolor</i>)	Least Concern
6	Snakes	(<i>Natrix sp.</i> , <i>Viper sp.</i>)	Least Concern
7	Kraits	(<i>Bungarus caeruleus</i>)	Least Concern
Birds			
8	House crows	(<i>Acridotheres tristis</i>)	Least Concern
9	House sparrows	(<i>Paser domesticus</i>)	Least Concern
10	Pigeons	(<i>Coluamba livia</i>)	Least Concern
Amphibians			
11	Indian bullfrogs	(<i>Rana tigrina</i>)	Least Concern
Arthropods			
12	Butterflies(plain tiger)	(<i>Danaus chrysippus</i>)	Least Concern
13	Ants	(<i>Tapinoma sessile</i>)	Not Evaluated

Source: Site visit during IEE preparation (February 2024) and local people

76. **Aquatic Flora and Fauna.** Anchored, free floating and submerged hydrophytes like Kachuri pana (*Eichhornia crassipes*), Azolla (*Azolla pinnata*), Sagittaria (*Sagittaria sp.*), Hogla (*Typha angustifolia*) etc can be seen in open water bodies around the project area. Such water bodies often contain fishes such as Rohu (*Labeo rohita*), Catla (*Catla catla*), and Bata (*Labeo bata*). Phytoplankton like *Spirogyra sp.*, *Zygnema sp.*, *Navicula sp.*, *Nostoc sp.*, *Hydrodistyom sp.*, etc. and zooplankton like *Cyclops sp.*, *Paramecium sp.*, *Euglena sp.*, *Diaptomus sp.*, larvae of *Culex sp.* etc. are ubiquitous. There is only one fishery pond in the project area. No such endangered species of aquatic flora or fauna reported from project area (Source: Chandra, Raghunathan, and Mao 2020. Biodiversity Profile of East Kolkata Wetlands (https://ekwma.in/ek/new_release/East%20Kolkata%20Wetlands%20Management%20Action%20Plan%202021-2026.pdf)).

77. **Phytoplankton and Zooplankton** species found in canals of Kolkata and EKW area: Several phytoplankton species are present in main sewage canals of city of Kolkata including T P canal and passing through the East Kolkata Wetland. Out of all species *Microcystis* sp. and *Oscillatoria* sp are showing their dominance. Other class of phytoplankton species are – Bacillariophyceae, Chlorophyceae, Dinophyceae, Euglenophyceae, Myxophyceae, Rhodophyceae, Xanthophyceae etc. Zooplankton species found are Rotifera, Copepoda and Cladocera (Source: Chandra, Raghunathan, and Mao 2020. Biodiversity Profile of East Kolkata Wetlands (https://ekwma.in/ek/new_release/East%20Kolkata%20Wetlands%20Management%20Action%20Plan%202021-2026.pdf)).

78. **Protected areas.** As per IBAT screening report nearest notified protected area is East Kolkata Wetland (EKW) which is designated Ramsar site and a wetland of international importance (Error! Reference source not found.). The boundary of EKW area is 690 m away from the proposed STP site at Hossainpur (Figure 13). Treated effluent from STP will be discharged in to TP canal which is outside of EKW area. Sundarban Biosphere Reserve, the UNESCO world heritage site is located within 50 km from the project area. There is no threatened or endangered flora and fauna in the subproject area. The sub-project will pose no risk or impact on biodiversity and natural resources.

79. **East Kolkata wetlands.** The East Kolkata Wetlands (EKW), located on the eastern fringes of Kolkata city, is a part of the extensive inter-distributary wetland regimes formed by the Gangetic delta. The EKW located on the eastern fringes of Kolkata city is and is distributed across the part of three districts covering 37 mouzas/villages (30 full) , seven Gram Panchayats and two municipal corporations (Figure 14), and is spreads over an area of 12 ,500 ha. It is a mosaic of water bodies, agricultural land and settlement areas largely under private ownership. It has more than 260 water bodies of varying sizes. It supports a resident population of over 120 ,000 and pisciculture and agriculture provide major livelihood avenues to them. Only a small part of KMC area falls within the limits of EKW.

80. The EKW area includes one of the largest assemblages of sewage fed fish ponds. The importance of this wetland lies in the fact that these sustain the world's largest and oldest integrated resource recovery practice based on a combination of agriculture and aquaculture, and provide livelihood support to a large, economically underprivileged sizeable population depends upon various wetland products, primarily fish and vegetables for sustenance. Based on its immense ecological and socio-cultural importance, East Kolkata Wetlands is declared as Wetland of International Importance under Criteria 1 under Ramsar Convention in 2002.¹⁷ EKW is a classic example of harnessing natural resources of the wetland system for fisheries and agriculture through ingenuity of local communities with their traditional knowledge. The wetland has been included by the Ramsar Convention as one of the 17 case studies on wise use of wetlands at the global level. The wetland provides strong arguments for integration of traditional knowledge of local communities into conservation and management practices.¹⁸ At least 380 species under major flora including 93 plant families, 10 amphibians, 29 reptiles, 123 birds, 79 fish, 24 crustaceans, and 13 mammal species have been recorded from these wetlands. The traditional waste recovery practice provides subsistence opportunities for a large, economically underprivileged population of 0.15 million living in the 37 revenue villages (locally called mouza)

¹⁷ The Ramsar Site was designated in 2002 with the name "East Calcutta Wetlands" and remains so in the Ramsar database. In 2001, the Government of West Bengal decided to change the name of its capital city to Kolkata. The Rules governing the wetland is titled ' East Kolkata (Conservation and Management) Rules, 2006' and the Authority as East Kolkata Wetlands Management Authority.

¹⁸ Integrated Management Plan of East Kolkata Wetlands (Management Action Plan 2021 – 2026)

within its boundaries. EKW is also one of the few natural habitats providing recreational space for the urban and peri-urban population.

81. Over 260 shallow fish ponds, in the EKW receive over 900 MLD pre-settled sewage from the Kolkata Metropolitan region through a network of locally excavated secondary and tertiary canals, which is used to produce fish, vegetables and irrigate 2850 ha of paddy lands. As the nutrient-rich effluent moves through the system, it is progressively cleaned, and nutrients are redirected to the growth of algae or agricultural products grown along the pond edges and agricultural lands. Algae and other aquatic plants are used to feed up to 17 species of fish cultured in these ponds, which in turn create nitrogen and phosphorus-rich water to irrigate the adjacent rice fields. The traditionally evolved natural water purification waste recovery practice saves the much of treatment cost. These wetlands also lock in over 60% of carbon from wastewater, thus reducing harmful Green House Gas emissions from the region.

82. The East Kolkata Wetlands (EKW) is the vital component of the friendly water regime. It provides three basic securities towards i) the fish ponds ii) paddy field and iii) garbage farms which are critical for the population. But , such securities for the foods , cannot be provided without the input of the sewage water. The basic line input to the EKW system is the sewage laden water, which passes through (DWF) channels, throughout the year, irrespective of the seasons and having with more or less with same flowing capacity.¹⁹ It is pertinent to mention that the Dry weather flow is made available throughout the year, whereas, the storm water flow is not perennial in nature.

83. **The ecology of the EKW** area has undergone a dramatic change since the beginning of the 19th century due to cessation of tidal (brackish water) influx from Bidyadhari and Matla rivers into the then saline marshy area with brackish water fisheries. The change is not only due to natural causes like siltation but also due to developmental activities and hydrological interventions. The brackish water fisheries of earlier years were converted in to sewage fed fisheries bringing in a changed ecosystem and establishing a new biodiversity in the EKW areas. Wastewater undergoes solar purification and natural oxidation, creating an environment suitable for algae and plankton, serving as the primary feed for fish. EKW offers a cost-effective, efficient, and eco-friendly solid waste and sewer treatment system for Kolkata. It serves as a habitat for waterfowl and hosts diverse flora and fauna.

84. There is no forest patch within EKW. There are no endangered species but there are a number of rare mammals, reptiles, fish and bird species. According to the Ramsar information database, there are rare mammals such as Marsh mongoose, small Indian mongoose, Palm civet and small Indian civet included in the schedule II of Indian Wildlife Protection Act,1972. The representative aquatic flora and fauna of the EKW are listed in Table 11 and Table 12, respectively.

Table 11: Representative Aquatic Flora of the EKW

Type of Flora	Species
Free floating forms	Eichhornia sp., Spirodella sp., Pistia sp., Ceratophyllum/Utricularia sp., Axolla sp.,
Fixed anchored forms	Vallisneria sp., Hydrilla sp., Najas sp., Nymphaea sp., Nymphoides sp
Emergent amphibious forms	Marsilea sp., Impomoea sp., Enhydra sp., Colocasia sp.,

¹⁹ The report of school of Water Resources Engineering, Jadavpur University , Kolkata -700032 , prepared for Kolkata Environmental Improvement Project , in 2006

Type of Flora	Species
Facultative forms	Typha sp., Cyperus sp.,
Algal forms	Synandra sp., Spirogyra sp., Zygnema sp., Nitelea sp.,

Source: 1. Utilization scenario of Kolkata Wetlands (1996) ; 2. Urban Ecology, Ghosh A.K 1988 ;3. Chandra, Raghunathan, and Mao 2020. Biodiversity Profile of East Kolkata Wetlands (https://ekwma.in/ek/new_release/East%20Kolkata%20Wetlands%20Management%20Action%20Plan%202021-2026.pdf)

Table 12: Representative Fauna of the EKW

Type of Fauna	Species
Water fowl	Phalacrocorax niger, Ardeola gravis; Babulcus ibis; Egretta garzatta
Waders	Tringa hypoleucos; Calidris minutilla
Kingfisher	Ceryle rudis; Alcedo atthis; Pelargopsis capensis; Halcyon smyrnensis
Aquatic reptiles	Lissemys punctata, Enhydra enhydra, xenochrophis piscator
Amphibians	Rana cyanophylla; Rana tigrina, Rana limnoides, Microphyla ornata; Bufo melanostictus
Fish	Catla catla; Labeo rohita; L. calbasu; L. bata; Cirrhinus mrigala, Hypophthalmichthys molitrix, Microvertebrates Puntius sarana, P. ticto, Amblypharyngodon mola; etc.
Mollusca	Mollusca Bellamya bengalensis; Pila globosa; Diagnostoma sp., Lymnaea sp., Gyrodont sp., Thiaridae sp., etc.
Annelida	Oligochaeta; Brachyura; Limnodrilus sp., Hirudines – Glossophonia sp.,
Insecta	Hemiptera : Anisops sp., Limnognathus sp., Plea sp., Hydrometra sp., Micronecta sp.,

Source: Utilization scenario of Kolkata Wetlands (1996) 2. Urban Ecology, Ghosh A.K 1988.

85. The EKW faces threats from urbanization, changes in waste quality and quantity, and anthropogenic activities. The East Kolkata Wetlands Management Authority (EKWMA). formed under the East Kolkata Wetlands (Conservation and Management) Act, 2006, is entrusted with the statutory responsibility for conservation and maintenance of the EKW area. The main task of the authority is to maintain the existing land use practices along with its unique wastewater recycling activities. EKWMA prepared Integrated Management Plan of East Kolkata Wetlands Management Action Plan 2021 – 2026.²⁰

²⁰(https://ekwma.in/ek/new_release/East%20Kolkata%20Wetlands%20Management%20Action%20Plan%202021-2026.pdf).

Figure 13: 500m, 1 km and 5 km buffer area around the proposed sub project site along with distance from EKW area

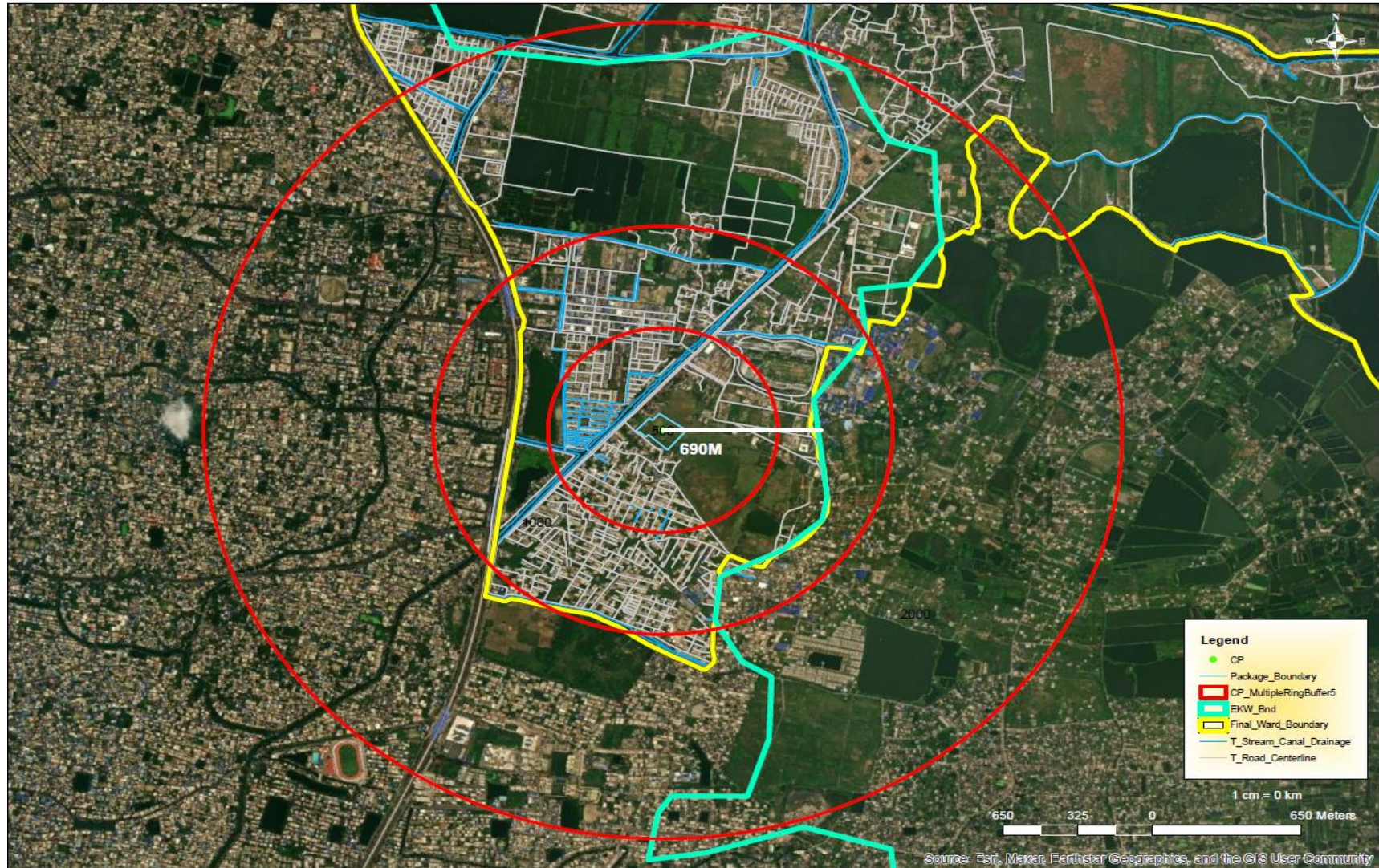
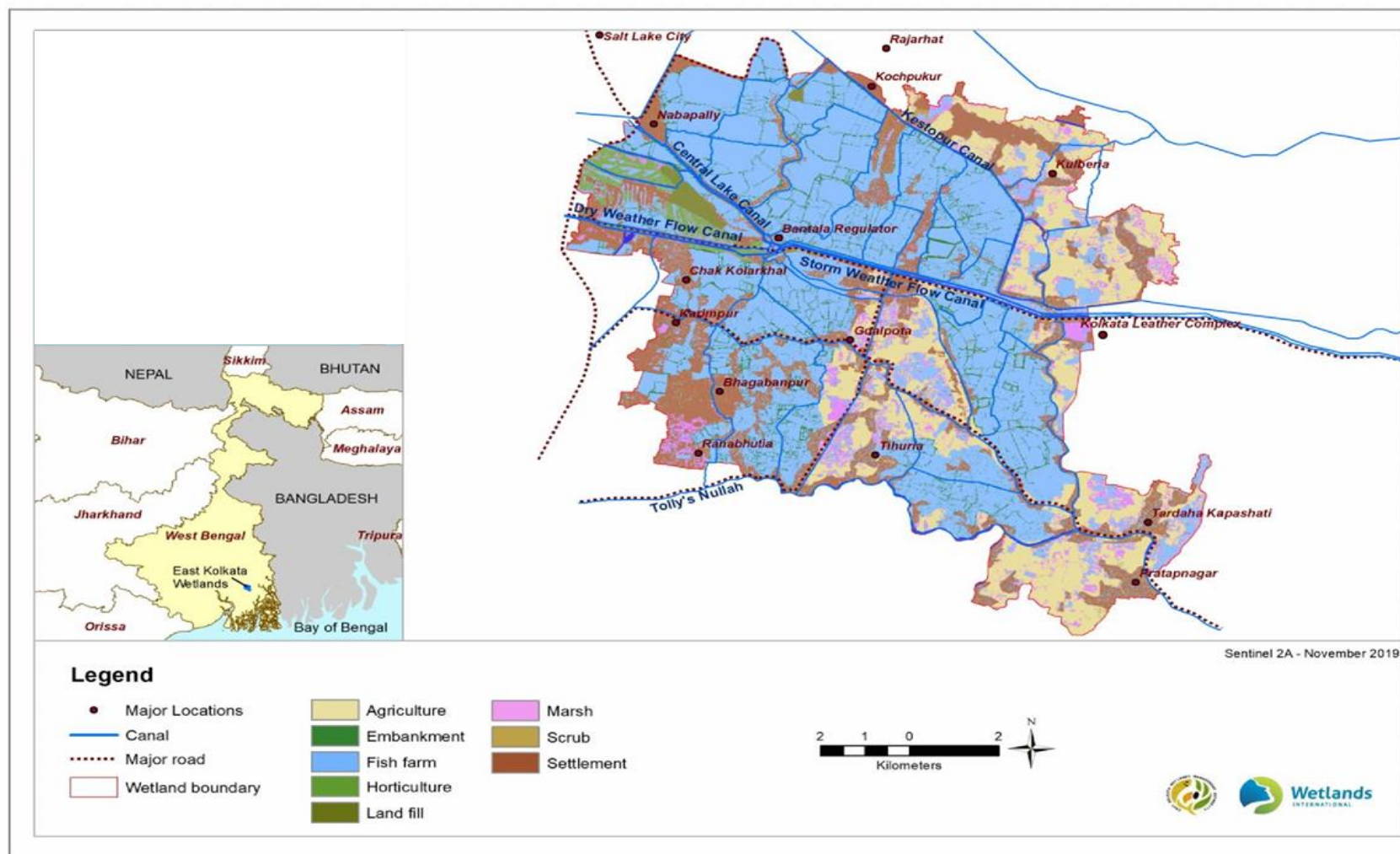


Figure 14: East Kolkata Wetland



Source: EKWMA and WISA, 2021

D. Economic resources

86. **Demographic profile of the project area.** According to the 2011 Census of India, Ward No. 108 in Kolkata Municipal Corporation reported a total population of 64,777. Among them, 33,428 (52%) were males, and 31,349 (48%) were females. The population below 6 years of age was 7,204. The total number of literates in Ward No. 108 was 46,487. Total number of population in 2028 (base year) would be 1,58,232 in the sub project area.

87. **Land Use.** The metropolitan area of Kolkata has grown from a few small villages to its present status as India's most populous city. The predominant land use in the KMC is residential. The land use pattern in the subproject area is predominantly residential with vacant land surrounding the selected STP site. Few commercial activities are observed in nearby areas. Urban agriculture is being practiced in Dhapa area in Kolkata. Seasonal farming is also being observed in the vacant land beside the EM bypass. However, there is no agriculture land within subproject area. Urban planning is one of the responsibilities of the KMC. The KMDA also has a role in land planning, with a broader geographic scope than KMC.

88. **Industrial facilities.** Major industrial activity in the sub-project area found in Kasba Industrial Estate I, II and III, situated in East Kolkata township, Anandapur. Sewer pipe laying is proposed along the Kasba Industrial Estate phase I and III, and at the backside of Kasba Industrial Park phase II. Main type of industries here includes engineering, fabrication, printing, synthetic fishing net, food industries, leather products.

89. **Existing water supply system.** The water supply system of Kolkata is very old, operated from 1865. Present average per capita supply is 134 lpcd, which is very near to desired supply of 150 lpcd. But the supply is very uneven, ranging from 40 lpcd to 310 lpcd. Unaccounted for water (UFW) is 40%. Average supply period is 8 hours a day. Residual pressure is very low. About 10% of supply in Kolkata is from ground water. The source is affected by arsenic in some locations and TDS and Fe values are often above permissible values. From quality and health point of view the ground water source needs to be replaced. Water supply is being improved under KEIIP and the water supply rate in the project area is expected to be 150 lpcd.

90. **Transportation.** Subproject area is located within the Kolkata metropolis. Howrah railway station, located 10 km away, serves as the nearest railway hub, while the Netaji Subhas Chandra Bose International Airport, situated 15 km away, caters to air travel needs. The proposed Garia to Dumdum Airport Metro line, running close to the project site along the EM Bypass, adds another convenient option for travelers. Major roads in the project include Madhurdaha Main Road, Hossainpur Main Road, Anandapur main road, Anandapur high road, and Anandapur East Kolkata Township (EKTP) road. Road widths typically range from 5m to 10m within the sub-project area, with roads like RR Plot road and Anandapur Main Road having widths between 7m and 10m. However, narrower lanes such as Anandapur EKTP road, canal roads, and the road behind the passport office have widths ranging from 5m to 6m. All the roads in the area are constructed with bituminous material and are under the jurisdiction of KMC, PWD and KMDA.

91. **Solid waste management.** Project area is being served by door-to-door solid waste collection system provided by KMC. However, open dumping of waste in the vacant land and beside the canal bank is also observed. Per KMC estimates only 3% of waste generated is not collected but (illegally) disposed in channels, vacant land and used for infill. KMC has two waste disposal sites. The Garden Reach dumping ground is a small facility with little remaining capacity. It receives waste mainly from borough XV nearby. The main dumping ground is at Dhapa in the east of KMC at approximately 7 km from the sub-project area. This dump site is nearing its

maximum capacity . Currently, there is hardly any processing and treatment of MSW generated in the city apart from a compost plant. The city is dumping approximately 4,902 MT/day of solid waste (year 2018) at the Dhapa disposal site. The mechanical compost plant set up in 2000 has a design capacity 700 MT/day. It is adjacent to the waste dumping ground. The estimated dried sludge generation from the STP is approximately 32 m³/day or 25.6 metric tons/day., which will be mostly used as fertilizer in agricultural land after proper sun drying. KMC proposed that the solid sludge cake will be sold to farmers as manure, and the revenue earned from this will contribute to the operation and maintenance (O&M) costs of the STP. Any remaining sludge will be disposed of at the KMC-owned landfill site in Dhapa. The selection of an alternative dumping site is under consideration, as the Dhapa landfill is approaching its maximum capacity. A new landfill site is expected to be operational in few years.

92. Common Hazardous Waste Management. West Bengal has one Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDf) at Haldia (about 100 km south of Kolkata) that commenced operations in May 2006. The facility was jointly developed by the Haldia Development Authority and the Hyderabad based private company, M/s Ramky Enviro Engineers Ltd. who formed a joint venture company named M/s West Bengal Waste Management limited (WBWML) for the development and operation of the facility. The CHWTSDf at Haldia operated by M/s WBWML has completed almost eighteen years of operation. The facility caters to units in the entire state of West Bengal.

E. Social and Cultural Resources

93. Communities and Population. The population of the KMC area is 4.45 million. Demographic details of the subproject area is given below:

Particulars	KMC	Ward 108
Population	4,496,694	64,777,
Area	205 square km	2.02 square km
Households	972,264	15,854
Density	24,783 persons/sq.km	32,067 persons/sq.km
Growth rate (2001-11)	-1.93%	-
Sex ratio	908 Female per 1000 male	937 Female per 1000 male
Literacy (male) %	88.3%	54.8%
Literacy (female) %	84.1%	45.1%
SC%	5.38 %	-
ST%	0.23%	-

Source: 2011 Census data

94. Religious & Cultural Resources. There are no religious, historical or cultural resources of national/ heritage importance within subproject area. There are few temples and mosques scattered over the area.

F. Environmental Settings of Investment Program Component Sites

95. Subproject components are located in the urbanized area, therefore, there is no natural habitat left around the proposed sites. STP is proposed in vacant Government land. No tree cutting is envisaged for the project. There are no heritage sites, forests, mangroves or estuaries in or near the project locations. No work is proposed within EKW area. No notable wildlife is also present. Site environmental features of all subproject sites and photographs are presented in the following table:

Table 13: Site Specific Environmental Features

Subproject component	Environmental Features of the Site	Photographs
STP (41 MLD)	A land parcel is part of a large vacant and low-lying land close to TP channel, and along Anandapur high road, is selected for the STP. Total land area available is 75.50 acres. About 5.62 acres (equivalent to 2.27 hectares) vacant land under the possession of Land and Land Reforms (L&LR) department, Govt. of West Bengal will be allocated for the construction of the STP. The land is flat and vacant; no trees are there. The exact site for STP is yet to be demarcated, and land transfer is in process. Per land records, this land is classified as “low-lying land used for used pisciculture”, and PMU will obtain change in classification after the land transfer following the procedure laid out in West Bengal Land Reform (WBLR) Act and Rules, 1954. The proposed plot is located about 25m away from Anandapur high road. Access road to STP plot is 4-5m wide (approximately) in the southern side which may lead to temporary access loss during pipe laying activity. The proposed STP site is mostly flat and gently sloping and elevation ranges from 3.4 m to 3.6 amsl. For the construction of STP, the selected site of 5.62 acres site will be elevated by 0.3-0.5 meters to reach the desired finished ground level of 3.9 m. The filled-up earth shall be protected by a retaining wall. As per preliminary design there are 8 nos. permanent / pucca houses in the southern direction, nearest distance is 25m from the boundary of the STP plot and some temporary hutments in the NNW directions, nearest distance is 10 m from the boundary of proposed STP site. The layout plan for the STP will be	 Proposed STP site  Proposed STP site  Access road to STP site  Drainage channel passing through the STP Site

Subproject component	Environmental Features of the Site	Photographs
	designed to ensure that odor-generating units, such as the inlet/raw water sump and sludge handling facilities, are situated away from residential areas. Currently, the wet well and sludge sump are approximately 100 meters and 90 meters away from the nearest permanent houses, respectively. A drainage channel is passing through the STP site and connects TP channel via a culvert under the Anandapur high road. This channel acts as a conduit for seasonal water from roadside drains and collects runoff from the entire catchment area, particularly during the wet season. Furthermore, it functions as a conduit for wastewater from nearby temporary houses. The channel remains dry most of the year, except during the monsoon season when it carries runoff water. Given the low-lying nature of this land parcel and Kolkata's susceptibility to heavy rains during the monsoon, any modifications to this drainage system could trigger flooding in the surrounding areas. Drain diversion proposal is prepared carefully without disturbing the existing condition or drainage function of the channel and vacant land i.e. flow of water from surrounding area and vacant land into drainage channel. There will be uninterrupted drain flow and discharge water into TP canal during the monsoon. The boundary of East Kolkata Wetland is located 690 m from the proposed STP site. There are no other environmentally, archeologically sensitive or protected areas near the proposed site. No wildlife is observed/reported in and around STP site.	 The drainage channel connects TP canal via a culvert under the Anandapur high road.

Subproject component	Environmental Features of the Site	Photographs
Outflow sewer alignment from STP to discharge point	Outflow sewer (150m long MS pipe with 1000mm diameter) will be installed to discharge treated effluent from the STP meeting the discharge standards. The excess / surplus treated effluent from STP after reuse will be discharged by gravity in the adjoining T P Canal of Irrigation department around 150m distance towards western direction from the proposed STP site. TP canal terminates at Chowbhaga pumping station, from there water is pumped to Storm Water Flow (SWF) canal. The GPS coordinates of outfall location in T P canal 22.5095 N and 88.4065E T P canal presently carrying untreated wastewater of the adjoining areas and algal growths are visible at this outfall location of canal and water are polluted. Once the sewerage system is implemented, the canal will no longer receive wastewater. The operation of the proposed sewage treatment plant (STP) will prevent pollution in the drains and canals. The outflow sewer will cross existing Aandapur high road and trenchless technology is suggested.	 Proposed outfall location of treated effluent at T P Canal

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Introduction

96. ADB SPS requires the assessment of potential impacts during different phases of the sub project including project planning and Design, Pre-Construction, Construction and Operation & Maintenance phases and the formulation of corresponding mitigation measures to avoid, minimize or offset environmental impacts.

97. **Impact Assessment.** Potential environmental impacts were identified on the basis of (i) the review and analysis of the primary and secondary data or information, (ii) Initial environmental screening using ADB's Rapid Environmental Assessment (REA) checklist (Appendix 1), (iii) consultation with the design team on the proposed infrastructure design and plan (iv) discussions with KMC, PMU, DSC, community people and other stakeholders' and (v) several field visits to the sites. In order to sketch out the potential impacts posed by the project interventions; it was necessary to single out every activity under the project; thereafter a detail understanding of the existing environmental and socio-economic settings of the project area was made. The significance of potential impacts was assessed using the criteria and methodology given below.

98. **Impact Magnitude.** All the interventions associated with this project can be grouped into two major types- (i) construction of STP, which mainly involves earth excavation at the proposed STP site, laying of outflow sewer across the road, and backfill the earth and (ii) civil and electro-mechanical works for the construction of STP. Electromechanical works may pose some risks of accident and disruptions, but not so naively cause any detrimental impacts on immediate surrounding environment.

99. The potential impacts of the project have been categorized as major, moderate, minor or negligible based on consideration of the parameters such as: (i) duration of the impact (short, medium, or long term); (ii) spatial extent of the impact; (iii) reversibility; (iv) likelihood; and (v) legal standards and established professional criteria. These likelihood and magnitude categories are defined in the below Table 14 and 15 respectively

Table 14: Likelihood of Impacts from Occurrence

Likelihood	Definition
Certain	Occurs under typical operating or construction conditions.
Likely	Occurs under worst case (negative impact) or best case (positive impact) operating conditions.
Occasional	Occurs under abnormal, exceptional or emergency conditions.
Unlikely	Unlikely to occur.

Source: Analysis of the environmental consultant, DSC (2024)

Table 15: Parameters for Determining Magnitude

Parameter pai	Major	Medium/ Moderate	Minor	Negligible
Duration of potential impact	Long term (more than 35 years)	Medium Term Lifespan of the subproject (5 to 15 years)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of potential impact	Widespread far beyond subproject boundaries	Beyond immediate subproject components, site boundaries or local area	Within subproject boundary	Specific location within subproject component or site boundaries with no detectable potential impact
Reversibility of potential impact	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal requirements	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Occurs under worst case (negative impact) or best case (positive impact) operating conditions (Likely)	Occurs under abnormal, exceptional or emergency conditions (occasional)	Unlikely to occur

Source: Analysis of the environmental consultant, DSC (2024)

100. **Sensitivity of Receptor.** The sensitivity of a receptor has been determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic. Criteria for determining receptor sensitivity of the project's potential impacts are outlined in the following Table.

Table 16: Parameters for Determining Sensitivity

Sensitivity Determination	Definition
Very severe	Vulnerable receptor with little or no capacity to absorb proposed changes
Severe	Vulnerable receptor with little or no capacity to absorb proposed changes or limited opportunities for mitigation
Mild	Vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low	Vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

Source: Analysis of the environmental consultant, DSC (2024)

101. **Assigning Significance.** Following the determination of impact magnitude and sensitivity of the receiving environment or potential receptors, the significance of each potential impact has

been established using the impact significance matrix shown below in the table.

Table 17: Significance of Impact Criteria

Magnitude of Potential Impact	Sensitivity of Receptors			
	Very severe	Severe	Mild	Low
Major	Critical	High	Moderate	Negligible
Medium/Moderate	High	High	Moderate	Negligible
Minor	Moderate	Moderate	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Source: Analysis of the environmental consultant, DSC (2024)

102. **Summary of Impacts Rating for the Subproject.** The subproject's potential impacts on the key environmental parameters have been assessed and their significance determined using the methodology described above. A summary of the potential impacts of the subproject on the key environmental parameters and significance of these impacts are presented in the following table.

Table 18: Summary of Rating of Potential Impacts – STP

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Design and Pre-Construction phase								
Approval of Consents, Permits and Clearances	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
EHS officer/supervisor designation and EMP implementation training	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Compliance with ADB Loan Agreement and SPS	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact due to lack of environmental quality baseline monitoring	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Updating of IEE and EMP and preparation of SEMP, including SDP, TMP, etc. based on final design	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Tree Removal	Long term	Local	No	Unlikely	Minor	Mild	Moderate	Negligible
Community Awareness Program	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impacts due to construction camps or workers' accommodation, construction camps, stockpile areas and storage sites and disposal areas	Short term	Local	Yes	Likely	Minor	Mild	Low	Negligible
Sources of Materials	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Construction Phase								
Impact on working on sensitive areas	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Demolition and dismantling works	Short term	Local	Yes	Unlikely	Minor	Mild	Moderate	Negligible
Impacts due to disruption of existing utilities and services	Short term	Local	Yes	Likely	Minor	Mild	Low	Negligible
Impact to ambient air quality	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact to noise and vibration level	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact to surface water, Soil and Groundwater Pollution	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact due to lack of disposal of construction wastes/spoil at site	Short term	Local	Yes	Occasional	Medium	Mild	Moderate	Negligible
Accessibility and traffic management	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible

Activity/ Impact	Duration of Impact	Spatial Extent	Reversible or not	Likelihood	Magnitude	Sensitivity	Significance Prior to Mitigation	Significance after Mitigation
Socio-Economic – disturbance to businesses and livelihood activities	Short term	Local	Yes	Certain	Minor	Mild	Moderate	Negligible
Socio-economic status- employment	Short term	Local	Yes	Certain	Medium	Mild	Positive	Negligible
Impact to occupational Health and Safety	Short term	Local	Yes	Certain	Medium	Major	Moderate	Negligible
Impact to community health and safety	Short term	Local	Yes	Certain	Major	Major	Moderate	Negligible
Worker health and safety and Workers Facilities	Short term	Local	Yes	Certain	Major	Major	Moderate	Negligible
Impact on Social and Cultural Resources	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Monsoon preparedness	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Site Reinstatement	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Operation Phase								
Maintenance and operation of the STP	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Leakage and Overflows	Long term	Local	Yes	Likely	Medium	Mild	Moderate	Negligible
Odor Generation and Air Emission	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Community and Occupational Health and Safety	Long term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible

Source: Analysis of the environmental consultant, DSC (2024)

B. Planning and Design Phase Impacts

103. Design of the Proposed Components (Sewerage system). The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15/30 years in general while designing the systems for sewerage components. It is proposed to consider 2058 as the design year for all the components in order to maintain unanimity in the design period and design population. The STP is proposed to be constructed on modular basis. The first phase of STP should be for about 15 years but land of STP has been taken for 30 years period. For the first phase capacity of the STP will be 41 MLD for 2043 & another modular type STP of capacity 14 MLD is proposed to be constructed for ultimate design period (2058). However, inlet chamber for STP will be constructed for ultimate design year (2058) including provision of diversion of 14 MLD flow to the future STP.

104. Following environmental considerations are already included in the project to avoid and/or minimize adverse impacts and enhance positive benefits:

- (i) Locating components and facilities appropriately by avoiding sensitive locations and protected areas (environmentally, socially, and archeologically).
- (ii) Technical design of all the elements like STP, reuse arrangements, outflow sewer mains will follow the relevant national planning and design guidelines.
- (iii) Avoiding usage of asbestos containing materials
- (iv) Adopting a combined approach of sewerage system to cover a sizeable population of the project area with safe collection, conveyance, treatment/ disposal of the sewage generated in the catchment area. To maximize the benefit of the project KMC should ensure that all existing septic tanks in areas will be connected with the sewer network in phased manner.
- (v) To integrate the climate change impact peak flow is considered rather than the average flow. During heavy rainfall event, in order to avoid over loading in STP, bypass arrangement has been proposed at strategic locations in networks to divert excess flow through the outfall structures.
- (vi) Treated effluent will be discharged into the T P canal by gravity to optimize the energy usage.
- (vii) SBR basin will be under continuous aeration for more than 50% of the day which will ensure minimum odor generation.
- (viii) The contractor shall design the process to ensure there are no odor issues at the STP and make appropriate provisions to ensure the same as per CPCB guidelines on odour pollution and control, May 2008²¹.
- (ix) Acoustic enclosure will be given around centrifugal pump at sludge dewatering area and around other utility pumps to reduce noise impact.
- (x) Treatment and reuse of sludge from treatment process; providing a covered shed of adequate space to air dry the processed sludge for at least 15 days at STPs.
- (xi) Reuse of treated wastewater from STP for non-potable uses thereby reducing the load in freshwater resources.
- (xii) Provision of appropriate personal protection equipment to the workers and staff

105. **Distance from Eco Sensitive Zone:** Proposed project area mostly comprises of urban and habitation areas and agricultural lands. The nearest protected area, East Kolkata Wetland , a declared Ramsar site is about 690 m radial distance from the STP site, and no sub-project

²¹<https://cpcb.nic.in/openpdf.php?id=UmVwb3J0RmlsZXMvTmV3SXRlbV8xNDFfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==>

components are proposed within EKW area. The treated effluent from STP will be discharged into TP canal which is outside of EKW area. Therefore, there are no risks or impacts on EKW area and biodiversity / natural resources.

106. Location of STP: The proposed STP will be constructed in vacant government land beside Anandapur high road. No trees are there; hence tree felling is not required. Total 75.50 acre government vested land under District Land and Land Reforms (L&LR) department adjacent to Anandapur high road is available and 5.62 acres (equivalent to 2.27 hectares) will be allocated for the construction of the STP. The proposed STP site is mostly flat and gently sloping and elevation ranges from 3.4 m to 3.6 amsl. For the construction of STP, the selected site of 5.62 acres site will be elevated by 0.3-0.5 meters to reach the desired finished ground level of 3.9 m. The proposed STP land is close to habitations. There are 8 nos. permanent / pucca houses in the southern side (nearest distance is 25 m from the boundary of the STP land) and some temporary hutments in the North North West (NNW) and South West (SW) directions, nearest distance is 10m from the boundary of proposed STP site as per preliminary design. The layout plan for the STP will be designed to ensure that odor-generating units, such as the inlet/raw water sump and sludge handling facilities, are situated away from residential areas. Currently, the wet well and sludge sump are approximately 100 meters and 90 meters away from the nearest houses, respectively. The boundary of EKW area is approximately 690 m from the proposed STP site. The treated effluent from STP will be discharged into TP canal which is outside of EKW area. Therefore, no impact on EKW area is envisaged. No wildlife is reported at from the sites.

107. Site and surrounding drainage. A narrow drainage channel is passing through the STP site and connects TP canal via a culvert under the Anandapur High Road. This channel acts as a conduit for seasonal water from roadside drains and collects runoff from the entire catchment area, particularly during the wet season. Furthermore, it functions as a conduit for wastewater from nearby temporary houses. The drainage channel remains dry most of the year, except during the monsoon season when it carries runoff water. Given the low-lying nature of this land parcel and Kolkata's susceptibility to heavy rains during the monsoon, any modifications to this drainage system could trigger flooding in the surrounding areas. Drain diversion proposal to be prepared carefully without disturbing the existing condition or drainage function of the channel and vacant land i.e. flow of water from surrounding area and vacant land into drainage channel. There should be uninterrupted drain flow and discharge into TP channel during the monsoon.

108. While protecting the site from flooding and water logging, raising the site elevation can potentially lead to adverse impacts on adjacent lands properties, such as flooding or prolonged waterlogging. To mitigate these impacts, an efficient stormwater drainage system for the STP, considering both elevated site and existing drain, will be developed to ensure that water is effectively channeled away from the raised site and adjacent properties.

109. Design of Sewage Treatment Plant. One STP of capacity 41 MLD is proposed to be constructed at Hossainpur to treat the sewage generated from ward nos.108 and part of ward 107 & 109 under Borough XII based on SBR (sequential batch reactor) process followed by disinfection by chlorine. As the bid is DBO type, detailed design of the STP will be carried out by the contractor to follow specific discharge standards (Table 19). The treated effluent will be finally discharged into the nearby TP canal by outflow sewer. It is proposed to provide disinfection for reduction of coliforms to treated sewage before discharged into nearby water body. The tolerance limits for discharge of treated sewage into inland surface water in accordance with latest National Green Tribunal (NGT) order will be followed (latest as per NGT order, Appl no. 1069/2018, dated 30th April 2019). Earlier for STPs in India, the standards notified by Ministry of Environment, Forests and Climate Change (MOEFCC) in 2017 (see column (4) in Table 19 below) were

applicable. It is also to be noted that, in April 2019, the National Green Tribunal (NGT) in one of its orders directed MOEFCC to reconsider stringent standards for STPs suggested by CPCB in 2015. The stringent standards also facilitate maximum utilization of treated wastewater for reuse in various purposes.

Table 19: Treated Wastewater Characteristics for STP Design

Sr. No	Parameter	Proposed Discharge Standards for STP (Latest as per NGT order, Application no. 1069/2018, dated 30th. April 2019) to be as follows.	MOEF&CC STP Discharge Standards, 2017	CPCB discharge standards, 2015#	IFC Guideline value for sewage discharge	WHO? Guideline Value for safe use in agriculture
1	pH	5.5 – 9.0	6 – 9	6.5-9.0	6 - 9	6 – 9
3	Biochemical Oxygen Demand (BOD) (mg/l)	≤10	<30 <20 (metro cities)	<10	30	-
4	Chemical Oxygen Demand (COD) (mg/l)	≤50	-	50	125	-
5	Total Suspended Solids (TSS) (mg/l)	≤20	<100 and <50 (metro cities)	<20	50	-
6	Total Nitrogen (mg/l)	≤ 10	-	<10	10	-
7	Ammoniacal Nitrogen (mg/l)	<5	-	<5	-	-
8	Residual Chlorine, mg/L	≤ 1	-	-	-	-
9	Total Phosphate as P (mg/l) (for discharge into pond, lake)	≤ 1.0	-	-	2	-
10	Fecal Coliform MPN/100 ml	Desireable-100 Permissible230	<1000	<100	-	<1000
11	Oil and grease, mg/l		-	-	10	-
13	Nematodes, number of eggs per liter	-	-	-	-	1

Source: MOEF&CC= Ministry of Environment, Forest and Climate Change; CPCB = Central Pollution Control Board; IFC = International Finance Corporation, the World Bank Group

in April 2019, the National Green Tribunal (NGT) in one of its orders directed MOEFCC to reconsider the standards issued in 2015 for STPs.

110. Mixing of industrial effluent in wastewater. One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of sewage treatment plant may affect the process and output quality. STP is designed for municipal wastewater, which does not include industrial effluent. Characteristics of industrial effluent widely vary depending on the type of industry, and therefore disposal of effluent into sewers may greatly vary the inlet quality at STP and will upset the process and affect the efficiency. Mixing industrial effluent will severely

deteriorate the quality of treated wastewater, and therefore the proposed reuse plan. Reuse of such water may have a significant impact on public health, and on land and water. KMC shall monitor and coordinate with WBPCB to ensure no illegal discharge of industrial wastewater into sewers. Following measures should be incorporated to safeguard the sewerage system and the intended reuse:

- (i) No industrial wastewater shall be allowed to dispose into municipal sewers.
- (ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers.
- (iii) Ensure that there is no illegal discharge through manholes or inspection chambers.
- (iv) Conduct public awareness programs in coordination with WBPCB and KMC.
- (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality complies with the effluent standards.

111. Odour nuisance from STP. As presented in the baseline profile, the proposed STP site is under the possession of L& LR department, GoWB beside Anandapur high road. The proposed site is 25 m away from the Anandapur high road. The proposed STP land close to residential areas (less than 30m). As per preliminary design, there are 8 nos. permanent / pucca houses in the southern side (nearest distance is 25 m from the tentative boundary of the STP plot) and some temporary hutments in the NNW and SW directions, nearest distance is 10 m from the boundary of proposed STP site. The layout plan for the STP will be designed to ensure that odor-generating units, such as the inlet/raw water sump and sludge handling facilities, are situated away from residential areas. Currently, the wet well and sludge sump are approximately 100 meters and 90 meters away from the nearest houses, respectively.

112. The proposed treatment technology, SBR, is an aerobic process conducted in a compact and a closed system with automated operation; hence, odor nuisance will be very minimal and negligible. Limited bad odors may be generated from wet well, primary treatment units and sludge treatment and smell generated can be mitigated through dense plantation around STP site. Mitigation measures to avoid smell and visual pollution shall be taken into consideration during design in Service Improvement Plan preparation period by contractor. An odour capture system will be installed during the operation stage if necessary. KMC has constructed other STPs using SBR technology in close proximity to residential houses. According to KMC, there have been no issues with odour or noise from these STPs. However, to account for future development potential around the sites, and to enhance the environmental benefits following measures should be included in the STP site planning and design:

- (i) Provide a green buffer zone of 3 -5 m wide all around the STP with local varieties of trees in multi-rows. This will act as a barrier and visual screen around the facility and will improve the aesthetic appearance. Treated wastewater shall be used for plantation.
- (ii) Develop layout plan of STP such that odour generating units (such as inlet/raw water sump, and sludge handling facilities) are located away from the habitation area.
- (iii) If necessary, an odour capture system will be installed during the operational stage as per CPCB guidelines on odour pollution and control, May 2008²².and

²²<https://cpcb.nic.in/openpdf/UmVwb3J0RmlsZXNmV3SXRlbV8xNDFfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==>

standby power arrangements are suggested to safeguard the health and safety of the community.

113. Treated wastewater reuse / disposal. The KMC promotes the reuse of treated sewage for non-potable applications, and also to make sewerage projects environmentally sustainable. The treated effluent shall be used for gardening, cleaning, firefighting, sewer manholes flushing and other purposes within plant premises. Balance will be discharged into the adjoining T P Canal with a outflow sewer of 150-meter long MS pipe with a diameter of 1000mm. from STP by gravity. Treated effluent will comply with discharge standards suggested by CPCB in 2015 and order of National Green Tribunal (NGT) dated 30th April 2019 (Appendix 4).. . This canal mainly carries untreated wastewater from nearby habitations and algal growths were visible in this part of canal and water is polluted. After implementation of sewerage system, the canal will not receive wastewater and operation of the proposed STP will save the drains/canals from pollution. As the sewerage subproject is proposed under DBO model, the reuse plan will be prepared by the contractor during the detailed design phase in consultation with the KMC and reuse modalities will be firmed up. Regular monitoring of raw and treated water quality shall be conducted at the STP as per specified by the WBPCB while issuing the consent. Compliance with discharge standards shall be ensured.

114. Reuse Options. Following the CPHEEO guidelines (Appendix 6), the draft Guidelines on Reuse provides the following reuse applications:

- (i) Agriculture, horticulture, irrigation
- (ii) Gardening in park
- (iii) Road washing and water sprinkling to reduce fugitive dust.
- (iv) Industries including mining.
- (v) Recreational ponds and lakes
- (vi) Social forestry
- (vii) Construction Activities
- (viii) Firefighting and other municipal uses
- (ix) Flushing of manholes

115. Use of treated wastewater for irrigation. Use of wastewater for irrigation is associated with some health risks – from germs in wastewater, which may contaminate food and spread disease, health risk to farm workers from worms (helminths) and nematodes and chemical risk is associated if industrial wastewater enters the sewers. If the wastewater with bacteriological contaminants is used for food crops like lettuce, tomato, which are eaten without peeling or cooking, it will present a greater health risk if precaution such as such washing with chlorinated water or storing for adequate time in normal temperature before use (at least 10 days) are not taken. According to the WHO, effluent which is used to irrigate trees, industrial/commercial (not food, like cotton) and fodder crops, fruit trees, and pasture should have less than one viable nematode egg per liter. Effluent used for the irrigation of food crops, sports fields, public parks, should have less than one viable nematode egg per liter and less than 1000 fecal coliforms per 100 milliliters. These shall be considered in the Reuse Plan that will be prepared during the detailed design and complied accordingly.

116. Discharge of excess/unused treated wastewater into drain/canal. Excess or unused treated effluent will be discharged to T P Canal with a 150m long outflow sewer from STP by gravity as per CPCB norms. The outflow sewer will cross existing Aandapur high road and trenchless technology is suggested. As the wastewater is treated to stringent disposal standards,

no notable impacts envisaged. The T P canal carries SWF and untreated wastewater throughout the year. Proper systems should be put in place at the proposed STP to ensure that treated wastewater at all times meets the stipulated standards prior to its disposal in the river. Any change / lowering of treatment efficiency during operation may lead to poor quality of wastewater and may further pollute the surroundings. It is therefore critical that STP treats the sewage as designed. The following measures will be observed:

- (i) Obtain of consent of West Bengal Pollution Control Board (WBPCB) for discharge of treat wastewater into drains
- (ii) Conduct a baseline water quality assessment of receiving water body (canal).
- (iii) Regularly monitor the treated wastewater quality at STP and ensure that it meets the discharge standards.
- (iv) Monitor water quality periodically during operation phase as per the Environmental Monitoring Plan

117. Sludge treatment and disposal. Sewage sludge generally consists of organic matter, pathogens, metals and micro pollutants. The concentration of parameters such as metals can be influenced by input to the sewers system from industry. Since no industrial wastewater is allowed into sewers, it is unlikely that sludge contains heavy metals. Heavy metal concentration may not be ruled out completely as the chemicals used in treatment may potentially contain heavy metals, which will then leach into the sludge.

118. Subproject includes sludge management infrastructure in STP, including system for sludge collection, thickening, solar drying, and disposal at landfill/identified site. This includes a Sludge Sump to collect sludge from SBR basins; returning arrangement for supernatant from the sump to inlet/equalization tank for treatment; pumping sludge to sludge thickener and pumping thickened to mechanical sludge dewatering system (such as centrifuge). It also requires contractor to establish a shed where the dewatered sludge cake can be further air dried for 15 days. About 32 m³/ day or 11680 m³/year sludge volume shall be generated. This sludge shall be used for Agricultural uses after testing through NABL certified lab. It is proposed that the solid sludge cake shall be sold off to the farmers for use as manure and the revenue earned from this will be used for O&M cost of the STP.

119. The treatment and drying processes kill enteric bacteria and pathogens, and because of its high content of nitrates, phosphates, and other plant nutrients the sludge is an excellent organic fertilizer for application to the land. Adequate drying is however necessary to ensure maximum kill of enteric bacteria. To achieve adequate drying a minimum drying period (15 days) shall be ensured. The drying period, which will vary depending on the season will be determined during operation and be followed. A sludge management plan will be developed by the DBO contractor during the detailed design phase. Proper sludge handling methods should be employed. Personal Protection Equipment should be provided to the workers. Any remaining sludge can be scientifically disposed of at an identified landfill site at KMC owned landfill site at Dhapa (coordinate: 22°32'45.43" N and 88°25'1.98" E) which is also approved by the WBPCB and about 5 km away from proposed STP site.

120. Contractor will propose the sludge management plan with best methods for reuse of sludge as per guidelines of CPHEEO (guidelines are attached as Appendix 6) and best international practices in consultation with PMU and KMC. Properly dried sludge can be used as soil conditioner. Periodic testing of dried sludge will be conducted to ensure that it does not contain heavy metals that make it unsuitable for food crops. Tests shall be conducted to confirm the

concentrations below the following standards (Table 20). As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 have been adopted here. Rules stipulate that “In order to ensure safe application of compost, the following specifications for compost quality shall be met”.

Table 20: Standards for Sludge Reuse as Manure

Standards for Composting. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Solid Waste Management Rules, 2016 (Schedule II A, Standards for Composting) have been adopted here. According to the standards “In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:			
Parameters	Units	Organic Compost (FCO 2009)	Phosphate Rich Organic Manure (FCO 2013)
Arsenic	mg/kg	10	10
Cadmium	mg/	5	5
Chromium	mg/kg	50	50
Copper	mg/kg	300	300
Lead	mg/kg	100	100
Mercury	mg/kg	0.15	0.15
Nickel	mg/kg	50	50
Zinc	mg/kg	1000	1000
C/N ratio	-	<20	<20:1
pH	-	6.5 – 7.5	(1:5 solution) maximum 6.7
Moisture, percent by weight, maximum		15.0 – 25.0	25.0
Bulk density	g/cm ³	<1	Less than 1.6
Total Organic Carbon, per cent by weight, minimum	percent by weight	12	7.9
Total Nitrogen (as N), per cent by weight, minimum	percent by weight	0.8	0.4
Total Phosphate (as P ₂ O ₅) percent by weight, minimum	percent by weight	0.4	10.4
Total Potassium (as K ₂ O), percent by weight, minimum	percent by weight	0.4	-
Odour		Absence of foul Odor	
Particle size		minimum 90% material should pass. through 4.0 mm is sieve	minimum 90% material should pass through 4.0 mm is sieve
Conductivity, not more than	dsm-1	4	8.2
Source: Fertilizer Control Order (FCO), Department of Agriculture, Government of India			
* Compost (final product) exceeding the above stated concentration limits shall not be used for food crops. however, it may be utilized for purposes other than growing food crops.			

121. In order to ensure the safe use of dried sludge, following should be followed:

- (i) Prepare a dried Sludge utilization plan with the help of Agriculture Department / KMC ; plan should also include if any additional processing is required for sludge to use as soil conditioner.
- (ii) Plan should clearly identify various potential uses and demand in and around project area and surroundings
- (iii) Establish usage limits, where required, (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations.
- (iv) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO.
- (v) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016)

122. Use of Hazardous/Harmful substances in Wastewater Treatment. Wastewater treatment may involve the application of hazardous/harmful chemicals such as in chlorination, disinfection etc. As the treatment process will be designed by DBO contractor, the use of chemicals in treatment is not available at this stage. Measures are required to reduce the usage as well the handling if any hazardous substances safely following prevailing rules and regulations. For disinfection, the bid specifies, however, the use of Chlorine as disinfectant. Disinfection with chlorine is also proposed at STP. There is invariably a safety risk when chlorine is handled. Safety precautions are necessary to ensure the safety of workers and citizens. Following measures are suggested:

- (i) Reduce the use of chemicals in the treatment process to the extent possible provide non-chemical alternatives or easily recoverable and/or reusable chemicals or biocompatible alternatives.
- (ii) Establish proper handling / storage / application system according to the relevant standards, safety precautions and prevent accidental release / spill.
- (iii) Provide leak/spill detection, collection / capture and safe disposal facilities such as chlorine absorption and neutralization facility.
- (iv) Provide ventilation, lighting, entry and exit facilities; visible and audible alarm facilities to alert chemical/chlorine leak.
- (v) Facility for isolation in the event of major leakages
- (vi) Eye wash and shower facility
- (vii) Personal protection and safety equipment for the operators (masks, oxygen cylinders, gloves, etc.,)
- (viii) Provide training to the staff in safe handling and application of chemicals, material safety, and standard operating procedures and emergency responses (ix) Develop emergency response procedures.
- (ix) Chlorine gas handling as per BIS guidelines.

123. Integration of EMP in bidding documents and contracts. Lack of awareness by contractors of ADB SPS requirements may result in insufficient budget and non-integration of EMP in the design. The PMU will incorporate the costs of implementing OHS and the EMP as well as specific provisions requiring contractors to comply with all other conditions required by ADB into the bidding and contract document. Once the contractor is selected, the PMU with support from PMDSC will inform contractors of their responsibilities in EMP implementation, in compliance with ADB and government requirements, self-monitoring and reporting procedures.

C. Pre-construction Impacts and Mitigation Measure

124. **Consents, permits and clearances.** Failure to obtain necessary consents, permits, and other appropriate regulatory clearances can result in design revisions and work stoppage. All the necessary consents, permits, and clearances shall be obtained before the start of civil works (ref. Table 3).

125. **EHS officer/supervisor designation and EMP implementation training.** Non-designation of EHS officer/supervisor and lack of EHS training may lead to inadequate/failure in EMP implementation, resulting in EHS impacts. If the contractors and construction supervision engineers are not aware of the requirements of this EMP, the project may not proceed and comply with ADB and GOI environmental policies. Project manager and all key workers of contractors will be required to undergo EMP implementation training including spoils management, Standard operating procedures (SOP) for construction works; health and safety (H&S), core labor laws, applicable environmental laws etc.

126. **Updating of IEE and EMP and preparation of SEMP** Non implementation may result in significant environmental impacts and non-compliance with ADB's environmental safeguards requirements. The following must be done before the start of construction:

- (i) Update IEE based on detailed designs, and submit to ADB for review, approval, and disclosure prior to commencement of work.
- (ii) Formulate SEMP during implementation and get approval from the PMU. The SEMP shall include (a) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes, adequately record the condition of roads, agricultural land and other and other infrastructure prior to starting to transport materials and construction; and (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for SEMP implementation.
- (iii) No works can commence prior to approval of SEMP. The SEMP will include Construction Compound Management Plan, Construction Health and Safety Plan, Emergency Response Plan, Spoils Disposal Plan and Traffic Management Plan

127. **Environmental monitoring of baseline conditions of air, noise, water.** Baseline environmental quality must be determined to determine if a project has any impact on the environment. DBO contractors must conduct baseline environmental monitoring through NABL accredited laboratory before construction.

128. **Tree cutting at project sites.** The proposed STP site is vacant no notable tree cover is present, therefore, no tree cutting is envisaged during the preliminary design phase. Some bushes and overgrowths of vegetations will be cleared off at the proposed STP site. If any tree felling is required based on survey by the contractor during SIP at treated waste water outfall location near T P canal side, following measures will be implemented to minimize and/or compensate for the loss of tree cover:

- (i) Minimize removal of trees by adopting to site condition and with appropriate layout design or any other site with trees
- (ii) Obtain prior permission for tree cutting at sites that may require tree cutting finalized during detailed design
- (iii) Plant and maintain 5 trees for each tree that is felled. as per KMC policy

- (iv) Conduct survey of trees for bird nests prior to cutting, if any active nests, ensure that trees are not disturbed until young birds fly away from the nests, do not cut trees during the breeding season.
- (v) Green buffer zones of 3 to 5m wide all around the STP site will be established using local varieties of trees in multiple rows to serve as odour barrier and visual screen around the facility.

129. Community Awareness on Project Activities and Impacts. Lack of community awareness on project activities may result in potential community health and safety concerns and complaints. Before the start of project construction, a meaningful consultation with the affected communities will be conducted. This meaningful consultation will aim to engage community stakeholders, listen to their views, and try to come to a common understanding about the need for an improved drainage system and the sacrifices that need to be made to achieve it. To aid in the consultation process, it is important that the community should be made aware of the details of project activities. Important information to be disseminated to the people are, among others, the following:

- (i) Overview and objectives of the proposed project;
- (ii) Preliminary and/or final detailed design of proposed project components;
- (iii) Potential environmental and social impacts (positive and negative) of the project, and the proposed mitigation measures for the perceived negative impacts; and
- (iv) Grievance redress mechanism and contact details of the project

130. Temporary construction facilities- Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. Setting up of construction facilities in or near residential areas may endanger human environment (i.e., accident risks, health risks due to air and water pollution and dust, and noise, social conflicts, shortages of amenities, and crime). Similarly setting up of these are near environmentally sensitive land uses such as forest, eco-sensitive area (such as EKW) or water bodies may have adverse impacts on the local ecology and flora and fauna. Project area however is fully urbanized, and the EKW boundary is about 690 m away. Surplus soil generated from construction will be used at proposed Hossainpur STP site as filling material which is a low land. To avoid conflict with local community and to reduce environmental impacts the following measures are recommended to avoid impacts:

- (i) Do not consider residential areas for setting up construction facilities;
- (ii) Debris disposal site shall be at least 200 m away from surface water bodies;
- (iii) For aggregate storage area, hot mix plant, etc. no residential areas shall be located within 100 m downwind side of the site; Site should be at an adequate distance away from sensitive locations like settlements, ponds or other water bodies
- (iv) No camps or facilities shall be located within 250 m from EKW boundary

131. Sources of Construction Materials. Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution. A significant amount of sand and coarse aggregate will be required for this project, which will be sourced from quarries. Quarries inevitably cause extensive physical changes; as construction materials are excavated from the ground, leaving large cavities, or levelling hillsides, etc. The physical damage caused by quarries is controlled by allowing them to operate within specific limited areas only, so the damage is restricted in extent and not allowed to spread indiscriminately. New quarries are subject to a rigorous process of environmental assessment to ensure appropriate siting and adequate environmental controls on the operation. It will therefore be important to ensure that construction

materials for this project are obtained from government approved licensed quarries only, to ensure these controls are in place. Contractors should avoid new borrow pits / quarries as far as possible, if necessary, all the permissions, including conduct of environmental assessment, and environmental clearance as necessary shall be obtained prior to start of quarrying activity. The contractor should also make a concerted effort to re-use as much excavated material from this project as possible. The construction contractor will be required to:

- (i) Obtain construction materials only from government approved quarries with prior approval of PMU;
- (ii) Material will be sourced from nearest existing licensed quarry site to the maximum possible extent
- (iii) Verify suitability of all material sources and obtain approval of PMU; and
- (iv) Submit to PMU on a monthly basis documentation of sources of materials. If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/suppliers are having CTE/CTO from WBPCB and will collect the copy of these certificates and submit to PMU/ PMDSC consultants.
- (v) Avoid creation of new borrow areas, quarries etc., for the project; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental Clearance prior to approval by PMU.

D. Construction Impacts

132. Construction Impacts The civil works for the subproject includes construction of one STP at Hossainpur within the vacant Government land. This work will be confined to site, and construction will involve activities like site clearance, excavation for foundations, and creation of concrete structures etc. Works will involve typical construction methods to build structures with reinforced cement concrete and bricks. Construction material will be brought to the site on trucks.

133. Deeper trenches, depending on the local soil conditions, will be protected by shoring/bracings to avoid collapse of trenches, and also to avoid any risk to surrounding buildings. The working hours will be 8 hours daily, the total duration of each stage depends on the soil condition and other local features. All excavated spoils are to be removed and stacked near the trench to facilitate backfilling. As far as possible trench works, and excavation works during monsoon season will be avoided to prevent any water logging and accident due to it. If open trenches are not avoidable during monsoon all the mitigations measures will keep ready to avoid water logging such as dewatering pumps and sufficient pipes, barricades etc. The trench shall be kept dry by dewatering and removal of slush.

134. Work in Sensitive Areas. Although construction of the STP will be confined within a demarcated boundary and it consists quite simple techniques of civil work, the invasive nature of excavation and the project location in the built-up areas of the town where there are a variety of human activities, will result in impacts to the environment and sensitive receptors such as religious places, houses and the community in general. In this subproject the sensitive receptors are mainly nearby residents (within 50m) Major impacts envisaged are increase in air quality, noise level and dust generation. All the identified impacts are temporary in nature and for short duration, require proper mitigation measures to reduce the significance to acceptable levels. Physical impacts will be reduced by the method of working and scheduling of work, whereby the contractor should provide adequate barricades and safety signages during construction. If night works are required (however unlikely, applicable only in extreme conditions) all the mitigation measures to reduce

impacts of disturbance to minimum level to nearby habitants should be ensured by contractor

135. Damage / disturbance to existing utilities. There are telephone lines, electric poles, underground cables, water lines, drains etc., along the Anandapur high road and approach road to STP, and these may be damaged / disturbed during the works. The utilities therefore need to be identified and avoided or shifted. Damage/disturbance and unplanned / unauthorized shifting pose safety risks to workers and local community, and consumers of utilities will also be affected. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with KMC will:

- (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase.
- (ii) prepare a contingency plan to include actions to be done in case of unintentional interruption of services.
- (iii) inform the local community in advance if utilities will be disrupted during construction)

136. Chance finds. There are no notable or significant archaeological places or protected monuments or areas in and around the sub-project area. Six ASI sites are within KMC area, which are located well outside STP site and subproject command area. Therefore, no impact is envisaged but the risk of uncovering archaeological remains, given the long history of town. Construction contractors therefore should follow the below measures in conducting any excavation work:

- (i) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work.
- (ii) Stop work immediately to allow further investigation if any finds are suspected.
- (iii) Inform local Archaeological Department if a find is suspected and take any action, they require to ensure its removal or protection in situ.

137. Air Quality – dust and Emissions from construction activities. Ambient air quality is mainly influenced by traffic movement through Anandapur high road beside the STP plot. Dust generation from construction work in individual and confined work sites like STP, will be mainly during the initial construction phase of earth work. As the site is confined, dust can be effectively controlled with common measures. Dust generation will be significant during excavation. Transport, loading and unloading of loose construction materials generates dust. Increase in dust/particulate matter in ambient air is detrimental and may have adverse impacts on people and environment. Emissions from construction vehicles, equipment, and machinery used for excavation and construction will induce impacts on the air quality. Anticipated impacts include dust and an increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons. There will be greater impact on air quality from the inadequately managed or haphazard project activities that includes burning of firewood for cooking and heating in work and labor camps and open burning of solid waste by workers. To mitigate the impacts, construction contractors will be required to:

- (i) Plan the work sites properly, and demarcate the sites for stockpiling of, soils, gravel, and other construction materials away from the vehicles, general workers movement to avoid disturbance of loose materials.
- (ii) Install dust screens around the site boundaries near permanent houses before starting construction works. Wherever possible, set up temporary enclosures for dust-generating activities.;

- (iii) Damp down exposed soil and any stockpiled material on site by water sprinkling.
- (iv) Use tarpaulins to cover sand and other loose material when transported by trucks.
- (v) Clean wheels and undercarriage of haul trucks prior to leaving construction site.
- (vi) use enclosers and sprinkle water during in the construction area; dampen the debris generated.
- (vii) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel.
- (viii) Fit all heavy equipment and machinery with air pollution control devices which are operating correctly and limit idling time of construction vehicles to minimize local air pollution. Contractor's vehicles and equipment should compulsorily have PUC and submit PUC to PMU before deployment at site. Some common air pollution control devices that can be fitted to heavy equipment and machinery to reduce emissions are : Catalytic Converters, Particulate Filters, Scrubbers, Selective Catalytic Reduction (SCR), Exhaust Gas Recirculation (EGR), , High-Efficiency Particulate Air (HEPA) Filters, and Activated Carbon Filters. Implementing these devices can significantly reduce air pollution from heavy equipment and machinery, improving overall air quality and meeting regulatory standards.
- (ix) Limit idling of vehicles on the construction site to 3-5 minutes
- (x) Obtain, CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project.
- (xi) If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/suppliers are having CTE/CTO from WBPCB and will collect the copy of these certificates and submit to PMU/consultants; PMU will approve the source only after all the certificates are submitted.
- (xii) Strict prohibition of open burning of solid waste
- (xiii) Regular inspection & maintenance of construction/transportation vehicles
- (xiv) Supply of LPG to workers instead of allowing them to use firewood for cooking.
- (xv) Conduct ambient air quality monitoring periodically as per Environmental Management Plan (EMP).

138. Noise and Vibration Levels. Noise is one of the most ubiquitous disturbances to the environment particularly during the construction and operation phases. Being located in the residential areas and large vacant area, the noise level in is within the limit. Increase in noise level may be caused by excavation, operation of construction equipment like concrete mixers, transportation of equipment and materials. Use of power horns and movement of heavy vehicles can cause a serious disturbance to the nearby residences. The sensitive receptors are the general population in nearby areas. Vibration generated from construction activity, for instance from the use of pneumatic drills and piling will have impact on nearby buildings. This impact is negative but short-term, and reversible by mitigation measures. The contractor to implement all measures to control noise and vibration from construction activities, including the following:

- (i) Conduct activities with the greatest potential to generate noise during periods of the day which will result in least disturbance; provide prior public information.
- (ii) Plan activities during day time only near residential area to avoid noise/ vibration generating activities as much as possible.

- (iii) Proper measures shall be taken to minimize noise and vibration in and around STP site.
- (iv) As far as possible use new construction machineries and keep all the old machineries in good and maintained state.
- (v) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor;
- (vi) Ensure proper training of construction workers on the safe usage of pneumatic drills and exposure limits per day; provide appropriate personal protection equipment - safety glasses or goggles/face shield, helmets, safety shoes or boots, hearing protection aids etc.
- (vii) Maximum sound levels should not exceed the CPCB guideline values for noise levels.
- (viii) Ensure that the drilling rig, generator sets have acoustic hoods and noise dampers in place; provide prior information to local community about the drilling operation; workers shall be provided with appropriate PPEs
- (ix) Conduct Noise monitoring according to the Environmental Management Plan (EMP).

139. Surface Water, Soil and Groundwater Pollution. Improper stocking and management of construction material, solid waste and debris, wastewater from construction camps and facility areas, and spillage and leaks from fuel, lubricants, and construction chemicals, etc. can contaminate soils, receiving water bodies, and may leach into will pollute soils, surface water and percolation of leachate through the soil strata can contaminate the groundwater. During the rains, storm water run-off from poorly managed construction areas, stockpiled materials and debris/waste, areas contaminated from fuels and lubricants spills and leaks, can lead to silting and pollution of drains and receiving water bodies, may percolate into the soil leading to groundwater pollution. A total quantity of 1900 cum of excavated soil will be generated during from the works, and most of which will be used for refilling the trenches. The surplus soil will be used for raising the ground level of proposed STP site at Hossainpur as the area is low-lying and requires substantial filling material.

140. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater collects in the voids. Here groundwater occurs in shallow water table condition (both unconfined and confined). Rains are also high during monsoon season. To minimize the issue, the construction contractor will be required to conduct excavation works in non-monsoon season to the maximum extent possible. All the mitigations measure to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. to be adopted. During the rains there is a risk of runoff collecting in the pits and trenches. The water collected in excavated pits will contain silt and disposal of this in drainage channels lead to silting. Project area receives most of the rainfall monsoon months. It is therefore required that runoff from the construction areas, solid waste and wastewater, fuel, lubricant and oil handling and storage is well managed. Construction phase impact on soil and water quality will be temporary and needs to be mitigated. Construction contractor will be required to:

- (i) Contractor to implement all measures to prevent and control land and water pollution
- (ii) Prepare and implement a construction waste management plan.
- (iii) Avoid stockpiling of soils especially during the monsoon season, if unavoidable, it should be covered by tarpaulins or plastic sheets, and protected by protection berms / bunds to avoid entry of runoff

- (iv) Create a temporary peripheral drainage channel around the work area to arrest the entry of runoff from upper areas into the work area;
- (v) Avoid locating construction camps and labour camps near to any water body and do not dispose any waste or sillage into any water body.
- (vi) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PMU on designated disposal areas;
- (vii) Inspect all the drainage lines / streams at work sites, construction site/construction camp/labor camp etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall.
- (viii) Groundwater occurs in shallow water table condition (both unconfined and confined) . Rains are also high during monsoon season – ensure that water will not pond in pits and voids near project location by dewatering the accumulated water
- (ix) Avoid trenching and excavation works during monsoon season
- (x) If work is not avoidable during monsoon, keep ready all the mitigations measure to avoid water logging such as dewatering pumps and sufficient pipes, , barricades etc.
- (xi) Pump out the water collected in the pits / excavations to a temporary sedimentation pond; dispose of only clarified water into drainage channels/streams after sedimentation in the temporary ponds;
- (xii) Consider safety aspects related to pit collapse due to accumulation of water.
- (xiii) Inspect and verify all the emergency measures and emergency control system before start of monsoon, keep the emergency response committee on high alert during monsoon/heavy rain fall
- (xiv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
- (xv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
- (xvi) Contractor shall source water from surface sources as far as possible, and obtain necessary permit to use groundwater or surface water for construction purposes.
- (xvii) Prevent pollutants from contaminating the soil and the groundwater; provide proper facilities for proper collection and treatment of sanitary waste in work facilities and workers accommodation
- (xviii) Store fuels and lubricants in double hulled tanks. Fuel and other petroleum products stored away from water drainage and protected by impermeable lining and bonded 110%;
- (xix) Conduct regular maintenance of machinery and vehicles, and avoid leakages;
- (xx) Enclose the construction area to prevent unauthorized access
- (xxi) Conduct surface quality monitoring according to the Environmental Management Plan (EMP).

141. Generation and management of construction wastes. Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. It is estimated that about 1900 m³ of excavated soil and 20 m³ dismantled bitumen top will be generated during pipe laying work. The excavated soil and the waste generated will be reused for backfilling and for area development purpose at the proposed STP site at Hossainpur as the area is low-lying and requires substantial filling material. Domestic solid wastes may also be generated from the workers' camp. Improper waste management could cause odour and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape. The following mitigation measures to minimize impacts from waste generation shall be implemented

by the contractor:

- (i) Prepare and implement a Construction Waste Management Plan;
- (ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access/internal roads etc.;
- (iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed of at approved designated areas immediately;
- (iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; site should locate away from residential areas, forests, water bodies and any other sensitive land uses;
- (v) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; create a compost pit at workers camp sites for disposal of biodegradable waste; non-biodegradable / recyclable material shall be collected separately and sold in the local recycling material market;
- (vi) establishment of separate bunded and lined areas with 110% volume for the storage of all the toxic material wastes, including batteries, oil filters, engine oils, used oils, etc. at the construction site;
- (vii) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed of through agencies authorized by WBPCB;
- (viii) Prohibit burning of construction and/or domestic waste;
- (ix) Ensure that wastes are not haphazardly thrown in and around the project site provide proper collection bins and create awareness to use the dust bins;
- (x) If temporary soil storage is adapted, such site should be properly demarcated by fencing and information board should be placed at entrance; soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission; soil should be levelled on daily basis and no heap or mound should be left at end of the day;
- (xi) Soil should be covered with tarpaulin sheets during the transportation.
- (xii) Soil transportation should not be done during the peak hours and should avoid narrow and heavy traffic routes.
- (xiii) Prior to the commencement of works, contractor will follow all the prescribed rules and shall identify a surplus soil and debris disposal site (temporary and final disposal) in consultation with the PMU/ULB and adhering to the EMP criteria
- (xiv) If any hazardous waste is generated, handled or managed during construction works contractor need to comply all the requirements of Hazardous and other wastes (Management and Trans boundary Movement) Rules, 2016, The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility
- (xv) Conduct site clearance and restoration to original condition after the completion of construction work; PMU to ensure that site is properly restored prior to issuing of construction completion certificate.

142. Accessibility and traffic management. Works related STP will be confined to the selected site; therefore, there is no direct interference of these works with the traffic and accessibility.. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Plan construction vehicle transportation routes properly so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;

- (ii) Schedule transport and hauling activities during non-peak hours;
- (iii) Locate entry and exit points in STP site where there is low potential for traffic congestion;
- (iv) Keep the site free from all unnecessary obstructions;
- (v) Drive vehicles in a considerate manner;
- (vi) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.

143. **Trenchless Pipe Installation.** About 150m outflow sewer pipeline will be laid through trenchless method at Anandapur high road for discharge of treated effluent into T P Canal. Trenchless pipe laying involves the use of horizontal direction drilling (HDD) which involves hydraulic machinery to drill a horizontal tunnel for a new pipe, so no trenches are dug, and excavation is limited to the entry and exit points. Noise generated due to HDD affect the neighboring communities and other sensitive receptors. However, there are no sensitive receptors in the area that would be impacted by noise generation.

144. During drilling, bentonite slurry may be used to cooling the drill bit, lubricating the drill bit and drill rods, increasing the stability of the borehole, etc. A part of the original bentonite slurry may be recycled and reused, while the remaining slurry may spill out to the watercourses. If the bentonite slurry is not properly collected and treated, it will contaminate the adjacent watercourse. The contractors' mitigation measures will include but not necessarily be limited to the following measures:

- (i) Pipes shall be installed by the horizontal directional drilling (HDD) methods where required. If the method is not feasible for any road, the contractor shall inform the Project Manager and gain prior approval for an alternative method or for open trench method.
- (ii) Excavation material shall be removed from the conduit as the work progresses. No accumulation of excavated material within the conduit will be permitted.
- (iii) The contractor shall provide sediment and erosion control measures in accordance with local environmental legislation.
- (iv) The contractor shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction. Spent drilling fluids and cuttings shall be confined to the entrance and exit pits.
- (v) The contractor shall take all necessary precautions to minimize the damage to the adjacent properties. Drilling fluid/ bentonite slurry that enters the pipe shall be removed by flushing or other suitable methods. Sediment tanks of sufficient capacity constructed from pre-formed individual cells of approximately 6-8m³ capacities shall be used for settling wastewaters prior to disposal.
- (vi) The contractor shall be responsible for clean-up and restoration of the site.
- (vii) Pits excavated to permit connection of bored pipe shall be backfilled, and disturbed areas shall be restored to their original state or better. Sections of sidewalks, curbs, and gutters or other permanent improvements damaged during HDD operations shall be repaired or replaced at the contractor's expense.

145. **Socio-Economic – disturbance to residents, and livelihood activities.** Blocking access to the residents, customers to nearby shops, disturbance to businesses and livelihood activities are not envisaged during construction of STP. The potential impacts are negligible and short-term and temporary. The construction contractor will be required to implement following measures to mitigate the impact:

- (i) Increase workforce;
- (ii) Consult nearby residents regarding operating hours and factoring this in work schedules;
- (iii) Provide sign boards to inform nature and duration of construction works and contact numbers for concerns/complaints.

146. **Socio-Economic – Employment.** Manpower will be required during the construction stage. This can result in a generation of temporary employment and increase in local revenue. Thus, potential impact is positive and long-term. The construction contractor will be required to:

- (i) Employ local labour force as far as possible
- (ii) Secure construction materials from local market as far as possible
- (iii) Comply with labor laws

147. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Trenches deeper than 1 m will be protected by shoring/bracings (wooden/steel) to avoid collapse of trenches, and also to avoid any risk to surrounding buildings. Utmost care must be taken by the contractor to keep the trench dry and provide hard barricade the same to avoid any accident. Undertake the construction work stretch-wise; excavation, and trench refilling should be completed on the same day. Construction workers may be potentially exposed to communicable and transmittable diseases in the community and the workforce, such as the COVID-19. The construction contractor will be required to:

- (i) Comply with all national, state and local labor laws
- (ii) Following best practice health and safety guidelines including IFC's General EHS Guidelines²³, Sector Specific (Water and Sanitation) Guidelines²⁴ and any other guidelines and protocols issues by WHO, ADB or relevant government agencies for emerging situation like COVID-19,
- (iii) Develop and implement site-specific occupational health and safety (OHS) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training²⁵ for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
- (iv) Provide dust screen around the site prior to start of construction works; provide temporary enclosure for dust-generating activities, where ever possible;

²³<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

²⁴<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

²⁵ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

- (v) Trench excavation works shall be conducted in a safe manner; public movement in the work site should be blocked;
- (vi) all trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel);
- (vii) As far as possible avoid trench works and excavation works during monsoon season to avoid any water logging and accident due to it. If open trenches are not avoidable during monsoon, keep ready all the mitigations measures to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc.
- (viii) Adequate safety measures shall be implemented for excavation and construction of wet well at the proposed STP; the risk is high consider the depth of excavation, and high water table.
- (ix) Provide hard barricades, and deploy security personnel to prevent unnecessary entry of people and to avoid accidental fall into open trenches
- (v) Ensure that qualified first aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
- (vi) Provide medical insurance coverage for workers;
- (vii) Secure all installations from unauthorized intrusion and accident risks;
- (viii) The project area may experience extreme temperature during summer months of April and May occasionally, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following:
 - Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM)
 - Provide appropriate shade near the workplace; allow periodic resting and provide adequate water
 - Provide necessary medicine and facilities to take care of dehydration related health issues
- (ix) Provide supplies of potable drinking water;
- (x) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
- (xi) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- (xii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- (xiii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (xiv) Ensure moving equipment is outfitted with audible back-up alarms;
- (xv) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and
- (xvi) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
- (xvii) Conduct regular health check-ups for workers

- (xviii) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites

148. Community Health and Safety. Movement of construction vehicles and equipment on public roads also pose risk to pedestrians and traffic. The STP works are located close to houses. These may pose significant safety risk from the presence of construction activities, machinery and materials to the local people and community. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Code of conduct for workers should be developed and implemented throughout the construction period;
- (ii) Follow International best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities;
- (iii) Trench excavation shall be conducted in a safe manner; public movement should be blocked and work shall be conducted;
- (iv) All trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel);
- (v) Provide boundary wall and deploy security personnel at STP site to prevent unnecessary entry and to avoid accidental fall into open trenches
- (vi) Follow established community health and safety protocol on emerging infectious diseases such as COVID19.
- (vii) Implement measure to prevent proliferation of vectors of diseases at work site;
- (viii) Maintain a complaint logbook in worker's camp and take action promptly of complaints. Follow the established GRM of the overall project (KSHARP);
- (ix) Schedule transportation activities by avoiding peak traffic periods;
- (x) Clean wheels and undercarriage of haul trucks prior to leaving construction site;
- (xi) Educate drivers: limit speed not more than 30 km/h in settlements; ensure that drivers follow road safety rules, and employ traffic marshals in all construction vehicles on road to assist the driver
- (xii) Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads, that may disturb the traffic movement;
- (xiii) Provide prior information to local community about work schedules;
- (xiv) Noise barriers must be installed in between the construction site and any community locations to reduce the noise level;
- (xv) Provide adequate space and lighting, temporary fences, reflectorized barriers and signages at the work site;
- (xvi) Provide hard barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches and
- (xvii) Ensure contractor has staff trained on emergency response

149. Operation of Construction Camps and Workers Facilities. It is likely that the contract may employ workers from outside project area, and therefore may provide temporary workers accommodation during the construction phase. Proper provision and maintenance of facilities is necessary for proper living conditions and avoid health, environment, and safety issues.

Operation of construction camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) Ensure conditions of liveability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit- in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation²⁶ which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface) per worker, a minimum ceiling height of 2.10 meters; a reasonable number of workers are allowed to share the same room – (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (IFC benchmark standards for workers accommodation is provided in **Error! Reference source not found.**).
- (ii) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (iii) Recover used oil and lubricants and reuse or remove from the site;
- (iv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas;
- (v) Remove all wreckage, rubbish, or temporary structures which are no longer required; and
- (vi) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work

150. Social and Cultural Resources. Houses are present nearby the proposed STP site and contractor will require to follow the mitigation measures as given below-

- (i) Consult with concerned agency authorities and local community in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required
- (ii) Provide proper signage, barricades etc.
- (iii) Take special measures including posting of security personnel at the work site,.
- (iv) Timely completion of the construction work
- (v) Establishment of construction site camp and labor camp must maintain proper distance from the nearby houses.

151. Night works. Most of the construction works shall be undertaken only during day hours. Night works are required only in the extreme conditions such as extreme climatic conditions (extreme hot during summers), religious fairs/celebrations in daytime etc. Contractors are required to take prior approval from PIU/consultants and concerned town authorities for night works. Contractors are required to adhere following conditions for night works including those

²⁶

https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-atifc/publications/publications_gpn_workers_accommodation

prescribed by concerned authorities:

- (i) Prepare a night work protocol and obtain prior approval from PMU, and no night works shall be conducted without prior written approval of PMU
- (ii) No noisy works shall be conducted during the night; maintain noise levels within the standards prescribed by CPCB
- (iii) Maintain proper lighting and illumination of work site
- (iv) Workers engaged in night works should have: adequate rest/sleep in daytime before start of night works, and previous experience of night works and should be physically fit for such works including clear vision in night
- (v) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests
- (vi) Workers / site staff should not shout or create noise / nuisance
- (vii) First aid and emergency vehicles should be available at site
- (viii) Emergency preparedness plan should be operative during night works
- (ix) Old persons and pregnant women and women having small kids should not work in nighttime
- (x) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
- (xi) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
- (xii) PIU/PMDSC site engineers and contractor's safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video graphic records as well as register the observations.
- (xiii) Drivers and workers should be alert and responsive during night works
- (xiv) All the wages to workers working in night hours should be as per the applicable labour acts
- (xv) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours

152. Post-construction clean-up and Reinstatement. The contractor will reinstate all working areas as work proceeds during construction. All plant, equipment, materials, temporary infrastructure, and vehicles will be removed at the earliest opportunity and the surface of the ground restored as near as practicable to its original condition. The following generic measures should be taken:

- (i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required;
- (ii) All excavated roads shall be reinstated to original condition; fully reinstate pathways, other local infrastructure, and others land used for the project to at least their pre-project condition upon the completion of construction.
- (iii) All disrupted utilities restored;
- (iv) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up;
- (v) All hardened surfaces within the construction camp area shall be ripped;
- (vi) All imported materials removed, and the area shall be top soiled and regressed using guidelines set out in the re-vegetation specification that forms part of this document;

- (vii) The contractor must arrange the cancellation of all temporary services;
- (viii) Request PMU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.

A. Operation and Maintenance Impacts

153. **Operation and Maintenance of system** will be carried out by the contractor for 5 years and then by KMC directly or through an external operator. The system has a design life of 30 years, during which major repairs or refurbishments will not require and operate with little maintenance beyond routine actions. The stability and integrity of the system will be monitored periodically to detect problems and allow remedial action if required. Repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

154. **STP Operations.** STP operational procedures will be firmed up during the detailed design phase, including the amount of automated or manual operation. The system shall have a design life of 30 years, during which time, the system shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order.

- (i) Ensure valid consent to operate (CTO) from WBPCB for operation of STP.
- (ii) Ensure that all conditions/standards prescribed by WBPCB are complied with duly.
- (iii) The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action, if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing, and replacement of parts.
- (iv) If necessary an odour capture system will be installed during the operational stage as per CPCB guidelines on odour pollution and control, May 2008.
- (v) Undertake preventive and periodic maintenance activities as required.
- (vi) Standard operating procedures and operation manual will be prepared by the DBO contractor. Besides routine operation, this should cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and system efficiency etc., Adequate resources – technical and financial, has been taken into consideration in the project design. The manual will also include safety awareness and mock drills for worker safety.
- (vii) Conduct periodic training to workers; ensure that all safety apparatus at STP including personal protection equipment is in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations;
- (viii) During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures.
- (ix) Ensure that chlorinator facility is operated only by trained staff and as per the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only
- (x) Implement Emergency Response System (ERS) for the chlorine leakage as per Guidelines and Emergency plan for handling and storing chlorine
- (xi) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility;

- (xii) Prepare a treated wastewater reuse plan and ensure intended quality for each direct reuse. Reuse applications will follow the Manual on Sewerage and Sewage Treatment Systems, CPHEEO, Ministry of Urban Development, Govt. of India (Appendix 6).
- (xiii) Ensure that treated wastewater meets the established discharge standards all times; conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards;
- (xiv) All necessary safety, mitigation and monitoring measures as suggested in the reuse plan shall be implemented.
- (xv) Conduct baseline water quality assessment of receiving water body prior to start of operation

155. Sludge management. Sewage sludge generally consists of organic matter, pathogens, metals, and micro pollutants. Properly dried sludge can be used as soil conditioner. In order to ensure the safe use of dried sludge, following should be followed:

- (i) Prepare a dried sludge utilization plan for subproject area with the help of Agriculture Department. Plan should clearly include various potential uses and demand in town and surroundings;
- (ii) Establish usage limits, where required, (geographical/crops/type of application /type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations;
- (iii) Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling, management and disposal/reuse actions suggested in the management plan
- (iv) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and ensure that the concentrations comply with the compost quality standard notified under the Solid Waste Management Rules, 2016 (refer Table 15: Standards for Sludge Reuse as Manure Standard for Composting) and the Fertilizer Control Order (FCO), 1985, amendments in 2009 and 2013. It shall not be used for food crops.
- (v) Identify a landfill/suitable site for disposal of surplus dried sludge;
- (vi) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016).

156. Occupational Health and Safety. Accidents may occur during the operation and maintenance of the sewerage and sanitation systems under the Project. An Occupational Health and Safety Plan that will cover all hazards and risks from the operation and maintenance of all facilities, including electrical, biological, chemical hazards and risks, etc. shall be prepared, and implemented during operation stage.

E. Cumulative Impacts

157. The subproject aims to improve sewerage systems by creating required new infrastructures. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of a project or activity when added to other existing, planned, and/or reasonably anticipated future ones. The proposed sub-project is aimed towards providing basic civic facilities

in the added area of KMC creating required new infrastructures. The construction works are fairly simple having no major impact on surrounding. There are few temporary/ short term impacts anticipated during the construction phase as the roads are narrow and the project area is highly residential. The nearest environmentally sensitive protected area, EKW is about 690m from the sub-project boundary but the intervening area is built up and urbanized area. There will be also no discharge of wastewater (combined or treated sewage) into the EKW from the subproject area and is not anticipated to have any adverse impact on the local flora, fauna, or fishing ponds in EKW area.

158. S&D works are also proposed to be taken up simultaneously in the service area of subproject in part of Ward no 108 and 109 (under different packages of KSHARP-SD 03 and SD 050) which is a developing area congested with people, traffic and activities. There are sensitive places like hospitals, schools, and marketplaces. Although no other notable public works are anticipated during the project implementation on public roads, there will be usual construction activities. However, certain collective impacts are anticipated as one pumping station along with S&D networks are proposed in under KSHARP in Ward no.108 (Package SD 05) beside the proposed STP site at Hossainpur. But their contribution during construction will not be very significant with the implementation of mitigation measures as discussed in this IEE report.

159. The construction of a combined 55 MLD STP capacity (41 MLD by 2043 and an additional planned STP with a capacity of 14 MLD by 2058) within 5.62 acres will put additional load on the receiving water body, TP Canal. Discharge of treated wastewater into TP canal may lead to overflowing and flooding if the canal capacity is insufficient to take the cumulative load and safety convey in to downstream. Preliminary assessments conducted by KMC for the STP, considering combined capacity, confirmed that the TP Canal has adequate capacity to carry the treated sewage from the STP. Further to evaluate the canals' carrying capacity for the KSHARP, a joint survey with the Irrigation Department and KMC is currently underway at all discharge locations. The results from this survey will be incorporated into the updated Initial Environmental Examination (IEE). Proposed reuse of treated effluent will reduce the load on TP canal, and will also help conserve freshwater resources.

160. During the summer season (dry and windy weather conditions) dust generation from cumulative construction activities may be significant, and this may increase the particulate matter concentration in ambient air. Dust control measures suggested in the EMP aim to minimize the dust generation from the subproject construction activities. Road restoration works are to be implemented in project area; scheduling of works needs to be coordinated with the respective road agency (KMC and PWD). The increase in road traffic, disturbance to traffic, public safety and workers safety issues, damage to existing utilities, influx of outstation workers, etc., due to various simultaneous construction works will be notable. However, the measures suggested in the EMP will minimize these impacts greatly, and therefore effective implementation of EMP must be ensured. Thus, the net impacts are unlikely to be significant.

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

A. Overview

161. The meaningful consultation and information disclosure program is an essential part of the environmental assessment process which enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, and the sharing of development benefits and opportunities, and implementation

issues.²⁷ The process also helps avoid potential conflicts with stakeholders for smooth project implementation. The findings from the public consultations are documented and considered in the development of the EMP, especially in identifying the significant impacts of the proposed Project and developing the corresponding mitigation measures.

B. Public Consultation

162. During IEE preparation stage, public consultations were conducted near the locations of proposed STP site and command area of STP locations. Local residents, business persons (vendors, hawkers, shopkeepers etc.), Government officials, women and residents were consulted during public consultations from November 2023 to June 2024. Total 4 stakeholder's consultations were held in which a total of 206 persons (43 male and 163 female) participated (Table 21). These consultations provided insights into the present situation and needs of the communities.

163. On November 8, 2023, a joint community consultation was held at the Ward 108 office for the S&D network and Hossainpur pumping station (SD 05) and the STP package (SD 04). Local public and ward representatives attended the meeting, where the project scope and benefits, potential temporary inconveniences, and mitigation measures during project implementation were discussed. A total of 63 persons (7 male and 56 female) participated.

164. Another public consultation took place at the Hossainpore STP site in Ward 108 on June 14, 2014, involving local residents, women, Youth Club members, and the ward councilor's representatives. A total of 125 people (27 men and 98 women) participated, including many residents from nearby houses.

165. Summary of all consultation are given in table below and details of the same along with attendance sheet and photographs is attached in Appendix 8.

Table 21: The details of Public Consultation in the Project area

Sr. No	Date	Type of consultation	Location	Total No. of Participants	No. of Male Participants	No. of Female Participants
1	08.11.23	Community Consultation	Ward 108 (Mukunda Bhaban)	63	7	56
2	07.02.2024	FGD	Ward 108 (Near STP land, Hossainpur)	11	7	4
3	07.02.2024	FGD	Ward 108 (Hossainpur Main Road, Madurdaha)	7	2	5

²⁷ Meaningful consultation is an essential part of the environmental assessment process which enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, and the sharing of development benefits and opportunities, and implementation issues. The process also helps avoid potential conflicts with stakeholders for smooth project implementation. The findings from the public consultations are documented and considered in the development of the EMP, especially in identifying the significant impacts of the proposed Project and developing the corresponding mitigation measures.

Sr. No	Date	Type of consultation	Location	Total No. of Participants	No. of Male Participants	No. of Female Participants
4	14.06.2024	Consultation with Local residents, women, local Youth Club Members, representatives of councilor of ward 108	Ward 108 (Hossainpur STP Land)	125	27	98
Total				206	43	163

166. KMC officials explained to the community members about KSHARP, an initiative of the Kolkata Municipal Corporation (KMC) supported by the Asian Development Bank (ADB), aimed at improving sewerage and drainage services in eastern Kolkata and its surrounding areas under KMC jurisdiction. They detailed the scope of work and the tentative commencement date for the project package, emphasizing the necessity of treating the Dry Weather Flow. Additionally, they explained how the excess treated effluent would be released into the Tolly Panchanna Canal after being reused in various non-domestic purposes. The sludge generated from the STP can be utilized as manure in agriculture. Activity.

167. Participants are aware of the project and are enthusiastic about the proposed work under KSHARP, which aims to improve the surrounding environment. They expressed their willingness to support the project during its execution. Youth club representatives mentioned that the proposed construction work will not interfere with evening playtime, as the land is large enough to leave ample open space for their activities and events.

168. Local women raised concerns about the inadequate drinking water supply and water logging problem during monsoon in the area and expressed their interest in skill development training for economic upliftment. They also inquired if the project could provide support for these initiatives. The public expressed concerns about the nuisance and disturbance from dust and noise during construction, which could impact nearby residents. They requested advance notice before construction begins, as well as proper warning signs and barricades around the construction area to prevent accidents and inconvenience. Considering the project's benefits, all participants in the consultation program unanimously agreed that the proposed work will address many environmental issues and improve health and hygiene conditions. They expressed their full support for the successful implementation of the program.

C. Future Consultation and Disclosure

169. Prior to start of construction, PMU with the assistance of PMDSC will conduct information dissemination sessions at STP site and major intersections and solicit the help of the local community leaders/prominent citizens to encourage the participation of the people to discuss various environmental issues. At ward/neighborhood level, focus group meetings will be conducted to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in project monitoring and evaluation.

170. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction and operational phases and also

regarding the grievance redress mechanism. PMU with the help of PMDSC consultants will organize public meetings and will appraise the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations before and during the construction.

D. Project Disclosure

171. Project related information shall be disclosed through public consultation and making relevant documents available in public locations. PMU and PMDSC shall provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected person and other stakeholders. For illiterate people, other suitable communication methods will be used.

172. Project summary in the local language (Bengali) and English will be made available at the Ward offices of KMC and PMU. Electronic version of the IEE in English and summary in Bengali will be placed in the official website of the KSHARP after approval of the IEE by Government and ADB. Per ADB requirements, IEE report, and environmental monitoring reports will be posted on ADB website.

173. Stakeholders will also be made aware of grievance register and redress mechanism, including contact information of project agency. During project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders.

174. Public information campaigns via newspaper/radio/TV are proposed. Prior to start of construction, the PMU will issue a notification on the start date of implementation in local newspapers. A board showing the details of the project will be displayed at the construction site for the information of general public.

175. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes and other likely disturbances during construction. The road closure together with the proposed detours will be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

VII. GRIEVANCE REDRESS MECHANISM

A. Common Grievance Redress Mechanism

176. A project-specific grievance redress mechanism (GRM) was established under ongoing project (Loan number 3413 and 3689, Kolkata Environmental Improvement Investment Program (KEIIP). The GRM for KEIIP, will be applicable and will be further strengthened for the proposed KSHARP.²⁸ The grievance redress mechanism (GRM) will receive, evaluate, and facilitate the resolution of social, environmental or any other project-related grievances for KSHARP (along with the existing project). The GRM aims to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns of the project stakeholders.²⁹ The multichannel, project-specific GRM functional for KEIIP and the positive features and learning from it will be adopted for the KSHARP.

177. A common grievance redress mechanism (GRM) will be in place to redress social, environmental or any other grievances related to project and/or respective subprojects. Implementation of the resettlement plan/resettlement and indigenous peoples plan (RIPP)/due diligence reports (DDRs)/ initial environment examination (IEEs) will follow the GRM described below. A public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per project entitlement matrix, and PMU will ensure that their grievances are addressed.

178. Affected persons will have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes that have already been installed by PMU or through toll-free telephone number “Didi Ke Bolo”,³⁰ or talk to Mayor³¹ or by e-mail, by post, or by writing in complaints register kept in PMU office or Kolkata Municipal Corporation (KMC) Borough offices or Contractor’s site offices. **Appendix 9** has the sample grievance registration format. Careful documentation of the name of the complainant, date of receipt of the complaint, address/contact details of the person, location of the problem area, and how the problem was resolved will be undertaken. PMU Safeguard Officers will have the overall responsibility for timely grievance redressal on environmental and social safeguards issues and for registration of grievances, related disclosure, and communication with the aggrieved party. The complainants/aggrieved persons will also be encouraged to seek a complaint registration number from the PMU.

²⁸ The office order regarding GRC is placed in Appendix 10.

²⁹ The project components under the KEIIP are water supply, sewerage and drainage, construction of STP and Pumping Stations. Similar project components have also been proposed in KSHARP, except for water supply components, so it is expected that the nature of grievances which may arise during the implementation phase under KSHARP will be similar in the nature of grievances that were received in KEIIP. During implementation of KEIIP, the grievances were mostly related to disruption in water supply services due to damages caused to existing pipelines during excavation work, minor damages caused to the property line during construction phase, damages to boundary walls, concrete ramps, water logging, delays in road restoration work, etc. The GRC in KEIIP has long standing experience for dealing and resolving the same kind of grievances within stipulated time. The GRM established in KEIIP is functioning effectively, hence adopting the same GRM structure of KEIIP is proposed in case of KSHARP. Under KEIIP, the grievances are resolved on average between seven and fifteen days. The same grievance redress committee (GRC) will continue to function for KSHARP.

³⁰ This is an initiative started by GoWB from 2019, that provides a platform for the people of West Bengal to directly lodge concerns or complaints to the state authority (Hon’ble Chief Minister GoWB). Official website: <https://www.didikebolo.com/>

³¹ KMC initiated this unique public communication system through which citizens of the city can call on a designated number to register complaints in 2019. Talk to Mayor dial in at 18003451213.

179. The GRM provides an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project. A three-tier GRM is conceived for the proposed project, the first tier is being at field/ward/Borough level, the second tier at PMU level and the grievance redress committee is being the apex level. For the project level GRM, a Grievance Redress Committee (GRC) will be established at PMU; the safeguards officers of the PMU, supported by the social safeguards specialist of PMDSC will be responsible for conducting periodic community meetings with affected communities to understand their concerns and help them through the process of grievance redressal including translating the complaints into Bengali or English, recording and registering grievances of non-literate affected persons and explaining the process of GRM. All expedient and minor grievances will be resolved at field/ward/Borough level; should any grievance fail to be resolved within the stipulated time period at the field level, the PMU will be consulted within specified time. PMU will also be responsible for follow-through for each grievance, periodic information dissemination to complainants on the status of their grievance and recording their feedback (satisfaction/dissatisfaction and suggestions). In the event that certain grievances cannot be resolved at project level, they will be referred to the grievance redress committee (GRC).³²

180. The GRM aims to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. All grievances will be registered. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel from the PMU supported by PMDSC will try to successfully resolve them in consultation with the Executive Engineer of KMC Borough offices. Grievances not redressed through this process within/at the project level within stipulated time period will be referred to the GRC. The GRC for the project has been constituted, as per office order PMU/ 404 A/2023-24, dated 29 December 2023, issued by Project Director, KEIP/KMC. The GRC will meet every month (if there are pending, registered grievances), determine the merit of each grievance, and resolve grievances within specified time upon receiving the complaint-failing which may be referred by affected persons to appropriate courts of law. The multi-tier GRM for the project is outlined below (Figure 15), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration. The PMU shall issue notifications to concerned Borough offices to establish field level GRCs, with details of composition, process of grievance redress to be followed, and time limit for grievance redress at each level.

181. **Grievance redress process.** In case of grievances that are immediate and urgent in the perception of the complainant, the contractor and PMDSC on-site personnel will provide the most easily accessible for quick resolution of grievances. Contact phone numbers and names of the concerned PMU safeguard officers and contractors will be posted at all construction sites at visible locations. The PMU safeguard officers will be responsible to see through the process of redressal of each grievance.

- (i) **1st Level Grievance.** The first point of contact for people filing complaints will be the staff from the contractor designated for receiving grievances and kept in safe custody under supervision of Gender and Safeguards Unit (GSU) field workers

³² The GRC comprises the Administrative Officer, KSHARP, Deputy Chief Engineer (I), KSHARP/KMC, Social Safeguard Officer, KSHARP, Environmental Officer KSHARP, Social Safeguards Specialist, PMDSC, KSHARP, Environmental Safeguards Specialist, PMDSC, KSHARP. The Administrative officer, KSHARP is the Convenor of the GRC.

assigned to the ward (who will be available at an appointed time at the sites(s) and borough office) and the contractor's personnel. The phone number of the KMC Borough office should be made available at the construction site signboards. Registers for writing complaints will be available at borough offices. The contractors and GSU safeguard monitors can immediately resolve grievances on-site in consultation with each other and the area engineer and borough engineer, as required, and will be required to do so within 5 days of receipt of a complaint/grievance. Record of grievances received at field level will be conveyed once a week to the Environmental and Social Managers and Administrative Officer at PMU, to enable tracking.³³

- (ii) **2nd Level Grievance.** All grievances that cannot be redressed within 7 days at field/ward level will be reviewed by the Grievance Redress Committee at PMU, headed by the Administrative Officer, assisted by the Safeguard Officers and concerned Deputy Chief Engineer, who will seek the advice of the Project Director, and Director General of PMU as necessary, and attempt to resolve the grievances within 10 days from the date of registration of complaint. The GRU of the PMU is already in place. If the PMU feels that the matter is beyond its jurisdiction, it will escalate the same to the Grievance Redress Committee (GRC).
- (iii) **3rd Level Grievance.** All grievances that cannot be resolved at PMU level will be referred to the GRC with support from PMU and PMDSC. GRC will attempt to resolve grievances within 5 days, 10 days and 15 days from the date of receipt of complaint from 1st level, 2nd level and 3rd level respectively.

182. Besides the project's GRM, the Kolkata Municipal Corporation (KMC) also has a centralized public grievance redress monitoring system where the public can file grievances through a dedicated web portal (please provide web portal).³⁴ The complainant or aggrieved persons can also lodge their complaints through this online portal.

183. **Court of Law.** An aggrieved person shall have access to the country's legal system at any stage, and accessing the country's legal system can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

184. **ADB Accountability Mechanism.** As cited in the above diagram any aggrieved person who is not satisfied with the decision of GRC than he/she can directly approaches to the court of law. In the event that the established GRM is not in a position to resolve the issue, the affected person also can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer at ADB headquarters or the ADB India Resident Mission (INRM). The complaint can be submitted in any of the official languages of ADB's developing member countries. Before submitting a complaint to the Accountability Mechanism, it is recommended that affected people make a good faith effort to resolve their problems by working with the concerned ADB operations department (in this case, INRM). Only after doing that, and if they are still dissatisfied, they could approach the Accountability Mechanism. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

185. **Areas of Jurisdiction.** The areas of jurisdiction of the GRC, headed by the Commissioner,

³³ In case of any impacts on indigenous people/scheduled tribe, in subproject areas, the grievance redress team must have representation of the affected indigenous people, the chief of the indigenous peoples group as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and/or an NGO working with indigenous peoples.

³⁴ <https://www.kmcgov.in/KMCPortal/jsp/ComplaintNew.jsp>

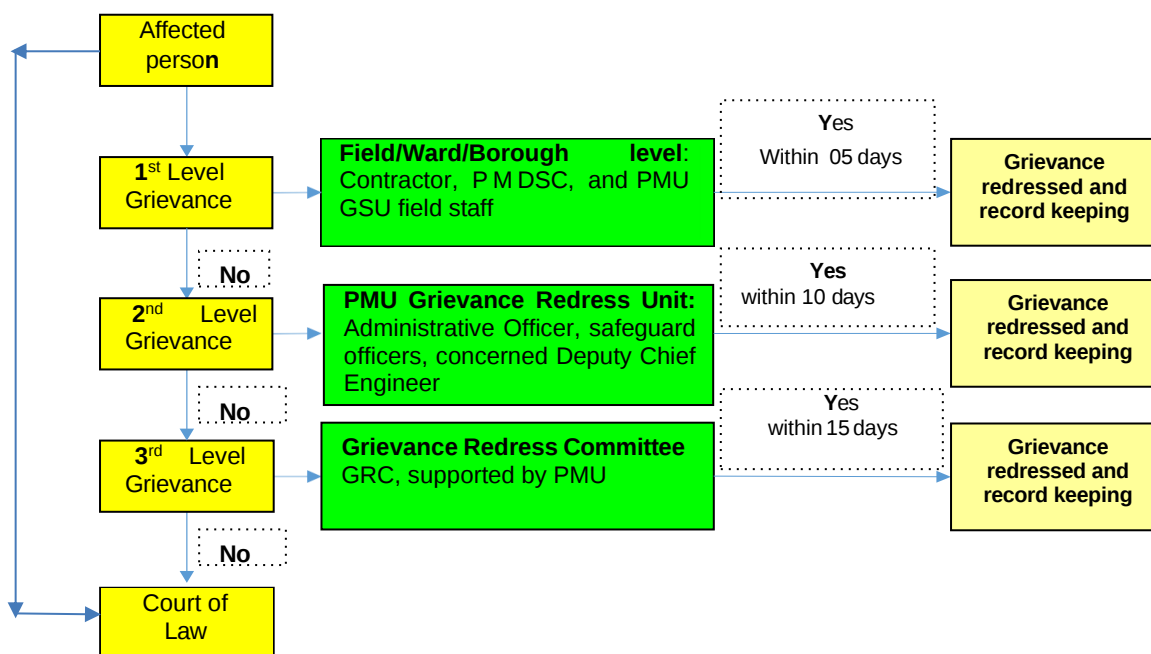
KMC will be (i) all locations or sites within the district where subproject facilities are proposed, or (ii) their areas of influence within the KMC areas. The GRC will have jurisdictional authority across the state (i.e., areas of influence of subproject facilities beyond district boundaries, if any).

186. Record-keeping. Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the final outcome will be kept by PMU (with the support of PMDSC). The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU office, the ward/borough office and on the web, as well as reported in the semi-annual environmental monitoring reports to be submitted to ADB.

187. Information Dissemination Methods of the GRM. The PMU, assisted by PMDSC will be responsible for information dissemination to affected persons on grievance redressal procedure. Subproject area/affected area-wide public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the consultation and participation plan. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated. The environment and social safeguard officer will be assisted by PMDSC safeguards specialists with information/collateral/awareness material etc. and in conducting project awareness campaigns. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per agreed entitlement matrix including Who to contact and when, where/ how to register grievance, various stages of grievance redress process, time likely to be taken for redressal of minor and major grievances, etc. Grievances received and responses provided will be documented and reported back to the affected persons. The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the PMU offices, Borough level notice outcomes will be displayed/disclosed in the offices of the different Boroughs of KMC and web. The phone number where grievances are to be recorded will be prominently displayed at the construction sites, boards and on the web, as well as reported in the semi-annual environmental and social monitoring reports to be submitted to ADB. A Sample Grievance Registration Form has been attached in Appendix 9.

188. Periodic Review and Documentation of Lessons Learned. The environment and social safeguard officer of PMU will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PMU's ability to prevent and address grievances.

189. Costs. All costs involved in resolving the complaints (meetings, consultations, communication and reporting / information dissemination) will be borne by PMU. Cost estimates for grievance redress are included in resettlement cost estimates. The grievance redress process is shown in Figure 15.

Figure 15: Grievance Redressal Process

PMDSC: Project Management and Design Supervision Consultant; PMU: Project Management Unit; GRC: Grievance Redress Committee; GSU: Gender and Safeguards Unit

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

190. An Environmental Management Plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable level and monitoring the same. This is presented in the following Tables 22-27 which shows the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

191. A copy of the EMP must be kept at work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

192. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate budget for compliance with these EMP measures, requirements and actions.

193. The contractor will be required to submit to PMU, for review and approval, a site-specific environmental management plan (SEMP) including (i) proposed sites/locations for construction

work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. No works can commence prior to approval of SEMP.

Table 22: Design-stage Environmental Management Plan – Mitigation

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds
Design of sewerage system	Environmental, health and safety risks from improper design of project components	(i) Locating components and facilities appropriately by avoiding sensitive locations and protected areas (environmentally, socially, and archeologically). (ii) Technical design of all the elements like STP, reuse arrangements, outflow sewer mains will follow the relevant national planning and design guidelines. (iii) Avoiding usage of asbestos containing materials (iv) Adopting a combined approach of sewerage system to cover a sizeable population of the project area with safe collection, conveyance, treatment/ disposal of the sewage generated in the catchment area. To maximize the benefit of the project KMC should ensure that all existing septic tanks in areas will be connected with the sewer network in phased manner. (v) To integrate the climate change impact peak flow is considered rather than the average flow. During heavy rainfall event, in order to avoid over loading in STP, bypass arrangement has been proposed at strategic locations in networks to divert excess flow through the outfall structures. (vi) Treated effluent will be discharged into the T P canal by gravity to optimize the energy usage. (vii) SBR basin will be under continuous aeration for more than 50% of the day which will ensure minimum odor generation. (viii) The contractor shall design the process to ensure there are no odor issues at the STP	DBO Contractor	PMDSC, PMU,	Project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds
		and make appropriate provisions to ensure the same as per CPCB guidelines on odour pollution and control, May 2008³⁵. (ix) Acoustic enclosure will be given around centrifugal pump at sludge dewatering area and around other utility pumps to reduce noise impact. (x) Treatment and reuse of sludge from treatment process; providing a covered shed of adequate space to air dry the processed sludge for at least 15 days at STPs. (xi) Reuse of treated wastewater from STP for non-potable uses thereby reducing the load in freshwater resources. (xii) Provision of appropriate personal protection equipment to the workers and staff			
STP site	Increasing the STP site elevation by 0.3 to 0.5 meters to reach the desired finished ground level of 3.9m may have potential adverse impacts on adjacent properties such as flooding or prolonged waterlogging. A drainage channel acts as a conduit for seasonal water from roadside drains and collects runoff from the	(i) Design a proper drainage system at the STP site, considering the existing drainage in the site and surrounding area, and likely changes due to increase in site elevation (ii) Ensure that runoff from the surrounding area is disposed quickly and safely without creating water logging or flooding conditions (iii) Implement rainwater harvesting systems to collect and reuse rainwater, reducing the volume of runoff. (iv) Existing drain diversion proposal to be prepared carefully without disturbing the existing condition or drainage function of the channel and vacant land i.e. flow of water from surrounding area and vacant land into drainage channel.	DBO Contractor	PMDSC, PMU,	Project cost

³⁵<https://cpcb.nic.in/openpdf.php?id=UmVwb3J0RmlsZXNmV3SXRlbV8xNDZfcGFja2FnZV9vZG91cnJlcG9ydF8yLjE5LjA4LnBkZg==>

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds									
	entire catchment area, is passing through the STP site and connects TP canal.	(v) Ensure that there will be uninterrupted drain flow and discharge water into TP canal during the monsoon. (vi) Regularly check and maintain drainage systems to ensure they work properly.												
STP Design	Odour nuisance and aesthetics	(i) Provide a green buffer zone of 3-5m wide all around the STP with trees in multi-rows. This will act as a visual screen around the facility and will improve the aesthetic appearance. Treated wastewater shall be used for plantation. (ii) Develop layout plan of STP such that odour generating units (such as inlet/raw water sump, and sludge handling facilities) are located away from the surrounding area with future development potential. (iii) An odour capture system will be installed during the operation stage if necessary and standby power arrangements are suggested to safeguard the health and safety of the community.	DBO Contractor	PMDSC, PMU,	Project cost									
	Inefficient sewage treatment, treated effluent characteristics not satisfying the CPCB/UPCB standards	(i) Ensure that the selected process is appropriate for the town and meets discharge standards and facilitate reuse. (ii) Treated effluent should meet the criteria set by CPCB or the following bid specified parameters, whichever are stringent: <table><tr><th>Sl. No</th><th>Parameters</th><th>Parameters Limit</th></tr><tr><td>1</td><td>pH</td><td>5.5-9.0</td></tr><tr><td>2</td><td>BOD (mg/l)</td><td>Not more than 10 mg/l</td></tr></table>	Sl. No	Parameters	Parameters Limit	1	pH	5.5-9.0	2	BOD (mg/l)	Not more than 10 mg/l	DBO Contractor	PMDSC, PMU,	Project cost
Sl. No	Parameters	Parameters Limit												
1	pH	5.5-9.0												
2	BOD (mg/l)	Not more than 10 mg/l												

Field	Anticipated Impact	Mitigation Measures			Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds
		3	COD (mg/l)	Not more than 50 mg/l			
		4	TSS (mg/l)	Not more than 20 mg/l			
		5	P-Total (mg/l)- for discharge into Ponds/lakes	Not more than 1.0 mg/l			
		6	N-Total (mg/l)	Not more than 10 mg/l			
		7	Fecal Coliform (MPN/100ml)	Desirable- Less than 100 MPN/100ml Permissible- 230 MPN/100ml			
	Use of treated wastewater for reuse applications	The Reuse Plan shall inter alia include the following: (i) Identify potential reuse application within sub-project area limits and its surroundings and establish quality criteria for each of the use. Reuse plan will be prepared by the contractor during the detailed design phase in consultation with the KMC (ii) For applications that use treated wastewater direct (e.g., agriculture), the quality required for such application in safe manner considering health, environment, and crop yield concerns shall be ensured. (iii) Carry out regular / online monitoring of critical quality parameters of treated wastewater to ensure that they meet the present standards established for reuse.					
	Treated effluent discharge into natural water channel /rivers	(i)Obtain of consent of West Bengal Pollution Control Board (WBPCB) for discharge of treat wastewater into drains.					

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds
	/canal and associated impacts on river water and downstream users	(ii) Conduct a baseline water quality assessment of receiving water body (iii) Regularly monitor the treated wastewater quality at STP and ensure that it meets the discharge standards (iv) Monitor water quality periodically during operation phase as per the Environmental Monitoring Plan			
	Sludge management and reuse	(i) Prepare a dried Sludge utilization plan with the help of Agriculture Department / KMC ; plan should also include if any additional processing is required for sludge to use as soil conditioner. (ii) Plan should clearly identify various potential uses and demand in and around project area and surroundings (iii) Establish usage limits, where required, (geographical / crops / type of application / type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations. (iv) Monitor sludge quality during operation phase as per the Environmental Monitoring Plan, ensure that it meets the quality parameters established by FCO. (v) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016)			
Change in raw sewage quality	Mixing of industrial effluent with sewage	(i) No industrial wastewater shall be allowed to dispose into municipal sewers			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds
		(ii) As there is a risk of potential mixing of industrial waste, no domestic wastewater from industrial units shall be allowed into municipal sewers (iii) Ensure that there is no illegal discharge through manholes or inspection chambers (iv) Conduct public awareness programs; in coordination with WBPCB and KMC. (v) Conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated wastewater quality complies with the effluent standards (vi) KMC shall monitor and coordinate with WBPCB to ensure no illegal discharge of industrial wastewater into sewers.			
Use of Hazardous/Harmful substances in Water and Wastewater Treatment.	Wastewater treatment may involve application hazardous/harmful chemicals such as in chlorination, disinfection etc.	(x) Reduce the use of chemicals in the treatment process to the extent possible provide non-chemical alternatives or easily recoverable and/or reusable chemicals or biocompatible alternatives. (xi) Establish proper handling / storage / application system according to the relevant standards, safety precautions and prevent accidental release / spill. (xii) Provide leak/spill detection, collection / capture and safe disposal facilities such as chlorine absorption and neutralization facility. (xiii) Provide ventilation, lighting, entry and exit facilities; visible and audible alarm facilities to alert chemical/chlorine leak. (xiv) Facility for isolation in the event of major leakages (xv) Eye wash and shower facility	DBO Contractor	PMDSC, PMU,	Project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Responsible for Monitoring	Cost and Source of Funds
		(xvi) Personal protection and safety equipment for the operators (masks, oxygen cylinders, gloves, etc.,) (xvii) Provide training to the staff in safe handling and application of chemicals, material safety, and standard operating procedures and emergency responses (xviii) Develop emergency response procedures. (xix) Chlorine gas handling as per BIS guidelines.			
Integration of EMP in bidding documents and contracts	Lack of awareness by contractors on ADB SPS requirements may result in insufficient budget and no implementation of EMP	The PMU will incorporate the costs of implementing OHS and the EMP as well as specific provisions requiring contractors to comply with all other conditions required by ADB into the bidding and contract document. Once the Contractor is selected, the PMU with support from PMDSC will inform contractors of their responsibilities in EMP implementation, in compliance with ADB and government requirements, self - monitoring and reporting procedures.	PMU, PMDSC	PMU, PMDSC	Project Cost

Table 23: Pre-Construction Environmental Management Plan -Mitigation

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Consents, permits and clearances	Environmental legal noncompliance may attract legal action. Failure to obtain necessary consents, permits, NOCs etc. can result to design	Ensure that all necessary approvals are obtained before start of construction.	DBO Contractor, PMU	PMU PMDSC	Project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	revisions and /or stoppage of works				
EHS officer/supervisor designation and EMP implementation training	Non-designation of EHS officer/supervisor and lack of EHS training may lead to inadequate/failure in EMP implementation, resulting in EHS impacts. If the contractors and construction supervision engineers are not aware about the requirements of this EMP, the project may not proceed and comply with ADB and GoI environmental policies	(i) DBO Contractor to designate EHS officer/supervisor to ensure implementation of EMP (ii) Project manager and all key workers of contractors will be required to undergo EMP implementation training including spoils management, standard operating procedures (SOP) for construction works; health and safety (H&S), core labor laws, applicable environmental laws etc.	DBO Contractor	PMU / PMDSC	Contractor
Updating of IEE and EMP and preparation of SEMP, including SDP, TMP, etc. based on final design	Non implementation may result in significant environmental impacts and non-compliance with ADB's environmental safeguards requirements	(i) Update IEE based on detailed designs, and submit to ADB for review, approval, and disclosure prior to commencement of work. (ii) Formulate SEMP during implementation and get approval from the PIU. The SEMP shall include (a) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes, , adequately record the condition of roads, agricultural land and other and other infrastructure prior to starting to transport materials and construction; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for SEMP implementation.	PMU and PMDSC DBO Contractor	PMU	PMU /Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(iii) No works can commence prior to approval of SEMP. The SEMP will include the following: (i) Construction Compound Management Plan; (ii) Construction Health and Safety Plan, and (iii) Emergency Incident Response Plan. (iv) Prepare Spoils Disposal Plan and Traffic Management Plan			
Environmental monitoring of baseline conditions of air, noise, water and soil	Baseline environmental quality must be determined if project has any impact on the environment. DBO contractor must conduct baseline environmental monitoring through NABL accredited laboratory before construction.	DBO contractor must conduct baseline environmental monitoring through NABL accredited laboratory before start of construction.	DBO contractor	PMDSC/PMU	Contractor
Tree cutting	The proposed STP site is vacant no notable tree cover is present, therefore, no tree cutting is envisaged during the preliminary design phase. Some bushes and overgrowths of vegetations will be cleared off at the proposed STP site.	(i) Minimize removal of trees by adopting to site condition and with appropriate layout design or any other site with trees (ii) Obtain prior permission for tree cutting at sites that may require tree cutting finalized during detailed design (iii) Plant and maintain 5 trees for each tree that is felled. as per KMC policy (iv) Conduct survey of trees for bird nests prior to cutting, if any active nests, ensure that trees are not disturbed until young birds fly away from the nests, do not cut trees during the breeding season.	DBO Contractor	PMDSC/PMU	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(v) Green buffer zones of 3 to 5m wide all around the STP site will be established using local varieties of trees in multiple rows to serve as odour barrier and visual screen around the facility.			
Community Awareness on Project Activities and Impacts	Lack of community awareness on project activities may result in potential community health and safety concerns and complaints.	Before the start of project construction, a meaningful consultation with the affected communities will be conducted. This meaningful consultation will aim to engage community stakeholders, listen to their views. Important information to be disseminated to the people are, among others, the following: (i) Overview and objectives of the proposed project; (ii) Preliminary and/or final detailed design of proposed project components; (iii) Potential environmental and social impacts (positive and negative) of the project, and the proposed mitigation measures for the perceived negative impacts; and (iv) Grievance redress mechanism and contact details of the project.	DBO Contractor/PMU	PMU, PMDSC	Contractor
Temporary construction facilities- Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas	Impacts to sensitive receptors such as flora and fauna, water bodies/natural drainage, settlements, etc.	(i) Do not consider residential areas for setting up construction facilities; (ii) Debris disposal site shall be at least 200 m away from surface water bodies; (iii) For aggregate storage area, hot mix plant, etc. no residential areas shall be located within 100 m downwind side of the site; Site should be at an adequate distance away from sensitive	DBO contractor	PMDSC/PIU	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		locations like settlements, ponds or other water bodies (iv) No camps or facilities shall be located within 250 m from EKW boundary			
Sources of Construction Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	(i) Obtain construction materials only from government approved quarries with prior approval of PMU; (ii) Material will be sourced from nearest existing licensed quarry site to the maximum possible extent (iii) Verify suitability of all material sources and obtain approval of PMU; and (iv) Submit to PMU on a monthly basis documentation of sources of materials. If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the parties/ suppliers are having CTE/CTO from WBPCB and will collect the copy of these certificates and submit to PMU/ PMDSC consultants. (v) Avoid creation of new borrow areas, quarries etc., for the project; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental Clearance prior to approval by PMU.	DBO contractor	PMDSC/PMU	Contractor

Table 24: Construction-stage Environmental Management Plan - Mitigation

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area may require to be shifted	(i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase. (ii) prepare a contingency plan to include actions to be done in case of unintentional interruption of services. (iii) inform the local community in advance if utilities will be disrupted during construction)	DBO Contractor/ PMU	PMU/PMDSC	Project Cost
Chance Finds	There are no notable or significant archaeological places or protected monuments or areas in and around the sub-project area. Six ASI sites are within KMC area but well outside the STP site and subproject command area. Therefore, no impacts envisaged but risk of uncovering archaeological remains, given the long history of town.	(i) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work; (ii) Stop work immediately to allow further investigation if any finds are suspected; (iii) Inform local Archaeological department if a find is suspected and take any action, they require to ensure its removal or protection in situ	DBO Contractor/ PMU	PMU/PMDSC	Project Cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Air Quality	Dust and emissions from construction activities, including use of vehicles, equipment, and machinery	(i) Plan the work sites properly, and demarcate the sites for stockpiling of, soils, gravel, and other construction materials away from the vehicles, general workers movement to avoid disturbance of loose materials (ii) Install dust screens around the site boundaries near permanent houses before starting construction works. Wherever possible, set up temporary enclosures for dust-generating activities.; (iii) Damp down exposed soil and any stockpiled material on site by water sprinkling; (iv) Use tarpaulins to cover sand and other loose material when transported by trucks; (v) Clean wheels and undercarriage of haul trucks prior to leaving construction site. (vi) use enclosers and sprinkle water during in the construction area; dampen the debris generated (vii) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel. Fit all heavy equipment and machinery with air pollution control devices which are operating correctly, and limit idling time of construction vehicles to minimize local air pollution. contractor's vehicles and equipment should compulsorily have PUC and submit to PMU before deployment at site. Some common air pollution control devices that can be fitted to heavy equipment and machinery to reduce emissions are: Catalytic Converters, Particulate	DBO contractor	PMU, , PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		Filters, Scrubbers, Selective Catalytic Reduction (SCR), Exhaust Gas Recirculation (EGR), , High-Efficiency Particulate Air (HEPA) Filters, and Activated Carbon Filters. Implementing these devices can significantly reduce air pollution from heavy equipment and machinery, improving overall air quality and meeting regulatory standards (viii) Limit idling of vehicles on the construction sites to 3-5 minutes (ix) Obtain, CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project. (x) If contractor procures any material (such as ready-mix concrete, asphalt/ macadam, aggregates etc..) from third party agencies, contractor shall ensure that such agencies have all necessary clearances / permissions as required under the law; these include CTE/CTO from WBPCB, environmental clearance, etc., contractor shall collect the copy of these certificates and submit to PMU; PMU will approve the source only after all the certificates are submitted. (xi) Strict prohibition of open burning of solid waste (xii) Regular inspection & maintenance of construction/transportation vehicles (xiii) Supply of LPG to workers instead of allowing them to use firewood for cooking (xiv) Conduct ambient air quality monitoring periodically as per Environmental Management Plan (EMP)			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Noise and Vibration Levels	Increase in noise and vibration levels due to construction and operation of equipment, and vehicles, earth works, and demolition activities	(i) Conduct activities with the greatest potential to generate noise during periods of the day which will result in least disturbance; provide prior public information. (ii) Plan activities during day time only near residential area to avoid noise/ vibration generating activities as much as possible. (iii) Proper measures shall be taken to minimize noise and vibration in and around STP site. (iv) As far as possible use new construction machineries and keep all the old machineries in good and maintained state. (v) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimize sound impact to surrounding sensitive receptor; (vi) Ensure proper training of construction workers on the safe usage of pneumatic drills and exposure limits per day; provide appropriate personal protection equipment - safety glasses or goggles/face shield, helmets, safety shoes or boots, hearing protection aids etc. (vii) Maximum sound levels should not exceed the CPCB guideline values for noise levels. (viii) Ensure that the drilling rig, generator sets have acoustic hoods and noise dampers in place; provide prior information to local community about the drilling operation; workers shall be provided with appropriate PPEs	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(ix) Conduct Noise monitoring according to the Environmental Management Plan (EMP).			
Surface water, soil, and groundwater	Works in rains/ Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during installation of pipelines can contaminate nearby surface water quality. Increased groundwater demand for construction and consumption use can deplete the Groundwater Table; Unscientific solid waste and construction waste disposal can lead to contamination of soil and ground water	(i) Contractor to implement all measures to prevent and control land and water pollution (ii) Prepare and implement a construction waste management plan. (iii) Avoid stockpiling of soils especially during the monsoon season, if unavoidable, it should be covered by tarpaulins or plastic sheets, and protected by protection berms / bunds to avoid entry of runoff (iv) Create a temporary peripheral drainage channel around the work area to arrest the entry of runoff from upper areas into the work area; (v) Avoid locating construction camps and labour camps near to any water body and do not dispose any waste or sullage into any water body. (vi) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PMU on designated disposal areas; (vii) Inspect all the drainage lines / streams at work sites, construction site/construction camp/labor camp etc. and clear all the drainage lines so that no water stagnation/flooding may occur during heavy rainfall. (viii) Groundwater occurs in shallow water table condition (both unconfined and confined) . Rains are also high during monsoon season – ensure that water will not pond in pits and voids near project location by dewatering the accumulated water (ix) Avoid trenching and excavation works	DBO contractor	PMU, PIU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		during monsoon season (x) If works are not avoidable during monsoon, keep ready all the mitigation measures to avoid water logging such as dewatering pumps and sufficient pipes, barricades etc. (xi) Pump out the water collected in the pits / excavations to a temporary sedimentation pond; dispose of only clarified water into drainage channels/streams after sedimentation in the temporary ponds; (xii) Consider safety aspects related to pit collapse due to accumulation of water. (xiii) Inspect and verify all the emergency measures and emergency control system before start of monsoon, keep the emergency response committee on high alert during monsoon/heavy rain fall (xiv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; (xv) Place storage areas for fuels and lubricants away from any drainage leading to water bodies; (xvi) Contractor shall source water from surface sources as far as possible, and obtain necessary permit to use groundwater or surface water for construction purposes. (xvii) Prevent pollutants from contaminating the soil and the groundwater; provide proper facilities for proper collection and treatment of sanitary waste in work facilities and workers accommodation (xviii) Store fuels and lubricants in double hulled tanks. Fuel and other petroleum products			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		stored away from water drainage and protected by impermeable lining and bonded 110%; (xix) Conduct regular maintenance of machinery and vehicles, and avoid leakages; (xx) Enclose the construction area to prevent unauthorized access (xxi) Conduct surface quality monitoring according to the Environmental Management Plan (EMP).			
Generation and management of construction wastes	Improper waste management could cause odour and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape and workers' health and safety.	(i) Prepare and implement a Construction Waste Management Plan; (ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access/internal roads etc.; (iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed of in approved designated areas immediately; (iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; site should locate away from residential areas, forests, water bodies and any other sensitive land uses; (v) Domestic solid wastes should be properly segregated in biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; create a compost pit at workers camp sites for disposal of biodegradable waste; non-biodegradable / recyclable material shall be collected separately and sold in the local recycling material market;	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(vii) establishment of separate bunded and lined areas with 110% volume for the storage of all the toxic material wastes, including batteries, oil filters, engine oils, used oils, etc. at the construction site; (viii) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed through agencies approved by WBPCB; (ix) Prohibit burning of construction and/or domestic waste; (x) Ensure that wastes are not haphazardly thrown in and around the project site provide proper collection bins and create awareness to use the dust bins; (xi) If temporary soil storage is adapted, such site should be properly demarcated by fencing and information board should be placed at entrance; soil should be covered by tarpaulin or regular water sprinkling should be done to reduce dust emission; soil should be levelled on daily basis and no heap or mound should be left at end of the day; (xii) Soil should be covered with tarpaulin sheets during transportation. (xiii) Soil transportation should not be done during the peak hours and should avoid narrow and heavy traffic routes. (xiv) Prior to the commencement of works, contractor will follow all the prescribed rules and shall identify a surplus soil and debris disposal site (temporary and final disposal) in consultation with the PIU/ULB and adhering to the EMP criteria.³⁶			

³⁶ Construction and Demolition Waste Management Rules 2016 and Solid Waste Management Rules.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(xv) If any hazardous waste is generated, handled or managed during construction works contractor need to comply all the requirements of Hazardous and other wastes (Management and Trans boundary Movement) Rules, 2016, The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorized actual user or shall be disposed of in an authorized disposal facility (xvi) Conduct site clearance and restoration to original condition after the completion of construction work; PIU to ensure that site is properly restored prior to issuing of construction completion certificate.			
Accessibility and traffic management	Traffic problems and conflicts near project locations and haul road	(i) Plan construction vehicle transportation routes properly so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; (ii) Schedule transport and hauling activities during non-peak hours; (iii) Locate entry and exit points in STP site where there is low potential for traffic congestion; (iv) Keep the site free from all unnecessary obstructions; (v) Drive vehicles in a considerate manner; (vi) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.	DBO contractor	PMU, PMDSC	Contractor
Trenchless Pipe Installation	Noise generated due to HDD may affect the neighbouring	(i) Pipes shall be installed by the horizontal directional drilling (HDD) methods where required. If the method is not feasible for any road, the contractor shall inform the Project	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	communities and other sensitive receptors, If the bentonite slurry is not properly collected and treated, it will contaminate the adjacent watercourse	Manager and gain prior approval for an alternative method or for open trench method. (ii) Excavation material shall be removed from the conduit as the work progresses. No accumulation of excavated material within the conduit will be permitted. (iv) The contractor shall provide sediment and erosion control measures in accordance with local environmental legislation. (v) The contractor shall supply portable mud tanks or construct temporary mud pits to contain excess drill fluids during construction. Spent drilling fluids and cuttings shall be confined to the entrance and exit pits. (vi) The contractor shall take all necessary precautions to minimize the damage to the adjacent properties. Drilling fluid/ bentonite slurry that enters the pipe shall be removed by flushing or other suitable methods. Sediment tanks of sufficient capacity constructed from pre-formed individual cells of approximately 6-8m³ capacities shall be used for settling wastewaters prior to disposal. (vi) The contractor shall be responsible for cleanup and restoration of the site. (vii) Pits excavated to permit connection of bored pipe shall be backfilled, and disturbed areas shall be restored to their original state or better. Sections of sidewalks, curbs, and gutters or other permanent improvements damaged during HDD operations shall be repaired or replaced at the contractor's expense.			
Socio-Economic - disturbance to	Impede the access of residents	(i) Increase workforce;	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
residents, and livelihood activities.		(ii) Consult nearby residents regarding operating hours and factoring this in work schedules; (iii) Provide sign boards to inform nature and duration of construction works and contact numbers for concerns/complaints.			
Socio-Economic – Employment	Generation temporary employment increase in local revenue	(i) Employ local labour as far as possible (ii) Secure construction materials from local market as far as possible (iii) Comply with labor laws	DBO contractor	PMU, PMDSC	Contractor
Occupational Health and Safety	Construction activities could create health and safety risks to construction workers	(i) Comply with all national, state and local labor laws (ii) Following best practice health and safety guidelines including IFC's General EHS Guidelines ³⁷ , Sector Specific (Water and Sanitation) Guidelines ³⁸ and any other guidelines and protocols issues by WHO, ADB or relevant government agencies for emerging situation like COVID-19, (iii) Develop and implement site-specific occupational health and safety (OHS) Plan which will include measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training ³⁹ for all	DBO contractor	PMU, PMDSC	Contractor

³⁷<https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

³⁸<https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2BAnd%2BSanitation.pdf?MOD=AJPERES>

³⁹ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence to ensure that the training provided is relevant and effective. Supervision and monitoring arrangements shall be in place to ensure that training has been effective and the worker is competent at their job. The level of supervision and monitoring required is a management decision that shall be based on the risks associated with the job, the level of

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; (iv) Provide dust screen around the site prior to start of construction works; provide temporary enclosure for dust-generating activities, where ever possible; (xiii) Trench excavation works shall be conducted in a safe manner; public movement in the work site should be blocked; (v) all trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel); (vi) As far a possible avoid trench works and excavation works during monsoon season to avoid any water logging and accident due to it If open trenches are not avoidable during monsoon, keep ready all the mitigations measure to avoid water logging such as dewatering pumps and sufficient pipes, traffic assistance, barricades etc. (vii) Adequate safety measures shall be implemented for excavation and construction of wet well at the proposed STP; the risk is high consider the depth of excavation, and high-water table. (xiv) Provide hard barricades, and deploy security personnel to prevent unnecessary entry of people and to avoid accidental fall into open trenches (xix) Ensure that qualified first aid is provided at all times. Equipped first-aid stations shall be			

competence required, the experience of the individual and whether the worker works as part of a team or is a lone worker.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		easily accessible throughout the site; (xx) Provide medical insurance coverage for workers; (xxi) Secure all installations from unauthorized intrusion and accident risks; (xxii) The project area may experience extreme temperature during summer months of April and May occasionally, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: ▪ Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM) ▪ Provide appropriate shade near the workplace; allow periodic resting and provide adequate water ▪ Provide necessary medicine and facilities to take care of dehydration related health issues (xxiii) Provide supplies of potable drinking water; (xxiv) Provide clean eating areas where workers are not exposed to hazardous or noxious substances; (xxv) Provide H&S orientation training to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers; (xxvi) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted; (xxvii) Ensure the visibility of workers through their use of high visibility vests when working in			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		or walking through heavy equipment operating areas; (xxviii) Ensure moving equipment is outfitted with audible back-up alarms; (xxix) Mark and provide sign boards for hazardous areas such as energized electrical devices and lines, service rooms housing high voltage equipment, and areas for storage and disposal. Signage shall be in accordance with international standards and be well known to, and easily understood by workers, visitors, and the general public as appropriate; and (xxx) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. (xxxi) Conduct regular health check-ups for workers (xxxii) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites.			
Community Health and Safety	Construction activities could create health and safety risks to community people.	(i) Code of conduct for workers should be developed and implemented throughout the construction period; (ii) Follow International best practices on community health and safety such as those in Section 4.3 of World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities; (iii) Trench excavation shall be conducted in a safe manner; public movement should be blocked, and work shall be conducted;	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(iv) All trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel); (v) Provide boundary wall and deploy security personnel at STP site to prevent unnecessary entry and to avoid accidental fall into open trenches (vi) Follow established community health and safety protocol on emerging infectious diseases such as COVID19. (vii) Implement measure to prevent proliferation of vectors of diseases at work site; (viii) Maintain a complaint logbook in worker's camp and take action promptly of complaints. Follow the established GRM of the overall project (KSHARP); (ix) Schedule transportation activities by avoiding peak traffic periods; (x) Clean wheels and undercarriage of haul trucks prior to leaving construction site; (xi) Educate drivers: limit speed not more than 30 km/h in settlements; ensure that drivers follow road safety rules, and employ traffic marshals in all construction vehicles on road to assist the driver (xii) Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads, that may disturb the traffic movement; (xiii) Provide prior information to local community about work schedules; (xiv) Noise barriers must be installed in between the construction site and any community locations to reduce the noise level; (xv) Provide adequate space and lighting,			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		temporary fences, reflectorized barriers and signages at the work site; (xvi) Provide hard barricades, and deploy security personnel to ensure safe movement of people and also to prevent unnecessary entry and to avoid accidental fall into open trenches and (xvii) Ensure contractor has staff trained on emergency response.			
Operation of Construction Camps and Workers Facilities	Proper provision and maintenance of facilities is necessary for proper living conditions and avoid health, environment, and safety issues. Operation of construction camps can cause temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants.	(i) Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit- in reusable cabins with proper ventilation); thatched huts, and facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be used as accommodation for workers; accommodation shall meet the IFC standards for workers accommodation 30 which include: provision of safe housing, availability of electricity, plumbing, water and sanitation, adequate fire protection and dormitory/room facilities; accommodation shall be in the range from 10 to 12.5 cubic meters (volume) or 4 to 5.5 square meters (surface) per worker, a minimum ceiling height of 2.10 meters; a reasonable number of workers are allowed to share the same room – (standards range from 2 to 8 workers); workers with accompanying families shall be provided with a proper and safe accommodation (IFC benchmark standards for workers accommodation is provided in Appendix 7).	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(ii) Train employees in the storage and handling of materials which can potentially cause soil contamination; (iii) Recover used oil and lubricants and reuse or remove from the site; (iv) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; (v) Remove all wreckage, rubbish, or temporary structures which are no longer required; and (vi) Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work			
Social and Cultural Resources	Schools, hospitals and religious places such as temples are present nearby the proposed alignment of pipe laying and contractor will require to follow the mitigation measures	(i) Consult with concerned agency authorities and local community in pre-construction phase and explain the work method and duration of proposed works, take their suggestions and comments and incorporate in design the mitigation measures required (ii) Provide proper signage, barricades etc. (iii) Take special measures including posting of security personnel at the work site. (iv) Timely completion of the construction work (v) Establishment of construction site camp and labor camp must maintain proper distance from the nearby houses.	DBO Contractor and PMU	PMU and PMSDC	Project costs
Night Works	Accidents and disturbance to sensitive receptors	(i) Prepare a night work protocol and obtain prior approval from PIU, and no night works shall be conducted without prior written approval of PIU	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	may occur during night works	(ii) No noisy works shall be conducted during the night; maintain noise levels within the standards prescribed by CPCB (iii) Maintain proper lighting and illumination of work site (iv) Workers engaged in night works should have: adequate rest/sleep in daytime before start of night works, and previous experience of night works and should be physically fit for such works including clear vision in night (v) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests (vi) Workers / site staff should not shout or create noise / nuisance (vii) First aid and emergency vehicles should be available at site (viii) Emergency preparedness plan should be operative during night works (ix) Old persons and pregnant women and women having small kids should not work in nighttime (x) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise (xi) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works (xii) PIU/PMDSC site engineers and contractor's safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and video graphic			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		records as well as register the observations. (xiii) Drivers and workers should be alert and responsive during night works (xiv) All the wages to workers working in night hours should be as per the applicable labour acts (xv) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours			
Post-construction clean-up and reinstatement	Construction debris, spoils, and excess construction materials may pose hazards to properties, community and environment if left unattended after construction	(i) Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; (ii) All excavated roads shall be reinstated to original condition; fully reinstate pathways, other local infrastructure, and others land used for the project to at least their pre-project condition upon the completion of construction (iii) All disrupted utilities restored; (iv) The area that previously housed the construction camp is to be checked for spills of substances such as oil, paint, etc. and these shall be cleaned up; (v) All hardened surfaces within the construction camp area shall be ripped; (vi) All imported materials removed, and the area shall be top soiled and regressed using guidelines set out in the re-vegetation specification that forms part of this document; (vii) The contractor must arrange the cancellation of all temporary services; (viii) Request PIU to report in writing that worksites and camps have been vacated and	DBO contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		restored to pre-project conditions before acceptance of work.			

Table 25: Operation-stage Environmental Management Plan - Mitigation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
STP operation and maintenance	EHS impacts due to discharge of effluent and sludge from STP Occupation health risk to workers engaged in maintenance activities	(i) Ensure valid consent to operate (CTO) from WBPCB for operation of STP. (ii) Ensure that all conditions/standards prescribed by WBPCB are complied with duly. (iii) The stability and integrity of the system will be monitored periodically to detect any problems and allow remedial action, if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing, and replacement of parts. (iv) Undertake preventive and periodic maintenance activities as required. (v) Standard operating procedures and operation manual will be prepared by the DBO contractor. Besides routine operation, this should cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and system efficiency etc., Adequate resources – technical and financial, has been taken into consideration in the project design. The manual will also include safety awareness and mock drills for worker safety. (vi) Conduct periodic training to workers; ensure that all safety apparatus at STP including personal	Contractor for 15 years and then by KMC	KMC	O & M cost of contractor, KMC

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		protection equipment is in good condition all times; and are at easily accessible and identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations; (vii) During the operation phase, it is necessary that the facility is operated by trained staff as per the standard operating procedures. (viii) Ensure that chlorinator facility is operated only by trained staff and as per the standard operating procedures; in case of any accident and/or maintenance activity, ensure that the staff follows documented procedures only (ix) Implement Emergency Response System (ERS) for the chlorine leakage as per Guidelines and Emergency plan for handling and storing chlorine (x) Ensure proper knowledge transfer, hands-on training to municipal staff engaged in STP operation has been provided by contractor prior to handover of facility; (xi) Prepare a treated wastewater reuse plan and ensure intended quality for each direct reuse. Reuse applications will follow the Manual on Sewerage and Sewage Treatment Systems, CPHEEO, Ministry of Urban Development, Govt. of India (Appendix 6). (xii) Ensure that treated wastewater meets the established discharge standards all times; conduct regular wastewater quality monitoring (at inlet and at outlet of STP) to ensure that the treated effluent quality complies with design standards; (xiii) All necessary safety, mitigation and monitoring measures as suggested in the reuse plan shall be implemented. (xiv) Conduct baseline water quality assessment of receiving water body prior to start of operation.			

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
Sludge Management		(i) Prepare a dried sludge utilization plan for subproject area with the help of Agriculture Department. Plan should clearly include various potential uses and demand in town and surroundings; (ii) Establish usage limits, where required, (geographical/crops/type of application /type of soils etc.); adopt international good practice suggested by agencies like World Health Organization (WHO), Food and Agricultural Organization (FAO) of the United Nations; (iii) Assess composition and characteristics of sludge from the first batch operation at the initial phases, and confirm the handling, management and disposal/reuse actions suggested in the management plan (iv) Conduct periodic testing of dried sludge/compost to check presence of heavy metals and ensure that the concentrations comply with the compost quality standard notified under the Solid Waste Management Rules, 2016 (refer Table 15: Standards for Sludge Reuse as Manure Standard for Composting) and the Fertilizer Control Order (FCO), 1985, amendments in 2009 and 2013. It shall not be used for food crops. (v) Identify a landfill/suitable site for disposal of surplus dried sludge; (vi) In case of sludge not meeting the quality parameters, it shall not be used as soil condition, and shall be disposed at appropriate disposal site (if it falls under hazardous category, it shall be disposed as per the Hazardous Waste Management Rules, 2016).	Contractor for 15 years and then by KMC	KMC	O & M cost of contractor, KMC
Occupational health and safety	Accidents	Prepare and implement an Occupational Health and Safety Plan during operation stage that will cover all hazards and risks from the operation and	Contractor for 15 years and then by KMC	KMC	O & M cost of contractor, KMC

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Monitoring of Mitigation	Cost and Source of Funds
		maintenance of all facilities, including electrical, biological, chemical hazards and risks, etc.			

Table 26: Construction-stage Environmental Management Plan - Monitoring

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
EMP - implementation of mitigation measures	All work sites and construction facilities, including workers accommodation	Implementation of dust control, noise control, traffic management, chance finds protocol, waste management, workers camps and facilities management, and community and occupational health safety and site restoration measures.	Weekly during construction	PMU, PMDSC and DBO Contractor	Contractor's cost
Work related permissions / clearances, including labour related licenses		Permission / clearance from concerned authority timely	One-off before it is due / start of construction. Check for timely renewals	PMU, PMDSC and DBO Contractor	Contractors cost
Environment, Health and Safety Incidents	Construction sites, transportation routes, labor camps	Safety Incidents (Near Miss, First Aid, Vehicular, Property Damage, Minor Injury, Serious Injury, Fatality)	Continuous	DBO Contractor	Cost for implementation of monitoring measures Responsibility of contractor
Grievances	Surrounding communities near construction sites, transportation routes, labor camps	Location, number and nature of grievances, Number of days until resolution	Continuous	DBO Contractor	Cost for implementation of monitoring measures Responsibility of contractor
Ambient air quality	At 2 different locations to be decided by the Environment	PM10, PM2.5, NO2, SO2, CO	Once before start of construction and quarterly during	DBO Contractor	Cost for implementation of monitoring measures

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
	Specialist of PMDSC.		construction except monsoon period		Responsibility of contractor (22 samples x Rs.6000 per sample = Rs.1,32,000)
Ambient noise level	At 2 different locations to be decided by the Environment Specialist of PMDSC	Day time and nighttime noise levels	Once before start of construction and quarterly during construction except monsoon period	DBO Contractor	Cost for implementation of monitoring measures Responsibility of contractor (22 samples x 1500 per sample = Rs.33,000)
Sediment quality	At 1 location in the downstream of treated waste water outfall location to be decided by the Environment Specialist of PMC.	pH, Color , Texture (silt, clay, sand), Total Kjeldahl Nitrogen, Phosphorous, Sulphide, Particulate Size, Mercury, ,Cadmium, Lead, Pesticide, Organic Matter, oil and grease	Once before start of construction and quarterly during construction except monsoon period	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (11 samples x Rs.6000 per sample = Rs.66,000)
Surface water quality	At 2 locations from the upstream and downstream of STP treated waste water discharge location at T P canal near STP site	All essential parameters depending on the classification and/or use of receiving body of water	Once before start of construction and quarterly during construction except monsoon period	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (22 samples x Rs.6000 per sample = Rs.132000)

Table 27: Operation Stage Environmental Monitoring Plan - Monitoring

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Monitoring of plantation at STP site	Plantation's locations	Number of tree survived	Monthly	O&M contractor (DBO Contractor) for 15 years and then KMC	Contract O&M cost / KMC
Monitoring of raw wastewater quality	Inlet of the STP	pH, BOD, COD, TSS, P-Total , N-total, Fecal Coliform (as per Appendix 4)	Monthly once	O&M contractor (DBO Contractor) for 15 years and then KMC	Contract O&M cost / KMC
Monitoring of treated effluent quality	Outlet of STP	pH, BOD, COD, TSS, P-Total , N-total, Fecal Coliform (as per Appendix-4)	Monthly Once	O&M contractor (DBO Contractor) for 15 years and then KMC	Contract O&M cost / KMC
Surface water quality	T P Canal	Relevant parameters and standards per classification/use of receiving body of water (T P Canal)	Monthly Once	O&M contractor (DBO Contractor) for 15 years and then KMC	Contract O&M cost / KMC
Sludge quality (STP) and suitability as manure	Dried sludge	Analysis for concentration of heavy metals and confirm that value is within the following limits of organic compost (FCO 2009) (all units are in mg/kg dry basis except pH) Arsenic - 10.00 Cadmium - 5.00 Chromium - 50.00 Copper- 300.00 Lead - 100.00 Mercury- 0.15 Nickel - 50.00 Zinc- 1000.00 PH - 6.5-7.5	Yearly twice	O&M contractor (DBO Contractor) for 15 years and then KMC	Contract O&M cost / KMC

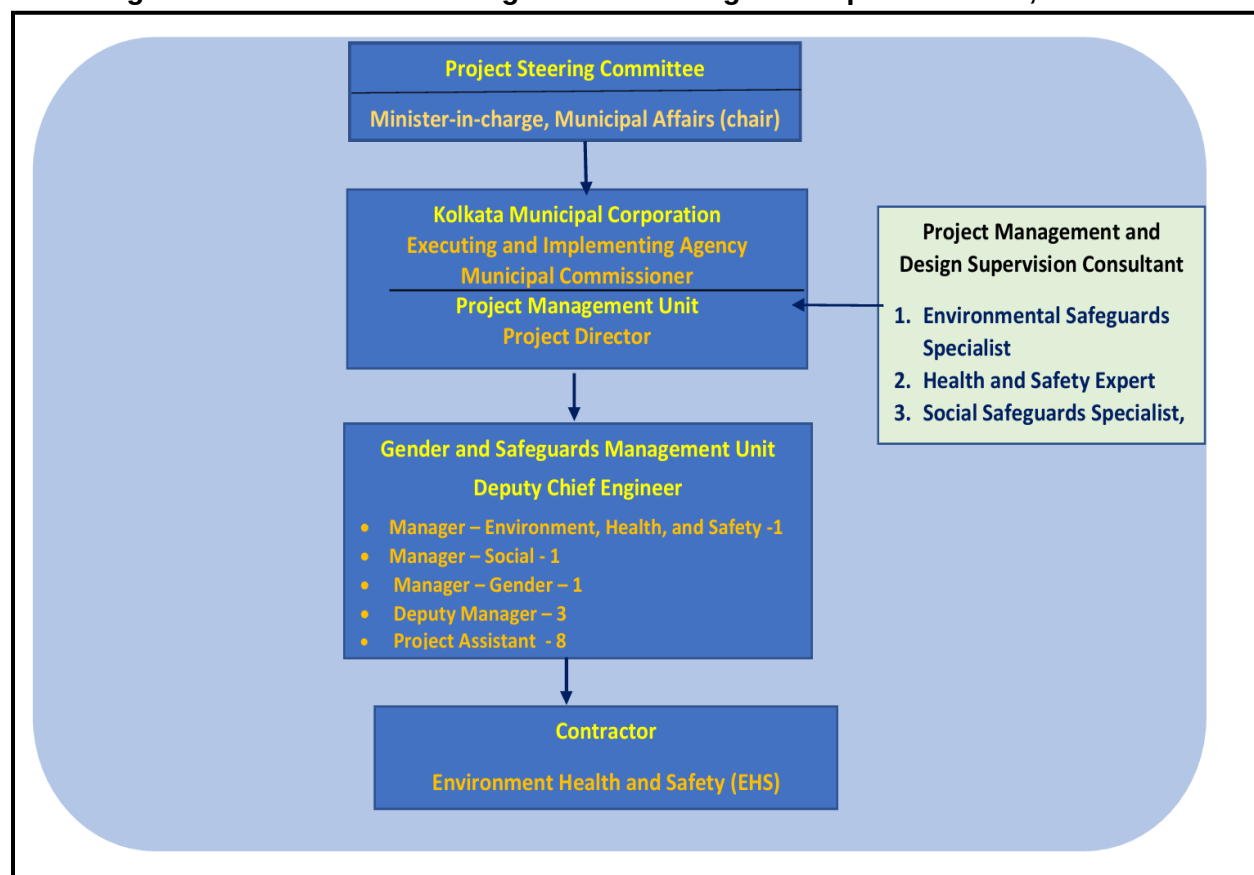
B. Institutional Arrangement

194. The Kolkata Municipal Corporation (KMC) will be the executing and implementing agencies, and the project management unit (PMU) established within KMC for the ADB-financed Kolkata Environmental Improvement Investment Program (KEIIP), will implement the project. The PMU, headed by a Project Director, will be strengthened and expanded to implement the project.

195. The Project Director will be supported by Director General - Project for procurement and contract management and Deputy Chief Engineer (DCE) for safeguards implementation. The DCE, supported by a Manager – Environment, Health and Safety and Manager - Social, will be responsible for environmental and social safeguards in compliance with project agreements, government requirements and ADB SPS, 2009. Gender, Safeguard management unit (GSMU) headed by DCE and staffed with 3 Managers, 3 Deputy Managers, and 8 project assistants to implement and monitor of gender action plan, EMP, resettlement plans, and with focus on community and occupational health and safety aspects.⁴⁰

196. PMU will be supported by a Project Management and Design Supervision Consultant (PMDSC) . The PMDSC will have an Environmental Safeguards Specialist (ESS) and a Health and Safety Expert to support in all tasks related to environmental safeguards. At contractor level, an Environment, Health and Safety (EHS) supervisor will be appointed on-site, one for each package, to assist in preparing and implementing site-specific EMP.

Figure 16: Institutional Arrangement for Safeguard Implementation, KSHARP



⁴⁰ The existing Social Safeguard Cell will function as the Safeguard and Safety Cell (SSC) for the project.

197. Project Management Unit. The PMU will be responsible for planning, management, coordination, supervision and progress monitoring. PMU has the responsibility of fulfilling environmental requirement of the government and ensuring effective implementation of the environmental management provisions in the EARF, IEEs, EMPs and civil works contracts. Supported by PMDSC, the following are the key environmental safeguard tasks and responsibilities of the Manager (Environment, Health & Safety) at the PMU level :

- (i) ensure compliance with government and ADB's environmental safeguards;
- (ii) review and approve the IEEs (for new packages) and updated/final IEEs;
- (iii) coordinate with design engineers, PMU and PMDSC to integrate environmental mitigation and enhancement measures and legal requirements in designs;
- (iv) ensure IEEs reflect final designs, and ensure prompt update to reflect any changes
- (v) ensure that EMP and associated costs are included in bids and contracts;
- (vi) review and approve the SEMP from the Contractor;
- (vii) establish a system to monitor and report on environmental safeguards;
- (viii) ensure legal requirements are met timely (consent, licenses, permissions etc.),
- (ix) oversee and ensure SEMPs and EMPs are implemented by contractors;
- (x) Check effectiveness on SEMPs, and Health and Safety Plans implementation, and take actions to improve or correct the same;
- (xi) Submit semi-annual environmental monitoring reports (SEMR) to ADB;
- (xii) assist in establishing and operating GRM and timely and effective redress of environmental safeguards-related complaints;
- (xiii) confirm compliance with all measures and requirements in the IEEs, the EMPs and any corrective or preventive actions set forth in safeguard monitoring reports;
- (xiv) ensure timely disclosure of final EARF, IEEs, SEMRs, corrective plans etc.;
- (xv) Oversee and ensure safeguards related loan covenants are complied with
- (xvi) organize capacity building and training programs on environmental safeguards.

198. Safeguard and Safety Cell (SSC), PMU. The existing Social Safeguard Cell will function as the Safeguard and Safety Cell (SSC) for the project, covering environment, social and safety aspects. The SSC, in addition to social development, public awareness and social safeguard responsibilities, will also monitor EMP implementation including community health and safety aspects. The SSC staff, currently implementing the ongoing KEIP, are conversant with EMP, health and safety and ADB safeguard policies. Capacity building of the SSC staff will be facilitated by PMDSC. SSC field staff will report to the Manager (Environment, Health & Safety) and Manager (Social). The environmental safeguards responsibilities of SSC field staff include:

- (i) Monitoring of EMP/SEMP implementation and submit monitoring reports to PMU
- (ii) Review of contractor's site-specific health and safety plans
- (iii) Monitoring occupational and community health and safety measures
- (iv) Carryout site inspections to review health and safety on-site, submit reports
- (v) Ensure records of work-related accidents (on and off-site), ensure prompt reporting to PMU and undertaking corrective actions
- (vi) Engage with local communities to raise awareness about the project's health and safety impacts.
- (vii) Implement GRM; coordinate with contractor, PMDSC and PMU to promptly address community grievances and avoid undue escalations;
- (viii) Coordinate with elected representatives, district administration, line departments, PMUs, Contractor, PMDSC, and community for project activities;
- (ix) Facilities field data, reports and information for IEE updates and SEMRs
- (x) rapport-building and information dissemination to the public;

- (xi) database management on safeguard monitoring, grievances.

199. **Project Design Management and Supervision Consultant (PMDSC).** The PMDSC will have an Environmental Safeguards Specialist (ESS) and a Health and Safety Expert to support in all tasks related to environmental safeguards to PMU.

200. The PMU will be supported by PMDSC's Environmental Safeguards Specialist who will assist in preparing, updating, reviewing, implementing, monitoring, and reporting of all tasks related to environmental safeguards. Following are the key tasks of Environment Specialist of PMDSC:

- (i) Assist the PMU in screening project components and update ADB Rapid Environmental Assessment (REA) checklists and category per EARF, when necessary to reflect project changes based on the final detailed survey;
- (ii) Work closely with PMU and Contractor design teams to include environmental considerations in project location, design, and technical specifications;
- (iii) Identify statutory clearance / permissions / approvals required and assist the PMU in obtaining them;
- (iv) Assist in including standards/conditions of regulatory clearances and consents, if any, in the project design;
- (v) Assist the PMU in the review of Contractor' SEMP's;
- (vi) Carry out baseline environmental surveys and prepare updated/final IEEs and EMPs based on the Contractor's detailed design, SEMP's, and in accordance with country's environmental legal frameworks and ADB SPS 2009;
- (vii) Lead / assist PMU in public consultations and include inputs from the public consultation in the project design and EMP, and proper documentation in the IEEs;
- (viii) Advise / assist PMU in disclosing relevant information on safeguards to affected people and relevant stakeholders;
- (ix) Assist PMU in reviewing and approving contractor SEMP's, health and safety plan and any other associated plans as required
- (x) Assist the PMU in monitoring the implementation of EMP's/SEMP's and ensure compliance by the Contractors including subcontractors;
- (xi) Carry out site verification of EMP/SEMP implementation on a regular basis;
- (xii) Provide guidance on resolving issues pertaining to effective and efficient implementation of proposed environmental mitigation measures per EMP's/SEMP's during construction phase. Identify, non-compliance or unanticipated impacts, if any, and initiate corrective actions and report to PMU;
- (xiii) Assist the PMU in the review and approval of monthly monitoring reports submitted by Contractor;
- (xiv) Assist the PMU in consolidating and preparing quarterly Environmental Monitoring Reports (EMR) and submit to PMU;
- (xv) Assist the PMU in preparing semi-annual environmental monitoring report per the requirement of ADB;
- (xvi) Identify training needs and implement capacity building activities on environmental safeguards for the PMU, contractors, and other stakeholders;
- (xvii) Assist PMU in establishing GRM for the Project;
- (xviii) Assist PMU in grievance redress, advise the contractor on appropriate actions on grievances, ensure timely resolution and proper documentation;
- (xix) Support all other environmental safeguards-related activities and tasks of the PMU as may be needed.
- (xx) Support in implementation of gender equality and social inclusion related activities

201. **Key roles and responsibilities for and Health and Safety Expert of PMDSC:**

- (i) Establishing and maintaining overall project's health and safety systems, protocols, work permit methods and communication structures; expert will be responsible for ensuring safety culture at project sites
- (ii) Promoting safe practices on site and ensuring the safety induction training of workers
- (iii) Assessment and approval of contractor's site-specific health and safety plan
- (iv) Regular inspection of project sites to ensure a hazard-free environment and rectify potential safety issues.
- (v) Ensuring tools and equipment safety, third party audits/inspections etc.,
- (vi) Creating and enforcing safety guidelines and programs
- (vii) Plan and ensuring that contractor carrying out drills and exercises on managing emergency situations
- (viii) Conducting investigations on accidents and incidents and prepare reports on findings
- (ix) Responding to workers' safety concerns
- (x) Arrange evaluations of the sites and identify areas for improvement
- (xi) Coordinates all issues regarding hazardous materials
- (xii) Attending periodically project planning meetings and collaborating with construction managers to identify and address safety concerns
- (xiii) Continuous monitoring of all safety related documents, reports and issues to keep them updated.
- (xiv) Engage with local communities to raise awareness about the project's health and safety impacts. Address community concerns related to project activities.

202. **The Contractor.** Contractors will be required to appoint a full-time Environment, Health and Safety (EHS) supervisor on-site to implement the EMP. Prior to start of construction, Contractor will be required to prepare and submit to PMU, for review and approval, Site-specific EMP (SEMP) which includes (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the EMP in approved draft and final EMP; (iii) monitoring program per EMP; and (iv) budget for SEMP and EMP implementation. No works can commence until SEMP is approved by PMU. Contractors will carry out all environmental mitigation and monitoring measures outlined in EMP, approved SEMP and their contracts. The contractor will be required to undertake day to day monitoring of the SEMP implementation and submit reports to the PMU on a monthly basis. A copy of the EMP/approved SEMP will be always kept on-site during the construction period. Non-compliance with, or any deviation from, the conditions set out in the EMP/SEMP constitutes a failure in compliance and will require corrective actions. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. Key responsibilities of the EHS Officer, in coordination with other contractors' personnel include:

- (i) Prepare SEMP including site-specific occupational health and safety plan and submit to PMU for approval prior to start of construction;
- (ii) Supervise work site safety, and provision of PPEs etc.,
- (iii) Ensure implementation of SEMP and report to PMU/PMDSC on any new or unanticipated impacts; seek guidance from the PMU/PMDSC to address the new or unanticipated impact in accordance with EARF and ADB SPS 2009;
- (iv) Ensure that necessary pre-construction and construction permits are obtained;

- (v) Conduct trainings,⁴¹ orientation and daily briefing sessions to workers on environment, health and safety;
- (vi) Ensure that appropriate worker facilities are provided at the workplace and labor camps as per the contractual provisions;
- (vii) Carry out site inspections on a regular basis and prepare site-inspection checklists/reports (Appendix 11);
- (viii) Record EHS incidents and undertake remedial actions;
- (ix) Conduct environmental monitoring (air, noise, etc.) as per the monitoring plan
- (x) Prepare monthly EMP monitoring reports and submit to PMU/PMDSC;
- (xi) Work closely with PMU Manager (Environment, Health & Safety) and PMDSC ESS to ensure communities are aware of project-related impacts, mitigation measures, and GRM; and
- (xii) Coordinate with the PMU and PMDSC on any grievances received and ensure that these are addressed in an effective and timely manner.

C. Institutional Capacity and Development

203. Executing and implementing agencies need to have a sustained capacity to manage and monitor environmental safeguards. Although specialist consultants support will be available to PMU, it is necessary to mainstream safeguards in day-to-day working. Therefore, PMU require capacity building measures for (i) a better understanding of the project-related environmental issues; and (ii) to strengthen their role in preparation of IEE, implementation of mitigation measures, and subsequent monitoring. Trainings and awareness workshops are included in the project with the primary focus of enabling the PMU staff to understand impact assessments and carry out environmental monitoring and implement EMPs. After participating in such activities, the participants will be able to review environmental assessments, conduct monitoring of EMPs, understand government and ADB requirements for environmental assessment, management, and monitoring (short- and long-term), and incorporate environmental features into future project designs, specifications, and tender/contract documents and carry out necessary checks and balances during project implementation.

204. PMU Safeguards Officers will be trained by PMDSC safeguards experts on safeguards issues related to the project, GESI action plan and GRM. The EARF, RF, and GESI action plan provided indicative capacity building program which included modules on: (i) introduction and sensitization to ADB SPS on environmental, involuntary resettlement and indigenous people policies and requirements; (ii) project related requirements as provided in the EARF, RF, and GESI action plan, (iii) review, updating and preparation of the IEEs, SEMRs, RPs, DDRs (as required) upon the completion of project detailed design; (iii) improved coordination within nodal departments; (iv) monitoring and reporting system; and (v) project GRM. Briefings on safeguards principles, GRM and GESI action plan will also be conducted to the contractors upon their mobilization by PMU Safeguard Officers supported by PMDSCs. The contractors will be required to conduct environmental awareness and orientation of workers prior to deployment to work sites. The suggested outline of the training program is presented in table 28 below.

⁴¹ Some of the key areas that may be covered during training as they relate to the primary causes of accidents include (i) slips, trips and falls; (ii) personal protective equipment; (iii) ergonomics, repetitive motion, and manual handling; (iv) workplace transport; and (v) legislation and responsibilities. Training can provide the foundations of competence, but it does not necessarily result in a competent worker. Therefore, it is essential to assess staff competence and monitor to ensure that the training provided is relevant and effective.

Table 28: Training Program on Environmental Safeguards and Its Implementation

Description	Target Participants and Venue	Estimate (INR)	Source of Funds
1. Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement - Government of India and West Bengal applicable safeguard laws, regulations and policies including but not limited to core labor standards, OH and S, etc. - Incorporation of EMP into the project design and contracts - Monitoring, reporting and corrective action planning	All staff and consultants involved in the project At PMU level	50,000 (LS)	PMU
2. Preparing and implementing SEMR (1/2 day - once at the beginning and at a frequency of once in six months during implementation) - site-specific mitigation & monitoring measures - Roles and responsibilities - Public relations, - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure -Construction site standard operating procedures (SOP) -Chance find (archaeological) protocol - AC pipe protocol - Traffic management plan - Waste management plan - Site clean-up & restoration	All staff and consultants involved in the project All contractors immediately after mobilization of the contractor At PMU level	100,000 (LS)	PMU
3. Contractors Orientation to Workers (1/2 day) - Environment, health and safety in project construction (O H and S, core labor laws, spoils management, etc.)	Once before start of work, and thereafter regular briefing every month once. Daily briefing on safety prior to start of work All workers (including unskilled laborers)	50,000 (LS)	Contractor's cost

Summary of Capacity Building cost for EMP Implementation

- Contractor Cost - INR 50,000
- PMU Cost - INR 150,000
- **Total - INR 200,000**

D. Monitoring and Reporting

205. Immediately after mobilization and prior to commencement of the works, the contractor will submit a compliance report to PMU that all identified pre-construction mitigation measures as detailed in the EMP are undertaken. Contractor should confirm that the staff for EMP implementation (EHS supervisor) is mobilized. PMU will review, and approve the report and allow commencement of works.

206. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the PMU. PMDSC will review and advise contractors for corrective actions if necessary.

207. A quarterly report shall be prepared PMDSC and PMU and submitted to PMU for review and further actions.

208. Based on monthly & quarterly reports and measurements, PMU (assisted by PMDSC) will submit Semi-Annual Environmental Monitoring Report. Once concurrence from the ADB is received the report will be disclosed on KSHARP/PMU websites.

209. ADB will review project performance against the project commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system

E. EMP Implementation Cost

210. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. There are some of the provisions in bid documents like compliance of the requirements of health and safety during construction works as per applicable labour laws, labour insurance, equipment fitness, provision of labour welfare facilities, healthcare facilities etc. which are unanimously bound to contractor bidding for the project therefore it is understood that costs for such requirements are bound to contractor and no need to consider as cost of EMP implementation. Regardless of this, any costs of mitigation by the construction contractors or consultants are included in the budgets for the civil works and do not need to be estimated separately here. Mitigation that is the responsibility of PMU/ULB will be provided as part of their management of the project, so this also does not need to be duplicated here. Cost for the capacity building program is included as part of the project Cost of environmental management are given in Table 29.

Table 29: Indicative Costs of Environmental Management Plan

Table 26: Indicative Costs of Environmental Management Plan							
Sr. No	Particulars	Stages	Unit	Total No.	Rate (₹)	Indicative Tentative Cost (₹)	Costs Covered By
A. Implementation staff							
1	EHS officer*	Construction	per month	1 No.	50,000	2,100,000	Contractor's cost supported from Project cost
	Subtotal (A)					2,100,000	
B. Mitigation Measures							
1.	Consent for establishments and consent for operation from WBPCB for Hot	Pre-construction	Lump sum			50,000	Project costs

[illegible]

Sr. No	Particulars	Stages	Unit	Total No.	Rate (₹)	Indicative Tentative Cost (₹)	Costs Covered By
1	Grievance Redressal Mechanism Resolutions	Construction			Lump Sum	100,000	Civil works contract
2	Public consultations on Environmental aspects	Construction	Lump sum	-	-	100,000	Civil works contract
	Sub Total (F)						200,000
	Total (A+B+C+D+E)						4,513,000

IX. CONCLUSION AND RECOMMENDATION

211. The process described in this document has assessed the environmental impacts of all elements of the specific sewerage (STP) subproject of KSHARP in Borough XII, part of ward 108 and 109. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible. Mitigation measures have been suggested to reduce all negative impacts to acceptable levels.

212. Project site is within KMC area and fully urbanized. There is no forest, eco-sensitive or protected areas, archeological sites, within proposed project activity areas. The STP site is close to habitations. During construction activities, no tree felling will be required as the STP site is vacant. East Kolkata Wetlands (EKW), a Ramsar wetland, is located in the eastern fringes of Kolkata, which is a largest assemblage of sewage fish ponds and farm lands. Boundary of EKW is located about 690m from the STP site. Intervening area is highly urbanized with residential, educational and business establishments. There is no discharge of SWF or DWF proposed into EKW. There is no presence of any protected species in or near the project area. Therefore, no notable impacts envisaged due to location or design of the project.

Kolkata has combined sewerage system that caters to both municipal wastewater and storm runoff (during rains). The dry weather flow (DWF, only wastewater) from the command area of proposed STP will be treated at the proposed SBR-based STP of 41 MLD capacity prior to discharge, therefore no impacts envisaged. The STP is designed to meet the discharge standards and will have sludge management facilities. The layout plan for the STP will be designed to ensure that odour-generating units, such as the inlet/raw water sump and sludge handling facilities, are situated away from residential areas. Currently, the wet well and sludge sump are approximately 100 meters and 90 meters away from the nearest houses, respectively. An odour capture system will be installed during the operation stage if necessary. However, KMC has constructed other STPs using SBR technology in close proximity to residential houses. According to KMC, there have been no issues with odour or noise from these STPs.

213. During the construction phase, physical impacts will be reduced by the method of working and scheduling of work, whereby the contractor should provide adequate barricades and safety signages during construction. Deep trenches need to be properly protected by shoring/bracings to avoid collapse of trenches, night works are required (however unlikely, applicable only in extreme conditions) all the mitigation measures to reduce impacts of disturbance to minimum

level to nearby habitants should be ensured by contractor. Contractors are required to carry out construction work upon due consultation with local people/ concerned authorities. Necessary measures included in the EMP and needs to be implemented effectively

214. Once the new system is operating, the facilities will operate with routine maintenance, which should not affect the environment. Improved system operation will comply with the operation and maintenance manual and standard operating procedures.

215. Mitigation will be assured by a program of environmental monitoring conducted during construction and operation to ensure that all measures are implemented, and to determine whether the environment is protected as intended. This will include observations on-site and offsite, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the PMU.

216. Stakeholders were involved in developing the IEE through face-to-face discussions, on site meetings, and a city level consultation workshop, which was conducted for larger public participation in the project. Views expressed by the stakeholders were incorporated into the IEE and the planning and development of the project. The IEE will be made available at public locations and will be disclosed to a wider audience via the PMU and ADB websites. The consultation process will be continued during project implementation to ensure that stakeholders are engaged in the project and have the opportunity to participate in its development and implementation. The project's grievance redress mechanism will provide the citizens with a platform for redressing their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

217. The sub-project will benefit the general public by contributing to the long-term improvement of sewerage and drainage system and community liveability in ward no 108 and 109 of KMC. The benefits arising from this subproject include: (i) better public health particularly reduction in waterborne and infectious diseases; (ii) reduced risk of groundwater contamination; (iii) reduced risk of contamination of treated water supplies; and (iv) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards. Improved sewerage and drainage systems will also significantly reduce the incidence of wastewater accumulation in the subproject area and hence reduce health risks to the citizens and improve the visual quality and landscape character of the area.

218. **Recommendations.** The following are recommendations applicable to the subproject to ensure no significant impacts:

- (i) Update this IEE during design verification, pre-construction and/or construction stage to reflect any changes in subproject design and submit to ADB for clearance and disclosure
- (ii) Contractor to prepare Site specific environmental management plan (SEMP) based on the updated EMP, and approved by PMU; no works can commence under SEMP is approved
- (iii) Obtain all statutory clearances prior to start of construction works.]
- (iv) KMC will need to obtain Consent to Establish (CTE) from the West Bengal State Pollution Control Board (WBPCB) before commencing STP construction work, and Consent to Operate (CTO) before the STP can begin operation. Conduct baseline environmental quality monitoring prior to start of construction
- (v) Conduct safeguards induction to the contractor upon award of contract

- (vi) Strictly supervise EMP implementation
- (vii) An odour capture system will be installed during the operation stage if necessary. The contractor shall design the process to ensure there are no odor issues at the STP and make appropriate provisions to ensure the same as per CPCB guidelines on odour pollution and control, May 2008.⁴²
- (viii) Ensure contractor appoints qualified environment, health and safety (EHS) supervisors prior to start of works
- (ix) Document and report on a regular basis as indicated in the IEE
- (x) Conduct continuous consultations with stakeholders and disclose information timely
- (xi) Ensure grievance redress mechanism is operationalized prior to start of works.

⁴²<https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvTmV3SXRlbV8xNDZfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==>

Appendix 1: Rapid Environmental Assessment Checklist

Instructions:

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (SDES) for endorsement by the Director, SDES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title:

Kolkata Municipal Corporation Sustainability and Resilience (Sector) Project (KSHARP) - Construction of 41 MLD Sewage Treatment Plant at Hossainpur including Operation and Maintenance for 15 years (Ward

Sector Division:

WUD-SA

Screening Questions	Yes	No	Remarks
A. Project siting			
Is the project area			
Densely populated?	✓		Proposed project site (STP) comes under ward no 109 of KMC which is an urban area and densely populated
Heavy with development activities?	✓		The subproject area is a developing area, urban expansion is considerable. No negative impacts are envisaged as STP will be constructed within confined area. Measures like best activity scheduling, traffic management, etc. will be employed to minimize the impact to acceptable levels.
Adjacent to or within any environmentally sensitive areas?		✓	There are no environmentally sensitive areas within or near to STP site. The nearest environmentally sensitive area is East Kolkata Wetland, a designated Ramsar site, lies at an aerial distance of about 690m from proposed STP site. None of the project components falls within the protected area.
Cultural heritage site		✓	There are no notified / notable protected monuments or places of archaeological or historical or cultural importance in the project area. Since the project areas are mostly in urban nature, there are various socio-cultural, educational, health institutes, such as schools, religious places, hospitals, courts etc. There may be inconvenience, access disruption etc., though temporarily during construction. Information regarding these places, and measures to avoid construction impacts are included in the EMP

Screening Questions	Yes	No	Remarks
Protected area		✓	The nearest protected area is East Kolkata Wetland , a designated Ramsar site, lies at an aerial distance of about 690m from proposed STP site. No project components are proposed within any protected areas.
Wetland		✓	The nearest wetland is East Kolkata Wetland , a designated Ramsar site, lies at an aerial distance of about 690m from proposed STP site. No project components are proposed within any protected areas
Mangrove		✓	Project sites are not located in coastal area. There are no mangrove sites.
Estuarine		✓	There are no estuaries in the proposed project areas.
Buffer zone of protected area		✓	The project locations and their vicinities do not involve any buffer zone of protected area.
Special area for protecting biodiversity		✓	The project locations and their vicinities do not involve any special area for protecting biodiversity.
Bay		✓	Project sites are not located in coastal area, and there are no bay areas.
B. Potential Environmental Impacts Will the Project cause...			
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	The project will not cause any impairment of historical/cultural monuments/areas and loss/damage to these sites
Interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?	✓		Anticipated during construction and operations but can be managed. During construction of STP, outflow sewers and sewer pipelines etc., will be laid underground and may interfere temporarily with access and other utilities. Coordination with the concerned agencies will be conducted in finalizing alignment and shifting of utilities, if necessary. Contractors will need to implement EMP measures to mitigate / minimize such impacts. Sewage treatment plants' design include considerations to minimize, if not reduce, the nuisance to the nearby communities and comply with noise standards.
Dislocation or involuntary resettlement of people?		✓	Not anticipated The project will not cause any dislocation or involuntary resettlement of people. There are 8 nos. permanent houses and few temporary hutments within 10 to 25m distance from proposed STP site. However, no displacement of communities is required.
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not anticipated

Screening Questions	Yes	No	Remarks
			The project will not cause any disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups
Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		✓	Not anticipated Proposed sewage treatment plant is designed to meet stringent applicable effluent disposal standards. Therefore, discharge of treated wastewater from STPs will not lead to impairment of downstream water quality. The water bodies at present are receiving untreated wastewater from subproject areas, and the subproject will improve this situation. Various design principles followed in STP design will ensure that sewage is adequately treated, and there is no release of untreated sewage.
Overflows and flooding of neighboring properties with raw sewage?		✓	Not anticipated Sewer system is designed to meet the ultimate demand considering various factors including climate change risks. Overflowing during operation stage will be avoided by proper and regular maintenance.
Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		✓	Not anticipated. STP designs include sludge collection, treatment and disposal. Standards are provided for the use of sludge as manure. Sewerage system design ensures no industrial effluent will be allowed into the network.
Noise and vibration due to blasting and other civil works?	✓		Anticipated but can be mitigated Construction works are likely to generate noise and dust, including for breaking of concrete/bitumen roads to construction sewer in some roads. These are anticipated impacts of construction, and are temporary, and localized. EMP will include various measures to control dust and noise during construction. Blasting for underground works is prohibited in KMC works
Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	✓		Anticipated but can be mitigated Construction works present occupational risk unless proper safety workplace environment and procedures, including wearing of personal protection equipment (PPE), are in place and are ensured by proper supervision and monitoring. Use of <i>ad hoc</i> , substandard methods and materials, non-use of PPE, lack of proper supervisory control etc., will increase the risk EMP will include proper measures, and contract includes provision of EHS Officer with the contractor. Submission of occupation health and safety plan including COVID19 health and safety management plan is mandatory prior to start of works.

Screening Questions	Yes	No	Remarks
Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		✓	Not anticipated. Sewerage system only caters for domestic wastewater, no industrial wastewater is allowed into the system.
Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		✓	Not anticipated. STP will be isolated through boundary wall and to avoid nuisances' mitigation measures such as dense tree buffer zone, odor sensitive design, pumps covered with insulators and standby power arrangements (green generator) are suggested to safeguard the health and safety of the nearby community. At STP, proposed SBR technology is advanced, treats sewage in a compact aerobic process, therefore issue due to bad odor is minimal.
Road blocking and temporary flooding due to land excavation during the rainy season?	✓		Anticipated but temporary, site-specific and can be mitigated. Temporary flooding of trenches envisaged if earthwork is conducted during rains. These are anticipated impacts of construction, and are temporary, and localized. EMP will include various measures including non-scheduling of earthworks during rains, proper planning of sites works to minimize roadblocks, and implementation of traffic management plan in coordination with local traffic police. These issues will be further addressed in SEMP's of individual construction packages by contractors. Prior intimation to general public and road users will be provided to minimize inconvenience.
Noise and dust from construction activities?	✓		Anticipated but can be mitigated Construction works are likely to generate noise and dust, including for breaking of concrete/bitumen roads to create drains in some roads. These are anticipated impacts of construction, and are temporary, and localized. EMP will include various measures to control dust and noise during construction. Dust generation will be controlled through water sprinkling, immediate transportation of excess soil, covered transport system etc.
Traffic disturbances due to construction material transport and wastes?	✓		Anticipated but can be mitigated There will be temporary traffic disturbances as construction work is likely to generate traffic to transport material and waste in large quantities. These are anticipated impacts of construction, and are temporary, and localized. EMP will include various measures such as the following: proper scheduling of transport activities avoiding peak times, and avoiding narrow, congested, and heavy traffic roads etc., will be

Screening Questions	Yes	No	Remarks
			considered in the traffic management in coordination with local traffic police. Prior information about the works and alternative arrangements, providing information/sign boards etc. will reduce the impact.
Temporary silt runoff due to construction?	✓		Anticipated but can be mitigated This impact will be mitigated by mostly scheduling excavation activities in dry season. There will also be measures included in EMP to contain silt runoff from sites for unexpected events, such as untimely rains.
Hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		✓	Not anticipated. Sewer system is designed to meet the ultimate demand considering various factors including climate change risks. Overflowing during operation stage will be avoided by proper and regular maintenance. Adequately trained staff and necessary equipment will be in place for regular O&M of the system. Proposed treatment system will be efficient and appropriate repair and maintenance procedures will be developed. Sufficient funds for O&M will be ensured. Backup power supply system is part of project.
Deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		✓	Not anticipated. STP designs include sludge collection, treatment and disposal. Standards are provided for the use of sludge as manure. No direct discharge of untreated wastewater anticipated. Treated wastewater meeting the disposal standards will be discharged from the STP. Sludge management will be done at the STP. The generated Sludge will be reused as manure.
Contamination of surface and ground waters due to sludge disposal on land?		✓	Not anticipated. No untreated sludge will be disposed on ground. STP designs include sludge collection, handling and treatment facilities. Treated sludge meeting the standards will only be disposed on land or used as manure.
Health and safety hazards to workers from toxic gases and hazardous materials which may be contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?		✓	Anticipated but can be mitigated. Workers may be exposed during cleaning of blockages in sewerage network. However, O&M manuals will include standard operating procedures, and mechanized sewer cleaning will be adopted. All necessary health and safety training and personal protection equipment will be given to workers and staff during operation of sewerage system. Implementation of contractors' H&S will be strictly enforced by the PMU.
Large population increase during project construction and operation that causes		✓	Not anticipated Large influx of construction workers not anticipated during construction. Although it is likely that

Screening Questions	Yes	No	Remarks
increased burden on social infrastructure (such as sanitation system)?			construction workers will be mobilized from outside the project areas, no notable impacts on infrastructure or services anticipated. Migrant workers will be reduced to the extent possible by mobilizing local workers.
Social conflicts between construction workers from other areas and community workers?		✓	Not anticipated Local workers will be engaged to the extent possible. Some workers may be brought from outside, but numbers will not be so large to have conflicts. Migrant workers will be provided with proper accommodation, training and briefing on proper behavior, awareness/ measures on HIV/AIDS and COVID19.
Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?		✓	Anticipated but can be mitigated. Construction will not involve use of explosives and chemicals. During operations, chemicals may be used in treatment of sewage. O&M Manuals will include health and safety requirements for managing chemicals.
Community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?		✓	Anticipated but temporary, site-specific and can be mitigated . Unlikely but cannot be ruled out as this is always an unforeseen risk in construction works. Considering the type of works, the risk may be less. Project design includes safety measures, and design will follow the standard codes. Implementation of construction works with proper measures, and emergency response systems will minimize the risk to great extent. Work area will be clearly demarcated with security access for the workers and project-concerned members only. Community health and safety risks are present during construction such as risks from excavations for pipe laying, equipment and vehicle operations which should be identified and implemented in the site-specific EMPs.

Appendix 2: Eligible Subprojects under KSHARP, KMC (Sector Loan)

Sl. No	Eligible subprojects
1.	Development of trunk S&D network and lateral sewers including house connections and construction of pumping stations in Suti Sub-Basin (part of wards 126 and 127)
2.	Development of trunk S&D network and lateral sewers including house connections and construction of pumping stations in Kalagachia Sub-Basin (part of wards 125 and 126)
3.	Development of trunk S&D network and lateral sewers including house connections in Bakrahat Road Catchment and Hanspukur Catchment (part of wards 125 and 144)
4.	Development of trunk S&D network and lateral sewers including house connections in Kabar Danga PS Catchment and construction of PS (part of wards 142 and 143)
5.	Development of trunk S&D network and lateral sewers including house connections in 22 Bigha PS Catchment and construction of PS in Borough XVI (part of wards 142 and 143)
6.	Development of trunk S&D network and lateral sewers including house connections in Julpia Road PS Catchment and construction of PS in Borough XVI (part of ward 142)
7.	Development of trunk S&D network and lateral sewers including house connections in Chowbhaga (East), Chowbhaga (west), and Nonadanga and including construction of 2 PSs in Borough XII (part of ward 108)
8.	Development of trunk S&D network and lateral sewers including house connections in Hossainpur & Anandapur PS in Borough XII (part of ward 108)
9.	Development of trunk S&D network and lateral sewers including house connections in Nayabad, Ajaynagar, Panchsayar, and Baishnabghata and augmentation of one existing PS in Borough XII (part of wards 109 and 110)
10.	Construction of Hossainpur & Hatisur STP
11.	Development of Trunk S&D network and lateral sewers including house connections in part of ward 139 and wards 140 and 141

PS = pump station, S&D = sewerage and drainage, STP = sewage treatment plant.

Appendix 3: Drinking water , Ambient Air Quality, Vehicle, Diesel Generator Emissions Standards, Noise Level Standards

Table 1: Applicable Drinking Water Quality Standards

Group	National Standards for Drinking Water ^a			WHO Guidelines for Drinking-Water Quality, 4 th Edition, 2011 ^b
	Parameter	Unit	Max. Concentration Limits ^d	
Physical	Turbidity	NTU	1 (5)	-
	pH		6.5 – 8.5	none
	Color	Hazen units	5 (15)	none
	Taste and Odor		Agreeable	-
	TDS	mg/l	500 (2,000)	-
	Iron	mg/l	0.3	-
	Manganese	mg/l	0.1 (0.3)	-
	Arsenic	mg/l	0.01 (0.05)	0.01
	Cadmium	mg/l	0.003	0.003
	Chromium	mg/l	0.05	0.05
	Cyanide	mg/l	0.05	none
	Fluoride	mg/l	1 (1.5)	1.5
	Lead	mg/l	0.01	0.01
	Ammonia	mg/l	0.5	none established
Chemical	Chloride	mg/l	250 (1,000)	none established
	Sulphate	mg/l	200 (400)	none
	Nitrate	mg/l	45	50
	Copper	mg/l	0.05 (1.5)	2
	Total Hardness	mg/l	200 (600)	-
	Calcium	mg/l	75 (200)	-
	Zinc	mg/l	5 (15)	none established
	Mercury	mg/l	0.001	0.006
	Aluminum	mg/l	0.1 (0.3)	none established
	Residual Chlorine	mg/l	0.2	5
Micro Germs	E-coli	MPN/100ml	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample
	Total Coliform	MPN/100ml		

^a Bureau of India Standard 10200: 2012.

^b Health-based guideline values.

^c Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

^d Figures in parenthesis are maximum limits allowed in the absence of alternate source.

- A. Notification by Ministry of Environment and Forests, Government of India
Environment (Protection) Seventh Amendment Rules, 2009

Table 2: Surface Water Quality Classification Criteria

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 6 mg/L or more Biochemical Oxygen Demand 5 days 20°C 2mg/L or less
Outdoor bathing (Organized)	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 20°C 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 4 mg/L or more Biochemical Oxygen Demand 5 days 20°C 3 mg/L or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4 mg/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 25°C micro mhos/cm Max. 2250 Sodium absorption Ratio Max. 26 Boron Max. 2 mg/L

Source: Central Pollution Control Board

mg/L = milligram per liter, ml = milliliter, MPN = Most Probable Number

Table 3: Ambient Air Quality Standards

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)	
			Global Update ^c 2005	2021 Guidelines
PM ₁₀	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	5(Annual) 15 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	5(Annual) 15 (24-hr)
PM ₂₅	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	15(Annual) 45 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	15(Annual) 45 (24-hr)

Parameter	Location ^a	India Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^b	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)	
			Global Update ^c 2005	2021 Guidelines
SO ₂	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10- min)	40(Annual) 4 (24-hr)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10- min)	40(Annual) 4 (24-hr)
NO ₂	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	10(Annual) 25 (24-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	10(Annual) 25 (24-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	4 (24-hr)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	4 (24-hr)
Ozone (O ₃)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)	100 (8-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)	100 (8-hr)
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		
Ammonia (NH ₃)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)		
	Sensitive Area	100 (Annual) 400 (24-hr)		
Benzene (C ₆ H ₆)	Industrial Residential, Rural and Other Areas	5 (Annual)		

	Sensitive Area	5 (Annual)		
Benzo(o) Pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)		
	Sensitive Area	0.001 (Annual)		
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)		
	Sensitive Area	0.006 (Annual)		
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)		
	Sensitive Area	0.02 (Annual)		

^a Sensitive area refers to such areas notified by the India Central Government.

^b Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

^c WHO Global Air quality guidelines (2021).

Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS

ambient air quality standards are more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS

Table 4: Vehicle Exhaust Emission Norms

1. Passenger Cars

Norms	CO(g/km)	HC+ NOx(g/km)
1991Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998Norms	4.34-6.20	1.50-2.18
India stage 2000 norms	2.72	0.97
Bharat stage-II	2.2	0.5
Bharat Stage-III	2.3	0.35 (combined)
Bharat Stage-IV	1.0	0.18combined)

2. Heavy Diesel Vehicles

Norms	CO(g/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15

Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

CO = Carbon Monoxide; g/kmhr = grams per kilometer-hour; HC = Hydrocarbons; NO_x = oxides of nitrogen; PM = Particulates Matter

**Table 5: Emission limits for New DG sets up to 800 KW
(As per Environment (Protection) (Third Amendment) Rules, 2013)**

TABLE				
Power Category	Emission Limits (g/kW-hr)			Smoke Limit (light absorption coefficient, m ⁻¹)
	NO _x + HC	CO	PM	
Upto 19 KW	≤ 7.5	≤ 3.5	≤ 0.3	≤ 0.7
More than 19 KW upto 75 KW	≤ 4.7	≤ 3.5	≤ 0.3	≤ 0.7
More than 75 KW upto 800 KW	≤ 4.0	≤ 3.5	≤ 0.2	≤ 0.7

Note:

1. The abbreviations used in the Table shall mean as under: NO_x – Oxides of Nitrogen; HC – Hydrocarbon; CO – Carbon Monoxide; and PM – Particulate Matter.
2. Smoke shall not exceed above value throughout the operating load points of the test cycle.
3. The testing shall be done as per D2 – 5 mode cycle of ISO: 8178- Part 4.
4. The above mentioned emission limits shall be applicable for Type Approval and Conformity of Production (COP) carried out by authorised agencies.
5. Every manufacturer, importer or, assembler (hereinafter referred to as manufacturer) of the diesel engine (hereinafter referred to as 'engine') for genset application manufactured or imported into India or, diesel genset (hereinafter referred to as 'product'), assembled or imported into India shall obtain Type Approval and comply with COP of their product(s) for the emission limits which shall be valid for the next COP year or, the date of implementation of the revised norms specified above, whichever earlier.
Explanation.- The term 'COP year' means the period from 1st April to 31st March.
6. Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines.

DIESEL GENERATOR SETS : STACK HEIGHT

The minimum height of stack to be provided with each generator set can be worked out using the following formula :

$$H = h + 0.2 \times \sqrt{\text{KVA}}$$

H = Total height of stack in metre

h = Height of the building in metres where the generator set is installed

KVA = Total generator capacity of the set in KVA

Based on the above formula the minimum stack height to be provided with different range of generator sets may be categorised as follows:

For Generator Sets	Total Height of stack in metre
50 KVA	Ht. of the building + 1.5 metre
50-100 KVA	Ht. of the building + 2.0 metre
100-150 KVA	Ht. of the building + 2.5 metre
150-200 KVA	Ht. of the building + 3.0 metre
200-250 KVA	Ht. of the building + 3.5 metre
250-300 KVA	Ht. of the building + 3.5 metre

Similarly for higher KVA ratings a stack height can be worked out using the above formula.

Source : Evolved By CPCB
[Emission Regulations Part IV:COINDS/26/1986-87]

Table 6: Ambient Noise Level Standards

Receptor/ Source	India National Noise Level Standards (dBA)		WHO Guidelines Value for Noise Levels Measured Out of Doors ^b (One Hour Leq in dBA)		Applicable Per ADB SPS ^c (dBA)	
	Day	Night	07:00 – 22:00	22:00 – 07:00	Day time	Night time
Industrial area	75	70	70	70	70	70
Commercial Area	65	55	70	70	65	55
Residential Area	55	45	55	45	55	45
Silent Zone	50	40	55	45	50	40

a- Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

b- Guidelines for Community Noise. WHO. 1999

c- Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

Noise Limits for Diesel Generator Sets

Environment (Protection) Second Amendment Rules vide GSR 371(E), dated 17th May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1st July 2003; GSR 448(E), dated 12th July 2004; GSR 315(E) dated 16th May 2005; GSR 464(E) dated 7th August 2006; GSR 566(E) dated 29th August 2007 and GSR 752(E) dated 24th October 2008; G.S.R. 215 (E), dated 15th March, 2011 under the Environment (Protection) Act, 1986)

Noise Limit for Generator Sets run with Diesel

1. Noise limit for diesel generator sets (upto 1000 KVA) manufactured on or after the 1st January, 2005

The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity upto 1000 KVA, manufactured on or after the 1st January, 2005 shall be 75 dB(A) at 1 metre from the enclosure surface.

The diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage itself.

The implementation of noise limit for these diesel generator sets shall be regulated as given in paragraph 3 below.

2. Noise limit for DG sets not covered by paragraph 1.

Noise limits for diesel generator sets not covered by paragraph 1, shall be as follows:-

- 2.1 Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
- 2.2 The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side (if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/acoustic treatment. Under such circumstances the performance may be checked for noise reduction upto actual ambient noise level, preferably, in the night time). The measurement for Insertion Loss may be done at different points at 0.5 m from the acoustic enclosure/ room, then averaged.
- 2.3 The DG set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).

2.4 These limits shall be regulated by the State Pollution Control Boards and the State Pollution Control Committees.

2.5 Guidelines for the manufacturers/ users of Diesel Generator sets shall be as under:-

01. The manufacturer shall offer to the user a standard acoustic enclosure of 25 dB (A) insertion loss and also a suitable exhaust muffler with insertion loss of 25 dB(A).
02. The user shall make efforts to bring down the noise levels due to the DG set, outside his premises, within the ambient noise requirements by proper citing and control measures.
03. Installation of DG set must be strictly in compliance with the recommendations of the DG set manufacturer.
04. A proper routine and preventive maintenance procedure for the DG set should be set and followed in consultation with the DG set manufacturer which would help prevent noise levels of the DG set from deteriorating with use.

3.0 Limits of Noise for DG Sets (upto 1000 KVA) Manufactured on or after the 1st January, 2005

3.1 Applicability

01. These rules apply to DG sets upto 1000 KVA rated output, manufactured or imported in India, on or after 1st January, 2005.
02. These rules shall not apply to –
 - a) DG sets manufactured or imported for the purpose of exports outside India; and
 - b) DG sets intended for the purpose of sample and not for sale in India.

3.2 Requirement of Certification

Every manufacturer or assembler or importer (hereinafter referred to as the "manufacturer") of DG set (hereinafter referred to as "product") to which these regulations apply must have valid certificates of Type Approval and also valid certificates of Conformity of Production for each year, for all the product models being manufactured or assembled or imported from 1st January, 2005 with the noise limit specified in paragraph 1.

3.3 Sale, import or use of DG sets not complying with the rules prohibited

No person shall sell, import or use of a product model, which is not having a valid Type Approval Certificate and Conformity of Production certificate.

Appendix 4: Effluent Discharge Standards for STPs as per National Green Tribunal (NGT) order dated 30.04.2019

Sl. No.	Parameters	Parameters Limit
1	pH	5.5-9.0
2	BOD (mg/l)	Not more than 10 mg/l
3	COD (mg/l)	Not more than 50 mg/l
4	TSS (mg/l)	Not more than 20 mg/l
5	P-Total (mg/l)- for discharge into ponds/lakes	Not more than 1.0 mg/l
6	N-Total (mg/l)	Not more than 10 mg/l
7	Faecal Coliform (MPN/100ml)	Desirable- Less than 100 MPN/100ml Permissible- 230 MPN/100ml

Note: The standards recommended are applicable to entire country irrespective of Mega and Metropolitan Cities The standards will apply not only for new STPs but also for existing/under construction STPs without any delay

Appendix 5: IBAT Screening Checklist

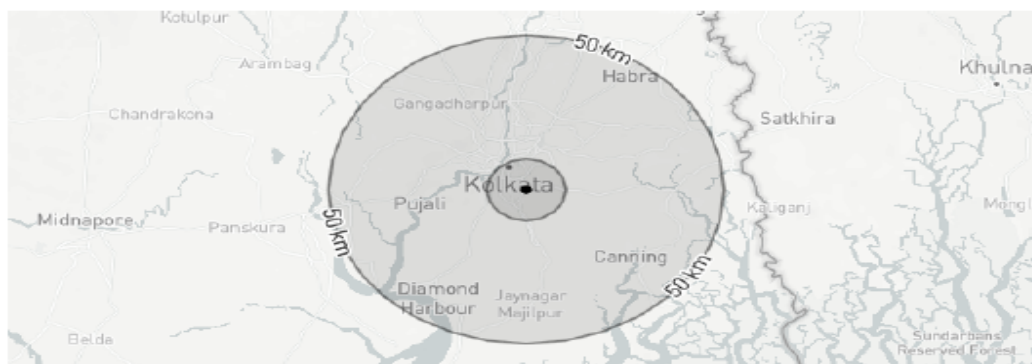


Integrated Biodiversity Assessment Tool World Bank Group Biodiversity Risk Screen KURIP WARD NO 108_ STP SITE

- **Country:** India
- **Location:** [22.5, 88.4]
- **IUCN Red List Biomes:** Freshwater, Terrestrial
- **Created by:** Prabhatish Bhattacharya

Overlaps with:

Protected Areas	1 km: 0	10 km: 1	50 km: 1	2
World Heritage (WH)	1 km: 0	10 km: 0	50 km: 0	0
Key Biodiversity Areas	1 km: 0	10 km: 0	50 km: 0	0
Alliance for Zero Extinction (AZE)	1 km: 0	10 km: 0	50 km: 0	0
IUCN Red List	33			
Critical Habitat	Likely			



Displaying project location and buffers: 1 km, 10 km, 50 km



This report is based on IFC Performance Standard 6 (PS6) but applies to World Bank Environmental and Social Standard 6 (ESS6)





About this report

The recommendations stated alongside any Protected Areas and Key Biodiversity Areas identified in this report are determined by the following:

Protected Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies a designation that includes either 'natural' or 'mixed world heritage site'.
- 'Assess for Critical Habitat' is stated if the report identifies a Strict Nature Reserve, Wilderness Area or National Park as coded by IUCN protected area categories Ia, Ib and II.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of protected area.

Key Biodiversity Areas:

- 'Highest risk. Seek expert help' is stated if the report identifies an Alliance for Zero Extinction site.
- 'Assess for Critical Habitat' is stated if the report identifies Critically Endangered or Endangered species OR species with restricted ranges OR congregatory species as coded in the IUCN Red List of Threatened Species.
- 'Assess for biodiversity risk' is stated if the report identifies any other type of Key Biodiversity Area.

IBAT provides initial screening for Critical Habitat values. Performance Standard 6 (PS6) defines these values for Critical Habitat (PS6: para. 16) and legally protected and internationally recognized areas (PS6: para. 20). PS6 will be triggered when IFC client activities are located in modified habitats containing "significant biodiversity value," natural habitats, Critical Habitats, legally protected areas, or areas that are internationally recognized for biodiversity. References to PS6 and Guidance Note 6 (GN6) are provided to guide further assessment and detailed definitions where necessary. Please see <https://www.ifc.org/ps6> for full details on PS6 and GN6.

This report identifies restricted range species according to the KBA Standard definition (hyperlink KBA Standard <https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf>):

Species having a global range size less than or equal to the 25th percentile of range-size distribution in a taxonomic group within which all species have been mapped globally, up to a maximum of 50,000 km². If all species in a taxonomic group have not been mapped globally, or if the 25th percentile of range-size distribution for a taxonomic group falls below 10,000 km², restricted range should be defined as having a global range size less than or equal to 10,000 km². For coastal, riverine and other species with linear distributions that do not exceed 200 km width at any point, restricted range is defined as having a global range less than or equal to 500 km linear geographic span (i.e. the distance between occupied locations furthest apart).

Note, sites supporting restricted range species can qualify as KBAs under criterion B2. These are sites that hold a significant proportion of the global population size of multiple restricted-range species, and so contribute significantly to the global persistence of biodiversity at the genetic and species level.

The report screens for known risks within a standard 50km buffer of the coordinates used for analysis. This buffer is not intended to indicate the area of impact. The report can be used to:

- Scope risks to include within an assessment of risks and impacts





- Identify gaps within an existing assessment of risks and impacts
- Prioritize between sites in a portfolio for further assessment of risks and impacts
- Inform a preliminary determination of Critical Habitat
- Assess the need for engaging a biodiversity specialist
- Identify additional conservation experts or organizations to inform further assessment or planning

WARNING: IBAT aims to provide the most up-to-date and accurate information available at the time of analysis. There is however a possibility of incomplete, incorrect or out-of-date information. All findings in this report must be supported by further desktop review, consultation with experts and/or on-the-ground field assessment as described in PS6 and GN6. Please consult IBAT for any additional disclaimers or recommendations applicable to the information used to generate this report.

Please note, sensitive species data are currently not included in IBAT reports in line with the [Sensitive Data Access Restrictions Policy for the IUCN Red List](#). This relates to sensitive Threatened species and KBAs triggered by sensitive species.

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Priority Species

Habitat of significant importance to priority species will trigger Critical Habitat status (See PS6: para 16). IBAT provides a preliminary list of priority species that could occur within the 50km buffer. This list is drawn from the IUCN Red List of Threatened Species (IUCN RL). This list should be used to guide any further assessment, with the aim of confirming known or likely occurrence of these species within the project area. It is also possible that further assessment may confirm occurrence of additional priority species not listed here. It is strongly encouraged that any new species information collected by the project be shared with species experts and/or IUCN wherever possible in order to improve IUCN datasets.

IUCN Red List of Threatened Species - CR & EN

The following species are potentially found within 50km of the area of interest.

For the full IUCN Red List please refer to the associated csv in the report folder.

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Batagur kachuga	Red-crowned Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Batagur dhongoka	Three-striped Roofed Turtle	REPTILIA	CR	Decreasing	Terrestrial, Freshwater
Pristis clavata	Dwarf Sawfish	CHONDRICHTHYES	CR	Decreasing	Marine, Freshwater
Pristis pristis	Largetooth Sawfish	CHONDRICHTHYES	CR	Decreasing	Marine, Freshwater
Aythya baeri	Baer's Pochard	AVES	CR	Decreasing	Freshwater
Calidris pygmaea	Spoon-billed Sandpiper	AVES	CR	Decreasing	Terrestrial, Marine, Freshwater
Batagur baska	Northern River Terrapin	REPTILIA	CR	Decreasing	Terrestrial, Marine, Freshwater
Pelochelys cantorii	Asian Giant Softshell Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine, Freshwater





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Hardella thurji</i>	Crowned River Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Morenia petersi</i>	Indian Eyed Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Orcaella brevirostris</i>	Irrawaddy Dolphin	MAMMALIA	EN	Decreasing	Marine, Freshwater
<i>Nilssonina gangetica</i>	Indian Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Nilssonina hurum</i>	Indian Peacock Softshell Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater
<i>Platanista gangetica</i>	Ganges River Dolphin	MAMMALIA	EN	Decreasing	Freshwater
<i>Heritiera fomes</i>		MAGNOLIOPSIDA	EN	Decreasing	Terrestrial, Marine, Freshwater
<i>Urogyrnus polylepis</i>	Giant Freshwater Whipray	CHONDRICHTHYES	EN	Decreasing	Marine, Freshwater
<i>Tringa guttifer</i>	Spotted Greenshank	AVES	EN	Decreasing	Terrestrial, Marine, Freshwater
<i>Rynchops albicollis</i>	Indian Skimmer	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Sterna acuticauda</i>	Black-bellied Tern	AVES	EN	Decreasing	Terrestrial, Freshwater
<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	AVES	EN	Decreasing	Terrestrial, Freshwater





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Eretmochelys imbricata</i>	Hawksbill Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine
<i>Sonneratia griffithii</i>		MAGNOLIOPSIDA	CR	Decreasing	Terrestrial, Marine
<i>Gyps bengalensis</i>	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
<i>Sarcogyps calvus</i>	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
<i>Gyps tenuirostris</i>	Slender-billed Vulture	AVES	CR	Decreasing	Terrestrial
<i>Gyps indicus</i>	Indian Vulture	AVES	CR	Decreasing	Terrestrial
<i>Chelonia mydas</i>	Green Turtle	REPTILIA	EN	Decreasing	Terrestrial, Marine
<i>Manis crassicaudata</i>	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
<i>Panthera tigris</i>	Tiger	MAMMALIA	EN	Decreasing	Terrestrial
<i>Varanus flavescens</i>	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
<i>Aquila nipalensis</i>	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
<i>Ploceus megarhynchos</i>	Fin's Weaver	AVES	EN	Decreasing	Terrestrial

Restricted Range Species





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Arius gogora	Gogora Catfish	ACTINOPTERYGII	NT OR LR/NT	Decreasing	Freshwater
Ctenops nobilis		ACTINOPTERYGII	NT OR LR/NT	Decreasing	Freshwater
Fejervarya moodiei	Crab-Eating Frog	AMPHIBIA	LC OR LR/LC	Unknown	Terrestrial, Freshwater
Chirixalus simus	Assam Asian Treefrog	AMPHIBIA	LC OR LR/LC	Decreasing	Terrestrial, Freshwater
Salvinia natans	Floating Fern	POLYPODIOPSIDA	LC OR LR/LC	Decreasing	Freshwater
Ophistemon bengalense	Bengal Mud Eel	ACTINOPTERYGII	LC OR LR/LC	Stable	Marine, Freshwater
Bengala elanga	Bengala Barb	ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Corica soborna	The Ganges River Sprat	ACTINOPTERYGII	LC OR LR/LC	Unknown	Marine, Freshwater
Xenentodon cancila		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Batasio batasio		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Oreochromis niloticus		ACTINOPTERYGII	LC OR LR/LC	Unknown	Freshwater
Oryzias latipes	Indian Ricefish	ACTINOPTERYGII	LC OR LR/LC	Stable	Marine, Freshwater
Pseudosphromenus cupanus	Spiketail Paradise Fish	ACTINOPTERYGII	LC OR LR/LC	Stable	Freshwater





Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
<i>Oryzias latipes</i>	Spotted Ricefish	ACTINOPTERYGII	LC OR LR/LC	Unknown	Marine, Freshwater
<i>Macrobrachium scabriculum</i>		MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
<i>Macrobrachium rude</i>		MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
<i>Macrobrachium rosenbergii</i>	Giant River Prawn	MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
<i>Leptocarpus fluminicola</i>		MALACOSTRACA	LC OR LR/LC	Unknown	Freshwater
<i>Acrocephalus orinus</i>	Large-billed Reed-warbler	AVES	LC OR LR/LC	Unknown	Terrestrial, Freshwater
<i>Anabas cobojus</i>		ACTINOPTERYGII	DD	Unknown	Freshwater
<i>Macrogomphus montanus</i>		INSECTA	DD	Unknown	Terrestrial, Freshwater
<i>Pseudolagusia flavida</i>		ACTINOPTERYGII	DD	Unknown	Freshwater
<i>Ovozomus similis</i>		ARACHNIDA	LC OR LR/LC	Unknown	Terrestrial
<i>Fregetta tropica</i>	Black-bellied Storm-petrel	AVES	LC OR LR/LC	Decreasing	Terrestrial, Marine



Biodiversity features which are likely to trigger Critical Habitat

Protected Areas

The following protected areas are found within 1 km and 10 km and 50 km of the area of interest.
For further details please refer to the associated csv file in the report folder.

Area name	Distance	IUCN Category	Status	Designation	Recommendation
East Calcutta Wetlands	10 km	Not Reported	Designated	Ramsar Site, Wetland of International Importance	Assess for biodiversity risk
Sunderban	50 km	Not Applicable	Designated	UNESCO-MAB Biosphere Reserve	Assess for biodiversity risk

Key Biodiversity Areas

There are no key biodiversity areas to show for this report.

Species with potential to occur

Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
REPTILIA	91	21	5	7	9	4	65	1
CHONDROCHTHYES	4	4	2	1	1	0	0	0
AVES	341	21	6	6	9	25	295	0
MAMMALIA	66	10	0	4	6	4	52	0
MAGNOLIOPSIDA	130	5	1	1	3	3	115	7





Area Taxonomic group	Total assessed species	Total (CR, EN & VU)	CR	EN	VU	NT	LC	DD
ACTINOPTERYGII	172	3	0	0	3	6	144	19
MALACOSTRACA	21	0	0	0	0	1	17	3
AMPHIBIA	17	0	0	0	0	0	17	0
INSECTA	105	0	0	0	0	0	102	3
GASTROPODA	68	0	0	0	0	0	58	10
POLYPODIOPSIDA	6	0	0	0	0	0	6	0
LILIOPSIDA	59	1	0	0	1	1	55	2
BIVALVIA	38	0	0	0	0	0	36	2
ARACHNIDA	3	0	0	0	0	0	3	0



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Recommended citation

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Recommended Experts and Organizations

For projects located in Critical Habitat, clients must ensure that external experts with regional expertise are involved in further assessment (GN6: GN22). Clients are encouraged to develop partnerships with recognized and credible conservation organizations and/or academic institutes, especially with respect to potential developments in natural or Critical Habitat (GN6: GN23). Where Critical Habitats are triggered by priority species, species specialists must be involved. IBAT provides data originally collected by a large network of national partners, while species information is sourced via the IUCN Red List and affiliated Species Specialist Groups. These experts and organizations are listed below. **Please note that this is not intended as a comprehensive list of organizations and experts. These organizations and experts are under no obligation to support any further assessment and do so entirely at their discretion and under their terms. Any views expressed or recommendations made by these stakeholders should not be attributed to the IFC or IBAT for IFC partners.**

Birdlife Partners

URL: <https://www.birdlife.org/worldwide/partnership/birdlife-partners>

Directory for Species Survival Commission (SSC) Specialist Groups and Red List Authorities

URL: <https://www.iucn.org/commissions/ssc-groups>



Appendix 6: Guidelines for Sewerage System Operations, Reuse of Treated Effluent and Sludge from STP for Beneficial Purposes

(Source: Manual on Sewerage and Sewage Treatment Systems, CPHEEO, Ministry of Urban Development, Govt. of India)

Health Hazards during Sewage Operations

Laborers working on the sewage treatment and operations may suffer from a number of ailments directly attributed to handling of sewage. In view of this it is desirable to disinfect sewage and where feasible mechanize sewage operations.

The staff of sewage operations must be well educated in the sanitary rules on the utilization of sewage for irrigation as well as with personal hygiene. All persons working in sewage farms must undergo preventive vaccination against enteric infections and annual medical examination for helminthiasis and be provided treatment if necessary.

Sewage treatment plants should be provided with adequate space for canteens with proper sanitation, wash-stands and lockers for irrigation implements and protective clothing. Safe drinking water must be provided for the workers and for population residing within the effective range of the sewage treatment plants.

All workers should be provided with gum boots and rubber gloves, which must compulsorily be worn while at work. They should be forced to observe personal hygiene such as washing after work as well as washing before taking food. The use of antiseptics in the water used for washing should be emphasized. The farm worker should be examined medically at regular intervals and necessary curative measures enforced.

Mitigation measures to avoid Health Hazards Personal Hygiene against Pathogen

The worker should take precautions because a large number of coliform groups, various kinds of micro-organisms, and egg parasites exist in sewage. The workers should strive to maintain good health by taking care of the following points:

- Wear clean uniform, work boots, etc.
- After work and before having a meal, always wash hands and disinfect them.
- After work, take a shower if possible.
- Do not enter the offices and lounges wearing dirty clothes.
- If necessary, take vaccinations against tetanus, leptospirosis fever and so on

Maintaining Cleanliness, the worker should maintain each facility in a clean and neat condition.

- The floors of workrooms, stairs and corridors should be cleaned at the appropriate frequency to maintain them in a clean condition
- Disinfection of relevant locations is to be carried out periodically.

Health Check Workers should receive health check once a year to maintain their health, and prevent illnesses or detect them at an early stage. The results of the health check should be maintained as records. Recommended items to be inspected during the health check are as given below.

- Examine medical history.
- Examine subjective symptoms and other objective symptoms.
- Check height, weight, vision and hearing ability.
- Chest X-ray examination.
- Blood pressure measurement.
- Check for anemia.
- Check for liver functions.
- Check for lipids in blood. • Check blood sugar level
- Urine analysis.
- Electrocardiogram analysis

Welfare Measures. The Sanitation Workers (Regulation of Employment and Conditions of Service) Act 2012 proposes constitution of a Sanitation Workers State Welfare Board to exercise powers conferred on it and to perform welfare functions such as the following for sanitation workers:

- Provide immediate assistance to a beneficiary in case of an accident
- Sanction of loan and advances
- Medical expenses for treatment of major ailments
- Financial assistance for education of children
- Payment of maternity benefits
- Make provision and improvement of welfare measures and facilities as may be prescribed

Corrective Measures When a worker has symptoms of an illness listed above, the plant engineer should ensure that the worker is checked-up by a specialist doctor and receives proper treatment and care and should take the following actions considering the content of work done by the worker:

- Change the workplace if necessary
- Change the content of the work
- Shorten the working hours
- Perform relevant measurements of the working environment
- Maintain the facility or equipment

Risks in use of treated effluent and sludge in agriculture practices

Cultivation of crops that are eaten raw should be banned. Cultivation of paddy in bunded fields is likely to give rise to sanitation problems and hence is undesirable. Growing of non-edible commercial crops like cotton, jute, fodder, milling varieties of sugarcane and tobacco would be suitable. Cultivation of grasses and fodder legumes, medicinal and essential oil yielding plants like menthol and citronella may be allowed. Cultivation of cereals, pulses, potatoes and other crops that are cooked before consumption may be permitted, if sewage is treated and care is taken in handling the harvests to ensure that they are not contaminated. Cultivation of crop exclusively under seed multiplication programmes would be advantageous as these are not consumed. As an additional safeguard, sewage irrigation should be discontinued at least two months in advance of harvesting of fruits and berries, one month for all kinds of vegetables and a fortnight for all other crops. Direct grazing on sewage irrigated farms should be prohibited.

Risks of Nutrient Loading in Agriculture

Crops receiving excessive dosage of nitrogen show superfluous vegetative growth and decrease in grain or fruit yield. The phosphate deficit of sewage, therefore, should be made good by supplementing with phosphate fertilizers, the extent of phosphate fortification depending upon the nature of crop and its phosphate requirements. As the availability of phosphate is low in the Irrigation water it would be desirable to apply the required quantity of phosphatic fertilizer at the time or even (about a fortnight) before the sowing or planting of the crop. Even when sewage nutrients are balanced by fortification, irrigation with such sewage may supply excessive amount of nutrients resulting in waste or unbalanced growth of plants with adverse effects on yields. It may therefore be necessary to dilute the sewage. Dilution also helps in reducing the concentration of dissolved salts and decomposable organic matter in the sewage thus, decreasing hazards to the fertility of the soil. It is desirable to limit the BOD and total suspended solids of sewage to be disposed on land for irrigation, as per relevant standards. There is a need to take caution on describing nutrient supply capacity of sewage particularly in the case of availability of phosphorus because there is a possible conversion of available phosphorus in unavailable mode in the presence of heavy metals present in the sewerage. This happens commonly in high as well as low pH soils.

Alternative Arrangement during Non-irrigating Periods

During rainy and non-irrigating seasons, agricultural practices may not need any water for irrigation. Even during irrigating season, the water requirement fluctuates significantly. Hence, satisfactory alternative arrangements have to be made for the disposal of sewage on such occasions either by storing the excess sewage or discharging it elsewhere without creating environmental hazards. The following alternatives are generally considered: a) Provision of holding lagoons for off-season storage. They enable irrigation of a fixed area of land to varying rates of crop demand. They may also serve as treatment units such as aerated or stabilization lagoons, provided the minimum volume required for treatment is provided beyond the flow-balancing requirement. b) Provision of additional land where treated sewage is not required on the main plot of land c) Discharge of surplus treated sewage to river or into sea with or without additional treatment. Combining surface discharge facilities with irrigation system is quite common and often quite compatible. d) Resorting to artificial recharge in combination with an irrigation system where feasible.

Treated Sewage into Perennial Rivers

When sewage is treated and discharged into perennial flowing rivers and the blended river water is drawn downstream of the point of such blending as raw water for treatment in public water supply schemes. This is indirect potable use after blending. This is historical and ongoing all around. However, of late, the organic load due to the discharged treated, partially treated and non-point sewage becomes in excess of the self-purifying capacity of the river. Thus, the river water is not actually fresh water. The water quality of Yamuna River for Agra water supply scheme requires to be first treated in MBBR to purify the river water to a level as raw water for the downstream WTP. When it passes through flowing surface water it has the potential disadvantages of contamination by human and animal activities adding organic matter and waterborne pathogens unless the river stretch is protected from such activities. The guiding principle in such cases for the ULBs will be to at least intercept the sewage outfalls and provide adequate STPs and follow the recommended quality criteria for the treated sewage.

Treated Sewage into Non-Perennial / Dry River Courses

There are locations where the rivers are not perennial or almost dry throughout the year except some monsoon runoff. In this case the discharged treated sewage sinks into the aquifer zone and is extracted by infiltration wells or galleries. The advantage of direct dilution from surface water is lost, but the additional purification in the soil and dilution from the aquifer water are happening. An example is the case of the Palar River course in Tamil Nadu. The surface water flow in this occurs only for about a week if the monsoon is normal and if the water spills beyond the upstream impoundments. The aquifer however supports the public water supply of over 30 habitations along its dry tract of nearly 80 km before the sea. The partly treated sewage of the en-route habitations does reach this river course as intervals. So far, no epidemics have been met with. This may be due to the above said additional purification in the soil and dilution by aquifer water. However, if these are exceeded by the contamination load, there can be immediate health problems. The guiding principle in such cases for the ULBs will be (a) to keep a check on the raw water quality from the infiltration wells to detect sudden increase in contaminants and (b) at least intercept the sewage outfalls and provide adequate STPs.

Appendix 7: IFC Benchmark Standards for Workers Accommodation

August 2009

11

PART II: STANDARDS FOR AND MANAGEMENT OF WORKERS' ACCOMMODATION

I. Standards for workers' accommodation

This section looks at the principles and standards applicable to the location and construction of workers' accommodation, including the transport systems provided, the general living facilities, rooms/dormitories facilities, sanitary facilities, canteen and cooking facilities, food safety, medical facilities and leisure/social facilities.

A. National/local standards

The key standards that need to be taken into consideration, as a baseline, are those contained in national/local regulations. Although it is quite unusual to find regulations specifically covering workers' accommodation, there may well be general construction standards which will be relevant. These may include the following standards:

- **Building construction:** for example, quality of material, construction methods, resistance to earthquakes.
- **Housing and public housing:** in some countries regulations for housing and public housing contain requirements on issues such as the basic amenities, and standards of repair.
- **General health, safety and security:** requirements on health and safety are often an important part of building standards and might include provisions on occupation density, minimal air volumes, ventilation, the quality of the flooring (slip-resistant) or security against intrusion.
- **Fire safety:** requirements on fire safety are common and are likely to apply to housing facilities of any type. This can include provision on fire extinguishers, fire alarms, number and size of staircases and emergency exits, restrictions on the use of certain building materials.
- **Electricity, plumbing, water and sanitation:** national design and construction standards often include very detailed provisions on electricity or plumbing fixtures/fittings, water and sanitation connection/equipment.

Benchmark

1. The relevant national and local regulations have been identified and implemented.

B. General living facilities

Ensuring good standards in living facilities is important in order to avoid safety hazards and to protect workers from diseases and/or illness resulting from humidity, bad/stagnant water (or lack of water), cold, spread of fungus, proliferation of insects or rodents, as well as to maintain a good level of morale. The location of the facilities is important to prevent exposure to wind, fire, flood and other natural hazards. It is also important that workers' accommodation is unaffected by the environmental or operational impacts of the worksite (for example noise, emissions or dust) but is sufficiently close that workers do not have to spend undue amounts of time travelling from their accommodation to the worksite. Living facilities should be built using adequate materials and should always be kept in good repair, clean and free from rubbish and other refuse.

Benchmarks

1. Living facilities are located to avoid flooding and other natural hazards.
2. Where possible, living facilities are located within a reasonable distance from the worksite.
3. Transport from the living facilities to worksite is safe and free.
4. The living facilities are built with adequate materials, kept in good repair and kept clean and free from rubbish and other refuse.

Drainage

The presence of stagnant water is a factor of proliferation of potential disease vectors such as mosquitoes, flies and others, and must be avoided.

Benchmarks

1. The building site is adequately drained to avoid the accumulation of stagnant water.

Heating, air conditioning, ventilation and light

Heating, air-conditioning and ventilation should be appropriate for the climatic conditions and provide workers with a comfortable and healthy environment to rest and spend their spare time.

Benchmarks

1. For facilities located in cold weather zones, the temperature is kept at a level of around 20 degrees Celsius notwithstanding the need for adequate ventilation.
2. For facilities located in hot weather zones, adequate ventilation and/or air conditioning systems are provided.
3. Both natural and artificial lighting are provided and maintained in living facilities. It is best practice that the window area represents not less than 5% to 10% of the floor area. Emergency lighting is provided.

Water

Special attention to water quality and quantity is absolutely essential. To prevent dehydration, water poisoning and diseases resulting from lack of hygiene, workers should always have easy access to a source of clean water. An adequate supply of potable water must be available in the same buildings where bedrooms or dormitories are provided. Drinking water must meet local or WHO drinking water standards⁷ and water quality must be monitored regularly. Depending on the local context, it could either be produced by dedicated catchment and treatment facilities or tapped from existing municipal facilities if their capacity and quality are adequate.

Benchmarks

1. Access to an adequate and convenient supply of free potable water is always available to workers. Depending on climate, weather conditions and accommodation standards, 80 to 180 litres per person per day are available.
2. Drinking water meets national/local or WHO drinking water standards.⁸
3. All tanks used for the storage of drinking water are constructed and covered as to prevent water stored therein from becoming polluted or contaminated.

4. Drinking water quality is regularly monitored.

Wastewater and solid waste

Wastewater treatment and effluent discharge as well as solid waste treatment and disposal must comply with local or World Bank effluent discharge standards⁹ and be adequately designed to prevent contamination of any water body, to ensure hygiene and to avoid the spread of infections and diseases, the proliferation of mosquitoes, flies, rodents, and other pest vectors. Depending on the local context, treatment and disposal services can be either provided by dedicated or existing municipal facilities.

Benchmarks

1. Wastewater, sewage, food and any other waste materials are adequately discharged, in compliance with local or World Bank standards – whichever is more stringent – and without causing any significant impacts on camp residents, the biophysical environment or surrounding communities.
2. Specific containers for rubbish collection are provided and emptied on a regular basis. Standards range from providing an adequate number of rubbish containers to providing leak proof, non-absorbent, rust and corrosion-resistant containers protected from insects and rodents. In addition it is best practice to locate rubbish containers 30 metres from each shelter on a wooden, metal, or concrete stand. Such containers must be emptied at regular intervals (to be determined based on temperatures and volumes generated) to avoid unpleasant odours associated with decaying organic materials.
3. Pest extermination, vector control and disinfection are carried out throughout the living facilities in compliance with local requirements and/or good practice. Where warranted, pest and vector monitoring should be performed on a regular basis.

7. www.who.int/water_sanitation_health/dwg/en/
8. Ibid

9. As per the "Pollution Prevention and Abatement Handbook", World Bank Group, July 1998, available from www.worldbank.org

C. Room/dormitory facilities

The standards of the rooms or dormitory facilities are important to allow workers to rest properly and to maintain good standards of hygiene. Overcrowding should be avoided particularly. This also has an impact on workers' productivity and reduces work-related accidents. It is generally acknowledged that rooms/dormitories should be kept clean and in a good condition. Exposure to noise and odour should be minimised. In addition, room/dormitory design and equipment should strive to offer workers a maximum of privacy. Resorting to dormitories should be minimised and single or double rooms are preferred. Dormitories and rooms must be single-sex.

Benchmarks

1. Rooms/dormitories are kept in good condition.
2. Rooms/dormitories are aired and cleaned at regular intervals.
3. Rooms/dormitories are built with easily cleanable flooring material.
4. Sanitary facilities are located within the same buildings and provided separately for men and women.
5. Density standards are expressed either in terms of minimal volume per resident or of minimal floor space. Usual standards range from 10 to 12.5 cubic metres (volume) or 4 to 5.5 square metres (surface).
6. A minimum ceiling height of 2.10 metres is provided.
7. In collective rooms, which are minimised, in order to provide workers with some privacy, only a reasonable number of workers are allowed to share the same room. Standards range from 2 to 8 workers.
8. All doors and windows should be lockable, and provided with mosquito screens where conditions warrant.
9. There should be mobile partitions or curtains to ensure privacy.
10. Every resident is provided with adequate furniture such as a table, a chair, a mirror and a bedside light.
11. Separate sleeping areas are provided for men and women, except in family accommodation.

Additional issue

Irrespective of whether workers are supposed to keep their facilities clean, it is the responsibility of the accommodation manager to ensure that rooms/dormitories and sanitary facilities are in good condition.

Bed arrangements and storage facilities

The provision of an adequate numbers of beds of an appropriate size is essential to provide workers with decent, safe and hygienic conditions to rest and sleep. Here again, particular attention should be paid to privacy. Consideration should be given to local customs so beds could be replaced by hammocks or sleeping mats for instance.

Benchmarks

1. A separate bed for each worker is provided. The practice of "hot-bedding" should be avoided.
2. There is a minimum space between beds of 1 metre.
3. Double deck bunks are not advisable for fire safety and hygiene reasons, and their use is minimised. Where they are used, there must be enough clear space between the lower and upper bunk of the bed. Standards range from 0.7 to 1.10 metres.
4. Triple deck bunks are prohibited.
5. Each worker is provided with a comfortable mattress, pillow, cover and clean bedding.
6. Bed linen is washed frequently and applied with repellents and disinfectants where conditions warrant (malaria).
7. Facilities for the storage of personal belongings for workers are provided. Standards vary from providing an individual cupboard for each worker to providing 475-litre big lockers and 1 metre of shelf unit.
8. Separate storage for work boots and other personal protection equipment, as well as drying/airing areas may need to be provided depending on conditions.

D. Sanitary and toilet facilities

It is essential to allow workers to maintain a good standard of personal hygiene but also to prevent contamination and the spread of diseases which result from inadequate sanitary facilities. Sanitary and toilet facilities will always include all of the following: toilets, urinals, washbasins and showers. Sanitary and toilet facilities should be kept in a clean and fully working condition. Facilities should also be constructed of materials that are easily cleanable and ensure privacy. Sanitary and toilet facilities are never shared between male and female residents, except in family accommodation. Where necessary, specific additional sanitary facilities are provided for women.

Benchmarks

1. Sanitary and toilet facilities are constructed of materials that are easily cleanable.
2. Sanitary and toilet facilities are cleaned frequently and kept in working condition.
3. Sanitary and toilet facilities are designed to provide workers with adequate privacy, including ceiling to floor partitions and lockable doors.
4. Sanitary and toilet facilities are not shared between men and women, except in family accommodation.

Toilet facilities

Toilet arrangements are essential to avoid any contamination and prevent the spread of infectious disease.

Benchmarks

1. An adequate number of toilets is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons. For urinals, usual standards are 1 unit to 15 persons.
2. Toilet facilities are conveniently located and easily accessible. Standards range from 30 to 60 metres from rooms/dormitories. Toilet rooms shall be located so as to be accessible without any individual passing through any sleeping room. In addition, all toilet rooms should be well-lit, have good ventilation or external windows, have sufficient hand wash basins and be conveniently located. Toilets and other sanitary facilities should be ("must be" in cold climates) in the same building as rooms and dormitories.

Showers/bathrooms and other sanitary facilities

Hand wash basins and showers should be provided in conjunction with rooms/dormitories. These facilities must be kept in good working condition and cleaned frequently. The flooring for shower facilities should be of hard washable materials, damp-proof and properly drained. Adequate space must be provided for hanging, drying and airing clothes. Suitable light, ventilation and soap should be provided. Lastly, hand washing, shower and other sanitary facilities should be located within a reasonable distance from other facilities and from sleeping facilities in particular.

Benchmarks

1. Shower/bathroom flooring is made of anti-slip hard washable materials.
2. An adequate number of handwash facilities is provided to workers. Standards range from 1 unit to each 15 persons to 1 unit per 6 workers. Handwash facilities should consist of a tap and a basin, soap and hygienic means of drying hands.
3. An adequate number of shower/bathroom facilities is provided to workers. Standards range from 1 unit to 15 persons to 1 unit per 6 persons.
4. Showers/bathrooms are conveniently located.
5. Shower/bathroom facilities are provided with an adequate supply of cold and hot running water.

E. Canteen, cooking and laundry facilities

Good standards of hygiene in canteen/dining halls and cooking facilities are crucial. Adequate canteen, cooking and laundry facilities and equipments should also be provided. When caterers are contracted to manage kitchens and canteens, special attention should be paid to ensure that contractors take into account and implement the benchmarks below, and that adequate reporting and monitoring mechanisms are in place. When workers can individually cook their meals, they should be provided with a space separate from the sleeping areas. Facilities must be kept in a clean and sanitary condition. In addition, canteen, kitchen, cooking and laundry floors, ceilings and walls should be made of easily cleanable materials.

Benchmarks

1. Canteen, cooking and laundry facilities are built in adequate and easy to clean materials.
2. Canteen, cooking and laundry facilities are kept in a clean and sanitary condition.
3. If workers can cook their own meals, kitchen space is provided separate from sleeping areas.

Laundry facilities

Providing facilities for workers to wash both work and non-work related clothes is essential for personal hygiene. The alternative is for the employer to provide a free laundry service.

Benchmarks

1. Adequate facilities for washing and drying clothes are provided. Standards range from providing sinks or tubs with hot and cold water, cleaning soap and drying lines to providing washing machines and dryers.
2. When work clothes are used in contact with dangerous substance (for example, application of pesticide), special laundry facilities (washing machines) should be provided.

Additional issue

When workers are provided with facilities allowing them to individually do their laundry or cooking, it should be the responsibility of each worker to keep the facilities in a clean and sanitary condition. Nonetheless, it is the responsibility of the accommodation manager to make sure the standards are respected and to provide an adequate cleaning, disinfection and pest/vector control service when necessary.

Additional issue

When the employer provides family accommodation, it is best practice to provide each family with a private kitchen or the necessary cooking equipment to allow the family to cook on their own.

Canteen and cooking facilities

Canteen and cooking facilities should provide sufficient space for preparing food and eating, as well as conform to hygiene and safety requirements.

Benchmarks

1. Canteens have a reasonable amount of space per worker. Standards range from 1 square metre to 1.5 square metres.
2. Canteens are adequately furnished. Standards range from providing tables, benches, individual drinking cups and plates to providing special drinking fountains.
3. Places for food preparation are designed to permit good food hygiene practices, including protection against contamination between and during food preparation.
4. Kitchens are provided with facilities to maintain adequate personal hygiene including a sufficient number of washbasins designated for cleaning hands with clean, running water and materials for hygienic drying.
5. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are also equipped with a smooth durable washable surface. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures and all walls and ceilings have a smooth durable washable surface.
6. All kitchen floors, ceiling and wall surfaces adjacent to or above food preparation and cooking areas are built using durable, non-absorbent, easily cleanable, non-toxic materials.
7. Wall surfaces adjacent to cooking areas are made of fire-resistant materials. Food preparation tables are equipped with a smooth, durable, easily cleanable, non-corrosive surface made of non-toxic materials. Lastly, in order to enable easy cleaning, it is good practice that stoves are not sealed against a wall, benches and fixtures are not built into the floor, and all cupboards and other fixtures have a smooth, durable and washable surface.
8. Adequate facilities for cleaning, disinfecting and storage of cooking utensils and equipment are provided.
9. Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation.

F. Standards for nutrition and food safety

When cooking for a number of workers, hygiene and food safety are absolutely critical. In addition to providing safe food, providing nutritious food is important as it has a very direct impact on workers' productivity and well-being. An ILO study demonstrates that good nutrition at work leads to gains in productivity and worker morale, prevention of accidents and premature deaths and reductions in health care costs.¹⁰

Benchmarks

1. The WHO 5 keys to safer food or an equivalent process is implemented (see Box 6 below).
2. Food provided to workers contains an appropriate level of nutritional value and takes into account religious/cultural backgrounds; different choices of food are served if workers have different cultural/religious backgrounds.
3. Food is prepared by cooks. It is also best practice that meals are planned by a trained nutritionist.

Box 6 - Five keys to safer food

Keep clean

Wash your hands before handling food and often during food preparation.
Wash your hands after going to the toilet.
Wash and sanitise all surfaces and equipment used for food preparation.
Protect kitchen areas and food from insects, pests and other animals.

While most micro organisms do not cause disease, dangerous micro organisms are widely found in soil, water, animals and people. These micro organisms are carried on hands, wiping cloths and utensils, especially cutting boards and the slightest contact can transfer them to food and cause food borne diseases.

Separate raw and cooked

Separate raw meat, poultry and seafood from other foods.
Use separate equipment and utensils such as knives and cutting boards for handling raw foods.
Store food in containers to avoid contact between raw and prepared foods.

Raw food, especially meat, poultry and seafood, and their juices, can contain dangerous micro organisms which may be transferred onto other foods during food preparation and storage.

Cook thoroughly

Cook food thoroughly, especially meat, poultry, eggs and seafood.
Bring foods like soups and stews to boiling to make sure that they have reached 70°C. For meat and poultry, make sure that juices are clear, not pink. Ideally, use a thermometer.
Reheat cooked food thoroughly.

Proper cooking kills almost all dangerous micro organisms. Studies have shown that cooking food to a temperature of 70°C can help ensure it is safe for consumption. Foods that require special attention include minced meats, rolled roasts, large joints of meat and whole poultry.

Keep food at safe temperatures

Do not leave cooked food at room temperature for more than 2 hours.
Refrigerate promptly all cooked and perishable food (preferably below 5°C).
Keep cooked food piping hot (more than 60°C) prior to serving.
Do not store food too long even in the refrigerator.
Do not thaw frozen food at room temperature.

Micro organisms can multiply very quickly if food is stored at room temperature. By holding at temperatures below 5°C or above 60°C, the growth of micro organisms is slowed down or stopped. Some dangerous micro organisms still grow below 5°C.

Use safe water and raw materials

Use safe water or treat it to make it safe.
Select fresh and wholesome foods.
Choose foods processed for safety, such as pasteurised milk.
Wash fruits and vegetables, especially if eaten raw.
Do not use food beyond its expiry date.

Raw materials, including water and ice, may be contaminated with dangerous micro organisms and chemicals. Toxic chemicals may be formed in damaged and mouldy foods. Take care in selection of raw materials and implement simple measures such as washing.

Source: World Health Organization, Food Safety

www.who.int/foodsafety/publications/consumer/en/5keys_en.pdf

¹⁰ C. Wanjek (2005), "Food at Work - Workplace solutions for malnutrition, obesity and chronic disease", International Labour Organization, Geneva.

G. Medical facilities

Access to adequate medical facilities is important to maintain workers' health and to provide adequate responses in case of health emergency situations. The availability or level of medical facilities provided in workers' accommodation is likely to depend on the number of workers living on site, the medical facilities already existing in the neighbouring communities and the availability of transport. However, first aid must always be available on site.

First aid facilities

Providing adequate first aid training and facilities can save lives and prevent minor injuries becoming major ones.

Other medical facilities

Depending on the number of workers living on site and the medical services offered in the surrounding communities, it is important to provide workers with additional medical facilities. Special facilities for sick workers and medical services such as dental care, surgery, a dedicated emergency room can, for instance, be provided.

Benchmarks

1. A number of first aid kits adequate to the number of residents are available.
2. First aid kits are adequately stocked. Where possible a 24/7 first aid service/facility is available.
3. An adequate number of staff/workers is trained to provide first aid.
4. Where possible and depending on the medical infrastructures existing in the community, other medical facilities are provided (nurse rooms, dental care, minor surgery).

Box 7 - UK/HSE First Aid facilities

What should be in a first aid kit?

There is no standard list and it very much depends on the assessment of the needs in a particular workplace:

- a leaflet giving general guidance on first aid, for example HSE leaflet *Basic advice on first aid at work*
- individually wrapped sterile adhesive dressings (assorted sizes)
- two sterile eye pads
- four individually wrapped triangular bandages (preferably sterile)
- six safety pins
- six medium-sized (approximately 12 cm x 12 cm) individually wrapped sterile unmedicated wound dressings
- two large (approximately 18 cm x 18 cm) sterile individually wrapped unmedicated wound dressings
- one pair of disposable gloves.

What should be kept in the first aid room?

The room should contain essential first aid facilities and equipment. Typical examples of these are:

- a sink with hot and cold running water
- drinking water and disposable cups
- soap and paper towels
- a store for first aid materials
- foot-operated refuse containers, lined with disposable yellow clinical waste bags or a container for the safe disposal of clinical waste
- a couch with waterproof protection, clean pillows and blankets
- a chair
- a telephone or other communication equipment
- a record book for recording incidents where first aid has been given.

Source: UK Health and Safety Executive

H. Leisure, social and telecommunication facilities

Basic leisure and social facilities are important for workers to rest and also to socialise during their free time. This is particularly true where workers' accommodation is located in remote areas far from any communities. Where workers' accommodation is located in the vicinity of a village or a town, existing leisure or social facilities can be used so long as this does not cause disruption to the access and enjoyment of local community members. But in any case, social spaces should also be provided on site. Exercise and recreational facilities will increase workers' welfare and reduce the impact of the presence of workers in the surrounding communities. In addition it is also important to provide workers with adequate means to communicate with the outside world, especially when workers' accommodation is located in a remote location or where workers live on site without their family or are migrants. Consideration of cultural attitudes is important. Provision of space for religious observance needs to be considered, taking account of the local context and potential conflicts in certain situations.

Benchmarks

1. Basic collective social/rest spaces are provided to workers. Standards range from providing workers multi-purpose halls to providing designated areas for radio, TV, cinema.
2. Recreational facilities are provided. Standards range from providing exercise equipment to providing a library, swimming pool, tennis courts, table tennis, educational facilities.
3. Workers are provided with dedicated places for religious observance if the context warrants.
4. Workers have access to public phones at affordable/public prices (that is, not inflated).
5. Internet facilities can also be provided, particularly where large numbers of expatriates/Third Country Nationals (TCNs) are accommodated.

Box 8 - Examples of social/leisure facilities

In Qatar there is a newly built 170-hectare complex which accommodates contractors and more than 35,000 workers for a project run by a major oil company. At the heart of this complex, the recreation area includes extensive sport facilities, a safety-training centre, an outdoor cinema and a park. The purpose of those facilities goes beyond providing adequate accommodation to the large numbers of contractors and workers on this project but is designed to provide the same level of services as a small town. The accommodation complex has a mayor, as well as a dedicated welfare team which is responsible for the workers' welfare, cultural festivals and also acts as the community's advocates.

II. Managing workers' accommodation

Once the living facilities have been constructed and are operational, effective ongoing management of living facilities is essential. This encompasses issues such as the physical maintenance of buildings, security and consultation with residents and neighbouring communities in order to ensure the implementation of the housing standards in the long term.

A. Management and staff

Worker camps and housing facilities should have a written management plan, including management policies or plans on health and safety, security, living conditions, workers' rights and representation, relationships with the communities and grievance processes. Part of those policies and plans can take the form of codes of conduct. The quality of the staff managing and maintaining the accommodation facilities will have a decisive impact on the level of standards which are implemented and the well-being of workers (for instance on the food safety or overall hygiene standards). It is therefore important to ensure that managers are competent and other workers are adequately skilled. The manager will be responsible for overseeing staff, for ensuring the implementation of the accommodation standards and for the implementation of the management plans. It is important the accommodation manager has the corresponding authority to do so.

If the facility is being managed by a contractor, as is often the case, the expected housing and management standards should be specified in the relevant contract, and mechanisms to ensure that those standards are implemented should be set up. As part of this process, the accommodation manager (or contractor) should have a duty to monitor the application of the accommodation standards and to report frequently on their implementation to the client.

Benchmarks

1. There are management plans and policies especially in the field of health and safety (with emergency responses), security, workers' rights, relationships with the communities.
2. An appointed person with the adequate background and experience is in charge of managing the workers' accommodation.
3. If contractors are being used, there are clear contractual management responsibilities and monitoring and reporting requirements.
4. Depending on the size of the accommodation, there is a sufficient number of staff in charge of cleaning, cooking and of general maintenance.
5. Such staff are recruited from the local communities.
6. Staff have received basic health and safety training.
7. Persons in charge of the kitchen are trained in nutrition and food-handling and adequately supervised.

B. Charging fees for accommodation and services

Charging fees for the accommodation or the services provided to workers such as food or transport should be avoided where workers do not have the choice to live or eat anywhere else, or if deemed unavoidable, should take into account the specific nature of workers' accommodation. Any charges should be transparent, discussed during recruitment and specified in workers' contracts. Any such charges should still leave workers with sufficient income and should never lead to a worker becoming indebted to an employer.

Benchmarks

1. When fees are charged, workers are provided with clear information and a detailed description of all payments made such as rent, deposit and other fees.
2. When company housing is considered to be part of workers' wages, it is best practice that workers are provided with an employment contract clearly specifying housing arrangements and regulations, in particular rules concerning payments and fees, facilities and services offered and rules of notice.
3. When fees are charged, the renting arrangements are fair and do not cost the worker more than a small proportion of income and never include a speculative profit.
4. Food and other services are free or are reasonably priced, never above the local market price.
5. The provision of accommodation or other services by employers as a payment for work is prohibited.

Additional issue

To avoid that fair renting arrangements turn into unfair ones, any deposit of advance should be set at a reasonable level and it is best practice that renting prices include a fixed fee covering the water needed and the use of the energy required to the functioning of the heating/cooling/ventilation/cooking systems. However, in such cases it might be necessary to raise workers' awareness to ensure that workers will use the facilities responsibly, particularly in areas where water is scarce.

C. Health and safety on site

The company or body in charge of managing the workers' accommodation should have the prime responsibility for ensuring workers' physical well-being and integrity. This involves making sure that the facilities are kept in good condition (ensuring that sanitary standards or fire regulations are respected for instance) and that adequate health and safety plans and standards are designed and implemented.

Benchmarks

1. Health and safety management plans including electrical, mechanical, structural and food safety have been carefully designed and are implemented.
2. The person in charge of managing the accommodation has a specific duty to report to the health authorities the outbreak of any contagious diseases, food poisoning and other important casualties.
3. An adequate number of staff/workers is trained to provide first aid.
4. A specific fire safety plan is prepared, including training of fire wardens, periodic testing and monitoring of fire safety equipment and periodic drills.
5. Guidance on the detrimental effects of the abuse of alcohol and drugs and other potentially harmful substances and the risk and concerns relating to HIV/AIDS and of other health risk-related activities is provided to workers. It is best practice to develop a clear policy on this issue.
6. Workers have access to adequate preventive measures such as contraception (condoms in particular) and mosquito nets.
7. Workers have easy access to medical facilities and medical staff. Where possible, female doctors/nurses should be available for female workers.
8. Emergency plans on health and fire safety are prepared. Depending on the local context, additional emergency plans are prepared as needed to handle specific occurrences (earthquakes, floods, tornadoes).

D. Security of workers' accommodation

Ensuring the security of workers and their property on the accommodation site is of key importance. To this end, a security plan must be carefully designed including appropriate measures to protect workers against theft and attacks. Policies regarding the use of force (force can only be used for preventive and defensive purposes in proportion to the nature and the extent of the threat) should also be

carefully designed. To implement those plans, it may be necessary to contract security services or to recruit one or several staff whose main responsibility is to provide security to safeguard workers and property. Before making any security arrangements, it is necessary to assess the risks of such arrangements to those within and outside the workers' accommodation and to respect best international practices, including IFC PS4 and EBRD PR4 and applicable law.¹¹ Particular attention should be paid to the safety and security of women workers.

Benchmarks

1. A security plan including clear measures to protect workers against theft and attack is implemented.
2. A security plan including clear policies on the use of force has been carefully designed and is implemented.
3. Security staff have been checked to ensure that they have not been implicated in any previous crimes or abuses. Where appropriate, security staff from both genders are recruited.
4. Security staff have a clear mandate and have received clear instruction about their duties and responsibilities, in particular their duties not to harass, intimidate, discipline or discriminate against workers.
5. Security staff have received adequate training in dealing with domestic violence and the use of force.
6. Security staff have a good understanding about the importance of respecting workers' rights and the rights of the communities.
7. Body searches are only allowed in specific circumstances and are performed by specially trained security staff using the least-intrusive means possible. Pat down searches on female workers can only be performed by female security staff.
8. Security staff adopt an appropriate conduct towards workers and communities.
9. Workers and members of the surrounding communities have specific means to raise concerns about security arrangement and staff.

11. See for instance the Voluntary Principles on Security and Human Rights, www.voluntaryprinciples.org/principles

E. Workers' rights, rules and regulations on workers' accommodation

Freedoms and human rights of workers should be recognised and respected within their living quarters just as within the working environment. House rules and regulations should be reasonable and non discriminatory. It is best practice that workers' representatives are consulted about those rules. House rules and regulations should not prevent workers from exercising their basic rights. In particular, workers' freedom of movement needs to be preserved if they are not to become effectively "trapped". To this end it is good practice to provide workers with 24/7 access to the accommodation and free transport services to and from the surrounding communities. Any restriction to this freedom of movement should be limited and duly justified. Penalties for breaking the rules should be proportional and implemented through a proper procedure allowing workers to defend themselves and to challenge the decision taken. The relationship between continuing employment and compliance with the rules of the workers' accommodation should be clear and particular attention should be paid to ensure that housing rules do not create indirect limitation of the right to freedom of association. Best practice might include a code of conduct relating to the accommodation to be signed together with the contract of employment.

Box 9 - Dole housing plantation regulation in Costa Rica

In every plantation there is an internal accommodation regulation that every worker is required to sign together with his/her employment contract. That document describes the behaviour which is expected from workers at all times and basic rules such as the prohibition of alcohol and the interdiction to make noise after a certain time at night. In case there is any problem concerning the application of those internal rules, a set of disciplinary procedures which have been designed with the workers' representatives can be enforced. Workers are absolutely free to enter or leave the site and do not have any restrictions in relation to accessing their living quarters. Families are not allowed in the living quarters unless they have been registered for a visit.

Benchmarks

1. Restriction of workers' freedom of movement to and from the site is limited and duly justified. It is good practice to provide workers 24/7 access to the accommodation site. Any restrictions based on security reasons should be balanced by the necessity to respect workers' freedom of movement.
2. Where possible, an adequate transport system to surrounding communities is provided. It is good practice to provide workers with free transportation to and from local communities.
3. Withholding workers' ID papers is prohibited.
4. Freedom of association is expressly respected. Provisions restricting workers' rights on site should take into account the direct and indirect effect on workers' freedom of association. It is best practice to provide trade union representatives access to workers in the accommodation site.
5. Workers' gender and religious, cultural and social backgrounds are respected. In particular, workers should be provided with the possibility of celebrating religious holidays and observances.
6. Workers are made aware of their rights and obligations and are provided with a copy of the internal workers' accommodation rules, procedures and sanction mechanisms in a language or through a media which they understand.
7. Housing regulations, including those relating to allocation of housing, should be non-discriminatory. Any justifiable discriminatory rules – for example all-male dormitories – should be strictly limited to the rules which are necessary to ensure the smooth running of the worker camp and to maintain a good relationship with the surrounding communities.
8. Where possible, visitor access should be allowed.
9. Decisions should be made on whether to prohibit alcohol, tobacco and third party access or not from the camp and the relevant rules should be clearly communicated to all residents and workers.
10. A fair and non-discriminatory procedure exists to implement disciplinary procedures including the right of workers to defend themselves (see also next section).

F. Consultation and grievance mechanisms

All residents should be made aware of any rules governing the accommodation and the consequences of breaking such rules. Processes that allow for consultation between site management and the resident workers will assist in the smooth running of an accommodation site. These may include a dormitory or camp committee as well as formal processes that allow workers to lodge any grievances about their accommodation.

Benchmarks

1. Mechanisms for workers' consultation have been designed and implemented. It is best practice to set up a review committee which includes representatives elected by workers.
2. Processes and mechanisms for workers to articulate their grievances are provided to workers. Such mechanisms are in accordance with PS2/PR2.
3. Workers subjected to disciplinary proceedings arising from behaviour in the accommodation should have access to a fair and transparent hearing with the possibility to contest decisions and refer the dispute to independent arbitration or relevant public authorities.
4. In case conflicts between workers themselves or between workers and staff break out, workers have the possibility of easily accessing a fair conflict resolution mechanism.
5. In cases where more serious offences occur, including serious physical or mental abuse, there are mechanisms to ensure full cooperation with the police authority (where adequate).

Additional issue

Alcohol is a complex issue and requires a very clear policy from the workers' accommodation management. If a non-alcohol policy is taken, special attention should be paid to clearly communicate the interdiction, how it applies and the consequences for breaching this rule. Special attention should also be paid to enforce it adequately.

G. Management of community relations

Workers' living facilities have various ongoing impacts on adjacent communities. In order to manage these, it is good practice to design a thorough community relations management plan. This plan will contain the processes to implement the findings of the preliminary community impact assessment and to identify, manage, mitigate or enhance ongoing impacts of the workers' accommodation on the surrounding communities. Issues to be taken into consideration include:

- community development – impact of workers' camp on local employment, possibility of enhancing local employment and income generation through local sourcing of goods and services
- community needs – ways to identify and address community needs related to the arrival of specific infrastructures such as telecommunications, water sanitation, roads, health care, education, housing
- community health and safety – addressing and reducing the risk in the increase in communicable diseases, corruption, trade in illegal substances such as drugs, alcohol (in the Muslim context), petty crimes and other sorts of violence, road accidents
- community social and cultural cohesion – ways to mitigate the impact of the presence of large numbers of foreign workers, often males, with different cultural and religious background, ways to mitigate the possible shift in social, economic and political structures due to changes in access to income generation opportunities.

Benchmarks

1. Community relations plans addressing issues around community development, community needs, community health and safety and community social and cultural cohesion have been designed and implemented.
2. Community relations plans include the setting up of a liaison mechanism allowing a constant exchange of information and consultation with the local communities in order to identify and respond quickly to any problems and maintain good working relationships.
3. A senior manager is in charge of implementing the community relations management plan and liaising with the community.

-
4. The impacts of workers' accommodation on local communities are periodically reviewed, mitigated or enhanced.
 5. Community representatives are provided with an easy means to voice their opinions and to lodge complaints.
 6. There is a transparent and efficient process for dealing with community grievances, in accordance with PS1/PR10.

Box 10 - Examples of community relations management

Community consultation in the Baku-Tbilisi-Ceyhan (BTC) pipeline

The BTC pipeline's Environment and Social Management Plans incorporated a Worker Camp Management Plan to be implemented by the construction contractor. As part of ongoing community liaison over the project as a whole, community liaison officers were appointed for worker camps who were responsible for meeting regularly with communities, identifying issues and addressing community concerns. A particular responsibility was to review HR records and disciplinary logs at worker camps to assess that rules were being implemented effectively and that any community liaison after any incidents was effective.

Appendix 8: Ward Level Stake holder consultations, consultation with Affected Person and Focus Group discussion

Sr. No	Date	Place of Consultation	No. of Participants	Points Discussed	Photographs
1	8.11.23	Ward Office, Ward 108	Total Participants 63 Male: 7 (11%) Female: 56 (89%) Local residents, women SHG members, representatives of KMC Councilor of ward 109, Market association representatives	- Explaining about KSHARP as an initiative of The Kolkata Municipal Corporation funded by The Asian Development Bank, and its role for improving the S&D services in Ward no 108 and its adjoining areas - Need and scope of work and tentative commencement date for this package was elucidated. - Anticipated impacts during construction phase, Only temporary livelihood loss has been assessed. Importance of public participation and public awareness was emphasized. - Technical information i.e. total length of work, diameter of pipes to be laid along the road, flow of water etc. were shared - Water logging problem of the area and reduction of flooding during monsoon after implementation of this project. - Existing water logging during heavy showers, back flow of water from adjoining area happens to be a persistent issue. - Choking of drains, latrines etc. during heavy showers. Provision of rain water harvesting. - It was informed that all the safety norms shall be used to avoid inconveniences during project implementation. Information shall be disseminating throughout the project. - People were happy to know about the Grievance Redress mechanism and process of lodging complaints. - Contact number of officials of project contractor, project	 

Sr. No	Date	Place of Consultation	No. of Participants	Points Discussed	Photographs
				implementation unit shall be provided to every one prior to start of works for lodging any grievances.	

Stakeholders consultation at ward No. 108, dated 08.11.23(Mukunda Bhaban) Attendance Sheet

Kolkata Urban Resilience Improvement Project (KURIP) Signature Sheet for Public Consultation

Date: 08/11/2023

Venue: Anandapur Ward 108

Sl. No.	Name	M/F	Address	Contact No.	Signature
1	Margala Maital	F	Anandapur	9654821352	Margala Maital
2	Bipati Mondal	F	V.I.P Nagar	933648215	Bipati Mondal
3	Nitu Lal	F	V.I.P Nagar	86761240	Nitu Lal
4	Papiya Das	F	V.I.P Nagar	9559276107	Papiya Das
5	Bithika Majumdar	F	"	6290831424	Bithika Majumdar
6	Dipali Sinha	F	"	9748740426	Dipali Sinha
7	Mumtaz Sinha	F	"	8774319208	Mumtaz Sinha
8	Maya Nandi	F	Nonadanga	9051476746	Maya Nandi
9	Pratima Majumdar	F	"	8481025426	Pratima Majumdar
10	Kakoli Patra	F	West Chakraborty	840903464	Kakoli Patra
11	Sonali Chakraborty	F	Nonadanga	6291474823	Sonali Chakraborty
12	Kakoli Mondal	F	V.I.P Nagar	7503056234	Kakoli Mondal

Kolkata Urban Resilience Improvement Project (KURIP) Signature Sheet for Public Consultation

Date: 08/11/2023

Venue: Anandapur Ward 108

Sl. No.	Name	M/F	Address	Contact No.	Signature
13	Rushpa Halder	F	Nonadanga	913059255	Rushpa Halder
14	Riya Halder	F	"	"	Riya Halder
15	Dibakar Sanyal	M	Mundapara	8334916852	Dibakar Sanyal
16	Santika Chakraborty	M	"	9676342184	Santika Chakraborty
17	Animesh Mondal	M	"	7674439903	Animesh Mondal
18	Amit Mondal	M	Hossainpur	8420662472	Amit Mondal
19	Sanjib Malik	M	"	7002743127	Sanjib Malik
20	Sumanika Chakraborty	M	Nonadanga	8290719437	Sumanika Chakraborty
21	Rupa Mondal	F	"	9330291532	Rupa Mondal
22	Sukla Karmal	F	Nonadanga	7831557422	Sukla Karmal
23	Choudhury Das	M	Anandapur	9162687940	Choudhury Das
24	Biplab Nath	M	Maduradah	8240334532	Biplab Nath

Kolkata Urban Resilience Improvement Project (KURIP) Signature Sheet for Public Consultation

Date: 08/11/23

Venue: Anandapur Ward 108

Sl. No.	Name	M/F	Address	Contact No.	Signature
25	Rina Jale	F	Anandapur	913346811	Rina Jale
26	Suparna Biswas	F	"	80	Suparna Biswas
27	Dolan Jale	F	"	80	Dolan Jale
28	Suparna Bar	F	"	80	Suparna Bar
29	Dipali Hati	F	"	80	Dipali Hati
30	Prityanka Halder	F	Mundapara	830806494	Prityanka Halder
31	Roma Bapari	F	"	80	Roma Bapari
32	Gita Mondal	F	"	80	Gita Mondal
33	Nabita Choudhury	F	"	80	Nabita Choudhury
34	Rina Naskar Sanyal	F	Maduradah	690610723	Rina Naskar Sanyal
35	Sita Gupta	F	"	967485380	Sita Gupta
36	Gouri Dutta	F	R.R. Plot	7980255655	Gouri Dutta

Kolkata Urban Resilience Improvement Project (KURIP) Signature Sheet for Public Consultation

Date: 09/11/23

Venue: Anandapur Ward 108

Sl. No.	Name	M/F	Address	Contact No.	Signature
37	Pratima Chakraborty	F	R.R. Plot	9836226041	Pratima Chakraborty
38	Soma Mondal	F	Pona Basti	8240988073	Soma Mondal
39	Biswajit Pandey	F	VIP Nagar	80	Biswajit Pandey
40	Laxmi Mondal	F	VIP Gaganam Colony	9796157180	Laxmi Mondal
41	Minu Mondal	F	VIP Gaganam Colony	80	Minu Mondal
42	Jharna Mondal	F	V.I.P Nagar	9905215601	Jharna Mondal
43	Jharna Prasad	F	Rail Colony Nonadanga	8479070023	Jharna Prasad
44	Urmila Mondal	F	Bhai Bhai Colony	7980107314	Urmila Mondal
45	Rina Das	F	Nonadanga	9086779117	Rina Das
46	Bhazati Sanyal	F	Maduradah	80	Bhazati Sanyal
47	Papiya Ghosh	F	Ambedkar Abasan	6289217955	Papiya Ghosh
48	Bhikaspati Sanyal	F	Maduradah	80	Bhikaspati Sanyal

Kolkata Urban Resilience Improvement Project (KURIP)					
Signature Sheet for Public Consultation					
Date: 08/11/23		Venue: 08/11/23 Anandapur			
Sl. No.	Name	M/F	Address	Contact No.	Sig
49.	Nilima Sarker	F	9, Madurdaha Road, P.O. EKIPD Kol- 107	9007223 116	Nilima
50.	Sylita Sarker	F	"	"	Sylita
51.	Hemidipa Basu	F	R.R. Plot	629027252	Hemidipa
52.	Pratima Mandal	F	"	905628909	Pratima
53.	Rita Haldar	F	"	7831315712 1280525557	Rita
54.	Mamuni Sarker	F	Madurdaha	N/A	Mamuni
55.	Mahanta Sarker	F	"	N/A	Mahanta
56.	Minu Bag	F	"	9831694277	Minu
57.	Ashima Choudhary	F	"	"	Ashima
58.	Ruman Sarker	F	China Mandir	80	Ruman
59.	Saptami Saha	F	"	80	Saptami
60.	Soma Mandal	F	"	80	Soma

Kolkata Urban Resilience Improvement Project (KURIP)					
Signature Sheet for Public Consultation					
Date: 08/11/23		Venue: Anandapur Ward 10			
Sl. No.	Name	M/F	Address	Contact No.	Sig
61.	Shamita Laxminipriya Sarker	F	Madurdaha	504478 1896	Shamita
62.	Rumita Sarker	F	"	7003232 057	Rumita
63.	Shibani Ghosh	F	V.I.P Nagar	798022 4405	Shibani
64.	Arumita Das	F	Nona Janga	628986 3129	Arumita
Organised and conducted by;					
1.	Haseenul Islam	M	DSC, KEIP	9051841215	Haseenul
2.	Rutna Mukherjee	F	DSC, KEIP	8240225218	Rutna
3.	Anushka Chakrabarty	F	DSC, KEIP	8961640800	Anushka
4.	RUNKINI GHOSH	F	PMU, KEIP	8910062536	Runkini
5.	Indira Banerjee	M	SDU, KEIP	8017782128	Indira

Date	Location	No. of Participant	Participant Details	Key Discussions
07.02.2024	Ward 108 (Near STP land, hossainpur)	11	Local residents, shop owners, housewives, representatives of PMU and team of consultants	✓ Need for and scope of work and tentative commencement date for this package was elucidated. ✓ No adverse impacts on structures, livelihoods anticipated.
07.02.2024	Ward 108 (Hossainpur Main Road, madurdaha, near STP land)	7	Local residents, shop owners, housewives, representatives of PMU and team of consultants	✓ The subproject will provide facilities for treatment of wastewater and discharge into the canal by conforming CPCB standard and as per NGT order. ✓ Short term impact on air quality- dust generation, noise level, access problem, inconvenience for public and movement of vehicle during construction. ✓ People may face some access disruption during construction work. Suitable

Date	Location	No. of Participant	Participant Details	Key Discussions
				measures will be taken to avoid or minimize any disruption. People's cooperation will be needed for successful implementation of the project. ✓ Application of mitigation measures as per EMP to mitigate short term impact ✓ Operation phase impact due to operational noise and odour nuisance. ✓ Inclusion of environmental sensitive design measures. Development of green zone is suggested in EMP to mitigate odour and visual impact. ✓ The project work will reduce environmental impact/ health problems that is caused by open discharge of domestic wastewater ✓ It will be ensured that river Ganga is not polluted which is a priority of the state and national government. ✓ Participants have shown their willingness to engage with the project. ✓ Discussed about safety issues of residents during construction period. ✓ Grievance Redressal mechanism will be in place to address the complaints and grievances of the community people and affected persons, by the project authority.
Concerns of the Participants: Local residents near STP site were concerned about the inconvenience occur due to construction of STP. They were explained that the advantage of SBR technology over the conventional treatment method. It is also explained that the chance of odour generation is minimal in this type of system. Acoustic enclosure will be provided to reduce the noise impact around the noise generating unit. Green buffer zone will be developed to reduce noise and odour impact as well as for aesthetic purpose. They were also explained about the requirement of a STP for treatment of sewage generated from nearby areas which will help to reduce pollution load in receiving water bodies. The local residents were convinced and willing for the project.				



**Community consultation at ward No. 108, dated
07.02.24(Near STP land, Hossainpur)**

Kolkata Urban Resilience Improvement Project (KURIP)
Signature Sheet for Public Consultation

Date: 7/2/24

Venue: Hossainpur STP (Hossainpur)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1	পরিচয় সেন				
2	কপিল কল				
3	Jayanta Chatterjee				Jayanta Chatterjee
4	Partha Das	M			Partha Das
5	Nitay Das				Nitay Das
6	Rakhi Ghosh	F			Rakhi Ghosh
7	সুপ্রভা কল				সুপ্রভা কল
8	Madhumita Sen	F			Madhumita Sen
9	অমিত সেন				অমিত সেন
10	পার্বী				পার্বী
11	পরিচয় সেন				পরিচয় সেন

**Attendance Sheet
of Community consultation at ward No. 108, dated
07.02.24(Near STP land, Hossainpur)**



**Community consultation at ward no. 108, dated
07.02.24 (Hossainpur Main Road, Madurdaha)**

Kolkata Urban Resilience Improvement Project (KURIP)
Signature Sheet for Public Consultation

Date: 7/2/24

Venue: Hossainpur STP (Madurdaha)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1	সাইলি দাস	F			সাইলি দাস
2	সিমা কল	F			সিমা কল
3	সম্মানিত সেন	F			সম্মানিত সেন
4	সুপ্রভা কল	F			সুপ্রভা কল
5	সুপ্রভা কল	M			সুপ্রভা কল
6	বসন্ত কল	M			বসন্ত কল
7	সম্মানিত	F			সম্মানিত

**Attendance Sheet
of Community consultation at ward No. 108, dated
07.02.24 (Hossainpur Main Road, madurdaha)**

**Public Consultation Programme at Hossainpore STP
Site held on 14th June 2024**

Date	Place of Consultation		No. of Participants	Participants	Key Points of Discussion	Points Discussed	Photographs
14.06.24	Ward 108 (Hossainpore STP Land)		Male: 27 Female: 98 Total: 125	Local residents including residents from nearby houses., Women, Local Youth Club Members, representatives of councilor of ward 108	- Objective of the proposed project; - Project components proposed and scope of work; - Views and concerns of community members - Environmental enhancement due to proposed project	- The project officials explained to the community members about KSHARP, as an initiative of Kolkata Municipal Corporation (KMC) supported by Asian Development Bank (ADB); role of KMC in improving the sewerage and drainage services in Kolkata and its adjoining areas. - Scope of work under the proposed project package and tentative commencement date for this package was elucidated. - Requirement of the STP and Pumping Station was briefed to the local residents, it was explained to them why it is necessary to treat the Dry Weather Flow and how the treated effluent will be released into the Tolly Panchanna Canal. - Participants were enthusiastic regarding the KMC work proposed, which will improve the adjacent environments. - Local youth club representatives informed that the proposed construction work will not hamper daily activities (children play in the evening time), as the land is big enough, there is adequate open space left for them to carry out or organize any events in vacant portion of the land. - The participants also emphasized on poor drinking water supply facilities in the area; they specially requested to the project authority to consider the matter with priority.	  KSARP Hossainpur STP 14.06.2024 17:18 22.509, 88.40676 GC544JHJ, Anandapur Rd, Madurdahe, Hossainpur, Kolkata, West Bengal 700107

Date	Place of Consultation		No. of Participants	Participants	Key Points of Discussion	Points Discussed	Photographs
						- The local women expressed their willingness to learn skill development training for economical upliftment, and requested if the project can support them. - The participants informed the project team that the land is big enough to accommodate the proposed construction work, even after completion of the work a major portion of the land will remain vacant. - Considering the project outcome it has been unanimously accepted by all the participating members of the consultation program that the proposed work will address many environmental issues and it will improve their health and hygiene conditions. They have expressed their full support for successful implementation of the program.	

Attendance Sheet of Public Consultation Programme at Hossainpore Pumping station /STP Site

Kolkata Municipal Corporation Sustainability and Resilience(Sector) Project (KSARP)

Signature Sheet for Public Consultation

Date:

Venue:

Sl No.	Name	M/F	Address	Signature
1	মহিমমন্ডল	F		মহিমমন্ডল
2	MAHANI PRAMANIK	F		আমনি প্রমণিক
3	মাহানী প্রমণিক	F		তপস্বিনী আমনি
4	মুখতারী	F		অমিতা সন্দ্বী
5	মুখতারী	F		দয়ালী মুখতারী
6	মৌচুমী	F		মৌচুমী
7	মৌচুমী	F		মৌচুমী
8	মৌচুমী	F		মৌচুমী
9	মৌচুমী	F		মৌচুমী
10	মৌচুমী	F		মৌচুমী
11	মৌচুমী	F		মৌচুমী
12	মৌচুমী	F		মৌচুমী
13	মৌচুমী	F		মৌচুমী
14	মৌচুমী	F		মৌচুমী
15	KALPANA SARKAR	F		কাল্পনা সর্কার
16	SHUKLA NAIYA	F		শুক্লা নায়িকা

Kolkata Municipal Corporation Sustainability and Resilience(Sector) Project (KSARP)

Signature Sheet for Public Consultation

Date:

Venue:

Sl No.	Name	M/F	Address	Signature
17	BASANTI DAS	F		বাসন্তী দাস
18	MINATI SINGH	F		মিনতি সিং
19	CHANDANA BAIRAGI	F		চন্দনা বৈরাগী
20	SANDHYA NASKAR	F		সন্ধ্যা নস্কর
21	PARVATI TARAFDAR	F		পার্বতি তারাদার
22	DHIKA NASKAR	F		ধিকা নস্কর
23	RITA SINGH	F		রিতা সিং
24	JHARNA DAS	F		জর্ণা দাস
25	APARNA BAIRAGI	F		অপর্ণা বৈরাগী
26	BHAGABATI DHALI	F		ভাগবতী দালী
27	GITANDALI ROY	F		গিতান্দলী রয়
28	GREETTA KHATVA	F		গ্রীতা খাত্বা
29	SABITA GOYEL	F		সবিতা গয়েল
30	MEENA BHAKTA	F		মীনা ভক্টা
31	MOUSUMI ROY	F		মৌসুমী রায়

Kolkata Municipal Corporation Sustainability and Resilience(Sector) Project (KSARP)

Signature Sheet for Public Consultation

Date:

Venue:

Sl No.	Name	M/F	Address	Signature
32	DAYA NASKAR	M		দয়ালী নস্কর
33	ANIMA MAYRA	F		আনিমা মায়রা
34	SHOVA MONDAL	F		শোভা মন্ডল
35	RINA LET	F		রিনা লেট
36	POTUL PATRA	F		পটুল পাত্রা
37	HANOURI HALDER	F		হানুরী হালদার
38	JYOTSNA MOYRA	F		জ্যোত্সনা মায়রা
39	HANONI PURKAIT	F		হানোনি পুরকৈত
40	HANONI GOLDER	F		হানোনি গল্ডার
41	KRISHNA BEBARI	F		কৃষ্ণা বৈবরি
42	PIYUSH BEBARI	M		পিয়ুষ বৈবরি
43	BIMALA PAUL	F		বিমলা পল
44	BISHAKHA PRAMANIK	F		বিশখা প্রমণিক
45	JAYATI GHAROVARTY	F		জয়ন্তী গারভার্তী
46	HUNDI GAYE	F		হুন্দি গায়ে

Kolkata Municipal Corporation Sustainability and Resilience(Sector) Project (KSARP)

Signature Sheet for Public Consultation

Date:

Venue:

Sl No.	Name	M/F	Address	Signature
47	RUMA PANDA	F		রুমা পান্ডা
48	RUPALI DAS	F		রূপালী দাস
49	SANGITA PURKAIT	F		সঙ্গিতা পুরকৈত
50	JHUMA BERA	F		জুমা বেরা
51	RAMA MONDAL	F		রামা মন্ডল
52	RINKI SHARMA	F		রিন্কা শর্মা
53	ANIMA SARKAR	F		আনিমা সর্কার
54	PURNIMA DEBNATH	F		পূর্ণিমা দেবনাথ
55	CHANDANA HALDER	F		চন্দনা হালদার
56	MILI HALDER	F		মিলি হালদার
57				
58	NIKHIL GAYEN	M		নিকিল গায়েন
59	KUSH HALDER	M		কুশ হালদার
60	ANJILA SARDAR	F		অঞ্জিলা সর্দার
61	SHIPRA DAS	F		শ্রীপা দাস
62	PUSA MONDAL	F		পূষা মন্ডল

**Kolkata Municipal Corporation Sustainability and Resilience(Sector) Project
(KSARP)**

Signature Sheet for Public Consultation

Date:

Venue: HOSSAINPUR

Sl No.	Name	M/F	Address	Signature
63	TAPAS ROY	M		তপস রয়
64	SUDARSHAN DAS	M		সুদর্শন দাস
65	SHAMBHU DAS	M		শম্ভু দাস
66	MINATI HALDER	F		মিনতি হালদার
67	ABIR BERA	M		আবির বেরা
68	HAMATA ROY	F		হামতা রয়
69	UDURI MONDAL	M		উদুরী মন্ডল
70	BISHAKHA HALDER	F		বিশাখা হালদার
71	BASANTI BHUINYA	F		বাসন্তী বহুনিয়া
72	LAXMI MONDAL	F		লক্ষ্মী মন্ডল
73	MANJU SHARMA	F		মানু শর্মা
74	BUNTY MONDAL	M		বন্টু মন্ডল
75	ANITA MAITY	F		অনিতা মাইতি
76	ANJALI MONDAL	F		অঞ্জলি মন্ডল
77	TAPASI MAJHI	F		তপসি মাজি
78	ASHA HOLLA	F		অশা হোলা

**Kolkata Municipal Corporation Sustainability and Resilience(Sector) Project
(KSARP)**

Signature Sheet for Public Consultation

Date:

Venue:

Sl No.	Name	M/F	Address	Signature
79	SANKA POREL	F		সংকা পোরেল
80	SHAIBA MAHATO	F		শাইবা মাহাতা
81	MANSA HALDER	F		মনসা হালদার
82	SHEPALI BEPARA	F		শেপালি বেরা
83	CHH	F		চিহ্ন
84	VANU	M		বানু
85	TIPU	M		তিপু
86	SHRPA SARDAR	F		শ্রীপা সর্দার
87	SAGARIKA GHOSH	F		সাগরিকা ঘোষ
88	TUKPA DAS	F		তুকা দাস
89	BANDANA MONDAL	F		বন্দনা মন্ডল
90	SHILA SHOW	F		শিলা শো
91	SHIBANI PATRA	F		শিবানী পাত্রা
92	ANITA BERA	F		অনিতা বেরা
93	SUCHITRA PURKAIT	F		সুচিত্রা পুরকৈত
94	JHUMA PAIK	F		জুমা পাইক

Appendix 9: Sample Grievance Registration Form

(To be available also in Bengali, Hindi)

The _____ Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date		Place of registration			
Contact Information/Personal Details					
Name		Gender	* Male * Female	Age	
Home Address					
Village / Town					
District					
Phone no.					
E-mail					
Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below:					
If included as attachment/note/letter, please tick here:					
How do you want us to reach you for feedback or update on your comment/grievance?					

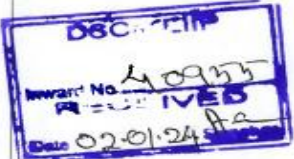
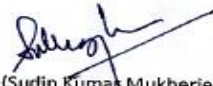
FOR OFFICIAL USE ONLY

Registered by: (Name of Official registering grievance)	
Mode of communication: Note/Letter E-mail Verbal/Telephonic	
Reviewed by: (Names/Positions of Official(s) reviewing grievance)	
Action Taken:	
Whether Action Taken Disclosed:	Yes No
Means of Disclosure:	

Signature

Position

Appendix 10: GRC Notification Office Order

 KOLKATA ENVIRONMENTAL IMPROVEMENT INVESTMENT PROGRAM (KEIP)	
 D.G. (P) KEIP	Ref: DSC/KEIP/DTL/2023-24/38240 December 29, 2023 Subject: Constitution of Grievance Redressal Committee of Kolkata Urban Resilience Improvement Project (KURIP) As per Social Safeguard and Environmental Policy of ADB, a Grievance Redressal Committee (GRC) is to be constituted for Kolkata Urban Resilience Improvement Project (KURIP). The details of Constitution of GRC is enclosed for approval of Project Director, KEIP. A draft copy of Office Order is enclosed for signature of Project Director, KEIP
	  (Sudip Kumar Mukherjee) Dy. Team Leader DSC- KEIP
Encl. As stated above.	
<i>A.O. KEIP / In no H @ 30/12/23 26/10/</i> <i>P.D. Placed for approval. please. 30/12/23</i> <i>As informed. 02/01/24</i> <i>Mr. Hasan SAE 02/01/24</i> <i>DG(P) 02/01/24</i> <i>Dy. Team Leader / In no H @ 02/01/24 26/10/</i> 	

**Kolkata Environmental Improvement
Investment Program
(KEIIP)**



The Kolkata Municipal Corporation
Kolkata Environmental Improvement Investment Program
206, A. J. C. Bose Road, Kolkata 700 017
Tel: (91) 2283 0544
Email ID: pdkeiip@gmail.com
Website: www.keip.in

Ref: PMU/404A/2023-24.
Date 29.12.2023.

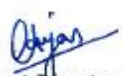
December 29, 2023

Office Order

It is considered necessary to constitute a Grievance Redressal Committee (GRC) on Kolkata Urban Resilience Improvement Project (KURIP) for redressing Social and Environmental or any other project related grievances for Kolkata Urban Resilience Improvement Project (KURIP), posed for funding from ADB.

Under the circumstances, a Grievance Redressal Committee (GRC) with the following members is constituted with immediate effect:

1. Administrative Officer, PMU, KURIP - Member Secretary (Convenor)
2. Dy. C.E. (I), CMU, KURIP
3. Social Safeguard Officer, PMU, KURIP
4. Environmental Officer, PMU, KURIP
5. Social Safeguard Specialist, PMDSC, KURIP
6. Environmental Specialist, PMDSC, KURIP


Project Director- KEIIP

Project Director
K.E.I.I.P./K.M.C.

Copy to: 1) Director General (Project), KEIIP
2) Administrative Officer, KEIIP

CONSTITUTION OF GRIEVANCE REDRESS COMMITTEE (GRC) OF KURIP

- Display of address of Contractor's site office Complaint & Suggestion Books are to be made available for lodging any complaint. The concerned Executive Engineer of KURIP to periodically monitor these Books and take necessary actions for redressal with intimation to the complainant.
- At every Borough under which works are under progress, a Public Relation & Grievance Redressal Unit, comprising of KURIP staff to be established for availing detailed information of the works, registering of complaint and act as Liaison for its redressal under intimation to the complainant. A suggestion box will be kept at Borough office for lodging complaints/suggestions.
- In KURIP office at 206, A J C Bose Road, Kolkata – 700017, The Administrative Officer, KURIP will be In-charge of the grievance redressal matters under the Project Director.
- Complaints may be lodged by AhatsApp number/e-mail.
- Complaints may also be lodged through KURIP website and KMC website.
- A Grievance Redressal Committee (GRC) has been constituted consisting of :

1. Administrative Officer, KURIP	Member Secretary (Convener)
2. Dy. C.E.(I) KURIP	Member
3. Social Safeguard Officer, KURIP	Member
4. Environmental Officer, KURIP	Member
5. Social Safeguard Specialist, PMDSC, KURIP	Member
6. Environmental Specialist, PMDSC, KURIP	Member

Under the Project Director, KURIP for regular monitoring of the entire process.

Appendix 11: Sample Environmental Site Inspection Checklist

Project Name

Contract

Number

NAME: _____ DATE: _____

TITLE: _____ DMA: _____

LOCATION: _____ GROUP: _____

WEATHER:

	Projectt Activityy Stage	Survey	
		Design	
		Implementation	
		Pre-Commissioning	
		Guarantee Period	

Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)

	Compliance
EHS supervisor appointed by contractor and available on site	
Construction site management plan (spoils, safety, schedule, equipment etc.,)prepared	
Traffic management plan prepared	
Dust is under control	
Excavated soil properly placed within minimum space	
Construction area is confined; no traffic/pedestrian entry observed	
Surplus soil/debris/waste is disposed without delay	
Construction material (sand/gravel/aggregate) brought to site as & when required only	
Tarpaulins used to cover sand & other loose material when transported by Vehicles	
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving thesite	
No chance finds encountered during excavation	
Work is planned in consultation with traffic police	
Work is not being conducted during heavy traffic	
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	
Pipe trenches are not kept open unduly	
Road is not completely closed; work is conducted on edge; at least one line iskept open	
Road is closed; alternative route provided & public informed, information board provided	

Pedestrian access to houses is not blocked due to pipe laying	
Spaces left in between trenches for access	
Wooden planks/metal sheets provided across trench for pedestrian	
No public/unauthorized entry observed in work site	

Children safety measures (barricades, security) in place at works in residential areas	
Prior public information provided about the work, schedule and disturbances	
Caution/warning board provided on site	
Guards with red flag provided during work at busy roads	
Workers using appropriate PPE (boots, gloves, helmets, ear muffs etc.)	
Workers conducting or near heavy noise work is provided with ear muffs	
Contractor is following standard & safe construction practices	
Deep excavation is conducted with land slip/protection measures	
First aid facilities are available on site and workers informed	
Drinking water provided at the site	
Monitoring Items	Compliance
Toilet facility provided at the site	
Separate toilet facility is provided for women workers	
Workers camps are maintained cleanly	
Adequate toilet & bath facilities provided	
Contractor employed local workers as far as possible	
Worker's camp set up with the permission of PIU	
Adequate housing provided	
Sufficient water provided for drinking/washing/bath	
No noisy work is conducted in the nights	
Local people informed of noisy work	
No blasting activity conducted	
Pneumatic drills or other equipment creating vibration is not used near old/risky buildings	

SIGNATURE

Sign

off

Name
Position

Name
Position