Initial Environmental Examination

PUBLIC

Document Stage: Draft
Project Number: 56287-001
May 2025

India: Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project

Sewerage and Drainage Network

(i) Development of S&D Network in Julpia Catchment Including Construction of Julpia Pumping Station in Borough XVI (Part of Ward 142) – Package No. KSHARP/ OCB/ SD 06/ 2023-24; and
(ii) Development of S&D Network in Kabardanga Catchment Including Construction of Kabardanga Pumping Station in Borough XVI (Part of Wards 142 & 143) – Package No. KSHARP/ OCB/ SD 07/ 2023-24

Prepared by Kolkata Municipal Corporation for the Asian Development Bank (ADB).

CURRENCY EQUIVALENTS

(as of 20 May 2025)

Currency unit	–	Indian rupee (₹)
₹ 1.00	=	$ 0.012
$ 1.00	=	₹ 84.37

ABBREVIATIONS

ADB	-	Asian Development Bank
ASI	-	Archaeological Survey of India
BOD	-	biochemical oxygen demand
COD	-	chemical oxygen demand
CPCB	-	Central Pollution Control Board
CTE	-	consent to establish
CTO	-	consent to operate
DWF	-	dry weather flow
EIA	-	environmental impact assessment
EKW	-	East Kolkata Wetlands
EMP	-	environmental management plan
GRC	-	grievance redress committee
GRM	-	grievance redress mechanism
IEE	-	initial environmental examination
KEIP	-	Kolkata Environmental Improvement Project
KEIIP	-	Kolkata Environmental Improvement Investment Program
KMC	-	Kolkata Municipal Corporation
KMDA	-	Kolkata Metropolitan Development Authority
KSHARP	-	Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project
MFF	-	Multi-tranche financial facility
NIOSH	-	National Institute of Occupational Health
O&M	-	Operation and maintenance
PMU	-	Program management unit
PMDSC	-	Project management and design supervision consultant
REA	-	Rapid environmental assessment
ROW	-	Right-of-way
S&D	-	Sewerage and drainage
SEMR	-	Semi-annual environmental monitoring report
SPS	-	Safeguard Policy Statement
STP	-	Sewage treatment plant
SWF	-	Stormwater flow
TDS	-	Total dissolved solid
TMP	-	Traffic management plan
ULB	-	Urban Local Body
WBPCB	-	West Bengal Pollution Control Board

WEIGHTS AND MEASURES

m^3/h	-	cubic meter per hour
dB(A)	-	decibel in A network
°C	-	degree Celsius
km	-	kilometer
km/h	-	kilometer per hour
kVA	-	kilovolt-ampere
kW	-	kilowatt
m	-	meter
$\mu g/m^3$	-	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 dollars.

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EXECUTIVE SUMMARY

Background: The Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project (KSHARP) aims to benefit the unserved areas of Kolkata Municipal Corporation (KMC) with sewerage and drainage services to improve wastewater management and resilience against climate change, disasters, and other shocks and stresses. The project is part of Asian Development Bank's (ADB) long-term partnership with KMC, which started with the Kolkata Environmental Improvement Project (KEIP) approved in 2000 and the Kolkata Environmental Improvement Investment Program (KEIIP) approved in 2013. The project is aligned with the following impact: integrated urban renewal of Kolkata City achieved.[1] The project will have the following outcome: access, resilience, inclusion, and sustainability of urban services improved. The outcome will be achieved through two outputs: (i) **Output 1:** Climate- and disaster-resilient urban services and systems developed and (ii) **Output 2:** Enabling environment for sustainable, inclusive, and resilient urban services improved.

The Subproject. The development of sewerage and drainage (S&D) networks is proposed in the areas of Julpia and Kabardanga, along with their adjoining localities, which fall under Wards 142 and 143 of Borough XVI of the KMC. The total area covered under the Julpia subproject is approximately 360 hectares (ha) within Ward 142, while the Kabardanga subproject spans about 242 ha - comprising 213 ha in Ward 142 and 29.9 ha in Ward 143.The proposed system has been designed essentially as a combined network to carry both Dry Weather Flow (DWF) and Storm Water Flow (SWF) generated from the catchment area. This sub project includes following civil works:

(i) **Package SD 06: Julpia Catchment Area (covering part of Ward 142) -** (i) combined sewer network of 16.9 km, including 2.7 km using micro tunnelling technology, (ii) construction of a combined pumping station (PS), along with the installation of a dedicated 1400 millimeters (mm) diameter SWF pumping main using mild steel (MS) pipe over a length of 175 meters (m) for discharge of storm water and a 400 mm diameter DWF pumping main with ductile iron (DI) pipe over a length of 1,500 m, (iii) construction of 892 manholes, 1,623 catch pits, and 85 gully pits, (iv) around 1,600 proposed house service connections and (v) construction of twenty four (24) gravity outfalls (GOFs) for discharging SWF into the Keorapukur canal system and into the local channels.

(ii) **Package SD 07: Kabardanga Catchment Area (covering part of Ward 142 & 143):** (i) combined sewer network of 16.6 km including 2.0 km using micro tunnelling technology (ii) construction of a combined pumping station, along with the installation of a dedicated 1400 mm diameter SWF pumping main with MS pipe over a length of 175 m for discharge of storm water and a 500 mm diameter DWF pumping main with DI pipe over a length of 850 m, (iii) construction of 977 manholes, 1,697 catch pits and 89 gully pits (iv) around 1,580 proposed house service connections and (v) construction of fifteen (15) gravity outfalls (GOFs) for discharging SWF into the local channels/drains, Western channel and Keorapukur canal system.

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. In accordance with the Environmental Impact Assessment (EIA)

[1] KMC. 2007. Sewerage and Drainage Master Plan for Kolkata City; and KMC. 2023. Master Plan of Sewerage and Drainage System for Project Area under Kolkata Urban Resilience Improvement Project.

Notification, 2006, issued by the Government of India (GOI), this subproject does not require EIA study or environmental clearance.

Description of Environment. General topography of the subproject location is flat and elevation ranging from 22.2 m to 4.3 m above mean sea level (MSL) for Julpia and 2.5 to 4.6 m above MSL for Kabardanga catchment area respectively. Low lying areas are predominant within the subproject areas, and the area regularly experiences water logging in the rainy season. The area is located within the lower deltaic alluvial plain of the Ganges River system. The soil has cohesive characteristics and low permeability which reduces infiltration of stormwater into the soil. Sub-soil water level varies from 1 to 6m below ground level (bgl) in this part. In general, the 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 1,919 mm. The land use pattern in the subproject area is predominantly residential, mostly built-up urban zones with commercial activities concentrated around Kabardanga More, Thakurani Chak, Parta Para, M.G road and other similar localities.

Based on the existing topography and outfall system, the entire KMC area comprising all 16 boroughs was re-delineated into the following nine (9) major S&D basins.[2] The subproject area comprises part of ward 142 in Julpia (SD 06) and part of 142 and143 in Kabardanga (SD 07). Packages under borough XVI come under Tolly Nullah basin. The drainage system in Tolly Nullah basin gravitated westwards to the Hooghly River system. Tolly's Nullah is a navigational link between the Hooghly River and the Bidyadhari River system. The Bidyadhari River (a tributary to Matla River) is connected with Hooghly River through Adi-Ganga (a spill channel of Hooghly River). Tolly Nullah joined the 'Adi-Ganga' by cutting a new canal from Garia where the 'Adi-Ganga' takes a southward turn. There are two storm water channels viz. Keorapukur canal and Western channel flowing through both subproject areas. The Western channel merges with the Keorapukur canal under Tolly Nullah basin which ultimately joins with the Tolly nullah near Kudghat Metro station at a distance of about 2.3 m from the proposed Kabardanga subproject boundary. Tolly Nullah, in the form of 'Adi-Ganga' meets Hooghly River at a distance of about 8.0 km from the Kudghat location.

The Julpia pumping station is proposed to be constructed on a vacant, government-owned plot under the ownership of the KMC, located along the Kabardanga–Julpia road. The Kabardanga pumping station is planned on a vacant government land parcel owned by the Public Health Department (PWD), Government of West Bengal (GoWB), situated at Kabardanga More, adjacent to M.G. Road. At the Kabardanga pumping station site, ten non-scheduled trees will need to be felled to facilitate construction activities. At the Julpia pumping station site, a community pond exists within the premises; however, no adverse impact is anticipated. A Banyan tree and several bamboo groves are also present within the Julpia pumping station area, but they will remain unaffected, as they are located on the opposite side of the designated plot

No tree felling will be necessary for the installation of the sewer pipeline, as it will be laid in the middle of existing government roads. Along with the proposed pipeline alignment, ten (10) water bodies (ponds) are located within the Kabardanga subproject area and twenty-nine (29) ponds within the Julpia subproject area including one community pond within the proposed pumping

[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.

station site. These ponds function as natural holding tanks, helping to manage stormwater runoff and reduce initial flooding during heavy rainfall events.

No areas of ecological diversity are located within the subproject locations. According to the Integrated Biodiversity Assessment Tool (IBAT) screening report, the nearest protected area is the East Kolkata Wetlands (EKW), a designated Ramsar site, located approximately 9 km from the proposed Julpia pumping station and 8.5 km from the Kabardanga pumping station. The EKW boundary lies about 7.5 km and 7.7 km from the nearest boundaries of the Julpia and Kabardanga subproject areas, respectively. There are no archaeological sites in proximity to the subproject areas, and no threatened species of flora or fauna have been reported at the project locations.

Potential Environmental Impacts. 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 are 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 pipelaying are proposed in roads under the ownership of local authority. There is no flora or fauna of the threatened category and endangered aquatic, or fish species reported from the project area. No impact is envisaged on EKW area due to pipe laying activities. No tree felling is required for pipe laying as the alignment will be passing through centre of the road to avoid impact on other existing utilities. The proposed Kabardanga pumping station will be constructed on government land under the possession of PWD, which will require demolition of one staff quarter and two storerooms, as well as felling of approximately 10 non-scheduled trees. The final decision regarding tree felling will be made during the detailed design phase, and if tree removal is necessary, compensatory tree plantation will be carried out at a 1:5 ratio. The proposed Julpia pumping station will also be constructed on vacant government land under the possession of KMC, with no tree cutting required. Access to both project locations will be through public rights-of-way and existing roads. There will be no impacts on ecologically sensitive areas, forests, or archaeological resources.

Sewer network in the sub-project area is designed as a combined system, considering the prevailing drainage pattern and narrow road network in the entire catchment area which is prohibitive for laying at least two conduits required for a separate system – one to carry dry weather flow and other for storm water flow and in the line of system adopted in KEIP & ongoing KEIIP. A combined (SWF + DWF) pumping station is proposed at Julpia to handle the flow from the Julpia catchment area under the SD 06 package, and another at Kabardanga to manage the flow from the Kabardanga catchment area under the SD 07 package. In the proposed system, the DWF and SWF generated from the catchment area flow through the same conduit. As quantum of stormwater flow is several times greater than the dry weather flow, the system carries an insignificant flow for a major period of a year.

The DWF from the proposed Julpia pumping station (package SD 06) will be directed to the S&D network in the Kabardanga catchment via a dedicated pumping main and then transmitted to the proposed Kabardanga pumping station. The S&D network, including the pumping station for the Kabardanga catchment, will be implemented under the KSHARP (package SD 07). From the Kabardanga PS, the DWF generated from both the Kabardanga and Julpia catchments will be conveyed through a dedicated pumping main along M.G. Road to the S&D network of the proposed Churial Extension catchment, and onward to the Churial Extension pumping station. At the Churial Extension pumping station, the DWF will be transmitted to the 40 million liters/day (MLD) capacity Bank Plot Sewage Treatment Plant (STP) based on Sequential Batch Reactor (SBR) for treatment and disposal. The construction of the S&D network for the Churial Extension

catchment, the Churial Extension pumping station,[3] and the Bank Plot STP[4] are currently underway under KEIIP Tranche 3.[5] The DWF from both subproject areas will be treated at the Bank Plot STP to meet discharge standards as recommended by the Central Pollution Control Board (CPCB) in 2015 and in accordance with the National Green Tribunal (NGT) order dated April 30, 2019. Surplus treated effluent from the STP, after reuse, will be discharged into the nearby Churial canal, which flows into the Hooghly River near Budge Budge, approximately 15 km from the Bank Plot STP site. Considering the present canal water quality, discharge of treated effluent will be beneficial, and no adverse impact is anticipated.

SWF from the Julpia pumping station (SD 06) will be discharged into the Keorapukur canal via a dedicated 175 m long pumping main, comprising a 1400 mm diameter MS pipe. Additionally, a portion of the SWF generated from the project area will be directed to the Keorapukur canal via thirteen gravity outfalls (GOF) and through eleven GOFs connected to various drains/channels, equipped with sluice gate arrangements. During rainfall, the combined flow from the trunk sewers is diverted into the Keorapukur canal system through these connecting drains. The Keorapukur canal system eventually merges with Tolly Nullah and flows into the Hooghly River.

SWF from the Kabardanga pumping station (SD 07) will be discharged into the Keorapukur canal via a dedicated 175 m long pumping main, comprising a 1400 mm diameter MS pipe. Additionally, a portion of the SWF generated from the project area will be routed to the Keorapukur canal through five gravity outfalls (GOF), to connecting local channels/drains through five more GOFs, and to the Western channel through another five GOFs, all equipped with sluice gate arrangements flowing along the subproject boundary. During rainfall, the combined flow from the trunk sewers will be diverted into both the Western channel and Keorapukur canal. The Western channel joins the Keorapukur canal system, which in turn connects with Tolly Nullah, eventually flowing into the Hooghly River, located at a distance of about 8.0 from the Kabardanga subproject area. No impact is envisaged as adequate dilution is ensured in the system for SWF discharge through (i) overflow structures level in gravity outfall ensures minimum dilution before bypassed into SWF channels, (ii) pumping from wet well to SWF is initiated only after attaining the requisite level and thus dilution, and (iii) standard operating procedures (SOP) are already available and followed. Preliminary assessments conducted by KMC confirmed that these canals have adequate capacity to carry the SWF and 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 proposed sewers in both SD 06 and SD 07 packages will primarily be installed using conventional open trenching (cut and cover method) and micro tunnelling methods. Temporary impacts have been identified on busy roads within the project areas, including Sajna Beria road, Rabindra Sarani, Ramkrishna Ashram Road, Julpia road (ONGC More to Middir Chak), St. Thomas Church road, Ramjibanpur Magur Khali, and Darir Chak Road in Julpia as well as M.G. road, Brick Field Road, Ananda Pally road, Ram Chandrapur, Kabardanga-Julpia road, and Krishna Nagar road in Kabardanga subproject area. Three schools (D.F. Blind School, Carmel High School, Ramchandrapur Primary School) in Kabardanga and a few local temples, two churches, and two schools (Jiadargot Primary School and Sajna Baria Primary School) in Julpia area are located along the proposed pipeline alignment. To minimize impact, micro tunneling and jack pushing methods are proposed for pipeline installation along Julpia Road (2.7 km with diameters ranging from 1400 mm to 2200 mm) under Package SD 06. Additionally, about 2.0 km

[3] https://www.adb.org/sites/default/files/project-documents/42266/42266-025-iee-en_0.pdf
[4] https://www.adb.org/sites/default/files/project-documents/42266/42266-026-sddr-en_11.pdf
[5] Due diligence of both packages were carried out and IEE reports were prepared and approved and disclosed by ADB.

of sewer line will be installed using the micro tunneling method along M.G. road (870 m) and Kabardanga-Julpia road (1170 m) with pipe diameters varying from 1400 mm to 2000 mm under Package SD 07. Pipeline installation in narrow roads will be conducted in phases, with prior consultation with local residents and relevant authorities to mitigate impact. Priority will be given to backfilling excavated trenches immediately. Traffic management plans and temporary diversions will be implemented in affected areas, particularly in front of schools, where work will be scheduled during school vacations to minimize disruption. There is a potential risk of pollution or contamination of water bodies (ponds) during pipeline installation. To mitigate this, all earthworks near existing ponds should be conducted during the dry season. Additionally, temporary drainage channels will be created around the work areas to prevent runoff from entering the ponds.

Potential impacts during construction are considered significant but temporary and are common impacts of construction in urban areas, and there are well developed methods to mitigate the same. In these works, the temporary negative impacts arise mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupational health and safety (OHS) aspects. Pipe laying works will be conducted along public roads in an urban area congested with people, activities and traffic. Therefore, these works may have significant impacts during the construction arising mainly from the disturbance of residents, businesses and traffic due to construction work; safety risk to workers, public and nearby buildings due to trench excavations in the road; access impediment to houses and business, disposal of large quantities of construction waste etc. Therefore, appropriate mitigation measures are necessary.

Environmental Management Plan (EMP). EMP has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels, along with the delegation of responsibility to appropriate agencies. 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 includes 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 site. 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) is the executing and implementing agency of the project. The existing institutional arrangement for implementation of the ADB financed Kolkata Environmental Improvement Investment Program (KEIIP) will be strengthened for implementation of KSHARP. The project management unit (PMU) established under KMC for the KEIIP will implement the KSHARP project. The project will be governed by a high-level steering committee headed by the Minister-in-charge, Municipal Affair. The PMU is headed by a project director of KSHARP, KMC. The Project Director will be supported by Director General - Project procurement and contract management and Deputy Chief Engineer (DCE) for overall safeguards implementation and monitoring. The Gender and Safeguard Management Unit

(GSMU) at PMU, headed by the DCE will be supported by an Environment, Health and Safety Officer (EHSO), a Social Safeguards Officer (SSO) and Gender Officer, who will be responsible for environmental and social safeguards in compliance with project agreements, government requirements, and ADB Safeguards Policy Statement (SPS), 2009. The Safeguards and Safety Cell[6] (SSC) under KSHARP is headed by the Deputy Chief Engineer (DCE) and includes three Junior Officers and eight Project Assistants. The SSC is responsible for implementing and monitoring the gender assessment and action plan, environmental management plan (EMP), and resettlement plans, with particular emphasis on community and occupational health and safety aspects. One Junior Officer is designated to oversee Environment, Health, and Safety (EHS). In addition, one Project Assistant will support Environment and Health, while two Project Assistants will be specifically assigned to Safety related tasks.

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 and to ensure implementation of EMP during civil works and operation and maintenance (O&M).

Consultation, Disclosure and Grievance Redress Mechanism. Public participation activities were carried out during the project preparation stage to ensure stakeholder engagement in the preparation of this IEE. Both formal and informal consultations were held with local residents, business owners, government officials, and women's groups between November 2023 and December 2024. A total of seven stakeholder consultations were conducted under the SD 06 (Julpia) package, with 144 participants comprising 37 males and 107 females (74% of the total attendees). Under the SD 07 (Kabardanga) package, six stakeholder consultations were held, attended by 148 participants, including 45 males and 103 females (70% of the total attendees).Three ward-level stakeholder consultations were conducted on 7 November 2023 at the following locations under Ward 142 of Borough XVI, KMC: (i) Company Pukur in Julpia, (ii) Chakramnagar School in the Kabardanga area, and (iii) Ramchandrapur near Rupali Sangha in Kabardanga. The meetings were attended by Urban Local Body (ULB) ward representatives, KMC officials, and local residents. A total of 163 participants took part in the consultations, including 132 women. The project received broad public and institutional support, reflecting recognition of its potential to improve local drainage and sewerage infrastructure. The feedback received was constructive and has been incorporated into the subproject through design modifications or planned mitigation measures. No major concerns were raised.

The IEE report will be made accessible at public locations for transparency and continued stakeholder engagement. 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 KEIIP, 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 the contractor. The PMU will oversee the implementation and

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

compliance and will submit semi-annual environmental monitoring reports (SEMR) to ADB. SEMRs will be disclosed on the ADB and KSHARP websites. 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.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; (ii) relief from water logging conditions within the Julpia sub-project area such as Krishnanagar, Para road, Netaji Pally, Chak Ramnagar, Pragati Pally, Sajnaberia, Ramjibanpur, Magur Khali and in Kabardanga area namely MG Road, Brick field road, Chak Ramnagar road, Krishnanagar para road, Nutan pally, Ramkantopur Udayachal (iii) reduced risk of groundwater contamination through appropriate sewer collection and treatment; (iv) 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). This IEE needs to be updated during the detailed design, reviewed and approved by ADB, and disclosed prior to the start of construction.

I. INTRODUCTION

A. Project Background

1. The Kolkata Municipal Corporation Sustainability, Hygiene, and Resilience (Sector) Project (KSHARP) aims to benefit the unserved areas of Kolkata Municipal Corporation (KMC) with sewerage and drainage services to improve wastewater management and resilience against climate change, disasters, and other shocks and stresses. The project is part of Asian Development Bank's (ADB) long-term partnership with KMC, which started with the Kolkata Environmental Improvement Project (KEIP) approved in 2000 and the Kolkata Environmental Improvement Investment Program (KEIIP) approved in 2013. The project is aligned with the following impact: integrated urban renewal of Kolkata City achieved.[7] The project will have the following outcome: access, resilience, inclusion, and sustainability of urban services improved. The outcome will be achieved through two outputs:

(i) **Output 1: Climate- and disaster-resilient urban services 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 the KMC with due consideration of future increases in rainfall intensity. It includes the construction of 84 kilometers (km) of combined trunk and secondary sewerage and drainage pipelines, 176 km of combined lateral sewerage and drainage pipelines up to customer connections, 50,000 household sewer connections, one sewage treatment plant (STP) with a capacity of 41 million liters per day, and five pumping stations. The project complements the Kolkata Environmental Improvement Investment Program and state-funded projects, as sewers from some project sub-catchments will be treated by the STPs being constructed under those projects. The project will also embed nature-based measures to enhance the groundwater recharge and water retention capacity of the catchment on a pilot basis. Strengthened urban services and systems will provide better services to all, including disadvantaged groups, which will be prioritized to ensure they benefit from improved urban sanitation, health, and hygiene.[8]

(ii) **Output 2: Enabling environment for sustainable, inclusive, and resilient urban services improved.** This output will build on the results delivered under the Kolkata Environmental Improvement Investment Program to enhance the KMC's operational capacity and resilience to climate change, disasters, and other shocks and stresses. Specific initiatives include support in developing and institutionalizing a comprehensive asset management system in the KMC to improve transparency and creditworthiness, with the following activities: (i) formulating an asset management policy; (ii) developing an IT-based asset management system; and (iii) establishing an inventory of all classes of the KMC's assets, following a physical survey, verification, and valuation. Additionally, capacity building support and training will be provided to establish processes,

[7] KMC. 2007. Sewerage and Drainage Master Plan for Kolkata City; and KMC. 2023. Master Plan of Sewerage and Drainage System for Project Area under Kolkata Urban Resilience Improvement Project.

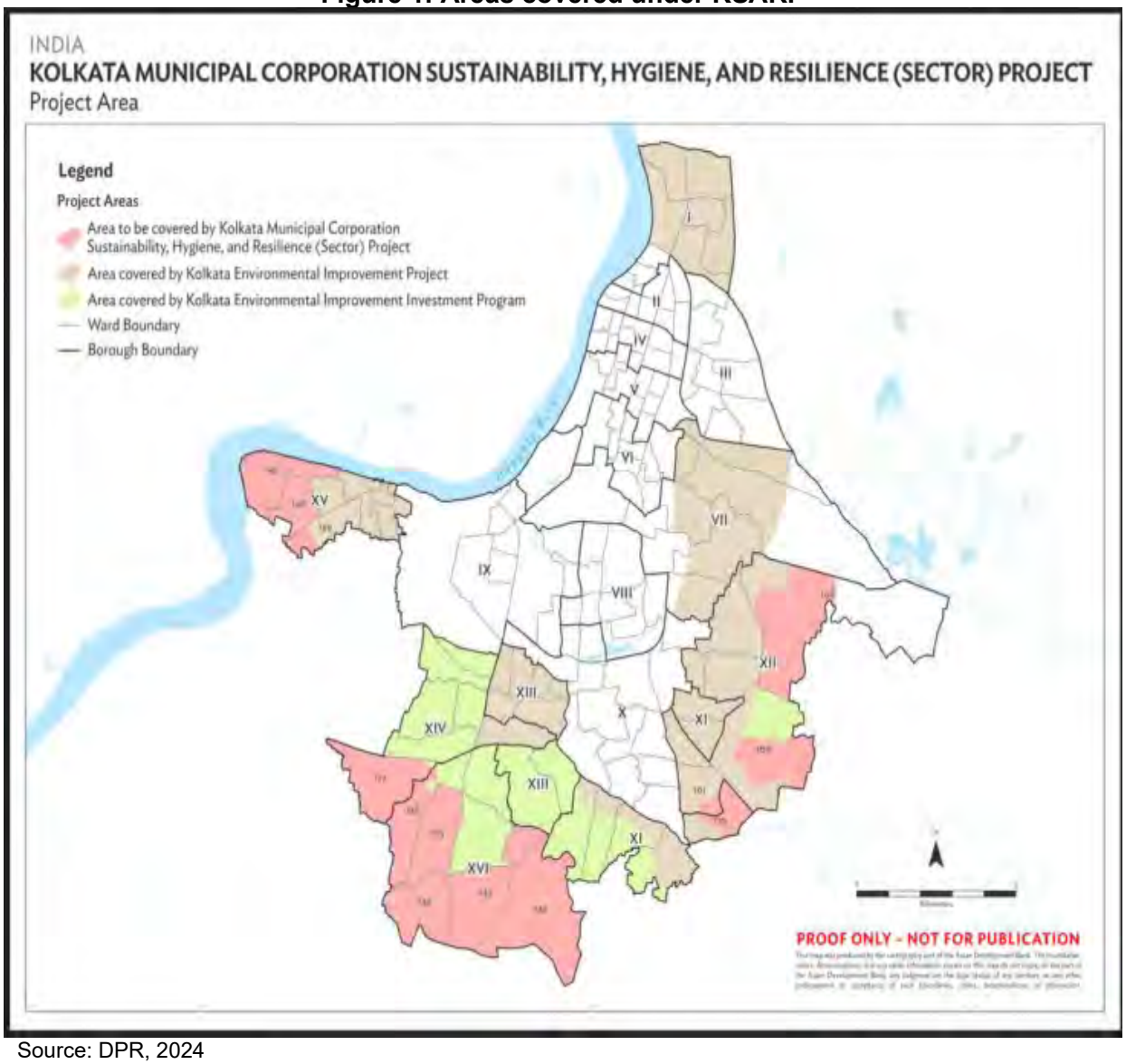
[8] Disadvantaged households include scheduled caste and scheduled tribe households, households with persons with disability, and transgender persons who are eligible beneficiaries or recipients of state-sponsored schemes. It will also include households that are recognized by the state as below the poverty line, and the poorest of the households below the poverty line (Antyodaya Anna Yojana families) categorized under the state's public distribution system (based on The West Bengal Public Distribution System [Maintenance and Control] Order, 2013).

practices, and clear accountabilities for institutionalizing the asset management system in the KMC. Output 2 also includes (i) assessing the current property tax collection performance, preparing a property tax enhancement plan, and increasing overall revenues from property tax in the KMC; (ii) expanding the flood forecasting and early warning system established under the Kolkata Environmental Improvement Investment Program to areas supported by the project to supplement infrastructure to be developed under output 1;3 and (iii) updating a comprehensive web-enabled GIS for infrastructure information in the KMC.4 The updated GIS will expand its data coverage to utility networks proposed under the project in addition to those developed under the Kolkata Environmental Improvement Investment Program and will complement the proposed asset management system. Additionally, the project will focus on institutionalizing gender mainstreaming in the KMC by (i) establishing a gender equality cell and developing a five-year action plan; (ii) providing an internship program for women to gain professional experience under the project; (iii) supporting women's employment through certified skills training including e-tendering and project management for potential KMC contracts; and (iv) promoting social leadership development among women for raising community awareness on issues related to water, sanitation, and hygiene (WASH) and emergency response in project areas, including the benefits of household sewerage connections.

2. KSHARP will adopt the sector loan modality. A series of subprojects will be implemented for development of sewage and drainage (S&D) networks in the selected part of un-sewered areas of KMC. Subprojects will be selected from the 11 eligible subprojects (Figure 1) identified under the Master Plan of S&D System for project area under KSHARP, KMC.

3. This initial environmental examination (IEE) report is prepared for two interlinked packages (i) development of S&D network in Julpia catchment (part of Ward 142) including construction of pumping station in Borough XVI under Package no. KSHARP/ OCB/ SD 06/ 2023-24 and (ii) development of S&D network in Kabardanga catchment (part of Wards 142 & 143) including construction of pumping station in Borough XVI under Package no. KSHARP/ OCB/ SD 07/ 2023-24 with Operation & Maintenance (O&M) for 5 years.

Figure 1: Areas covered under KSARP



Source: DPR, 2024

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 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 potential environmental impacts of the subprojects have been screened using ADB's Rapid Environmental Assessment checklist (REA) checklist for sewerage system (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.

6. The subproject will be implemented as an item rate contract modality. This IEE is based on detailed design. If there are any changes during pre-construction and construction phases, the IEE needs to be updated and approved by the ADB.

C. Report Structure

7. The report has been structured in compliance with ADB SPS, 2009 is organised in 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. Project Background

8. The subproject area[9] includes part of Ward No. 142 under the SD 06 package, and parts of Ward Nos. 142 and 143 under the SD 07 package, administrative divisions of the Kolkata Municipal Corporation (KMC) within Borough XVI. Wards 142 and 143 were created in 2012 and subsequently incorporated under the jurisdiction of KMC. The total area covered under the Julpia subproject is approximately 360 ha within Ward 142, while the Kabardanga subproject spans 242 ha comprising 213 ha in Ward 142 and 29.9 ha in Ward 143. M.G Road is one of the major roads on the northern side of the project area and runs along a west - east direction. Kabardanga- Julpia road runs along the north - south direction of the project area. Keorapukur canal and Western channel are the major canals in the project area flowing from south to north direction. Western channel has merged with the Keorapukur canal and ultimately drains into Tolly Nullah. The sub project area is connected with adjacent localities through M.G Road and Kabardanga-Julpia Road. The nearest railway station is Howrah railway station (14 km) and the nearest airport, Netaji Subhas Chandra Bose International Airport, is at a distance of 24 km.

9. The subproject areas under package SD 06 (Julpia subproject area) and SD 07 (Kabardanga subproject area) cover rapidly developing localities with increasing number of populations. The projected population in the Julpia subproject area in 2028 (base year), mid-year (2043) and ultimate year (2058) would be 34,235, 43,244 and 45,767 respectively as calculated based on Census data. Total number of estimated populations in the Kabardanga subproject area in 2028 (base year), mid-year (2043) and ultimate year (2058) would be 25,889, 32,590, 34,500 respectively.

10. The proposed two S&D zones/packages are delineated based on the prevailing drainage system of the area, ground topography, existing road network of the area, drainage outlets, location of pumping stations, catchment area of outlet canals, carrying capacity of the canals etc. Package wise major areas proposed to be covered under both subprojects are given in Table 1. Table 2 and 3 shows the subproject area covered under each package.

Table 1: Major areas covered under Julpia subproject (Package SD 06)

		Major Areas / Roads
Borough XVI	**Part of Ward - 142**	• Julpia Road • Madha Ram Nagar • Ghol Para • Sajneberia • Netaji palli • St. Thomas Chruch Road • Rabindra Palli • Ram Jibanpur Magur Khali • Malpara • Mallickpur Gram

Source: DPR, 2024.

[9] Several subprojects will be carried out to develop the sewerage and drainage (S&D) network in selected un-sewered areas of KMC. These will be chosen from 11 eligible subprojects listed in the Master Plan under the KSHARP project (see Appendix 2).

Table 2: Major areas covered under Kabardanga subproject (Package SD 07)

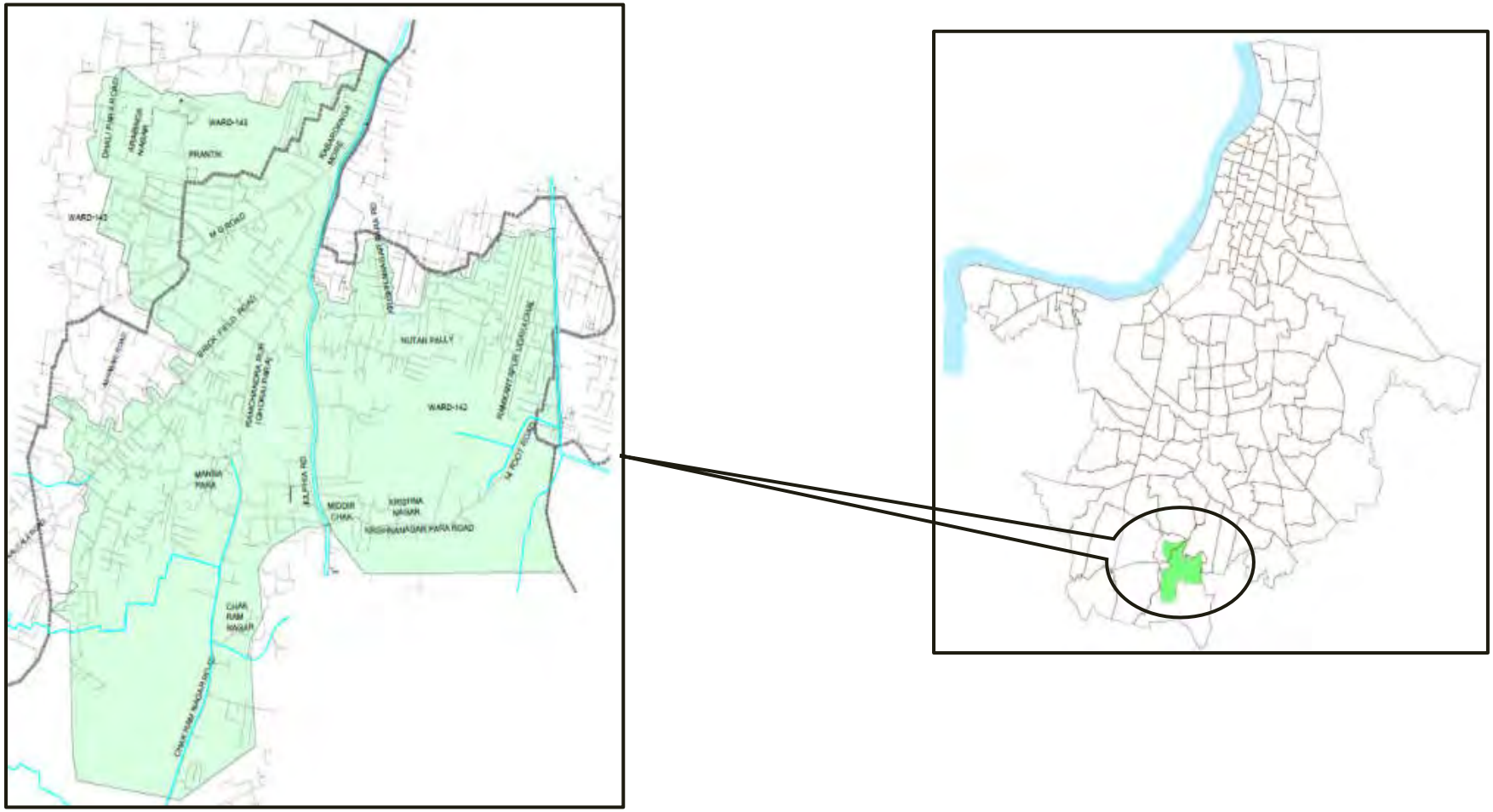
		Major Areas / Roads
Borough XVI	**Part of Wards- 142 & 143**	• MG Road • Prantik Housing Road • Arabinda Nagar (Dhali Para) • Brick Field Road • Ramchandrapur (Ghorai Road) • Julpia Road • Krishna Nagar Hazra Para Road • Nutan Pally (Lal Pole) • Ramkantapur Udayachal

Source: DPR, 2024.

Figure 2: Location of Julpia Subproject Area (Package SD 06)

Source: DPR, 2024

Figure 3: Location of Kabardanga Subproject Area (Package SD 07)



Source: DPR, 2024

B. Existing Situation

11. Kolkata has a combined sewerage and drainage system. An organized S&D system (Town System) was first introduced in 1859 covering 19.13 sq. km area. For the fringe areas (covering wards 101 to 144) annexed to KMC in 1984 & subsequently in 2012, the existing drainage network was grossly inadequate, before development of S&D system in KEIP & ongoing KEIIP. The present study area, which is a part of the 'Added areas' but not covered under KEIP & ongoing KEIIP, is almost devoid of any organized sewerage and drainage system except for some segregated parts of the study areas. At present there is no organized sewerage system in these areas. Wherever sewerage and drainage systems exist, DWF from those areas is being discharged to the canals. However, there are a few drainage lines which not only carry storm water but also carry DWF to Tolly Nullah via different tributaries (such as Keorapukur canal, Western channel) and ultimately lead to River Hooghly. In the process, not only the canals but also the river water is getting polluted. The project area depends largely on septic tank arrangement for household sanitary systems and open surface drainage systems mainly for stormwater and effluents of septic tanks. In many cases the drains do not have any proper outlet and are terminated into low land/ canal. All these existing practices need to be controlled by providing a comprehensive combined flow (DWF+SWF) collection system and diversion of the entire quantum of DWF generated from the project area to the STP for treatment.

12. Most of the subproject area is either devoid of any S&D system or grossly inadequate. Combined flow generated from the subproject area is being discharged to Keorapaukur canal (for SD 06) and in Keorapaukur canal and western channel (for SD 07) through existing underground conduits. There is no specific discharge point at either of these channels.

13. In the absence of any organized drainage network, the subproject areas largely depend on septic tank arrangements for household sanitary systems. The surface drainage channels carry both sullage and storm water runoff, causing pollution to the receiving surface water body. The existing system, wherever available, in most of the cases is inadequate to take care of the generated storm water load and prolonged periods of pooling of stagnant water mixed with sewage are a common sight of nuisance in the major portion of areas during the monsoons. As a result, unhygienic conditions and prolonged water logging instances prevail in the area. Moreover, due to inadequate sewer line, waterlogging phenomenon are common at Krishnanagar Para road, Netaji Pally, Chak Ramnagar, Pragati Pally, Sajnaberia, Ramjibonpur, Magur Khali in SD 06 package and adjoining areas to MG road, Brick field road, Chak Ramnagar road, Krishnanagar para road, Nutan pally, Ramkantopur Udayachal of SD 07 package after any event of moderate to high intensity rainfall occurrence (Figure 7 and 8).

14. Therefore, it is urgently required a combined system of S&D network along with sewage treatment facility for improvement of citizen services and overall enhancement of quality of life.

C. Proposed Subproject Components

14. Details of the subproject components are summarized below in Table 3 and thematic maps; typical layout plan and schematic diagrams are shown in Figure 4 to 24 at the end of this chapter. Figure 25 and 26 shows the photographs of proposed Gravity outfall locations in the subproject areas.

Table 3: Subproject Component Details of Julpia Catchment (Package: SD 06)

Component	Function	Description	Location
Laying of sewer and drainage network with manholes and house sewer connection	Collection of Stormwater Flow (SWF) from entire catchment area and Dry Weather Flow (DWF) from individual houses Each gully pit / catch pit with proper road camber will receive storm runoff from the road surface.	**1. Sewer and Drainage network** (i) **Total Length**: 16.9 km . • Diameter below 600 mm = 4.8 km • Diameter 600 mm and above = 9.4 km • Out of 16.9 km, 2.7 km sewer line (diameter varying 1400 mm - 2200 mm) will be laid by micro – tunneling method and rider sewer line of 2.5 km ➢ 1400 mm = 982.3 m ➢ 1600 mm = 823.2 m ➢ 1800 mm =379.1 m ➢ 2000 mm =382.7 m ➢ 2000 mm =94.5 m (ii) **Pipe material**: Reinforced Cement Concrete (RCC) (iii) **Pipe Diameter**: 300 to 1800 mm (iv) **Road Width**: 2.0 to 8.5 m (v) **Trench Width**: 0.85 to 2.5 m **2. Manholes –** 892 nos. • Material: Brick masonry circular manholes **3. Gully pit** – 85 nos,	Trunk sewers are proposed to be laid along Julpia road, Netaji pally, Rabindra pally, Gholpara, Ramjibanpur Magur khali, Sajneberia, Rabindra sarani, Darir chak road etc. Around 2.7 km sewer line will be laid by micro tunnelling method along Kabardanga - Julpia road. The manholes will be constructed based on the assessment of subsoil condition and traffic loads well within the Right of Way (ROW) of Kolkata Municipal Corporation (KMC) and Public Works Department (PWD) roads along the sewer network. Gully pits will be provided in broader roads and Catch pits in narrow roads

		• Dimension: 625mm x 1100mm x 1550mm depth **4. Catch pit** – 1623 nos. • Dimension: 600mm x 525mm x 1250mm depth **5. Household sewer connections:** 1600 nos. • **Materials: Unplasticized** Polyvinyl Chloride (uPVC) Diameter: 110 mm or 160 mm **6. Road restoration:** 15.9 km	
Outfall structures	Discharge storm runoff / combined flow into canals. All the outfalls are proposed to be with controlling arrangement to prevent possibility of intrusion of canal water into the S&D system during the high-water level condition in the canals. The Invert level of all the outfalls is considered to be at the full discharge level (FDL) or above FDL of canal with sluice gate of requisite size.	**New:** Total 24 nos. of Gravity outfalls are proposed. **Components**: Sluice gate structure or Flap gate as per site condition.	**New**: **<u>Outfalls on local channels and Keorapukur canal connecting to Tolly's Nullah Basin</u>** (i) Outfall at Chak ramnagar road (Lat- 22.4509 long. 88.33428) (ii) Outfall at Netaji pally (Lat- 22.45082, long. 88.33712) (iii) Outfall at St. Thomas church road (Lat- 22.44835 long. 88.33446) (iv) Outfall at St. Thomas church road (Lat- 22.4480, long. 88.33874) (v) Outfall at St. Thomas church road (Lat- 22.44846, long. 88.34203) (vi) Outfall at St. Thomas church road (Lat- 22.44859, long. 88.34312) (vii) Outfall at St. Thomas church road (Lat- 22.44816, long. 88.3482) (viii) Outfall at Ramnagar (Lat- 22.44688, long. 88.3343) (ix) Outfall at Nepalgange (Lat- 22.44499, Long. 88.33516) (x) Outfall at Ramjibanpur (Lat- 22.44259, long. 88.33581) (xi) Outfall at Ramjibanpur (Lat- 22.44158, long. 88.34058)

			(xii) Outfall at Nepalgange (Lat-22.44163, 88.33524) (xiii) Outfall at Sajneberia (Lat-22.44076, 88.3354) (xiv) Outfall at sajneberia (Lat-22.44067, long. 88.33522) (xv) Outfall at sajneberia(lat. 22.43952, 88.32832) (xvi) Outfall at Darir chowk road (222.43961, long. 88.32832 (xvii) Outfall at Darir chowk road (lat. 22.44182, long. 88.3268) (xviii) Outfall at Darir chowk road (lat. 22.44182, long. 88.32736) (xix) Outfall at Darir chowk road (lat. 22.44531, long. 88.32846) (xx) Outfall at Sajneberia (lat. 22.43914, long. 88.33544) (xxi) Outfall at Sitala pally (lat. 22.43767, long. 88.3366) (xxii) Outfall at Ramjibanpur Magurkhali (lat. 22.43539, long. 88.3381) (xxiii) Outfall at Ramjibanpur Magurkhali (lat 22.43315, long. 88.339021) (xxiv) Outfall at ONGC more (lat 22.43014, long. 88.34153) Outfall locations are under the Irrigation department, Government. of West Bengal
Construction of combined Pumping station and pumping mains	The combined flow (DWF+SWF) generated from the project area will be conveyed to the proposed Julpia Pumping station. SWF from Julpia PS will be disposed of to Keorapukur canal through a dedicated SWF pumping main. The entire DWF will be conveyed to the proposed Kabardanga PS	**New** Construction of Pumping station **Area required:** 0.18 Ha **Components:** **1. SWF Pump** ➢ SWF pump – 5 nos. **(**4W+1S) ➢ Capacity of pump: 1125 liters per second (lps) each ➢ SWF pumping main – 1400mm	One new pumping station at government land under possession of KMC (latitude:22.44136, Longitude: 88.33503) **Pumping mains:** 1. SWF to Keorapukur canal 2. DWF will be conveyed to the proposed S&D network in Kabardanga catchment for onward transmission to the proposed Kabardanga pumping station (under KSHARP, Package SD 07)

	proposed under KSHARP.	diameter mild steel MS pipe with length of 175 m ➢ Wet well: 10.5m diameter and 13.4 m depth **2. DWF Pump** ➢ DWF pump – 6 nos. (3W+3S) ➢ Capacity of pump: 57 lps of 19 m head. ➢ Power requirement – 18.5 KW each ➢ DWF Pumping Main – 400mm diameter DI pipe of 1500m length	

Source: DPR,2024.

Table 4: Subproject Component Details of Kabardanga Catchment (Package: SD 07)

Component	Function	Description	Location
Laying sewer and drainage network with manholes and house sewer connection	Collection of Stormwater Flow (SWF) from entire catchment area and Dry Weather Flow (DWF) from individual houses Each gully pit / catch pit with proper road camber will receive storm runoff from the road surface.	**1. Sewer and Drainage network** (i) **Total Length:** 16.6 km • Diameter below 600 mm = 5.7 km • Diameter 600 mm and above = 10.84 km • Out of 16.6 km, 2.0 km sewer line (diameter varying 1400 mm - 2000 mm) will be laid by Micro – tunneling method and rider sewer line of 1.1 km (ii) **Pipe material:** Reinforced Cement Concrete (RCC)	Trunk sewers are proposed to be laid along M.G. Road, Prantik housing road, Dhali para, Ramchanndrapur(Ghorai Road), brick field road, Julpia road, Krishnanagar Hazra para road, Nutan pally and Ramkantopur Udayachal. About 2.0 km sewer line will be laid by micro tunnelling method along M. G. Road (870 m) and along Julpia Road (1170 m). The manholes will be constructed based on the assessment of subsoil condition and traffic loads well within the ROW of KMC and PWD roads along the sewer network. Gully pits will be provided in broader roads and Catch pits in narrow roads

Component	Function	Description	Location
		(iii) **Pipe Diameter:** 300 to 1800 mm (iv) **Road Width:** 2.5 to 13.5 m (v) **Trench Width**: 0.85 to 3.1 m **2. Manholes –** 984 nos. (RCC manhole) • Material: Brick masonry circular manholes **3. Gully pit** – 89 nos. • Dimension: 625mm x 1100mm x 1550mm depth **4. Catch pit** – 1697 nos. • Dimension: 600mm x 525mm x 1250mm depth **5. Household sewer connections: 1580 nos.** • Materials: Unplasticized Polyvinyl Chloride (uPVC) Diameter: 110 mm or 160 mm **6. Road restoration:** 15.5 km	
Outfall structures	Discharge storm runoff / combined flow into canals. All the outfalls are proposed to be with controlling arrangement to prevent possibility of intrusion of canal water into the S&D system during the high-water level condition in the	**New:** Total 15 no. of Gravity outfalls are proposed. **Components**: Sluice gate structure or Flap gate as per site condition.	**New:** **<u>Outfalls to connecting channels to Keorapukur canal</u>** (i) Outfall at Thakurani chak patra para (Long- 88.3256697929, Lat- 22.4548141534) (ii) Outfall at Pragati Pally (Long- 88.3285870621, Lat- 22.446279786)

Component	Function	Description	Location
	canals. The invert level of all the outfalls are considered to be at the full discharge level (FDL) or above FDL of canal with sluice gate of requisite size.		(iii) Outfall at Chak ramnagar road (Long- 88.3299778221, Lat- 22.4501714163) (iv) Outfall at Chak Ramnagar road (Long- 88.3302022106, Lat- 22.452003221) (v) Outfall at Chak ramnagar road (Long- 88.3309725502, Lat- 22.455395933) **<u>Outfall to Keorapukur canal</u>** (i) Outfall at Krishnapara road (Long- 88.3341487666, Lat- 22.4538061078) (ii) Outfall near missonary of word hostel (Long- 88.3338741696, Lat- 22.4548591844) (iii) Outfall near Carmel high school (Long- 88.3339000508, Lat- 22.4569909555) (iv) Outfall near St. Thomas burial ground (Long- 88.3336981903, Lat- 22.4586997152) (v) Outfall near Kabardanga fish market (Long- 88.3348422315, Lat- 22.4636281616) **<u>Outfall on Western Channel</u>** (i) Outfall at Dhalai bridge area (Long- 88.342509198, Lat- 22.4568177578) (ii) Outfall at Dhalai bridge area (Long- 88.3424524017, Lat- 22.4580438824) (iii) Outfall at Dhalai bridge area (Long- 88.3424377768, Lat- 22.4591006822) (iv) Outfall at Dhalai bridge area (Long- 88.342403124, Lat- 22.4601681508)

Component	Function	Description	Location
			(v) Outfall at Dhalai bridge area (Long-88.3423401652, Lat-22.460782742) Outfall locations (canals) are under the Irrigation department Government of West Bengal
Construction of combined Pumping station and Pumping mains	The combined flow (DWF+SWF) generated from the project area will be conveyed through the main trunk sewer line to the proposed Kabardanga pumping station. SWF from this PS will be disposed of to Keorapukur canal by one number of dedicated SWF pumping main. DWF from Kabardanga PS (including DWF generated from both Kabardanga and Julpia subproject areas) is proposed to be conveyed to Churial Extension PS. From Churial Extension PS, DWF will be transmitted to STP at Bank Plot for treatment and disposal. The S&D network in Churial extension catchment, Churial Extension pumping station & STP are being implemented under ongoing KEIIP Trench 3.	**New** Construction of Pumping station **Area required:** 0.40 Acres **Components:** **1. SWF Pump** ➢ SWF pump – 5 nos. **(**4W+1S) ➢ Capacity of pump: 1000 lps each ➢ SWF pumping main – 1400 mm diameter MS pipe with length of 175 m ➢ Wet well: 14 mm diameter and 13m depth **2.DWF Pump** ➢ DWF Pump – 6 nos. (3W+3S) ➢ Capacity of pump: 90 lps of 14 m head. ➢ Power requirement – 24 KW each ➢ DWF Pumping Main – 500mm dia DI pipe of 850 m length	One new pumping station in a government land under possession of PWD (latitude:22.46290, Longitude: 88.33410) **Pumping mains:** 1. SWF to Keorapukur canal 2. DWF from the Kabardanga pumping station will be pumped to the manhole of S&D network of Churial Extension pumping station on M.G Road (under construction in KEIIP Tranche 3) ,

Source: DPR,2024.

15. **Proposed subproject.** The proposed sewerage system in the subproject areas of Julpia and Kabardanga zones are designed as a combined system to convey both DWF and storm water flow SWF. With the aim of providing relief to the residents of the study areas from the long-lasting problem of prolonged stormwater logging and stagnation of sewage, an organized S&D network including construction of pumping stations are proposed for the subproject areas. Pumping stations are proposed to be constructed in a government land at Julpia (KMC land) and Kabardanga (under PWD department) to cater flows generated under this project (refer Figure 14 and 17). As the quantum of SWF is several times higher than the dry weather flow, the system carries an insignificant flow for major period of a year. In the KMC areas the roads are in general narrow, particularly in the study areas. Therefore, it will be extremely difficult to lay at least two separate conduits for SWF and DWF keeping into consideration the presence of other utility lines. Further, the prevailing drainage system in the city is combined in nature i.e. carries both sewage and storm runoff. Therefore, the sewer network in the study areas are proposed to be designed as a combined system in the line of system adopted in KEIP and ongoing KEIIP. In order to avoid undue loading on the STP, bypass arrangement is proposed at strategic locations so that during heavy showers, excess flow is diverted through the outfall system. Adequate dilution is ensured in the system for SWF discharge through (i) overflow structures level in gravity outfall ensures minimum dilution before bypassed into SWF channels, (ii) pumping from wet well is initiated only after attaining the requisite level and thus dilution, and (iii) standard operating procedures are already available and followed.

16. In **Julpia catchment** major trunk sewers (16.9 km) are proposed to be laid along Kabardanga-Julpia road which will cater to flow from the western and eastern part of the Julpia road as shown in Figure 23.

17. The said sewer line will be connected to the proposed Julpia pumping station. Flow from the eastern part of the Julpia road, will be conveyed to the major trunk sewer line along Julpia road through the trunk sewer lines along different roads in the eastern portion of the project areas. For conveying flow to the proposed sewer line along Julpia road, sewer lines at different locations are proposed to be laid below the Keorapukur canal. For crossing of Keorapukur canal, sewer lines below canal bed level are proposed to be laid by Jack pushing method. Trunk sewer line along Julpia road is proposed to be laid by micro tunneling method (2.7 km sewer line with diameter varying from 1400 mm to 2200 mm) (Figure 15). Flows, generated from western part of the Julpia road, will be conveyed to the Julpia road through different trunk sewer lines along Sajna Beria Road, Rabindra Sarani, Ramkrishna Ashram Road. The combined flow generated from these sewers will be conveyed to the proposed main trunk sewer line for onward transmission to the proposed Julpia pumping station.

18. In Kabardanga catchment area sewers (16.6 km) are proposed to be laid along M.G. road, Prantik housing road, Dhali para, Ramachandrapur (Ghorai Road), Brick Field Road, Julpia road, Krishnanagar Hazra para road, Nutan Pally and Ramkantopur Udayachal and other roads as shown in Figure 17. About 2.0 km sewer line will be laid by micro tunnelling method along M. G. Road (870 m) and along Julpia road (1170 m) with pipe diameter varying from 1400 mm to 2000 mm (Figure 18). The combined flow generated from these sewers will be conveyed to the proposed main trunk sewer line for onward transmission to the proposed Kabardanga pumping station.

19. **Treatment and Discharge.** The DWF from the proposed Julpia pumping station (package SD 06) will be directed to the S&D network in the Kabardanga catchment via a dedicated pumping main of 1500 m length of 400 mm diameter of DI (K-9) pipe, for onward transmission to the proposed Kabardanga pumping station. The S&D network including the pumping station for the

Kabardanga catchment, will be implemented under the KSHARP (package SD 07). From the Kabardanga PS, the DWF generated from both the Kabardanga and Julpia catchments will be conveyed through a dedicated pumping main of 850 m length with 500 mm diameter of DI (K-9) pipe along M.G. road to the S&D network of the Churial Extension catchment, and onward to the Churial Extension pumping station. At the Churial Extension pumping station, the DWF will be transmitted to the Bank Plot STP for treatment and disposal.[10] The construction of the S&D network for the Churial Extension catchment and the Churial Extension pumping station[11] and the Bank Plot STP[12] are currently underway under KEIIP Tranche 3.[13] The DWF from both subproject areas of Julpia and Kabardanga will be treated at the SBR based treatment technology at Bank Plot STP (Figure 21) to meet discharge standards as recommended by the CPCB in 2015 and in accordance with the National Green Tribunal (NGT) order dated April 30, 2019 (Appendix 3). Surplus treated effluent from the STP, after reuse, will be discharged into the nearby Churial canal, which flows into the Hooghly River near Budge Budge, approximately 15 km from the Bank Plot STP site.

20. The SWF from the Julpia pumping station will be discharged into the Keorapukur canal through a dedicated pumping main of 175 m in length, consisting of a 1400 mm diameter MS pipe. Additionally, a portion of the SWF generated from the project area will be directed to the Keorapukur canal via thirteen gravity outfalls (GOF) and through eleven GOFs connected to various drains, equipped with sluice gate arrangements. During rainfall, the combined flow from the trunk sewers is diverted into the Keorapukur canal system through these connecting drains. The Keorapukur canal system eventually merges with Tolly Nullah and flows into the Hooghly River.

21. The SWF from the Kabardanga pumping station (SD 07) will be discharged into the Keorapukur canal through a dedicated pumping main of 175 m in length, consisting of a 1400 mm MS pipe. Additionally, a portion of the SWF generated from the project area will be routed to the Keorapukur canal through five gravity outfalls (GOF), to connecting drains through five more GOFs, and to the Western channel through another five GOFs, all equipped with sluice gate arrangements flowing along the subproject boundary. During rainfall, the combined flow from the trunk sewers will be diverted into both the Western channel and Keorapukur canal. The Western channel joins the Keorapukur canal system, which in turn connects with Tolly Nullah, eventually flowing into the Hooghly River, located at a distance of 8.0 km from the Kabardanga subproject area.

22. Sluice gates will be provided as the controlling device to prevent backflow into the system. Considering tidal influence and water level in all the drainage outlets, the invert level of the outfalls are proposed to be fixed at the full discharge level (FDL) of the canal. During heavy rainfall events, the sluice gate will be opened, and the stormwater flow will be disposed of to the canal gravity outfall. Sluice gates will be operated by motorized mechanisms. Preliminary assessments conducted by KMC confirmed that these canals have adequate capacity to carry the SWF and 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.

[10] Total distance of Julpia PS to Kabrdanga PS is about 2.40 km and from Kabardanga PS to Bank plot STP via Churial PS is 2.25 km

[11] https://www.adb.org/sites/default/files/project-documents/42266/42266-025-iee-en_0.pdf

[12] https://www.adb.org/sites/default/files/project-documents/42266/42266-026-sddr-en_11.pdf

[13] Due diligence of both packages was carried out and IEE reports were prepared and approved and disclosed by ADB.

23. The drainage system in Tolly Nullah basin gravitated westwards to the Hooghly River system. Tolly's Nullah is a navigational link between the Hooghly River and the Bidhyadhari River system. The Bidyadhari River (a tributary to Matla River) is connected with Hooghly River through Adi-Ganga (a spill channel of Hooghly River). Tolly Nullah joined the 'Adi-Ganga' by cutting a new canal from Garia where the 'Adi-Ganga' takes a southward turn. There are two stormwater channels viz. Keorapukur canal and Western channel flowing through the subproject areas. The Western channel meets with the Keorapukur canal, under Tolly Nullah basin and ultimately meets with the Tolly Nullah near Kudghat Metro station. Tolly Nullah, in the form of 'Adi-Ganga' meets Hooghly River at a distance of about 8.0 km from the Kabardanga subproject location.

24. Road wise proposed pipeline diameter, trench width and depth and average width of the road for Julpia (SD 06) is given in Table 5 and for Kabardanga (SD 07) is given in Table 6.

25. Roads through which sewer pipelines will be laid are under the ownership of KMC and PWD.

Table 5: Road wise Proposed Pipeline Diameter (Julpia Subproject, Package SD 06)

Sr. No.	Name of Road	Proposed Pipe Diameter (mm)	Length (mt)	Trench Width (mt)	Trench Depth (mt)	Average Width of Road (mt)
1	Kabardanga Julpia Road	300-2000	2700	0.85-3.4	7.35	7.5 - 8.5
		300-600	2500	0.85-1.3	2.37	
2	Madha Ramnagar Road	300-700	265	0.85-1.45	1.89	3.0 - 4.0
3	Ramkrishna Asrama Road	300-800	321	0.85-1.6	2.51	4.0 - 4.5
4	Keorapukur Canal Side Road connecting to Sitala Pally	500	228	1.15	3.06	2.0 - 2.5
5	Keorapukur Canal Side Road connecting to Ramjibanpur	300-600	630	0.85-1.3	1.95	2.0 - 2.5
6	Keorapukur Canal Side Road connecting to Rabindra Pally	300-700	316	0.85-1.45	2.44	2.0 - 2.5
7	Keorapukur Canal Side Road connecting to Netaji Pally	300-500	260	0.85-1.15	1.80	2.0 - 2.5
8	Netaji Pally Road	700-1000	365	1.45-1.9	3.12	4.0 - 4.5
9	St. Thomas Church Road	500-1400	1335	1.15-2.5	3.26	3.0 - 4.5
10	Rabindra Pally Road	600-1000	446	1.3-1.9	3.54	2.9 - 3.2
11	Ramjibanpur (Magur Khali) Road	300-1400	1300	0.85-2.5	3.58	3.2 - 4.2
12	Sitala Pally (Magur Khali) Road	300-800	232	0.85-1.6	2.50	2.3
13	Vivekananda Pally Road	300-800	347	0.85-1.6	2.31	2.5
14	Road of Amra Kajon Sangha, Maa Manasha Thakur Bari & Malpara Water Supply Tank	300-1200	588	0.85-2.2	2.16	4.0 - 4.3
15	Road of Mallicpur gram area	700-800	523	1.45-1.6	3.74	3.0 - 3.5

Sr. No.	Name of Road	Proposed Pipe Diameter (mm)	Length (mt)	Trench Width (mt)	Trench Depth (mt)	Average Width of Road (mt)
16	Road Connecting to Kabardanga Julpia Road at ONGC More	1200	414	2.2	3.65	4.0 - 7.0
17	Keorapukur Canal Side Road Connecting to Vivekananda Pally	300-500	152	0.85-1.15	1.95	2.0 - 2.5
18	Sajna Beria Road	500-1000	562	1.15-1.9	2.63	3.0 - 4.5
19	Road Connecting to Darir Chak Road	400-1000	538	1.0-1.9	1.95	2.0 - 3.0
20	Darir Chak Road	1000-1200	610	1.9-2.2	2.79	5.5 - 6.0
21	Gholpara Road	1200	605	2.2	4.69	4.0 - 4.5
22	SWF Pumping Main	1400	175	2.5	2.50	7.5 - 8.5
23	DWF Pumping Main	400	1500	1.0	1.50	7.5 - 8.5

Source: DPR 2024.

Table 6: Road wise Proposed Pipeline Diameter (Kabardanga Subproject, Package SD 07)

Sr. No.	Name of Road	Proposed Pipe Diameter (mm)	Length (mt)	Trench Width (mt)	Average Width of the road (mt)	Proposed Trench Depth (mt)	Ward No.
1	MG road	400 – 1800	1260	1.0 – 3.1	13.5	3.5	Ward no. 142 (Connecting Road to M G Road comes under ward No. 143)
2	Brickfield road	500 – 1200	1769	1.15 – 2.2	4.5	4.1	Ward No. 142
3	Chak Ram Nagar road	600 – 1200	728	1.3 – 2.2	6.0	2.8	
4	Ramchandrapur Ghorai para	1000 – 1600	1035	1.9 – 2.8	5.0	3.6	
5	Rong para	300 – 800	308	0.85 – 1.6	3.5	2.3	
6	Manna para	500 – 800	220	1.15 – 1.6	4.5	3.3	
7	Paramanik para	300 – 500	165	0.85 – 1.15	3.5	1.9	
8	Purbayan area	800	326	1.6	3.5	2.6	
9	Prantik Housing Road	500 – 1200	875	1.15 – 2.2	7.0	2.3	Roads adjacent to Prantik housing complex phases I and III are under ward no. 143
10	Arabinda Nagar Dhali para	400 – 800	511	1.0 – 1.6	3.0	2.2	Ward No. 143
11	Sabujayan Abasan area	500 – 800	409	1.15 – 1.6	3.0	2.6	Ward No. 142
12	Ananda pally road	700 – 1000	311	1.45 – 1.9	4.5	2.8	
13	Kabardanga Julpia road	1400 – 2000	1152	2.5 – 3.4	8.0	8.0	
		300 – 1600	1067	0.85 – 2.8		2.7	
14	Krishnanagar para road	700 – 1000	546	1.45 – 1.9	4.0	3.9	
15	Patra para	400 – 800	355	1.0 – 1.6	3.0	2.0	
16	Keorapukur canal bank road	300 – 500	767	0.85 – 1.15	3.0	1.8	
17	Krishnanagar Hazra para road	300 – 500	247	0.85 – 1.15	3.0	1.9	
18	Nutan pally Lal pole	600 – 1000	563	1.3 – 1.9	3.5	3.1	
19	Krishnanagar Nutan pally	600 – 800	506	1.3 – 1.6	3.0	2.4	
20	Ramkantapur Udayachal	300 – 600	1318	0.85 – 1.3	2.5	1.8	

Sr. No.	Name of Road	Proposed Pipe Diameter (mm)	Length (mt)	Trench Width (mt)	Average Width of the road (mt)	Proposed Trench Depth (mt)	Ward No.
21	Western channel bank road	400 – 800	618	1.0 – 1.6	6.0	2.2	
22	MG road	1400 (SWF pumping main)	175	2.5	13.5	2.4	
23	Kabardanga Julpia road	500 (DWF pumping main)	850	1.15	8.0	1.5	

Source: DPR, 2024.

D. Analysis of Alternatives

24. Alternative analysis provides an opportunity to integrate environmental considerations into the early stages of a project (i.e., pre-feasibility or feasibility study), so that adverse environmental impacts can be avoided or minimized by various alternatives.

25. The development of S&D system in the added areas of Julpia (Part of ward 142) and Kabardanga covering part of wards 142 and 143 (Borough XVI of KMC) include construction of two pumping stations) and laying of combined networks (DWF and SWF collection) of 16.9 km and 16.6 km respectively and allied works like construction of manholes, catchpits, gully pits, outfall structures and house sewer connections which are proposed in government owned lands.

26. The proposed system will be developed as a combined network to carry DWF and SWF generated from the catchment area. The combined flow generated from the project area will be transported to proposed Julpia PS (SD 06) and Kabardanga PS (SD 07). SWF from both these PS will be disposed to Keorapukur canal by one pumping main. DWF from Julpia PS, entire DWF, would be conveyed to the proposed S&D network in Kabardanga catchment by dedicated pumping main for onward transmission to the proposed Kabardanga PS (under SD 07). From Kabardanga PS, the entire DWF generated from Julpia and Kabardanga catchment will be pumped to the inlet of proposed Bank Plot STP for SBR based treatment and disposal.

27. “Without” subprojects would yield the area 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 City of Kolkata and the 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.

28. “With” the implementation of the proposed subproject, people will have convenient access to improved drainage and sewerage systems. The sewerage system will remove the human waste from their homes safely and quickly and relief from water logging conditions within the sub-project area specially at Krishnanagar Para road, Netaji Pally, Chak Ramnagar, Pragati Pally, Sajnaberia, Ramjibonpur, Magur Khali (under SD 06) and adjoining areas to MG road, Brick field road, Chak ramnagar road, Krishnanagar para road, Nutan pally, Ramkantopur Udayachal (under SD 07) through improved drainage system. The promotion of good hygiene and sanitation practices will lead to significant public health benefits, notably by reducing waterborne and infectious diseases

due to enhanced sewerage and drainage systems. These improvements will also foster a conducive environment for local economic growth and better social services, benefiting communities within the municipality's reach. Consequently, this will contribute to the broader economic development of the region.

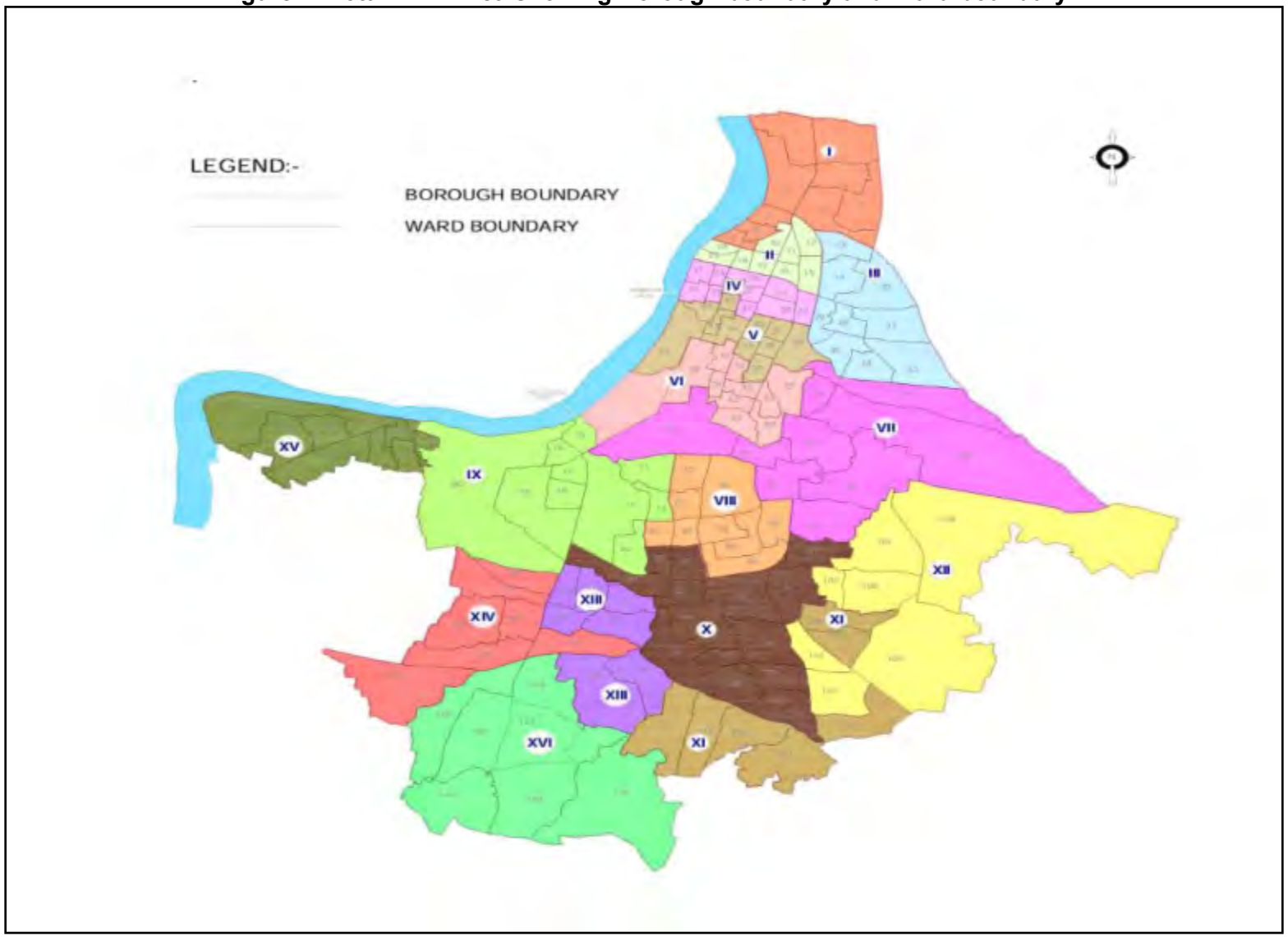
E. Subproject Benefit

29. The residents of ward 142 and 143 will be the major beneficiaries of the sub project. The benefits arising from the project include:(i) relief from prolonged water logging in Krishnanagar Para road, Netaji Pally, Chak Ramnagar, Pragati Pally, Sajnaberia, Ramjibonpur, Magur Khali (package SD 06) and adjoining areas to MG road, Brick field road, Chak Ramnagar road, Krishnanagar para road, Nutan pally, Ramkantopur Udayachal (package SD 07) due to improved sewer and drainage networks including construction of pumping stations (ii) better public health particularly reduction in waterborne and infectious diseases due to improved sewerage systems in project areas; (iii) reduced risk of groundwater contamination through appropriate sewer collection and treatment; (iv) reduced risk of contamination of treated water supplies; and (v) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

F. Implementation schedule

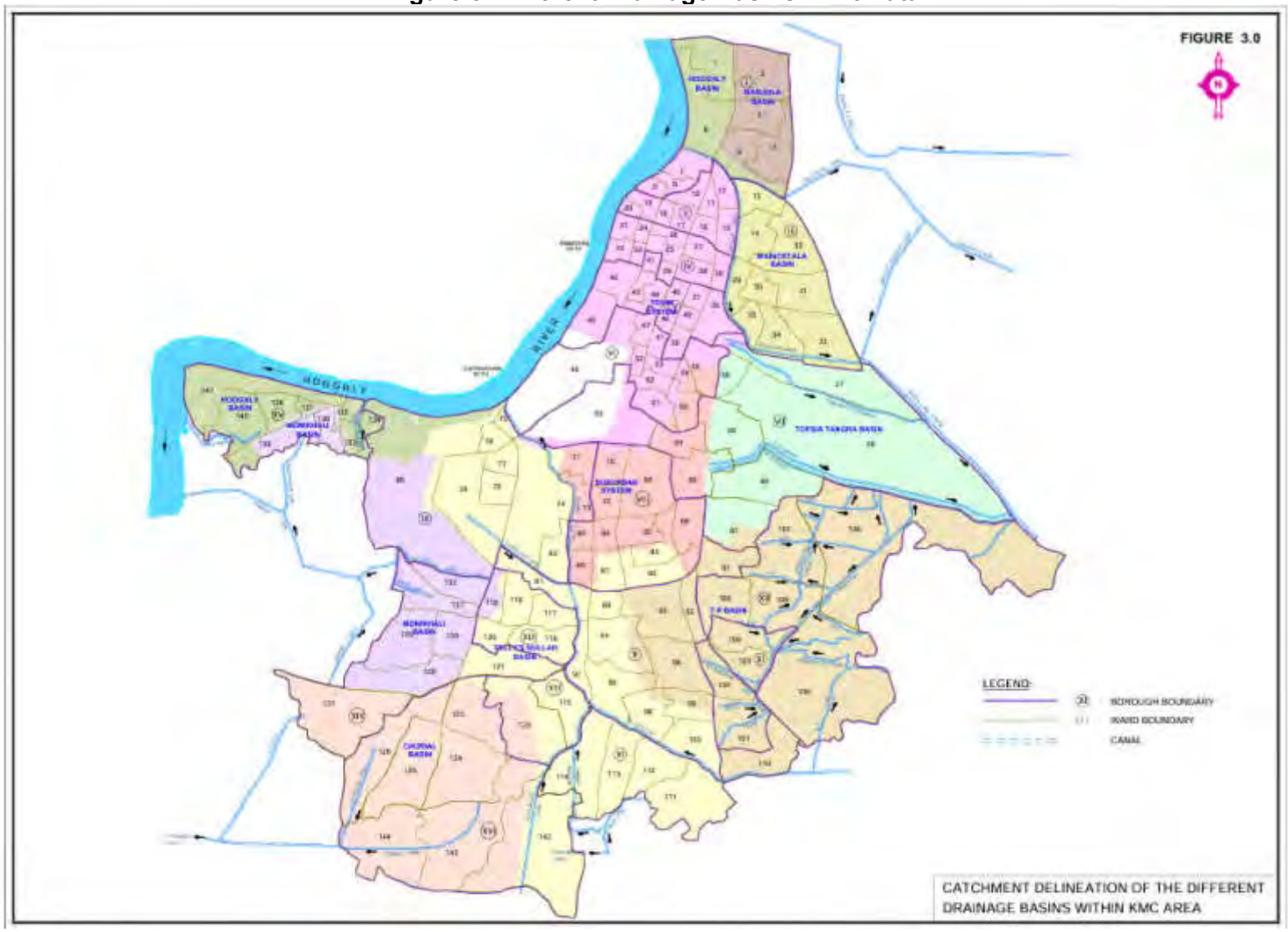
30. The project will be implemented under the Item rate contract. The implementation schedule for the subprojects involves a design and construction period of 4 years. Bids were invited in December 2024. The project is likely to be awarded by June 2025. The contractor will submit a System Improvement Plan (SIP), after carrying out detailed study of the existing system within the first 3 months after award of the work. The operation and maintenance (O&M) activity of 5 years is considered in both packages.

Figure 4: Total KMC Area showing Borough boundary and Ward boundary



Source: DPR,2023

Figure 5: Different Drainage Basins in Kolkata

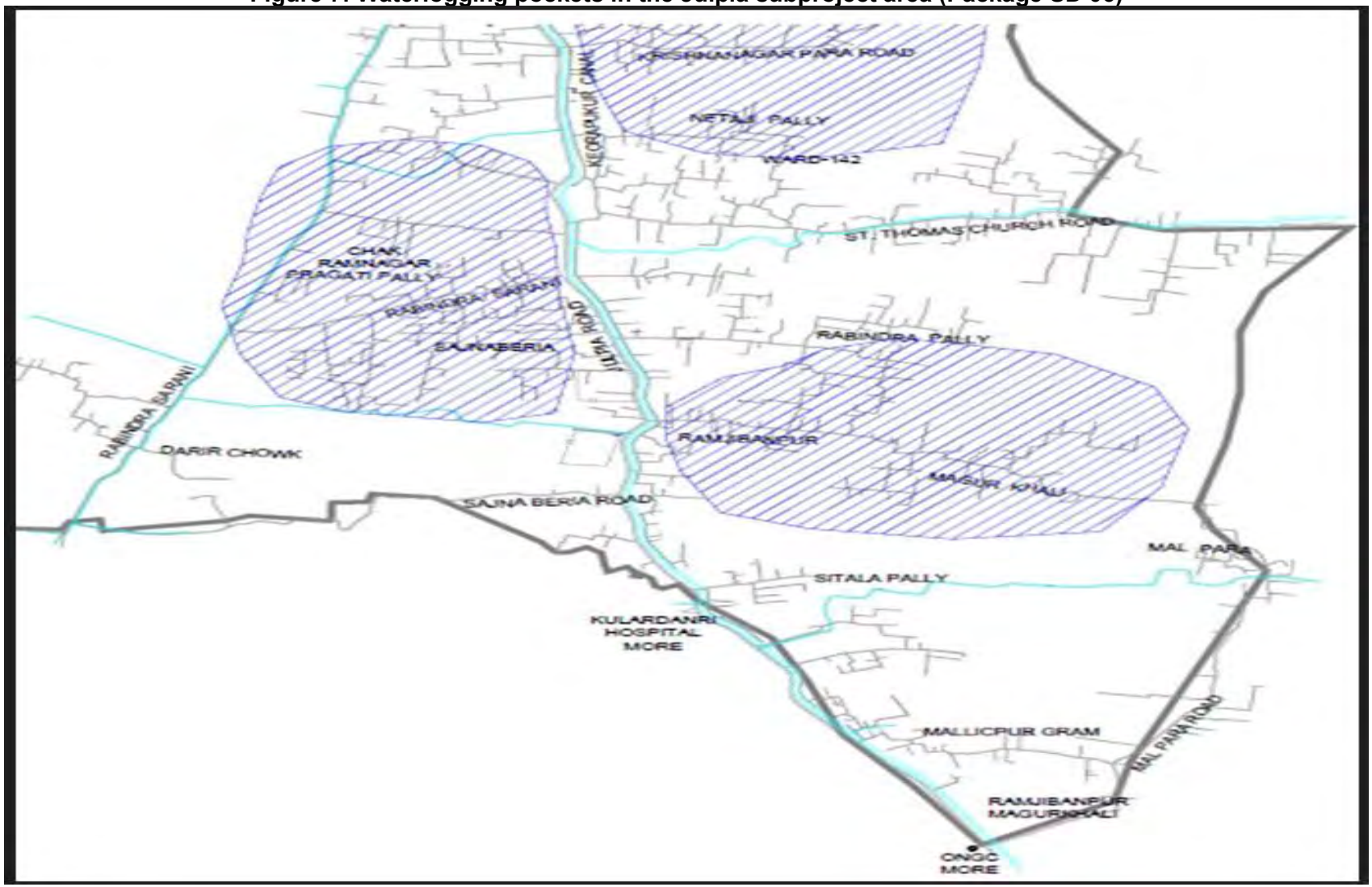


Source: DPR,2023

Figure 6: Canal Network in KMC Area

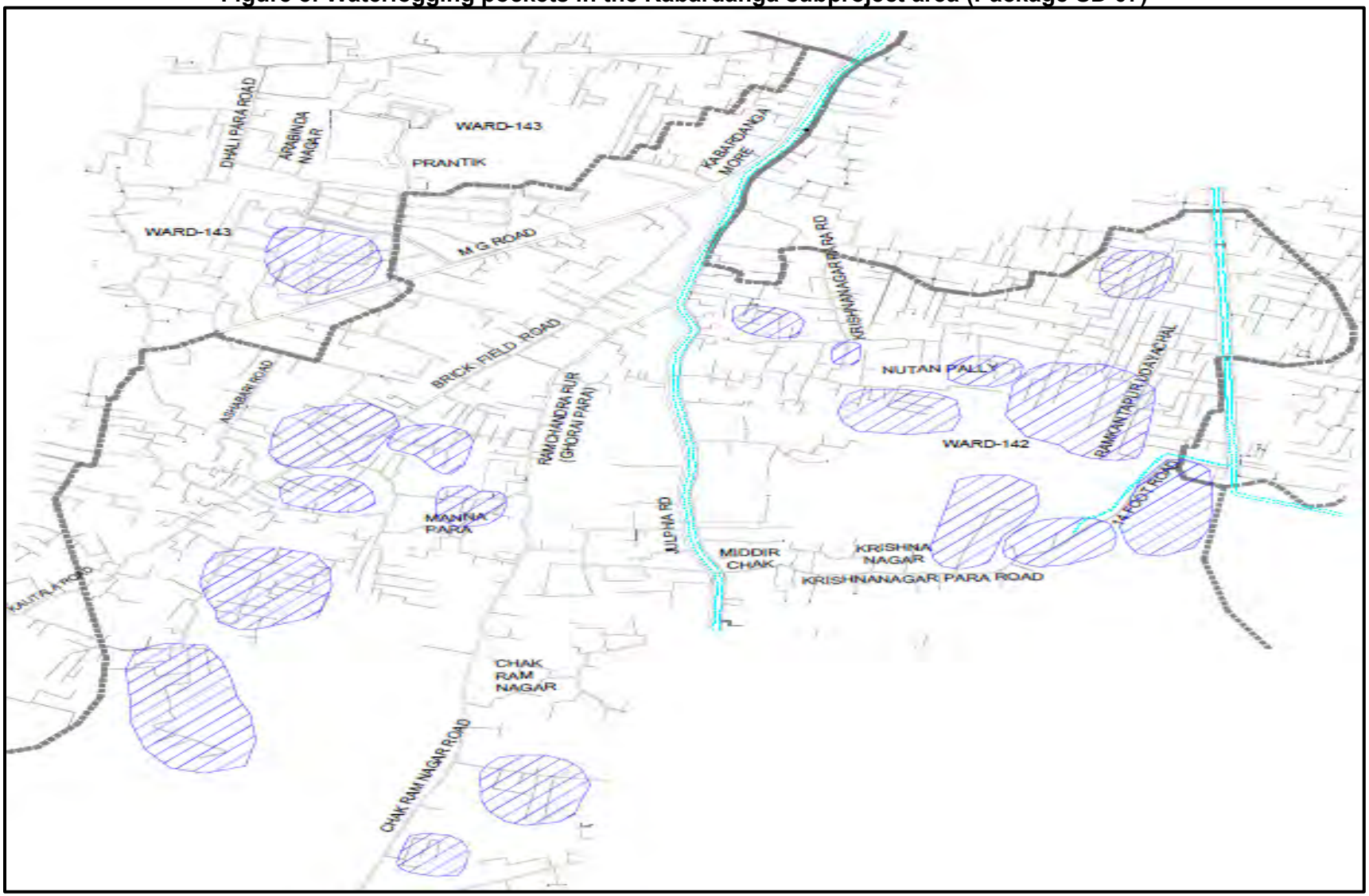
Source: DPR,2023

Figure 7: Waterlogging pockets in the Julpia subproject area (Package SD 06)



Source: DPR,2024

Figure 8: Waterlogging pockets in the Kabardanga subproject area (Package SD 07)

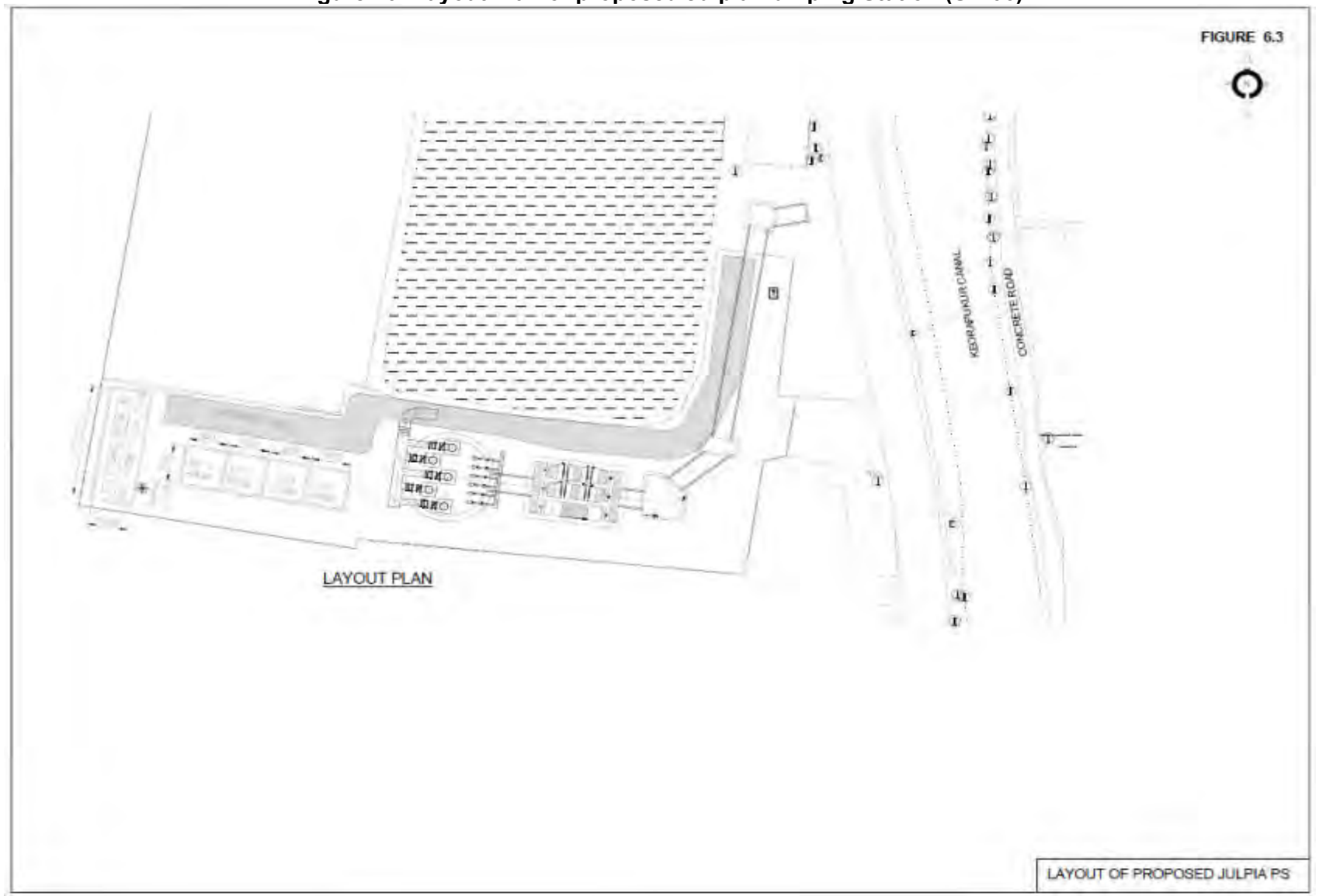


Source: DPR,2024.

Figure 9: Proposed Pumping Station Site at Julpia (SD 06)

Source: DPR,2024

Figure 10: Layout Plan of proposed Julpia Pumping Station (SD 06)

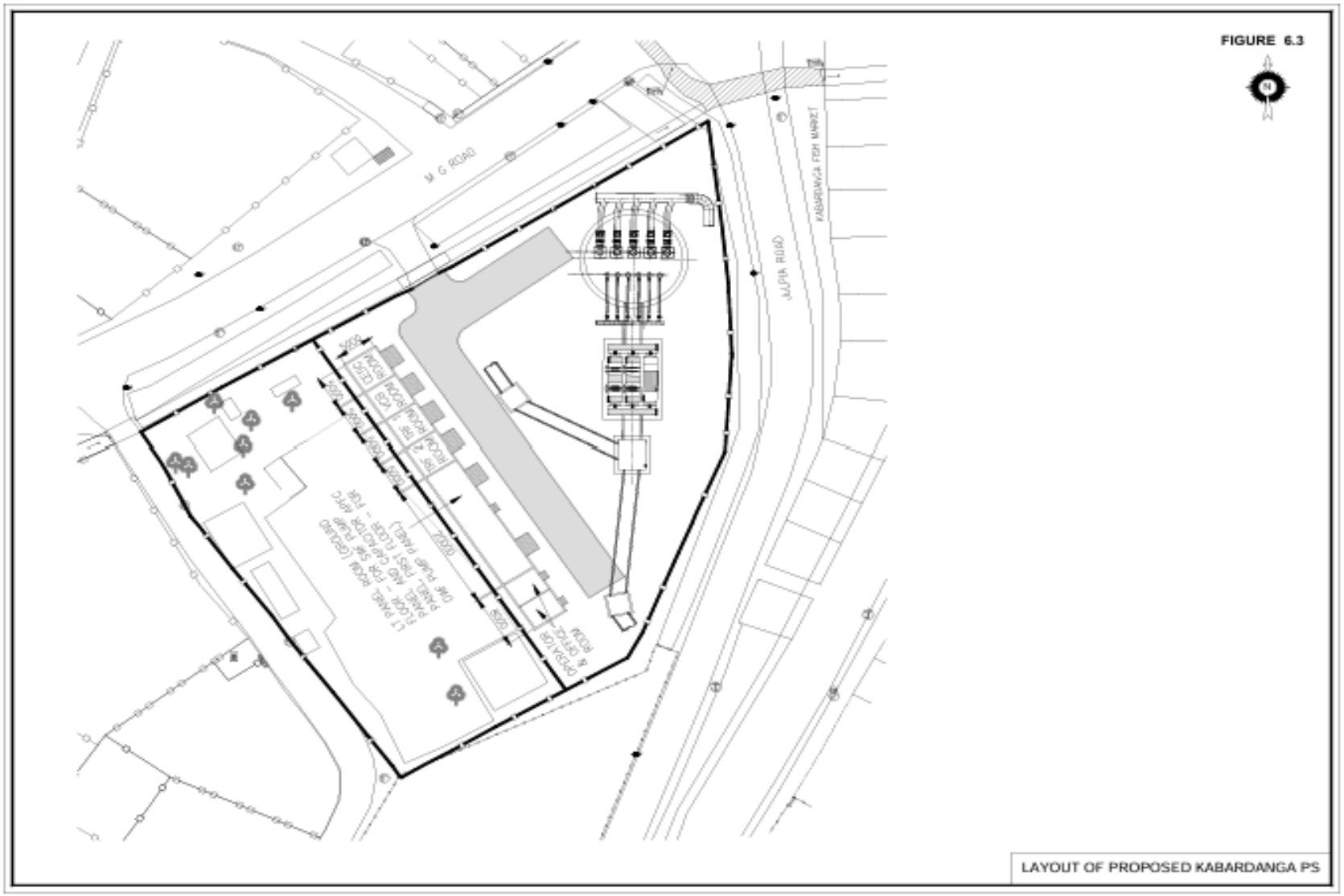


Source: DPR,2024.

Figure 11: Proposed Pumping Station Site at Kabardanga along with SWF and DWF Pumping main (SD 07)

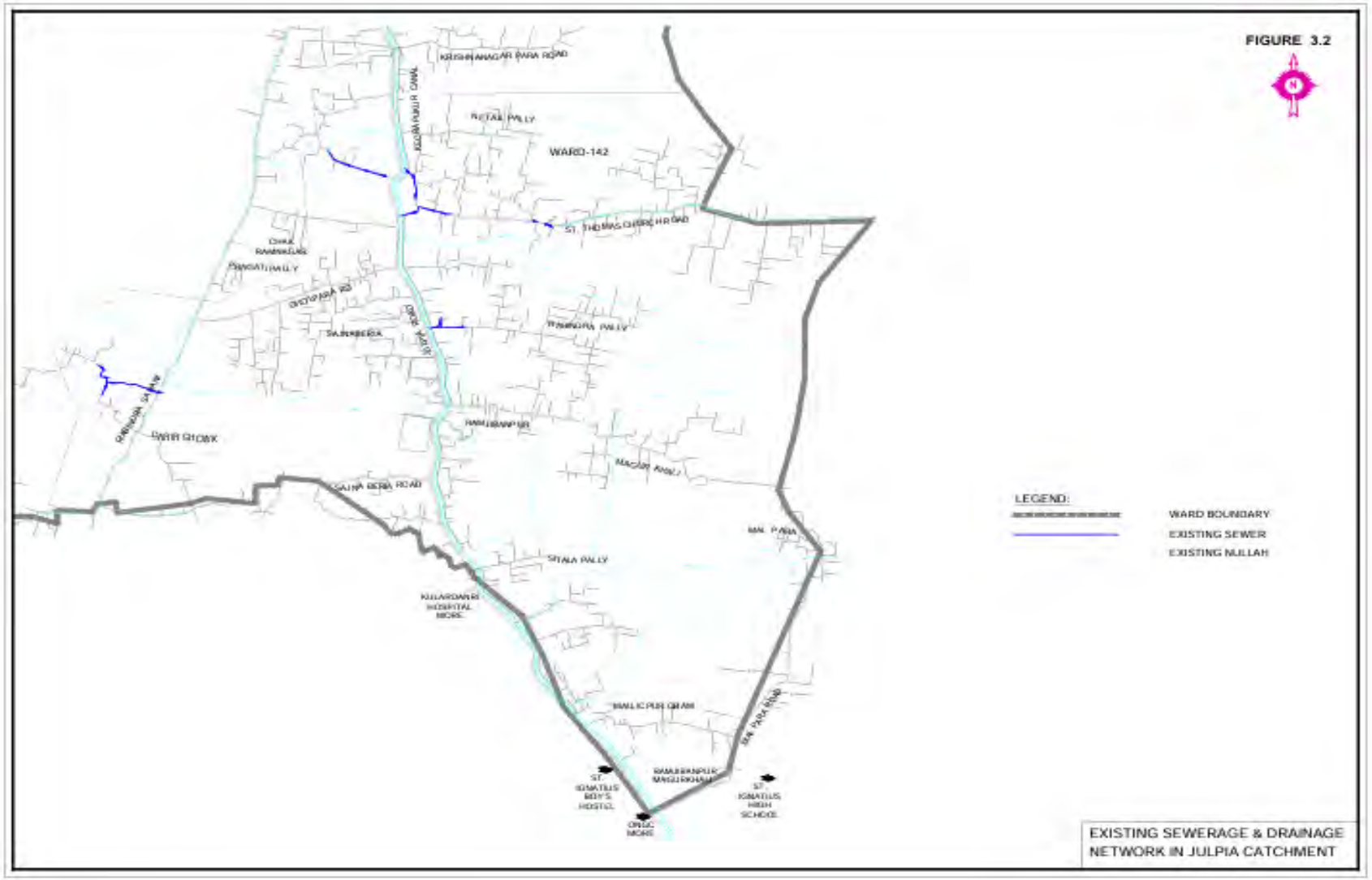
Source: DPR,2024

Figure 12: Layout Plan of Proposed Kabardanga Pumping Station (SD 07)



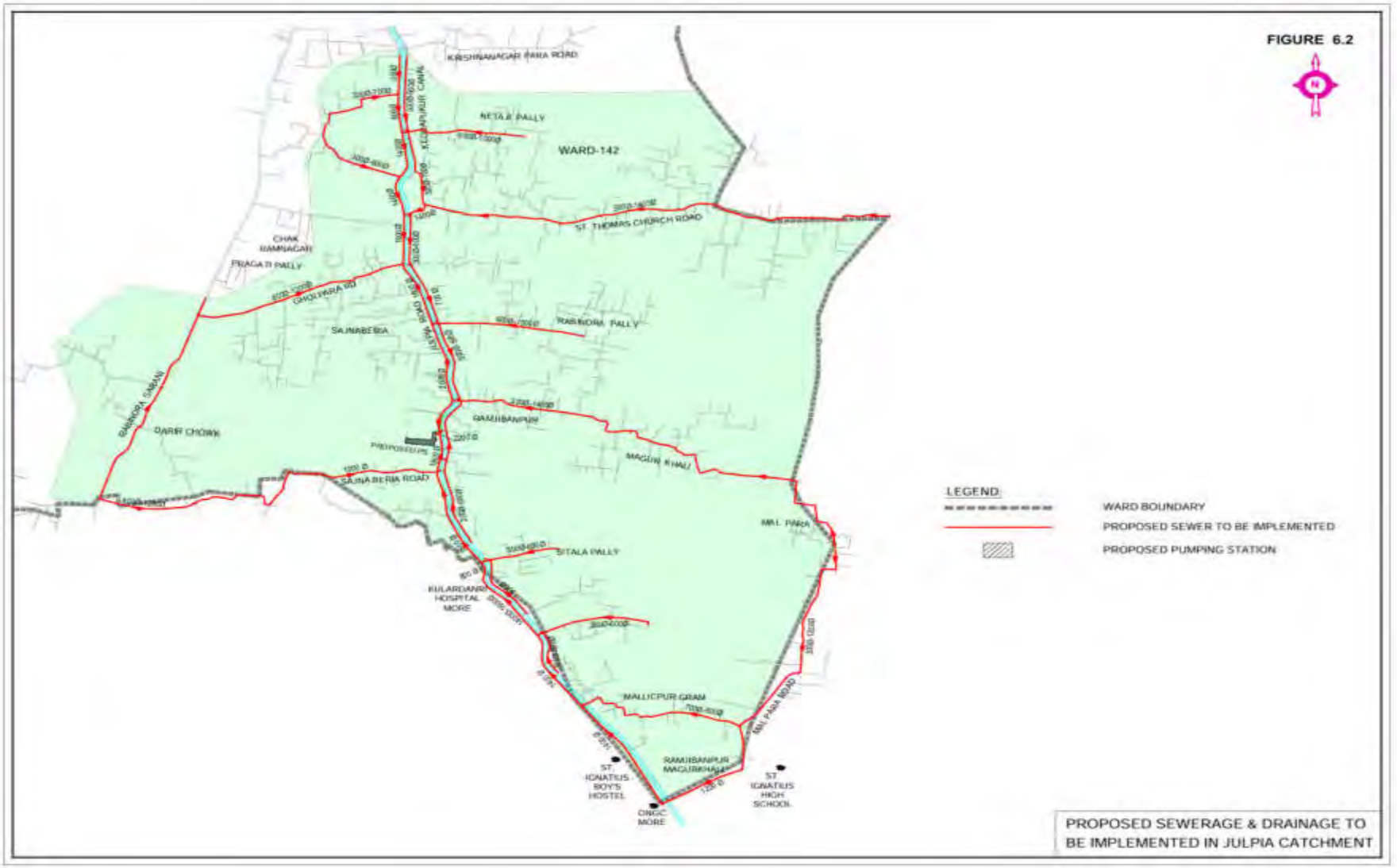
Source: DPR,2024

Figure 13: Existing Sewerage & Drainage Network in Julpia Subproject Area



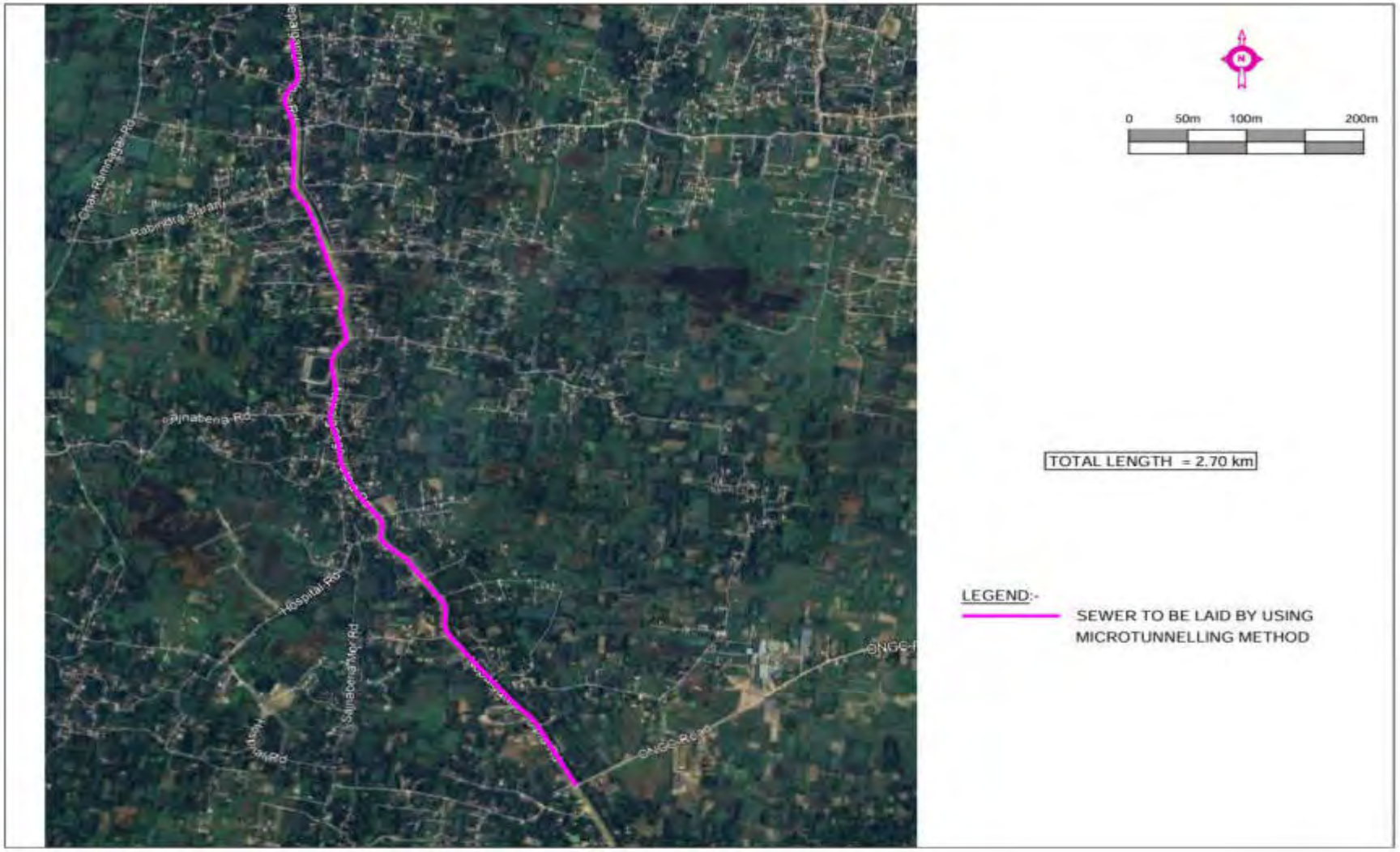
Source: DPR,2024

Figure 14: Proposed Sewerage & Drainage Work to be Implemented in Julpia Catchment



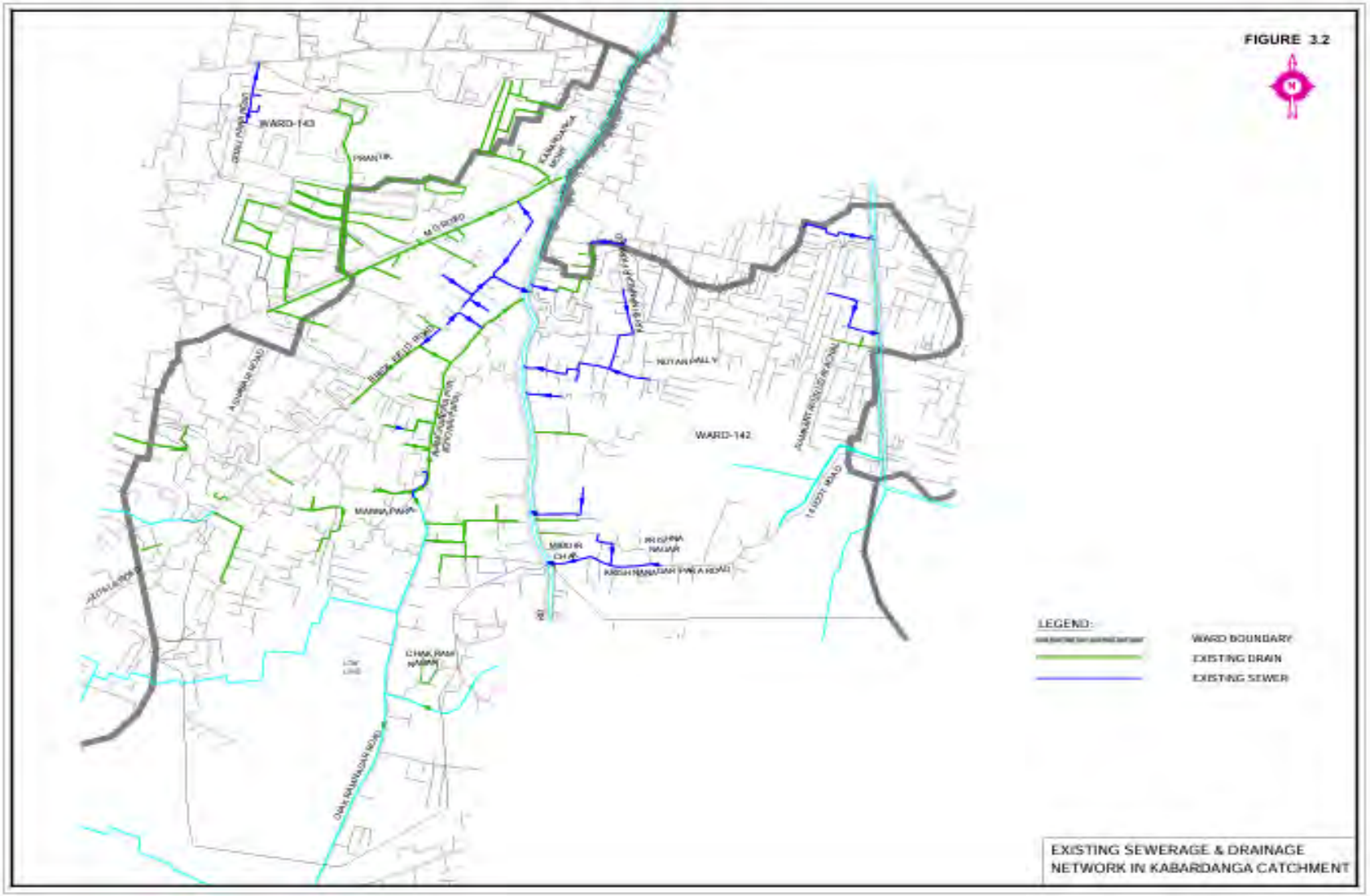
Source: DPR,2024

Figure 15: Proposed Sewer Pipe laying by Micro tunneling and Jack pushing in Julpia Catchment



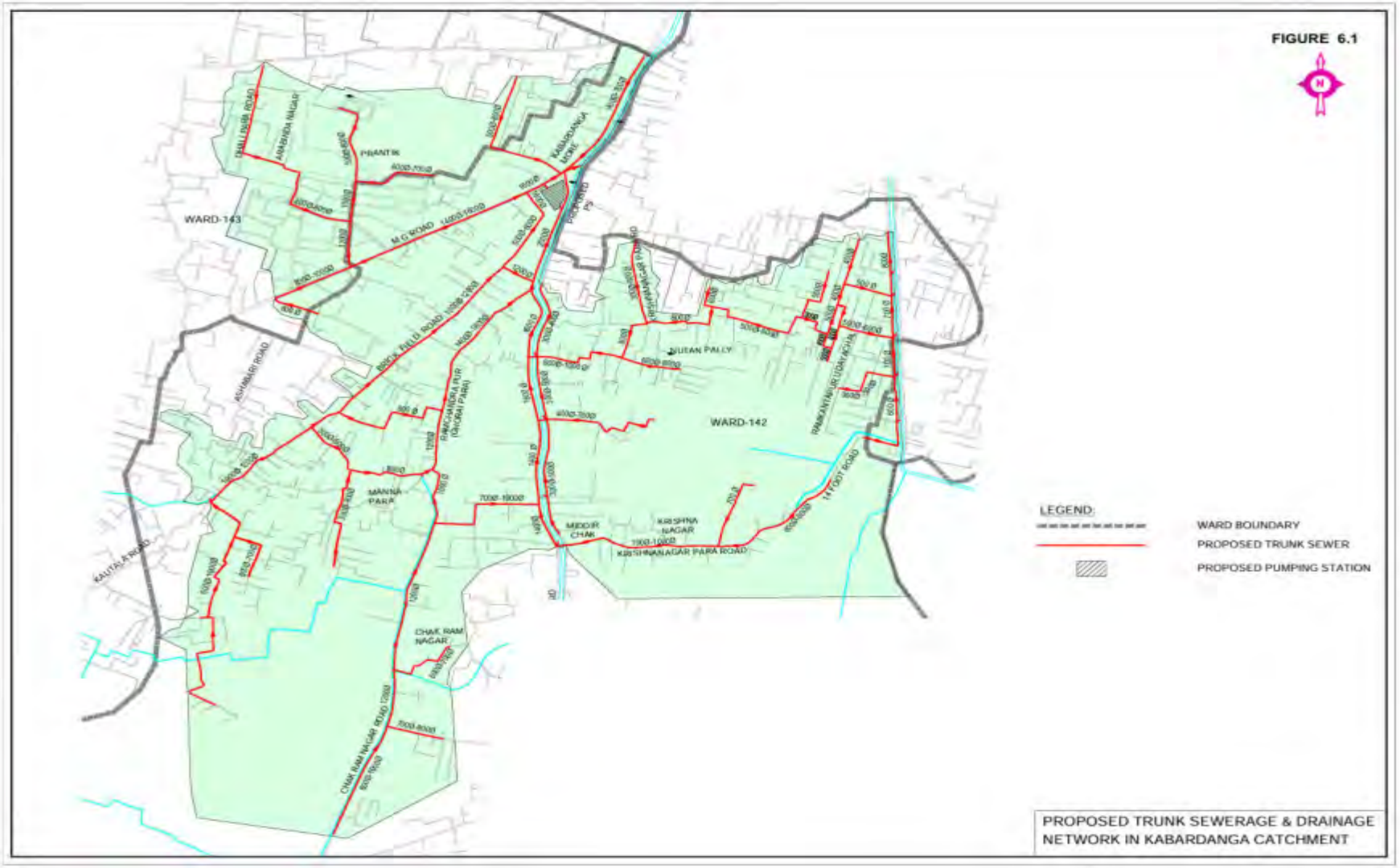
Source: DPR,2024

Figure 16: Existing Sewerage & Drainage Network in Kabardanga Catchment



Source: DPR,2024

Figure 17: Proposed Sewerage & Drainage Work to be Implemented in Kabardanga Catchment



Source: DPR,2024

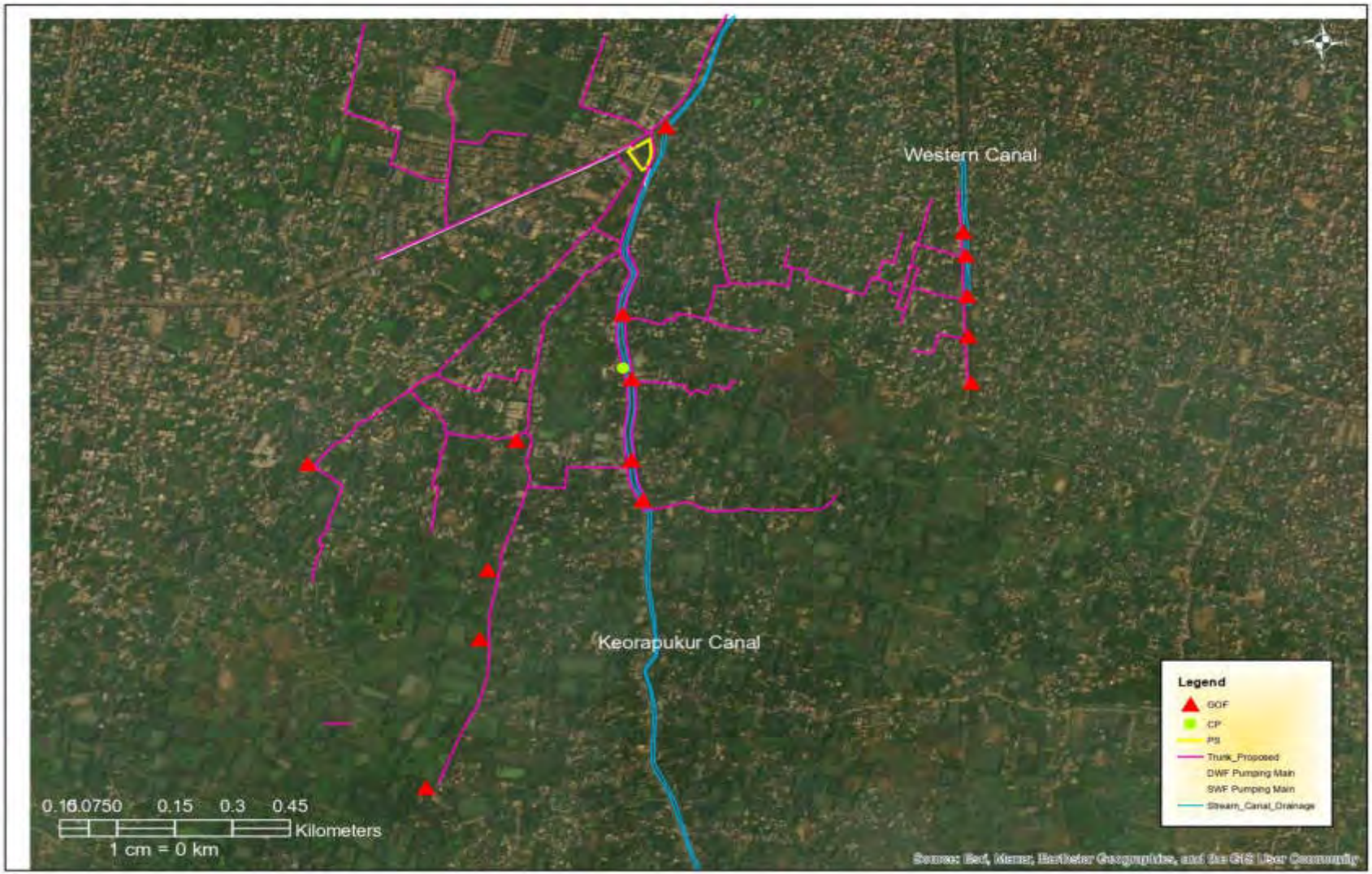
Figure 18: Proposed Sewer Pipe laying by Micro tunneling and Jack pushing in Kabardanga

Source: DPR,2024

Figure 19: Trunk Sewer Line showing proposed Gravity Outfall locations in Julpia Catchment (Package SD 06)

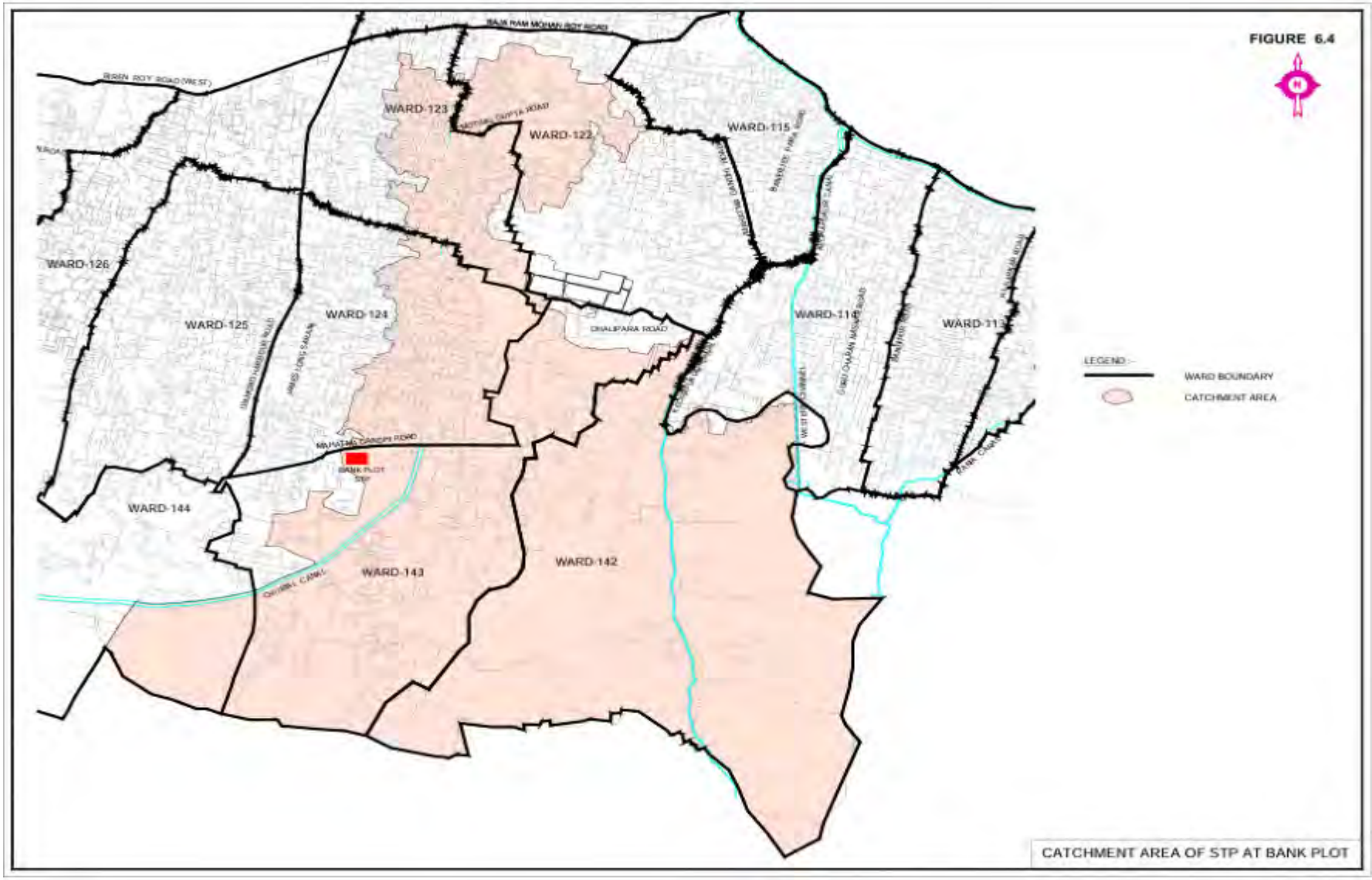
Source: DPR,2024

Figure 20: Trunk Sewer Line showing proposed Gravity Outfall locations in Kabardanga Catchment (Package SD 07)



Source: DPR,2024

Figure 21: Catchment Area of Bank Plot STP (Under KEIIP Trench 3)



Source: DPR,2024

Figure 22: Typical Design of Catch Pit, Gully Pit and Inspection Pit

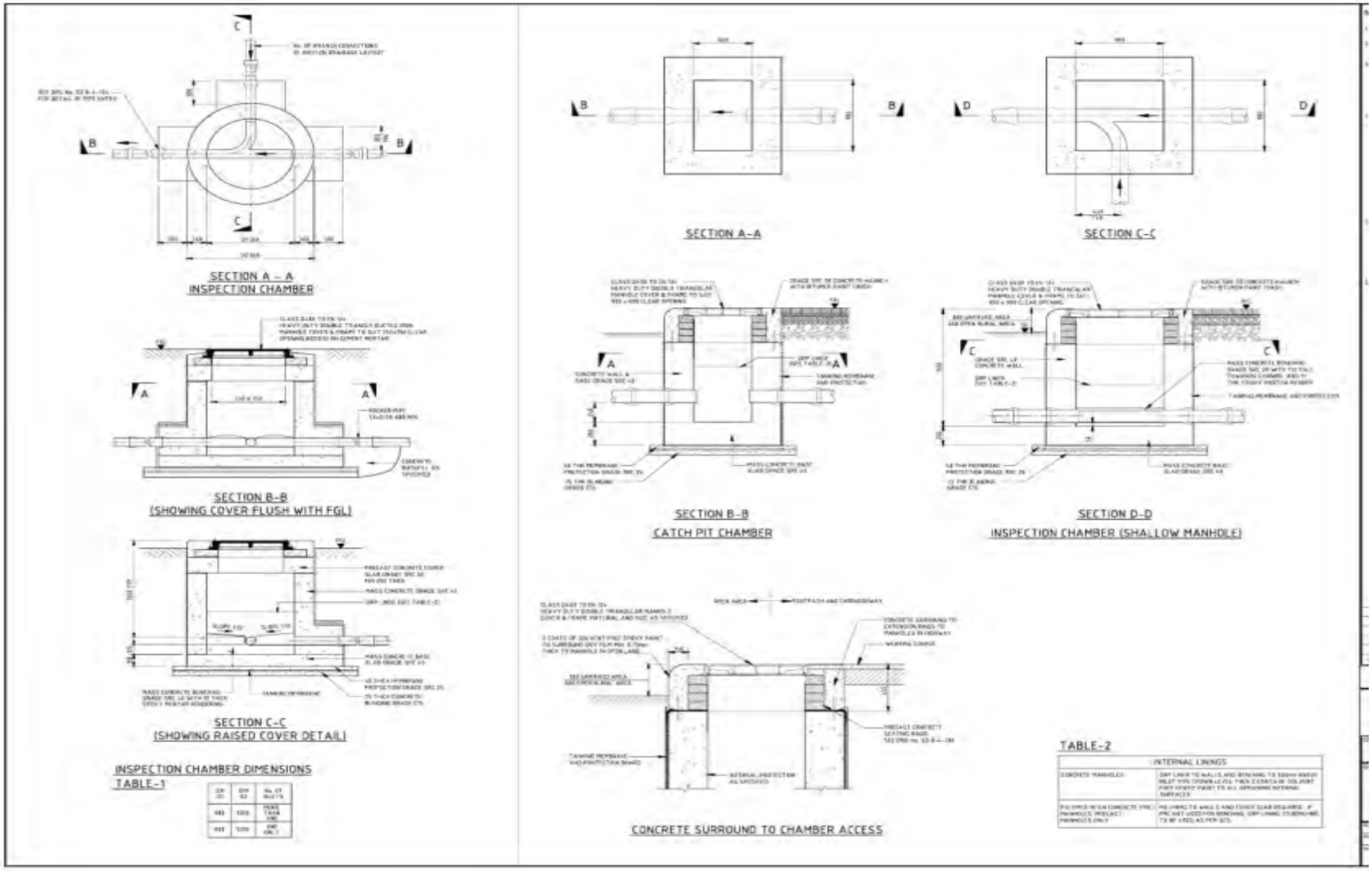
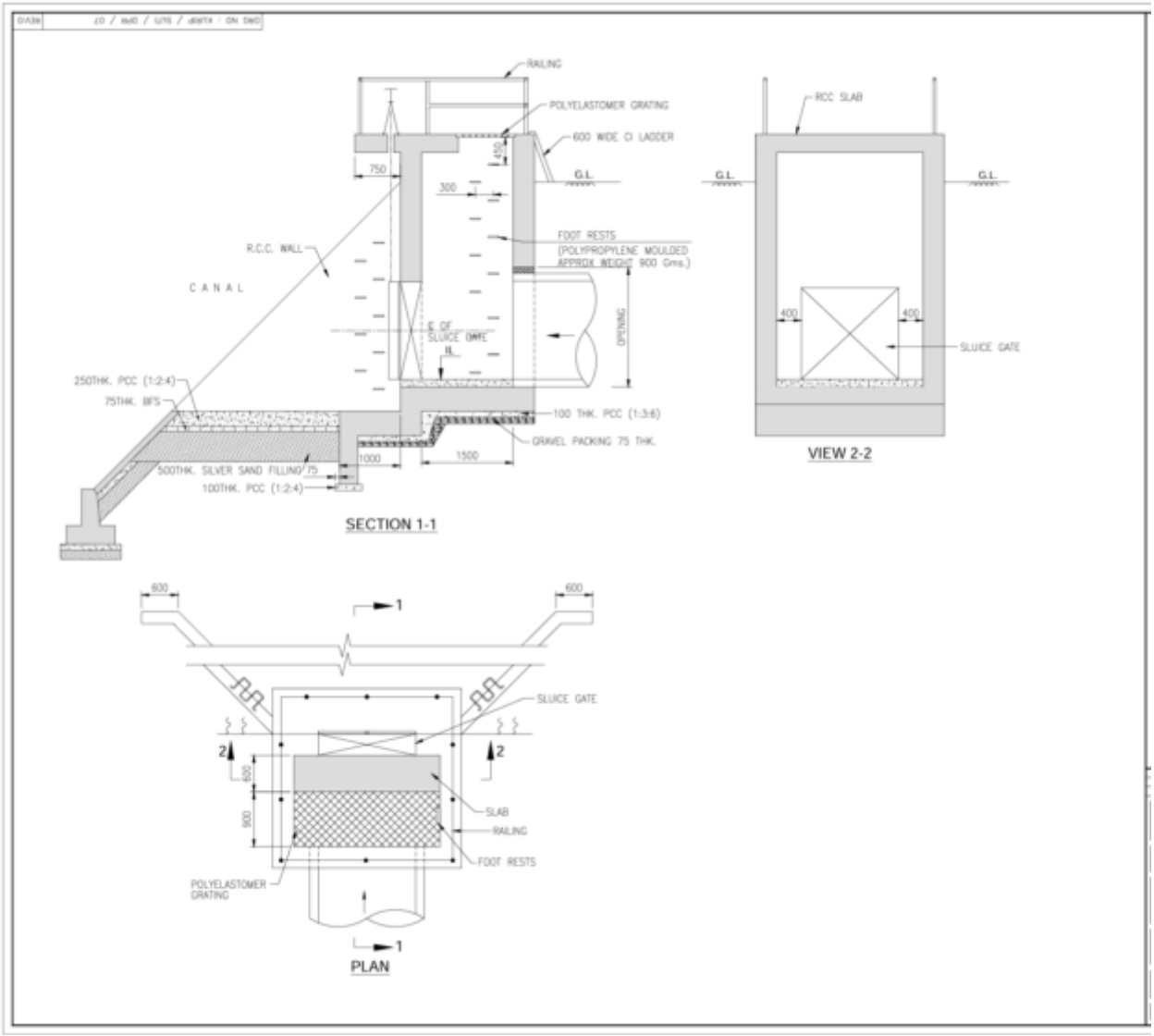
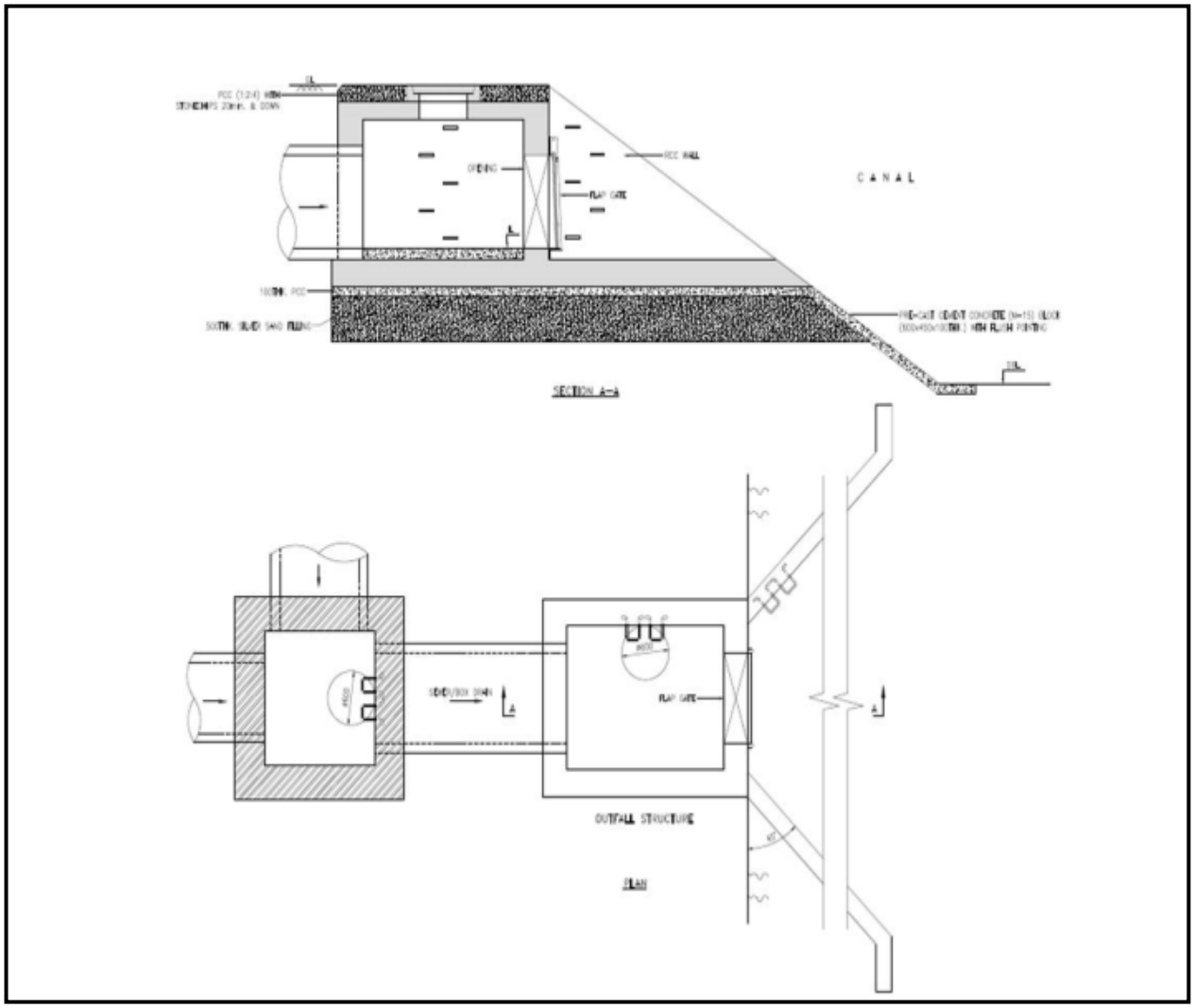


Figure 23: Typical outfall structures for Sluice Gate



Source: DPR,2024.

Figure 24: Typical outfall structures for Flap Gate

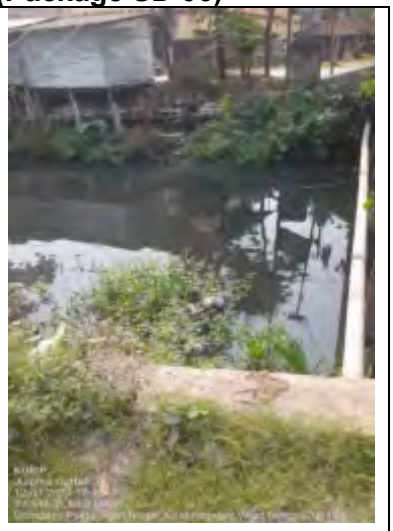


Source: DPR,2023

Figure 25: Outfall locations in Julpia Catchment (Package SD 06)

GOF 1 at Chak ramnagar road

GOF 2 at Netaji pally



GOF 3 at St. Thomas church road

GOF 4 at St. Thomas church road

GOF 5 at St. Thomas church road

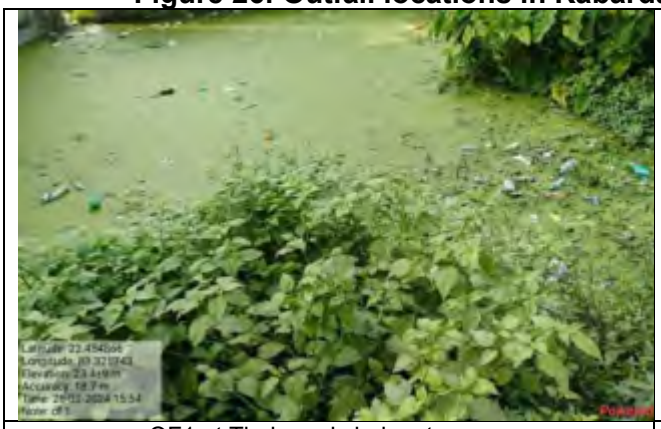
GOF 6 at St. Thomas church road

GOF 7 at St. Thomas church road	GOF 8 at Ramnagar	GOF 9 at Nepalgange
		
GOF 10 at Ramjibanpur	GOF 11 at Ramjibanpur	GOF 12 at Nepalgange

GOF 13 at Sajneberia	GOF 14 at Sajneberia	GOF 15 at Sajneberia
		

		
GOF 16 at Darir chowk road	GOF 17 at Darir chowk road	GOF 18 at Darir chowk road
		
GOF 19 at Darir chowk road	GOF 20 at Sajneberia	GOF 21 at Sitala pally
		
GOF 22 at Ramjibanpur Magurkhali	GOF 23 at Ramjibanpur Magurkhali	GOF 24 at ONGC more

Figure 26: Outfall locations in Kabardanga Catchment (Package SD 07)



OF1 at Thakurani chak patra para

OF2 near Pragati Pally

OF3 at Chak ramnagar road

OF4 at Chak ramnagar road

OF5 at Chak ramnagar road

OF6 at Chak ramnagar road

OF7 at Krishnapara road

OF8 near missonary of word hostel

OF9 near Carmel high school

OF10 near Kabardanga fish market

OF11 at Dhalai bridge area

OF12 at Dhalai bridge area

OF13 at Dhalai bridge area

OF14 at Dhalai bridge area

OF15 at Dhalai bridge area

III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

31. 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, and loans involving financial intermediaries, and private sector loans.

32. **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 impact 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.

33. The potential environmental impacts of Julpia (package SD 06) and Kabardanga (package SD 06) S&D network and pumping stations have been assessed using ADB's Rapid Environmental Assessment (REA) Checklist for Sewerage (Appendix 1) was conducted, and results of the assessment show that the subproject 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.

34. **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.

35. **Environmental Audit of Existing Facilities**. ADB SPS, 2009 requires an environmental audit, if a subproject involves facilities and/or business activities that already exist or are under construction, including an on-site assessment to identify past or present concerns related to impacts on the environment. The objective of this compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients, and to identify and plan appropriate measures to address outstanding compliance issues.

36. **Public Disclosure.** The IEE will be put in an accessible place (e.g., local government offices, libraries, community centers, etc.), and a summary translated into local language for the project affected people and other stakeholders. The following safeguard documents will be put up in ADB's 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.

37. **Consultation and Participation.** ADB SPS, 2009 requires borrowers to conduct meaningful consultation[14] 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.

38. **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.

39. **Occupational Health and Safety.** ADB SPS requires the borrower[15] to ensure that workers[16] are provided with a safe and healthy working environment, taking into account 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.

40. **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

[14] 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.

[15] 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.

[16] 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.

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.

41. **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 Group's Environment, Health and Safety (EHS) Guidelines.[17] (IFC's General EHS Guidelines[18] and Sector Specific [Water and Sanitation] Guidelines[19]). 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 PMUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PMUs 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

42. Implementation of the subproject will be governed by the national and State of West Bengal environmental acts, rules, regulations, and standards. These regulations impose restrictions on activities to minimize/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 national, state or municipal/ local. Compliance is required in all stages of the subproject, including design, construction, operation, and maintenance.

43. **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 sewerage and drainage system subproject falls under the ambit of the EIA Notification 2006, and therefore EIA Study or environmental clearance is not required for the subproject

44. **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 7.

[17] World Bank Group, 2007. Environmental, Health, and Safety General Guidelines. Washington, DC.

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

[19] https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

Table 7: Applicable Environmental Regulations for Sewerage and Drainage Subproject

Law	Description	Requirement
Environmental Impact Assessment (EIA) Notification, 2006	Environmental Clearance is required for activities/projects notified in the schedule, and this must be obtained before any construction work or land preparation (except land acquisition) may commence.	Not applicable. Components of this sub projects are not listed in the schedule
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 the Act. 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 shall 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 occupiers of such subprojects to take measures to abate the possible pollution of receiving water bodies.	Development of S&D network will not require CTE and CTO from WBPCB Implement measures to mitigate water pollution from project activities; construction facilities may require CTE and CTO based on type of facilities to be established by the contractor
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.	Development of S&D network will not require CTE and CTO from WBPCB Implement measures to mitigate air pollution from project activities; construction facilities may require CTE and CTO based on type of facilities to be established by the contractor.
Environment (Protection) Act, 1986 and Central Pollution Control Board (CPCB) Environmental Standards.	An umbrella act for environmental protection in India. Various rules, notifications and standards established under the Act. Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards.	Appendix 4 provides applicable standards for ambient air, air emission, effluents, receiving water bodies, and drinking water at the consumer end. Contractors to comply with. emissions and discharge 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 4 provides applicable noise standards. Contractors to ensure all noise-producing activities during civil works conform to standards

Law	Description	Requirement
Solid Waste Management Rules 2016	Rules for management of municipal solid waste. Responsibility of solid waste generator include waste segregation, and no throwing, burning or burry the solid waste generated on streets, open public spaces outside the premises or in the drain or water bodies, storage and disposal as per the rules	Contractor to follow all the rules in managing solid waste during construction works
Construction and Demolition Management Rule 2016 of MOEF & CC (26 March 2016)	This 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 authorized processing facilities Shall ensure that there is no littering or deposition so as to prevent obstruction to the traffic or the public or drains.	Contractor to follow all the rules in managing construction debris and waste (soil, road debris etc.,) during construction works
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.	Contractor to comply with all the requirements of this Act, if there is any hazardous waste generated, handled or managed during construction and operation works. However, it is unlikely that it will involve any hazardous waste.
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 from 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 the Central Wetlands Regulatory Authority.	The subproject is not within the East Kolkata Wetlands, thus no permission from the Central Government is required.
Ancient Monuments and Archaeological Sites and Remains Act, 1958 The Ancient Monument and Archaeological Sites and Remains (Amendment and Validation) Act 2010	Act for the preservation of ancient and historical monuments and archaeological sites and remains of national importance. It regulates archaeological excavations and for the protection of sculptures, carvings and other like objects. Any construction activities in the protected monument and within 300 m around is subjected to prior permission of National Monument Authority	There are no protected properties in the subproject area. However, in case of chance finding, the contractors will be required to follow a protocol as defined in the Environmental Management Plan (EMP).
West Bengal Trees (Protection and	Any felling / cutting of tree requires permission from the Divisional Forest	Not applicable, subproject requires no tree cutting

Law	Description	Requirement
Conservation in Non-Forest Areas) Act, 2006	Officer (Utilization Division), Forest Directorate, Government of West Bengal. Act specifies provisions for trees/species looked upon as sacred groves, identifies as belonging to an endangered species, or given the status of heritage	
East Kolkata Wetlands (Conservation and Management) Act, 2006 and the Rules issued under the Act	In August 2002, 12,500 hectares (ha) of the East Kolkata Wetland (EKW) area were included in the 'Ramsar List'. This act was enacted for conservation and management of EKW. The East Kolkata Wetlands Management Authority (EKWMA) established under the Act, has the power to enforce land use control in the substantially water body-oriented areas and other areas in the EKW. Any change in land use or construction activities are permitted by EKWA if it may not adversely affect the ecology or environment of the EKW, or may not adversely affect the livelihood or socioeconomic conditions of the people in the area; or is not against the principles of Ramsar Convention	No work is proposed within the East Kolkata Wetlands, thus no permission from the Central Government is required.
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 - EN/3170/ T- IV-7/ 001/ 2009.	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 sources of air pollution in Kolkata and its surroundings and also suggested some guideline to minimize such impacts	The contractor will follow the guidelines, and KMC will ensure implementation of the guidelines.
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.	Appendix 4 provides applicable NIOSH occupational noise standards. Contractors are required to provide hearing-protection equipment and ensure exposures of workers to noise-generating activities are within the allowed NIOSH standards.
The Child Labour (Prohibition and Regulation)	No child under 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	No children between the ages of 14 to 18 years will be engaged in hazardous working conditions.

Law	Description	Requirement
Amendment Act, 2016	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.	
Workmen Compensation Act, 1923	Provides 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 a 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 the Act with respect to construction workers.
Contract Labour (Regulation and Abolition) Act, 1970.	Provides 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 a 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.	Contractor to comply with the provisions of the Act
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.,	Contractor to comply with the provisions of the Act if interstate migrant workers are engaged for the work
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 scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Contractor to comply with the provisions of the Act 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.	Contractor to comply with the provisions of the Act Equal wages for work of equal nature to male and female workers

International Conventions and Treaties	
Convention	**Relevance**
Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), 1971	No components are proposed in a wetland area that spread over 125 sq. km. Project will implement measures to avoid interference in the wetland area.
Convention on Migratory Species of Wild Animals, 1979 (Bonn convention)	No direct relevance, project will ensure no impacts on migratory species, if any

Law	Description	Requirement
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 is envisaged.	
ILO Core Labour Standards	Project will ensure compliance with core labour standards	

45. **Clearances / permissions to be obtained prior to start of construction.** Table 8 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 8: Clearances and Permissions required for Construction Activities

Sr. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
1	Tree Cutting	State forest department	Construction Contractor /PMDSC	PMU/PMDSC
3	Hot mix plants, Crushers and Batching plants	Consent to establish and consent to operate under Air Act, 1981 from WBPCB	Construction Contractor	PMU/PMDSC
4	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
5	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
6	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Construction Contractor	PMU/PMDSC
7	Temporary traffic diversion measures	District traffic police	Construction Contractor	PMU/PMDSC
8	Road cutting for Sewer laying works	KMC, PWD, KMDA	PMU	PMU/PMDSC
9	Discharge of stormwater and construction of outfall structures in different Nallas and Canals	Approval or NOC from Department of Irrigation, Government of West Bengal	PMU	PMU/PMDSC

Sr. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision
10	Construction Waste and Demolition Debris Management	Approval from KMC for disposal site is required per Construction and Demolition Waste Management Rules 2016	Construction Contractor	PMU/PMDSC
11	Labour License	Labour Commissioner, Government of West Bengal	Construction Contractor	PMU/PMDSC
12	Use of Vehicles and Equipment- noise, emissions and Pollution Under Control (PUC) Certificate	Motor Vehicle Rules, 1989	Construction Contractor	PMU/PMDSC

IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

A. Subproject Area of Influence

46. The subproject areas are situated within the Kolkata metropolis. The right-of-way (ROW) along the roads includes the width of the roads plus footpaths on both sides of wider roads, with the width varying by location. Major roads like M.G. Road, Julpia Road, Prantik Housing Road, Brickfield Road, and Dhalai Bridge Road, all of which are under KMC/PWD ownership and have sufficient road widths (ranging from 7.0 to 13.5 m). Therefore, no significant impact is expected on these roads. However, certain sections of the proposed pipeline will pass through busier, narrower roads (2.5 to 6.0 m wide) in areas such as Arabinda Nagar, Krishnanagar Hazra Para Road, Thakurani Chak Patra Para, Ramchandrapur, Ghorai Para, Ramakantapu. The proposed alignment runs near three schools—Carmel High School, D.F. Blind School, and Ramchandrapur Primary School. The area of influence for potential environmental impacts extends up to 50m for the direct impact zone and between 50 m to 100 m 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 work areas, and disruptions to traffic and pedestrian access in the immediate vicinity. The indirect impacts of pipelaying works can extend beyond 100m, particularly affecting traffic conditions over a broader area depending on the work location.

47. The direct impact areas for the subproject encompasses the sites of the pumping stations of Julpia and Kabardanga and the adjoining areas within 20 to 50 m from its boundary. This area is expected to experience disturbances from demolition, construction activities, vehicular movements, potential access issues and road re-routing.

B. Physical Resources

1. Location, Area and Connectivity

48. **Package SD 06: Julpia Catchment Area.** The subproject area covers a part of Ward 142, within the administrative division of the KMC. This area was established and integrated into Borough XVI of KMC in 2012, encompassing a total area of 360 ha. Julpia Road runs through the middle of the project area in a north-south direction, serving as a major thoroughfare. The Keorapukur canal, flowing from south to north, is the primary canal in the project area. The area is well connected to nearby localities via Julpia road and several other significant roads. These roads include Madha Ram Nagar, Gholpara, Sajne Baria road, Netaji Pally, St. Thomas Church Road, Rabindra Pally, Ramjibanpur Magurkhali, Malpara, Mallikpur Gram, and Vivekananda Pally. Additionally, drains along Netaji Pally, St. Thomas Road, Darir Chowk Road, Sajneberia, and Ramjibanpur Magurkhali road merge with the Keorapukur Canal, eventually draining into Tolly Nullah.

49. **Package SD 07: Kabardanga Catchment Area.** The subproject area covers parts of Wards 142 and 143, within the administrative division of KMC. This area was integrated into Borough XVI in 2012. The total area covered by the subproject is 242 ha, with Ward 142 encompassing 213 ha and Ward 143 covering 29.9 ha. M G Road, a major road in the northern part of the project area, runs from west to east, while Julpia road runs from north to south. Other significant roads in the area include Brick Field Road, Chak Ram Nagar Road, Prantik Housing Road, Ananda Pally Road, Krishnanagar Para road, Keorapukur Canal Bank Road, and Western Channel Bank Road. The Keorapukur Canal and Western Channel are the major canals in the project area, flowing from south to north. The nearest railway station is Howrah railway station,

located about 14 kilometres away, and the closest airport is Netaji Subhas Chandra Bose International Airport, which is 24 km from the subproject area.

50. **Topography:** General topography is flat. The elevations range from 2.5 to 4.6 m above MSL in Kabardanga subproject area and 2.2 to 4.3 m above MSL in Julpia area. Low lying areas are predominant within the subproject areas; therefore, the area regularly experiences water logging during monsoon even with moderate rainfall.

51. **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 1,582 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.

52. 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 areas comprising ward 142 and 143 under Boroughs XVI comes under Tolly Nullah basin. As explained earlier, the Tolly Nullah basin drains westward into the Hooghly River. Tolly's Nullah connects the Hooghly and Bidyadhari rivers. The Bidyadhari, a tributary of the Matla River, links to the Hooghly through the "Adi-Ganga". A canal was dug at Garia to connect Tolly's Nullah with the Adi-Ganga. Two stormwater channels, the Keorapukur canal and the Western channel flow through the area and join Tolly's Nullah near Kudghat Metro Station. Tolly's Nullah, as "Adi-Ganga", meets the Hooghly River about 8 km from the subproject area.

53. **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 palaeo-channels and palaeo-interfluves 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 palaeo-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 9: 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 grey 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 +).

54. 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 subproject areas.

55. The soil is fertile in nature. Table 10 shows the physical and chemical characteristics of soil sampled and analysed from the two selected locations of Ward no 142 and 143. The soil is predominantly silty in nature (70% silt content) in Kabardanga and in Julpia it is found to be silty-clayey in nature. The pH value is 6.5 at 25^0C. The soil has cohesive characteristic and low permeability with specific gravity of 2.56 to 2.70.

Table 10: Soil Quality

Sr. No.	Soil Sample Location	pH at 25 ^{0}C	Temp (^{0}C)	Available Sulphate SO_3 (ppm)	Natural Moisture Content (%)	Sand	Silt	Clay	Specific Gravity
1	Kabardanga Borehole No.1	6.5	31.3	ND	27	7	70	23	2.56
2	Julpia Borehole No. 1	6.5	30	ND	34.5	6	51	43	2.70

*ND=Not Detected

56. **Seismology:** Geologically, Kolkata is located in the Moderate Earthquake Damage Risk Zone (Zone III) and lies in close proximity to the High Earthquake Damage Risk Zone (Zone IV), which includes the North and South 24 Parganas districts (District Survey Report_2018).

57. 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 four quakes of magnitudes above 3 and up to 4.9; three quakes above magnitude 4 and one 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.

58. **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 degrees 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.

59. 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 kilometre 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).

60. **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 areas, air quality is not monitored by West Bengal Pollution Control Board (WBPCB). Following table 11 presents ambient air quality measured at PWD stackyard, Charaktala Elevated Service Reservoir (ESR), Ramkantopur ESR and Malpara ESR during the implementation of works in Borough XVI under KEIIP (Tranche 2) for the period of June 2022 to January 2024, 2023. Proposed subproject areas are located about 1.9 km aerial distance from monitoring sites. When compared with National ambient air quality standards (NAAQS,2009), the air quality monitoring results (24-hours monitoring) are found within the permissible limit during June 2022. However, monitoring results of June 2023 and January 2024 shows PM_{10} and $PM_{2.5}$ are above the standards of NAAQS but NOx and SO_2 are well within the limit. The concentration

of particulate matter and oxides of nitrogen is above the standard (except SO_2 concentration) at all monitoring locations when compared with World Health Organization (WHO) air quality guideline (Global Update 2021).

Table 11: Ambient Air Quality Data, Borough XVI

Monitoring location	Monitoring stage	Parameters, µg/m3				Parameters, µg/m3				Parameters, µg/m3			
		22.06.2022 to 23.06.2022				06.06.2023				03.01.2024			
		PM_{10}	$PM_{2.5}$	SO_2	NO_2	PM 10	$PM_{2.5}$	SO 2	NO 2	PM 10	$PM_{2.5}$	SO 2	NO 2
Charaktala ESR	Construction Stage of KEIIP	77.86	27.47	11.17	26.48	114	66	7.8	33.1	137	75	8.9	36.3
Ramkantopur ESR		-				93	56	7.4	32.5	115	63	8.1	34.5
PWD Stackyard		86.33	32.46	16.25	28.24	134	69	9.3	34.8	159	83	10.2	37.1
Malpara ESR		-				109	63	8	32.6	166	89	9	35.8
NAAQS standard (2009), (24-hr) - µg/m3		**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**	**100**	**60**	**80**	**80**
IFC-WB EHS Guidelines (the WHO Global Update 2021) (24-hr) (µg/m³)		**45**	**15**	**40**	**25**	**45**	**15**	**40**	**25**	**45**	**15**	**40**	**25**

Source: Air Quality Monitoring report of Package WS 15, WS 16, WS 18, KEIIP Tranche 2

61. **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 day time. Noise level near busy roads is 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 ESRs in Borough XVI under KEIIP, Tranche 2 project for the period of June 2022 to January 2024. The results are shown below in Table 12 and noise level standards for different sources are provided in Table 13 for India National Noise Level Standards and WHO Standards. The monitoring results indicate that both day time and night time noise levels (as shown in Table 12) exceed the permissible limits for residential areas, according to both Indian and WHO standards (refer to Table 13). However, it's worth noting that during January 2024, the day time noise levels at all monitored locations were within the prescribed standards of both Indian and WHO standards.

Table 12: Noise Level data at Borough XVI

Sampling Locations- Area	Implementation Stage	22.06.2022		06.06.2023		03.01.2024	
		Day Time Leq dB(A)	Night time Leq dB(A)	Day Time Leq dB(A)	Night time Leq dB(A)	Day Time Leq dB(A)	Night time Leq dB(A)
Malpara ESR	Construction Stage of KEIIP			61.1	48.9	53.1	58.7
Charaktala ESR		59.61	-	60	46.7	51.3	56.3
Ramkantopur ESR				62.5	50.6	53.6	59.3
PWD Stachyard		58.70	-	62.8	52.8	54	58.4

Source: Noise monitoring report, KEIIP Tranche 2.

Table 13: Reference Noise level

Receptor/ Source	Indian National Noise Level Standards (dBA)[a]		WHO Guidelines Value for Noise Levels Measured Out of Doors[b] (One Hour LA_q 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. 19990

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

63. **Surface Water Quality**. There are 29 water bodies (ponds) identified within the Julpia Catchment (SD-06) sub-project area, including one community pond located within the proposed pump station site, which acts as a holding tank for stormwater during heavy rainfall events. In the Kabardanga Catchment,10 ponds are situated near the proposed pipe-laying alignment at Thakurani Chak Patra Para and Dhalai Bridge areas, with distances ranging from 2.62 m to 34.56 m. The Keorapukur Canal and Western Channel are the major canals in the project area, flowing from south to north.

64. No site-specific surface water quality data is available. Therefore, surface water quality monitoring shall be conducted for ponds and canals and Hooghly River during pre-construction phase (service Improvement Period) by the contractor and results will be appended in the updated in IEE.

65. **Ground Water Quality.** 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 m bgl and are capable to yield 100 to 120 m^3/h, with drawdown ranging from 2.3m to 16.5 m (CGWB Report on North and South 24 Parganas and Howrah districts, West Bengal, 2021).

66. As part of KEIP II, DPR preparation for added area geohydrological investigations were carried out in January 2009 in seventeen wards distributed in Borough XI to XV. In these areas, ground water occurs mainly under confined to semi-confined conditions. Depths of piezometric surface from ground level in these wards varied between 9.3 m to 14.11 m. An aquitard occurs near surface over the entire studied area and ground water from this aquitard is tapped by dug

wells. The depths to water table varied between 0.50 m to 7.95 m in these dug wells. With most areas reporting water levels within 1 to 2 m from the ground surface.

67. Groundwater in KMC area occurs under two principal types, viz. Bicarbonate type and Chloride type. Groundwater 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.

68. Groundwater is not generally used for construction in this area; however, contractor will obtain necessary permits if groundwater is used. Detailed study of baseline groundwater quality monitoring shall be conducted during pre-construction phase (service Improvement Period) by the contractor and results will be appended in the updated in IEE.

C. Ecological Resources

69. **Flora**. In KMC area, except a small part falling under East Kolkata Wetland, located in the eastern fringes, naturally found vegetation is scarce. The sub-project area is a developing area; therefore, natural vegetation is only found in few comparatively undisturbed patches such as along Canal side roads. Roadside plantation orchards within the residential area offer more varied vegetation. There is no forest area within or close to sub project area. Few commonly found tree species are given below:

Table 14: Tree Species available within Subproject Area (SD 06 & 07)

Sr.no	Name	Scientific Name	IUCN Status
1	Coconut	Cocos nucifera	Not evaluated
2	Mango	Mangifera indica	Data Deficient
3	Gulmohar	Delonix regia	Least concern
4	Jarul	Lagerstroemia speciosa	Not evaluated
5	Sajina	Moringa oleifera	Least concern
6	Kadam	Neolamarckia cadamba	Not Evaluated
7	Neem	Azadirachta indica	Least concern

Source: Site visit of environmental expert, DSC during IEE preparation (February 2024).

70. There are 10 non-scheduled trees within the premises of the pumping station site at Kabardanga. The detailed list is provided below.

Table 15: Tree species observed in Kabardanga PS site (SD 06)

Sr. No.	Name	Scientific Name	IUCN Status	Girth Size (Ft)
1	Coconut (1 trees)	*Cocos nucifera*	*Not Evaluated*	3 ft.
2	Mango (2 trees)	*Mangifera indica*	Data deficient	3 ft & 1.6 ft
3	Jam (3 trees)	*Ddelonix regia*	Least Concern	5 ft; 4.7 ft & 2 ft
4	Khejur (1 tree)	*Lagerstroemia speciosa*	Least Concern	3.5 Ft
5	Travelers Palm (1 tree)	*Ravenala Madagascariensis*	Least Concern	2.5 ft
6	Kadam (2 trees)	*Neolamarckia cadamba*	Not Evaluated	5 ft and 4 ft
7	Banyan (1 tree)	*Azadirachta indica*	Least Concern	10 ft

Source: Site visit of environmental expert, DSC during IEE preparation (February 2024).

71. **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 16: Fauna available within Sub-project Area

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

Source: Source: Site visit of environmental expert, DSC during IEE preparation (February 2024) and local people

72. **Aquatic Flora and Fauna**. Anchored, free floating and submerged hydrophytes like Water Hyacinth (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. No such endangered species of aquatic flora or fauna reported from project area.

73. **Protected areas.** The nearest protected area is the East Kolkata Wetlands (EKW), a designated Ramsar site. It is situated approximately 9 km from the proposed Julpia pumping station and about 7.5 km from the nearest boundary of the Julpia subproject area (Figure 27). Similarly, the EKW boundary is located around 8.5 km from the Kabardanga pumping station and approximately 7.7 km from the nearest boundary of the Kabardanga subproject area (Figure 28).). The intervening area is highly urbanized and residential. No work is planned within the EKW area. The Sundarban Biosphere Reserve, a UNESCO World Heritage Site, is located within 50 km of the subproject areas. There are no threatened or endangered species of flora and fauna in the subproject area. Therefore, the subproject will pose no risk or impact on biodiversity and natural resources.

Figure 27: Map showing distance of EKW from Pumping Station and Subproject boundary of Julpia catchment (SD 06)

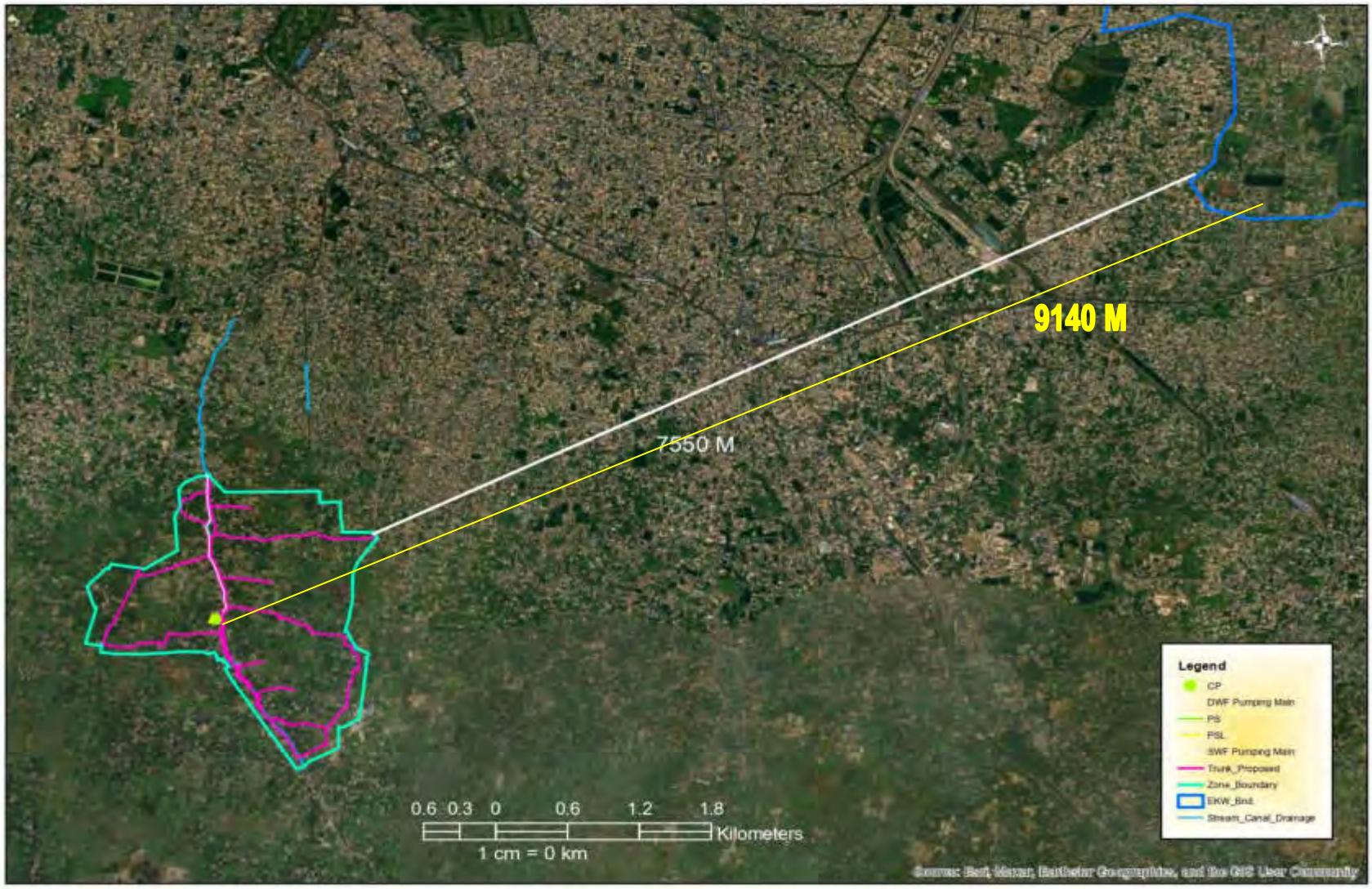
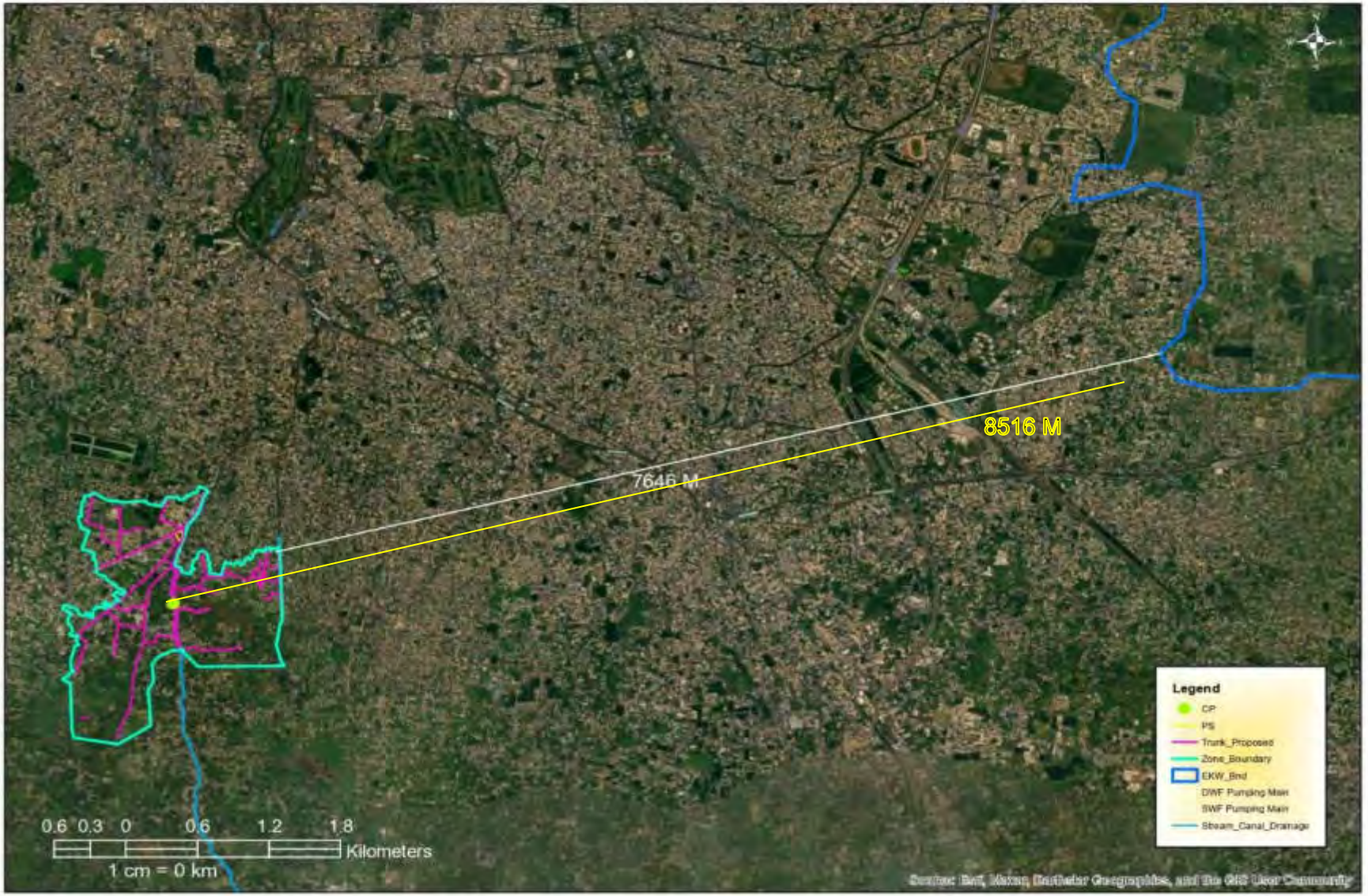


Figure 28: Map showing distance of EKW from Pumping Station and Subproject boundary of Kabardanga catchment (SD 07)



D. Economic Resources

74. **Land use.** Kolkata, once a cluster of small villages, has transformed into India's most populous city, with residential areas being the primary land use within the Kolkata Municipal Corporation (KMC). Similarly, the Kabardanga and Julpia catchment areas are predominantly residential, with only a few commercial activities. Along the proposed pipe-laying route, a large fish and vegetable market is situated in Kabardanga near M G road, while a smaller market is found in Thakurani Chak Patra Para Bazar. There are 10 water bodies near the proposed alignment in the Thakurani Chak Patra Para and Dhalai Bridge areas, with no agricultural activities. The Julpia catchment area is characterized by vacant land and 29 water bodies, with no agriculture observed. Urban planning is a key responsibility of the KMC, while the Kolkata Metropolitan Development Authority (KMDA) oversees land planning on a broader scale.

75. **Existing water supply and sanitation.** The water supply system of Kolkata is very old, operated from 1865. Present average per capita supply is 134 liters per capita per day (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 system is being improved under KEIIP and the water supply rate in the project area is expected to be 150 lpcd.

76. **Transportation.** Subproject area is located within the Kolkata metropolis. Howrah railway station, located 14 km away, serves as the nearest railway hub, while the Netaji Subhas Chandra Bose International Airport, situated 24 km away, caters to air travel needs. Major roads in the project include MG road, Julpia road, Brick field road and Darir chak road etc. under the ownership of KMC and PWD having enough road width (5.0 m to 8.5 m). However, narrower roads such as Netaji Pally, Ghol para, Sajneberia, Rabindra pally, Rabindra Sarani, Sitala pally, Ramjibanpur, Magurkhali etc. have widths ranging from 2.0 m - 4.5 m. All the roads in the area are constructed with bituminous material and are under the jurisdiction of KMC and PWD.

77. **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 13 km from the sub-project area. This dump site is nearing its maximum capacity. Currently, there is hardly any processing and treatment of Municipal Solid Waste (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.

78. **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

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

Particulars	KMC	Ward 142 & 143
Population	4,496,694	Census data not available as Ward no. 142, 143 and 144 are brought under Borough XVI in 2012
Area	205 square km	
Households	972,264	
Density	24,783 persons/sq.km	
Growth rate (2001-11)	-1.93%	
Sex ratio	908 Female per 1000 male	
Literacy (male) %	88.3%	
Literacy (female) %	84.1%	
SC%	5.38 %	
ST%	0.23%	

Source: 2011 Census data

80. **Religion**. In the project area about 80% are Hindus. Most belong to general castes (70%), with the balance belonging to scheduled caste or scheduled tribes. There are significant concentrations of Muslims in the bustees.

81. **Languages**. The mother tongue reported by 75% of the population is Bengali, with Hindi and Urdu represented by 20% and 5% of the population respectively.

82. **Religious & Cultural Resources**. There are no archaeological sites, historical or cultural resources within the Kabardanga and Julpia sub-project areas. However, in the Kabardanga subproject area, the Sheetala Temple and two burial grounds are located beside the proposed pipe-laying alignment. In the Julpia subproject area, a few temples, the Ramkrishna Ashram, and two churches (St. Thomas Church and St. Joseph's Church) are situated along the pipe-laying route.

F. Environmental Settings of Subproject Component Sites

83. The subproject components are situated in a highly residential and urbanized area, leaving no natural habitat around the proposed sites. The sewer network will be installed along the center of existing roads owned by the KMC and the PWD. The proposed pumping stations will be located on government-owned land, so land acquisition is not required. There are no significant environmental sensitivities in the project area. Additionally, there are no protected areas, wetlands, mangroves, or estuaries in or near the project sites, Notably, there is no significant wildlife presence in the vicinity. The environmental features of the SD 06 and SD 07 subproject sites, along with corresponding photographs, are detailed in Table 17 and Table 18, respectively

Table 17: Site Specific Environmental Features of Julpia Subproject Area (Package SD 06)

Subproject component	Environmental Features of the Site	Photographs
Sewer and Drainage network in Julpia subproject area	Sewers will be laid through the center of the existing roads to avoid any impact on existing water pipelines. No tree felling is required for pipe laying activities and construction of a pumping station. A sewer line of approximately 16.9 km is proposed to be laid along major roads, including Julpia Road, Netaji Pally, Rabindra Pally, Gholpara, Ramjibanpur, Magur Khali, Sajneberia, Rabindra Sarani, and Darir Chak Road. These roads, which are under the ownership of KMC/PWD, have sufficient width, ensuring that no significant impact is anticipated during the project. The pipeline installation on narrow roads will be conducted in phases, with careful coordination and consultation with shop owners. A sewer line of approximately 2.7 km in length, with a diameter ranging from 1400 to 2200 mm, will be installed using the micro-tunneling method along Kabardanga-Julpia Road. There are 29 water bodies situated near the proposed pipe-laying alignment along Netaji Pally, St. Thomas Church Road, Sajneberia, Ramjibanpur, Magur Khali, Sitala Pally, Nepal Guange, Darir Chowk Road, and other nearby roads. Adjacent to the proposed alignment, there is a Municipal health clinic, St. Thomas Church, and two primary schools: Sajna Baria Primary School and Jiadargot Primary School. Based on transect walks along the proposed route, it has been confirmed that the laying of the sewer and drainage pipelines will not result in the loss of trees, structures, common property resources (CPRs[20]), or require any relocations A total of 24 nos. Gravity Outfalls (GOF) are proposed for discharging stormwater into the	 Kabardanga Julpia road,Chakramnagar  Darir Chowk Road  Kabardanga Julpia Road opposite PS  Ramjibanpur, Magurkhali

[20] Common property resources include public resources, community-owned facilities or cultural property such as temples, shrines, public utility posts, etc, that the landless poor and vulnerable depend on for survival.

Subproject component	Environmental Features of the Site	Photographs
	Keorapukur canal system, equipped with sluice gates to prevent water backflow. The invert level of each outfall structure will be set above the high flood level of the receiving water body. Additionally, each outfall will include silt traps and trash screens to prevent debris/floating matters and silt from entering rivers or other water bodies.	 Mallikpur  Kabardanga Julpia road  ONGC road  Malpara road

Subproject component	Environmental Features of the Site	Photographs
		 Malpara ESR
		 Urban primary health center of KMC, Ward no. 142
		 Jiyadargot primary school
		 Ramkrishna ashram

Subproject component	Environmental Features of the Site	Photographs
		 Chakramnagar Primary school
		 St. Thomas church
		 St. Joseph's church
Pumping Station	A new pumping station will be constructed on government land under the possession of KMC, located at latitude 22.44136 and longitude 88.33503 beside Kabardanga- Julpia Road.Approximately 0.18 hectares of vacant land, is available at the selected site.There is existing water supply infrastructure viz.one ground level service reservoir (GLSR) and one overhead service reservoir (OHSR) under KMC in the same plot.	 **Proposed Pumping station site**

Subproject component	Environmental Features of the Site	Photographs
	Within the premises of the Julpia pumping station, there is one community pond, along with a banyan tree and a few bamboo groves. However, no tree felling will be required for the construction of the pumping station, as the water body and trees are situated on the opposite side of the selected plot. The nearest house is located 10 meters from the wet well of the Julpia pumping station. The boundary of the East Kolkata Wetlands is situated 9 km from the proposed pumping station site. There are no other environmentally, archaeologically sensitive, or protected areas in the vicinity of the proposed site.	 **Banyan tree**  Bamboo groves

Table 18: Site Specific Environmental Features of Kabardanga Subproject Area (Package SD 07)

Subproject component	Environmental Features of the Site	Photographs
Sewer and drainage network in Kabardanga subproject area	Sewers will be installed along the central portion of the roads to prevent any impact on existing water pipelines. No tree felling will be necessary for either the pipe-laying activities A combined sewer line network of approximately 16.6 km is proposed to be laid along major roads, including MG Road, Prantik Housing Road, Arabinda Nagar (Dhali Para), Rick Field Road, Ramchandrapur (Ghorai Road), Julpia Road, Krishna Nagar Hazra Para Road, Nutan Pally (Lal Pole), and Ramkantapur Udayachal. These roads are under KMC/PWD ownership, have sufficient width, ensuring that the project will not have any significant impact Pipeline installation in narrower roads such as Arabinda Nagar, Krishnanagar	 M.G. Road (Micro-tunnelling is proposed)  Kabardanga fish and vegetable market area

Subproject component	Environmental Features of the Site	Photographs
	Hazra Para Road, Thakurani Chak Patra Para, and Ghorai Para will be conducted in phases, with careful consultation and coordination with local residents and shop owners. Approximately 2.0 km of sewer line, with diameters ranging from 1000 to 2000 mm, will be installed using the micro tunneling method. This includes 870 meters along MG Road (with diameters of 1000 to 1800 mm) and 1170 m along Julpia Road (with diameters of 1400 to 2000 mm). There are 10 water bodies (ponds) located near the proposed pipe-laying alignment in the Thakurani Chak Patra Para and Dhalai Bridge areas. The distances from the alignment to these vary between 2.62m and 34.56m and pipe diameter ranging between 400mm and 1200mm. Three schools and two burial grounds are located along the pipe-laying alignment. Based on transect walks along the proposed route, it has been confirmed that the laying of the sewer and drainage pipelines will not result in the loss of trees, structures, common property resources (CPRs[21]), or require any relocations.Fifteen (15) number of gravity outfalls (GOF) are proposed for discharge of SWF to the Western channel and Keorapukur canal system with sluice gate arrangement to avoid back flow of water. It shall be ensured that in the outfall structure, the invert level shall be above the high flood level of the receiving water body. At every outfall point, the provision of a silt trap and trash screen is proposed to prevent floating matters and silt discharging to rivers/water bodies.	 Pipe laying alignment towards Sabujayan Apartment  Pipe laying near Prantik housing complex  Small market area in Thakurani chak patra para  Pipe laying alignment in Ramkantopur  DF Blind school

[21] Common property resources include public resources, community-owned facilities or cultural property such as temples, shrines, public utility posts, etc, that the landless poor and vulnerable depend on for survival.

Subproject component	Environmental Features of the Site	Photographs
		 Sheetala mandir at Dhalai bridge  Ramchandrapur Primary School  Carmel High school  St. Pauls church burial ground I  St. Pauls church burial ground III
Pumping Station	Kabardanga pumping station (PS) is proposed on government land under the possession of the Public Health Department (PWD), Govt. of West Bengal (GoWB) at Kabardanga More adjacent to M.G. Road. (latitude:22.46290, Longitude: 88.33410). About 0.44 Ha vacant land plot is available at selected sites for the construction of PS.	

Subproject component	Environmental Features of the Site	Photographs
	Ten (10) trees will need to be felled on the proposed pumping station site at Kabardanga for its construction. None of these trees are scheduled species. A No Objection Certificate (NoC) from the Forest Department will be obtained for the tree felling For the construction of the pumping station, one single-story staff quarter and the section office of PWD will be demolished as per the design. There is no asbestos-containing material (ACM) in these buildings. There are several residential and commercial establishments near the proposed pumping station location. The nearest shop /r market is located 20 meters from the proposed wet well. The boundary of the East Kolkata Wetlands is approximately 8.5 km from the proposed pumping station site. There are no other environmentally, archaeologically sensitive, or protected areas in the vicinity of the proposed site.	 **Proposed pumping site at Kabardanga**   **Trees within the proposed Pumping station location**  Staff quarter inside the premise

Subproject component	Environmental Features of the Site	Photographs
		 Photo of Section office

V. ANTICIPATED IMPACTS AND MITIGATION MEASURES

A. Introduction

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

85. **Impact Assessment Methodology.** 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.

86. **Impact Magnitude.** All the interventions associated with this project can be grouped into two major types- (i) construction of sewer network across subproject area, which mainly involves earth excavation along the existing roads, laying pipelines in the middle of the road, and backfill the earth on top of the pipelines; earthworks of similar types will also be practiced in proposed pumping station sites and (ii) civil and electromechanical works for the construction of PS. Electromechanical works may pause some risks of accident and disruptions, but not so naively cause any detrimental impacts on immediate surrounding environment.

87. 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 19 and 20 respectively

Table 19: Likelihood of Impacts from Occurrence

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

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

Table 20: Parameters for Determining Magnitude

Parameter	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).

88. **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 21: 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

Sensitivity Determination	Definition
Low	Vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

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

89. **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 22: 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)

90. **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 23: Summary of Rating of Potential Impacts

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	Reversible	Certain	Medium	Mild	Moderate	Negligible
EHS officer/supervisor designation and EMP implementation training	Short term	Local	Reversible	Certain	Minor	Mild	Low	Negligible
Compliance with ADB Loan Agreement and SPS	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Impact due to lack of environmental quality baseline monitoring	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Impact on ecologically sensitive areas (EKW area)	Long term	Local	Reversible	Certain	Medium	Mild	Negligible	Negligible
Updating of IEE and EMP and preparation of SEMP, including SDP, TMP, etc. based on final design	Long term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Tree Removal	Long term	Local	Not Reversible	Unlikely	Minor	Mild	Moderate	Negligible
Community Awareness Program	Short term	Local	Reversible	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	Reversible	Likely	Minor	Mild	Low	Negligible
Sources of Materials	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Construction Phase								
Impact of working in sensitive areas (schools, religious places, hospitals, etc.)	Short term	Local	Reversible	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
Demolition and dismantling works	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Impacts due to disruption of existing utilities and services	Short term	Local	Reversible	Likely	Minor	Mild	Low	Negligible
Impact to ambient air quality	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Impact to noise and vibration level	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Impact to surface water, Soil and Groundwater Pollution	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Impact due to lack of disposal of construction wastes/spoil at site	Short term	Local	Reversible	Occasional	Medium	Mild	Moderate	Negligible
Accessibility and traffic management	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Socio-Economic – disturbance to businesses and livelihood activities	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Socio-economic status-employment	Short term	Local	Reversible	Certain	Medium	Mild	**Positive**	Negligible
Impact to occupational Health and Safety	Short term	Local	Reversible	Certain	Medium	Major	Moderate	Negligible
Impact to community health and safety	Short term	Local	Reversible	Certain	Major	Major	Moderate	Negligible
Worker health and safety and Workers Facilities	Short term	Local	Reversible	Certain	Major	Major	Moderate	Negligible
Impact on Social and Cultural Resources	Short term	Local	Reversible	Certain	Minor	Mild	Low	Negligible
Monsoon preparedness	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Site Reinstatement	Short term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Operation Phase								
Maintenance and operation of the S&D network	Long term	Local	Reversible	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
Impact on discharge of SWF from pumping station and gravity outfalls	Long term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Leakage and Overflows	Long term	Local	Reversible	Likely	Medium	Mild	Moderate	Negligible
Odor Generation and Air Emission	Long term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible
Community and Occupational Health and Safety	Long term	Local	Reversible	Certain	Medium	Mild	Moderate	Negligible

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

B. Planning and Design Phase

91. **Integration of EMP in bidding documents and contracts.** Lack of awareness by contractors on 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/ 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.

Selection of Pipe laying Alignment and Pumping Station site:

92. **Julpia Catchment (SD 06):** The proposed Julpia pumping station will be constructed on a government-owned land parcel under the possession of the Kolkata Municipal Corporation (KMC), located adjacent to the Kabardanga–Julpia road. The site already houses existing KMC water supply infrastructure, including one ground level service reservoir (GLSR) and one overhead service reservoir (OHSR). A community pond is also present within the premises, along with a Banyan tree and bamboo groves. However, the project design ensures that there will be no impact on the pond or vegetation, as these are located on the opposite side of the designated plot, and no tree felling will be necessary

93. The nearest residential house is approximately 10 m (southern direction) from the wet well of the pumping station (Figure 9). The East Kolkata Wetlands (EKW), a Ramsar-designated site, lies approximately 9.0 km from the proposed Julpia pumping station and around 7.5 km from the nearest boundary of the Julpia subproject area. The road in front of the pumping station has a sufficient width of about 7 meters, so no additional access road construction will be necessary. The combined sewer line will be laid underground in the middle of the road owned by KMC and PWD to avoid impact on existing water pipelines.

94. A combined sewer network is planned to be laid along major roads (average width of road 7 m to 8.5 m) such as Kabardanga-Julpia road, Darir Chak road, ONGC more. There is one Municipal health clinic, one Church (St. Thomas Church) and two primary schools (Sajna Baria Primary School and Jiadargot Primary School) beside the proposed alignment. As a result, certain impacts are anticipated during the construction phase, especially along narrow roads with widths ranging from 2 to 5 m. To mitigate these impacts, approximately 2.7 km of the sewer line, with a diameter ranging from 1400 to 2200 mm, will be laid using the micro tunnelling method along Kabardanga - Julpia road, specifically to avoid disruptions in busy congested market areas.

95. **Kabardanga Catchment (SD 07):** The proposed Kabardanga pumping station will be constructed on government owned land currently under the possession of the PWD located at Kabardanga more, adjacent to M.G. Road. As per the design, construction will require the removal of 10 non-scheduled trees within the premises. Additionally, one single-story staff quarter and the existing PWD section office will be demolished. These structures do not contain any asbestos containing material (ACM). The nearest commercial establishment, the Kabardanga fish and vegetable market, is situated approximately 20 m (eastern direction) from the proposed site (Figure 11). The boundary of the East Kolkata Wetlands (EKW) is about 7.6 km from the subproject boundary and 8.5 km from the proposed pumping station location. M.G. Road, located in front of the proposed pumping station, has an adequate width of approximately 13.5 m; therefore, no additional access road construction is required. The combined sewer line will be laid underground along existing roads owned by KMC and PWD, with alignment through the centre of the roadway to minimize any impact on existing water pipelines.

96. A combined sewer network is planned to be laid along major roads like M.G. Road, Julpia road, Prantik Housing Road, Brickfield Road, and Dhalai Bridge Road, all of which are under KMC/PWD ownership and have sufficient road widths (ranging from 7 to 13.5 m). Therefore, no significant impact is expected on these roads. However, certain sections of the proposed pipeline will pass through busier, narrower roads (2.5 to 6 m wide) in areas such as Arabinda Nagar, Krishnanagar Hazra Para Road, Thakurani Chak Patra Para, Ramchandrapur, Ghorai Para, Ramakantapu. The proposed alignment runs near three schools—Carmel High School, D.F. Blind School, and Ramchandrapur Primary School. Besides, there is a large fish and vegetable market at Kabardanga More and a small market at Thakurani Chak Patra Para Lane. As a result, some impacts are anticipated during the construction phase in these narrower roads. To minimize disruptions, approximately 2.0 km of the sewer line (1000-2000 mm in diameter) will be laid using the micro tunnelling method along M G Road (870 m length, 1000-1800 mm diameter) and Julpia Road (1170 m length, 1400-2000 mm diameter).

97. Construction contractors therefore should follow mitigation measures before start of work at those places.

(i) Development of green belts around the proposed pumping station sites will act as a visual shield and minimize the odour problem.
(ii) Laying of pipeline in narrow and busy areas in a phased manner with due consultation with local shop owner/ street vendors and local authority,
(iii) Material stacking, establishment of labour camp or hot mix plants will be strictly prohibited in front of schools, health centers, playgrounds and parks.
(iv) A traffic management plan will be prepared by the contractor in coordination with local traffic police before the onset of work. The diversion route will be clearly marked.
(v) Site safety arrangements such as barricading and caution boards will be implemented.
(vi) Road restoration will be done immediately after completion of the work.

98. **Distance from Eco Sensitive Zone:** As per IBAT screening assessment (Appendix 5), there is no eco sensitive areas within 5 km radius area from the proposed subproject areas. The East Kolkata Wetlands (EKW), a Ramsar-designated site, lies (i) approximately 9.0 km from the proposed Julpia pumping station and around 7.5 km from the nearest boundary of the Julpia subproject area and (ii) about 7.6 km from the Kabardanga subproject boundary and 8.5 km from the proposed Kabardanga pumping station (Figure 27 and 28). Sundarban Biosphere Reserve is within 50 km from the proposed project area.

99. The DF collected from both the catchment area will be treated at the proposed STP at Bank Plot and surplus treated effluent after reuse will be discharged into the Churial canal complying with CPCB discharge standards (2015 and order of National Green Tribunal (NGT) dated 30th April 2019). SWF from the project area will be disposed into Keorapukur canal that ultimately meets with Tolly Nullah near Kudghat metro station at a distance of about 2.28 km from the project location. Tolly Nullah in the form of Adi Ganga meets with Hooghly River at a distance of about 8 km from the proposed subproject location. Therefore, subproject activities do not interfere with the EKW system and is not anticipated to have any adverse impact on biodiversity and natural resources.

100. **Tree cutting at project sites.** The proposed S&D pipelines will be buried in the middle of the road, with no notable trees along the alignment. However, ten (10) non-scheduled trees will need to be felled within the premises of the proposed pumping station site at Kabardanga to

accommodate the construction as per the design. The exact number of impacted trees will be confirmed after the confirmatory survey. No flora of threatened species has been identified at the sub-project locations. If tree felling is deemed necessary based on the contractor's survey during the SIP at outfall locations near canal sides, appropriate measures will be implemented to minimize and/or compensate for the loss of tree cove

(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) If any birds/wildlife on the trees within or in the proximity of work site, identify the species and their protection status; in case if protected specifies are identified, do not initiate works or mobilization of workers/staff on the site until Environmental Specialist of PMDSC and PMU visits the sites, undertakes the assessment, and the updated IEE submitted to ADB, and reviewed and cleared.

101. **Chance finds.** There are no notable or significant archaeological places or protected monuments or areas in and around project area. Therefore, no impacts envisaged but risk of discovering any archaeological remains during the excavations cannot be ruled out completely. Construction contractors therefore should follow the below measures in conducting any excavation work:

(i) Strictly follow chance find procedures (Appendix 6) by coordinating immediately with PMU and Archaeological Department for any suspicion of chance finds during excavation works;
(ii) Create awareness among the workers, supervisors and engineers about the chance finds during excavation work;
(iii) Stop working immediately to allow further investigation if any findings are suspected.
(iv) Inform local Archaeological Department if a find is suspected and take any action, they require to ensure its removal or protection in situ

102. **Design of Sewer System:** The Central Public Health and Environmental Engineering Organization (CPHEEO) manual suggests a design period of 15 years in general while designing the systems for sewerage components and 30 years for sewer network considering replacement difficulties. The design period for sewerage and drainage networks are decided that the systems operate for many years after their completion. The gestation period of subprojects under KSHARP is to be considered as 5 years thus completed by 2028 AD. Accordingly, the project horizon is considered as year 2058 AD, considering 30 years design period. The design norms adopted for preparation of various components of subproject area are in line with CPHEEO Manual, KMC and other standard practices.

103. As mentioned in baseline in detail the proposed system has been developed essentially as a combined network to carry DWF and SWF generated from the catchment area. In this system the sewage as well as the storm water flows through the same conduit. As quantum of SWF is several times greater than the DWF, the system carries an insignificant flow for major period of a year.

104. DWF generated from the Kabardanga catchment and Julpia catchment is proposed to be collected at Kabardanga and Julpia pumping stations respectively. From there, the DWF will be conveyed to adjacent Bank Plot STP (under construction) under KEIIP Trench 3. SWF from the Kabardanga and Julpia pumping stations will be disposed of to Keorapukur canal by two separated dedicated pumping main. In addition, 15 nos. of GOF arrangements are proposed for S&D network in Kabardanga catchment and 24 nos. GOF arrangements are proposed for S&D network in Julpia catchment at suitable locations for discharging SWF from the different zones to the respective canals. It is suggested that each outfall is necessary to be equipped with sluice gate structure / flap gate as per site condition. Following environmental measures are already included in the project to avoid and/or minimize adverse impacts and enhance positive benefits:

(i) A combined system has been proposed by considering narrow/limited road width in the sub project areas.
(ii) To integrate the climate change impact following design measures are considered - Design is proposed by considering the pre-dominant stormwater runoff co-efficient; during heavy rainfall event, in order to avoid over loading in STP, bypass arrangement has been proposed at strategic locations to divert excess flow through the outfall structures to existing canal system.
(iii) Stormwater flow from the S&D network is proposed to be disposed of to the canals by gravity outfalls to optimize the overall energy usage.
(iv) To prevent backflow of water, the invert level of the outfalls is proposed to be fixed at the full discharge level (FDL) of the canal. Sluice gates are also proposed as a controlling arrangement at the GOF.
(v) Avoiding the use of asbestos-containing materials.
(vi) Reducing the incidence of water borne diseases by providing 100% of the population, including urban poor, with improved sanitation facilities.
(vii) 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.
(viii) Providing appropriate personal protection equipment for the workers and staff is important.

105. **Sewerage and Storm Water Collection and Conveyance.** The proposed system has been developed essentially as a combined network to carry DWF and SWF generated from the catchment area. Combined sewers are proposed to collect stormwater and sanitary wastewater from households. Upon completion of the S&D network for the area, existing open surface drains in general are proposed to be dismantled and filled up. This will not only improve environmental condition of the area, but will also result in increased road width, which in general is narrow. 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. Accumulation of silt in sewers in over time, overflows, blockages, power outages, harmful working conditions for the workers cleaning sewers etc. are some of the issues that needs to be critically looked into during design of sewer system. A properly designed system is a must for system sustainability. Measures such as the following shall be included in sewer system design to ensure that the system provides the benefits as intended:

(i) Limit sewer depth to a possible extent. Sewers shall be laid away from water supply lines and drains (at least 1 m, wherever possible).
(ii) In all cases, the sewer line should be laid deeper than the water pipeline (the difference between top of the sewer and bottom of water pipeline should be at least 300 mm)

(iii) In unavoidable, where sewers are to be laid close to stormwater drains, appropriate pipe material shall be selected (stoneware pipes shall be avoided)
(iv) For shallower sewers and especially in narrow roads, use small inspection chambers in lieu of manholes;
(v) Design manhole covers to withstand anticipated loads and ensure that the covers can be readily replaced if broken to minimize silt/garbage entry.
(vi) Ensure sufficient hydraulic capacity to accommodate peak flows and adequate slope and gas vents in gravity mains to prevent buildup of solids and hydrogen sulfide generation.
(vii) Take necessary precautionary measures to protect sewer networks, and to avoid disposal of solid wastes, debris, and wastewater into newly laid sewers from the time it is constructed to the start of operation phase.

106. **Design of Pumping Stations:** As discussed in baseline that construction of two new pumping stations are proposed in Julpia (land under possession of KMC beside Kabardanga-Julpia road) and at Kabardanga (land under possession of PWD, GoWB at Kabardanga more beside M.G. Road). The combined flow generated from both the Kabardanga catchment and Julpia Catchment will be conveyed to these proposed pumping stations. It is proposed to provide submersible pumps in wet well type pumping station. Incoming combined flow shall be screened by mechanical coarse screens located upstream of pumping station and shall be pumped to the head works by DWF and SWF pumps. Odour is generated from the pumping station due to accumulation of obnoxious gases specially when sewage becomes stagnant, causing nuisance to the surrounding environment. Since the proposed pumping stations are located near residential/commercial areas, and devoid of any tree cover, the odour nuisance issue may be anticipated. At the Julpia pumping station site, the nearest house is approximately 10 m (southern direction) from the wet well (Figure 9). Similarly, the Kabardanga site is surrounded by both residential and commercial establishments, with the closest shop-cum-market is located about 20 m from the proposed wet well in the eastern direction (Figure 11). Mitigation measures to avoid smell and visual pollution shall be taken into consideration during design in Service Improvement Plan (SIP) period by the contractor. An odour capture system will be installed during the operation stage as per requirement. Following environmental sensitive design measures are already included in the design to avoid and/or minimize adverse impacts on surrounding environment:

(i) Provide low noise, efficient pumping systems
(ii) Provide dedicated power supply to pumping station, if possible, otherwise Diesel Generator (DG) set to be used during power failure, should be soundproof and having acoustic enclosures with low/permitted air emission standards
(iii) Design pumping stations with appropriate retention time, so as not to retain the sewage in the sump for a long time to avoid generation of odorous gases.
(iv) Plantations should be provided in the available space within boundary of the plot and provide with multiple rows of trees to act as visual and odour screen.
(v) Place significant odour-emitting units at adequate distance from nearby houses to minimize impact.
(vi) An odour capture system will be installed during the operational stage as per CPCB guidelines on odour pollution and control, May 2008[22] to safeguard the health and safety of the community.

[22]https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvTmV3SXRlbV8xNDFfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==

(vii) Entry should be restricted through the provision of gates and guards during the operation.

107. **Discharge of Dry Weather Flow.** The DWF from the proposed Julpia pumping station (package SD 06) will be directed to the S&D network in the Kabardanga catchment via a dedicated pumping main and then transmitted to the proposed Kabardanga pumping station. The S&D network, including the pumping station for the Kabardanga catchment, will be implemented under the KSHARP (package SD 07). From the Kabardanga pumping station, the DWF generated from both the Kabardanga and Julpia catchments will be conveyed through a dedicated pumping main along M.G. Road to the S&D network of the Churial Extension catchment, and onward to the Churial Extension pumping station. At the Churial Extension pumping station, the DWF will be transmitted to the 40 MLD capacity Bank Plot STP based on Sequential Batch Reactor (SBR) for treatment and disposal. The construction of the S&D network for the Churial Extension catchment, the Churial Extension PS[23], and the Bank Plot STP[24] are currently underway under KEIIP, Tranche 3. Due diligence of both packages was carried out and respective IEE reports were prepared and approved and disclosed by ADB. A summary of due diligence report of Churial PS and Bank Plot STP is attached in Appendix 7. The DWF from both subproject areas will be treated at the Bank Plot STP to meet discharge standards as recommended by the CPCB in 2015 and in accordance with the National Green Tribunal (NGT) order dated April 30, 2019. Surplus treated effluent from the STP, after reuse, will be discharged into the nearby Churial canal, which flows into the Hooghly River near Budge Budge, approximately 15 km from the Bank Plot STP site. Considering the present canal water quality, discharge of treated effluent will be beneficial, and no adverse impact is anticipated.

108. **Disposal of SWF.** During the rains, the combined flow (both the wastewater and storm runoff) will be diverted directly into Keorapukur canal partially from both Kabardanga and Julpia pumping stations, and partially from the gravity outfalls proposed under the subprojects. Since this is a combined system, the combined flows will not be subjected to treatment given the significant quantities of combined flow. As quantum of SWF is several times greater than the wastewater flow from the catchment areas, the resulting combined flow is highly diluted. Keorapukur canal, as stated above, flows into Tolly Nullah near Kudghat metro station which ultimately in the form of Adi Ganga flows into Hooghly River. No impact envisaged. However, to ensure that system functions properly, and flow is not diverted improperly resulting in inadequate dilution, a standard operating procedure (SOP) will be followed at the diversion points (gravity outfalls and pumping station), operators will be trained in the SOP and will be monitored. Water quality monitoring also will be conducted. Carrying capacity of the channels has been considered, and it is assessed that the channels have adequate capacity to carry the discharge. Moreover, in the existing condition also, the storm water runoff is carried in the same canals. A hydraulic modelling study has been conducted to review the performance of outfalls and carrying capacity adequacy. 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.

109. **Mixing of industrial effluent in wastewater.** One of the critical aspects in sewerage system operation is, change in raw sewage characteristics at inlet of pumping station and sewage treatment plants 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 process and affect the efficiency. Mixing of industrial

[23] https://www.adb.org/sites/default/files/project-documents/42266/42266-025-iee-en_0.pdf
[24] https://www.adb.org/sites/default/files/project-documents/42266/42266-026-sddr-en_11.pdf

effluent will severely deteriorate the quality of treated wastewater, and therefore the proposed reuse plan. Reuse of such water may have significant impact on public health, and on land and water. 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) Ensure that there is no illegal discharge through manholes or inspection chambers
(iii) Conduct public awareness programs in coordination with WBPCB
(iv) Conduct regular wastewater quality monitoring (at inlet and at outlet of pumping station and STP) to ensure suitability of raw wastewater entering the STP and treated wastewater quality meeting the discharge standards.

C. Pre-Construction Phase Impact: Planning

110. **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.

111. **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. 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 labour laws, applicable environmental laws etc.

112. **Updating of IEE and EMP and preparation of SEMP**. This draft IEE is prepared based on the detailed designs and will be disclosed in the ADB and Project websites, Detailed site investigations and designs will be carried out by the contractor. Therefore, IEE needs to be updated to reflect the final project and changes if any and confirm and/or update the predicated impacts and EMP as necessary. A site-specific EMP needs to be prepared prior to start of construction works. Therefore, 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; (b) specific mitigation measures following the approved EMP; (c) monitoring program as per EMP; and (d) budget for SEMP implementation.
(iii) No work can commence prior to approval of SEMP. The SEMP shall include the following plans as necessary: construction work site plan, construction compound/facility management plan, construction health and safety plan, emergency incident response plan, spoils disposal plan, traffic management plan, demolition works and debris management plan, waste and spill management plan, emergency preparedness plan for night works, contingency plan for utility disruptions of essential services like water supply.

113. **Environmental monitoring of baseline conditions of air, noise, water**. Prior to start of baseline environmental quality (air, noise, water etc.,) of the subproject area will be established. Monitoring locations will be identified by the Environment specialist of the PMDSC, and the construction contractor will carry out baseline environmental quality measurements prior to start of the construction through an approved laboratory. Monitoring will be synchronized with the location of works and continued periodically over the construction period as per the environmental monitoring plan.

114. **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
(v) Establish and maintain standards aimed at preventing sexual harassment, abuse, and exploitation and other forms of misconduct at work site. Zero tolerance to inaction on sexual exploitation, abuse, and harassment.[25]

115. **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 or water bodies may have adverse impacts on the local ecology and flora and fauna. Project area however is fully urbanized. About 85 to 90% of excavated earth will be used for backfilling the trenches after laying of pipelines. The surplus soil and bitumen waste will be used for area development purpose in the proposed Kabardanga and Julpia pumping station sites. To reduce environmental impacts the following measures are recommended to avoid impacts:

(i) Prioritize areas within or nearest possible vacant space in the project location;
(ii) Do not consider residential areas;
(iii) For excess spoil disposal, ensure site shall be selected preferably from barren, infertile lands.
(iv) Debris disposal site shall be at least 200 m away from surface water bodies;

[25] The Asian Development Bank (ADB) has developed comprehensive guidelines to address Sexual Exploitation, Abuse, and Harassment (SEAH) in ADB-financed projects, particularly those involving civil works. These guidelines, found in the Good Practice Note on Addressing SEAH, aim to prevent, mitigate, and manage SEAH risks throughout the project lifecycle.

(v) 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/lakes or other water bodies

116. **Source of Construction Materials:** Construction material such as various type of pipe material (uPVC, DI and MS pipe), brick, cement, concrete, sand and coarse aggregate will be required for this project. Construction of pumping stations will involve using of various prefabricated material and electro-mechanical items etc. 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. Contractor 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) Verify suitability of all material sources and obtain approval of PMU; and
(iii) 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.
(iv) 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 Phase

117. The civil works for the subprojects includes construction of pumping stations at Kabardanga (SD-07) in the vacant government land under possession of PWD, GoWB and at Julpia (SD-06) in the vacant government land under possession of KMC. This work will be confined to site, and construction will involve activities like site clearance, excavation for foundations, and creation of concrete structures etc. Most such structures will be constructed from reinforced concrete (RC), where steel reinforcing rods and bars are placed and attached by hand to create an interior skeleton for the foundations. Subprojects also include linear works and will install 16.9 km and 16.6 km sewer pipes in Jupia and Kabardanga catchments respectively. Sewers will be laid by both open cut method (1.5 to 6 m depth based on topography) and micro tunnelling method. Work includes construction of circular manholes, gully pits (in wide roads) and catch pits (in narrow roads). For guiding storm water to the gully pits / catch pits, Kerb channel of about 26 km and 25.3 km are proposed to be provided on either side of the road in Kabardanga and Julpia catchment respectively. Sewers will be laid in the center of roads under KMC/ PWD ownership. In Julpia catchment, the diameter of proposed sewer main is between 300 mm to 1400 mm and the road width on such locations where pipe laying is proposed ranges from 2.0 to 8.5

m. About 2.7 km sewer line (1400-2200 mm diameter) to be laid by micro tunnelling method along Kabardanga-Julpia road. In Kabardanga catchment, the diameter of proposed sewer main is between 300 mm to 2000 mm and the road width on such locations where pipe laying is proposed ranges from 2.5 to 13.5 m. About 2.0 km sewer line (1000-2000 mm diameter) to be laid by micro tunnelling method along M.G Road (870 m length; 1000-1800 mm pipe diameter) and Julpia road (1170 m length ;1400 mm to 2000 mm diameter).

118. Pipe laying activities involves quite simple techniques of civil work - excavation and back filling. Excavation will be done by earth cutting equipment supplemented by manual digging. Sufficient care will be taken while laying so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged but carefully laid in the trenches. Trenches deeper than 1m 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 contractor to keep the trench dry and barricade the same with hard barricading to avoid any accident. The normal 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 to be removed and stacked near the trench to facilitate backfilling. As far as possible trench works and excavation works (pipe laying) 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, traffic assistance, barricades etc. Trench shall be kept dry by dewatering and removal of slush.

119. During Micro tunnelling intermittent shafts of access will be dug using a backhoe digger, supplemented by manual digging where necessary. Excavated soil will be placed alongside the shafts and the pipes will be brought to shaft sites on trucks and stored on unused land nearby. Excess spoils will be loaded into trucks for disposal. Slurry will be collected, stored in a container and disposed of to permitted low laying area.

120. Road of about 16.9 km that will be excavated in Julpia catchment and about 16.6 km that will be excavated in Kabardanga catchment for pipe laying/construction activities will be rehabilitated by removing temporary barricades and any other materials placed in/or near to trench. Restoration of roads in its original condition must be approved by the site engineer. 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.

121. **Work on Sensitive Areas (Schools, Religious places, Hospitals etc.).** Although construction of these project components involves quite simple techniques of civil work, the invasive nature of excavation and the project locations 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 schools, religious places, hospitals and the community in general near Carmel High School, D.F. Blind School, Ramchandrapur Primary School (SD-07) and Municipal health clinic, St. Thomas church, Sajna Baria Primary School and Jiadargot Primary School (SD-06) during pipe laying activities (Appendix 13). 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 project components will be (i) constructed by small teams working at a time; (ii) any excavations will be protected as per standard norms (iii) finish excavation, pipe laying and back filling of trench in the minimum time possible (iv) provide adequate barricades and road safety signage during pipe laying works in traffic areas (v) if night works are required all the mitigation measures to

reduce impacts of disturbance to minimum level to nearby habitants and road users should be ensured by contractor, (vi) consult with business and institutions for work schedules. In critical areas such as schools or hospitals, operating hours are factored into work schedules and workforce is increased for speedy completion, (vii) all trench, and pit excavations and other work shall be carried out during night time at busy road section. and (viii) pedestrian access to schools, public libraries, courts, doctor's chambers, pharmacists, and other premises frequently by the public will be maintained with the use of walking boards.

122. **Demolition and Dismantling works.** In the proposed pumping station site at Kabardanga one staff quarter and section office of PWD will be demolished as per design. It is estimated that a total quantity of 114,855 cum of excavated soil and 6,910 cum dismantled bitumen top will be generated from the sewer pipe laying in Julpia catchment (SD 06) and 110,367 cum of excavated soil and 6,485 cum dismantled bitumen top will be generated from the sewer pipe laying in Kabardanga catchment (SD 07). Approximately 9340 cum of excavated soil and 550 cum of dismantled bitumen top will be generated from Julpia pumping station site and about 8260 cum of excavated soil and 400 cum of dismantled bitumen top will be generated from Kabrdanga pumping station site. About 85 to 90% of excavated earth will be used for backfilling the trenches after laying of pipelines. The surplus soil and bitumen waste will be used for raising the ground level of the proposed Kabrdanga and Julpia pumping stations. About 1400 cum of solid waste will be generated due to demolishing of existing staff quarter and section office of PWD at Kabardanga pumping station site. Demolition works will be taken up with proper work plan and mitigation measures will be adopted for demolition works as per Construction and Demolition Act, 2016. A demolition plan will be prepared considering the local community and workers' safety, emergency procedure, dust, noise, storage, transport and disposal of debris, site cleanup etc.

123. During the preparation of the Detailed Project Report (DPR) and from the preliminary survey and design conducted in January 2024, it has been confirmed that there is no presence of asbestos or asbestos containing material (ACM) in the existing infrastructures. Monitoring reports from previous ADB-funded KEIP projects and ongoing KEIIP projects have also confirmed that there are no ACM in the existing infrastructures. Appropriate site for storage and disposal of demolished materials should be selected prior to start of demolition activities with prior permission/approval of PMU/ULB. Debris generated due to the dismantling of the existing road need to be suitably reused in the road construction, subject to the suitability of materials and as follows:

(i) Proper debris management plan to be prepared and followed.
(ii) Spray water to keep debris moist.
(iii) Segregate and recover reusable materials.
(iv) Segregate waste into recyclable, non-recyclable parts and hazardous waste
(v) The dismantled existing bitumen surface will be reused by melt-mixing and utilised for paving of crossroads, access roads, and paving works in construction sites and camps, temporary traffic diversions, haulage routes,
(vi) Unusable and non-bituminous debris materials should be suitably disposed of at pre- designated disposal locations, with approval of the concerned authority.
(vii) Sub grade of the existing pavement shall be used as fill material.
(viii) Existing base and sub-base material shall be recycled as sub-base of the haul road or access roads
(ix) Contractor will suitably dispose of unutilized debris materials either through filling up of borrow areas located in wasteland or at pre-designated disposal locations

124. **Damage / disturbance to existing utilities.** Since the sewers are proposed in the centre of the road, the presence of utilities are minimal. However, in narrow roads, and for large sewers width of excavation will be significant. There are telephone lines, electric poles, underground cables, water lines, drains etc., along the roads, and these may fall within the alignment of proposed pipelines, and 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 risk 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 PMU and PMDSC will:

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

125. **Trenchless Pipe Installation (Micro tunnelling).** Noise generated due to micro-tunnelling may affect the neighbouring communities and other sensitive receptors (such as students at schools and other educational institutes, patients at hospitals etc.). During drilling bentonite slurry may be used to cool 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 6-8m^3 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.

126. **Air Quality:** Ambient air quality is mainly influenced by traffic movement through M.G. Road, Kabrdanga- Julpia Road, Brickfield Road, Darir Chak Road etc. Construction work, especially from earthwork activities, material and debris transport, and works along the public

roads carrying significant traffic, have high potential to generate dust. Also, emissions from construction vehicles, equipment, and machinery used for excavation and construction induce impacts on the air quality. Anticipated impacts include dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulphur oxides, particulate matter, nitrous oxides, and hydrocarbons. Increase in dust/ particulate matter in ambient air is detrimental and may have adverse impacts on people and environment. 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 labour camps and open burning of solid waste by workers. Demolition activities at Kabardanga pumping station site are likely to generate dust. To mitigate the impacts, construction contractors will be required to:

(i) Contractor to implement all measures to prevent and control dust from construction activities, including the following:
(ii) Plan the work sites properly, and demarcate the sites for stockpiling of, soils, gravel, and other construction materials away from the traffic, vehicle, general worker movement to avoid disturbance of loose materials
(iii) Conduct work sequentially - excavation, pipe laying, backfilling; use the freshly excavated soil for back filling, it will avoid stocking of material and minimize the dust. Back-to-back road restoration shall be undertaken immediately.
(iv) No stacking of soil or material is allowed near school/hospital area to avoid dust generation. Additional measures shall be taken to avoid any impact on these sensitive areas.
(v) Provide dust screen around the sites prior to start of demolition works; provide temporary enclosure for dust-generating activities, wherever possible;
(vi) Damp down exposed soil and any stockpiled material on site by water sprinkling;
(vii) Use tarpaulins to cover sand and other loose material when transported by trucks;
(viii) Clean wheels and undercarriage of haul trucks prior to leaving construction site
(ix) use enclosers and sprinkle water during concrete road cutting works to lay pipelines; dampen the unpaved ground in the immediate vicinity, and the debris generated;
(x) Don't allow access in the work area except workers to limit soil disturbance and prevent access by barricading and security personnel
(xi) 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
(xii) Limit idling of vehicles on the construction sites to 3-5 minutes
(xiii) Obtain CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project.
(xiv) If contractor is purchasing ready mix concrete, asphalt/macadam and aggregates from third party, contractor will assure that all the partier/ 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.
(xv) Strict prohibition of open burning of solid waste
(xvi) Regular inspection & maintenance of construction/transportation vehicles
(xvii) Supply of LPG to workers instead of allowing them to use firewood for cooking
(xviii) Restore the road surface as soon as possible after the refilling; in case of time delay, necessary measures are to be implemented to avoid traffic movement on loose soil surface; use of dust free crushed stone aggregates with appropriate binder as top layer on backfilled area may be considered

(xix) Conduct ambient air quality monitoring periodically as per Environmental Management Plan (EMP).

127. **Noise and Vibration**: Noise is one of the most ubiquitous disturbances to the environment particularly during the construction and operation phases Being located mostly in the residential areas, the noise level in the sub project area is within the limit except at main roads (such as M.G. Road, Kabrdanga- Julpia Road, Brickfield Road, Darir chak Road) and in commercial areas (Kabardanga fish market area). There are three schools located in Kabrdanga Catchment and two school in Julpia catchment near the pipe laying alignment. Besides, these, there is a municipal health centre beside Julpia Road. Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roads, operation of construction equipment like concrete mixers, transportation of equipment and materials. Increase in noise level may be caused by building demolition activities proposed at existing pumping station. Use of power horns and movement of heavy vehicles can cause a serious disturbance to the community, educational institutes, hospitals/health centers and residences etc. The sensitive receptors are the general population in these areas. Vibration generated from construction activity, for instance from the use of pneumatic drills, will have impact on nearly buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be required to:

(i) Contractor to implement all measures to control noise and vibration from construction activities, including the following:
(ii) Conduct activities with the greatest potential to generate noise during periods of the day which will result in the least disturbance; provide prior public information.
(iii) Plan activities during day time only near hospital area to avoid noise/ vibration generating activities as much as possible.
(iv) Proper measures shall be taken to minimize noise and vibration in these sensitive areas.
(v) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;
(vi) As far as possible use new construction machinery and keep all the old machinery in a good and maintained state.
(vii) 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;
(viii) 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. Set up screens or shields in areas where nearby workers or community may be exposed to flying fragments, chips, dust and excessive noise.
(ix) Maximum sound levels should not exceed the WHO guideline values for noise levels.
(x) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
(xi) Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals.
(xii) 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
(xiii) Conduct Noise monitoring according to the Environmental Management Plan

(EMP).

128. **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, stormwater 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 110367 cum and 114855 cum of excavated soil will be generated from the sewer pipe laying work in Kabardanga catchment (SD 07) and Julpia catchment (SD 06) respectively. Additionally, approximately 8260 cum and 9340 cum of excavated soil will be generated from Kabrdanga pumping station and from Julpia pumping station sites respectively. About 85 to 90% of excavated earth will be used for backfilling the trenches after laying of pipelines. The surplus soil and bitumen waste will be used for raising the ground level of the proposed Kabrdanga and Julpia pumping stations as the area is low-lying and requires substantial filling material.

129. 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) and the proposed excavation depth is 1.5 m to 6 m. 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 measures 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. 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 of 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 conditions (both unconfined and confined), and the proposed excavation depth is 1.5m to 6m. 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 (pipe laying) during monsoon season
(x) 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.

(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) The contractor shall source water from surface sources as far as possible and obtain necessary permits 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).

130. **Generation and management of construction wastes**. Wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, used containers of oil and fuel and other similar items. It is estimated that about 114855 cum excavated earth and 6910 cum of bitumen top will be generated due to sewer pipe laying from Julpia catchment and 9340 cum excavated earth and 550 cum of bitumen top will be generated for construction of proposed pumping station at Julpia. Also, at Kabardanga subproject area about 110,367 cum of excavated soil and 6,485 cum of dismantled bitumen top will be generated due to sewer pipe laying and 8260 cum excavated earth and 400 cum of bitumen top will be generated for construction of proposed pumping station at Kabardanga. About 1400 cum of solid waste will be generated due to demolishing of existing staff quarter and section office of PWD at Kabardanga pumping station site. The excavated soil and the waste generated will be reused for backfilling and for area development purpose at the proposed pumping station sites. 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 roads etc.;

(iii) Avoid stockpiling any excess spoils at the site for a long time. Excess excavated soils should be disposed of to 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 transportation.
(xii) Soil transportation should not be done during the peak hours and should avoid narrow and heavy traffic routes and important religious or tourist sites
(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. [26]
(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.

131. **Accessibility and traffic management.** Excavation along the roads, hauling of construction materials and operation of equipment on-site can cause traffic problems. A major portion of roads carry considerable traffic, mainly comprises buses, cars, bicycles, 2 wheelers, Mini trucks, Auto rikshaw etc. Sewer pipeline works will be conducted in the middle of the roads, which has potential to create accessibility issues to surrounding houses and business establishments and also affect the traffic movement. Temporary impact on permanent shops will be avoided in busy market areas by executing work during night hours and with proper safety measures. Laying of pipelines through busy roads such as M.G. Road (SD-07) and Kabardanga-Julpia Road under both SD-07 and SD-06 will be laid through micro tunnelling method. Pipelaying in narrow road stretches in the project area will be carried out in phased manner, upon due consultation with local residents and shop owners. Temporary impact is also anticipated near Carmel High School, D.F. Blind School, Ramchandrapur Primary School (SD-07) and Municipal

[26] Construction and Demolition Waste Management Rules 2016 and Solid Waste Management Rules.

health clinic, St. Thomas church, Sajna Baria Primary School and Jiadargot Primary School (SD-06) during pipe laying activities. Pipe laying works in such areas will be executed in small stretches, section by section. Civil works will be completed in one section before commencing work on the next section. The contractor will ensure that noise levels are within limits. Hauling of construction material, equipment, construction waste, etc., to and from the work site may increase the road traffic on local roads, some of which are not in good condition. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor will be required to:

(i) Prepare and implement a Traffic Management Plan, ensure road traffic and pedestrian and traffic safety through proper safety measures
(ii) Plan construction vehicle transportation routes properly so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites;
(iii) Schedule transport and hauling activities during non-peak hours;
(iv) Locate entry and exit points in areas where there is low potential for traffic congestion;
(v) Keep the site free from all unnecessary obstructions;
(vi) Drive vehicles in a considerate manner;
(vii) Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours;
(viii) Notify affected sensitive receptors 1-week in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.
(ix) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
(x) Confine work areas along the roads to the minimum possible extent; all the activities, including material & waste/surplus soil stocking, should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required
(xi) Provide pedestrian access in all locations until normalcy is restored. Leave spaces for access between excavation and/or mounds of soil to maintain access to the houses / properties
(xii) Provide wooden/metal planks over the open trenches at each house to maintain the access.

132. **Socio-Economic – disturbance to businesses and livelihood activities.** The project components will be located in government land and there is no requirement for land acquisition or any resettlement. Blocking of access to the business / livelihood activities, especially during pipeline laying along the narrow roads (owned by KMC and PWD), may slightly impact the income of households. The measures suggested above for ensuring accessibility during pipeline works, will minimize this impact. The potential impacts are negative and moderate but short-term and temporary. The construction contractor will be required to implement following measures to mitigate the impact:

(i) Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools;
(ii) Consult businesses and institutions regarding operating hours and factor this in work schedules;
(iii) Provide walkways and metal sheets where required to maintain access across the trenches for people and vehicles;

(iv) Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints and
(v) Implement resettlement plan (RP) to address any issues related to livelihood impacts

133. **Socio-Economic – Employment.** Manpower will be required during the construction stage. This can result in 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

134. **Occupational Health and Safety.** Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Building demolition works pose significant safety risk if proper appropriate equipment and methods are not adapted and precautions are not taken. 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 Contractor to keep the trench dry and provide hard barricade the same to avoid any accident. Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day. Existing canals and drains carry wastewater, and accumulated sludge may also be harmful if not handled properly. Working in these areas, including in areas where there is need to connect to existing sewers (or manholes) may pose safety hazards to workers from possible accumulation of harmful gases like hydrogen sulfide (H_2S), methane, ammonia, and carbon monoxide in confined spaces. These gases pose risks of asphyxiation, poisoning, or even explosion (in the case of methane). 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 Guidelines,[27] Sector Specific (Water and Sanitation) Guidelines[28] 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[29] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;

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

[28] https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

[29] 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.

(iv) Ensure that demolition works are properly planned and executed; competent engineer shall assess the buildings to be demolished and prepare a demolition plan duly considering the potential hazards, methods to be adapted, equipment to be used, and control of dust, noise and debris. Workers shall be trained, and an emergency plan shall be put in place.

(v) Provide dust screen around the sites prior to start of demolition works; provide temporary enclosure for dust-generating activities, wherever possible;

(vi) Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and KMC shall be planned

(vii) Conduct work in confine spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt ad hoc methods; all trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel);

(viii) As far a possible avoid trench works and excavation works (pipe laying) 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.

(ix) Adequate safety measures shall be implemented for excavation and construction of wet well at the proposed pumping station; the risk is high considering the depth of excavation, and high-water table.

(x) There is an occupation health risk to workers engaged in sewer activities and potential contaminated areas with sewage and accumulated sludge. The contractor must implement appropriate safety measures, including but not limited to the following:

- Avoid manual working in all such areas posing risks to workers/staff
- No work should be conducted without presence of on-site work supervisor or engineer as the case may be
- Use appropriately equipment, provide proper PPEs (including oxygen masks), and work shall be conducted only under proper supervision
- Monitoring oxygen levels and other harmful gases (Oxygen level safe range: 19.5%–23.5%,
- Ensure continuous mechanical ventilation inside the sewer line.
- Maintain constant communication (radio or line-of-sight)

(xi) 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

(xii) Ensure that qualified first aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;

(xiii) Provide medical insurance coverage for workers;

(xiv) Secure all installations from unauthorized intrusion and accident risks;

(xv) The project area may experience extreme temperatures during the 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

(xvi) Provide supplies of potable drinking water;
(xvii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances;
(xviii) 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;
(xix) 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;
(xx) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(xxi) Ensure moving equipment is outfitted with audible back-up alarms;
(xxii) 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
(xxiii) Disallow worker exposure to noise levels greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
(xxiv) Conduct regular health check-ups for workers
(xxv) Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites

135. **Asbestos Containing Materials**. No Asbestos containing material (ACM) is proposed to be used in the subproject construction. During the preparation of the Detailed Project Report (DPR) and from the preliminary survey and design conducted in February 2024, it has been confirmed that there is no presence of asbestos or asbestos-containing material (ACM) in the existing infrastructure and sewerage & drainage (S&D) networks. Monitoring reports from previous ADB-funded KEIP projects and ongoing KEIIP projects have also confirmed that there are no ACM in the existing infrastructures. Given the dangerous nature of this material for both workers and citizens, measure should be taken to protect the health of all parties in the event of any ACM (however unlikely) are encountered. For management of ACM, approach recommended by ADB for "protecting workplaces and communities from asbestos exposure risks (Good Practice Guidance for the Management and Control of Asbestos: Protecting Workplaces and Communities from Asbestos Exposure Risks30 (March 2022) and United States Environmental Protection Agency (USEPA)31 shall be adapted

136. **Community Health and Safety.** Hazards posed to the public, specifically in high pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Movement of construction vehicles and equipment on public roads also pose risk to pedestrians and traffic. Due to land constraints, roads are narrow. There are also works located close to houses, business

[30] https://www.adb.org/publications/good-practice-management-control-asbestos
[31] In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHSA) and the Environmental Protection Agency (EPA) and can be found at http://www.osha.gov/SLTC/asbestos

and establishments. 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[32];
(iii) Trench excavation and pipeline works shall be conducted in a safe manner; if allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned
(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 pumping station site to prevent unnecessary entry and to avoid accidental fall into open trenches
(vi) Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day
(vii) Follow established community health and safety protocols on emerging infectious diseases such as COVID19.
(viii) Implement measure to prevent proliferation of vectors of diseases at work site;
(ix) Maintain a complaint logbook in worker's camp and take action promptly of complaints. Follow the established GRM of the overall project (URLIP);
(x) Schedule transportation activities by avoiding peak traffic periods;
(xi) Clean wheels and undercarriage of haul trucks prior to leaving construction site;
(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, temples and other places of worship 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

137. **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

[32] IFC World Bank Group. 2007. Environmental, Health, and Safety (EHS) Guidelines – General EHS Guidelines: Construction and Decommissioning.

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 accommodation[33] 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 (refer Appendix 8).
(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

138. **Social and Cultural Resources.** Schools, hospitals and religious places such as temples, churches and burial grounds are present nearby the proposed alignment of pipe laying 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) Do not schedule the works at sensitive times; observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and do not make any disturbance/hindrance/obstacles during such times
(iii) Provide proper signage, barricades, etc.
(iv) Take special measures including posting security personnel at the work sites near the schools and hospitals, ensure safe entrance, and fully separated from the work site. Define clear pedestrian path with fully barricaded on both sides, and on the top if there is risk of falling objects.

139. **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 road having heavy traffic in day time and/or no alternate access can be provided for the road users, extreme climatic conditions

[33]https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-atifc/publications/publications_gpn_workers accommodation

(extreme hot during summers), religious fairs/celebrations in day time etc. Contractors are required to take prior approval from PMU/consultants and concerned town authorities for night works. Contractors are required to adhere following conditions for night works including those 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 day time 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) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements
(vi) 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
(vii) Workers / site staff should not shout or create noise / nuisance
(viii) First aid and emergency vehicles should be available at site
(ix) Emergency preparedness plan should be operative during night works
(x) Old persons and pregnant women and women having small kids should not work in night time
(xi) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise
(xii) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works
(xiii) PMU/PMDSC site engineers and contractor 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.
(xiv) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement
(xv) After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians
(xvi) Drivers and workers should be alert and responsive during night works
(xvii) All the wages to workers working in night hours should be as per the applicable labour acts
(xviii) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours
(xix) Nightwork should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

140. **Post-construction clean-up and Reinstatement**. The contractor will reinstate all working areas and access routes 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 contractors' contract indicates no final payment will be disbursed until the PMU concurs that the post-

construction clean-up and reinstatement are satisfactory. 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 their original condition; fully reinstated 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) All affected structures rehabilitated;
(v) 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;
(vi) All hardened surfaces within the construction camp area shall be ripped;
(vii) 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.
(viii) The contractor must arrange the cancellation of all temporary services;
(ix) Request PMU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.

E. Operation and Maintenance Phase

141. **Operation and Maintenance of Sewer and Drainage 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.

142. The main requirement for maintenance of the S&D conveyance system will be for the detection and repair of leaks. The general flat topography in the project area and the usage of good quality pipes will ensure minimum breakage and therefore, leaks would be mainly limited to joints between pipes. Recurrence of pipe bursting and leakage problems in sewerage system will be managed by the leak detection and water auditing surveys. The operating agency will be required to ensure that the leak detection and rectification time is minimized. Ensure adequate pumping to avoid water logging condition during heavy rain. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should be followed:

(i) Establish regular maintenance program, including:
- Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas;
- Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration;
- Monitoring of sewer flow to identify potential inflows and outflows; and
- Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an

overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g., pump station failures, sewer line ruptures, or sewer line blockages).

(ii) Maintain records; review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed;
(iii) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers;
(iv) Develop an Emergency Response Plan for the sewerage system leaks, burst and overflows, etc.;
(v) Provide necessary health and safety training to the staff in sewer cleaning and maintenance;
(vi) Provide all necessary personnel protection equipment;
(vii) Do not conduct manual cleaning of sewers; for personnel engaged in sewer maintenance work, there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use;
(viii) Concentration of hydrogen sulphide, which is a flammable and highly toxic gas, in or near sewage infrastructure (sewers, manholes, septic tanks etc.), is highly dangerous to operation and maintenance and may lead to inhalation deaths if works are conducted in such conditions. Appropriate and safe conditions shall be ensured prior to start of any works; H_2S levels confirming to ILO[34] threshold limits[35] shall be ensured (1 ppm as TWA (time weighted average) usually 8 hours and 5 ppm as STEL (short-term exposure limit) which is usually 15 minutes.

143. **Operation of pumping stations** will be mostly automated with less human intervention in the process, so scope for human error and its effect on efficiency is very limited. Emergency preparedness and response plan will guide personnel in an accident or emergency situation to prevent or minimize injury, damage and material loss and also to prevent or mitigate environmental impact from the accident or emergency. To continue pumping operation provision of one standby pump will be kept. Uninterrupted power supply with back-up generator facility will be there. Only CPCB approved generators will be procured from registered vendors with necessary pollution control devises/measures (Appendix 4, Table 5).

144. Available Standard operating procedure will be implemented for discharge of SWF into Keorapukur canal and Western channel.

F. Cumulative Impact

145. 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 to the citizens in the added areas, part of Ward 142 and 143 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 are anticipated during the construction phase as the

[34] International Labour Organization
[35] https://www.ilo.org/dyn/icsc/showcard.display?p_card_id=0165&p_version=1&p_lang=en

roads are narrow, and the project area is highly residential. Trenchless technology is adopted to minimize the impacts in narrow and congested areas. There are no environmentally sensitive protected areas nearby.

146. S&D works are proposed to be taken up in the service area of subproject Part of Ward 142 and 143 which is a developing area congested with people, traffic and activities. There are sensitive receptors such as schools and religious places. Works will be spread over entire project area, covering all the roads and streets. 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 some infrastructural construction works are under implementation. But their contribution during construction and implementation phases will not be very significant with the implementation of mitigation measures as discussed in this IEE report.

147. 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/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

148. The meaningful consultations 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.[36] 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.

149. **Public Consultation. As** part of the IEE preparation process, public consultations were held near the proposed sewerage and drainage (S&D) network alignments, pumping station sites and outfall locations to raise public awareness and gather input on existing drainage and sanitation conditions, environmental and health concerns, and community perspectives on the proposed project. These consultations, conducted between November 2023 and February 2024, involved local residents, business owners (including vendors, hawkers, and shopkeepers), Urban

[36] ADB SPS requires meaningful consultation to be a process that (i) begins early in the project preparation stage and is carried out on as an ongoing process throughout the project cycle; (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 any socio-economic and cultural etc. pressure ; (iv) is gender inclusive and responsive, and is responsive to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stake holders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

Local Body (ULB) representatives and women's groups, ensuring active stakeholder engagement in the IEE process. Most participants were long-term residents, having lived in the area for over 20 years. A total of seven stakeholder consultations were conducted under the SD 06 (Julpia) package, with 144 participants—comprising 37 males and 107 females (Table 24). Under the SD 07 (Kabardanga) package, six stakeholder consultations were held, attended by 148 participants, including 45 males and 103 females (Table 25). Further details of the consultations are provided in Appendix 9.

150. Three ward-level stakeholder consultations on the proposed project components and related environmental and social safeguard requirements were conducted on 7 November 2023 at the following locations under Ward 142 of Borough XVI, KMC: (i) Company Pukur in Julpia, (ii) Chakramnagar School in the Kabardanga area, and (iii) Ramchandrapur near Rupali Sangha in Kabardanga. The meetings were attended by ULB ward representatives and local residents. A total of 163 participants took part in the consultations, including 132 women. ADB team along with KSHARP officials and consultants visited most of the proposed sites and facilities in March 2024. During the visit, team also interacted with local community and staff of KMC.

Table 24: Details of Public Consultation in the Julpia Subproject Area (SD 06)

Sr. No	Date	Type of consultation	Location	Total No. of Participants	No. of Male Participants	No. of Female Participants
1	07.11.2023	Ward Level consultation	Ward 142 (Julphia, Company Pukur)	51	9	42
2	07.11.2023	Public consultation	Ward 142 (Indira Udyan)	35	2	33
3	21.02.2024	Public consultation	Ward 142 (Julphia, Sajneberia)	12	7	5
4	21.02.2024	Public consultation	Ward 142 (Julphia, MagurKhali)	11	3	8
5	21.02.2024	Public consultation	Ward 142 (Julphia, Ramjibanpur)	15	5	10
6	21.02.2024	Public consultation	Ward 142 (Julphia, St. Thomas Church Road)	11	7	4
7	21.02.2024	Public consultation	Ward 142 (Julphia, ONGC More)	9	4	5
	Total			**144**	**37(26%)**	**107(74%)**

Table 25: The details of Public Consultation in the Kabardanga Subproject Area (SD 07)

Sr. No	Date	Type of consultation	Location	Total no. of Participants	No. of Male Participants	No. of Female Participants
1	07.11.2023	Ward Level consultation	Ward 142 (Chakramnagar School)	53	9	44

Sr. No	Date	Type of consultation	Location	Total no. of Participants	No. of Male Participants	No. of Female Participants
2	07.11.2023	Ward Level consultation	Ward 142 (Ramchandrapur, beside Rupali Sangha)	59	11	48
3	21.02.2024	Public consultation	Ward 142 (Kabardanga, beside PS)	9	5	4
4	21.02.2024	Public consultation	Ward 142 (Kabardanga, Brick Field Road)	7	3	4
5	21.02.2024	Public consultation	Ward 142 (Kabardanga, Ramchandrapur)	12	12	0
6	21.02.2024	Public consultation	Ward 142 (Kabardanga bazar)	8	5	3
	Total			**148**	**45 (30%)**	**103 (70%)**

151. Participants in the consultations showed awareness of the project and expressed their willingness to support its implementation. They acknowledged that the proposed works would benefit their area by alleviating waterlogging during the rainy season and improving overall living conditions and public health. Participants emphasized the need for widespread dissemination of detailed project information to the community. During discussions with roadside shop owners, hawkers, and vendors, it was clarified that any disruption to their businesses during the construction phase would be temporary and limited in duration. Where impacts are unavoidable, compensation will be provided for the days their shops remain closed.

152. Community members also raised concerns about potential disturbances during construction, such as dust, road closures, and traffic disruptions, which could affect their daily activities. They requested advance notice before the commencement of construction and the installation of adequate warning signs around work areas to minimize inconvenience and ensure public safety. Additionally, they stressed the importance of establishing a reliable operation and maintenance system for the project's long-term success. The PMU assured that the subproject will be completed within a set time frame, with regular joint monitoring by project officials and KMC Borough engineers. Waterlogging will be addressed through water discharge into the canals. Technical and beneficial aspects were detailed by the Design Engineer of DSC. The PMU informed that, since the proposed sewage pumping stations are close to residential houses and market area, An odour capture system based on requirement will be installed during the operational stage as per CPCB guidelines on odour pollution and control, May 2008[37] and standby power arrangements are suggested to safeguard the health and safety of the community. Additionally, multiple rows of trees will be planted within the plot boundary to serve as both a visual and odour screen. The project's Grievance Redress Mechanism was also explained,

153. The project received acceptance and support from both the public and representatives of the Ward members of KMC and other government departments. This positive response was due to the public's recognition of the subproject's potential benefits for the overall welfare of the area

[37]https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvTmV3SXRlbV8xNDFfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==

by providing improved drainage and sewerage networks. Constructive suggestions and recommendations provided during the consultations have been duly considered and incorporated into the subproject, either through design modifications or mitigation measures to be implemented during the execution phase. Overall, no major issues were raised during the consultations.

B. Future Consultation and Disclosure

154. Prior to start of construction, PMU with the assistance of PMDSC will conduct information dissemination sessions at 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/neighbourhood 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.

155. 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.

C. Information Disclosure

156. 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.

157. 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.

158. 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.

159. 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.

160. 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

161. A project-specific grievance redress mechanism (GRM) was established under ongoing project (Loan number 3413 and 3689, Kolkata Environmental Improvement Investment Program (KEIIP) (Appendix 10). The GRM for KEIIP, will be applicable and will be further strengthened for the proposed KSHARP.[38] 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.[39] The multichannel, project-specific GRM functional for KEIIP and the positive features and learning from it will be adopted for the KSHARP.

162. 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.

163. 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”,[40] or talk to Mayor[41] 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 11 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.

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[38] The office order regarding GRC is placed in Appendix 10.

[39] 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.

[40] 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/

[41] 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.

164. 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 tire 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 tocomplainants 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).[42]

165. 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, KEIIP/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 29), 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.

166. **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

[42] 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.[43]

(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.

167. 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).[44] The complainant or aggrieved persons can also lodge their complaints through this online portal.

168. **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.

169. **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.

[43] 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 people's group as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and/or an NGO working with indigenous peoples.

[44] https://www.kmcgov.in/KMCPortal/jsp/ComplaintNew.jsp

170. **Ares of Jurisdiction.** The areas of jurisdiction of the GRC, headed by the Commissioner, 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).

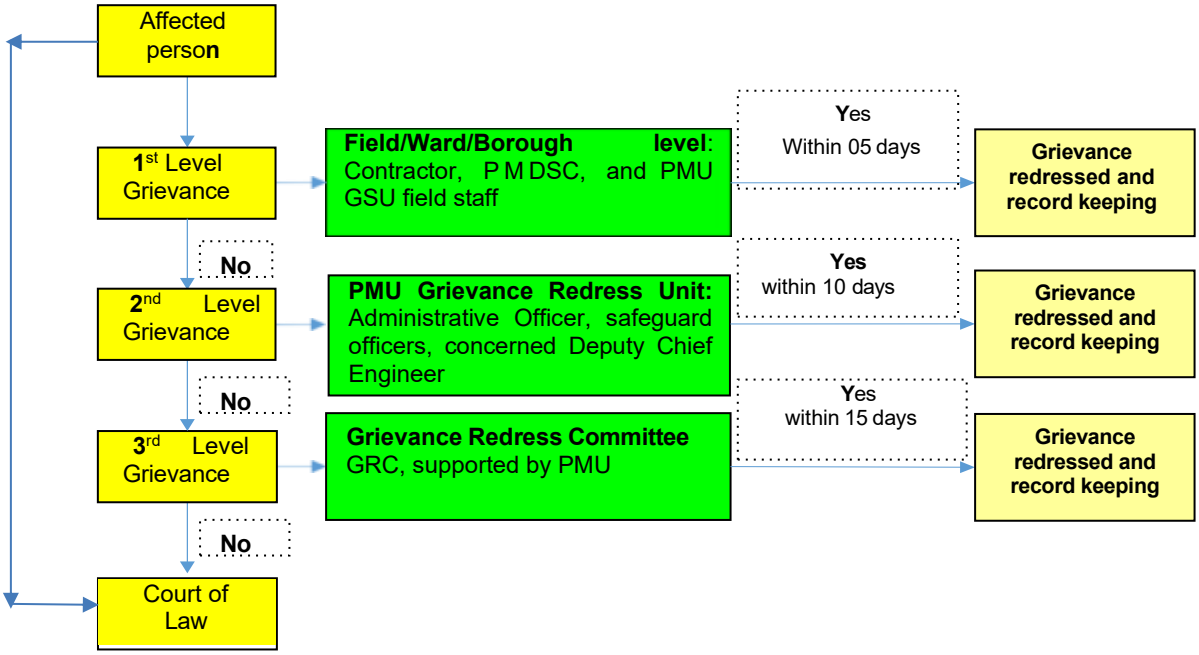
171. **Record-keeping.** Records of all grievances received, including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the final outcome will be kept by PMU (with the support of PMDSC). The number of grievances recorded and resolved, 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.

172. **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 wellas 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 11.

173. **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.

174. **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 29.

Figure 29: 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

175. 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 (26 to 30) which shows the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

176. 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.

177. 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.

178. 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 26: Pre-Construction Environmental Management Plan - Mitigation

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision
Consents, permits and clearances	Environmental legal noncompliance may attract legal action. Failure to obtain necessary consents, permits, NOCs etc. can result to design revisions and /or stoppage of works	Ensure that all necessary approvals are obtained before the start of construction.	Project cost	Contractor, PMU	PMU /PMDSC
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	• Contractor to designate EHS officer/supervisor to ensure implementation of EMP • 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. • The capacity building program will be participatory to the extent possible to make it more effective, with learning by doing, role playing, group exercises, on-the-job training, etc. • Pre- and post-training assessments will be conducted to measure the effectiveness of the program.	Contractor	Contractor	PMU/ PMDSC
Updating of IEE and EMP and preparation of	Non implementation may result in significant environmental impacts	• Update IEE based on detailed designs, and submit to ADB for	PMU /Contractor	PMU and PMDSC Contractor	PMU

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision

SEMP, including SDP, TMP, etc based on final design	and non-compliance with ADB's environmental safeguards requirements	review, approval, and disclosure prior to commencement of work.
		• 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. No work can commence prior to approval of SEMP.
		• The SEMP shall also include following plans as necessary:
		  • Construction of work site plans.
		  • Construction compound/facility management plan
		  • Construction health and safety plan
		  • Emergency incident response plan,
		  • Spoils disposal plan
		  • Traffic management plan
		  • Demolition works and debris			

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision
		management Plan • Waste and Spill Management Plan • Emergency Preparedness Plan for Night Works • Contingency plan for utility disruptions of essential services like water supply			
Environmental monitoring of baseline conditions of air, noise, water and soil	Baseline environmental quality must be determined to determine if project has any impact on the environment	Contractors shall conduct baseline environmental monitoring through government-accredited laboratories. Monitoring locations will be identified by the Environment Specialist of the PMDSC. Monitoring will be synchronized with the location of works over the construction period.	Contractor	Contractor	PMDSC/PMU
Flora and fauna	Tree cutting	Ten (10) no. of non-scheduled trees are required to be felled in the premises of proposed Kabardanga PS site for construction of the PS. No objection certificate (NoC) is therefore required from the Forest Department. However, the number of impacted trees can only be confirmed after the finalization of the layout. following measures needed to be taken: • Avoid removal of trees by adapting to site conditions and with appropriate layout design. • Obtain prior permission for tree cutting at sites that may require tree cutting finalized during detailed design	Contractor	Contractor	PMDSC/PMU

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision
		• Plant and maintain 5 trees for each tree that felled as per GOWB policy. • 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; • If any birds/wildlife on the trees within or in the proximity of work site, identify the species and their protection status; in case if protected specifies are identified, do not initiate works or mobilization of workers/staff on the site until Environmental Specialist of PMSC and PMU visits the sites, undertakes the assessment, and the updated IEE submitted to ADB, and reviewed and cleared			
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	Contractor/PMU	Contractor/PMU	PMU, PMDSC

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision
		achieve it. To aid in the consultation process, it is important that the community be aware of the details of project activities. Important information to be disseminated to the people are, among others, the following: • Overview and objectives of the proposed project; • Preliminary and/or final detailed design of proposed project components; • Potential environmental and social impacts (positive and negative) of the project, and the proposed mitigation measures for the perceived negative impacts; and • Grievance redress mechanism and contact details of the project. • Establish and maintain standards aimed at preventing sexual harassment, abuse, and exploitation and other forms of misconduct at work site. Zero tolerance to inaction on sexual exploitation, abuse, and harassment.[45]			
Temporary construction facilities-	Impacts on sensitive receptors such as flora and fauna, water	• Do not consider residential areas for setting up construction facilities;	Contractor	Contractor	PMDSC/PMU

[45] The Asian Development Bank (ADB) has developed comprehensive guidelines to address Sexual Exploitation, Abuse, and Harassment (SEAH) in ADB-financed projects, particularly those involving civil works. These guidelines, found in the Good Practice Note on Addressing SEAH, aim to prevent, mitigate, and manage SEAH risks throughout the project lifecycle.

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas	bodies/natural drainage, settlements, etc.	• Debris disposal site shall be at least 200 m away from surface water bodies; • For aggregate storage area, hot mix plant, etc. no residential areas shall be located within 200 m downwind side of the site; Site should be at an adequate distance away from sensitive locations like settlements, ponds/lakes or other water bodies.			
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.	• Obtain construction materials only from government approved quarries with prior approval of PMU; • Verify suitability of all material sources and obtain approval of PMU; and • 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. • 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.	Contractor	Contractor	PMDSC/PMU

Activities	Potential Impacts	Mitigation Measures	Cost and Source of Funds	Responsibility	
				Implementation	Supervision
EMP Implementation Training	Lack of training on EMP implementation may lead to irreversible impacts on the environment, workers, and community.	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.	PMU cost	Contractor, PMDSC	PMU/PMU

Table 27: Construction-stage Environmental Management Plan – Mitigation

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Demolition and dismantling works	Dust, noise, demolition waste generation	• Prepare and implement a debris management plan • Spray water on debris to keep it moist. • Segregate and recover reusable materials. • Segregate waste into recyclable, non-recyclable parts and hazardous waste • The dismantled existing bitumen surface will be reused and utilized for paving of crossroads, access roads, and paving works in construction sites and camps, temporary traffic diversions, haulage routes, • Unusable and non-bituminous debris materials should be suitably disposed of at pre- designated disposal locations, with approval of the concerned authority • Sub grade of the existing pavement shall be used as filling material. • Existing base and sub-base material shall be recycled as sub-base of the haul road or access roads • Contractor will suitably dispose of unutilized debris materials either through filling up of borrow areas located in wasteland or at pre-designated disposal locations	Contractor/ PMU	PMU	Project Cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• All the safety measures should be adopted during demolition activities according to Construction and Demolition Waste Management Rules 2016.			
Work on Sensitive Areas (Educational institutes, School. religious places)	Dust generation, air, noise pollution	Physical impacts will be reduced by the method of working and scheduling of work, whereby the project components will be: • constructed by small teams working at a time; • any excavations will be protected as per standard norms • finish excavation, pipe laying and back filling of trench in the minimum time possible • provide adequate barricades and road safety signage during pipe laying works in traffic areas • if night works are required all the mitigation measures to reduce impacts of disturbance to minimum level to nearby habitants and road users should be ensured by contractor, • consult with business and institutions for work schedules. In critical areas such as schools or hospitals, operating hours are factored into work schedules and workforce is increased for speedy completion, • all trench and pit excavations and other work shall be carried out during night time at busy road sections. and • Pedestrian access to schools, public libraries, courts, doctor's surgeries, pharmacists, and other premises frequently by the public will be maintained with the use of walking boards.	Contractor/ PMU	PMU	Project Cost
Utilities	Telephone lines, electric poles and wires, water	• identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and	Contractor/ PMU	PMU	Project Cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	lines within proposed project area may require to be shifted	• prepare a contingency plan to include actions to be done in case of unintentional interruption of services • inform the local community in advance if utilities will be disrupted during construction)			
Air Quality	Emissions from construction vehicles, equipment, and machinery used for bringing construction material, installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, Sulphur dioxides, particulate matter, nitrous oxides, and hydrocarbons.	• Contractor to implement all measures to prevent and control dust from construction activities, including the following: • Plan the work sites properly, and demarcate the sites for stockpiling of, soils, gravel, and other construction materials away from the traffic, vehicle, general worker movement to avoid disturbance of loose materials • Provide dust screen around the sites prior to start of demolition works; provide temporary enclosure for dust-generating activities, wherever possible; • Damp down exposed soil and any stockpiled material on site by water sprinkling; • There are some educational institutes within the sub-project area where pipe laying is proposed. No stacking of soil or material is allowed near these sensitive areas to avoid dust generation. Additional measures shall be taken to avoid any impact on these sensitive areas. • Use tarpaulins to cover sand and other loose material when transported by trucks; • Clean wheels and undercarriage of haul trucks prior to leaving construction site. • use enclosers and sprinkle water during concrete road cutting works to lay pipelines; dampen the unpaved ground in the immediate vicinity, and the debris generated; • 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	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		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. • Limit idling of vehicles on the construction sites to 3-5 minutes • Obtain CTE and CTO for batching plant, hot mix plant, crushers etc. if specifically established for this project. • 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. • Strict prohibition of open burning of solid waste • Regular inspection & maintenance of construction/transportation vehicles • Supply of LPG to workers instead of allowing them to use firewood for cooking • Conduct ambient air quality monitoring periodically as per Environmental Management Plan (EMP)			
Noise and Vibration Levels	Increase in noise and vibration levels due to earth-moving and excavation equipment, and the transportation	• Contractor to implement all measures to control noise and vibration from construction activities, including the following: • Conduct activities with the greatest potential to generate noise during periods of the day which will result in the least disturbance; provide prior public information. • Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	equipment, materials, people	• There are three major educational institutes within the sub-project areas and pipe laying is proposed at these locations. Additional measures shall be taken to minimize noise and vibration in these sensitive areas. • As far as possible use new construction machinery and keep all the old machinery in a good and maintained state. • 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; • 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. Set up screens or shields in areas where nearby workers or community may be exposed to flying fragments, chips, dust and excessive noise. • Maximum sound levels should not exceed the WHO guideline values for noise levels. • Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity; • Consult the custodians of important buildings, cultural and tourism authorities and local communities in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals. • Ensure that the drilling rig, generator sets have acoustic hoods and noise dampers in place; provide prior information to local community about the drilling			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		operation; workers shall be provided with appropriate PPEs • Conduct Noise monitoring according to the Environmental Management Plan (EMP).			
Surface Water, Soil and Groundwater Pollution	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. Unscientific solid waste and construction waste disposal can lead to contamination of soil and ground water	• Contractor to implement all measures to prevent and control land and water pollution • Prepare and implement a construction waste management plan. • 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 • there is 1 no. community pond within the premises of Julpia pumping station. The water body is on the other side of the selected plot for construction of Julpia PS. • Create a temporary peripheral drainage channel around the work area to arrest the entry of runoff from upper areas into the work area; • Avoid locating construction camps and labour camps near the water body and do not dispose of any waste or sullage into the water body. • Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, consult with PMU on designated disposal areas; • 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. • Groundwater occurs in shallow water table condition (both unconfined and confined) and the proposed excavation depth is 1.5m to 6.0m. Rains are also high during monsoon season – ensure that water will not pond in pits and voids near project location by	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		dewatering the accumulated water • Avoid trenching and excavation works (pipe laying) during monsoon season • 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. • 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; • Consider safety aspects related to pit collapse due to accumulation of water. • 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 • Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies. • Place storage areas for fuels and lubricants away from any drainage leading to water bodies; • The contractor shall source water from surface sources as far as possible and obtain necessary permits to use groundwater or surface water for construction purposes. • 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 • Store fuels and lubricants in double hulled tanks. Fuel and other petroleum products are stored away from water drainage and protected by impermeable lining and bonded 110%. • Conduct regular maintenance of machinery and vehicles, and avoid leakages;			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• Enclose the construction area to prevent unauthorized access • Conduct surface quality monitoring according to the Environmental Management Plan (EMP).			
Generation and management of construction wastes	Improper waste management could cause odor and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape and workers' health and safety.	• Prepare and implement a Construction Waste Management Plan; • As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access roads etc.; • Avoid stockpiling any excess spoils at the site for a long time. Excess excavated • soils should be disposed of to approved designated areas immediately; • About 85 to 90% of excavated earth will be used for backfilling the trenches after laying pipelines. The surplus soil and bitumen waste will be used for area development purposes in the proposed Kabardanga and Julpia PS sites. • 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; • 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;	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• 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; • Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed of in disposal sites approved by KMC; • Prohibit burning of construction and/or domestic waste; • 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; • 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; • Soil should be covered with tarpaulin sheets during transportation. • Soil transportation should not be done during the peak hours and should avoid narrow and heavy traffic routes and important religious or tourist sites • 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. [46] • 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			

[46] 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
		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 • 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.			
Accessibility and traffic management	Traffic problems and conflicts near project locations and haul road	• Plan water line works to minimize traffic disturbance / blockades; as the lines are to be laid on all the roads and streets in the town, work planning is crucial to minimize the inconvenience to the public. • Prepare and implement a Traffic Management Plan ensure road traffic and pedestrian and traffic safety through proper safety measures • Plan construction vehicle transportation routes properly so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites; • Schedule transport and hauling activities during non-peak hours; • Locate entry and exit points in areas where there is low potential for traffic congestion; • Keep the site free from all unnecessary obstructions; • Drive vehicles in a considerate manner; • Coordinate with Traffic Police for temporary road diversions and with for provision of traffic aids if transportation activities cannot be avoided during peak hours; • Notify affected sensitive receptors 1-week in advance by providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.	contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum. • Confine work areas along the roads to the minimum possible extent; all the activities, including material & waste/surplus soil stocking, should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required • Provide pedestrian access in all locations until normalcy is restored. Leave spaces for access between excavation and/or mounds of soil to maintain access to the houses / properties • Provide wooden/metal planks over the open trenches at each house to maintain access.			
Social and Cultural Resources	Ground disturbance can uncover and damage historical remains – chance finds	• Strictly follow chance find procedures (Appendix 6) by coordinating immediately with PMU and Archaeological Department for any suspicion of chance finds during excavation works • Create awareness among the workers, supervisors and engineers about the chance finds during excavation work; • Stop working immediately to allow further investigation if any findings are suspected. • Inform local Archaeological Department if a find is suspected and take any action, they require to ensure its removal or protection in situ	Contractor and PMU	PMU and PMSDC	Project costs
Socio-Economic - Income.	Impede the access of residents and customers to nearby shops	• Increase workforce in the areas with predominantly institutions, place of worship, business establishment, hospitals, and schools; • Consult businesses and institutions regarding operating hours and factoring this in work schedules; and	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• Provide sign boards for pedestrians to inform nature and duration of construction works and contact numbers for concerns/complaints. • Provide all mitigation measures as given in resettlement plan (RP) prepared for the project to mitigate impacts on vendors and shopkeepers			
Occupational Health and Safety	Construction activities could create health and safety risks to construction workers	• Comply with all national, state and local labor laws • Following best practice health and safety guidelines including IFC's General EHS Guidelines[47], Sector Specific (Water and Sanitation) Guidelines[48] and any other guidelines and protocols issues by WHO, ADB or relevant government agencies for emerging situation like COVID-19, • 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[49] for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents; • Ensure that demolition works are properly planned and executed; competent engineer shall assess the buildings to be demolished and prepare a demolition plan duly considering the potential hazards, methods	Contractor	PMU, PMDSC	Contractor

[47]https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES
[48]https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES
[49] 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.

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		to be adapted, equipment to be used, and control of dust, noise and debris. Workers shall be trained, and an emergency plan shall be put in place. • Provide dust screen around the sites prior to start of demolition works; provide temporary enclosure for dust-generating activities, wherever possible; • Trench excavation and pipeline works shall be conducted in a safe manner; if the allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and KMC shall be planned • Conduct work in confine spaces, trenches, and at height with suitable precautions and using standards and safe construction methods; do not adopt ad hoc methods; all trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel); • Adequate safety measures shall be implemented for excavation and construction of wet wells at the proposed pumping station; the risk is high considering the depth of excavation, and high-water table. • As far a possible avoid trench works and excavation works (pipe laying) 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. • Provide hard barricades, and deploy security personnel to ensure safe movement of people and			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		also to prevent unnecessary entry and to avoid accidental fall into open trenches • Ensure that qualified first aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site; • Provide medical insurance coverage for workers; • Secure all installations from unauthorized intrusion and accident risks; • The project area experiences extreme temperatures during the summer months of April and May, which may affect the health of workers engaged in construction work. Contractor should take necessary measures during summers including the following: a. Work schedule should be adjusted to avoid peak temperature hours (12 – 3 PM) b. Provide appropriate shade near the workplace; allow periodic resting and provide adequate water c. Provide necessary medicine and facilities to take care of dehydration related health issues • Provide supplies of potable drinking water; • Provide clean eating areas where workers are not exposed to hazardous or noxious substances; • 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; • 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; • Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• Ensure moving equipment is outfitted with audible back-up alarms; • 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 • Disallow worker exposure to noise levels greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively. • Conduct regular health check-ups for workers • Provide periodical awareness camps and special trainings for workers for health issues and risks in construction sites			
	Working in existing drains, contaminate areas, combined sewer and drainage pipelines or manholes poses serious safety risks from harmful gas accumulatio	• There is an occupation health risk to workers engaged in sewer activities and potential contaminated areas with sewage and accumulated sludge. The contractor must implement appropriate safety measures, including but not limited to the following: • Avoid manual working in all such areas posing risks to workers/staff • No work should be conducted without presence of on-site work supervisor or engineer as the case may be • Use appropriately equipment, provide proper PPEs (including oxygen masks), and work shall be conducted only under proper supervision • Monitoring oxygen levels and other harmful gases (oxygen level safe range: 19.5%–23.5%, • Ensure continuous mechanical ventilation inside the	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	n, which can cause asphyxiation, poisoning, or explosions,	sewer line. • Maintain constant communication (radio or line-of-sight)			
Community Health and Safety	Construction activities could create health and safety risks for community members.	• Code of conduct for workers should be developed and implemented throughout the construction period; • 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; • Trench excavation and pipeline works shall be conducted in a safe manner; if allowing public movement along the work sites (pedestrians or vehicles as the case may be) is likely to cause safety risks, movement should be blocked temporarily and work shall be conducted; in such areas, conducting night work or working in small stretches to avoid blockage of traffic/movement no more than few hours in due consultation with the local community and ULB shall be planned • All trenches deeper than 1 m shall be provided with safety shoring/braces (wooden/steel); • Undertake the construction work stretch-wise; excavation, pipe laying and trench refilling should be completed on the same day • Follow established community health and safety protocols on emerging infectious diseases such as COVID19. • Implement measure to prevent proliferation of vectors of diseases at work site;	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• Maintain a complaint logbook in worker's camp and take action promptly of complaints. Follow the established GRM of the overall project (KMC); • Schedule transportation activities by avoiding peak traffic periods; • Clean wheels and undercarriage of haul trucks prior to leaving construction site; • 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 • Earmark parking place for construction equipment and vehicles when idling; no parking shall be allowed on the roads, that may disturb the traffic movement; • Provide prior information to local community, temples and other places of worship about work schedules; • Noise barriers must be installed in between the construction site and any community locations to reduce the noise level; • Provide adequate space and lighting, temporary fences, reflectorized barriers and signages at the work site; • 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 • Ensure contractor has staff trained in emergency response.			
Operation of Construction Camps and	Proper provision and maintenance	• 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	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Workers Facilities	of facilities is necessary for proper living conditions and to 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.	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[50] 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 • Train employees in the storage and handling of materials which can potentially cause soil contamination; • Recover used oil and lubricants and reuse or remove from the site; • Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; • Remove all wreckage, rubbish, or temporary structures which are no longer required; and • Report in writing that the camp has been vacated and restored to pre-project conditions before acceptance of work			

[50]https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-atifc/publications/publications_gpn_workers accommodation

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
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	• 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 • Do not schedule the works at sensitive times; • observe the local rituals and important dates of festivals, weekly/monthly/annual religious occasions in the religious places and do not make any disturbance/hindrance/obstacles during such times • Provide proper signage, barricades, etc. • Take special measures including posting security personnel at the work sites near the schools and hospitals, ensure safe entrance, and fully separated from the work site. Define clear pedestrian path with fully barricaded on both sides, and on the top if there is risk of falling objects.	Contractor and PMU	PMU and PMSDC	Project costs
Monsoon preparedness	Disruption of utilities and water logging in trenches	• As for a possible avoid trench works and excavation works (pipe laying) 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.	contractor	PMU, PMDSC	Contractor
Night Works	Accidents and disturbance to sensitive receptors may occur during night works	• Prepare a night work protocol and obtain prior approval from PMU, and no night works shall be conducted without prior written approval of PMU • No noisy works shall be conducted during the night; maintain noise levels within the standards prescribed by CPCB • Maintain proper lighting and illumination of work site • Workers engaged in night works should have adequate rest/sleep in day time before start of night works, and previous experience of night works and	contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		should be physically fit for such works including clear vision in night • All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements • 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 • Workers / site staff should not shout or create noise / nuisance • First aid and emergency vehicles should be available at site • Emergency preparedness plan should be operative during night works • Old persons and pregnant women and women having small kids should not work in night time • All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise • All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works • PMU/PMDSC site engineers and contractor 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. • Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement			

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians • Drivers and workers should be alert and responsive during night works • All the wages to workers working in night hours should be as per the applicable labour acts • Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours • Nightwork should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.			
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	• Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; • All excavated roads shall be reinstated to original condition; • All disrupted utilities restored; • All affected structures rehabilitated/compensated; • 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; • All hardened surfaces within the construction camp area shall be ripped; • 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; • The contractor must arrange the cancellation of all temporary services; • Request PMU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.	Contractor	PMU, PMDSC	Contractor

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		• The contractors' contract indicates no final payment will be disbursed until the PMU concurs that the post-construction clean-up and reinstatement are satisfactory.			

Table 28: Operation-stage Environmental Management Plan - Mitigation

Activities	Potential Impacts	Mitigation Measures	Responsibility	
			Implementation	Supervision
Discharge of SWF from pumping station and gravity outfalls	Improper operational leading in inadequate dilution	• Ensure that no ad hoc methods of operations are adapted by the operators or staff • Develop and implement standard operating procedures with all technical specifications for bypass of SWF into canals • Train operators and staff in SOP • Conduct periodic monitoring of SWF discharge and receiving canal water quality	KMC	KMC
Detection and repair of leaks	Potential health hazard to nearby community, soil and groundwater contamination	• Ensure stability and integrity of the system by periodic monitoring to detect any problem and quick remedial action, if required. • Ensure adequate pumping to avoid water logging conditions during heavy rain. • Any repairs will be small-scale involving manual, short duration works involving regular checking and recording performance for signs of deterioration, servicing and replacement of parts. • Restrict maintenance activities to reasonable working hours near sensitive receptors. Keep local communities informed about nature and duration of work and likely causes of	O&M Contractor	Environment Officer PMU

Activities	Potential Impacts	Mitigation Measures	Responsibility	
			Implementation	Supervision
		disturbance. Provide sign boards displaying contact numbers for concerns/complaints. • Clearly demarcate working areas and maintain strict access control. • Recurrence of pipe bursting and leakage problems can be managed by the leak detection and surveillance program. The Department will ensure that leak detection and rectification time are minimized. • Adequate resources – technical and financial, have been taken into consideration in the project design. • Ensure compliance with all national and state laws during O&M activities.		
O&M of Pumping station	Odour and noise impact, Potential health hazard to nearby community	• A Standard Operating Procedures (SoP) and operation manual will be prepared by the construction contractor. • Ensure operation and maintenance of PS as per the SoP to avoid overflows, blockages, etc. and immediately conduct maintenance work in case of such occurrences. Ensure there is no overflow of sewers due to blockages or leaks in sewer network. • Ensuring an uninterrupted power supply with back-up facilities is a must. • Ensure that all conditions/standards prescribed by WBPCB are compiled duly. • Develop an Emergency Response System (ERS) to avoid any unprecedented incident. • Undertake preventive and periodic maintenance activities as required; • Conduct periodic training to workers; ensure that all safety apparatus at PS including personal protection equipment is in good condition all times; and are at easily accessible and identifiable place; periodically	O&M Contractor	Environment Officer PMU

Activities	Potential Impacts	Mitigation Measures	Responsibility	
			Implementation	Supervision
		check the equipment, and conduct mock drills to deal with emergency situations; • No wastewater from industrial premises (including domestic wastewater) shall be allowed to dispose into municipal sewers; monitor regularly and ensure that there is no illegal discharge through manholes or inspection chambers; conduct public awareness programs; in coordination with KMC.		
Leakage and Overflows	It may affect the sewer system, contaminate land, water and create public health issues	Effective operation to avoid and/or immediate clearance of such leaks and blockages; Implementation of regular O&M schedules.	KMC or in association O&M contractor	PMU
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 maintenance of all facilities, including electrical, biological, chemical hazards and risks, etc. There is an occupation health risk to workers engaged in sewer maintenance activities. Following measures should be followed: (i) Establish regular maintenance program, including: • Regular cleaning of grit chambers and sewer lines to remove grease, grit, and other debris that may lead to sewer backups. Cleaning should be conducted more frequently for problem areas; • Inspection of the condition of sanitary sewer structures and identifying areas that need repair or maintenance. Items to note may include cracked/deteriorating pipes; leaking joints or seals at manhole; frequent line blockages; lines that generally flow at or near capacity; and suspected infiltration or exfiltration;	KMC or in association O&M contractor	PMU

Activities	Potential Impacts	Mitigation Measures	Responsibility	
			Implementation	Supervision
		• Monitoring of sewer flow to identify potential inflows and outflows; and • Conduct repairs on priority based on the nature and severity of the problem. Immediate clearing of blockage or repair is warranted where an overflow is currently occurring or for urgent problems that may cause an imminent overflow (e.g., pump station failures, sewer line ruptures, or sewer line blockages). (ii) Maintain records; review previous sewer maintenance records to help identify "hot spots" or areas with frequent maintenance problems and locations of potential system failure, and conduct preventative maintenance, rehabilitation, or replacement of lines as needed; (iii) Prohibit/prevent disposal of wastewater/effluent from industrial units in the sewers; ensure regular checking to ensure no illegal entry of industrial wastewater into sewers; (iv) Develop an Emergency Response Plan for the sewerage system leaks, burst and overflows, etc.; (v) Provide necessary health and safety training to the staff in sewer cleaning and maintenance; (vi) Provide all necessary personnel protection equipment; (vii) Do not conduct manual cleaning of sewers; for personnel engaged in sewer maintenance work, there is a risk due to oxygen deficiency and harmful gaseous emissions (hydrogen sulphide, methane, etc.); provide for adequate equipment (including oxygen masks) for emergency use; (viii) Concentration of hydrogen sulphide, which is a flammable and highly toxic gas, in or near sewage infrastructure (sewers, manholes, sewage sumps, septic tanks, etc.),is highly		

Activities	Potential Impacts	Mitigation Measures	Responsibility	
			Implementation	Supervision
		dangerous to operation and maintenance and may lead to inhalation deaths if works are conducted in such conditions. Appropriate and safe conditions shall be ensured prior to start of any works; H_2S levels confirming to ILO[51] threshold limits[52] shall be ensured (1 ppm as TWA (time weighted average) usually 8 hours and 5 ppm as STEL (short-term exposure limit) which is usually 15 minutes.		

Table 29: Construction-stage Environmental Management Plan - Monitoring

Monitoring field	Monitoring location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Construction disturbances, nuisances, public and worker safety,	All work sites	Implementation of dust control, noise control, traffic management, and safety measures. Site inspection checklist to review implementation is appended at Appendix 12	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Tree cutting and plantation	Kabardanga pumping station location and Outfall locations	Obtain permission from concerned authority for any tree cutting and plant trees in the ratio of 1:5	Continuous	Supervising staff and safeguards specialist	Contractor's cost
Julpia Subproject: Package SD 06 **Construction period: 4 years**					

[51] International Labour Organization
[52] https://www.ilo.org/dyn/icsc/showcard.display?p_card_id=0165&p_version=1&p_lang=en

Monitoring field	Monitoring location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Ambient air quality	At 2 different locations to be decided by the Environment Specialist of PMDSC.	PM10, PM2.5 NO2, SO2, CO	Once before start of construction and quarterly during construction except monsoon period[53]	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x Rs.6000 per sample = Rs.156,000)
Ambient noise	At 2 different locations to be decided by the Environment Specialist of PMDSC.	Day time and night time noise levels	Once before start of construction and quarterly during construction except monsoon period	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x 1500 per sample = Rs,39,000)
Surface water quality	At 2 different locations (Keorapukur canal Tolly Nullah / pond) to be decided by the Environment Specialist of PMDSC.	pH, TDS, TSS Oil and grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity, Phenolic compound	Once before start of construction and quarterly during construction except monsoon period	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x Rs,6000 per sample = Rs.156,000)
Sediment Quality	At 2 different outfall locations viz. Keorapukur canal and Tolly Nullah to be decided by the Environment Specialist of PMDSC.	pH, Color, Texture (silt, clay, sand), Total Kjeldahl Nitrogen, Phosphorous, Sulphide, Particle Size, Mercury, Cadmium, Lead, Pesticide, Organic Matter, oil and grease	Once before start of construction and quarterly during construction except monsoon period	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x Rs.6000 per sample =Rs.156,000)
				Total Cost	**Rs.507,000**

[53] The monsoon season can cause significant fluctuations in environmental parameters, which may lead to skewed or unrepresentative data. For example, heavy rains can dilute pollutant concentrations, giving a misleading impression of environmental quality. Environmental quality monitoring may be suspended during the monsoon season for several reasons (i) Safety Concerns,(ii)Accessibility Issues,(iii) Instrument and Equipment Damage. (iv) Data Reliability, (v) Sampling Challenges and (vi) Resource Allocation.

Monitoring field	Monitoring location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Kabardanga Subproject: Package (SD 07) **Construction period: 4 years**					
Ambient air quality	At 2 different locations to be decided by the Environment Specialist of PMDSC.	PM10, PM2.5 NO2, SO2, CO	Once before start of construction and quarterly during construction except monsoon period[54]	construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x Rs,6000 per sample = Rs.156,000)
Ambient noise	At 2 different locations to be decided by the Environment Specialist of PMDSC.	Day time and night time noise levels	Once before start of construction and quarterly during construction except monsoon period	construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x 1500 per sample = Rs,39,000)
Surface water quality	At 2 different locations (Keorapukur canal, Western channel, Tolly nullah, Hooghly River and Ponds) to be decided by the Environment Specialist of PMDSC.	pH, TDS, Oil and grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity	Once before start of construction and quarterly during construction except monsoon period	Construction Contractor	Cost for implementation of monitoring measures responsibility of contractor (26 samples x Rs,6000 per sample = Rs.156,000)
Sediment Quality	At 2 different locations viz. Keorapukur canal,	Heavy metal, oil & grease and other toxic elements	Once before start of construction and quarterly during	Construction Contractor	Cost for implementation of monitoring measures responsibility of

[54] The monsoon season can cause significant fluctuations in environmental parameters, which may lead to skewed or unrepresentative data. For example, heavy rains can dilute pollutant concentrations, giving a misleading impression of environmental quality. Environmental quality monitoring may be suspended during the monsoon season for several reasons (i) Safety Concerns, (ii)Accessibility Issues,(iii) Instrument and Equipment Damage. (iv) Data Reliability, (v) Sampling Challenges and (vi) Resource Allocation.

Monitoring field	Monitoring location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
	Western channel, Tolly nullah, and Hooghly River to be decided by the Environment Specialist of PMDSC.		construction except monsoon period		contractor (26 samples x Rs.6000 per sample =Rs.156,000)
				Total Cost	**Rs.507,000**

Table 30: Operation Stage Environmental Monitoring Plan – Monitoring (Package SD 06 and SD 07)

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost and Source of Funds
Monitoring of plantations	Plantation's locations	Number of trees survived	Monthly	O&M contractor in association KMC	PMU
Monitoring at Outfall locations for discharge of combined flow	Drainage and sewer system	As per SOP	as per plan	O&M contractor in association KMC	PMU
Operation and maintenance of the drainage and sewer system	Drainage and sewer system	Contractor records (inspections, repairs and maintenance	as per plan	O&M contractor in association KMC	PMU

B. Institutional Arrangement

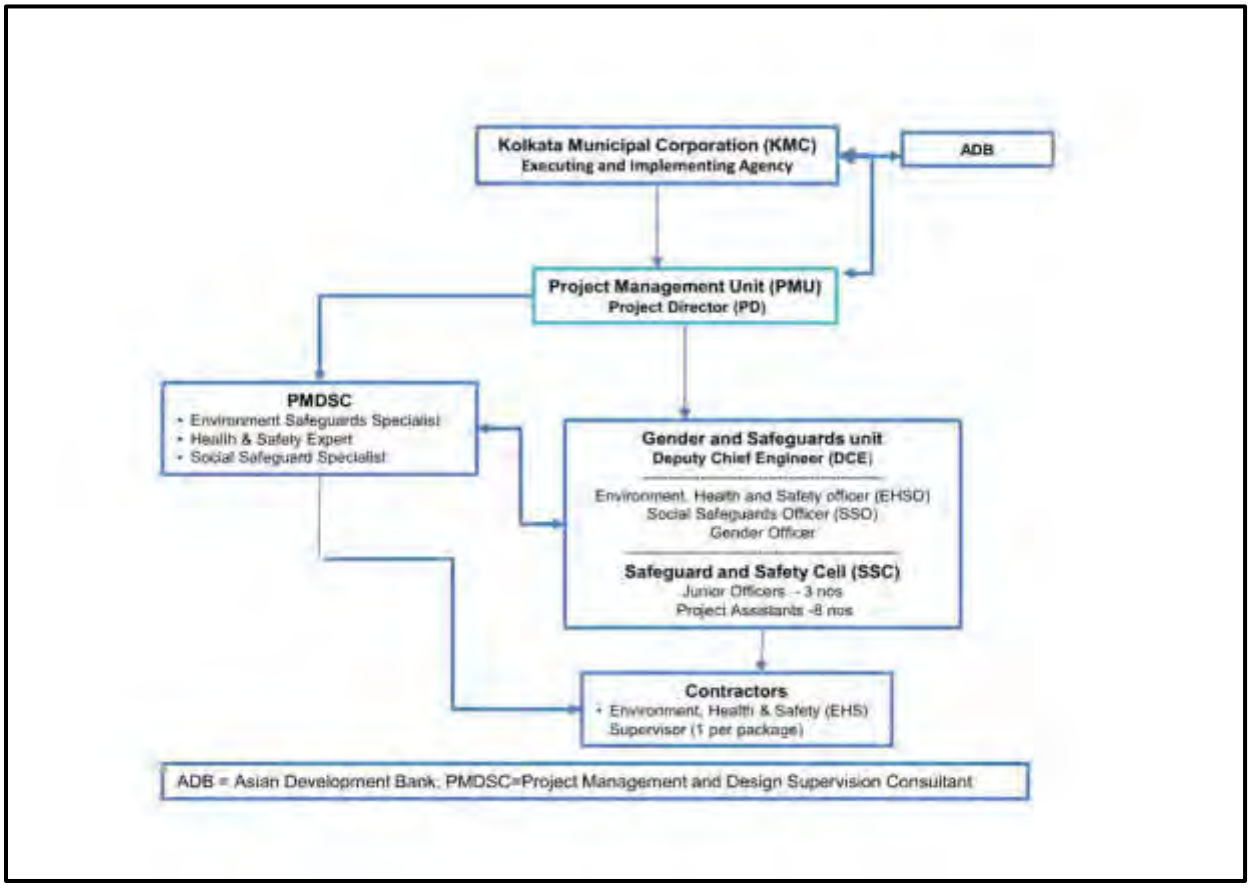
179. The Kolkata Municipal Corporation (KMC) is the executing and implementing agency of the project. The existing institutional arrangement for implementation of the ADB financed Kolkata Environmental Improvement Investment Program (KEIIP) will be strengthened for implementation of KSHARP. The Project Management Unit (PMU) established under KMC for the KEIIP will implement the KSHARP project. The project will be governed by a high-level steering committee headed by the Minister-in-charge, Municipal Affair. The PMU is headed by a project director of KSHARP, KMC. The Project Director will be supported by Director General - Project for procurement and contract management and Deputy Chief Engineer (DCE) for overall safeguards implementation and monitoring.

180. **Safeguards Implementation.** The Gender and Safeguard Management Unit (GSMU) at PMU, headed by the DCE will be supported by an Environment, Health and Safety Officer (EHSO), a Social Safeguards Officer (SSO) and Gender Officer, who will be responsible for environmental and social safeguards in compliance with project agreements, government requirements, and ADB Safeguards Policy Statement (SPS), 2009. The Safeguards and Safety Cell[55] (SSC) for KSHARP is led by the DCE and comprises three Junior Officers and eight Project Assistants to implement and monitor of gender assessment and action plan, environment management plan (EMP), resettlement plans, and with focus on community and occupational health and safety aspects. One Junior Officer position is designated for Environment, Health, and Safety. Additionally, there will be one Project Assistant each for Environment and Health, and two Project Assistants assigned specifically for Safety.

181. 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 and to ensure implementation of EMP during civil works and O&M. The safeguard arrangement is depicted in the following Figure 30.

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

Figure 30: Institutional Arrangement for Safeguard Implementation, KSHARP



182. **Project Management Unit.** The PMU will be responsible for planning, management, coordination, supervision and progress monitoring. PMU has the responsibility of fulfilling environmental requirements 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 Environment, Health & Safety officer (EHSO) 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 SEMPs 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.

183. **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 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.

184. **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. The ESS will assist in preparing, updating, reviewing, implementing, monitoring, and reporting of all tasks related to environmental safeguards. Following are the key tasks of ESS 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' SEMPs;
(vi) Carry out baseline environmental surveys and prepare updated/final IEEs and EMPs based on the Contractor's detailed design, SEMPs, 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 SEMPs, health and safety plan and any other associated plans as required
(x) Assist the PMU in monitoring the implementation of EMPs/SEMPs 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 EMPs/SEMPs 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

185. 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.

186. **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,[56] 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 12);
(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

187. 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

[56] 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.

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.

188. 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 31 below.

Table 31: 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	All staff and consultants involved in the project All contractors immediately after mobilization of the contractor At PMU level	100,000 (LS)	PMU

Description	Target Participants and Venue	Estimate (INR)	Source of Funds
- Waste management plan - Site clean-up & restoration			
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 the start of work, and thereafter a 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

189. 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.

190. 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.

191. Quarterly report shall be prepared PMDSC and PMU and submitted to PMU for review and further actions.

192. 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. The semi-annual submission of Environmental Monitoring Reports (EMRs) will be required during both the construction and operation phases of the project.

193. 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

194. 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 32. Operation Stage Environmental Monitoring Plan is provided in Table 30 and monitoring cost will be covered under separate O&M budget during O&M period.

Table 32: Cost Estimates to Implement Environmental Management Plan

A. Julpia Subproject (Package: SD 06)

Sr. No	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
A. Implementation staff							
1	EHS officer*	Construction	per month	1 no.	50,000	2,400,000	Contractor's cost supported from Project cost (4 years of construction period)
	Subtotal (A)	**Rs.2,400,000**					
B. Mitigation Measures							
1.	Consent for establishments and consent for operation from WBPCB; Other statutory permissions	Pre-construction	Lump sum			50,000	Project costs
2.	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	200,000	Contractor's cost supported from Project cost
3.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rainwater Harvesting for	Construction	Lump sum	-	-	400,000	Contractor's cost supported from Project cost

Sr. No	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
	water conservation etc.)						
4.	Provision for PPEs for labors, safety equipment (barrier, poster, banner etc.), first-aid box, medical service and supervisory staff	Construction	lump sum	-	-	500,000	Contractor's cost supported from Project cost
5.	Development and maintenance of green buffer zone	Post construction	Lump sum	-	-	5,00,000	Project cost
	Subtotal (B)	**Rs.1,650,000**					
	C. Monitoring Measures						
1.	Pre-construction and construction phase monitoring cost	**Refer Table 29**				5,07,000	Contractor's cost supported from Project cost
	Subtotal (C)	**Rs.507,000**					
	D. Capacity Building						
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			50,000	PMU
2	EMP implementation	Construction	lump sum			1,00,000	PMU
3	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	lump sum			50,000	Civil works contract
	Subtotal (D)	**Rs.200,000**					
	E. Grievance Redressal and Public Disclosure Mechanism						
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 (E)	**Rs.200,000**					
	Grand Total (A+B+C+D+E)						**Rs.4,957,000**

B. Kabardanga Subproject (Package: SD 07)

Sr. No	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
	A. Implementation staff						
1	EHS officer	Construction	per month	1 no.	50,000	2,400,000	Contractor's cost supported from Project cost
	Subtotal (A)	**Rs.2,400,000**					
	B. Mitigation Measures						
1.	Consent for establishments and consent for operation from WBPCB; Other statutory permissions	Pre-construction	Lump sum			50,000	Project costs
2.	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	200,000	Contractor's cost supported from Project cost
3.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rainwater Harvesting for water conservation etc.)	Construction	Lump sum	-	-	400,000	Contractor's cost supported from Project cost
4.	Provision for PPEs for labors, safety equipment (barrier, poster, banner etc.), first-aid box, medical service and supervisory staff	Construction	lump sum	-	-	500,000	Contractor's cost supported from Project cost
5.	Development and maintenance of green buffer zone	Post construction	Lump sum	-	-	5,00,000	Project cost
	Subtotal (B)	**Rs.1,650,000**					
	C. Monitoring Measures						

Sr. No	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
1.	Pre-construction and construction phase monitoring cost	**Refer Table 29**				507,000	Contractor's cost supported from Project cost
	Subtotal (C)	**Rs.507,000**					
D. Capacity Building							
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			50,000	PMU
2	EMP implementation	Construction	lump sum			1,00,000	PMU
3	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	lump sum			50,000	Civil works contract
	Subtotal (D)	**Rs.200,000**					
E. Grievance Redressal and Public Disclosure Mechanism							
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 (E)	**Rs.200,000**					
	Grand Total (A+B+C+D+E)						**Rs.4,957,000**

IX. CONCLUSION AND RECOMMENDATION

195. The process described in this document has assessed the environmental impacts of all elements of the specific sewerage and drainage subproject of KSHARP in Borough XVI, part of ward 142 and 143 under Julpia (Package SD 06) and Kabardanga (Package SD 07) subprojects. 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.

196. There are 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). Therefore, the same is adapted in the subproject area. The DWF (only wastewater) will be

treated at the Bank Plot STP (ongoing under the KEIIP, Trench 3) prior to discharge, therefore no impacts envisaged. SWF (combined wastewater and storm runoff), which will have high quantity, and high dilution will be bypassed directly without treatment. Considering the high dilution, no adverse impacts envisaged. However, to ensure proper dilution in the system, implementation of already available standard operating procedure (SOP) recommended.

197. No tree felling will be required for the sewer pipeline installation as it will be laid in the middle of existing government roads. At the proposed pumping station site in Kabardanga, one staff quarter and a section office of the PWD will need to be demolished, and ten non-scheduled trees are to be felled to accommodate the construction. The final decision regarding tree felling will be made during the detailed design phase, and if tree removal is necessary, compensatory tree plantation will be carried out at a 1:5 ratio. The East Kolkata Wetlands (EKW), a Ramsar-designated site, lies approximately 9.0 km from the proposed Julpia pumping station and around 7.5 km from the nearest boundary of the Julpia subproject. In the case of the Kabardanga subproject, the EKW boundary is situated about 8.5 km from the proposed Kabardanga pumping station and approximately 7.6 km from the nearest subproject boundary. There are no archaeological sites near the subproject areas, and no protected species of flora and fauna found have been reported.

198. During the construction phase, impacts mainly arise from the safety risk due to excavations and construction work in public roads, need to dispose waste soil and from the disturbance of residents, businesses, traffic and buildings by the construction work. Temporary locational impacts were identified in busy narrow roads in commercial areas (such as such as M.G. Road and Kabardanga-Julpia Road. To minimize impact, micro-tunnelling and jack-pushing methods are proposed for pipeline installation along Julpia Road (2.7 km with diameters ranging from 1400 mm to 2200 mm) under Package SD 06. Additionally, about 2.0 km of sewer line will be installed using the micro-tunnelling method along M.G. Road (870 m) and Kabardanga-Julpia Road (1170 m) with pipe diameters varying from 1400 mm to 2000 mm under Package SD 07. Since sewerage works are conducted along the town area roads, there is potential to create disturbance to traffic flow and accidents. To minimize this, the contractor should develop a traffic management plan, which should be approved by the PMU prior to start of work and should conduct the work strictly in line with the plan. Occupational and community health and safety risk will be significant during the construction phase as the works are conducted in urban areas congested with people, traffic and activities. Necessary measures included in the EMP and needs to be implemented effectively. Deep trenches created for sewers needs to be properly protected by shoring/bracings to avoid collapse of trenches, and also to avoid any risk to surrounding buildings. Laying of pipeline in narrow roads will be carried out in phased manner upon due consultation with local people/ concerned authorities to avoid impact. Back-to back filling of excavated trench will be done on priority basis.

199. 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.

200. 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.

201. 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 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.

202. The subproject will benefit the general public by contributing to the long-term improvement of sewerage and drainage system and community liveability in ward no 142 and 143 of KMC. The benefits arising from this subproject include: (i) better public health particularly reduction in waterborne and infectious diseases due to improved sewerage and drainage systems in project areas; (iv) relief from water logging conditions within the sub-project area and (vi) improvement in quality of water bodies due to disposal of treated effluent meeting disposal standards.

203. Based on the findings of the IEE. the project is classified as environmental Category B and does not require further environmental impact assessment. This IEE shall be updated by PMU during the detailed design phase to reflect any changes, amendments and will be reviewed and approved by ADB.

204. **Recommendations.** The following recommendations are provided to ensure the subproject avoids significant impacts and remains compliant with ADB SPS requirements:

(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) 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 based on requirement at the proposed pumping station sites. The contractor shall design the process to ensure there are no odor issues at the pumping station sites and make appropriate provisions to ensure the same as per CPCB guidelines on odour pollution and control, May 2008.[57]
(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) Implement standard operating procedure for bypass and discharge of SWF from pumping stations and trunk sewers, and conduct water quality monitoring

[57]https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvTmV3SXRlbV8xNDFfcGFja2FnZV9vZG91cnJlcG9ydF8yLjEyLjA4LnBkZg==

(xii) Ensure grievance redress mechanism is operationalized prior to start of works.

(xiii) KMC shall ensure that the preparation, design, construction, implementation, and operation of all project facilities comply with (i) all applicable laws and regulations of the Borrower and the State relating to environment, health, and safety. (iii) the Environmental Safeguards; and (iv) all measures, and requirements set forth in the IEEs and EMPs, and any corrective or preventative actions set forth in a safeguard monitoring report.

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: Development of S&D network in Julpia catchment (part of ward - 142) including construction of Julpia pumping station in Borough XVI

Development of S&D network in Kabardanga catchment (part of wards - 142 & 143) including construction of Kabardanga pumping station in borough XVI

Sector Division: **Urban Development and Water Division**

Screening Questions	Yes	No	Remarks
A. Project siting Is the project area			
Densely populated?	✓		Project site is located in urban areas and part of KMC Ward nos.142 and 143
Heavy with development activities?	✓		No negative impacts are envisaged as S&D pipe laying will be laid mostly through the center of the existing road alignment. 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?		✓	
Cultural heritage site		✓	
Protected area		✓	
Wetland	✓		The East Kolkata Wetland (EKW), a designated Ramsar site, is located approximately 8.5 km from the proposed Kabardanga pumping station site and 7.6 km from the nearest boundary of the Kabardanga subproject (package SD 07). For the Julpia subproject (package SD 06), the EKW boundary is situated about 9.0 km from the proposed Julpia pumping station site and 7.5 km from the nearest subproject boundary.
Mangrove		✓	
Estuarine		✓	

Screening Questions	Yes	No	Remarks
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
Bay		✓	
B. **Potential Environmental Impacts** Will the Project cause…			
Impairment of historical/cultural monuments/areas and loss/damage to these sites?		✓	Not anticipated.
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 activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts.
Dislocation or involuntary resettlement of people?		✓	No displacement of communities is required.
Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?		✓	Not applicable.
Impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?		✓	Collected sewage will be treated at the STP at Bank Plot being constructed under KEIIP, Trench 3
Overflows and flooding of neighboring properties with raw sewage?		✓	Project will improve current situation of discharging sewage to open drains and collected sewage will be treated at the STP at Bank Plot.
Environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?		✓	Not applicable.
Noise and vibration due to blasting and other civil works?	✓		Increased noise is anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts.
Risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?	✓		The EMP ensures occupational health and safety measures as included. Chemicals will not be used during construction and operation activities.
Discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?		✓	**Not anticipated.** The subproject sites are predominantly residential with few commercial areas. Thus, discharge of hazardous materials into sewers is unlikely. Measures have been included in the design to prevent discharge of industrial and hazardous materials into the sewer network system
Inadequate buffer zones around pumping and treatment plants to alleviate noise and other possible nuisances, and protect facilities?		✓	The S&D pipeline will be laid under the proposed project. The SWF will be pumped through proposed pumping stations at Julpia and Kabardanga to Canals. The DWF will be

Screening Questions	Yes	No	Remarks
			transmitted to STP at the Bank Plot. Sufficient buffer areas are considered for PS.
Road blocking and temporary flooding due to land excavation during the rainy season?	✓		Temporary road blockage would be required during construction phase with the permission of respective authorities. Adequate pumping arrangements will be kept avoiding temporary flooding conditions due to excessive rainfall.
Noise and dust from construction activities.	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts.
Traffic disturbances due to construction material transport and waste?	✓		Anticipated during construction activities near schools, religious places, and health centers. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Construction contractors will be required to coordinate with the local traffic police, and they will prepare a Traffic Management Plan to avoid obstruction and the entry and exit points. Prior work scheduling should be scheduled.
Temporary silt runoff due to construction?	✓		Run-off during construction will be more. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Construction contractors will be prohibited from stockpiling loose materials along drain channels and will be required to immediately dispose of any waste materials.
Hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?		✓	**Not anticipated**. The design life of the subproject is 30 years. Provision of periodic monitoring for detection and repair of leakage servicing and replacements of parts will be considered in the project design. The same will be ensured by KMC.
Deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?		✓	Not anticipated for S&D pipe laying projects including construction of pumping stations.
Contamination of surface and ground waters due to sludge disposal on land?		✓	Not anticipated for S&D pipe laying projects including construction of pumping stations.
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?		✓	Not anticipated for S&D pipe laying projects including construction of pumping stations.
Large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?		✓	Not anticipated. The design life of 30 years is considered.

Screening Questions	Yes	No	Remarks
Social conflicts between construction workers from other areas and community workers?		✓	Priority in employment will be given to local workers.
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?		✓	**Not applicable.** Construction will not involve the use of explosives and chemicals. The trenching will be done by excavator followed by manual digging.
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?		✓	Operational areas will be clearly demarcated, and access will be controlled. Only workers and project members concerned will be allowed to visit the operational sites.

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

Sr. 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 = Pumping station, S&D = Sewerage and Drainage; STP = Sewage Treatment Plant.

Appendix 3: Effluent Discharge Standards for STPs as per National Green Tribunal (NGT) Order dated 30.04.2019

Sr. 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	Fecal 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 4: Drinking Water Standards, Surface Water Quality Classification, Ambient Air Quality, Vehicle, Diesel Generator Emissions Standards, Noise Level Standards

Table 1: Applicable Drinking Water Quality Standards

Group	National Standards for Drinking Water			WHO Guidelines for Drinking-Water Quality, 4th Edition, 2011[b]
	Parameter	Unit	Minimum and Maximum Concentration Limit[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 sources.

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 les
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 Wildlife 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 ($\mu g/m^3$)[b]	WHO Air Quality Guidelines ($\mu g/m^3$)	
			Global Update [c] 2005	2021 Guidelines
PM_{10}	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20(Annual) 50 (24-hr)	15(Annual) 45 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20(Annual) 50 (24-hr)	15(Annual) 45 (24-hr)

Parameter	Location[a]	India Ambient Air Quality	WHO Air Quality Guidelines (µg/m3)	
PM_{25}	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10(Annual) 25 (24-hr)	5(Annual) 15 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10(Annual) 25 (24-hr)	5(Annual) 15 (24-hr)
SO_2	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	--- (Annual) 40 (24-hr)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10- min)	--- (Annual) 40 (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)		0.5 (Annual)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)
Ammonia (NH_3)	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)	-	-
	Sensitive Area	100 (Annual) 400 (24-hr)	-	-

Parameter	Location[a]	India Ambient Air Quality	WHO Air Quality Guidelines (µg/m3)	
Benzene (C_6H_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 Air Quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006

[d] Air Quality Guidelines for Europe Second Edition. WHO 2000.

[e] 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.

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	0.18 combined)

2. Heavy Diesel Vehicles

Norms	CO(g/km-hr)	HC (g/km-hr)	NOx (g/km-hr)	PM(g/km-hr)
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; NOx = 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})
	NOx +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+0.2x ÖKVA
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[a] (dBA)		WHO Guidelines Value for Noise Levels Measured Out of Doors[b] (One Hour LA_q 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 5: IBAT Screening Checklist

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Integrated Biodiversity Assessment Tool

PROXIMITY REPORT
KURIP SD 06

Country: India

Location: [22.5, 88.3]

Date of analysis: 09 March 2024 (GMT)

Buffers applied: 1 km | 10 km | 50 km

IUCN Red List Biomes: Freshwater, Terrestrial

Generated by: Prabhatish Bhattacharya

Organisation: ADB

Overlaps with:

Protected Areas	2
Key Biodiversity Areas	0
IUCN Red List	63

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

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About this report

This report presents the results of [38880-59727] proximity analysis to identify the biodiversity features and species which are located within the following buffers: 1 km, 10 km, 50 km.

This report is one part of a package generated by IBAT on 09 March 2024 (GMT) that includes full list of all species, protected areas, Key Biodiversity Areas in CSV format, maps showing the area of interest in relation to these features, and a 'How to read IBAT reports' document.

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. 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.

Data used to generate this report

- UNEP-WCMC and IUCN, 2024. Protected Planet: The World Database on Protected Areas (WDPA)[On-line], Cambridge, UK: UNEP-WCMC and IUCN. Available at: www.protectedplanet.net - March 2024.
- BirdLife International (on behalf of the KBA Partnership), 2023. Key Biodiversity Areas - October 2023.
- IUCN, 2024. IUCN Red List of Threatened Species - January 2024.
- IUCN. The IUCN Red List of Threatened Species. Version 2019-3. (2019). https://www.iucnredlist.org
- IUCN. Threats Classification Scheme (Version 3.2). (2019)
- Strassburg, B.B.N., Iribarrem, A., Beyer, H.L. et al. Global priority areas for ecosystem restoration. Nature 586, 724–729 (2020). https://doi.org/10.1038/s41586-020-2784-9

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

Area name	Within buffer of
East Calcutta Wetlands	10 km
Sunderban	50 km

Key Biodiversity Areas

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

No KBAs within buffer distance

IUCN Red List of Threatened Species

The following threatened 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

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
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
Glyphis gangeticus	Ganges Shark	CHONDRICHTHYES	CR	Decreasing	Marine, Freshwater
Eretmochelys imbricata	Hawksbill Turtle	REPTILIA	CR	Decreasing	Terrestrial, Marine
Sonneratia griffithii		MAGNOLIOPSIDA	CR	Decreasing	Terrestrial, Marine
Gyps bengalensis	White-rumped Vulture	AVES	CR	Decreasing	Terrestrial
Sarcogyps calvus	Red-headed Vulture	AVES	CR	Decreasing	Terrestrial
Gyps tenuirostris	Slender-billed Vulture	AVES	CR	Decreasing	Terrestrial
Gyps indicus	Indian Vulture	AVES	CR	Decreasing	Terrestrial
Geoclemys hamiltonii	Spotted Pond Turtle	REPTILIA	EN	Decreasing	Terrestrial, Freshwater

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

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Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Chelonia mydas	Green Turtle	REPTILIA	EN	Decreasing	Terrestrial, Marine
Manis crassicaudata	Indian Pangolin	MAMMALIA	EN	Decreasing	Terrestrial
Varanus flavescens	Yellow Monitor	REPTILIA	EN	Decreasing	Terrestrial
Aquila nipalensis	Steppe Eagle	AVES	EN	Decreasing	Terrestrial
Ploceus megarhynchus	Finn's Weaver	AVES	EN	Decreasing	Terrestrial
Crocodylus palustris	Mugger	REPTILIA	VU	Stable	Terrestrial, Freshwater
Lutrogale perspicillata	Smooth-coated Otter	MAMMALIA	VU	Decreasing	Terrestrial, Marine, Freshwater
Prionailurus viverrinus	Fishing Cat	MAMMALIA	VU	Decreasing	Terrestrial, Freshwater
Rhinoceros unicornis	Greater One-horned Rhino	MAMMALIA	VU	Increasing	Terrestrial, Freshwater
Carcharhinus leucas	Bull Shark	CHONDRICHTHYES	VU	Decreasing	Marine, Freshwater
Pangshura tecta	Indian Roofed Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Wallago attu		ACTINOPTERYGII	VU	Decreasing	Freshwater
Aythya ferina	Common Pochard	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Halcyon pileata	Black-capped Kingfisher	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Sterna aurantia	River Tern	AVES	VU	Decreasing	Terrestrial, Marine, Freshwater
Clanga clanga	Greater Spotted Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Aquila heliaca	Eastern Imperial Eagle	AVES	VU	Decreasing	Terrestrial, Freshwater
Schoenicola striatus	Bristled Grassbird	AVES	VU	Decreasing	Terrestrial, Freshwater
Sousa chinensis	Indo-Pacific Humpback Dolphin	MAMMALIA	VU	Decreasing	Marine, Freshwater
Lissemys punctata	Indian Flapshell Turtle	REPTILIA	VU	Decreasing	Terrestrial, Freshwater
Xenochrophis cerasogaster	Painted Keelback	REPTILIA	VU	Decreasing	Freshwater
Schizothorax plagiostomus	Snow Trout	ACTINOPTERYGII	VU	Decreasing	Freshwater
Bagarius bagarius		ACTINOPTERYGII	VU	Decreasing	Freshwater
Caretta caretta	Loggerhead Turtle	REPTILIA	VU	Decreasing	Terrestrial, Marine
Dermochelys coriacea	Leatherback Turtle	REPTILIA	VU	Decreasing	Terrestrial, Marine

Species Name	Common Name	Taxonomic Group	IUCN Category	Population Trend	Biome
Lepidochelys olivacea	Olive Ridley Turtle	REPTILIA	VU	Decreasing	Terrestrial, Marine
Dalbergia latifolia		MAGNOLIOPSIDA	VU	Decreasing	Terrestrial
Hopea odorata		MAGNOLIOPSIDA	VU	Decreasing	Terrestrial
Dipterocarpus alatus		MAGNOLIOPSIDA	VU	Decreasing	Terrestrial
Rusa unicolor	Sambar	MAMMALIA	VU	Decreasing	Terrestrial
Ophiophagus hannah	King Cobra	REPTILIA	VU	Decreasing	Terrestrial
Python bivittatus	Burmese Python	REPTILIA	VU	Decreasing	Terrestrial
Columba punicea	Pale-capped Pigeon	AVES	VU	Decreasing	Terrestrial
Clanga hastata	Indian Spotted Eagle	AVES	VU	Decreasing	Terrestrial
Oryza malampuzhaensis		LILIOPSIDA	VU	Decreasing	Terrestrial

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Recommended citation

IBAT Proximity Report. Generated under licence 38880-59727 from the Integrated Biodiversity Assessment Tool on 09 March 2024 (GMT). www.ibat-alliance.org

How to use this report

This report provides an indication of the potential biodiversity-related features - protected areas, key biodiversity areas and species - close to the specified location. It provides an early indication of potential biodiversity concerns, and can provide valuable guidance in making decisions. For example, this information can be helpful when assessing the potential environmental risk and impact of a site, categorising investments/projects, preparing the terms of reference for an impact assessment, focusing attention on key species of conservation concern and sites of known conservation value, and reviewing the results of an impact assessment.

The report does not provide details of potential indirect, downstream or cumulative impacts. Furthermore, the report should be regarded as a "first-step", providing a set of conservation values sourced from global data sets, and is not a substitute for further investigation and due diligence, especially concerning national and/or local conservation priorities.

Appendix 6: Sample Chance find Protocol

1. Purpose of the chance find procedure. The chance find procedure is a project-specific procedure that outlines actions required if previously unknown heritage resources, particularly archaeological resources, are encountered during project construction or operation. A Chance Find Procedure as described in international best practice like IFC Performance Standard 8 and is a process that prevents chance finds from being disturbed until an assessment by a competent specialist is made and actions consistent with the requirements are implemented.
2. Scope of the chance find procedure. This procedure is applicable to all activities conducted by the personnel, including contractors, that have the potential to uncover a heritage item/site. The procedure details the actions to be taken when a previously unidentified and potential heritage item/site is found during construction activities. Procedure outlines the roles and responsibilities and the response times required from both project staff, and any relevant heritage authority.
3. Induction/Training. All personnel, especially those working on earth movements and excavations, are to be inducted on the identification of potential heritage items/sites and the relevant actions for them with regards to this procedure during the Project induction and regular toolbox talks.
4. Chance find procedure. If any person during construction work discovers a physical cultural resource, such as (but not limited to) archaeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the following steps shall be taken:
   - (i) Stop all works in the vicinity of the find, until a solution is found for the preservation of these artefacts, or advice from the relevant authorities is obtained;
   - (ii) Immediately notify the Site manager. The Site Manager will then notify the Construction
   - (iii) Manager and the Environment Officer (EHS)/PMU/Environmental expert of Supervision consultant
   - (iv) Record details in Incident. Report and take photos of the find;
   - (v) When clearance and excavation take place artefacts and historic objects are sometimes found. These should be recovered and kept in a safe place. The place of discovery should be recorded and each find given a number and tag tied to the find with the same number on it. A list of the finds should be kept (with the find no. and place of discovery and date of discovery recorded).
   - (vi) Delineate the discovered site or area; secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible local authorities take over;
   - (vii) PMU/Consultants should inform in written to the Archaeological Department at the earliest with photographs and request to Archaeology Department to visit the site and hand over the chance finds to them.
   - (viii) The archaeologist must make a rapid assessment of the site or find to determine its importance. Based on this assessment the appropriate strategy can be implemented. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage such as aesthetic, historic, scientific or research, social and economic values of the find;
   - (ix) Sites of minor significance (such as isolated or unclear features, and isolated finds) should be recorded immediately by the archaeologist, thus causing a minimum disruption to the work schedule of the Contractor.

Appendix 7: Environmental Due Diligence of Proposed Facility – Churial Pumping Station and Bank Plot STP

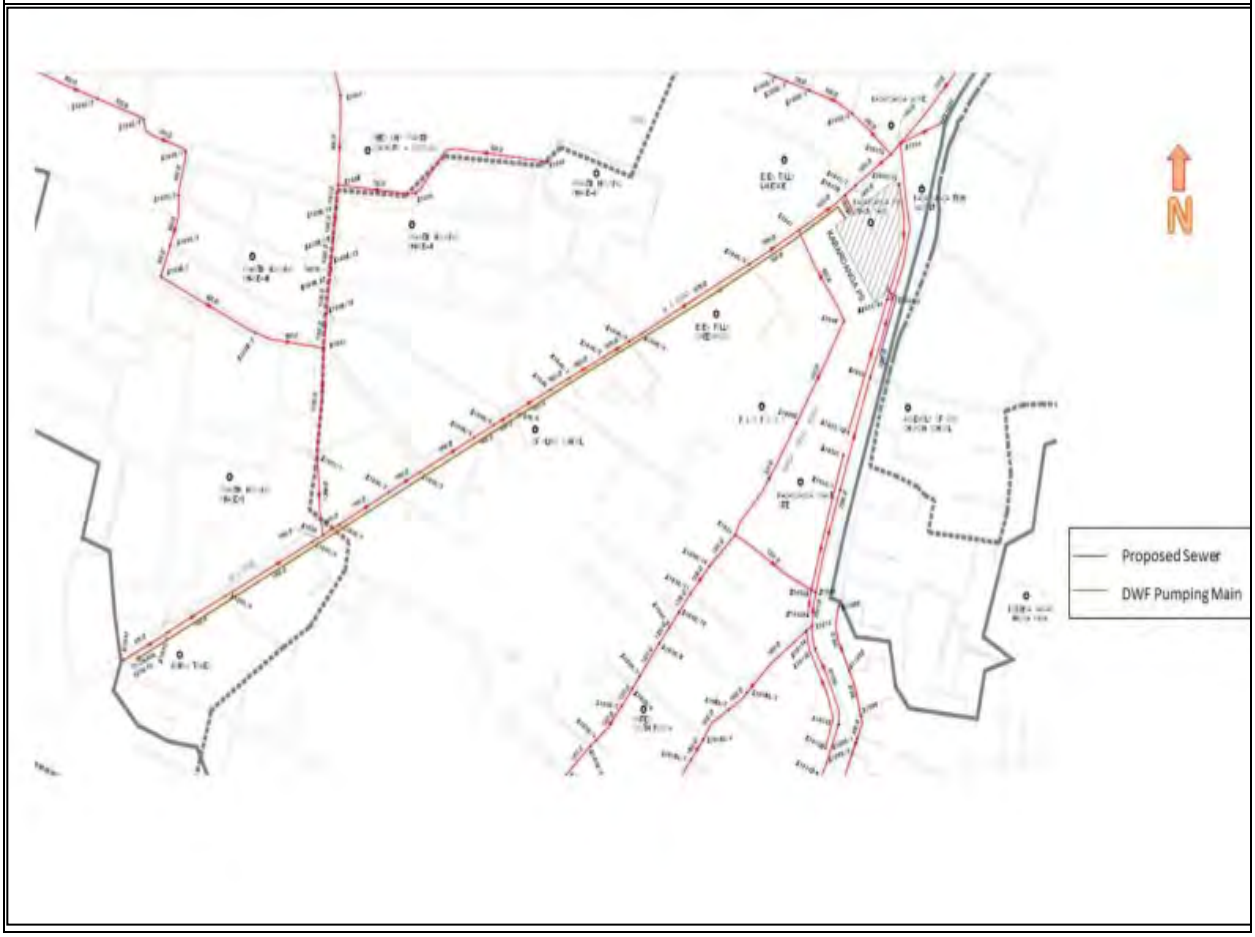
Churial Pumping Station

Location		Adjacent to M G Road, Lat: 22.460532°, Long: 88.318185°
Proposed commencement year		June 2024 The construction of the S&D network for the Churial Extension catchment and the Churial Extension PS[58], is currently underway under KEIIP, Tranche 3. Due diligence was carried out and IEE report was prepared and approved and disclosed by ADB
Owned by		KMC
Contact person and designation		**-**
Details of Churial Pumping Station		
1	Type	Combined PS (SWF + DWF)
2	Flow	DWF + SWF
3	Design period for Civil Structural units	30 years (2045)
4	Design period for E & M equipment	15 years (2030)
5	DWF (in lps)	115 lps (2030)
6	Screen	Motorized Screens
Details of DWF		
1	DWF Pumps	2W + 2S (2030). Each having capacity 100 lps, + 2 future (1W + 1 S)
2	DWF pump discharge capacity (Cu.m/hr) and Head (m) of each pump	360 cum/hr, TDH = 18 m
3	DWF pump motor rating (KW)	45 KW each
4	DWF transmission main dia (mm)/length (m)	500 mm (DI), L = 125 m
Details of SWF		
1	SWF (in lps)	800 lps
2	SWF Pumps	(4W+0S) for 1st cluster (3W+1S) for 2nd cluster
3	SWF pump discharge capacity (Cu.m/hr) and Head (m) of each pump	2880 cum/hr, TDH = 20m

[58] https://www.adb.org/sites/default/files/project-documents/42266/42266-025-iee-en_0.pdf

4	SWF pump motor rating (KW)	300 KW each
5	SWF transmission main dia (mm)/length (m)	1st cluster- length 510 m dia 1200 MS 2nd cluster – length 420 m dia 1200 MS

Layout of proposed DWF Pumping main from Kabardanga PS to Churial extension PS



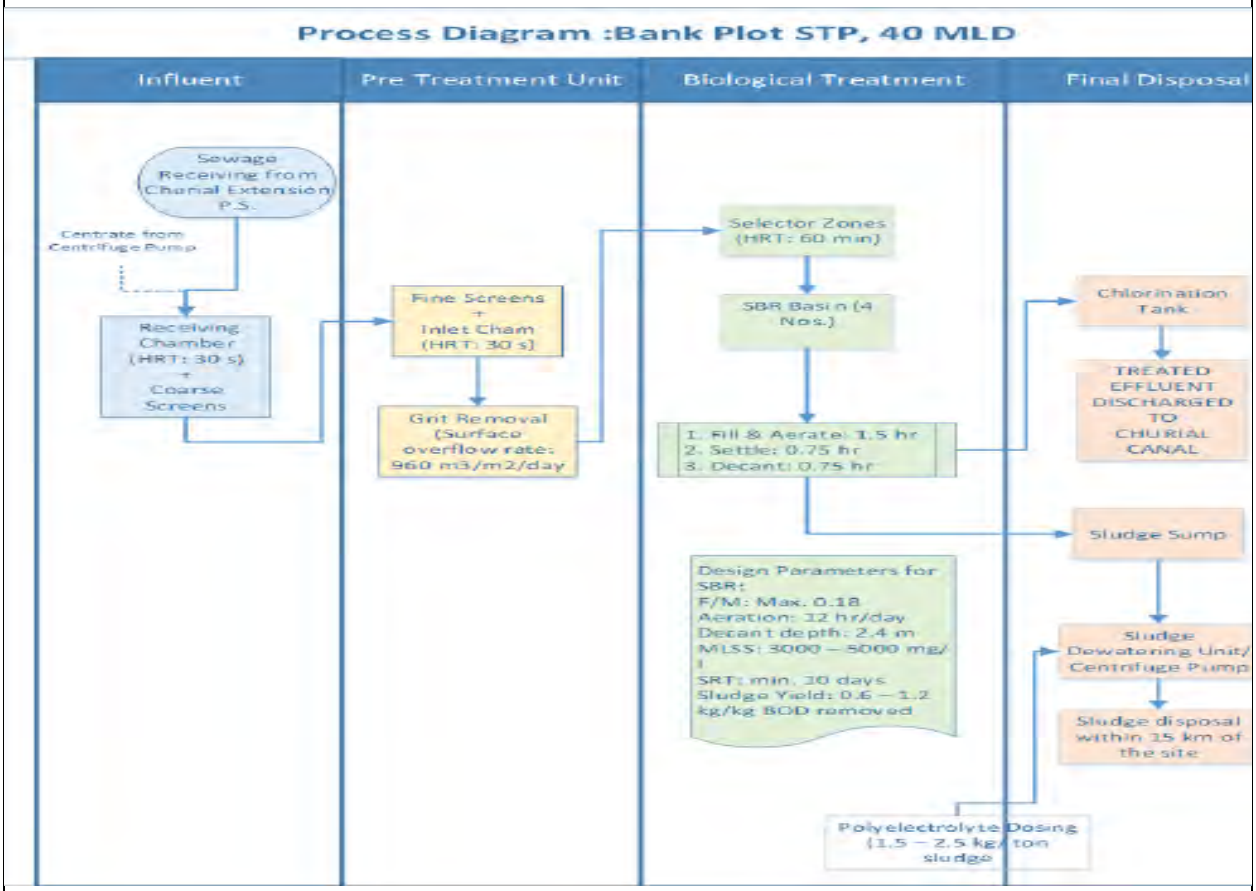
Environmental Due Diligence of Bank Plot STP

Location	Adjacent to M G Road, at Bank plot, Kolkata-700104 Coordinate: Lat: 22.458306°, Long: 88.313150°
Proposed commencement year	June 2024 The construction of Bank Plot STP[59] is currently underway under KEIIP, Tranche 3. Due diligence was carried out and IEE report was prepared and approved and disclosed by ADB
Owned by	Kolkata Municipal Corporation (KMC)
Contact person and designation	-

[59] https://www.adb.org/sites/default/files/project-documents/42266/42266-026-sddr-en_11.pdf

Capacity	34 MLD (year 2030) and 40 MLD (2045)
Status of CTE and CTO	-
Sewage treatment process	Sequential Batch Reactor (SBR) technology
	Treatment Process at STP: A typical sewage treatment process involves (i) screening/ primary mechanical removal of grit, debris, oil and grease from the influent at screen/ grit chamber; (ii) secondary biological and/or chemical treatment process; (iii) disinfection; (iv) sludge dewatering and (v) disposal. For biological treatment of sewage, the STP will employ a sequential batch reactor (SBR) process which provides the highest treatment efficiency 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.

Process Diagram of proposed Bank Plot STP



Bank Plot STP


RECEPTOR
100m
85m
110m
140m
RECEPTOR
RECEPTOR
RECEPTOR
AREA OF BANK
PLOT STP
BANK PLOT ST


M G ROAD
AREA OF BANK
PLOT STP
Malanchia
Kalua
CHURIAL CANAL
Kalyan
LEGEND:-
PROPOSED TREATED
EFFLUENT PUMPING MA
BANK PLOT ST

Sludge Management: The sludge from STP would be sent to the sludge sump for storage. This sludge is expected to have a consistency between 0.8 – 1% Dry Solid. This would then be sent to centrifuges for dewatering. The sludge is dosed with polyelectrolyte solution prior to feeding in centrifuge pump to help achieve higher solid concentration. The dewatered sludge will have a 20 – 25% DS which is semi solid (wet cake) in nature and can be trucked for transportation. The centrifuge pump is placed in such a way that the solids can be stored in a container or a truck beneath it. The wet cakes produced will have to be disposed of by the contractor (who is awarded the contract) as per the instruction of the engineer within 15 km of the plant site. This sludge is stabilized and therefore it could be used as a soil conditioner or landfilled. It can also be sent to a composting plant since it is nutrient rich, which would help in improving the compost quality produced. The final design will be one by BOOT contractor.
Treated wastewater (effluent disposal): The treated effluent will be discharged in the Churial canal while conforming to national standards for discharge of treated effluent to inland water bodies. It is proposed to follow the latest discharge standards as suggested by CPCB in 2015 and order of National Green Tribunal (NGT) dated 30th April 2019 (Appendix 4 3) KMC will obtain Consent to Establish (CTE) before start of construction work and Consent to Operate (CTO) before operation from West Bengal State Pollution Control Board (WBSPCB). Churial canal which flows into the Hooghly River near Budge Budge, approximately 15 km from the Bank Plot STP site. Considering the present canal water quality, discharge of treated effluent will be beneficial, and no adverse impact is anticipated.

Appendix 8: IFC Benchmark Standards for Workers Accommodation

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 standards[7] 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 standards[9] 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/dwq/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 to 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 accomodation 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. Waeljak (2005), "Food at Work – Workplace solutions for malnutrition, obesity and chronic diseases", 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 9: Public Consultation

A. Julpia Subproject Area (Package: SD-06)

Date	Location	Total Participants	Participant Details	Key Discussions
07.11.2023	Ward 142 (Julpia,Company Pukur)	51	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	✓ The need for scope of work and tentative commencement date for this package was elucidated. ✓ No adverse impacts on structures and livelihoods were anticipated. ✓ The subproject will provide a wastewater discharge in the canals and water bodies of Kolkata which will ensure improvement of living condition and overall environment ✓ Short term impact on air quality-dust generation, noise level, access problem, inconvenience for public and movement of vehicle. ✓ Application of mitigation measures as per EMP to mitigate short term impact ✓ The project work will reduce environmental impact/ health problems that is caused by open discharge of domestic wastewater ✓ It will be ensured that the river Ganga is not polluted,
05.01.2024	Ward 142 (Indira Udyan)	35	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Julpia, Sajneberia)	12	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Julpia, Magurkhali)	11	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Julpia,Ramjibanpur)	15	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Julpia, St. Thomas church road)	11	Local residents, shop owners, housewives, businessmen, Service men, representatives of	

Date	Location	Total Participants	Participant Details	Key Discussions
			PMU and team of consultants	which is a priority of the state and national governments.
21.02.2024	Ward 142 (Julpia, ONGC more)	9	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	✓ People may face some access disruption during construction work. Suitable measures will be taken to avoid or minimize any disruption. People's cooperation will be needed for the successful implementation of the project. ✓ KMC officials assured the participants that the subproject implementation will be time bound and efforts will be made to complete the work within the time frame. ✓ The project performance will be jointly monitored by project officials and KMC Borough engineers on a periodic basis in order to ensure that the project is completed within the stipulated time frame ✓ Participants have shown their willingness to engage with the project. ✓ Discussed safety issues of residents during construction.

Date	Location	Total Participants	Participant Details	Key Discussions
				✓ A Grievance Redressal mechanism will be in place to address the complaints and grievances of the community people and affected persons, by the project authority.

PHOTOGRAPHS

Ward Level Consultation at Ward No. 142 (Borough XVI) at Company Pukur (Julpia)

Attendance Sheet

Ward Level Consultation at Ward No. 142 (Borough XVI) at Company Pukur (Julpia)

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Ward No. 142 Company Pukur.

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.	[illegible]	F	[illegible]	9051294448	Dipali Haldar
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6.	[illegible]	F	Ranjie bon para	[illegible] 45	[illegible]
7.	[illegible]	F	Magera Kaly	[illegible]	Ankita Agarwal
8.	[illegible]	F	Magere Kaly	88202785R	Bina Agarwal
9.	[illegible]	F	[illegible]	[illegible]	[illegible]
10.			[illegible]		
10.	[illegible]	F	[illegible]		[illegible]
11.	[illegible]	F	Sipali Bey		Sipali Bey

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Company Pukur (142 Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
12	[illegible]	F	[illegible]	[illegible]	[illegible]
13	[illegible]	F	"	[illegible]	[illegible]
14	[illegible]	F	"	[illegible]	[illegible]
15	[illegible]	F	"		[illegible]
16	[illegible]	F	"		[illegible]
17	[illegible]	F	"		[illegible]
18	[illegible]	F	"	[illegible]	Rinku Haiti
19	[illegible]	F	"	[illegible]	Mina [illegible]
20	[illegible]	F	"		[illegible]
21	[illegible]	F	"	[illegible]	Roka [illegible]
22	[illegible]	F	"	[illegible]	Tapsi [illegible]
23	[illegible]	F	"	[illegible] 865	Suparna Das

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Company Pokur (142 Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
24	[illegible]	F	"	7980369241	Sama Hasin Gayen
25	[illegible]	M	"	[illegible]	[illegible]
26	[illegible]	F	"	[illegible]	[illegible]
27	[illegible]	F	"	[illegible]	Kakali [illegible]
28	[illegible]	M	"	[illegible]	Rahima Hasim
29	[illegible]	F	"		[illegible]
30	[illegible]	F	"	743918?? 42	[illegible]
31	[illegible]	F	"	743918?? 42	[illegible]
32	[illegible]	F	"	[illegible]	Debjani Shee
33	[illegible]	F	"	[illegible]	Rakhi Dey
34	[illegible]	F	"	[illegible]	Rima Singh
35	[illegible]	M	"	[illegible]	[illegible]

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Company Pokur (142 Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
36	[illegible]	M	"	[illegible] 173	[illegible]
37	[illegible]	F	"	[illegible]	[illegible]
38	[illegible]	F	"	[illegible]	[illegible]
39	[illegible]	F	"	[illegible] 60	[illegible]
40	[illegible]	F	"	[illegible]	[illegible]
41	[illegible]	M	"	[illegible]	[illegible]
42	[illegible]	M	"	[illegible]	[illegible]
43	[illegible]	F	"	[illegible]	[illegible]
44	[illegible]	M	"		Mampa Bag
45	[illegible]	F	"	[illegible] 73	[illegible]
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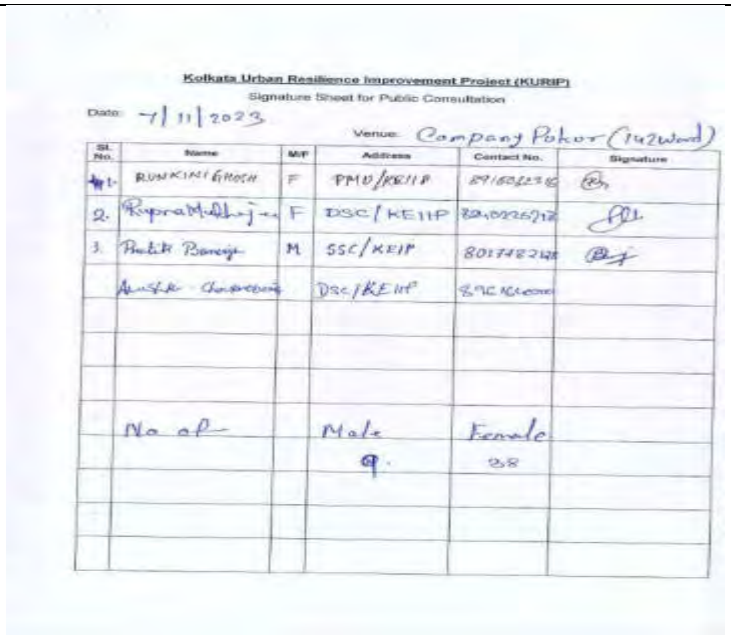

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Company Pokur (142Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.	RUNKINI GHOSH	F	PMU/KEIIP	8916824346	
2.	Rupra Mukherjee	F	DSC/KEIIP	8240226712	
3.	Prabir Banerjee	M	SSC/KEIP	8017482448	
	Anusha Chakraborty		DSC/KEIIP	8240226712	
	No of		Male	Female	
			9	28	

Photographs: Public Consultations at Ward no. 142 (Indira Udyan), on 05.01.24

Kolkata Urban Resilience Improvement Work(KURIP)

Signature sheet of Public Consultation

Date: 5/1/2024 Vanue: (Indira Udyan Company Bokur)

Sl No.	Name	Contact Number	Signature
1	Moumita Sardar	9163486048	M. Sardar
2	BANI DHARA	9874979552	Bani Dhara
3	Mili Das	9831938688	Mili Das
4	Phulmoni Manna Das	9073046766	Phoolmoni Manna Das
5	Soma Manna	7439466745	Soma Manna
6	Sujata minz	9748183457	Sujata minz
7	Manorama Gomes.	7278541198	M. Gomes.
8	[illegible]	9748183937	[illegible]
9	Kakali Roy.	9748291799	Kakoy.
10	Manosi Baichi	8420572318	Manosi Baichi
11	Nilima Mondal	8013300856	Nilima Mondal
12	[illegible]	9674524383	[illegible]
13	Mousumi Mondal	6291111387	Mousumi Mondal
14	Puja Patra (Pramanik)	9007778301	Puja Patra
15	Rupali Das	9031656895	Rupali Das

Kolkata Urban Resilience Improvement Work(KURIP)

Signature sheet of Public Consultation

Date: 5/1/24 Vanue: Indira Udyan Company Bokur

Sl NO.	Name	Contact Number	Signature
1.	[illegible]	[illegible]	[illegible]
2.	Nilima Mondal	8013300856	Nilima Mondal
3.	Mousumi Mondal	6291111387	Mousumi Mondal
4.	Puja Patra (Pramanik)	9007778301	Puja Patra
5.	[illegible]		[illegible]
6.	Shefali Naskar	6290969350	shefali naskar
7.	[illegible]	9127654493	[illegible]
8.	Rama Sarkar	8582923976	Rama Sarkar
9.	[illegible]	9831715457	[illegible]
10.	Shefali Hati	7003859014	Shefali Hati
11.	Mallika Sardar.	6289778966	Mallika Sardar
12	Monika Bar	8777816294	[illegible]
13.	Arati Mukhal	9836597141	Amkhal
14.	RUCHI KHURANA	9891648840	[illegible]
15	K. S. [illegible]	9831317118	[illegible]
16.	RUNKINI GHOSH	9910082316	[illegible]
17	Rupa Mukherjee	8240095215	[illegible]
18.	Pratisha Banerjee	8017182116	[illegible]

Attendance Sheet
Public Consultations at Ward no. 142 (Indira Udyan) on 05.01.24

Public consultation at ward No. 142, on 21.02.24 (Julpia, Sajneberia)

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date:

Venue: Julpia (Sajneberia)

Sl. No.	Name	WP	Address	Contact No.	Signature
1.	Naren Sardar				
2.					
3.					Joba Patra
4.	Ratan Garg				
5.	Raju Das				Raju Das
6.					
7.					Papu Manna
8.					
9.	Sangita guyen				Sagika Guyen
10.	Mahua Kundu				
11.	Rinkini Ghosh				
12.	Madhumita Sur				M.Sur

Attendance Sheet of public consultation at ward No. 142, on 21.02.24 (Julpia,Sajneberia)

<table>
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<td>Kolkata Urban Resilience Improvement Project (KURIP)
Signature Sheet for Public Consultation
Date:
Venue: Julphia (Nagar, Khali)
<table>
<tr><th>Sl. No.</th><th>Name</th><th>M/F</th><th>Address</th><th>Contact No.</th><th>Signature</th></tr>
<tr><td>1.</td><td>Baban Mandal</td><td></td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>Bina Halder</td><td></td><td></td><td></td><td></td></tr>
<tr><td>3.</td><td>Opi Halder</td><td></td><td></td><td></td><td></td></tr>
<tr><td>4.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>5.</td><td>Basanti Bar</td><td></td><td></td><td></td><td></td></tr>
<tr><td>6.</td><td>Bonita Dh</td><td></td><td></td><td></td><td></td></tr>
<tr><td>7.</td><td>Bhagbati Bar</td><td></td><td></td><td></td><td></td></tr>
<tr><td>8.</td><td>Arati Bala Patra</td><td></td><td></td><td></td><td></td></tr>
<tr><td>9.</td><td>Charu Mandal</td><td></td><td></td><td></td><td></td></tr>
<tr><td>10.</td><td>Bali Pandit</td><td></td><td></td><td></td><td></td></tr>
<tr><td>11.</td><td>Dipti Mondal</td><td></td><td></td><td></td><td></td></tr>
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<td>Public consultation at ward no. 142 on 21.02.24 (Julphia, Magurkhali)</td>
<td>Attendance Sheet
of public consultation at ward No. 142, on 21.02.24 (Julpia, Magurkhali)</td>
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Public consultation at ward no. 142 on 21.02.24(Julphia, Ramjibanpur)

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date:

Venue: Ramjibanpur, Julphia

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

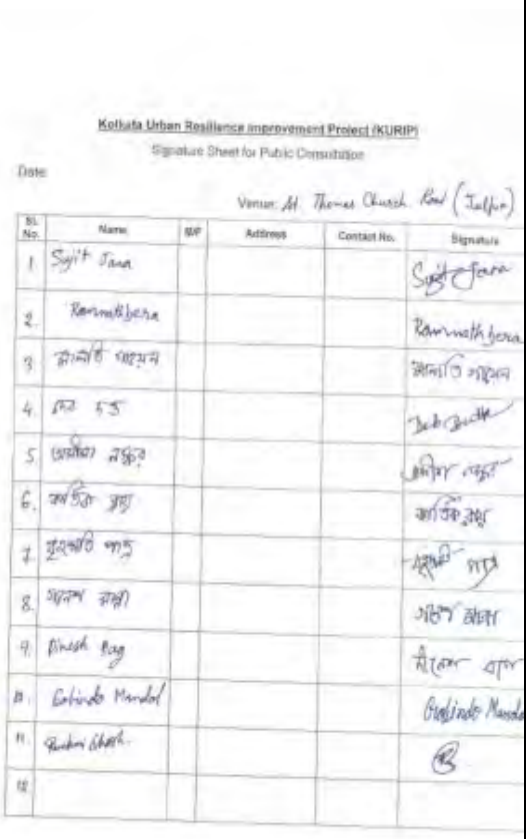
Date:

Venue: Ramjibanpur, Julphia

Sl. No.	Name	M/F	Address	Contact No.	Signature
13.					
14.					
15.					

Attendance Sheet of public consultation at ward No. 142 on 21.02.24 (Julphia, Ramjibanpur)

Public consultation at ward no. 142 on 21.02.24 (Julphia, St. Thomas Church Road)



Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date:

Venue: St. Thomas Church Road (Julpia)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.	Sujit Jana				Sujit Jana
2.	Ramnath Jana				Ramnath Jana
3.	[illegible]				[illegible]
4.	[illegible]				[illegible]
5.	[illegible]				[illegible]
6.	[illegible]				[illegible]
7.	[illegible]				[illegible]
8.	[illegible]				[illegible]
9.	Dinesh Bag				[illegible]
10.	Govinda Mandal				Govinda Mandal
11.	[illegible]				[illegible]
12.					

Attendance Sheet of public consultation at ward No. 142 dated 21.02.24 (Julpia, St. Thomas Church Road)

Public consultation at ward no. 142 on 21.02.24 (Julphia, ONGC more)

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date

Venue: ONGC more (Julphia)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.	Ahalya Halder				Ahalya Halder,
2.	[illegible]				[illegible]
3.	AJAY PATRA				[illegible]
4.	Alok Koley				[illegible]
5.	[illegible]				[illegible]
6.	Anil Bhuniya				Anil Bhuniya
7.	[illegible]	F			[illegible]
8.	[illegible]				M San
9.	[illegible]				

Attendance Sheet of public consultation at ward No. 142 on 21.02.24 (Julpia, ONGC more)

B. Kabardanga Subproject Area (Package SD 07)

Date	Location	Total Participants	Participant Details	Key Discussions
07.11.2023	Ward Level Consultation at Ward no. 142 (Chakramnagar School)	53	Local residents, shop owners, housewives, businessmen, Service men, representatives of ward members and PMU	✓ The need for scope of work and tentative commencement date for this package was elucidated. ✓ No adverse impacts on structures and livelihoods were anticipated. ✓ The subproject will provide a wastewater discharge in the canals and water bodies of Kolkata which will ensure improvement of living
07.11.2023	Ward Level Consultation at Ward no. 142 (Ramchandrapur, beside Rupali Sangha)	59	Local residents, shop owners, housewives, businessmen, Service men, representatives of	

Date	Location	Total Participants	Participant Details	Key Discussions
			ward members and PMU	condition and overall environment ✓ Short term impact on air quality- dust generation, noise level, access problem, inconvenience for public and movement of vehicle. ✓ Application of mitigation measures as per EMP to mitigate short term impact ✓ The project work will reduce environmental impact/ health problems that is caused by open discharge of domestic wastewater ✓ It will be ensured that the river Ganga is not polluted, which is a priority of the state and national governments. ✓ People may face some access disruption during construction work. Suitable measures will be taken to avoid or minimize any disruption. People's cooperation will be needed for the successful implementation of the project. ✓ Participants have shown their willingness to engage with the project. ✓ Discussed safety issues of residents during construction. ✓ A Grievance Redressal mechanism will be in place to address the complaints and grievances of the community people and affected persons, by the project authority.
21.02.2024	Ward 142 (Kabardanga, beside PS)	9	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Kabardanga, Brick Field Road)	7	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Kabardanga, Ramchandrapur)	12	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	
21.02.2024	Ward 142 (Kabardanga bazar)	8	Local residents, shop owners, housewives, businessmen, Service men, representatives of PMU and team of consultants	

Ward Level consultation at Ward no. 142 (Borough XVI) at Chakramnagar School on 07.11.23	
	
	

Attendance Sheets
Ward Level consultation at Ward no. 142 (Borough XVI) at Chakramnagar School on 07.11.23

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Chakramnagar school (Ward 142)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.	[illegible]	F	Jadavgarh	[illegible]	[illegible]
2.	Mesa Sarkar	F	Jadavgarh	[illegible]	[illegible]
3.	[illegible]	F	Jadavgarh	[illegible]	[illegible]
4.	Priyanka Patra Malik	F	chakramnagar	[illegible]	Priyanka Patra Malik
5.	[illegible]	M	Jadavgarh	[illegible]	[illegible]
6.	[illegible] Mondal	F	chakramnagar	[illegible]	[illegible]
7	Mallika Malick	F	Chakramnagar	[illegible]	Mallika Malick
8	Pinky Mondal	F	Chakramnagar	[illegible]	Pinky Mondal
9	[illegible]	F	chakramnagar	[illegible]	[illegible]
10	[illegible]	F	Dulalpur	[illegible]	[illegible]
11)	Malabika Kanji	F	Dulalpur	[illegible]	Malabika Kanji
12)	Anindita Kanji Kayal	F	Dulalpur	[illegible]	Anindita Kanji Kayal

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Chakramnagar school (Ward 142)

Sl. No.	Name	M/F	Address	Contact No.	Signature
13	[illegible]	F	[illegible]	[illegible]	[illegible]
14	[illegible] Chatterjee	F	Chakramnagar	[illegible]	R. Chatterjee
15	Mallika Sardar	F	Chakramnagar	[illegible]	Mallika Sardar
16.	[illegible] Chatterjee	F	Chakramnagar	[illegible]	[illegible] Chatterjee
17	[illegible]	M	Chakramnagar	[illegible]	[illegible]
18.	[illegible]	M	[illegible]	[illegible]	[illegible]
19.	Bharati Sardar	M	Krishnanagar		Bharati Sardar
20.	[illegible]	F	[illegible]	[illegible]	[illegible]
21	[illegible] Das	F	Krishnanagar	[illegible]	[illegible] Das
22	[illegible]	F	[illegible]	[illegible]	[illegible]
23	[illegible]	F	[illegible]	[illegible]	[illegible]
24	[illegible]	F	Krishnanagar	[illegible]	[illegible]

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Chakramnagar school (Ward 142)

Sl. No.	Name	M/F	Address	Contact No.	Signature
25.	[illegible]	F	[illegible]		[illegible]
26	Laboni Kanji	F	Dulalpur	[illegible]	Laboni Kanji
27.	[illegible] Kanji [illegible]	F	Dulalpur	[illegible]	[illegible]
28	Pranati Kanji	F	Dulalpur	[illegible]	Pranati Kanji
29	[illegible]	F	Chak Ram Nagar	[illegible]	[illegible]
30.	[illegible]	F	[illegible]		[illegible]
31	[illegible] Banerjee	F	Dulalpur	[illegible]	[illegible] Banerjee
32.	[illegible] Kanji	F	Dulalpur	[illegible]	[illegible] Kanji
33.	[illegible] SARKAR	F	Jadavgarh	[illegible]	[illegible]
34.	[illegible]	F	Chak Ramnagar		[illegible]
35.	Jhuma Banerjee	F	Chak Ramnagar	[illegible]	Jhuma Banerjee
36.	[illegible]	M			[illegible]

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Chakramnagar School (Ward 142)

Sl. No.	Name	M/F	Address	Contact No.	Signature
37.	[illegible]	F	[illegible]	[illegible]	[illegible]
38	[illegible]	F	[illegible]	[illegible]	[illegible]
39	[illegible]	F	[illegible]	[illegible]	[illegible]
40	[illegible]	F	[illegible]	[illegible]	[illegible]
41.	[illegible]	F	[illegible]	[illegible]	[illegible]
42	[illegible] Banerjee	F	Dulalpur	[illegible]	[illegible] Banerjee
43.	[illegible]	F	[illegible]	[illegible]	[illegible]
44	[illegible]	F	[illegible]	[illegible]	[illegible]
45.	[illegible]	F	[illegible]	[illegible]	[illegible]
46	[illegible]	F	[illegible]	[illegible]	[illegible]
47.	[illegible]	F	[illegible]	[illegible]	[illegible]
48	Jhuma Patra	F	[illegible] chak	[illegible]	Jhuma Patra

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023 (Ward 142)

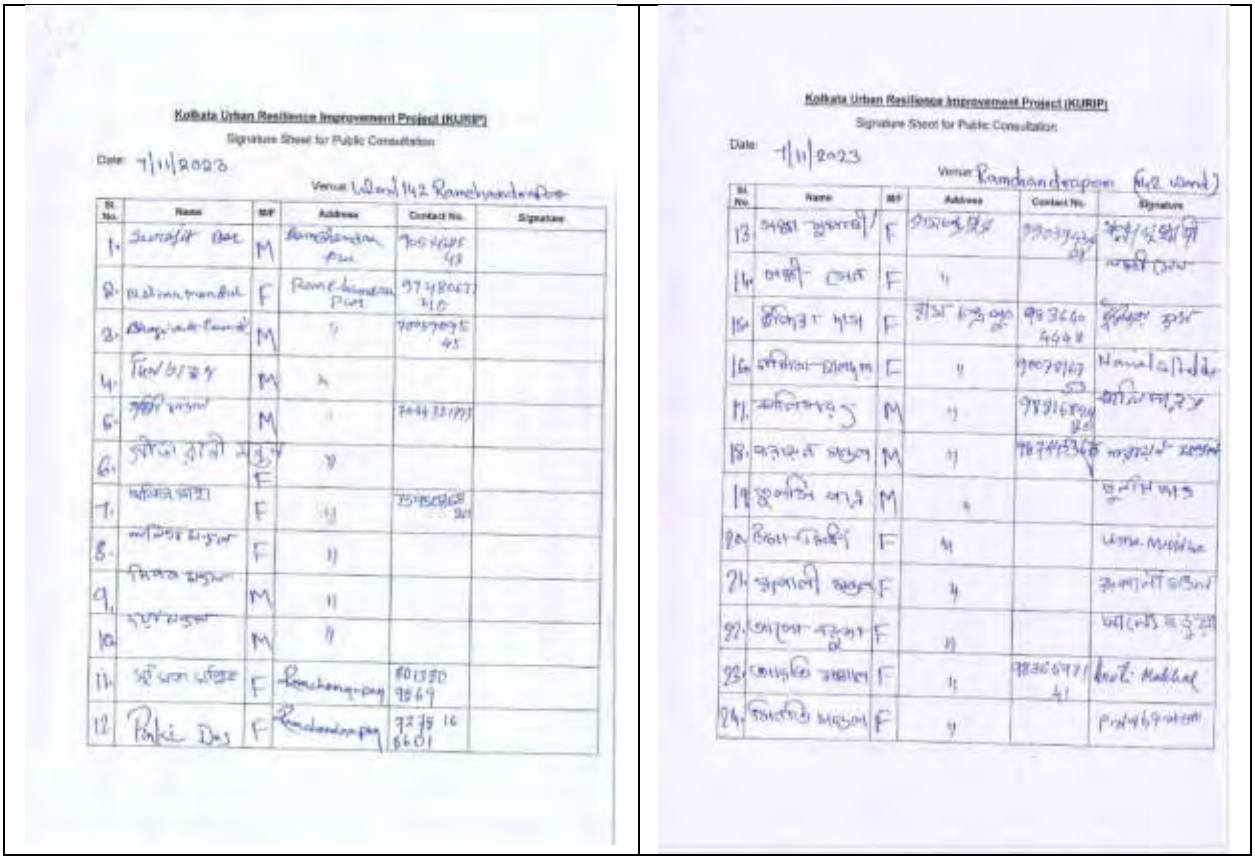
Venue: Chakraamnagar school

Sl. No.	Name	M/F	Address	Contact No.	Signature
49.	Kamala Kuley	F	Dulal Para	974897 9265	Kamala Kuley
50.	RUNKINI GHOSH	F	PMU/KEIIP	8918062385	
	Rupna Mukherjee	F	DSC KEIIP	8240225285	
	Patrick Banerjee	M	SDO / KEIIP	8017782128	
	Anushka Chakraborty		DSC/KEIIP	8961640900	
	No of.		Male	Female.	
			5	44	

Ward Level consultation at Ward no. 142 (Borough XVI) at Ramchandrapur beside Rupali Sangha on 7.11.23

Attendance Sheet

Ward Level consultation at Ward no. 142 (Borough XVI) at Ramchandrapur beside Rupali Sangha on 7.11.23



Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Ward 142 Ramchandrapur

Sl. No.	Name	M/F	Address	Contact No.	Signature
1.		M			
2.		F			
3.		M			
4.		M			
5.		M			
6.		F			
7.		F			
8.		F			
9.		M			
10.		M			
11.		F			
12.	Pinki Das	F			

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Ramchandrapur

Sl. No.	Name	M/F	Address	Contact No.	Signature
13.		F			
14.		F			
15.		F			
16.		F			
17.		M			
18.		M			
19.		M			
20.		F			
21.		F			
22.		F			
23.		F			
24.		F			

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Ramchandrapur (142 Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
25	[illegible]	F	[illegible]	923973[illegible] 87	[illegible]
26	[illegible]	F	[illegible]	[illegible]	[illegible]
27	[illegible]	F	[illegible]	905161 3665	[illegible]
28	[illegible]	F	[illegible]	[illegible] 39	[illegible]
29	[illegible]	F	[illegible]	[illegible] 95	[illegible]
30	[illegible]	F	[illegible]		[illegible]
31	[illegible]	F	[illegible]	[illegible]	[illegible]
32	[illegible]	F	[illegible]	629[illegible] 50	[illegible]
33	[illegible]	F	[illegible]	628[illegible] 245	[illegible]
34	[illegible]	F	[illegible]	916365 3621	[illegible]
35	[illegible]	F	[illegible]	7439[illegible] 60	[illegible]

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Ramchandrapur (142 Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
36	[illegible]	F	[illegible]	[illegible]	[illegible]
37	[illegible]	F	"	[illegible]	Tyotshna Das
38	[illegible]	F	"		[illegible]
39	[illegible]	F	"		[illegible]
40	[illegible]	F	"		[illegible]
41	[illegible]	F	"	985680 1618	Mortina Sabbag
42	[illegible]	F	"	[illegible]	[illegible]
43	[illegible]	F	"		Krishna Rang
44	[illegible]	F	"	[illegible]	Manasi Baichi
45	[illegible]	F	"	[illegible]	[illegible]
46	[illegible]	F		[illegible]	Mala Das
47	[illegible]	F	Ramchandrapur	[illegible]	Mounita Sardar

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date: 7/11/2023

Venue: Ramchandrapur (142 Ward)

Sl. No.	Name	M/F	Address	Contact No.	Signature
48	[illegible]	F	RAMCHANDRA PUR	[illegible]	[illegible]
49	[illegible]	F	RAMCHANDRA PUR	[illegible]	[illegible]
50	[illegible]	F	RAMCHANDRA PUR KALITALA	[illegible]	[illegible]
51	[illegible]	F	RAMCHANDRA PUR KALITALA	[illegible]	[illegible]
52	[illegible]	M	Ramchandra Pur	[illegible]	B. Dhara
53	[illegible]	F	Ramchandrapur	[illegible] 6294	Mousika Basu
54	[illegible]	F	RAMCHANDRA Thakurani chak	[illegible]	Mamita Baidhi
55	[illegible]	M	Lalitala	[illegible]	Tahomi Roy
	Organised and conducted by:				
1.	Anwesha Chakraborty	F	DM, KEIIP	[illegible]	[illegible]
2.	[illegible]	F	DSC-KEIIP	[illegible]	[illegible]

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date:

Venue:

Sl. No.	Name	M/F	Address	Contact No.	Signature
3.	Prabirda Banerjee	M	SHU KEIIP	[illegible]	[illegible]
4.	Rupkiri Ghosh	F	PMU KEIIP	[illegible]	[illegible]
	No of :-				
	Male		Female		
	11		44		

Public consultation at Ward no. 142, on21.02.24 (Kabardanga, beside PS)

Kolkata Urban Resilience Improvement Project (KURP)

Signature Sheet for Public Consultation

Date:

Venue: Kabardanga (Near PS)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1	Kausal Ishwar				
2	Lakshmi Kanta Sardar				L. Sardar
3					
4	Mayda Malik				M. Mallik
5					Manoj Mondal
6	Maya Mal				
7					M. Naskar
8	Ramkrishna Ghosh				
9	Madhumita Sen				M Sen

Attendance Sheet Public consultation at Ward no. 142 on 21.02.24 (Kabardanga, beside PS)

Public consultation at Ward no. 142 on21.02.24 (Kabardanga, Brick Field Road)

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date:

Venue: Kabardanga (Brick field Road)

Sl. No.	Name	M/F	Address	Contact No.	Signature
1	Ekadashi Mondal				E. M.
2	Dulu mondal				
3					
4					
5					
6					
7					

Attendance Sheet Public consultation at Ward no. 142 on 21.02.24 (Kabardanga, Brick Field Road)

Public consultation at Ward no. 142 on 21.02.24 (Kabardanga, Ramchandrapur)

Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

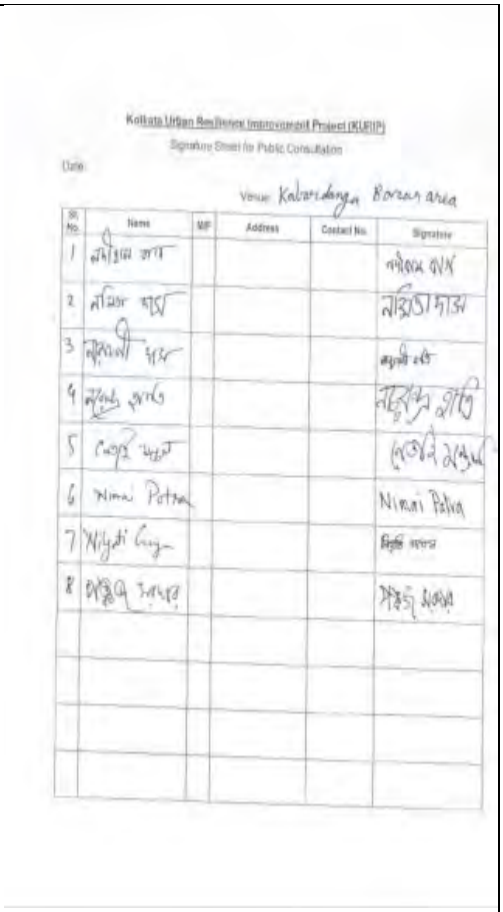
Date:

Venue: Ramchandrapur, Kabardanga

Sl. No.	Name	M/F	Address	Contact No.	Signature
1					
2					
3					
4					
5					
6	Thakur Mandal				
7	Kali Das Garg				
8	Kamal Ghosh				
9					
10					
11					
12					

Attendance Sheet Public consultation at Ward no. 142 on 21.02.24 (Kabardanga, Ramchandrapur)

Public consultation at Ward no. 142 on 07.02.24 (Kabardanga Bazar)



Kolkata Urban Resilience Improvement Project (KURIP)

Signature Sheet for Public Consultation

Date

Venue: Kabardanga Bazar area

Sl. No.	Name	M/F	Address	Contact No.	Signature
1					
2					
3					
4					
5					
6	Nimai Patra				Nimai Patra
7					
8					

Attendance Sheet Public consultation at Ward No. 142 on 07.02.24 (Kabardanga Bazar)

Appendix 10: GRC Notification of KEIIP

KOLKATA ENVIRONMENTAL IMPROVEMENT INVESTMENT PROGRAM (KEIIP)

Ref: DSC/KEIIP/DTL/2023-24/38840 December 29, 2023

D.G. (P)
KEIIP

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, KEIIP.

A draft copy of Office Order is enclosed for signature of Project Director, KEIIP

DSC KEIIP
Inward No. 40955
RECEIVED
Date 02.01.24

(Sudip Kumar Mukherjee)
Dy. Team Leader
DSC- KEIIP

Encl. As stated above.

A.O KEIIP

PD Placed for approval. Please.
28/12/23

Approved.
02/1/24

DG (P)
02/1/24

Mr. Hasan SAE
02/01/24

KEIIP

Kolkata Environmental Improvement Investment Program
(KEIIP)

The Kolkata Municipal Corporation
Kolkata Environmental Improvement Investment Program
286, A. J. C. Bose Road, Kolkata 700 017
Tel: (91) 2283 0544
Email ID: pdkeiip@rediffmail.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 Grievance Registration Form

(To be available in Bengali, Hindi and English)

The Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage people 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**	**Project Town** **Project:**

Contact information/personal details					
Name		**Gender**	* **Male** * **Female**	**Age**	
Home address					
Place					
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 updates 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 officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	**Yes No**
Means of disclosure:	

Appendix 12: Sample Environmental Site Inspection Checklist

Project Name
Contract
Number

NAME:_____DATE:_____
TITLE:_____DMA:_____
LOCATION:_____GROUP: _____

WEATHER:

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

Monitoring Items	Compliance
Compliance marked as Yes / No / Not applicable (NA) / Partially Implemented (PI)	
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 the site	
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 is kept 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	
Workers 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 **Name**
Position **Position**

Appendix 13: Photos of Sensitive Receptors along the Project Influence area

A. Julpia Subproject Area (Package SD 06)

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>Water body at Jiadargot</td><td>Water body at Jiadargot</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Water body at Jiadargot</td><td>Water body at Gholpara</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>Water body at Darir chowk road</td><td>Water body beside Malpara Water tank</td></tr>
<tr><td colspan="2"> 
Sajneberia Abaitanik primary school</td></tr>
</table>

B. Kabardanga Subproject Area (Package SD-07)

Water body at Chakramnagar

Water body at Chakramnagar

W

Water body at Thakurani chak patra para

Water body at Chakramnagar

Water body at Brick field road

Water body at Ramchandrapur

Trees within Kabardanga Pumping Station Site