Initial Environmental Examination

PUBLIC

July 2024

India: West Bengal Drinking Water Sector Improvement Project

Subproject : Water Supply Distribution System : Indpur Block (Bankura District)
[Package DWW/BK/02A]

Prepared by Public Health Engineering Department, Government of West Bengal for the Asian Development Bank (ADB). This is an updated version of initial environmental examination report originally posted in March 2020 available at https://www.adb.org/projects/documents/ind-49107-006-iee-13.

This updated initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature. Your attention is directed to the “terms of use” section of ADB’s website.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, ADB does not intend to make any judgments as to the legal or other status of any territory or area.

Asian Development Bank

`

Initial Environmental Examination

Updated
Project Number: 49107-006
January 2021

SFG Log: 6240

IND: West Bengal Drinking Water Sector Improvement Program –Subproject: Water Supply Distribution System : Indpur Block (Bankura District)[Package DWW/BK/02A]

Prepared by Public Health Engineering Department, Government of West Bengal for the Asian Development Bank.

ABBREVIATIONS

ADB	–	Asian Development Bank
CPCB	–	Central Pollution Control Board
CTE	–	consent to establish
CTO	–	consent to operate
DSISC		design, supervision and institutional support consultant
EAC	–	Expert Appraisal Committee
EHS	–	Environmental, Health and Safety
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
GRC	–	grievance redress committee
GRM	–	grievance redress mechanism
GOI	–	Government of India
GoWB	–	Government of West Bengal
HSGO	–	Head, Safeguards and Gender Officer
IBPS	–	Intermediate Booster Pumping Station
IEE	–	Initial Environmental Examination
IWD	–	Irrigation and Waterways Department
MoEFCC	–	Ministry of Environment, Forest and Climate Change
WBPCB	–	West Bengal Pollution Control Board
NOC	–	No Objection Certificate
PHED	–	Public Health Engineering Department
PIU	–	Project Implementation Unit
PMC	–	Project Management Consultant
PMU	–	Project Management Unit
PWSS	-	Piped Water Supply Scheme
PPTA	–	Project Preparatory Technical Assistance
REA	–	Rapid Environmental Assessment
ROW	–	right of way
SPS	–	Safeguard Policy Statement
WHO	–	World Health Organization
WTP	–	water treatment plant
WBDWSIP	–	West Bengal Drinking Water Sector Improvement Project

WEIGHTS AND MEASURES

m^3/hr	cubic meter per hour
dBA	decibel
°C	degree Celsius
ha	hectare
km	kilometre
lpcd	liters per capita per day
m	meter
mbgl	meters below ground level
mgd	million gallons per day
MLD	million liters per day
mm	millimeter
km^2	square kilometer

NOTES

In this report, "$" refers to US dollars.

CURRENCY EQUIVALENTS

(as of 17th August, 2018)

Currency unit	=	Rupee (INR)
INR 1.00	=	0.014 USD
USD 1.00	=	69.80 INR

Initial Environment Examination covers

All 19 OHSR and 20 Pipeline Zones

This initial environmental examination is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

In preparing any country program or strategy, financing any project, or by making any designation of or reference to a particular territory or geographic area in this document, the Asian Development Bank does not intend to make any judgments as to the legal or other status of any territory or area.

CONTENTS

List of Appendices

EXECUTIVE SUMMARY

1. The proposed West Bengal Drinking Water Improvement Project (WBDWIP) aims to provide safe, reliable and continuous drinking water as per Government of India's (GOI) standard to about 2.6 million people in the arsenic, fluoride, and salinity affected selected areas of North 24 Parganas, South 24 Parganas, East Medinipur and Bankura districts of West Bengal.

2. The project will adopt a sector approach, and subprojects will be selected and proposed for funding adhering to the agreed Subproject Selection Criteria (SSC). Project districts are North 24 Parganas (with two blocks of South 24 Parganas included for distribution network), Bankura and East Medinipur, and subprojects to be covered under the Project will be within these districts only unless otherwise agreed with ADB. Subprojects proposed under the Project stem from a district-wide comprehensive water quality and sustainability planning and completion of the Drinking Water Quality Action Plan (DWQAP) for the concerned district.

3. WBDWSIP will be implemented over period of 3 years after award of contract and operate and maintenance period is of 2 years.

4. **The Subproject.** Provision of water supply distribution system in fluoride (groundwater) affected block of Indpur in Bankura district is taken up in this subproject under the WBDWSIP. A parallel subproject, implemented under WBDWSIP, will provide bulk water supply (treated water) to this subproject for further distribution to the households in the project area. Subproject includes the following civil works components: (i) Intermediate Booster Pumping Station (IBPS) cum Ground Level Storage Reservoir (GLSR) of capacity 1400 KL and allied works at Raghunathpur, (ii) IBPS and allied structures at Gobindapur (iii) laying of Transmission Mains from IBPS cum GSLR to OHRs of approx. 155.48 km, (iii) construction of 19 overhead storage reservoirs (OHSRs) in Indpur block; (iv) laying of about 803.65 km distribution network, and (v) provision of domestic water meters for household water connections with water meters.

5. **Project Implementation Arrangements**. Public Health Engineering Department (PHED) of Government of West Bengal is the executing and implementing agency for the WBDWSIP. Project Management Unit (PMU) exclusively established in PHED for the WBDWSIP will implement the project. PMU is assisted by district level Project Implementation Units. Safeguard and Gender Cell (SGC) in the PMU is responsible for safeguards compliance. Project Management Consultant and PIU-wise Design, Supervision and Institutional Support Consultant (DSISC) assist PMU and PIUs in implementation and management of the project.

6. **Screening and Assessment of Potential Impacts**. 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 Safeguard Policy Statement (SPS), 2009. As per the GOI EIA Notification, 2006, this subproject does not require EIA study or environmental clearance. The potential environmental impacts of the subproject have been assessed using ADB's Rapid Environmental Assessment Checklist for Water Supply. The potential negative impacts were identified in relation to pre-construction, construction and operational period. This IEE document has included all 19 numbers of OHSR zones and 20 numbers of pipe-laying zones, Construction has commenced at 12 numbers of OHSR and in 19 numbers of pipe-laying zones upto 31st December, 2020. The detail of the zones are given in Section II of this report.

7. **Categorization.** Based on results of the assessment and ADB's SPS, the subproject is classified as environmental Category B, i.e., the subproject is judged to be unlikely to have any significant adverse environmental impacts. However, an initial environmental examination is required/advisable.

8. **Description of the Environment**. The subproject components are located in Indpur block of Bankura District which is situated on the western part of the State of West Bengal. The total area of the district is 6882 square kilometers (km^2). It extends from $23^0$38' north Latitude and between $86^0$36' and $87^0$47' east Longitude. Headquarter of Bankura district is at Bankura, from which this district derived its name. It is bounded by Paschim Medinipur in the south and Hooghly district in the north, Purulia district in the west, Bardhaman district in the north and east. In shape, it resembles an isosceles triangle wedged in between Purulia and Bardhaman, with its apex nearly opposite to Raniganj and with an irregular base line resting on Paschim Medinipur and Hooghly. The district is drained by Damodar, Dwarakeswar and Kangsabati river along with their tributaries of which Gandheswari, Silai and Kumari deserve separate mention. The district comprises of 22 blocks and 3 Municipalities.

9. The district physiography is quite varied and marked successively from west to east by zones of plateau, plateau fringe, piedmont zones, marginal plan to delta flank, one merging imperceptive into the other. There are long stretches of paddy fields in the eastern alluvial part, but in the west, the undulating plain and hill tract are covered with low jungle, though traces of taller forest trees are occasionally seen. About 14 percent of the total area of the district is under forest cover. Low forest clad spurs such as Biharinath (447.8 m) and Susunia (439.5 m), which are extensions of the Chhotonagpur table and are found in the northwest of the district. There are several other low hills interspersed here and there. Bankura is drained by Damodar, Dwarakeswar and Kangsabati river along with their tributaries of which Gandheswari, Silai and Kumari deserve separate mention. They have in general a southeasterly flow. The courses of the principal rivers are approximately parallel to each other.

10. Highest elevation of the district is within 448 metres above mean sea level(msl). The district falls under red laterite zone and generally undulating, coarse textured, susceptible to erosion, acidic soil. Bankura is generally arid compared to other parts of Bengal. Annual average rainfall in the district is 1400 mm and the temperature varies from a maximum of ≥44°C and minimum of ≤6°C.The climate in the western portion of the district is drier than the eastern regions. From March to May, the hot westerly winds prevail and the day time temperatures are oppressive. The north-westerly winds are frequent during the early part of March (locally called as "Kal Baisakhi") and help to mitigate the excessive heat.As per the report published by National Institute of Disaster Management (NIDM) in 2013, the districts of Bankura, Purulia, Birbhum and parts of Paschim Midnapore have been affected by drought at regular intervals, mainly due to deficient rainfall and adverse soil conditions. Every summer many parts of the district suffer water shortage with respect to the entire state.

11. The Project area Indpur block is a community development block that forms an administrative division in Khatra sub-division of Bankura district in the Indian state of West Bengal. Indpur is located at 23.1667°N 86.9333°E. It has an average elevation of 118 m (387 ft). Indpur CD Block has an area of 302.60 km^2.

12. Indpur CD Block spreads over from the central parts of the district to the western border with Purulia district. It belongs to the uneven lands/ hard ring rock area. The soil is laterite red and hard beds are covered with scrub jungle and Sal wood. Indpur CD Block is bounded

by Chhatna and Bankura I CD Blocks on the north, Onda and Taldangra CD Blocks on the east, Khatra and Hirbandh CD Blocks on the south and Puncha CD Block, in Purulia district, on the west. It is located 17 km from Bankura, the district headquarters.

13. Indpur block has 1 panchayat samity, 7 gram panchayats, 112 gram sansads (village councils), 222 mouzas and 198 inhabited villages. Indpur police station serves this block.Headquarters of this CD Block is at Indpur. Gram panchayats of Indpur block/panchayat samiti are: Bheduasole, Brahmandiha, Brajarajpur, Gourbazar, Hatgram, Indpur and Raghunathpur.

14. As per the 2011 census the total number of literates in Indpur CD Block was 92,434 (67.42% of the population over 6 years) out of which males numbered 56,305 (79.87% of the male population over 6 years) and females numbered 36,829 (55.30%) of the female population over 6 years). The gender disparity (the difference between female and male literacy rates) was 24.57%. As per the 2011 Census of India Indpur CD Block had a total population of 156,522, all of which were rural. There were 80,556 (51%) males and 75,966 (49%) females. Population below 6 years was 19,430. Scheduled Castes numbered 63,532 (40.59%) and Scheduled Tribes numbered 15,003 (9.59%).

15. **The Project.** As per information available in the project report of PHED, only 10.0% of the total rural habitations in the select project block is connected with Piped water supply based on ground / sub-surface water source. The impact of ground water abstraction and the associated risks of fluoride contamination in the block of Indpur cannot be undermined. In effect, a comprehensive Piped Water Supply Scheme (PWSS) is essential to be drawn up with respect to sustainable water sources to effectively mitigate the risks and impact of Fluoride contamination.

16. The identified land for proposed GLSR at Raghunathpur is about 11 km from the proposed GLSR cum IBPS site located at Gobindapur Mouza of the Indpur block and is easily accessible by State Highway No. 2 (SH 2). The coordinates of the GLSR location is 23.1532 N and 86.8610 E. The Topography is undulating and ground level of the site and surroundings are about 130m above the mean sea level. The land is connected by an approach road to the nearby villages. As per local enquiries carried out during field visits, the site is not prone to flooding, and is barren land. The land of GLSR and IBPS is privately owned land and will be purchased from private owner(s). Process continued for purchase of lands. Assessment of the alignment indicated that the length of the secondary transmission main from Gobindapur, IBPS to Raghunathpur GLSR to OHRs are around 155.48 km. OHSRs sites are located in small land parcels (~25m x 25m) - one in each zone and pipes (distribution system) are laid along the public roads. Based on the land availability, OHSRs sites are selected in government land parcels, and in cases where there is no government land, private land parcels are selected. Project sites are mostly located in rural habitations, some of which are densely populated. Sites are mostly vacant (private lands), and some are covered with few trees; measures are suggested to minimize, and conduct compensatory tree plantation at a ratio of 1:5. Overall, there are no notable sensitive environmental features in the project sites.

17. **Potential Environmental Impacts.** The subproject is unlikely to cause significant adverse impacts because: (i) the components will involve straightforward construction and operation, so impacts will be mainly localized; (ii) there are no notable sensitive environmental features in the project sites and (iii) predicted impacts are site-specific and likely to be associated with the construction process and are produced because the process is invasive,

involving excavation and earth movements. The main design impacts of water supply system in general are due to abstraction of water. This subproject includes only provision of distribution system, and does not include source development or water abstraction or treatment. Treated water for the subproject will be provided from bulk water supply system that is being developed under a parallel subproject, and the environmental impacts of which are assessed through another initial environmental examination (IEE).

18. Construction activities are confined to the selected sites, and the interference with the general public and community around is minimal. There are temporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.,), mining of construction material, occupation health and safety aspects. During the construction phase of pipeline work along the public roads, impacts arise from the construction dust and noise; from the disturbance of residents, businesses, traffic by the construction work, and from the need to dispose of large quantities of waste soil. The social impacts (access disruptions) due to construction activities are minimal.

19. All the proposed project sites are on vacant land and there is no notable tree cover. No tree feeling is anticipated till now after final survey and design. The OHSR sites are not in close proximity of forest land. There is sufficient available ROW along the pipe lying routes and no forest area is affected.

20. Anticipated impacts of water distribution system during operation and maintenance (O&M) will be related to detection and repair of leaks, pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work. Therefore, no notable operation phase impacts are anticipated from the subproject.

21. **Environmental Management Plan.** An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. Locations and siting of the proposed infrastructures were considered to further reduce impacts. The EMP includes design and location related measures such as (i) minimizing tree cutting at OHSR sites by proper planning; (ii) avoiding any disturbance / encroachment into ponds, water bodies at OHR sites; (iii) energy efficient pumping system, and (iv) noise controls.

22. During construction, the EMP includes mitigation measures such as (i) barricading, dust suppression and control measures (ii) traffic management measures for works along the roads and for hauling activities; (iii) provision of walkways and planks over trenches to ensure access will not be impeded; (iv) finding beneficial use of excavated materials to extent possible to reduce the quantity that will be disposed of and (v) Implement all site-specific occupational health and safety (OHS) Plan as per the “Standard Operating Procedure for Prevention and Risk Minimization of Corona Virus Disease (COVID-19) at the Facilities and Work Sites**”** developed by PMU and implemented measures such as: (a) excluding public from the site; (b) personal hygiene, disinfection and maintaining social distancing; (c) ensuring all workers are provided with and use personal protective equipment including face mask; (d) OHS Training and COVID 19 awareness training for all site personnel. EMP will guide the environmentally-sound construction of the subproject. EMP includes a monitoring program to measure the effectiveness of EMP implementation and include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

23. The contractor has submitted site environmental management plan (SEMP) for the zones where construction started. SEMP 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 approved EMP; (iii) monitoring program as per SEMP; (iv) application of Health and Safety Plan for personal protection and protection from COVID 19 infection and (v) budget for SEMP implementation to PIU, for review and approval. No works are allowed to commence prior to approval of SEMP. A copy of the EMP/approved SEMP are kept on site during the construction period at all times. The EMP is included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance

24. **Consultation, Disclosure and Grievance Redress Mechanism.** The stakeholders have been involved in developing the IEE through discussions on-site and public consultation at several places in the subproject area, after which views expressed were incorporated into the IEE and in the planning and development of the project. The IEE has been made available at public locations and will be disclosed to a wider audience via the ADB and PHED/PMU websites. The consultation process are continued and expanded during project implementation to ensure that stakeholders are fully engaged in the project and have the opportunity to participate in its development and implementation. A grievance redress mechanism (GRM) is described within the IEE to ensure any public grievances are addressed quickly.

25. **Monitoring and Reporting.** The PMU and PIUs are responsible for monitoring, and submit semi-annual environmental monitoring reports to ADB. ADB will post the environmental monitoring reports on its website.

26. **Conclusion and Recommendations.** Therefore, as per ADB SPS, the project is classified as environmental category B and does not require further environmental impact assessment.

27. Presently, zone wise designing is completed for this package. This IEE has been updated considering designed zone and where construction started till 31st December, 2020. With further implementation of the project, if there is any change in design or location, this IEE will be again updated, reviewed and approved by PMU and further submitted to ADB for approval.

I. INTRODUCTION

A. Background

1. The proposed West Bengal Drinking Water Improvement Project (WBDWIP) aims to provide safe, reliable and continuous drinking water as per Government of India's standard to about 2.6 million people in the Arsenic, Fluoride, and salinity affected selected areas of North 24 Parganas, South 24 Parganas, East Medinipur and Bankura districts of West Bengal.

2. The Project will adopt a sector approach, and subprojects will be selected and proposed for funding adhering to the agreed Subproject Selection Criteria (SSC). Project districts are North 24 Parganas (with two blocks of South 24 Parganas included for distribution network), Bankura and East Medinipur, and subprojects to be covered under the Project will be within these districts only unless otherwise agreed with ADB. Subprojects proposed under the Project stem from a district-wide comprehensive water quality and sustainability planning and completion of the Drinking Water Quality Action Plan (DQWAP) for the concerned district. The DQWAP for the Project districts supported by the Project were prepared by the executing agency, the Public Health and Engineering Department (PHED) of Government of West Bengal (GoWB), with support of project preparatory consultants from the Asian Development Bank (ADB), and has been adopted by PHED to guide present and future drinking water improvement in the districts.

3. The impact of the Project will be drinking water security ensured in selected districts of West Bengal (Vision 2020, PHED and National Sub-mission for Arsenic and Fluoride Removal). The outcome will be inclusive, gender-responsive, and sustainable drinking water service delivered in Project districts:

(i) **Output 1: Drinking water infrastructure constructed and upgraded.** The project will provide a minimum 70 liters per capita per day (lpcd) potable water through metered household connections on a 24/7 basis to each household in the selected rural areas covered under the project, and potable bulk water at the prescribed national standards to the enroute habitations. The distribution systems will be designed on district metering area (DMA) basis, provided up to the household level, including community and government institutions such as schools and *Anganwadis*[1], complete with district meters and domestic water meters. Both the bulk as well as distribution systems will be integrated with state-of-art smart water management and monitoring tools, including supervisory control and data acquisition (SCADA) and geographic information systems. Bulk water supply systems will be inter-connected on a grid-based supply system where feasible. PHED will be responsible for operating, maintaining and monitoring the bulk water systems, up to boundary of the *Gram Panchayats*[2], whereas the Gram Panchayats will operate and maintain the respective distribution networks. The *Panchayat Samitis*[3] and *Zilla Parsishads*[4] will be involved in coordinating, technical support and monitoring role at the block and district level respectively; and

[1] An Anganwadi is a typical health care center in rural India.
[2] Village-level administrative authority, the first-tier of the local administrative body of the West Bengal Government
[3] Block-level administrative authority, the second-tier of the local administrative body of the Government
[4] District-level administrative authority, third tier of the local administrative body of the Government

(ii) **Output 2: Institutions and capacity of stakeholders for drinking water service delivery strengthened.** The project will strengthen institutional structures and capacity of PHED, the bulk water supplier up to the GPs, and project GPs - for efficient and sustainable drinking water service delivery. It will support and enable them to conduct web-based water quantity and quality monitoring, electronic billing and collections, meter reading, and accounting. To ensure long-term asset sustainability and service delivery, GoWB will issue a government order defining roles and responsibilities of PHED and project GPs called asset management and service delivery framework (AMSDF) which each project GPs will endorse prior to commissioning of the system. The project will introduce innovative practices and high technology for smart water management to create a model for rural water service delivery and bulk water supply systems for the state and the country. It will provide skill training, and generate employment for about 350 locals, of which 33% minimum are expected to be females. It will support the project GPs in creating public awareness on water, sanitation and hygiene (WASH), and benefits and opportunities arising from the project. It will also support the state to strengthen water and sanitation safety planning, develop regulatory framework and piloting for fecal sludge (or septage) management in West Bengal.

4. WBDWIP targets three districts: North 24 Parganas districts is the most Arsenic-affected district in West Bengal; Bankura is heavily affected by Flouride, and East Medinipur is affected by Salinity. These districts are also one of the most water-stressed districts in West Bengal as they are reliant on depleting groundwater sources. Overall, the Project is intended to meet the requirements of “VISION 2020”, endorsed by the GoWB and in line within the guidelines and implementation frame-work of NRDWP.

5. In line with the national objectives, GoWB has decided to consistently ensure the availability of safe and acceptable drinking water supply in sufficient quantity to the district of Bankura, which has been affected by Fluoride contamination (10 of the 22 Blocks in Bankura are affected by Fluoride contamination). The need for comprehensive piped water supply was necessitated on account of the absence of reliable[5] and sustainable ground water sources[6], poor coverage of piped water supply and also in the backdrop of social backwardness and high tribal population[7].

6. Based on the water quality test results and analysis, it may be inferred that pattern of fluoride contamination in the district varies from being severely affected to blocks which remain unaffected. A matrix has been framed to separate out the Blocks which are critically affected by fluoride contamination from those which are only moderately affected or unaffected. The details of the severity of the Blocks affected by fluoride contamination within Bankura is given in **Table 1.**

[5] As per the Central Ground Water Board Report, the blocks in the western part of the district have hydro-geological formations, which are unsuitable for large scale water abstraction.

[6] An assessed 4.6% of rural households in Bankura have treated tap water as per the District Census handbook for Bankura-2011.

[7] An estimated 33.5% of rural population are Scheduled Castes and 11.5% belong to the Schedule Tribes as per the District Census handbook for Bankura-2011.

Table 1:Severity of Blocks Affected by Fluoride Contamination

Sr. No	Fluoride Contamination	Name of Blocks	Number of Blocks
1	Critically affected	Bankura-II, Barjora, Chhatna, Gangajalghati, Hirbandh, Mejhia, Raipur, Saltora, Simlapal and Taldangra, Indpur,	11
2	Moderately affected	Bankura-I, Indus, Khatra, Onda, Sarenga and Sonamukhi	6
3	Un-affected	Bishnupur, Joypur, Kotulpur, Patrasayer and Ranibundh	5
Total Number of Blocks			**22**

7. Based on the various investigations and lithological study (as provided in the Central Ground Water Board brochure), the blocks in Bankura can be categorized with respect to ground water potential to make an even comparison on the water security scenario. The CGWB in its ground water brochure has indicated 3 major issues related to Bankura district, namely: (i) fluoride contamination (ii) iron concentration beyond permissible limit and (iii) declining ground water levels. To make a fair assessment of the criticality of the blocks, it is imperative that a broader framework be prepared and emphasis be provided to the blocks which are severely water stressed.

Table 2: Groundwater Potential of Blocks in Bankura

Sr. No	Ground Water Potential	Name of Blocks	Number of Blocks
1	Poor	Bankura-I and II, Chhatna, Gangajalghati, Hirbundh, Indpur, Khatra, Mejhia, Onda, Ranibundh,Saltora, Sarenga	12
2	Poor to medium	Joypur, Patrasayer, Raipur, Taldangra,	4
3	Medium to High	Barjora, Bishnupur, Indus, Kotulpur,Simlapal, Sonamukhi	6
Total Number of Blocks			**22**

Source: Central Ground Water Board

8. Presently, the demand of the rural areas within the fold of the selected block of Indpur(henceforth referred as project area) is met from ground water and sub-surface sources. With increase in population, and increase in ground water withdrawal (for agricultural and drinking water purposes), the ground water resources are getting depleted. Also, in select areas, the ground water is affected by fluoride contamination.

9. Primarily the prioritization and appraisal of the WS Scheme is based on the Preliminary Project Report prepared by the PHED, as a part of its endeavor to provide Piped Water Supply to the rural areas as per the plan outlined in “VISION-2020”. The Indpur block has been prioritized by PHED for comprehensive coverage with surface based WS Scheme and is proposed for implementation under the WBDWSIP funded by ADB. The objective of the subproject is to provide sustainable water supply at a rate 70 liters per capita per day (lpcd) to each household in all habitations in the Indpur block. A detailed description of the components is provided in Section III.

B. Purpose of the Initial Environmental Examination Report

10. 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 Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Water Supply (**Appendix 1**). Then potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. Thus, this initial

environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment category B projects.

11. This IEE is based on the preliminary project report prepared by PHED, and a technical due diligence report prepared by the Project Preparatory Technical Assistance (PPTA) team and finalized during implementation stage by the contractor to reflect any changes and latest subproject designs zone wise. The IEE was based mainly on field reconnaissance surveys and secondary sources of information as well as stakeholder consultations. Field monitoring (environmental) survey was conducted as part of the environmental management plan (EMP) to establish the baseline environmental conditions prior to commencement of civil works by the contractors. The results are reported as part of the environmental monitoring report and forms the basis to ensure no degradation takes place during subproject implementation. Stakeholder consultation has been considered as an integral part of the IEE.

C. Report Structure

12. This Report contains the following ten (10) sections including the executive summary at the beginning of the report:

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

II. DESCRIPTION OF THE PROJECT

A. Project Area

13. Proposed project area falls in Bankura district of West Bengal.Bankura is located in the western part of the State of West Bengal. The District Bankura is bounded by latitude $22^0$38' N and longitude $86^0$36' E to $87^0$47' E. The Damodar river flows along the northern boundary of the district. The district is bounded by Bardhaman in the north, Purulia in the west and Paschim Medinipur in the south.

14. The total area of Bankura district[8] is 6882 km^2. As per the latest Census data (2011), the population of the district[9] is 3,596,674. It is the 3rd least populated district in West Bengal (After Alipurduar and Purulia)with Population Density of 523 persons/km^2. The district has 22 Panchayet Samitis[10], with 190 Gram Panchayats[11], consisting of 3823 Villages and 6638 habitations.

15. The total number of urban centers is 12, of which 3 are Municipalities (Bankura, Bishnupur and Sonamukhi), and the remaining 9 are Census towns[12], (Khatra, Ledisol, Jhanti Pahari, Kotulpur, Simlapal, Raipur Bazar, Ghutgarya, Barjora and Beliatore).Bankura district has 22 Blocks, divided into 3 Sub-divisions, namely Bankura Sadar, Khatra and Bishnupur. The details of Blocks within each Sub-division and the Municipalities are tabled below:

Table 3: Administrative Division of Bankura

Sr. No	Sub-Division	Block Details	Municipality
1	Bankura Sadar	Bankura-I, Bankura-II, Barjora, Chhatna, Gangajalghati, Mejia, Onda and Saltora	Bankura
2	Khatra	Indpur, Khatra, Hirbandh, Raipur, Sarenga, Ranibundh, Simlapal and Taldangra	-
3	Bishnupur	Indas, Joypur, Patrasayer, Kotulpur, Sonamukhi and Bishnupur	Bishnupur and Sonamukhi

16. Communication Network and Connectivity. The critical importance of a road network and connectivity to the inhabited villages and in building up of a comprehensive piped water supply network is of paramount importance, considering the need to implement and maintain a sustainable water supply system. While a good road network is appropriate to gain accessibility to the various habitations, a rail network normally creates impediments in the laying of pipeline across them. Bankura does not have an exhaustive rail network. However, it is well connected to Howrah (approximately 235 km) Bardhaman and Asansol.

17. The subproject component locations are in the Indpur block. Total population of selected project block (hereinafter referred to as the Project area) is 156,522, all of which were rural as

[8] As per http://bankura.gov.in/census.htm.

[9] District Census Handbook-2011.

[10] The Panchayat Samiti is the rural localself-government system at the block level. They form the middle level of the Panchayati Raj Institutions in India. It acts as a link between Village Panchayats (Gram Panchayats) and Zila Parishad (District council). Each district is divided into a number of blocks and each block consists of a number of adjoining villages (Gram Panchayat). For each block again there is a Panchayat Samiti.

[11] Gram Panchayat is the organization of elected members of Gram Sabha of the village. A Gram Sabha consists of members that include every adult of the village or Gram.

[12] Census Towns (CTs) are rural pockets with (a) A minimum population of 5000 (b) where, at least 75% of the male main working population engaged in non-agricultural pursuits and (c) have a density of population of at least 400 per km^2.

per 2011 census. The total project area is 302.60 km^2 which is totally rural area. Indpur CD Block spreads over from the central parts of the district to the western border with Purulia district. It belongs to the uneven lands/ hard ring rock area. The soil is laterite red and hard beds are covered with scrub jungle and sal wood. Block is bounded by Chhatna and Bankura I Blocks on the north, Onda and Taldangra Blocks on the east, Khatra and Hirbandh CD Blocks on the south and Puncha CD Block, in Purulia district, on the west. The project area does have any census town but has 7 Gram Panchayats. Details of Project area including Gram Panchayats in each block is shown below:

Table 4:Details of Project Area and Gram Panchayets

Block	Area[13] (km^2)		Number of Gram Panchayats
	Total	Rural	
Indpur	302.60	302.60	7

Source:Census2011

B. Existing Water Supply Situation

18. Incidence of ground water level depletion and intrusion of fluoride in ground water is reported from vast area of the district. High iron concentration in groundwater is also recorded in the district. The water demand is met through (i) Piped Water Supply Scheme (PWSS) with ground / sub-surface water source, conveyed either through direct pumping and or through an overhead tank (OHR) or (ii) spot sources (primarily hand pumps and shallow tube wells). As per information available in the project report of PHED, out of the 283 habitations in the Indpur block, 29 habitations have been covered with PWSS, while the remaining 264 are still uncovered. The Command area of the scheme comprising of the Habitations covered existing PWSS is tabled below:

Table 5: Habitations Covered under Piped Water Supply Schemes

Name of Block	Total Habitations	Habitations Covered under Piped Water Supply Scheme, Based on			Habitations under Piped Water Supply Scheme	Percentage of Total Habitations connected to Piped Water Supply (%)
		Surface Source	Sub-surface Source	Ground Water		
Indpur[14]	283	-	18	11	29	10

Source: PHED

19. In effect, only 10% of the total rural habitations in the block are connected with piped water supply. The impact of ground water abstraction and the associated risks of Fluoride contamination) in the Taldangra block cannot be undermined. In effect, a comprehensive piped Water Supply Scheme is essential to be drawn up with respect to sustainable water sources to effectively mitigate the risks and impact of fluoride contamination.

[13]District Census Handbook-2011: Bankura.
[14]Excludes Water Supply Scheme under Dual Use Solar Pump.

C. Proposed Project

20. For the blocks of Indpur and Taldangra, the raw water will be abstracted from Mukutmanipur Dam, which will be pumped to the proposed 44 Mld WTP. The WTP will then pump treated water to the IBPS from the GLSR at Gobindapur in Indpur block (the said work has been considered under BK/01) and from Gobindpur to IBPS/GLSR at Raghunathpur in Indpur Block.

21. Under package BK/02A, treated water will be supplied to IBPS cum GLSR at Raghunathpur from IBPS cum GLSR in Gobindapur (IBPS and allied works is constructed, at Gobindapur under the said package). The Indpur block has 20 water supply zones.

22. The proposed subproject components under package BK/02A include the following:

Component-A: Construction and Commissioning of the intermediate booster pumping station cum ground level storage reservoirs (IBPS cum GLSR) including Chlorination building, Operators room cum office building, guard room etc. and allied works at Raghunathpur (23.1532 N and 86.8619 E) and intermediate booster pumping station, operators room cum office building, guard room etc. and allied works at Gobindapur (23.0559 N and 86.9338 E) in Indpur block.

Component-B: Transmission mains from (i) IBPS cum GLSR at Raghunathpur to proposed 13 numbers of overhead storage reservoirs (OHSRs) and (ii) IBPS cum GLSR at Gobindapur to proposed 7 numbers of OHSRs- estimated length of approx. 155.48 km, including laying of (rising) mains, valves, pipeline appurtenances including necessary survey and investigation.

Component-C: Construction of 19 overhead storage reservoirs (OHSRs) and associated works within the OHSR premises. Potable water from the IBPS cum GLSR at Raghunathpur and Gobindapur will be pumped to proposed 20 numbers of Overhead reservoirs (19 newly constructed OHSRs and one existing OHSR).

Component-D: Water supply distribution network for an estimated approx.. length of 803.65 km downstream of the 20 numbers of overhead reservoirs including supply, laying and commissioning of the water supply distribution network.

Component-E: Providing of Household service connection including updating the consumer database and providing domestic water meters.

23. Summary of the subproject components are provided in **Table 6.**

Table 6: Proposed Subproject Component under Package WW/BK/02B

Sr. No.	Project Component	Details
1.	Construction of IBPS cum GLSR	(i) Intermediate booster pumping station cum ground level storage reservoir of capacity 1400 KL with chlorination building, operators room cum office building, guard room and other allied works at Raghunathpur and (ii) IBPS & allied works at Gobindapur
2.	Laying of clear water Transmission Mains	Length: approx.. 155.48 km and diameter ranging from 100 to 600 mm
3.	Construction of OHSRs	19 OHSRs of capacity ranging from 300 to 900 KL

Sr. No.	Project Component	Details
4.	Distribution Network	Approx. 803.65 km of distribution network - diameter ranging from 90 mm to 450 mm
5.	Domestic Water Meters	Providing domestic water meters

Source: PHED Bankura

- **Intermediate Boosting Pumping Station (IBPS) cum Ground Level Storage Reservoir (GLSR)**

24. Under package BK/02A an IBPS cum GLSR is constructed along with chlorination building, and rooms for allied works; ground level storage reservoir of 1400 KL is constructed for storage of clear water before pumping to the overhead reservoirs (OHRs) for distribution at Raghunathpur (23.1532 N and 86.8619 E) and IBPS with operators room cum office building, guard room and allied works at Gobindapur (23.0559 N and 86.9338 E). The IBPS-cum-GLSR at Raghunathpur is proposed on a private land parcel that measures 1.23 acres in Indpur block. The proposed land parcel is a vacant plot .

25. No involuntary resettlement impact is anticipated due to construction of IBPS/GLSR at Raghunathpur and the IBPS at Gobindapur.

- **Overhead Storage Reservoirs (OHSRs)**

26. Under the package 02A, 19 OHSRs are constructed for distribution of clear water to the block of Indpur. Existing OHSR at Goaldanga (zone 15) will be renovated. The land selected for the proposed 19 OHSRs with capacities ranging from 300 to 900 kilo liters are all on private-owned land.

27. **Table 7** provides land ownership details and purchase status of the land parcels where OHSRs are constructed. All the identified plots for the OHSRs are vacant plots free of any encumbrances. Hence, no involuntary resettlement impact is anticipated for the proposed construction of the OHSRs on private owned land parcels.

Table 7: Location wise Proposed Overhead Reservoirs with Assessed Capacities and Land status

Zone No.	OHSR Locations	Gram Panchyat	OHSR Capacity (KL)	Northing	Easting	Ownership (Pvt./Govt.) & Purchase Status	Present Land use of the Plot
1	Uttar Kendabona	Hatagram	300	23.264636°	86.790439°	Private, land purchased	Unused Vacant Plot
2	Hatagram	Hatagram	600	23.240380°	86.802184°	Private, land purchased	Unused Vacant Plot
3	Suruliya	Hatagram	300	23.196792°	86.798631°	Private, land purchased	Unused Vacant Plot
4	Bramhandia	Brahmandiha	600	23.176933°	86.782510°	Private, land purchased	Unused Vacant Plot
5	Gottarya	Brahmandiha	600	23.162410°	86.790303°	Private, land purchased	Unused Vacant Plot
6	Chukighata	Raghunathpur	500	23.167546°	86.828423°	Private, land purchased	Unused Vacant Plot
7	Raghunathpur	Raghunathpur	500	23.151271°	86.858074°	Private, Registration under progress	Unused Vacant Plot

Zone No.	OHSR Locations	Gram Panchyat	OHSR Capacity (KL)	Northing	Easting	Ownership (Pvt./Govt.) & Purchase Status	Present Land use of the Plot
8	Chakhaltore	Indpur	450	23.166613°	86.884975°	Private, land purchased	Unused Vacant Plot
9	Kantakuli	Indpur	450	23.171291°	86.909333°	Private, land purchased	Unused Vacant Plot
10	Neyakhir	Indpur	400	23.156737°	86.919410°	Private, land purchased	Unused Vacant Plot
11	Siromonipur	Indpur	400	23.154854°	86.958120°	Private, land purchased	Unused Vacant Plot
12	Moukuri	Indpur	300	23.148535°	86.985539°	Private, land purchased	Unused Vacant Plot
13	Bholarkhap	Gaurbazar	400	23.135612°	86.936724°	Private, land purchased	Unused Vacant Plot
14	Dumurtor	Gaurbazar	700	23.096528°	86.990239°	Private, land purchased	Unused Vacant Plot
15	Goaldanga	Brojarajpur	NA	23.084887°	86.927878°	PHED_ Existing OHR	Unused Vacant Plot
16	Gunnath	Brojarajpur	500	23.088166°	86.965348°	Private, Registration under process	Unused Vacant Plot
17	Jugibaid	Brojarajpur	450	23.066163°	86.958616°	Private, Registration under process	Unused Vacant Plot
18	Tunamara	Bheduasole	400	23.096387°	86.894250°	Private, land purchased	Unused Vacant Plot
19	Saluka	Bheduasole	400	23.136370°	86.882915°	Private, Registration under process	Unused Vacant Plot
20	Golakpur	Bheduasole	600	23.104455°	86.911923°	Private, land purchased	Unused Vacant Plot

Source: PHED ‘

28. As mentioned above existing OHSR at Goaldanga will be utilized for supply of water within Zone 15. Minor repairing work[15] may be required as mentioned below. There is no environmental issue related to renovation of existing reservoir. Demolition waste (if any) or any construction waste will be disposed at low laying area after getting NOC from concerned dept./ local public.

OHSR at Goaldanga (under Pkg BK 02A)covering supply zone -15	Location: Goaldanga village, Brajarajpur G.P. Under Indpur Block Construction year: 2011 Capacity: 250 KL	Civil repairs and rehabilitation, replacement of pipes, connections, electrical and mechanicals parts as required, SCADA control. (Requirement of renovation is not yet finalized)	

[15] Not yet decided whether any repairing work is required or not.

- **Laying of Transmission Mains**

29. Clear water from the GLSRs at Raghunathpur and Gobindpur are transferred to the 20 OHSRs (19 newly constructed and one existing) through approx. 155.48 km of transmission mains. The transmission mains are laid within the RoW of Public Works Department, Government of West Bengal (PWD, GoWB) roads and Gram Panchayat roads; precisely along the shoulder of the roads. Details on the laying of transmission mains is summarized in **Table 8.** The diameter of the transmission mains pipe ranges between 150 -600 mm depending on the road width that vary between 3.75 - 5.5 m. (Black Top). Walk-through along the transmission mains and field visit indicated that beyond the black top, the shoulder of the road is quite wide and the shops are beyond the shoulder of the road (in the market places). There are no road side vendors of kiosks along the road where the transmission mains world be laid. Impacts due to pipelaying activity are assessed and reconfirmed after finalization of detailed design and finalization of alignment of the transmission mains pipelines through detailed measurement surveys. PHED has obtain no objection certificate (NOC) from respective PWD Division for undertaking the construction work on PWD roads and the respective Gram Panchayats for the PMGSY roads **.**

Table 8: Transmission Mains Network Details

Name of the Road	Name of Gram Panchayat	Width of Road (m) BT	Dia of pipe to be laid (mm)	Trench width for laying of Pipeline (mm)	Ownership
Dhaldanga Khatra Road	Veduasole, Indpur	5.5	300, 350, 400, 500	600 to 1000	PWD
Veduasole Raghunathpur Road	Veduasole, Raghunathpur	3.75	150, 200, 250,300,350	300 to 750	PMGSY
Raghunathpur Chowkighata Road	Raghunathpur	3.75	250,300,350	500 to 750	PMGSY
Brambhandiha Indpur road	Indpur, Raghunathpur, Brambhandiha	3.75 - 5.5	150, 200, 250, 300, 350,	300 to 750	PWD
Indpur Dumurtore road	Indpur, Gourbazar, Brajorajpur	3.75	150, 200, 250, 300, 350,	300 to 750	PMGSY

Source: PHED

- **Laying of Distribution Network**

30. The distribution pipelines for supplying clear water from the OHSRs are being laid along the ROW of Gram Panchayat roads. Total length of 803.65 km (after final design) of distribution pipelines are to be laid in Indpur block. No potential temporary impact is anticipated during the laying of distribution pipeline. The diameter of pipeline ranges from 90 to 450 mm depending on the road width that vary between 3.75 to 5.5 meters. **Table 9A** provides details of the distribution network after preliminary design.

Table 9A : Details of Distribution Network under package BK/02A*

Water Supply Zone	Length of DI Pipe (mm)					Length of HDPE (m)				Total
	400	350	300	250	200	200	140	110	90	
Uttar Kenbona	0	0	0	0	25	1165	1241	6594	6454	**15479**
Hatagram	0	0	0	75	1236	2859	7052	15054	27866	**54142**
Suruliya	0	0	0	29	593	3416	2285	6330	18602	**31255**
Bramhandia	0	0	292	1545	1602	2649	4341	11613	14332	**36374**

Water Supply Zone	Length of DI Pipe (mm)					Length of HDPE (m)				Total
	400	350	300	250	200	200	140	110	90	
Gottry	0	22	0	2969	1695	3053	5688	10307	20282	**44016**
Raghunathpur	27	0	0	1208	2798	3057	5507	18958	26839	**58394**
Chakhaltore	61	0	249	0	3938	2462	1077	5695	11265	**24747**
Chukighata	0	19	0	959	0	3914	2961	5069	19148	**32070**
Kantakuli	27	218	794	939	1041	1110	4254	7678	13628	**29689**
Neyakhir	40	181	22	149	0	1390	3662	2965	17475	**25884**
Moukuri	0	0	0	0	25	2548	1481	2611	9571	**16236**
Siromonipur	0	0	0	0	29	1773	2130	6916	16687	**27535**
Bholarkhap	0	0	14	0	1599	3099	4001	13762	16498	**38973**
Dumurtora	0	0	37	319	706	3712	8526	10678	26561	**50539**
Muduna	0	0	0	168	673	3760	2514	12873	17189	**37177**
Jugibaid	0	0	0	25	0	3379	2606	10326	20547	**36883**
Tunamara	0	0	23	81	0	1165	3226	8738	13415	**26648**
Saluka	32	577	0	1675	2066	2576	863	9963	26127	**43879**
Golakpur	0	0	0	405	1814	2468	3299	8053	24103	**40142**
Goaldanga(existing OHR)	0	0	0	822	71	2636	3010	7769	13122	**27430**

Source: PHED, Note- *- As per preliminary design

31. Impacts due to pipelaying activity are assessed and reconfirmed after finalization of detailed design and finalization of alignment of the distribution pipelines through detailed measurement surveys zone wise. Visit to the distribution network locations with PHED engineers indicated that the impact on traffic and roadside business activities (shops, markets), especially in congested areas (eg: Indpur Bangla Bazar, Bheduasole Bazar, Saldiha bazar, Brambhandiha Bazar more and other areas under the block) of the block, are minimized by laying of pipelines with appropriate diameters depending upon the road width**. Table 9B** provides summary of some of the roads through which the distribution pipeline are traversed along with the diameter of pipe being laid and trench width.

Table 9B: Roads wise Laying of Distribution Network

Sl. No.	Road Name	Dia range of distribution pipeline (mm)	Width of trenches (mm)
1	Tungi to Satami	90 mm to 450 mm	900mm to 300 mm
2	Hatagram to Niyasa		
3	Gopaldihi to Bajora		
4	Raotora to PWD Road		
5	Nischintapur to Nuniabaid		
6	Bamni to Gottoria		
7	Gopaldihi to Bajora		
8	Jirra to Deulvira		
9	Moukuri to PWD Road		
10	Bondeuli to PWD Road		
11	Goaldanga to Brajaraupur		
12	Kalachandpur to Balarampur		
13	Gunnath to Dangarampur		
14	Damodorpur to Junbedia		
15	Chakultasahar to Bheduasole		
16	Chakaltora to PWD Road		

Sl. No.	Road Name	Dia range of distribution pipeline (mm)	Width of trenches (mm)
17	Dakshinpairachali to PWD Road		
18	Gourbazer to PWD Road		
19	Kadamdeuli to PWD Road		
20	Gnduara to Raghunathpur		
21	Hutysi to Zilla Parishad Road		
22	Bhatargora to Zilla Parishad Road		
23	Uttarasanboni to Surulia		
24	Niyamatpur to PWD Road		
25	Uttarkendbona to Zilla Parishad Road		

Source: PHED

32. Overhead storage reservoirs (OHSRs) are located in each zone, outside habitations, and pipelines (distribution lines) are being laid along the public roads Location of subproject components are shown in **Figure 1** to **Figure 3A- 3B.**

D. Implementation Schedule

33. The project is being implemented on an item rate contract (Ad measurement contract), with provision of design activity included as part of the contract. Bids invited on December 2018, and the contract was awarded on May 2019. After which contractor has mobilized, detailed designs has prepared zone wise from June 2019, the total period of design and construction is 36 months. After which the Item rate contractor will operate and maintain for a period of 2 years.

E. Present status implementation

34. **Table 10A** provided status of Site Specific Environment Management Plans (SEMPs) and website link of disclosed document.

Table 10A: Status of Submitted SEMPs and Website link

Bankura: Package BK/02A- INDPUR BLOCK			
Components	**Gram Panchayat**	**Name of Village**	**Website link**
Zone 1 (OHR, Distribution)	Hatagram	Uttarkendabona	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z01_O_P.aspx
Zone 2 (OHR, Distribution)	Hatagram	Hatagram	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z02_O_P.aspx
Zone 3 (OHR, Distribution)	Hatagram	Surulia	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z03_O_P.aspx
Zone 4 (OHR, Distribution)	Brahmandiha	Brahmandiha	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z04_O_P.aspx
Zone 5 (OHR, Distribution)	Brahmandiha	Gottayara	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z05_O_P.aspx
Zone 6 (OHR, Distribution)	Raghunathpur	Chaukighata	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z06_O_P.aspx
Zone 7 (GLSR, OHR, Distribution)	Raghunathpur	Raghunathpur	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z7_GLSR_O_P.aspx
Zone 8 (OHR, Distribution)	Indpur	Chakaltor	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z08_O_P.aspx
Zone 9 (OHR, Distribution)	Indpur	Kantakuli	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z09_O_P.aspx

Bankura: Package BK/02A- INDPUR BLOCK			
Components	**Gram Panchayat**	**Name of Village**	**Website link**
Zone 10 (OHR, Distribution)	Indpur	Nayekhir	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z10_O_P.aspx
Zone 11 (OHR, Distribution)	Indpur	Siromanipur	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z11_O_P.aspx
Zone 12(OHR, Distribution)	Indpur	Maukuri	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z12_O_P.aspx
Zone 13(OHR, Distribution)	Gourbazar	Bholarkhap	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z13_O_P.aspx
Zone 14 (OHR, Distribution)	Gourbazar	Dumurtor	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z14_O_P.aspx
Zone 15 (Distribution)	Brajarajpur	Goaldanga	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z15_P.aspx
Zone 16 (OHR, Distribution)	Brajarajpur	Gunnath	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z16_O_P.aspx
Zone 17 (OHR, Distribution)	Brajarajpur	Jugibad	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z17_O_P.aspx
Zone 18 (OHR, Distribution)	Bheduasole	Tunamara	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z18_O_P.aspx
Zone 19 (OHR, Distribution)	Bheduasole	Saluka	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z19_O_P.aspx
Zone 20 (OHR, Distribution)	Bheduasole	Golakpur	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z20_O_P.aspx
Zone 16 (Transmission Main) (OHR & Distribution Main under BK 2B)		Belasuli-Shyamsundarpur	http://wbdwsipmis.wbphed.gov.in/SEMP_BK02A_Z16_CWRM_P.aspx

35. Zone wise present status of implementation upto 31st December, 2020 is mentioned below. Work has commenced in 13 numbers of OHSRs and also for 19 pipe laying zones. About 422.19 km pipeline laying has been completed till December 2020.

36. Upto 31st December 2020, almost 78.0 km of clear water transmission main has also been laid.

Table10B: Construction Status upto December 2020

Zone No.	Location	OHSR work status	Pipe-laying work status
1	Uttarkendabona	Column Concrete completed above Raft	HDPE pipe laid upto 9008 m
2	Hatgram	Raft concrete completed	HDPE pipe laid upto 21023 m
3	Surulia	Column Concrete completed above Raft	HDPE pipe laid upto 21774 m
4	Brahmandiha	Not yet started	HDPE pipe laid upto 25257 m DI pipe laid upto 1333 m **Total= 26,590 m**
5	Gottarya	Tie beam concrete completed	HDPE pipe laid upto 33569 m
6	Chaukighata	First lift Column above Tie beam completed	HDPE pipe laid upto 25981 m
7	Raghunathpur	Not yet started	HDPE pipe laid upto 29123 m
8	Chakaltor	PCC completed	HDPE pipe laid upto 22222 m

9	Kantakuli	Not yet started	HDPE pipe laid upto 20182 m DI pipe laid upto 1314.5 m **Total= 21,496.5 m**
10	Nayekhir	Pedestal Concrete completed	HDPE pipe laid upto 20,349 m
11	Siromanipur	Pedestal Concrete completed above Raft	HDPE pipe laid upto 14712 m
12	Maukuri	PCC completed	HDPE pipe laid upto 7326 m
13	Bholarkhap	Tie beam concrete completed	HDPE pipe laid upto 18965 m
14	Dumurtor	PCC completed	HDPE pipe laid upto 23394 m DI pipe laid upto 808.5 m **Total=24,202.5 m**
15	Goaldanga	**Not applicable** (OHSR Existing)	HDPE pipe laid upto 9217 m
16	Gunnath	Not yet started	HDPE pipe laid upto 12878 m
17	Jugibad	Not yet started	HDPE pipe laid upto 22643 m
18	Tunamara	Raft concrete completed	HDPE pipe laid upto 18313 m
19	Saluka	Not yet started	HDPE pipe laid upto 27378 m DI pipe laid upto 704 m **Total= 28,082 m**
20	Golakpur	Tie beam Concrete completed	HDPE pipe laid upto 33726 m DI pipe laid upto 990 m **Total= 34,716 m**

37. Detail design has been completed and provisionally approved for all the OHSR zones (19 numbers) and 20 pipe-laying zones. Design for clear water transmission main has already been completed and approved.

38. Final design of Transmission main pipeline as below,

Table 10C: Approved design of Clear Water Transmission main

Dia in mm	Pipe Material & Class	Approved Design Qty (Rm)
600	**DI K9**	8486
500		34810
450		0
400		3901
350		11031
300		18462
250		23443
200		10374
150		44981
Total in km:		**155488**

39. Below Table shows approved design status of distribution main pipe line details.

Table 10D: Approved design status of Distribution Network of BK 02A after Final Design

Zone No.	Zone	AS PER HYDRAULICS TOTAL LENGTH(RM)											
		DI-K7 Pipeline length in Rm						HDPE Pipeline length in Rm					TOTAL Length in Rm
		200 mm dia	250 mm dia	300 mm dia	350 mm dia	400 mm dia	450 mm dia	75 Mm dia	90 mm dia	110 mm dia	140 mm dia	200 mm dia	
1	Uttarkendabona	0	37	0	0	0	0	1207	1128	11108	0	0	13480
2	Hatgram	923	0	28	0	0	0	1516	9806	33475	4238	4489	54475
3	Surulia	902	27	0	0	0	0	837	4822	16645	2770	3208	29211
4	Brahmandiha	2061	33	33	0	0	0	434	6446	20088	7986	2676	39757
5	Gottarya	562	3164	379	0	0	0	978	7972	18781	11483	6273	49592
6	Choukighata	523	1341	1808	19	0	0	2258	5731	23572	5287	8366	48905
7	Raghunathpur	1958	0	289	27	0	0	965	10473	24756	10554	5688	54710
8	Chakaltor	249	124	31	0	0	0	2699	3250	19549	1802	5468	33172
9	Kantakuli	1840	261	0	0	0	0	2266	3399	18838	5221	3948	35773
10	Nayekhir	534	15	0	0	0	0	1348	12646	13682	7779	3250	39254
11	Siromanipur	0	27	0	0	0	0	772	2972	15604	2135	4159	25668
12	Maukuri	0	27	0	0	0	0	2298	1969	8259	1526	3548	17627
13	Bholarkhap	263	13	0	0	0	0	183	4852	28447	4398	4564	42720
14	Dumurtore	2941	1188	35	0	0	0	1040	6768	39061	3875	2654	57562
15	Goaldanga (OHSR-Existing)	23	22	0	0	0	0	1187	7618	16826	4475	4673	34824
16	Gunnath	0	2095	22				6699	13914	18664	6435	5165	52994
17	Jugibaid	0	25	0	0	0	0	2550	6159	25657	3163	3010	40564
18	Tunamara	209	1774	23	0	0	0	642	5173	19552	3118	3315	33806
19	Saluka	1454	39	0	0	0	0	2834	5562	23804	3177	4956	41826
20	Golakpur	1765		101				1341	11716	30529	8747	3535	57734
TOTAL		**16207**	**10212**	**2749**	**46**	**0**	**0**	**34053**	**132376**	**426897**	**98169**	**82945**	**803654**

40. Present IEE report considered for all 19 new OHSRs and 20 Pipe-laying zones where work has commenced or to be commenced. Location and land use pattern around the zones presently under physical activity are shown in **Figure 4** below. The distribution and transmission main network, for all 20 number of zones are shown in a single map in **Figure 5** below.

Figure 1: Proposed Subproject Components and Secondary Transmission Main Alignment

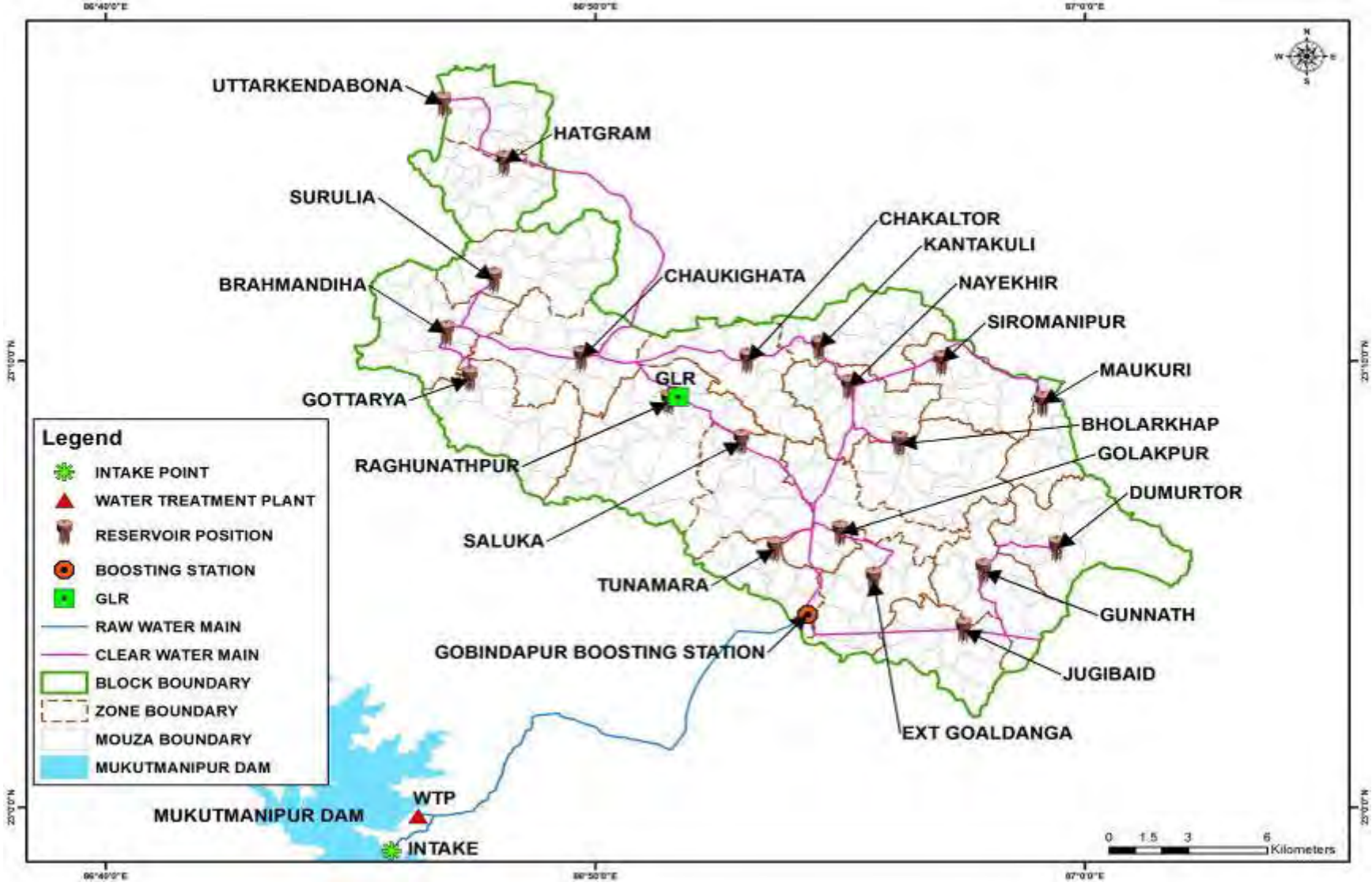


Figure 2: Google Earth Image of the Subproject Components

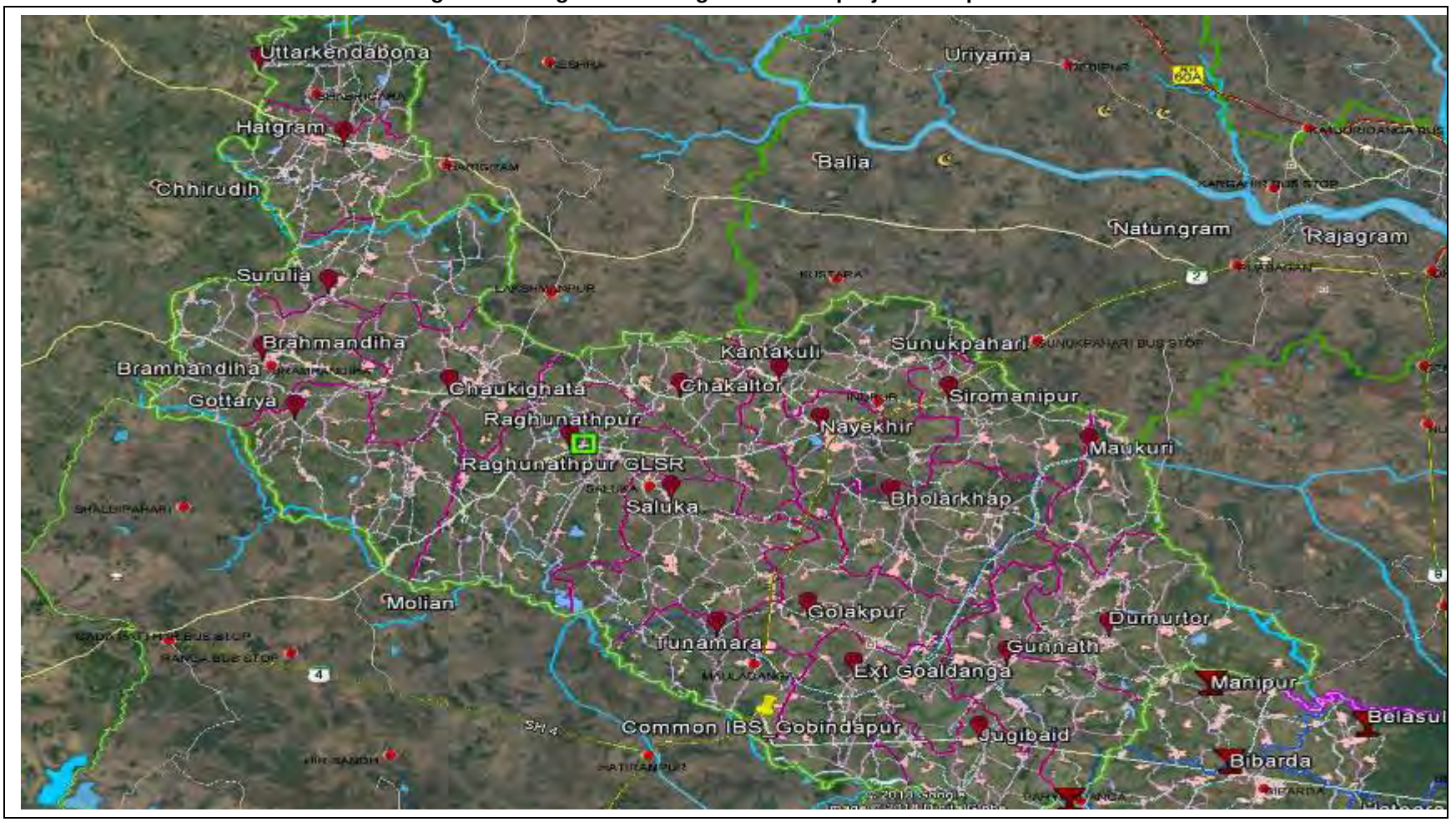


Figure 3A: GLSR cum IBPS at Raghunathpur, Indpur Block

Figure 3B: Proposed Intermediate Booster Pumping Station Site at Gobindapur Village

Figure 4: OHSR Location and land use pattern around reservoir- Google Earth image

Uttarkendbona

Hatagram

Surulia

Brahmandiha

Gottayara

Chaukighata

Raghunathpur

Chakaltor

Kantakuli

Nayekhir

Siromanipur

\Maukuri

Bholarkhap

Dumurtor

Gunanth

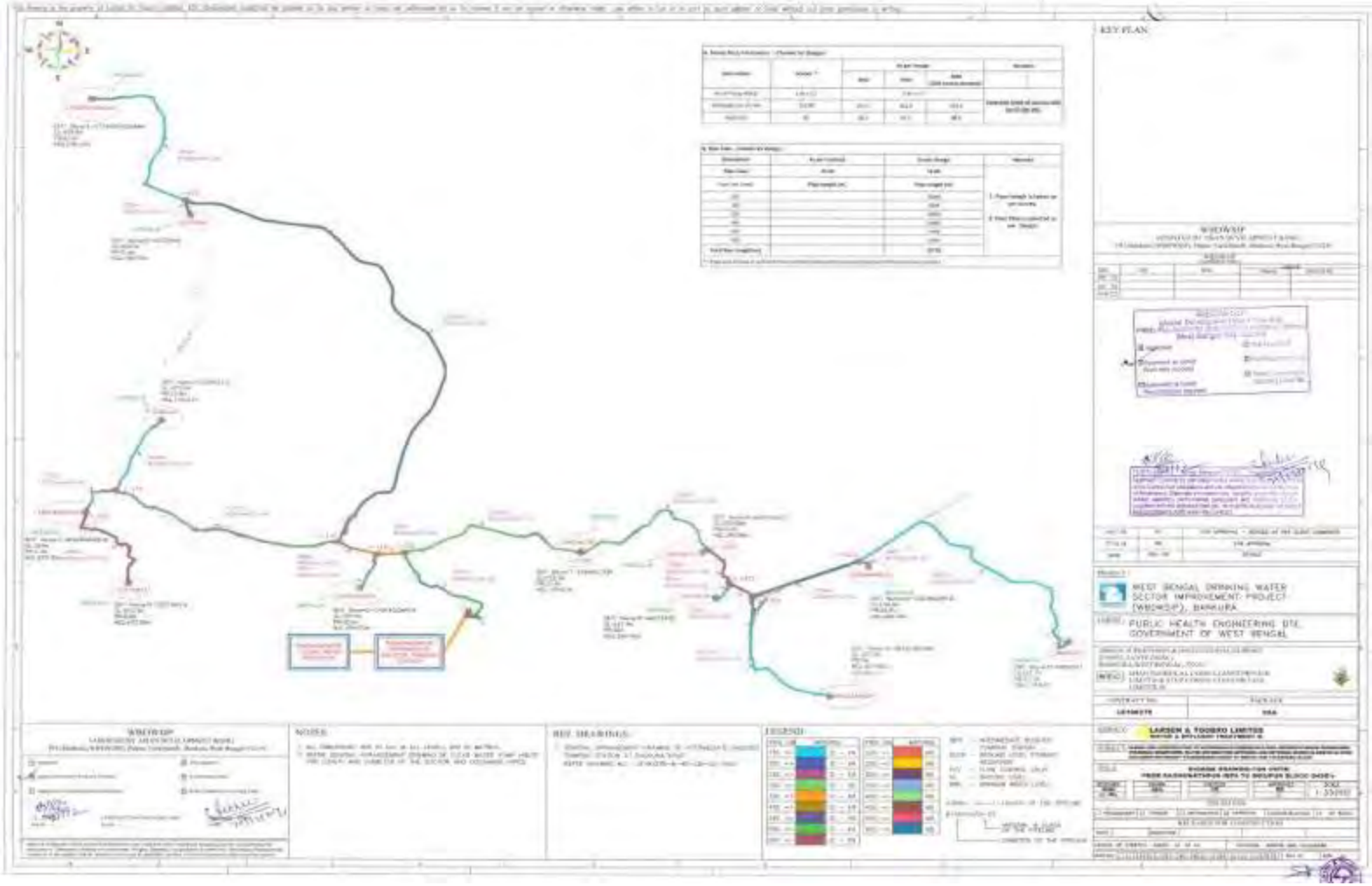
Jugibadh

Tunamara

Saluka

Golakpur

Figure 5: Transmission and Distribution Main Network under package BK 02A



III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

A. ADB Policy

41. 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 ADB investments.

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

(i) **Category A.** Projects could have significant adverse environmental impacts. An EIA is required to address significant impacts.
(ii) **Category B.** Projects could have some adverse environmental impacts, but of lesser degree or significance than those in category A. An IEE is required to determine whether significant environmental impacts warranting an EIA are likely. If an EIA is not needed, the IEE is regarded as the final environmental assessment report.
(iii) **Category C.** Projects are unlikely to have adverse environmental impacts. No EIA or IEE is required, although environmental implications are reviewed.
(iv) **Category FI.** Projects involve a credit line through a financial intermediary or an equity investment in a financial intermediary. The financial intermediary must apply an environmental management system, unless all projects will result in insignificant impacts.

43. **Environmental Management Plan.** An environmental management plan (EMP), which addresses the potential impacts and risks identified by the environmental assessment, has been prepared. The level of detail and complexity of the EMP and the priority of the identified measures and actions are commensurate with the project's impact and risks.

44. **Public Disclosure.** ADB posts the safeguard documents on its website as well as disclose relevant information in accessible manner in local communities:

(i) for environmental category A projects, draft EIA report at least 120 days before Board consideration;
(ii) final or updated EIA and/or IEE upon receipt; and
(iii) environmental monitoring reports submitted by the implementing agency during project implementation upon receipt.

45. **Consultation and Participation.** ADB SPS require borrower to conduct meaningful consultation[16] with affected people and other concerned stakeholders, including civil society,

[16] 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

and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

46. **Grievance Redress Mechanism.** ADB SPS require borrowers to establish a mechanism to receive and facilitate resolution of affected people's concerns, complaints, and grievances about the subproject's performance. The grievance mechanism shall be scaled to the risks and adverse impacts of the subproject.

47. **Monitoring and Reporting.** Borrower shall monitor, measure and document the implementation progress of the EMP. If necessary, the borrower shall identify the necessary corrective actions, and reflect them in a corrective action plan. Borrower shall prepare and submit to ADB semi-annual environmental monitoring reports that describe progress with implementation of the EMP and compliance issues and corrective actions, if any. For subprojects likely to have significant adverse environmental impacts during operation, reporting will continue at the minimum on an annual basis until ADB issues a project completion report.

48. **Unanticipated Environmental Impacts.** Where unanticipated environmental impacts become apparent during subproject implementation, ADB SPS 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.

49. **Occupational Health and Safety.** ADB SPS requires the borrower[17] to ensure that workers[18] 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. In addition, COVID 19 risks and protection measures are pointed out under mitigation measures and EMP.

50. **Community Health and Safety.** ADB SPS 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.

51. **Physical Cultural Resources.** Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS requires that

[17] 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

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

such resources likely to be affected by the subproject are identified, and qualified and experienced experts assess the subproject's potential impacts on these resources using field-based surveys as an integral part of the environmental assessment process. When the proposed location of a subproject component is in areas where physical cultural resources are expected to be found as determined during the environmental assessment process, chance finds procedures included in the EMP.

52. **ADB SPS International Best Practice Requirements.** ADB SPS 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 Guidelines. {IFC's General EHS Guidelines[19] WHO Interim Guidance (and its updates) on Water, Sanitation, Hygiene and Waste management for the COVID 19 virus (**Appendix 19**) and Sector Specific (Water and Sanitation) Guidelines[20]}. These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives.

B. National Environmental Laws

53. **Environmental Assessment.** The Government of India EIA Notification of 2006 (replacing the EIA Notification of 1994), sets out the requirement for Environmental Assessment in India. This states that Environmental Clearance 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.

54. Category A projects require Environmental Clearance from the central Ministry of Environment, Forest and Climate Change (MoEF&CC). The proponent is required to provide preliminary details of the project in the prescribed manner with all requisite details, after which an Expert Appraisal Committee (EAC) of the MoEF&CC prepares comprehensive Terms of Reference (TOR) for the EIA study. On completion of the study and review of the report by the EAC, MoEF&CC considers the recommendation of the EAC and provides the EC if appropriate.

55. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the Environmental Clearance based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in

[19]https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES
20https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES

whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

56. None of the components of this water supply distribution system subproject falls under the ambit of the EIA Notification 2006, and, therefore EIA Study or environmental clearance is not required for the subproject.

57. **Applicable 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 11.**

Table 11: Applicable Environmental Regulations

Law	Description	Requirement
Environment (Protection) Act, 1986 and Central Pollution Control Board (CPCB) Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	**Appendix 2** provides applicable standards for ambient air quality. **Appendix 3** provides vehicular emission norms
Noise Pollution (Regulation and Control) Rules, 2000 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.
Air (Prevention and Control of Pollution) Act, 1981, amended 1987 and its Rules, 1982.	- Applicable for equipment and machinery's potential to emit air pollution (including but not limited to diesel generators and vehicles); - CTE and CTP from WBPCB; - Compliance to conditions and emissions standards stipulated in the CTE and CTO.	All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the WBPCB website (www.wbpcb.gov.in).
Direction of West Bengal Department of Environment under the Air Act, 1981 Direction No. EN/3170/T-IV-7 /001/2009 dated: 10 December 2009	- issued based on a study by WBPCB with help of ADB on air pollution from construction activities - lays out norms for control of air pollution from construction activities - prescribes two sets of norms: preventive measures, and practices to be discarded - failure to comply will lead to legal action, stoppage of work etc., -All construction activities under WBDWSIP shall follow the norms	**Appendix 5** provides the pollution control measures indicated in the direction
West Bengal Inland Fisheries Act, 1984	Act to conserve, develop, propagate, protect, exploitation of inland fish and fisheries. -No discharge of wastewater, pollutants into inland water bodies that may affect fish. -Prohibits conversion of fishery area (any water area, naturally or artificially depressed land, irrespective of ownership, measuring 0.035 hectares (ha) or more, which retains water for more than 6 months and capable of being used as fishery) for	Project sites located in such areas will require prior permission

Law	Description	Requirement
	any other purpose. -prohibits filling up fishery areas to convert into solid land, e. g., for any construction. -Prohibits dividing water area into parts to make any part less than 0.035 ha. -if conversion/ filling up is for development works, prior permission is required	
Municipal Solid Wastes Management Rules, 2016	Rules to manage municipal solid waste generated; provides rules for segregation, storage, collection, processing and disposal.	Solid waste generated at proposed facilities shall be managed and disposed in accordance with the MSWM Rules
Construction and Demolition Waste Management Rules, 2016	Rules to manage construction and to waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C and D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and demolition of any civil structure.	Construction and demolition waste generated from the project construction shall be managed and disposed as per the rules (**Appendix 6**)
Labor Laws	The contractor shall not make employment decisions based upon personal characteristics unrelated to job requirements. The contractor shall base the employment relationship upon equal opportunity and fair treatment, and shall not discriminate with respect to aspects of the employment relationship, including recruitment and hiring, compensation (including wages and benefits), working conditions and terms of employment or retirement, and discipline. The contractor shall provide equal wages and benefits to men and women for work of equal value or type.	**Appendix 7** provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.
West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006	This Act has put restriction on felling of trees in the State unless until permitted by the Tree Officer. Any person desiring to fell a tree shall apply in writing to the tree officer for permission in that behalf. It further defines clauses for planting adequate number of trees, planting in place of fallen/destroyed trees, preservation of trees and adoption of trees.	Tree cutting is required for construction work and laying of rising main. Therefore, prior permission should be obtained
Ancient Monuments and Archaeological Sites and Remains Rules of 1959 Ancient Monuments and Archaeological Sites and Remains (Amendment) Bill, 2017	The Rules designate areas within a radius of 100 meters (m) and 300 m from the “protected property” as “protected area” and “controlled area” respectively. No development activity (including mining operations and construction) is permitted in the “protected area” and all development activities likely to damage the protected property are not permitted in the “controlled area” without prior permission of the Archaeological Survey of India (ASI). Protected property includes the site,	There are no protected properties near project area. However, in case of chance finds, the contractors will be required to follow a protocol as defined in the Environmental Management Plan (EMP).

Law	Description	Requirement
	remains, and monuments protected by ASI or the State Department of Archaeology.	
Hazardous Waste Rules 2016	Responsibilities of the occupier for management of hazardous and other wastes.- (1) For the management of hazardous and other wastes, an occupier shall follow the following steps, namely:- (a) prevention; (b) minimization; (c) reuse, (d) recycling; (e) recovery, utilisation including co-processing; (f) safe disposal. (2) The occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes. (3) The hazardous and other wastes generated in the establishment of an occupier shall be sent or sold to an authorised actual user or shall be disposed of in an authorised disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorised actual user or to an authorised disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to get its hazardous and other wastes treated and disposed of by the operator of a treatment, storage and disposal facility shall give to the operator of that facility, such specific information as may be needed for safe storage and disposal. (6) The occupier shall take all the steps while managing hazardous and other wastes to- 6 (a) contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and (b) provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.	Contractor to comply all the requirements of this Act during construction works.

C. Other Permission from Statutory Authorities

58. Clearances / permissions to be obtained prior to start of construction. **Table 12** 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 specific site construction, and obtain all necessary clearances/permission prior to start of construction. PMU are overall responsible for supervision in getting all clearances and provide details to ADB through semi-annual report.

Table 12: Clearances and permissions required for Construction activities

Sr. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision	Status
1.	Tree Cutting	State forest department/ Revenue	PIU	PIU and PMU	Not required till report period
2	Hot mix plants, wet	Consent to operate	Contractor	PIU	Not required

Sr. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision	Status
	mix plants, Stone Crushers.	under Air Act, 1981 from WBPCB			till report period
3	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from WBPCB	Contractor	PIU	No hazardous material stored
4	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mining	Contractor	PIU	Not required till report period
5	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor	PIU	Not required till report period
6	Temporary traffic diversion measures	District traffic police	Contractor	PIU	Not required but Traffic Management Plan prepared
7	Permits for Pipe Laying along National and State Highways	National and State Highway Authority	Contractor	PIU	Under process

IV. DESCRIPTION OF THE ENVIRONMENT

A Methodology Used for Baseline Study

59. **Data Collection and Stakeholder Consultations.** Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

60. The literature survey broadly covered the following:
- (i) Project details, reports, maps, and other documents prepared by technical experts of the PHED, ADB PPTA Team
- (ii) Discussions with Technical experts of the PPTA team, municipal authorities, relevant government agencies like WBPCB, etc.
- (iii) Secondary data from previous project reports and published articles, and
- (iv) Literature survey on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from Government agencies and websites.

61. **Ocular inspection.** Several visits to the project sites were made during IEE preparation period in 2017-18 to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed project. A separate socioeconomic study was conducted to determine the demographic information, existing service levels, stakeholder needs and priorities.

62. **Field Surveys.** During updation of IEE report (2020) several time field visit, discussion with stakeholder and generation of primary data with the help of respective contractor have been conducted by Environment safeguard team.

B. Physical Resources

1. Location, Area and Connectivity

63. Geographically Bankura district is situated between $22^0$38'' North latitudes and $86^0$36''to $87^0$46'' East longitudes. It is bounded by W and Hugli district to the East, Puruliya to the West, District Barddhaman to the North and Paschim Medinipur to the South. Bankura district is almost triangular in shape with a total area of 6,882 km^2. Its north to south extension is of 112 km. and that of east to west is of 120 km.

64. The population of the district is 3,596,674[21]of which male and female were 1,840,504 and 1,755,788 respectively. It is the 3rd least populated district in West Bengal after Alipurduar and Purulia, with Population Density of 523 persons/km^2.The district has 22 Panchayet Samitis[22], with 190 Gram Panchayats[23], consisting of 3823 Villages and 6638 habitations. The

[21]District Census Handbook-2011

[22]The Panchayat Samiti is the rural localself-government system at the block level. They form the middle level of the Panchayati Raj Institutions in India. It acts as a link between Village Panchayats (Gram Panchayats) and Zila Parishad (District council). Each district is divided into a number of blocks and each block consists of a number of adjoining villages (Gram Panchayat). For each block, again there is a Panchayat Samiti.

[23]Gram Panchayat is the organization of elected members of Gram Sabha of the village. A Gram Sabha consists of members that include every adult of the village or Gram.

total number of urban centers is 12, of which 3 are Municipalities (Bankura, Bishnupur and Sonamukhi), and the remaining 9 are Census towns, (Khatra, Ledisol, Jhanti Pahari, Kotulpur, Simlapal, Raipur Bazar, Ghutgarya, Barjora and Beliatore).

65. Average literacy rate of Bankura in 2011 were 70.95 % compared to 63.44% of 2001. If things are looked out at gender wise, male and female literacy were 81.00% and 60.44% respectively. With regards to Sex Ratio in Bankura, it stood at 954 per 1000 male compared to 2001 census figure of 952. The details of Blocks within each Sub-division and the Municipalities are tabled below:

Table 13: Administrative Divisions of Bankura District

Sr. No	Sub-Division	Block Details	Municipality
1	Bankura Sadar	Bankura-I, Bankura-II, Barjora, Chhatna, Gangajalghati, Mejia, Onda and Saltora	Bankura
2	Khatra	Indpur, Khatra, Hirbandh, Raipur, Sarenga, Ranibundh, Simlapal and Taldangra	-
3	Bishnupur	Indas, Joypur, Patrasayer, Kotulpur, Sonamukhi and Bishnupur	Bishnupur and Sonamukhi

66. **The Indpur block of Bankura District** (hereinafter referred to as the Project area) is under Khatra sub-division. Indpur is located at 23.1667°N 86.9333°E. Indpur CD Block has an area of 302.60 km^2. It has an average elevation of 118 m (387 ft). Indpur CD Block spreads over from the central parts of the district to the western border with Purulia district. It belongs to the uneven lands/ hard ring rock area. The soil is laterite red and hard beds are covered with scrub jungle and sal wood. Indpur CD Block is bounded by Chhatna and Bankura I CD Blocks on the north, Onda and Taldangra CD Blocks on the east, Khatraand Hirbandh CD Blocks on the south and Puncha CD Block, in Purulia district, on the west. It is located 17 km from Bankura, the district headquarters.

67. It has 1 panchayat samity, 7 gram panchayats, 112 gram sansads (village councils), 222 mouzas and 198 inhabited villages. Indpur police station serves this block. Headquarters of this CD Block is at Indpur.

68. As per the 2011 Census of India , Indpur CD Block had a total population of 156,522, all of which were rural. There were 80,556 (51%) males and 75,966 (49%) females. Population below 6 years was 19,430. Scheduled Castes numbered 63,532 (40.59%) and Scheduled Tribes numbered 15,003 (9.59%).The project area does not have any Census town but has 7 Gram Panchayats. Administrative profile of the block is given below:

Table 14: Profile of the Project Area

General Information of Block	Indpur Block
Subdivision	Khatra
Block Headquarter	Indpur
Geographical area (in Sq. km,)	302.60
Panchayat Samity	1
No. of Gram Panchayats	7 (Bheduasole, Brahmandiha, Brajarajpur, Gourbazar, Hatgram, Indpur and Raghunathpur)
No.of Inhabited Village	198

General Information of Block	Indpur Block
No. of Mouza	222
No. of Gram Samsad (Village Councils),	112

69. **Road Network and Connectivity**. The National Highway 60 or NH-60 connects NH-5 (At Balasore) to NH-34 (At Morgram). Within Bankura, it runs through Bishnupur, Bankura, Gangajalghati and Mejia, an approximate distance of 93 km before crossing over to Ranigunj. State Highway-2, 4, 8 and 9 are the major State Highways connecting / interconnecting Bankura, with the rest of the districts. Details of the major [24] National / State Highways within the district and their connectivity as per available information are presented below:

Table 15: Details of Major Roads in Bankura District

Sr. No	National / State Highway Number	Length (km)		Details of Major Blocks which Passing Through
		Total	In Bankura	
1	NH-60	446	93	Bishnupur, Onda, Bankura, Gangajalghati and Mejia
2	NH-60A	84	33	Bankura-II,Bankura-I
3	State Highway-2	323	117	Saltora, Chhatna, Bankura-II, Chhatna, Indpur to SH-4
4	State Highway-4	466	80	Hirbandh, Khatra to Sarenga
5	State Highway-7	289	-	Bishnupur, Joypur, Kotulpur
6	State Highway-8	292	112	Beliatore, Sonamukhi, Patrasayer and Indua
7	State Highway-9	251	82	Durgapur, Beliatore, Bankura, Onda, Taldangra, Simlapal, Sarenga, Raipur

Source: 1) P.W.D. (Roads),

70. Length of Roads maintained by different agencies in the Indpur block of Bankura for the year 2013-14 are given below:

Table 16: Roads Maintained by Different Agencies in the Indpur Block

Name of Block	Length of Road Maintained by Institutions (km)				Total Length (km)
	PWD	Zilla Parishad	Gram Panchayat	PMGSY	
Indpur	41.00	19.40	483.00	48.4	591.80

Source: 1) P.W.D. (Roads), Government of West Bengal; 2)Zilla Parishad, Bankura; 3) Panchayat Samity, Bankura; 4) Gram Panchayat, Bankura

2. Physiography, Topography, Soil and Geology

71. **Physiography.** The district is described as the “connecting link between the plains of Bengal on the east and Chota Nagpur plateau on the west.” The areas to the east and north-east are low lying alluvial plains, similar to predominating rice lands of Bengal. To the west the surface gradually rises which gives way to undulating country, interspersed with rocky hillocks. Much of the district is covered with jungles. The regions of the district could be divided into broad three parts viz. 1) the hilly areas to the west, 2) the connecting undulating tract in the

[24]http://www.pwdwb.in/road/state_highway

middle, and 3) the level alluvial plains to the east. The greater portion of the district consists of a rolling country covered by laterite and alluvium. While metamorphic or gneissose rocks are found to the extreme west, to the east there is a wide plain of recent alluvium. Strong massive runs of hornblendic varieties stretch across the region in tolerably continuous lines, the general strike being nearly east and west. The most characteristic geological feature of the district is the area of laterite and associated rocks of sand and gravel. At some places one finds hard beds of laterite. At other places, it is decomposed and reorganized. Locally, the ferruginous rock is called kankar. The calcareous concretions, commonly used as the sources of lime, are known as ghutin. The Gondwana system is represented in the northern portion of the district, south of the Damodar, between Mejia and Biharinath Hill. The beds covered with alluvium contain seams of coal belonging to the Raniganj system.

72. Indpur block falls in the category of hilly terrain of Bankura district. Land relief of the block ranges from 81 to 182 metre, land slope of the block towards south-eastern part.

73. **Topography**. The highest elevation of the district (Biharinath) from mean sea level is 448 metres.Topographically the district of Bankura is divided into 6 micro regions viz.:

(i) Main Bankura Upland: characterized by undulating terrain with many hills and ridges along the north-western boundary of the district and having a gradual descent from the Chhatonagpur plateau.
(ii) Bankura Upland: continuation from the main Bankura Upland over a small tract in the south-east corner.
(iii) Bankura–Bishnupur Radh Plain: the elevation rises gradually with undulating topography but abruptly in hilly tract towards the west extending between the western hilly tract and eastern alluvial plains. The hillocks ranges in the region from 90 m to 180 m.
(iv) Patrasayer Plain: a fertile plain with a gradual slope towards the south-west located in the north-east part.
(v) Silai Plain: a plain with few undulations in the west extending to the south-central part.
(vi) Middle Kasai Basin: mainly a plain shaped by the Kasai river which flows from north-west to south-east and covers the north-western part of the district.

74. There are three distinct geomorphic units with characteristic morphological assemblages in Bankura. These are:

(i) **The Hilly Terrain in the West**: the terrain consists of crystalline rocks of Archean age, characterized by hillocks, low ridges and valleys. Susunia Hills (493m) and Biharinath Hillas (447.8m) have the highest surface elevation of the unit. There are other small hills such as Mejhia Karo around Gangajalghati block and in other blocks e.g. Khatra, Ranibundh, Raipur. The average elevation of these hills ranges between 100 – 150m above mean sea level. The entire geomorphic unit is the continuation of Chotonagpur plateau.
(ii) **The Eastern Plain:** the eastern part of the district comprising the blocks of Bishnupur, Kotulpur, Indus etc. is flat land which promotes intense cultivation. The surface elevation of this unit ranges between 10-50m above mean sea level with a gentle slope. At places, the flat land shows dissected topography and is devoid of natural swamps or lakes.
(iii) **The Marginal Undulating Tract:** this is relevant in the central part of the district where hilly terrain of the western part slowly merges into plain alluvial land. This

geomorphic unit is favorable for the growth of forest. The morphology of this unit presents a highly dissected topography where the average surface elevation is of the order of 100m above mean sea level.

75. Indpur Block is covered by buried pediment shallow (Baid) of lateritic undulating land. Buried pediments are capped by 1.5 to 15 meter weathered material consisting of Precambrian crystalline like granite gneisses, anorthosites, epidiorites, paraschists and gondowana sediments like sandstone. Dissected Lateritic upland (lower) is not found in this block. Pediment (Tanr) patches are present in the western part near Brahmandina- Rampur settlement, comperatively small patches are scattered on southern paret and also in the eastern part of the block. Mesa and Butte structure are visible in small patches of which the prominent one is found near Bhalukbasa on the west.

76. No significant river flows through this block. The only river Silabati flows touching the border between Khatra and Indpur over the south western part This block is criss crossed by numerous small streams and gully erosion is quite prominent. All buried pediment medium patches are covered with valley fill (Bahel). Stream shows dendrite pattern, radiating from north to southand joins silabati on the south.

77. Check dams are constructed on these streams to retain water. They are mainly concentrated on the south eastern part of the block near Chakaltasahar ,Chattapur, north of Kuchaipal, south of Siromanipur etc. Percolation tanks are plenty in numbers and exist all over the block. Silabati Canal No. 1 irrigates the eastern part of the block operated from Kadamdaulisaheb bandh, Bholarkhap bandh and Sahanabundhreservoir . The canal passes through the settlements namely Tunamar, Goaladanga, Kurpa, Tentulia, Shibarampur and Maukuri on th boarder of block Onda. From Kurpa the canal is divided and turn right towards Taldangra block. Farm ponds are constructed on the stream beds specially on the confluence of the streams which are flowing in numbers in this block.

78. A metaled District road cuts the eastern border of Indpur from Bankura town enters the block and passes through the settlement such as Nayakhir , Indpur, Kantakuli, Balarampur, Natherdanga and enters Purulia district on the west.

79. There are quite a few numbers of lineaments present . These lineaments are radiating out from the eastern part of the block. The longest one is 6.3 km long stretches vertically north south started from Bholarkhap on the north and to near Jugibad on the south. Another parallel lineament east of this runs through Sirishgamal on the north to near Gunnath settlement in south. Lineament situated in the middle of the block stretches between Birchandrapur village on the north to Bisharbera on the south. A parallel lineament exists on the west from Beldangra from the north to Bisharbera on the south. A lineament about 5.8 km long found lying east to west on the northwestern part of the block from Kajalkura to Kurchibedia. Other lineaments 2 to 4 km long are found in various part of the block.

80. **Soil**. Soil of Bankura district can be broadly grouped into three principal types (Groundwater Resources Assessment and Management of the Bankura District, CSME, 1993) viz. (1) Red Soil (2) Alluvial Soil and (3) Laterite Soil.

81. Typical red soil has limited distribution in the south central, south-eastern and south western parts of the district around Bishnupur, Kotulpur and Raipur blocks respectively. These are the red-colored sedimentary soils (i.e. formed from residual parent materials) found mainly

on laterites supporting Sal vegetation. They are also found along the margins of small hills bare of vegetation. Brown soils form a group within this class which are also sedimentary in nature, mainly derived from sandstone, granite gneiss and schist.

82. The alluvial soils, which have wide distribution in the east-central and south-eastern parts of the district, are grouped according to soil association as Damodar-Rajmahal riverine, Damodar flatlands, Damodar highlands etc. The oldestsoil amongst them is unaffected by floods and siltation and shows profile development, whereas the younger or newer alluvial soil, found mostly in the Damodar flatland areas is enriched by silt deposition during floods. Such areas are characterized by high water table, a heavy sub-soil and occurrence of brown concretions at shallow depths.

83. The laterite soils have wide distribution in the south-central to the south-western part of the district. Such soils are distinguished from the red soils by the occurrence of ferruginous concretions in a definite layer, whereas in the red soils they are distributed throughout the profile.

84. According to the textural types, soils of the district can be classified under the following types: (1) Sandy (2) Sandy Loam (3) Loam (4) Sandy Clay Loam (5) Clay Loam (6) Clay. Clay, clay dominated loam and loamy soils are mostly confident to the flood plains of the Damodar and the Dwarkeswar rivers through sporadic occurrences. This type of occurrences is also seen in other small river valleys. The district as a whole is covered generally by sandy loam.

85. On the basis of soil taxonomy the different order of soil, it has been classified as under with the area and also land slope in different order and given below:

Major Soil Types with area (Ha)		
Inceptisol : 10434 Ha	Alfisol : 8252 Ha	Entisol : 795 Ha

86. **Geology.** The geology of Bankura district is characterized broadly in four litho units as under:

(i) Crystalline granite gneiss of Archaean age is exposed in the Western part of the District covering Blocks of Chhatna, Bankura-I and II, Indpur, Khatra, Hirbundh, Gangajalghati, Ranibundh, Sarnga and parts of Saltora and Mejia.

(ii) Sedimentary Sandstone and Shale of lower Gondwana age occupy the northern and north-western parts of the district as small patches, covering parts of Saltora and Mejhia blocks.

(iii) Quaternary alluvium occupies the eastern and south-eastern parts of the district covering Bishnupur, Sonamukhi, Kotulpur, Indus, Joypur and Patrasayer Blocks.

(iv) The marginal tract covering Simlapal, Taldangra, Onda and parts of Barjora and Bishnupur blocks is covered by laterites and Quaternary alluvium underlain by basement rock at shallow depth within 40m.

3. Climatic Conditions

87. The climate of the State is tropical and humid except in the northern hilly region which is close to the Himalayas. The temperature in the mainland normally varies between 24°C-40°C during summer and 7°C-26°C during the winter. The average rainfall in the State is about 1,750 mm. West Bengal is divided in to six agro-climatic zones namely Hill zone, Tarai zone, Old Alluvial and New Alluvial zones, Laterite zone and Saline coastal zone. Birbhum, Bankura,

Puruliya, Paschim Medinipur districts falls under Red Laterite zone and generally undulating, coarse textured, susceptible to erosion, acidic soil.

88. Bankura is generally arid compared to other parts of Bengal. Annual average rainfall in the district is 1400 mm and the temperature varies from a maximum of ≥44°C and minimum of ≤6°C. The climate in the western portion of the district is drier than the eastern regions. From March to May, the hot westerly winds prevail and the day time temperatures are oppressive. The north-westerly winds are frequent during the early part of March (locally called as "Kal Baisakhi") and help to mitigate the excessive heat.

89. The rainy season sets during the month of June and lasts till September, but the climate is pleasant. The rainfall is maintained primarily by cyclonic storms, which originate from the Bay of Bengal, situated to the south-east.The winter sets in November and extends till February and the temperatures during the period are far more pleasant and enjoyable. The rainfall recorded at the various metrological stations, in and around Bankura district during the winter, summer and rainy seasons is tabled below:

Table 17: Rainfall Data Recorded in Various Metrological Stations

Sr. no.	Station	Years recorded	Average Rainfall in Bankura (mm)			
			November to February	March to May	June to October	Average Annual
1	Bankura	43 - 46	50.8	169.7	1207.5	1428.0
2	Bishnupur	21 - 22	50.0	200.9	1234.2	1485.1
3	Gangajalghati	15 - 16	45.2	147.1	1185.7	1378.0
4	Indus	16 - 17	43.2	209.3	1128.8	1381.3
5	Khatra	20 - 21	52.1	159.3	1293.9	1505.3
6	Kotulpur	16 - 17	47.5	172.7	1170.9	1391.1
7	Mejhia	20 - 21	36.3	134.6	1125.7	1296.6
8	Onda	16 - 17	34.8	131.8	1116.3	1282.9
9	Raipur	15 - 16	47.8	203.7	1300.2	1551.7
10	Sonamukhi	15 - 16	51.3	166.6	1119.1	1337.0
Average			**46.0**	**169.7**	**1188.2**	**1403.6**

Source: Metrological stations, in and around Bankura district

90. The project area is characterized by dry tropical climate and receives bulk of rainfall through south west monsoon from June to October. The average annual rainfall is about 1300 mm.

91. The area experiences a tropical climate characterized by hot summer with maximum temperature was recorded upto 46^0C, and moderately cold winter with temperature going down to 9 to 10^0C during January. Humidity in the area is moderately high and ranges from maximum 83 to minimum 52%. Agro-climatic details is given below :

Block	Agrological Zone	Type of Terrain	Block area (ha)	Avg monthly Rainfall (mm)	Elevation		
					Min	Max	Mean
Indpur	**Eastern Highland**	**Undulated**	34974.4	107.3	20	200	110

Source: Metrological stations, in and around Bankura district

92. **Vulnerability to Earthquakes.** As per the report published by National Institute of Disaster Management (NIDM) in 2013, West Bengal experiences earthquakes at a relatively lower frequency of the seismic hazard zonation map. As per the map of Bureau of Indian Standards West Bengal lies in seismic zones II-IV. Entire Bankura district and the project area falls in Zone III, which is classified as Moderate Damage Risk Zone in India.

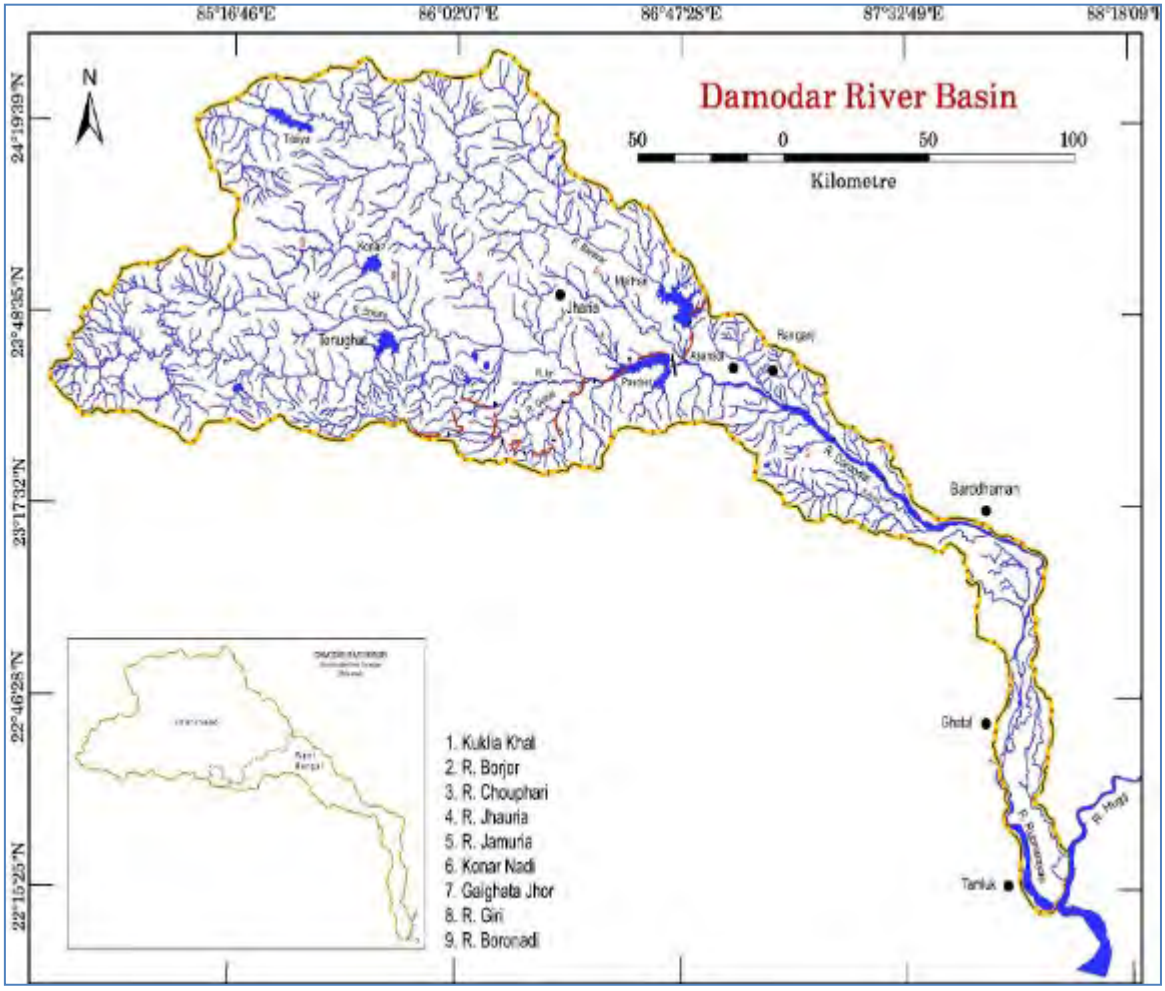
93. **Vulnerability to Drought**. As per the report published by National Institute of Disaster Management (NIDM) in 2013, the districts of Bankura, Purulia, Birbhum and parts of Paschim Midnapore have been affected by drought at regular intervals, mainly due to deficient rainfall and adverse soil conditions. Every summer many parts of Purulia, Bankura, Paschim Medinipur, and Birbhum (covering the south-western part of the state) suffer water shortage with respect to the entire state Surface Water.

4. Surface Water

94. **Rives and River Basin Systems of Bankura**. The drainage basin system of Bankura is controlled primarily by the Damodar, Sali, Dwarekeshwar, Silabati and Kangshabati rivers. All have a south-easterly flow and are almost parallel to each other. A brief discussion on each of the major rivers is outlined below.

95. **The Damodar river** rises in the Palamu Hills of Chhotanagpur in Jharkhand at about 609 mabove mean sea level. After flowing generally in a south-easterly direction for 540 km (240 km in Jharkhand and the rest in West Bengal),it joins the river Hoogly about 50 km below Kolkata. The river's principal tributary, the Barakar, joins it just upstream of the Jharkhand-West Bengal border. The Damodar has a number of tributaries and sub-tributaries, namely, Barakar, Konar, Bokaro, Haharo, Jamunia, Ghari, Guaia, Khadia and Bhera, with Barakar being the prime tributary. The catchment area of the river is about 22,000 km^2 of which about 19,000 km^2 are in uplands and 3,000 km^2 in plains which are of deltaic nature. The catchment is irregular in shape and somewhat elongated in the lower reach. The river slope is 1.86 m/km for the first 241km; 0.57 m/km in the next 167 km and 0.16 m/km in the lowest reach. Due to the particular topography of the catchment area, River Damodar used to inundate annually large tracts of Burdwan, Hoogly and Howrah Districts in the state of West Bengal. To mitigate the recurrent floods, dams were constructed at Tilaiya (on Barakar River In 1953), Konar (on Konar River in 1955), Maithon (on Barakar in 1957) and Panchet (on Damodar in 1959).**Figure 6** shows map of Damodar basin.

Figure 6: Damodar River Basin



96. **The Sali River** is an important tributary of Damodar River that drains the northern part of Bankura district. It originates from a few miles west of Kora hill, halfway between Mejia and Bankura, and flows northwest to south-east and meets the Damodar at Samsar village in Indas Block. The total length of the Sali river is 81 km.

97. **The Dwarekeshwar River.** The largest river flowing through Bankura is the Dwarakeswar River. The river originates from Tilboni hills (445 m), in neighboring Purulia district, entering Bankura near Chhatna. The total length of the river within Bankura is 132 km, and its catchment area is 4430 km2.The Silai (or Shilabati) is the largest tributary of Dwarakeswar and it joins Dwareshwar near Ghatal (in Paschim Mednipur). The two together are known as RupnarayanRiver, which flows through Hooghly. The other tributaries of Dwarakeswar River are theGandheswari, the Kukhra, and the Berai.

98. **The Silabati River (also known as Silai)** The Silabati River (also known as Silai) originates in the terrain of the Chhota Nagpur Plateau (Puncha Block) in Purulia district. It flows in a south-easterly direction through the districts of Bankura and West Midnapore. The length of the river within Bankura is 63 km. There is a small reservoir on the Silabati near Khatra known as Kadam Deuli Dam where a canal from Mukutmanipur-Kangsabati dam meets the river. The major tributaries are Joypanda, Purandar and Chamkakhali.

99. The Kangsabati River (also variously known as the Kasai and Cossye) rises from the Chota Nagpur plateau and passes through the districts of Purulia, Bankura and Paschim Medinipur before draining to the Bay of Bengal. After rising at Murguma near Jhaldain the Chota Nagpur plateau in Purulia district, the river passes by Purulia, Khatraand Ranibandh in Bankura district, and then enters Paschim Medinipur in the Binpur area. It is joined by Bhairabbanki. At Keshpur the river splits into two. The northern branch flows through the Daspur area as Palarpai and joins the Rupnarayan River. The other branch flows in a south-easterly direction and on joining the Kaliaghai River forms the Haldi River, which flows into the Bay of Bengal at Haldia. The total length of the river within the district is 51 km. Major tributaries are Bhairabanki and Tarafeni.

100. **Characteristics of the rivers.** Rivers have played a formidable role in framing the terrain of the district, nourished its art and culture having great archaeological importance Though the rivers are seasonal, the river course in itself allows a huge potential for the sub-surface water to be tapped. The extent of availability can be formalized only with requisite geo-hydrological study. While the need to harness the surface water flows of the rivers can well be understood, it must be appreciated that studies must also involve regarding river water characteristics, particularly of credible importance is the shifting of rivers, which could critically affect any WS Scheme contemplated.

101. **In the Indpur block** there are two rivers flowing in the block, the river Joypanda in the eastern part and the river Silabati along West South boundary.

102. **Surface Water quality**. Raw water quality tests of Mukutmanipur reservoir was carried out by the Public Health Engineering Department. It is being noted from the water quality test results that all the chemical quality parameters are well within the permissible values[25], excepting iron. So, only conventional treatment process is adequate to meet potable water standards. No special or tertiary treatment is required. Surface water quality classification criteria is shown in **Appendix 9.**

103. Iron content marginally exceeds the desirable value, but well within the permissible limit (value detected 0.41 mg/Lit, desirable limit 0.3 mg/Lit, permissible value 1.0 mg/Lit). The chlorine added for disinfection (pre and post) will oxidize a portion of the iron present and in the process, it is expected that the iron content will come down within/ closer to the desirable value**.**

Table 18:Surface Water Quality of Mukutmanipur Reservoir

Sr. No	Parameters	Unit	Desirable Limit as per IS 10,500	Permissible Limit as per BIS10,500	Test Results According to Sample Collection Date		
					4/8/2015	2/9/2015	6/9/2015
1	Temperature	^{O}C	-	-	27	-	-
2	Turbidity	NTU	5	10	95	39.4	37.6
3	pH	-	6.5	8.5	7.6	6.84	6.93
4	TDS	mg/L	500	2000	90	57.6	54.2
5	Alkalinity	mg/L	200	600	34	79.128	74.732
6	Calcium (Ca)	mg/L	75	200	20	-	-
7	Total Hardness	mg/L	200	600	80	56	60

[25] BIS 10500

Sr. No	Parameters	Unit	Desirable Limit as per IS 10,500	Permissible Limit as per BIS10,500	Test Results According to Sample Collection Date		
					4/8/2015	2/9/2015	6/9/2015
	(CaCO3)						
8	Chloride (Cl)	mg/L	250	1000	52	-	-
9	Iron (Fe)	mg/L	0.3	0.3	0.41	0.09	0.08
10	Residual Chlorine	mg/L	0.2	0.2	Nil	-	-
11	Color	Hazen	5	15	56	-	-
12	Odor	-	-	Nil	Nil	-	-
13	Fluoride (F)	mg/L	1	1.5	UR	-	-
14	Magnesium	mg/L	30	100	8	-	-
15	Sulphate	mg/L	200	400	40	-	-
16	Nitrate	mg/L	45	100	18	-	-
17	Aluminum (Al)	mg/L	0.03	0.2	0.002	-	-
18	Manganese (Mn)	mg/L	0.1	0.3	0.16	-	-
19	Phenolic Compound	mg/L	0.001	0.002	BDL	-	-
20	Coliform Bacteria (CFU/100ml), Max	-	NIL/100ml	-	540	-	300
21	Escherichia coli	-	NIL/100ml	-	120	-	-
22	Non Feacal Coliform (CFU/100ml), Max	-	NIL/100ml at 37 ^{O}C	-	320	-	-
24	Feacal Coliform MPN/100	-	-	-	-	-	40

Source: PHED

5. Groundwater

104. **Hydro-geology and Ground Water Potential**. The diverse geology of Bankura district controls the hydro-geological condition of the district. According to Central Ground Water Board (CGWB), in areas underlain by hard crystalline and Gondwana rocks, the groundwater occurs under:

(i) Unconfined condition in the weathered residuum down to the depth of about 15 meters below ground level (mbgl),with maximum to 25 mbgl;

(ii) Semi-confined to confined condition in the fractured zones in the depth span of 30-60mbgl. Resistivity survey shows that in some places a deeper fracture zone is also expected to occur at a depth span of 80-100 mbgl.

(iii) Groundwater in the unconfined condition is generally developed through open wells in the weathered zone and the available discharge can meet the domestic need, but is insufficient for any large-scale development of groundwater. Groundwater from the zone of secondary porosities i.e. weathered zone is developed through bore wells yielding 45-150 lpm.

105. About two thirds of the district is covered by alluvium. Older alluvium and laterites occur in central–southern part of the district. Groundwater exploration carried out in the area indicates that the thickness of the alluvial sediments increases eastward from 36m in the marginal part to 150m in the eastern most part. Potential aquifers exist between 30 and 95 mbgl and the discharge of the wells tapping such aquifers varies from 20 to 124 m^3/hr, with drawdown ranging

from 6 to13 m. Depth to water level in the older alluvium varies from 6 to15 mbgl during pre-monsoon period.

106. The dug-wells in the laterites usually dry up in summer, but those wells which have penetrated through the laterites to underlying bedrock are found to also contain water during the summer months.

107. A number of flowing tube wells exists along the banks of the Darakeswar, Joypanda and Silai rivers. These tube wells are 30-70m deep (30-50 m diameter) and free flow discharge of 23-30 lpm These wells are used for small-scale irrigation.

108. Recent alluvium occupies the eastern and north central parts of the district and extends down to a depth of about 300 m bgl. The thickness of the alluvium increases eastwards. Potential granular zones exist in the depth span of 30-270mbgl, yielding about 80-150 m^3/hr with a drawdown between 6 to 10 m. In general, transmissivity of the deeper aquifer ranges from 272 – 806 m^2/day and storability from 1.019 –x 10^{-3} to 2.1 x 10^{-4}.

109. Long-term water level trend analysis from some hydrograph stations shows either falling (between 0.4 to 1.88 m/yr) or rising (0.7 to 1.39 m/yr) trends in water levels in the pre-monsoon period. During the post-monsoon period, falling (0.05 to 1.34 m/yr) and rising (0.03 to 1.11 m/yr) trends occur.

110. A detailed study on Groundwater Resources Assessment and Management of the Bankura District, West Bengal was carried out by Center for Study of Man and Environment (CSME, 1990-1993) under Department of Science and Technology, Government of India. The sponsored project revealed that:

- Groundwater occurs under unconfined condition in the hard rock areas of the district and the potential aquifers comprise two units viz. a weathered residuum which is 10 to 20 m thick, and an underlying fractured hard rock to a depth of at least 50 m.
- In the laterite and older alluvium, occupying about 30 percent of the district in Onda, Taldangra, Simlapal, Raipur, parts of Bankura, Bishnupur, Sonamukhi block, groundwater occurs under unconfined condition.

111. **Annual rate of water-level fluctuation**. Maximum in Chhatna, Ranibandh, Raipur, Bishnupur, Jaypur, Indus and Kotulpur (4 m to 6 m). There are some patches in Bankura I, Bankura-II, Barjora, Gangajalghati and Khatra, where the fluctuation is between 4 m to 6 m. In the rest of the district the annual water-level fluctuation is 2 m to 4. In central Taldangra water-level fluctuation is negligible.

112. Historic water level data of Central Ground Water for Indpur from CGWB website were noted and analysed to find out the long term water level trend, it was found that water level trend during pre-monsoon show a declining trend 6 cm/yr, presented in **Figure 8** and during Post monsoon period declining trend is 22 cm/yr (**Figure 9**). Hydrograph from the observed water levels were drawn in **Figure 7.**

113. Salient features on estimated resource vis a vis draft of the study area in Indpur block given below :

- Total annual groundwater recharge :6652.11 ham
- Provision for Natural discharge : 655.21 ham
- Net groundwater availability : 5896.90 ham

- Existing groundwater draft for irrigation : 5.10 ham
- Existing groundwater draft for industry :158.66 ham
- Existing groundwater draft for all uses : 163.76 ham
- Provision for domestic & industrial uses in 2035: 313.20 ham
- Net groundwater availability for further irrigation : 5578.60 ham
- Stage of groundwater development : 2.33 %

Figure 7 : Hydrograph of Indpur

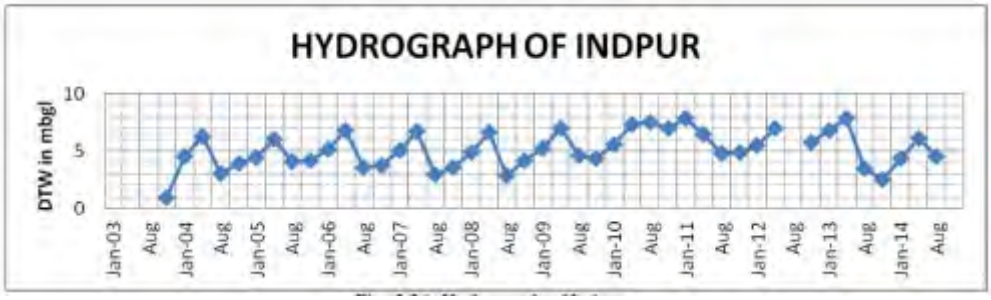


Figure 8 : Pre monsoon Water Level trend of Indpur

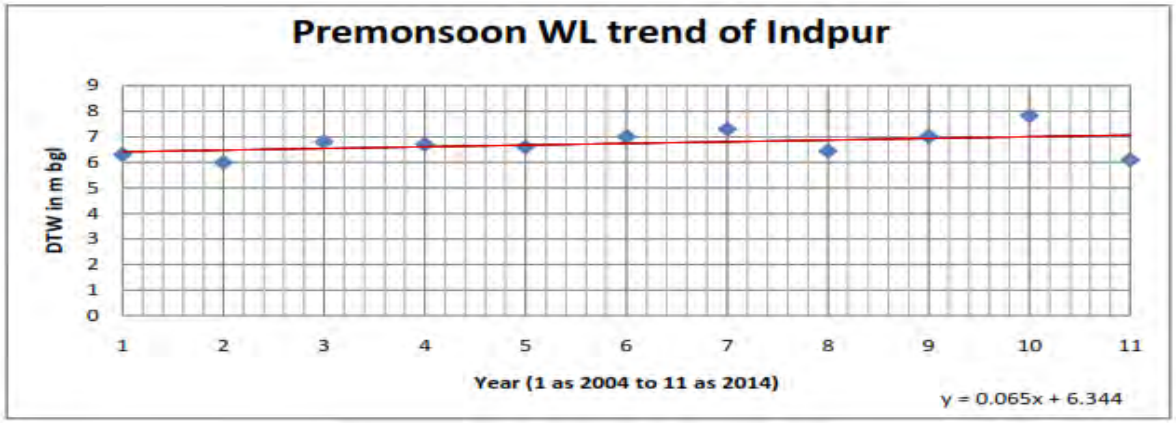
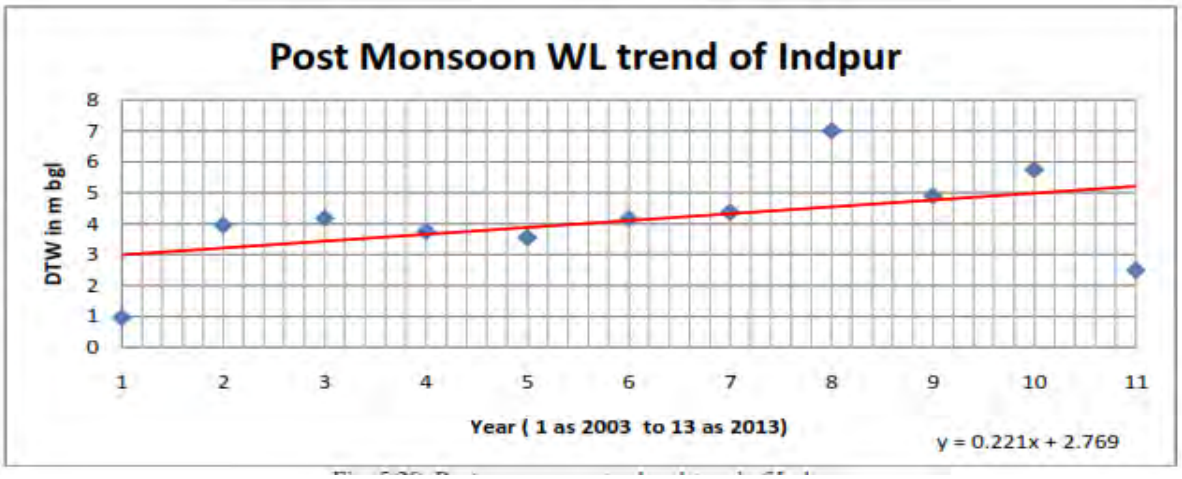


Figure 9 :Post monsoon Water Level trend of Indpur



6. Groundwater Quality Status

114. According to CGWB the high concentrations of fluoride and iron in groundwater area serious problem in the district. Groundwater in 10 blocks namely Taldangra, Simlapal, Raipur, Indpur, Bankura II, Saltora, Barjora, Hirabundh, Chhatna and Gangajalghati is affected sporadically by high concentrations of fluoride in groundwater i.e. more than the permissible limit (>1.5 mg/L). This occurs in different hydro-geological formations namely:

(i) In fractured granite at depths of 40 m to 50 m.
(ii) In older alluvium sediments at depths of 40 m to 50 m.

115. In Bankura district, quite high concentrations of iron in groundwater have been found (up to 9.5 mg/L). Though iron content in drinking water may not affect the human system as a simple dietary overload, but in the long run prolonged accumulation of iron in the body may result in homo-chromatosis, a disease in which tissues are damaged. It is generally recognized that concentrations above 0.3mg/L in household water can lead to staining of clothes during washing and may therefore be unsuitable for use.

116. Groundwater in the upper reaches of the district and flanks is of calcium bicarbonate type, while in the lower reaches, the groundwater is of calcium chloride type with relatively high TDS (CSME, 1993).

117. Blocks affected by fluoride contamination. As per the Water Quality Monitoring System, out of the 22 Blocks a total of 17 Blocks have been identified which have had recurrence of fluoride contamination.

118. **Sources of Fluoride.** Fluoride in the groundwater is geogenic (A.K.Yadav et al.2009). Generally, most groundwater sources have higher fluoride concentrations than surface water. The high concentrations are a result of dissolution of minerals such as fluorite, apatite and biotite from the local bedrock. Low concentrations of calcium also allow increased fluoride concentrations, controlled by precipitation of the mineral fluorite. The geology, chemical weathering and composition of bedrocks/soils/sediments play a major role in fluoride contamination of ground water**.** The Geological Survey of India has also observed that the Precambrian terrain with fractured/shear zones are possible locale for fluoride contamination of groundwater in parts of Purulia[26] and Bankura Districts.

119. Assessment of affected habitations based on IMIS Data. Habitation wise water quality data available from the National Rural Drinking Water Program (NRDWP) site were compiled to get an overview of status of water quality situation with special emphasis on Fluoride concentration. The data compiled for last four years (2013-17) is summarized and tabulated below:

Table 19: Compiled Summary of Fluoride Contamination in Bankura, 2013-2017

Sr. No	Name of Blocks	Number of Samples Tested	Fluoride Concentration				Affected Habitation with Fluoride Concentration	
			> 1.5(mg/L)		1.0 - 1.5(mg/L)		>1.5 (mg/L)	1.0-1.5 (mg/L)
			No.	%	No.	%		
1	Bankura I	1854	2	0.11	29	1.56	2	18
2	Bankura II	2657	25	0.94	95	3.58	19	53

[26]District adjoining Bankura in West Bengal

Sr. No	Name of Blocks	Number of Samples Tested	Fluoride Concentration				Affected Habitation with Fluoride Concentration	
			> 1.5(mg/L)		1.0 - 1.5(mg/L)		>1.5 (mg/L)	1.0-1.5 (mg/L)
			No.	%	No.	%		
3	Barjora	2751	18	0.65	35	1.27	13	20
4	Bishnupur	2368	0	0.00	3	0.13	0	3
5	Chhatna	5250	67	1.28	198	3.77	47	137
6	Ganjagalghati	5007	26	0.52	259	5.17	20	107
7	Hirabandh	1684	10	0.59	53	3.15	10	41
8	Indpur	2651	7	0.26	36	1.36	7	27
9	Indus	2077	2	0.10	2	0.10	2	2
10	Jaypur	2054	0	0.00	0	0.00	0	0
11	Khatra	1842	6	0.33	4	0.22	5	4
12	Kotulpur	1737	0	0.00	2	0.12	0	2
13	Mejia	867	4	0.46	61	7.04	4	23
14	Onda	3378	1	0.03	1	0.03	1	1
15	Patrasayer	1704	0	0.00	0	0.00	0	0
16	Raipur	2462	11	0.45	29	1.18	5	22
17	Ranibundh	2104	0	0.00	6	0.29	0	5
18	Saltora	1969	43	2.18	131	6.65	31	59
19	Sarenga	1425	2	0.14	0	0.00	2	0
20	Simlipal	2149	167	7.77	68	3.16	95	57
21	Sonamukhi	1704	1	0.06	0	0.00	1	0
22	Taldangra	3140	21	0.67	33	1.05	12	19
Total		**52834**	**413**	**0.78**	**1046**	**1.98**	**276**	**600**

Source: IMIS data (from 2013-2017)

120. Summing up the last four years' data, as compiled, it has been observed that out of 52834 water samples tested across the 22 blocks, fluoride concentration above 1.5mg/L was observed in 413 samples (0.78%). Total 276 habitations are affected by high fluoride contamination. These samples were tested mainly from tube-wells. Also, an estimated 1046 (1.98%) samples showed fluoride concentration between 1.0 mg/L and 1.5 mg/L.

121. Based on the water quality test results and analysis, it may be inferred that the pattern of fluoride contamination in the district varies from being severely affected to unaffected. A matrix has been framed to separate out the Blocks which are critically affected by fluoride contamination from those which are only moderately affected or unaffected.

122. Based on the analysis, high fluoride concentrations are noted in 10 blocks, namely Bankura II, Barjora, Chhatna, Ganjagalghati, Hirabandh, Mejia, Raipur, Saltora, Simlipal and Taldangra which are considered as[27] severely affected. The blocks, which are moderately affected are Bankura-I, Indpur, Indus, Khatra, Onda, Sarenga and Sonamukhi. The 5 blocks which are unaffected with fluoride contamination are Bishnupur, Joypur, Kotulpur, Patrasayer and Ranibandh.

123. Apart from fluoride, about 68% of the groundwater samples show iron concentration above the permissible drinking water standard (0.3 mg/L). E-Coli and Coliform counts were also

[27]The rationale for severely affected blocks has been assessed based on the consideration that the % of Samples tested with Fluoride Content > 1.5mg/Liter is more than 0.4%.

present above the permissible limit in samples tested. Details of other quality parameters based on IMIS data (from 2013-2017) is tabled below:

Table 20 : Summary of Water Quality Parameters

Year	Samples Tested	Samples with			
		Coliform >[0MPN/100ml]	E-Coli > [0MPN/100ml]	Fe > 0.3 (mg/L)	Hardness>200 (mg/L)
2013-14	14536	6927	1739	6984	895
	Range	1 –60 MPN/100 ml	0.06 –90 MPN/100 ml	0.31 – 8.70mg/L	602 – 5001mg/L
2014-15	26807	6236	2010	20091	2451
	Range	0.6 –9.0 MPN/100 ml	0.2 –90 MPN/100 ml	0.31 – 9.64mg/L	604 – 4700mg/L
2015-16	9383	4876	962	7374	617
	Range	1.0 –9.0 MPN/100 ml	0.02 –110 MPN/100 ml	0.31 – 9.68mg/L	604 – 1844mg/L
2016-17	2114	722	4	1557	65
	Range	4 –1600 MPN/100 ml	2 –17 MPN/100 ml	0.31 – 8.65mg/L	68 – 12365mg/L
Total	**52840**	**18761**	**4715**	**36006**	**4028**
Percentage of Samples Tested Positive (%)		**35.5**	**8.92**	**68.1**	**7.6**

Source: IMIS data (from 2013-2017)

7. Air Quality

124. West Bengal State Pollution Control Board (WBPCB) monitors air and noise pollution in the State. WBPCB have monitoring stations located at various places across the state covers major cities, district headquarters and industrial locations. Systematic estimation of the air quality in West Bengal started in the year 1998. In its current phase, the WBPCB monitors the air quality parameters in 12 districts during the period October 2012-December 2016.

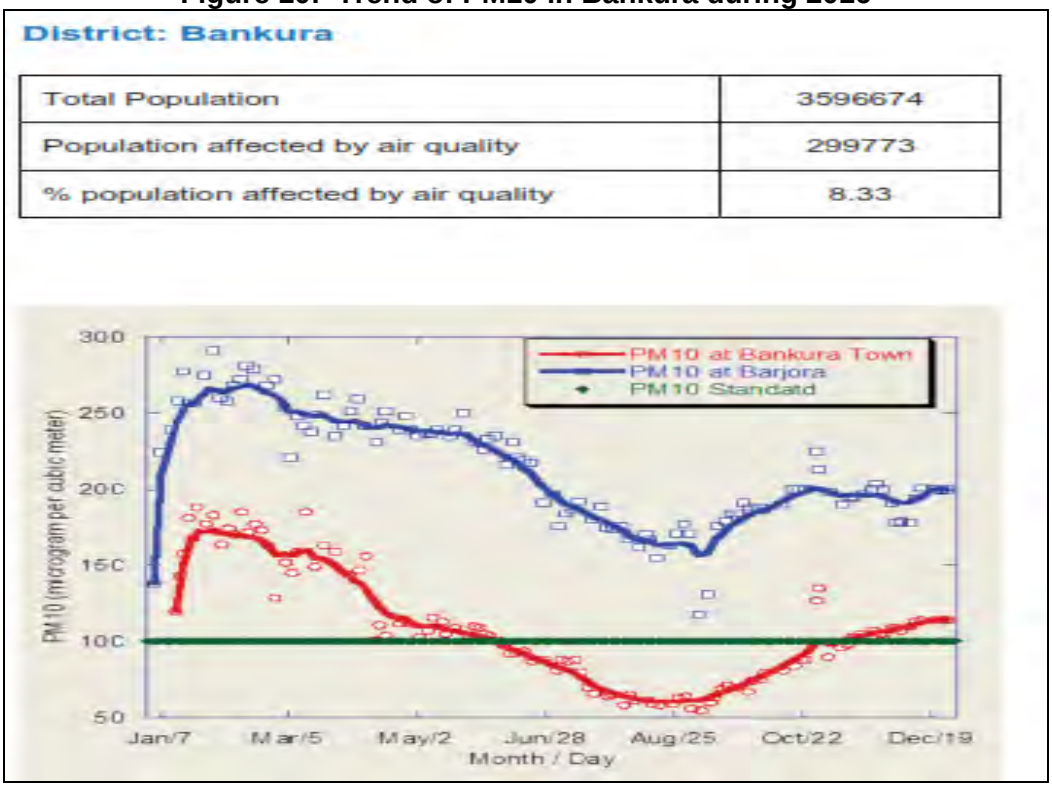
125. West Bengal has good air quality in most places for most of the time. Nevertheless, emissions from industrial sources and road traffic affect air quality in the districts. Around 32 per cent of the state population live in these locations. Both large and small urban settlements are affected by poor air quality. The entire state, throughout the year, hardly ever experience non-compliant air quality for any of the air pollutants other than the Particulate Matters. NO2, the gaseous air pollutant sourced from high temperature industrial burning processes and automobile exhaust emissions, occasionally miss the standard during winter months in the city area.

126. The district wise status of air quality, 2016 trends are reflected for the indicator air quality parameters, namely, PM_{10}, $PM_{2.5}$, NO_2 and SO_2, the first three being such air pollutants in which some of the city areas are non-compliant in the State. Air quality scenario of Bankura district is presented in tabular form in **Table 21** followed by graphical presentation (**Figure 10**) of the annual behaviour of the indicator pollutants during year 2016 and the estimated population exposed to such air quality in those districts.

Table 21: Air Quality in Respect of Four Traditional Parameters in Bankura District and Yearly Days of Non-Compliance

Year	PM10 (µg/m³)			PM2.5 (µg/m³)			SO_2 (µg/m³)			NO_2 (µg/m³)		
	Value	Stan-dard	% days of NC	Value	Stan-dard	% days of NC	Value	Stan-dard	% days of NC	Value	Stan-dard	% days of NC
2013	85	60	35	Not Done	40	Not Done	7	50	0	40	40	0
2014	69	60	13	Not Done	40	Not Done	8	50	0	54	40	0
2015	99	60	43	Not Done	40	Not Done	8	50	0	55	40	0

Figure 10: Trend of PM10 in Bankura during 2016



8. Work site Monitoring -Air Quality, Noise Level and Water Quality

127. **Baseline & During Construction Air, Noise and Surface Water Monitoring.** In order to establish baseline and assess project's construction impact, monitoring has been conducted (during construction) upto November 2020. Monitoring results are presented in below Tables (**Table 22, 23A, 23B and 24**). Location map of sampling points shown in **Figure 11A (Base line)** and **11B (During construction).**

Figure 11A: Baseline Monitoring Locations on Google Earth Image for Ambient Air Quality, Noise Level and Surface Water Monitoring Stations in Indpur Block

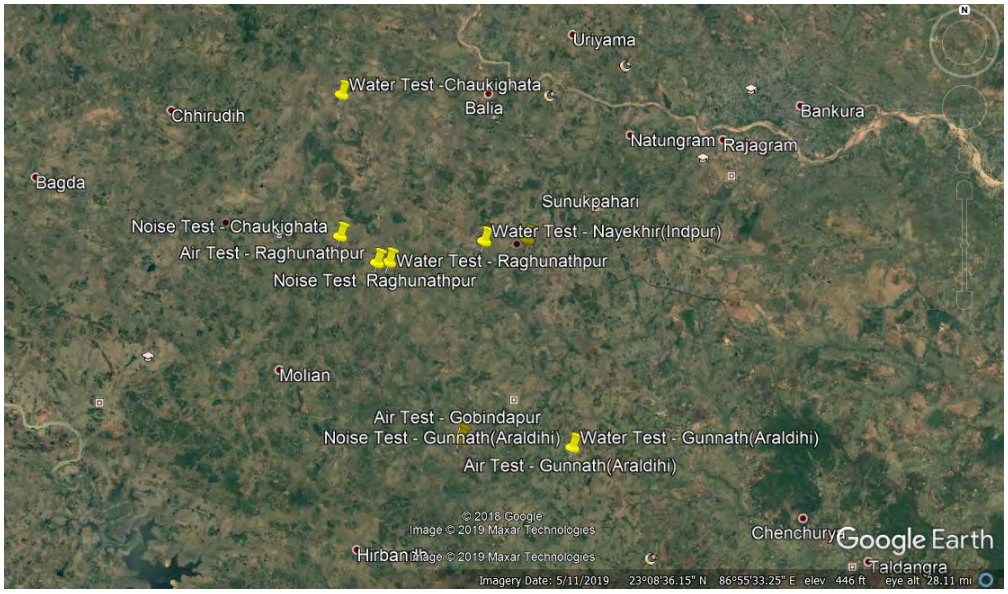


Figure 11B: During Construction Monitoring Locations on Google Earth Image for Ambient Air Quality, Noise Level and Surface Water Monitoring Stations in Indpur Block

Table 22: Ambient Air Quality- Daily Average

Sl. No.	Locations (Zone)	Sampling date	Baseline Monitoring				
			PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
	CPCB STANDARD		**100**	**60**	**80**	**80**	**4.0**
	WHO Standard		**100**	**50**	**50***	**40***	**-**

Sl. No.	Locations (Zone)	Sampling date	Baseline Monitoring				
			PM_{10} ($\mu g/m^3$)	$PM_{2.5}$ ($\mu g/m^3$)	NO_2 ($\mu g/m^3$)	SO_2 ($\mu g/m^3$)	CO (mg/m^3)
Baseline Monitoring							
1	Gobindapur	26.11.19	88.0	26.0	26.3	8.5	0.86
2	Raghunathpur	26.11.19	77.0	20.0	32.6	9.3	0.76
3	Chaukighata	26.11.19	71.0	19.0	27.2	14.3	0.65
4	Nayekhir	26.11.19	93.0	27.0	21.5	5.3	0.42
5	Gunnath (Araldihi)	26.11.19	65.0	18.0	30.8	8.6	0.53
During Construction Monitoring							
6	Chaukighata OHSR	13.10.20	58.4	28.64	37.35	7.56	0.354
7	Hatgram OHSR	12.10.20	60.76	30.33	37.66	7.64	0.319
8	Nayekhir OHSR	14.10.20	71.57	36.22	38.27	8.06	0.516
9	Siromanipur OHSR	12.10.20	65.4	32.01	37.96	7.89	0.446
10	Golakhpur OHSR	15.10.20	66.33	31.17	37.66	7.98	0.482

* Interim Target 2

Table 23A: Surface Water Quality (Baseline Monitoring)

Sr. No	Parameters	Unit	Limit as per IS 2296:1982	Baseline Monitoring				
				Gobindapur	Raghunathpur	Chaukighata	Nayekhir	Gunnath (Araldihi)
1	Turbidity	NTU	-	0.86	0.92	1.4	1.75	2.58
2	pH	-	6.5- 8.5	7.6	7.7	7.4	7.6	7.5
3	Dissolved Oxygen (DO)	mg/L	4.0 minimum	6.81	6.60	6.50	6.60	6.20
4	Biochemical oxygen demand (BOD)	mg/L	3.0	3.0	2.5	2.1	3.1	3.2
5	Chemical oxygen demand (COD)	mg/L	-	12.48	10.4	8.32	12.48	14.56
6	Total Alkalinity	mg/L	-	86	60	36	82	104
7	Total Hardness (CaCO3)	mg/L	-	60	70	42	62	82
8	Chloride (Cl)	mg/L	600.0	<0.05	<0.05	<0.05	<0.05	<0.05
9	Fluoride (F)	mg/L	1.5	<0.05	<0.05	<0.05	<0.05	<0.05
10	Nitrate	mg/L	50	<1.0	<1.0	<1.0	<1.0	<1.0
11	Oil & Grease (O&G)	mg/L	-	<1.0	<1.0	<1.0	<1.0	<1.0
12	Total Coliform Bacteria	MPN /100 ml	500	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected
13	Feacal Coliform	MPN /100 ml	nil	Not Detected	Not Detected	Not Detected	Not Detected	Not Detected

(Sample collection in December 2019)

Table 23B: Surface Water Quality (During Construction Monitoring)

Sl. No.	Parameters	Unit	Contract Package: WBDWSIP/DWW/NCB/BK/02A/2018-19					Surface Water Quality Standards (as per IS: 2296)		
			Results (During Construction)							
			Location: Siromanipur Date of sampling: 12.10.20	Location: Golakpur Date of sampling : 15.10.20	Location: Chaukighata Date of sampling: 13.10.20	Location: Nayekhir Date of sampling: 14.10.20	Location: Hatagram Date of sampling: 12.10.20	Category-B	Category-D	Category-E
1.	pH (max)		7.34	7.52	7.46	7.5	7.49	8.5	8.5	8.5
2.	DO (minimum)	mg/l	4.36	4.86	5.77	5.57	5.16	5	4	--
3.	BOD (3D, 27^0C)	mg/l	8.0	7.0	<5.0	<5.0	5.0	3	--	--
4.	O & G	mg/l	<3.0	<3.0	<3.0	<3.0	<3.0	--	0.1	--
5.	Total Hardness as CaCO3	mg/l	39.6	89.1	39.6	49.5	110.88	--	--	---
6.	Chloride as Cl	mg/l	7.71	33.75	10.61	8.68	17.36	--	--	600
7.	Nitrate as NO3	mg/l	6.5	7.2	6.0	5.4	6.2	--	--	--
8.	Fluorides as F	mg/l	BDL	BDL	BDL	BDL	BDL	1.5	--	--
9.	Total Coliforms	MPN/100 ml	ND	ND	ND	ND	ND	500	--	--
10.	Fecal Coliforms	MPN/100 ml	ND	ND	ND	ND	ND	---	--	--
11.	Turbidity	NTU	33.9	10.88	7.25	13.25	19.79	---	---	---
12.	COD	mg/l	70.56	60.48	40.32	50.4	59.52	---	---	--
13.	Total Alkalinity	mg/l	50.0	94.0	48.0	54.0	98.0	---	---	---

Table 24: Noise Level Data

Sl. No.	Locations (Zone)	Sampling date	Baseline Monitoring	
			Leq (day time) dBA	Leq (night time) dBA
	Standard (Residential)		**55**	**45**
Baseline Monitoring				
1	Gobindapur	25.11.19	59.4	48.6
2	Raghunathpur	25.11.19	60.3	46.5
3	Chaukighata	25.11.19	56.4	39.0
4	Nayekhir	25.11.19	57.8	42.5
5	Gunnath (Araldihi)	25.11.19	56.9	41.5
During Construction Monitoring				
6	Chaukighata OHSR	13/10/20	50.8	55.0
7	Hatgram OHSR	12/10/20	51.9	40.0
8	Nayekhir OHSR	14/10/20	59.9	54.6
9	Siromanipur	12/10/20	57.3	44.7

Sl. No.	Locations (Zone)	Sampling date	Baseline Monitoring	
			Leq (day time) dBA	Leq (night time) dBA
	OHSR			
10	Golakhpur OHSR	15/10/20	55.8	53.5
11	Chakaltor Pipeline	13/10/20	53.5	40.4
12	Golakpur Pipeline	15/10/20	52.5	33.3
13	Bholarkhap Pipeline	14/10/20	53.3	39.4
14	Surulia Pipeline	13/10/20	48.9	37.2
15	Saluka Pipeline	14/10/20	54.6	37.5

128. **Analysis of Environmental monitoring results**

(i) For Indpur Block, PM_{10} and $PM_{2.5}$ results are found to be below the limits prescribed in National Ambient Air Quality Standard and WHO limit. Also, CO, SO_2 and NO_2 concentration levels –typically emitted due to combustion of fossil fuels – were all found within the prescribed limits for the package. During construction period average level of PM_{10} marginally decrease, whereas average $PM_{2.5}$ marginally increase during construction period.

(ii) In case of noise level, while the limits are exceeded when the monitoring was conducted near vehicular roads, however, in other locations the noise levels are found to be within the stipulated limits.

(iii) Water quality results were compared against IS standard for drinking after conventional treatment and outdoor bathing – prevalent use of these water bodies. Based on the results obtained it can be concluded that the source water are suitable for outdoor bathing and drinking after conventional treatment.
Drinking water quality standard is shown in **Appendix 8** and surface water quality classification criteria enclosed as **Appendix 9.**

(iv) "During Construction" air quality, noise level and water quality monitoring is being continued as per Environment Management and Monitoring Plan. All monitoring expenses are borne by contractors from their project Health safety monitoring budget.

C. Ecological Resources

129. The eastern portion of the district forms part of the rice plains of West Bengal. The land under rice cultivation contains the usual marsh weeds of Gangetic plain. Aquatic plants and water weeds are found in ponds, ditches and still streams. Around human habitations there are shrub species such as Glycosmis, Polyantha sub-rosa*, Clerodendron infortunatum*, *Solanum torvum*, and various other species of the same genus, besides Trema, Streblus and Ficus hispida. The larger trees are papal, banyan, red cotton tree (*Bombax malabaricum*), mango (M*angifera indica*), jiyal (*Odina Wodier*), P*hoenix dactylifera*, and *Borassus flabellifer.* Other plants found include Jatropha gossypifolia, Urena, Heliotropiumand Sida. Forests or scrub jungles contain Wendlandia exserta, Gmelina arborea, Haldina cordifolia, Holarrhena antidysenterica, Wrightia tomentosa, Vitex negundo and *Stephegyne parvifolia*.

130. The western portion of the district is higher. The uplands either bare or are covered with scrub jungle of Zizyphus and other thorny shrubs. This thorny forest gradually merges into sal

(*Shorearobusta*) forest. Low hills are covered with Miliusa, Schleichera, Diospyros and other trees.

131. Some of the common trees of economic interest found in the district are: Alkushi (*Mucunapruriens*), amaltas (*Cassia fistula*), asan (*Terminalia tomentosa*), babul (*Acacia nilotica*), bair (*Zizyphusjujuba*), bael (*Aegle marmelos*), bag bherenda (*Jatropha curcas*), bichuti (*Tragia involucrate*), bahera (*Terminalia belerica*), dhatura (*Datura stramonium*), dhaman (*Cordia macleoidii*), gab (*Diospyros embyopteris*), harra (*Terminalia chebula*), imli (*Tamarindusindica*), kuchila (*Strychnosnux-vomica*), mahua (*Bassialatifolia*), palas (*Butea frondosa*), sajina (*Moringa pterygosperma*), kend (*Diospyros melanoxylon*), mango, date-palm, nim, papal, banyan, red cotton tree and jiyal.

132. The project area forms part the rice plains of West Bengal. The land under rice cultivation contains the usual marshy weeds of Gangetic plain. Aquatic plants and water weeds are found in ponds, ditches and still streams.

1. Terrestrial Plants at Project Sites

133. There is no such dense vegetation at the project sites. Most are agricultural land. Some scattered small patches of plants were observed in the road side and adjacent area. There is no such endangered or threatened plant has been observed. The common plants are as following:

Table 25:Common Plants at Project Sites

Name of the Family	Name of the Species
Anacordiaceae	*Buchananialanzan*
	Semicarpusanacardium
	Odinawoodies
Asclepidiaceae	*Calotropis gigantea*
Burseraceae	*Boswella serrata*
Caesalpiniaceae	*Cassia fistula*
Dipterocarpaceae	*Sorearobusta*
Fabaceae	*Butea monosperma*
	Dalbergialatifolia
	Dalbergia sissoo
	Samaneasaman
	Albizialebbeck
Lecythidaceae	*Careyaarborea*
Leguminoceae	*Pterocarpus marsupium*
Mimosaceae	*Acacia catechu*
Myrtaceae	*Syzygiumcumini*
Palmae	*Phoenix acaulis*
	phoenix dactylifera
	Borassusflabellifer
Poaceae	*Dendrocalamusstrictus*
Rhamnaceae	*Ziziphusmauritiana*
	Ziziphuszuzuba
Verbinaceae	*Vitex negunda*
Meliaceae	*Azadirectaindica*
Cornaceae	*Alangiumlamarckii*
Moraceae	*Streblus asper*

2. Aquatic Plants

134. The Reservoir, which are primarily rained have very little vegetal growth. The water surface was cleared of all weeds. There were no visible swamps within the study area. There is no such endangered or threatened plant has been observed. The different types of semi aquatic and aquatic plants were observed during the survey, growing are listed below:

Table 26: List of Macrophytes In and Around Intake of the Mukutmanipur Reservoir

Name of the Family	Name of the species
	Algae
Characeae	*Chara* sp.
	Nitella sp.
	Dicot
Najadaceae	*Najas minor*
	Najasindica
Scrophulariaceae	*Limnophilarepens*
	Monocot
Hydrocharitaceae	*Hydrillaverticillata*
	Vallisneriaspiralis
Aponogetonaceae	*Aponogetonundulatus*
Cyperaceae	*Scirpusarticulatus*

3. Phytoplankton and Zooplankton

135. Mukutmanipur reservoir, phytoplankton diversity was greatly concerned at consumer level of reservoir ecosystem. In this reservoir, chiefly contributed classes were Chlorophyceae, Cyanophyceae, Bacillariophyceae, Charophyceae, Xanthophyceae and Dinophyceae. Enormous growth and density of Cyanophyceaewas due to the richness of nitrogen and phosphates.

136. The Zooplankton of the Mukutmanipur Reservoir consists of Rotifera, Copepoda, Cladocera, Protozoa and Ostracoda. Total 39 genera were recorded which were available in the reservoir during the present study. Of which 12 genera of Rotiera, 12 genera of Copepoda,10 genera of Cladocera,3 genera of Protozoa and 2 genera of Ostracoda contributed to zooplankton density.

4. Common Fish

137. The studies on fish diversity observed the occurrence of about 36 species. The order Cypriniformes was dominant with 15 species, followed by Siluriformeswith 5 species, Channiformes with 4 species, and Mastacembeli -formes and Perciformes with 1 species each. There is no such locally threatened fish species has been observed.

5. Fauna in the Project Area

138. Generally, Rats, Chhachunder, Mongoose, Dogs and Pigs are commonly found near core zone. Snakes and lizards are also common. Different varieties of birds found in core zone are Anjan, Kabutar, Koel, Maina, Sparrows. No endangered species are found near the core zone.

139. Discussion with the DFO and other forest officials of Kanshabati south and Bankura south reveal the fact that the high vegetative growth around the area supports variety of faunal

species in the buffer zone. Prominent wild species include wild black napped hare, spotted deer, wild boar, fox squirrel, mongoose in buffer zone. Amongst birds the bulbul, the white-breasted kingfisher, magpie robin, spotted dove and myna are prominent. Amongst reptiles, several poisonous like cobra, viper, krait and non-poisonous snakes (like boa, rat snakes, green whip, Bronze backed tree snake, etc.) are abound in this area. The garden lizard and monitor lizard are also seen. Variety of butterflies (like common grass yellow/ common jezebel) and insects (such as beetles, spiders, red ants, and flies) are spotted in abundance in the study zone.

6. Forest

140. The total geographical area of the district of Bankura is 6882.00 km^2 and the total area of forest of this district is 1,45,006.56 ha (1450.06 sq kilometer)which constitutes 21.5% of total geographical area of the district coverage. A total area of 7305.76 ha has been declared as reserved forests under section 20 of Indian Forest Act. An area of 43643.87 ha of protected forests area has been covered under 438 proposals for declaring as reserved forests.

141. Bankura district forest is pre dominantly Sal and its associated species and plantation forest of Eucalyptus and Akashmoni. Bankura holds one of the best quality of Sal forest in West Bengal particularly at Radhanagar, Sonamukhi and Patrasayer and the entire Bishnpur sub-divisional jurisdiction. Its flora bio-diversity increased substantially over time. From the geographical, socioeconomic and environmental consideration, the district offers lot of scope for development of this activity. In view of Govt. supports for development of this sector, long term potential for development through credit may be estimated at 2500 hect. for next 5 years with annual phasing of 500 ha.

142. The district is covered under the programmes of National Waste Land Development Board. IWDP is being implementation in 7 blocks viz. Indpur, Chhatna, Saltora, Khatra, Hirbundh, G.Ghati and Ranibandh. Various schemes and projects like NREGS,13th Finance Commission, CSS Elephant Project are being implemented to improve the living conditions of the forest fringe area population. Elephant depredation is a very major problem in Bankura in view of very fast growing elephant population and seasonally moving elephant start straying back in Bankura for longer time and the number of residential elephants have also increased significantly. All-out efforts are being made with the help of local forest protection committee to tackle the problem with a human face to mitigate the problem and it is an on-going process.

143. State Government has implemented social forestry project in the district covering roadside, riverside, railway embankment plantation etc. West Bengal forest development corporation, pulpwood development corporation are also working for forest and wasteland development in the district during the past years. Govt. has stressed for biotic plantation distribution of seeding etc. in the district.

144. The total forest area is spread over 27 territorial Range under three forest divisions. Forest area of Indpur range is 5997.656 Ha (Bankura S division) and that of Taldangra range is 7484.080 Ha (Panchyat S.C Div).In forest areas, majority of the population depend on the forest for various purposes like grazing, firewood, collection of Sal leaves and seeds, mushrooms etc. Since the pressure on the forests is high, some minimum amount of forest degradation has almost become unavoidable. However, the Joint Forest Management (JFM) has taken roots in the district and its contribution for greening and conserving the forests of the district is immense. The JFM aims all round development of forest fringe areas.

145. All the proposed project sites are vacant and there is no notable tree cover, except the IBPS site where there are few trees of local species. Some trees required to be cut for laying of primary transmission main. . The GLSR/OHSRs and other project sites are not in close proximity of reserve forest land. There is sufficient available ROW along the pipe lying routes and no forest area will be affected.

7. Archaeological/Protected Monuments and Other Cultural Properties.

146. There is no notified Archaeological/Protected Monuments and other Cultural properties within project influence area.

D. Economic Development

1. Land Use

147. The distribution of the particular types of land use in Bankura district depends largely on natural factors like the distribution of water and soil. It also depends on the traditional preferences and Government policies of zoning and land use planning decisions. Among food crops, paddy is the most widespread crop. The following table shows the land utilization statistics of the district for the last five years (**Table 27**).

Table 27: Land Use Characteristics of Bankura District

	Land Use Class	Subclass	Sub-class Total (acre)	Class Total (acre)
A.	**Built Up Area**			**177964.10**
	A1.	Urban Settlement	6539.23	
	A2.	Rural Settlement	165937.87	
	A3.	Commercial Area	34.07	
	A4.	Industrial Area	2782.48	
	A5.	Abandoned Airstrip	27.67	
	A6.	Ash Pond	586.69	
	A7.	Archaeological Site	23.53	
	A8.	Area Under Infrastructural Development	271.98	
	A9.	Brick Kiln	541.77	
	A10.	Fine Clay Quarry	94.15	
	A11.	Coal Mining Area (Active/Disused)	132.03	
	A12.	Eco Tourism	11.38	
	A13.	Gravel/Stone Quarry	720.13	
	A14.	Pebble Querry	200.54	
	A15.	Stone Crushers	60.59	
B.	**Agricultural Land**			**1013534.81**
	B1.	Single Crop	603427.63	
	B2.	Single Crop (Boro)	140.60	
	B3.	Single Crop (Rabi)	739.03	
	B4.	More Than One Crop	403360.30	
	B5.	Vegetables	5867.24	
C.	**Forest**			**357869.85**
	C1	Notified Forest Area (As Per SOI Toposheet 1970's)	305200.22	
	C2.	Plantation	50590.64	
	C3.	Plantation(Under Regeneration)	2078.98	
D.	**Waste Land**			**76454.5**

	Land Use Class	Subclass	Sub-class Total (acre)	Class Total (acre)
	D1.	With Scrub	26228.20	
	D2.	Without Scrub	41997.10	
	D3.	Gullied	3214.88	
	D4.	Sandy Area-Riverine	1096.41	
	D5.	Stony Waste/Barren Rocky	3917.92	
E.	**Waterbodies**			**92446.82**
	E1.	**River**	**60767.96**	
	E2.	**Canal**	**3656.71**	
	E3.	**Reservoir/Lakes/Ponds/Tanks**	**28022.15**	
	GRAND TOTAL			**1718270.08**

Source: West Bengal Land Revenue Department.

148. The land use pattern of the **Indpur block** is given below (**Table 28)**

Table 28 : Land Use Characteristics of Indpur Block

Land Use Category	Indpur Block (Acre)
Built Up Area	7016.51
Agricultural Land	54902.05
Forest	9817.01
Waste Land	5777.38
Water bodies	1840.69
Grand Total	**79353.65**

Source: West Bengal Land Revenue Department

2. Industry and Agriculture

149. **Agriculture.** In spite of presence of small and marginal farmers, agriculture accounts almost 70 per cent of the district's total income. Due to land reforms, usage of high fertile and hybrid crops, the district has overcome its poor state as was to be in the past. Only 60 to 65 per cent of the total land area of the district is fertile due to availability of sufficient water supply either by canal or deep tube wells. Agricultural land of the district is of three types- Sali, Suna and Tara or Danga. 'Sali' is suitable for growing of aman rice, 'Suna' for various crops like 'aus' kharif, sugarcane, cotton, tobacco, mustard etc. 'Suna' is also used for production of fine kind of rice. Remaining lands of the district is not cultivable due to undulation of land and morum soil.

150. Agriculture in the district is largely dependent of monsoon. Drought constitutes a major hazard in the district. Intermittent gaps of in precipitation and moisture stress during the monsoon gives rise to serious setback in production during the Kharif, which is the main stay of Agriculture in the district. Farmers are working hard to get more production of crop with their limited area of land. Seed farms are working jointly. Fertilizers are available at every village. The main agricultural crop is paddy and it is produced in the 90.0 per cent of the total cultivated area of the district. Wheat, barley, jute and potato are the other important agricultural products of the district.

151. **Agriculture scenario in Indpur Block**. In 2013-14, persons engaged in agriculture in Indpur Community Development Block could be classified as follows: bargadars 2.82%, patta (document) holders 6.88%, small farmers (possessing land between 1 ha and 2 ha) 10.11%, marginal farmers (possessing land up to 1 ha) 25.60% and agricultural labourers 54.59%.In 2013-14, the total area irrigated in Indpur Community Development Block was 6,290 ha, out of which 3,570 ha was by canal water, 850 ha by tank water, 1,800 ha by river lift irrigation, 40 ha

by open dug wells and 30 ha by other methods. In 2013-14, Indpur Community Development Block produced 3,573 ton of Aman paddy, the main winter crop, from 1,611 ha, 284 ton of wheat from 128 ha and 182 ton of potatoes from 7 ha. It also produced pulses and mustard.[28]

3. Horticulture

152. Land utilization pattern reveals that only 59.5 percent of total land is under cultivation. The district has a vast area of cultivable wasteland comprising 2 percent of total geographical area. A part of that is acidic-alkaline or sand cast. These areas offer scope for further development.

153. On the other hand, the agro-climatic condition of the district is suitable for plantation/horticulture. Mulberry and arjun plantation and horticultural crops such as mango, guava, cashewnut, jackfruit, banana, papaya, citrus fruits etc. can be grown in large scale. There is also scope for development of floriculture, medicinal and aromatic plants in the district. Total area under horticultural crops in the district in around 4775 ha and that under mulberry and arjun plantation is 4606 ha.

154. Area of culturable wasteland in the district is 18846 ha, a major part of which can be utilized for the purpose. There are seven seed farms, one Horticultural Research and Development Centre at Indpur and about two hundred and fifty seed-dealers in the district.

155. Systematic identification of areas to be covered under plantation/horticulture, getting timely supply of planting materials and other inputs like technical advice, marketing arrangement, market information enabling the farmers to fetch remunerative price are the need of the day. The activity will help marginal and small farmers, to generate employment, improve nutritional standards through development of wasteland and soil conservation by peripheral plantation.

4. Animal Husbandry.

156. In animal husbandry, Bankura district occupies a moderate position in the State. Major problem relating to milk production and meat are shortage of green fodder and inadequate supply of improved breed of animals. By promoting fodder cultivation, encouraging farmers towards crop diversification for fodder cultivation, increasing awareness through exposure visits and conducting health camps, the above problem could be overcome. Dairy development is one of the major economic activities in the district.

5. Fishery

157. Pisciculture is an important factor of economic development of Bankura. District Bankura ranked first in pisciculture within West Bengal. The district provides a majority amount of fish production during the last five years, but still due to some unavoidable reasons we regularly find fishes purchased from Andhra Pradesh in most of the district's fish markets. Ramsagar of Bankura district is widely known destination with about 200 hatcheries. Recently a modern fish production unit has been started at Mukutmanipur.

[28]https://en.wikipedia.org/wiki/Indpur_(community_development_block)#cite_note-handbook2014-14

158. Under Rashtriya Sam Vikas Yojana (RSVY), nearly 81 hectors of pond area have been excavated. The scheme has been implemented through fishermen's groups in a participatory mode. The fishermen's groups have been encouraged to share a small part of the produce with the Primary Schools to make it a part of the mid-day meal. This has created a stake of community at large in the project.

159. As far as activities of fishery sector in Bankura are concerned, fish-breeding industries in Ramsagar and surrounding zone requires special mention. Transaction of about ₹. 6-7 crores through spawn production of about 50,000 million numbers in 225 to 250 numbers of hatcheries per annum occurs in that zone. About 1500 to 2000 numbers of workers are directly involved in production system and many other enterprises have grown by co-related activities. Spawn purchasers from different parts of India come here every year to purchase various types of spawn.

6. Industry

160. An overwhelming agro-economic base and low urbanization and industrialization characterize the district of Bankura. The district is broadly divided into two regions – the alluvial plains in the east and the undulating tract to the west. Within the district and even within these regions, the villages vary not only in their geographical features but also in their physical forms and composition their economic and social life patterns. Agricultural activities and most its employment and priority is being accord to its development.

161. The mines and minerals play a vital role in the economy of Bankura. Mines and minerals based ventures have already come up on the stretch of land from Bankura to Saltora. In areas like Chhatna, SaltoraKhatra, Ranibundh, Bankura to Indpur stretch and Raipur, Taldangra, the prospects for setting up of mines and minerals based industries are, indeed bright subject to environmental clearance.

162. The Community Development Blocks like Bishnupur, Sonamukhi, Patrasayer, Indus, Joypur, Kotulpur have been setting up Agriculture based Industries like rice and oil mills. There is scope for more. The climate is also conducive for food processing ventures.

163. The forest wealth of Khatra and Ranibandh areas has always been remarkable. Various types of medicated trees are available in these forests which are largely exported to neighboring districts and also outside the State. There are serious scopes to develop industries in connection with the available medicated trees which will generate employment opportunities for local inhabitants. Due to lack of water and undulated alluvial sandy soil, huge lands are remaining vacant which can be upgraded by using modern techniques. The plants which need little water may be planted in these areas. Moreover, new species of herbs and medicinal plants may be planted in the vacant areas and unutilized forest lands.

164. Cottage and Small Scale Industry constitutes a major segment of district's economy. It provides maximum employment opportunity next to agriculture and this accounts nearly 9 per cent of the total income of the district. This field could be developed more by using modern technology and other infrastructure facilities. Effort has been taken up for the improvement designs, marketing assistance and finance etc. specially in case of brass and bell metal craft, conch shell products, fishing hook, pottery and leather products etc. through different development agencies. Rural people of tribal areas are engaged in Babui Rope making and Sal leaf production.

165. The major large scale industrial unit in the district is Mejia Thermal Power Project. It has got All India recognition and is under the management of Damodar Valley Corporation (DVC). The cottage and small scale industry also constitute the major segment of the district's economy. In case of cottage industry, Bankura plays a dominant role in West Bengal. The silk products of Bishnupur are India famous and are also exported internationally. Tassar, Matka, Garad and Cotton Chadars (scarf) are produced in this district. The total products like the Conch shell products of Bishnupur and Bankura (Sadar) Sub-Divisions are famous in this state. The Brass and Bell Metal products, Wood Carved products, Soft Stone products, Clay products are also produced in the district. The Terracotta toys of the district are world famous and are exported to different parts of the country and also exported to different countries outside India.

7. Infrastructure

166. **Transport.** The major modes of Transport in Bankura is Road and Rail transport. By road, it is connected to the other districts of West Bengal. By rail, Bankura is served by the South-Eastern division of Indian Railways. The existing railway track passing through the district has a direct connectivity to the important nearby places like Kolkata, Asansol, Kharagpur, Ranchi, Tatanagar and Dhanb.

167. In 2013-14, Indpur CD Block had 7 originating/ terminating bus routes. The nearest railway station is 15 km from the CD Block headquarters. The Kharagpur-Adra line of South Eastern Railway passes through this CD Block. There is a station at Bheduasole. State Highway 2 (West Bengal) running from Bankura to Malancha (in North 24 Parganas district) passes through this CD Block.[29]

168. **Trade and Commerce.** Due to lack of adequate industries, trade and commerce of the district didn't flourished as other districts of the state. Jhantipahari, Chhatna, Bankura, Onda, Gangajalghati, Beliatore, Ramsagar, Barjora, Asaria, Pakhanna, Maliara, Kotulpur and Patrasayer are the main centres for transaction in paddy and rice. In Sonamukhi, Raipur and Sarenga jute is purchased and sold. Sonamukhi, Indus and Kotulpur are also the important trading centres of the district where potato and sugarcane are purchased and sold.

169. **Electricity and Power:** In Bankura district, the per capita consumption of commercial energy like coal, petroleum and electricity is very low as compared to the adjoining districts. Since last Five Year Plan, the demand of electricity from the rural area has strongly emerged, out of 3,826 numbers of mouza in the district 2,412 mouzas have declared electrified up to 31.03.2000.

170. The existence of Mejhia Thermal Power Plant within the district and other thermal power plants in Durgapur and Kolaghat can be a boon for the proposed industries for Bankura, as transmission-loss can be minimum due to proximity of the district to these power plants. The electrical grid in the district is well-knit with the existence of two numbers of 132/33/11 KV sub-station and 24 numbers of 33/11 KV sub-station. On the other hand, per capita domestic consumption of electricity is also very low compared to the adjoining districts. Thus, abundance of electricity can be used for setting up of industries in the entire district.197 or 89% of mouzas in Indpur Community Development Block and 141 or 97% of mouzas in Taldangra Community Development Block were electrified by 31 March 2014.

[29] https://en.wikipedia.org/wiki/Indpur_(community_development_block)#cite_note-19

8. Mineral Resources

(i) Coal. The coal mines are situated in Saltora, Mejhia, Barjora and Gangajalghati area. Mejhia itself holds 10 coal mines.
(ii) Copper. The district has a deposit of copper at Damdi, Mukutmanipur, Khatra, Sarong, Nilgiri and Narayanpur. Near Kangsaboti Dam, a 2 Km. long ridge of copper has been found.
(iii) Tungsten. It's a rare metal with vast demand in India and other countries. Chhendapathar and Porapahar have the deposit of this metal in the whole state.
(iv) Cayanite. This is another valuable mineral used in heater, high temperature instruments etc. At Balarampur (near Mukutmanipur), a huge amount of deposit (20 Km. long) has been found.
(v) Cheoline. An excessive deposit of cheoline or fine-clay can be found at JalahariPahar, Dhatara, Malti, Thakurdungry etc. and in many places of Taldangra police station.
(vi) Mica. Bankura is one of the three districts of West Bengal in which mica is available. Almost 100 numbers of pegmatite have been found in Khatra, Indpur, Bankura Town, Gangajalghati and jhilimily though most of them are in the form of either small shaped sheets or powdered form.

171. Education Bankura district had a literacy rate of 70.26% as per the provisional figures of the Census of India 2011. Bankura Sadar subdivision had a literacy rate of 69.56%, Khatra subdivision 69.79% and Bishnupur subdivision 71.60%.

172. In 2013-14, Indpur Community Development Block had 169 primary schools with 12,400 students, 13 middle schools with 1,741 students, 12 high schools with 7,364 students and 13 higher secondary schools with 10,695 students. Indpur Community Development Block had 1 general college with 2,096 students and 254 institutions for special and non-formal education with 8,297 students. Indpur Community Development Block had 7 mass literacy centers

9. Healthcare in Indpur Block

173. In 2014, Indpur Community Development Block had 1 rural hospital, 3 primary health centers and 1 private nursing home with total 55 beds and 5 doctors. It had 27 family welfare subcenters and 1 family welfare center. 7,120 patients were treated indoor and 211,362 patients were treated outdoor in the hospitals, health centers and subcenters of the Community Development Block.

E. Socio Cultural Resources

1. Demography

174. The population of the district[30] is 3,596,674 of which male and female were 1,840,504 and 1,755,788, respectively. It is the 3rd least populated district in West Bengal after Alipurduar and Purulia, with Population Density of 523 persons/km^2. Average literacy rate of Bankura in 2011 were 70.95 % compared to 63.44% of 2001. If things are looked out at gender wise, male

[30]District Census Handbook-2011

and female literacy were 81.00% and 60.44%, respectively. With regards to Sex Ratio in Bankura, it stood at 954 per 1000 male compared to 2001 census figure of 952.

175. Total population of select project block is147,893, all rural as per 2011 census. Scheduled Castes numbered 38,903 (26.30%) and Scheduled Tribes numbered 20,597 (13.93 %) as per 2011 census. Main language spoken in the project area is Bengali.

Table 29 : Demographic Characteristics

Demographic Parameters	West Bengal State	Bankura District	Indpur Block
Total Population (2011)	91,276,115	3,596,674	156,522
Male	46,809,027	1,838,095	80,556
Female	44,467,088	1,758,579	75,966
Geographical area (km^2)	88,752	6,882	116.14
Total households	20,380,315	765,536	31,668
Decadal Growth rate (2001-11) (%)	13.84	12.64	13.57
Sex ratio (Per 1000)	950	954	943
Population Density, (per km2)	1028	523	512
literacy rate (%)	76.26	70.95	67.42
literacy rate (male) (%)	81.69	81.00	79.87
literacy rate (female) (%)	70.54	60.44	55.30
% of urban population (%)	31.87	8.3	0
SC Population (%)	23.5	32.65	40.59
ST Population (%)	5.8	10.25	9.59
Total workers (%)	38.08	40.77	40.50
Male workers (%)	57.07	57.17	69.63
Female workers (%)	18.08	23.62	30.29
Main workers (%)	28.14	25.48	20.01
Marginal workers (%)	9.94	15.29	20.49
Cultivators (%)	14.72	21.12	20.24
Agricultural Labourers (%)	29.32	44.15	53.53
Household industry workers (%)	7.09	4.19	3.31
Other workers (%)	48.87	30.54	22.92

Source: Census 2011

2. History, Culture and Tourism

176. The earliest signs of human habitation in the area was at Dihar. By about 1000 BC chalcolithic people had settled on the north bank of the Dwarakeswar.

177. In later pre-historic times this area was inhabited by various Proto-Australoid and a few Proto-Dravidian tribes. The tribes were spread across different strata of development – food-gathering, hunting, animal-raring and agriculture. Bankura district was part of Rarh in ancient times.

178. From around 7th century AD till around the advent of British rule, for around a millennium, history of Bankura district is identical with the rise and fall of the Hindu Rajas of Bishnupur.

179. Romesh Chundra Dutta wrote in the late 19th century, “The ancient Rajas of Bishnupur trace back their history to a time when Hindus were still reigning in Delhi, and the name of the Muslims was not yet heard in India. Indeed, they could already count five centuries of rule over the western frontier tracts of Bengal before Bakhtiyar Khilji wrested the province from the Hindus. The Muslims conquest of Bengal, however, made no difference to the Bishnupur princes. these jungle kings were little known to the Muslims rulers of the fertile portions of Bengal, and were never interfered with. For long centuries, therefore, the kings of Bishnupur were supreme within their extensive territories. At a later period of Muslims rule, and when the Mughal power extended and consolidated itself on all sides, a Mughal army sometimes made its appearance near Bishnupur with claims of tribute, and tribute was probably sometimes paid. Nevertheless, the Subahdars of Murshidabad, never had that firm hold over the Rajas of Bishnupur which they had over the closer and more recent Rajaships of Burdwan and Birbhum. As the Burdwan Raj grew in power, the Bishnupur family fell into decay; Maharaja Kirti Chand of Burdwan attacked and added to his zamindari large slices of his neighbour’s territories. The Marathas completed the ruin of the Bishnupur house, which is an impoverished zamindari in the present. day.”

180. The area around Bishnupur was called Mallabhum the core area would cover present day Bankura police station area (excluding Chhatna), Onda, Bishnupur, Kotulpur and Indas. In olden days, the term was used for a much larger area, which probably was the furthest extent of the Bishnupur kingdom. In the north it stretched from Damin-i-koh in Santhal Parganas to Midnapore in the south. It included the eastern part of Bardhaman and parts of Chota Nagpur in the west. Portions of the district appear to have been originally the homes of aboriginal tribes, who were gradually subdued. The Khatra region was Dhalbhum, the Raipur region was Tungbhum, and the Chhatna region was Samantabhum. They were eventually overshadowed by the Malla kings of Bishnupur. There also are references in old scripts to Varahabhumi or Varabhumi (present day Barabhum) on whose borders run Darikesi river, and Sekhara mountain (probably present day Pareshnath).

181. Adi Malla was the founder of the Malla dynasty. Adi Malla ruled in Laugram for 33 years and has been known as the Bagdi Raja. He was succeeded by his son, Jay Malla, who invaded Padampur and captured the fort, then the power-centre. Jay Malla extended his domains and shifted his capital to Bishnupur. The subsequent kings steadily extended their kingdom. Among the more renowned are: Kalu Malla, the fourth in line, Kau Malla, the sixth in line, JhauMalla, the seventh in line, and Sur Malla, the eighth in line, who defeated the Raja of Bagri, a place now in northern Midnapore. He was followed by 40 other kings, all of whom were known as Mallas or Mallabaninath, which means lords of Mallabhum or Mallabani. Family records show that they were independent of foreign powers.

182. Bir Hambir, the 49th ruler of the Malla dynasty who flourished around 1586 AD and ruled in 16th-17th century, was a contemporary of the Mughal emperor Akbar, Bir Hambir was both powerful and pious. He was converted to Vaishnavism by Srinivasa. There is mention in two Vaishnava works, Prem-vilasa of Nityananda Das (alias Balaram Das) and Bhakti Ratnakara of Narahari Chakrabarti, about Srinivasa and other bhaktas (devotees) being robbed by Bir Hambir, when they were travelling from Vrindavan to Gaur with a number of Vaishanava manuscripts. However, Bir Hambirwas so moved by Srinivasa’s reading of Bhagavata that he converted to Vaishnavism and gave Srinivasa a rich endowment of land and money. He introduced the worship of Madan Mohan in Bishnupur.

183. Raghunath Singh, who followed Bir Hambir, was the first Bishnupur Raja to use the Kshatriya title Singh. It is said that he was conferred upon with this title by the Nawab of

Murshidabad. Bishnupur kingdom had entered its golden age. With exquisite palaces and temples built during the period that followed Bishnupur was reputed to be the most renowned city in the world, more beautiful than the house of Indra in heaven. However, it has also been recorded that while these royal patrons of Hindu art and religion were busy building temples they had lost much of their independence and sunk to the position of tributary princes. Raghunath Singh built the temples of Shyam Rai, Jor Bangla and Kalachand between 1643 and 1656.

184. Bir Singh built the present fort, the temple of Lalji in 1658, and seven big lakes named Lalbandh, Krishnabandh, Gantatbandh, Jamunabandh, Kalindibandh, Shyambandh and Pokabandh. His queen, Siromani or Chudamani, built the temples of Madan Mohan and Murali Mohan in 1665. He walked up alive all his sons, eighteen in number. The youngest, Durjan, alone escaped, having been kept in hiding by the servants.

185. Durjan Singh built the Madan Mohan temple in 1694. According to family records, the kings of Bishnupur continued to pay tribute to the Muslim rulers but they were free to do things internally. There was no interference by the Muslim rulers in the internal affairs of Bishnupur. This is also confirmed by Muslim historians. The status of the Raja of Bishnupur was that of a tributary prince, exempted from personal attendance at the court at Murshidabad, and represented there by a resident. The Bishnupur Rajas who were at the summit of their fortunes towards the end of the 17th century, started declining in the first half of the 18th century. First, the Maharaja of Burdwan seized the Fatehpur Mahal, and then the Maratha invasions laid waste their country.

186. While they failed to take the fort and pillage the treasury, the Marathas harried the less protected parts of the kingdom. The Maratha chief, Sheobhat, made Bishnupur his headquarters in 1760 during the invasion of Shah Alam. The Marathas fell with their heaviest weight on border principalities such as Bishnupur and Birbhum. Exactions of a hundred sorts reduced the once powerful kingdom to poverty. The tenants fled and the country became desolate.

187. Chaitanya Singh was another pious ruler unfit to face the difficulties. As he was too involved in religious matters he did not have time for administrative matters. He faced internal feuds. Damodar Singh, a cousin of his, tried to gain power. He was able to convince the court at Murshidabad about his capabilities. Initially, Siraj Ud-Daulah lent him forces but he was unable to capture Bishnupur. Later, after the British defeated Siraj, Mir Jafar lent him stronger forces. He succeeded in taking Bishnupur, and Chaitanya Singh escaped to Kolkata with the idol of Madan Gopal, but the British restored the latter to power. However, intrigue and litigation continued for many years. Litigation ruined the Bishnupur Raj family and eventually in 1806, the estate was sold for arrears of land revenue and bought up by the Maharaja of Burdwan.

188. **British Administration.** In the year 1760, Bishnupur was ceded to the British with the rest of Burdwanchakla. The Marathas had laid the country waste and famine of 1770 completed the misery of the kingdom. People swept away, cultivation failed and there was lawlessness everywhere due to lack of powerful administration as once the powerful king had been reduced to the status of a mere zamindar. Making Suri the capital, Bisnupur was united with Birbhum in 1787 but rebellious situation prevailed. Till 1793, Bankura continued to be part of Birbhum, when it was transferred to the Burdwan collectorate.

189. Towards the end of the 18th century, when Bankura was part of Jungle Mahals, certain portions of the district around Raipur were affected by the Chuar rebellion. The disturbances of

the Chuars in 1832 in the western part of the district lead to the disbandment of the Jungle Mahals in 1833. Bishnupur was transferred to Burdwan. In 1872, the parganas of Sonamukhi, Indas, Kotulpur, Shergarh and Senpahari were transferred from Manbhum to Burdwan. In 1879, the district acquired its present shape with the thanas (Police Stations) of Khatra and Raipur and the outpost of Simplapal being transferred from Manbhum, and the thanas of Sonamukhi, Kotulpur and Indas being retransferred from Burdwan. However, it was known for some time as West Burdwan and it came to be known as Bankura district from 1881 onwards only. Since then there has been no change either in the physical boundary of the district or in the administration of justice.

190. **Tourist Attractions**. Bankura has gained wide appeal as a popular tourist destination. The district can legitimately take pride in having a wide range of spots attracting tourists for a variety of reasons ranging from Arts and Arcitecture, Terracota temples, dense virgin forests, hills and the scenic spots at Mukutmanipur etc.

191. Bankura district, falling under Eastern Chhotanagpur Plateau, looks like handpicked by Mother Nature and is blessed with old brown hills, murmuring rivers, ancient temples- all bearing testimony to a rich and resourceful culture and tradition.

192. Situated in the western part of the State of West Bengal it comes under the Burdwan division and it forms a part of what is popularly known as Rarh area in Bengal. Bishnupur town deserves a special mention in that the town hosts a good many temples like Madan Mohan temple, Shyam Roy temple and a short distance away at Jairambati the famous temple dedicated to Sarada Devi -Holy Mother for crores of devotees of the Ramakrishna Monastic Order. The town also has its own distinct musical tradition known as Bishnupur Gharana.

193. The hill at Biharinath and at Susunia are spots of natural wonder and ideal for trekking and going foot-loose.

194. Mukutmanipur is situated in the confluence of river Kansabati and Kumari has the second largest earther Dam in India. Hemmed in by hillocks all around, the still waters of the lake offer a hypnotic visual of the azure sky above and is a delight for lovers of nature in its pristine beauty.

F. Subproject Site Environmental Features

195. Features of the selected subproject sites considered under this IEE report are presented in the following table.

Table 30: Site Environmental Features- Reference to Present IEE Report (Work Commenced)

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
1	Uttar Kenbona (OHSR zone 1)	Hatagram	Private	Vacant Plot	Brick paved Village Road	Nil	
2	Hatagram (OHSR zone 2)	Hatagram	Private	Vacant Plot	Blacktop village road	Few trees	
3	Suruliya (OHSR zone 3)	Hatagram	Private	Vacant Plot	Blacktop village road	Nil	
4	Gottayara (OHSR zone 5)	Brahmandiha	Private	Vacant Plot	Blacktop village road	Nil	

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
5	Chukighata (OHSR zone 6)	Raghunathpur	Private	Vacant Plot	Blacktop village road	Nil	
6	Chakhaltore (OHSR zone 8)	Indpur	Private	Vacant Plot	Blacktop village road	Nil	
7	Neyakhir (OHSR Zone 10)	Indpur	Private	Vacant Plot	Brick paved Village Road	Nil	
8	Siromonipur (OHSR zone 11)	Indpur	Private	Vacant Plot	Brick paved Village Road	Nil	

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
9	Moukuri (OHSR- Zone 12)	Indpur	Private	Vacant Plot	Brick paved Village Road	Nil	
10	Bholarkhap (OHSR Zone 13)	Gaurbazar	Private	Vacant Plot	Blacktop village road	Few trees, no impact till now	
11	Dumurtor (OHSR Zone 14)	Gaurbazar	Private	Vacant Plot	Blacktop village road	Nil	
12	Tunamara (OHSR Zone 18)	Bheduasol	Private	Vacant Plot	Brick paved Village Road	Nil	

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
13	Golakpur (OHR- Zone 20)	Bheduasol	Private	Vacant Plot	Blacktop village road	Few trees, no impact till now	

Transmission and Distribution Lines

Clear water from the Raghunathpur GLSR cum IBPS is transferred to the 20 OHRs through 155.48 km (approx..) of transmission mains. The transmission mains are laid within the RoW of Public Works Department, Government of West Bengal (PWD, GoWB) roads, precisely along the shoulder of the roads. Distribution pipe lines are laid for supplying clear water from the OHRs to households in respective zones, and cover entire habitation areas in each zone. The distribution pipelines of approx. 803.6 km length in Indpur block are laid along the RoW of Gram Panchayat roads. Details of Transmission main and distribution pipe lines are given in **Table nos. 8, 9A, 9B, 10C and 10D**.

Pipelines are laid along the public roads (buried in a trench). Where there is adequate land in the road shoulder beside tarmac, pipe line are buried in the earthen shoulder and where there is no space in road shoulder, pipeline are laid in the tarmac. Many roads within habitations are narrow. Laying of the pipelines may potentially cause temporary disruption to road users, pedestrians and community people – this is avoided by using proper mitigation measures. Such civil work disruptions is mitigated during construction by the contractor through simple measures such as provisions of planks for pedestrian access to shops and proper traffic management.

Table 31: Site Environmental Features- Rest of the locations (work not yet commenced)

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
1	Bramhandia (OHSR zone 4)	Brahmandiha	Private	Vacant Plot	Blacktop village road	Nil	

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
2	Raghunathpur (OHSR zone 7)	Raghunathpur	Private	Vacant Plot	Blacktop village road	Nil	
3	Kantakuli (OHSR zone 9)	Indpur	Private	Vacant Plot	Brick paved Village Road	Nil	
4	Gunnath (OHSR zone 16)	Brojarajpur	Private	Vacant Plot	Blacktop village road	Nil	
5	Jugibaid (OHSR zone 17)	Brojarajpur	Private	Vacant Plot	Blacktop village road	Nil	

Sr. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Landuse)	Approach Road to the OHR Plot	Environ-mental Impact	Photograph of Plot
6	Saluka (OHSR zone 19)	Bheduasol	Private	Vacant Plot	Blacktop village road	Nil	

Figure 12: Photo Gallery of Road Network for Proposed Transmission Main at Indpur Block

Dhaldanga Khatra Road

Veduasole Raghunathpur Road

Brambhandiha Indpur road

Indpur Dumurtore road

NH Crossing way to Uttar Kendabona

Access Bridge crossing on Arkasa River at Ahanda Ghat

Photo 13: Photo Gallery of Road Network for Clear Water and Distribution Network at Indpur Block

Hatagram to Niyasa

Nischintapur to Nuniabaid

Goaldanga to Brajaraupur

Chakultasahar to Bheduasole

Uttarasanboni to Surulia

Brahmindiha Road

Figure 14: Photo Gallery shows work in progress at OHSR site, Pipe-laying activities and COVID Compliance at Indpur Block

Excavation work and Barricading

Material Handling & Safety Practice

Health Check- up camp

COVID-19 Compliance (PEP Talk)

Disinfectionof work areas

Maintenance of social distancing & arrangement of hand sanitizer

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

196. Potential environmental impacts of the proposed infrastructure components are presented in this section. Mitigation measures to minimize/mitigate negative impacts, if any, are recommended along with the agency responsible for implementation. Monitoring actions conducted during the implementation phase is also recommended to reduce the impact.

197. Screening of potential environmental impacts are categorized into four categories considering subproject phases: location impacts and design impacts (pre-construction phase), construction phase impacts and operations and maintenance phase impacts and mitigation is devised for any negative impacts.

(i) **Location Impacts** include impacts associated with site selection and include loss of on-site biophysical array and encroachment either directly or indirectly on adjacent environments. It also includes impacts on people who will lose their livelihood or any other structures by the development of that site.
(ii) **Design Impacts** include impacts arising from Investment Program design, including technology used, scale of operation/throughput, waste production, discharge specifications, pollution sources and ancillary services.
(iii) **Construction Impacts** include impacts caused by site clearing, earthworks, machinery, vehicles and workers. Construction site impacts include erosion, dust, noise, traffic congestion and waste production.
(iv) **O&M Impacts** include impacts arising from the operation and maintenance activities of the infrastructure facility. These include routine management of operational waste streams, and occupational health and safety issues.

198. Screening of environmental impacts has been based on the impact magnitude (negligible/moderate/severe – in the order of increasing degree) and impact duration (temporary/permanent).

199. This section of the IEE reviews possible project-related impacts, in order to identify issues requiring further attention and screen out issues of no relevance. ADB SPS (2009) require that impacts and risks will be analyzed during pre-construction, construction, and operational stages in the context of the project's area of influence.

200. The ADB Rapid Environmental Assessment Checklist in http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asphas been used to screen the project for environmental impacts and to determine the scope of the IEE.

201. In the case of this project (i) most of the individual elements involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and (iii) being mostly located in an rural area and not falling in any environmentally sensitive zones will not cause direct impact on biodiversity values. The project will be in properties held by the local government and access to the project location is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

A. Pre-Construction Impacts – Design and Location

202. **Design of the Proposed Components**. Technical design of the (i) overhead reservoirs, (ii) distribution pipelines, and (iii) water connections and flow meters follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable. Following environmental considerations are included in the project:

(i) Gravity distribution system: designing the entire system to maintain optimal flow and terminal pressure, and optimising the overall energy usage
(ii) Implementation of a water quality surveillance program including development of a laboratory as part of the project to ensure that supplied water meets the drinking water standards (**Appendix 8)**
(iii) Minimizing water losses from pipelines by perfect jointing and alignments using appropriate techniques
(iv) Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies

203. **Proposed Subproject Locations and Impacts**. Location impacts are associated with planning particularly on the site selection, and include impacts due to encroaching on sensitive areas, and impacts on the people who might lose their homes or livelihoods. All the project sites are along the public roads, and there are no environmentally sensitive features like forests or protected areas in the project location.

204. There are several low lying land parcels filled with water / ponds in most habitations. Although there is no direct impact as pipelines are not encroaching/disturbing these areas, there may be impacts during construction due to spilling of excavated soil or silt laden run off or washing of construction material, waste etc., into these ponds, and may adversely effect on their current usage (as fishery ponds).These impacts are considered during construction phase. All the selected OHSR sites are privately owned vacant lands, some of which are low-lying lands .

205. No significant negative impacts envisaged due to filling up and raising of these low-lying lands or ponds, which are primarily private owned, and not necessarily part of overall natural drainage system. Following measures needs to be implemented:

(i) Avoid using low-lying lands / ponds for construction of OHSRs; alternative private lands may be explored within the vicinity;
(ii) Review the applicability of West Bengal Inland Fisheries Act, 1984, whether the site falls under the definition of fisher area; obtained permission from Fisheries Department if required prior to start of construction.

206. **Tree Cutting at Selected Project Sites**. There are trees in some selected OHSR sites (e.g., Bholarkhap, Golakpur, Hatagram). These are mostly trees of local species. Also, there are trees along the public roads – especially on the main roads. No tree felling is anticipated after final survey and design till now for the zones considered under this IEE report. Proper mitigation measures, such as permission of tree felling, compensatory plantation will be taken care of in case of any such incidence in future.

207. Following measures need to be implemented to compensate for the loss of tree cover.

(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of OHRs within the sites
(ii) Avoid cutting of trees by adopting suitable alignment changes as required during laying of pipelines;

(iii) In unavoidable cases, obtain prior permission for tree cutting , plant and maintain 5 trees for each tree that is removed.

208. **Utilities**. Telephone lines, electric poles and wires, water lines within the proposed project locations may require to be shifted in few cases. Till design period there is no as such requirement. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with the PHED will (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

209. **Site Selection of Construction Work Camps, Stockpile Areas, Storage Areas, and Disposal Areas**. Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas are not be considered for setting up construction camps to protect the human environment (i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care has taken to avoid disposals near forest areas, water bodies, or in areas which will inconvenience the community. All locations are included in the design specifications and on plan drawings. Material stockpiles are protected by bunds during the monsoon to arrest the silt laden runoff into rivers/ drains. The subproject is likely to generate soil from excavations, which needs to be disposed safely or utilized locally.

210. **Site Selection of Sources of Materials**. Significant quantities of gravel, coarse aggregate and fine aggregate are required for construction works. Contractor procures these materials only from the quarries permitted/licensed by Mines and Geology Department. Contractor procures material from existing quarries, and creation of new quarry areas should be avoided as far as possible. If new quarries are required then the contractor is responsible for obtaining all permissions and clearances, including environmental clearance for mining. Contractor should factor in the time required for obtaining clearances including conduct of EIA if required under the law. It is the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines and Geology and local revenue administration.

B. Construction Impacts

211. Main civil works in the subproject include construction of one GLSR, 2 IBPS and overhead storage reservoirs, at the identified sites, and laying of water supply pipe lines (distribution and transmission). OHSR works are confined to sites, and construction include general activities like site clearance, excavation for foundations, and creation of concrete structures (staging and reservoir).

212. Since these works are confined to the boundary of identified sites, there is no direct interference of construction work with the surrounding land use. However, construction dust, noise, use of local roads for transportation of construction material, waste, labour camps etc., have negative impacts, which needs to be avoided or mitigated properly.

213. Subproject also include laying of approximately 155.48 km long Transmission Main pipeline and laying of approximately 803.6 km. long distribution lines. Distribution lines cover all

habitations, and are laid along all internal roads in the project area. Pipelines are buried along the roads using open cut method.

214. Open cut trenching method of pipe laying involves excavation for laying pipes along the roads, placing pipes in the trench, jointing and testing, and refilling with the excavated soil. The trenches will be of 1 m – 1.5 m wide and 1.5 to 2 m deep. Earthwork excavation is undertaken by machine (backhoe excavator) or manually, while pipe laying works include laying pipes at required gradient, fixing collars, elbows, tees, bends and other fittings including conveying the material to work spot and testing for water tightness. Sufficient care is 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. As trenches are only 1.5-2m deep, there risk of collapse of trenches or damage to surrounding buildings is minimal. However, necessary precautions are taken depending on the soil conditions, and if required measures such as bracing or shoring in the trench is provided. Once they are laid, pipes are joined as per specification and then tested for any cracks of leakages. About 85%-95% of the excavated soil are used for refilling the trench after placing the pipe and the residual soil of 5-15% are disposed of. Therefore residual soil after pipe laying and refilling is not significant.

215. Although pipe laying work involves quite simple techniques of civil work, the invasive nature of excavation and pipeline alignment in the built-up areas where there are a variety of human activities, result in impacts to the environment and sensitive receptors such as residents, businesses, and the community in general. These anticipated impacts are temporary and for short duration, however, needs to be mitigated.

216. Anticipated impacts during the construction phase are discussed along with appropriate mitigation measures to avoid, minimize or mitigate those impacts to acceptable levels.

217. **Sources of Materials**. Significant amount of sand and coarse aggregate are required for this project, which are sourced from quarries. Quarries inevitably cause extensive physical changes; as construction materials are excavated from the ground, leaving large cavities, or leveling 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 is 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 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 makes a concerted effort to re-use as much excavated material from this project as possible. The construction contractor is required to:

(i) Obtain construction materials only from government approved quarries with prior approval of PIU
(ii) PIU to review, and ensure that proposed quarry sources have all necessary clearances/ permissions in place prior to approval
(iii) Contractor to submit to PIU on a monthly basis documentation on material obtained from each source(quarry/ borrow pit)
(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, prior to approval by PIU.

218. **Air Quality**. Construction work, especially from earthwork activities, coupled with dry and windy working conditions, material and debris transport, and works along the public roads carrying significant traffic, have high potential to generate dust. Also, emissions are anticipated 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, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Dust generation from construction work in sites like GLSR, IBPS, OHSR sites etc., are mainly during the initial construction phase of earth work. As the site is confined, dust can be effectively controlled with common measures. Dust generation is significant during pipeline laying along the roads. Increase in dust/ particulate matter in ambient air is detrimental, and may have adverse impacts on people and environment. To mitigate the impacts, construction contractors are required to:

219. **For All Construction Works**

(i) Comply with the air pollution / dust control measures for construction activities stipulated by the "Direction of West Bengal Department of Environment under the Air Act, 1981 Direction No. EN/3170/T-IV-7 /001/2009 dated: 10 December 2009" (**Ref Appendix 5**);
(ii) Provide a dust screen around the construction sites at IBPS, GLSR and OHSR work sites;
(iii) Damp down the soil and any stockpiled material on site by water sprinkling;
(iv) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.)when transported by trucks;
(v) Clean wheels and undercarriage of haul trucks prior to leaving construction site/quarry;
(vi) Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area;
(vii) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition
(viii) Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization;
(ix) Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process;
(x) Cover the soil stocked at the sites with tarpaulins;
(xi) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation;
(xii) Ensure that all the construction equipment, machinery is fitted with pollution control devises, which are operating correctly, and have a valid pollution under control (PUC) certificate.

220. **For Pipeline Works**

(i) Barricade the construction area using hard barricades (of 2 m height) on both sides
(ii) Initiate site clearance and excavation work only after barricading of the site is done
(iii) Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.,), to the barricaded area
(iv) Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area

(v) Undertake the work section wise: 100 – 200 m section should be demarcated and barricaded
(vi) Conduct work sequentially - excavation, pipe laying, backfilling; conduct pipe testing section-wise (for a minimum length as possible) so that backfilling, stabilization of soil can be done.
(vii) Remove the excavated soil of first section to the disposal site; as the work progresses, sequentially, by the time second section is excavated, the first section will be ready for back filling, use the freshly excavated soil for back filling, this will avoid stocking of material, and minimize the dust.
(viii) Backfilled trench at any completed section after removal of barricading is the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration undertaken immediately.

221. **Surface Water Quality**. Run-off from stockpiled materials and chemicals from fuels and lubricants during construction works can contaminate downstream surface water quality of the ponds, nallahs or streams. Project area is flat/undulating and receives considerable rainfall, although mostly confined during the monsoon months. It is important that runoff from the construction areas, which may contain silt and chemical traces do not enter any water bodies. Impact are temporary, and may not be significant, but needs to be mitigated. Construction contractor is required to:

(i) All earthworks be conducted during the dry season to prevent the problem of soil run-off during monsoon season;
(ii) Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;
(iii) Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used;
(iv) Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies;
(v) Place storage areas for fuels and lubricants away from any drainage leading to water bodies;
(vi) Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling;
(vii) Dispose any wastes generated by construction activities in designated sites; and
(viii) Conduct surface quality inspection according to the EMP.

222. **Groundwater Quality**. Another physical impact that is often associated with excavation is the effect on drainage and the local water table if groundwater and surface water collect in the voids. In the project area, groundwater depth is shallow, there are numerous water bodies and ponds, and it also receives high rainfall during the monsoon. Conducting excavation works during non-monsoon season will certainly help, but due to high water table, water may collect in pits as they are excavated. The water collected in excavated pits contain silt and disposal of this in drainage channels lead to silting. To avoid this the contractor needs to be implement the following measures:

(i) Create a temporary drainage channel around the work area to arrest the entry of runoff from upper areas into the work area.
(ii) 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.
(iii) Consider safety aspects related to pit collapse due to accumulation of water.

223. **Generation of Construction Wastes.** Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. Domestic solid wastes may also be generated from the workers' camp. Improper waste management could cause odor and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape. Construction waste are disposed in line with the guideline issued by WB Pollution Control Board. Contractor in consultation with PHED has identified disposal sites for stockpile. Stockpiles are not be situated such that they obstruct natural water pathways. Stockpiles are not exceed 2m in height unless otherwise permitted by the Engineer. Generally PHED allows 1.2m height. The following mitigation measures to minimize impacts from waste generation has been 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 long time. Excess excavated soils (if any) being disposed of at approved designated areas immediately
(iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; site should have located 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) Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed of in disposal sites approved by WBPCB;
(vii) Prohibit burning of construction and/or domestic waste;
(viii) 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.
(ix) Conduct site clearance and restoration to original condition after the completion of construction work; PIU to ensure that site is properly restored prior to issuing of construction completion certificate.

224. **Noise and Vibration Levels**. Most of the works are to be implemented in rural setting, with thickly populated habitation areas and surrounding extensively cultivated agricultural lands. Noise and vibration impacts are likely to be minimal as most of the OHSR sites located outside habitation in agricultural lands. Few OHSR sites are located adjoining schools and habitation areas, where there are houses, religious places and businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by breaking of bitumen roads for laying of pipelines, operation of construction equipment like concrete mixers, and the transportation of equipment, materials, and people. Vibration generated from construction activity, for instance from the use of pneumatic drills, have impact on nearby buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor is required to:

(i) Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which result in least disturbance;
(ii) Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers, and use portable street barriers to minimise sound impact to surrounding sensitive receptor;

(iii) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
(iv) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; and
(v) Consult 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.

225. **Accessibility**. Excavation along the roads for laying of pipelines, hauling of construction materials and operation of equipment on-site can cause traffic problems. Roads connecting IBPS to GLSR and GLSR to OHSR sites are main roads, but are narrow and carry considerable local traffic, mainly comprise bicycles, 2 wheelers, Mini trucks, auto rickshaws, buses etc., Vegetable cultivation is predominant, and large number of vehicles carrying vegetable produce to market can be seen in the area. Habitation areas mostly consists of very narrow streets, but the traffic is limited mostly to bicycles and two wheelers, and other transport vehicles. Distribution line works within habitation have accessibility issues to surrounding houses. Works related to OHSRs are confined to the selected sites, therefore there is no direct interference of these works with the traffic and accessibility. Hauling of construction material, equipment, construction waste, etc., to and from the work site may increase the road traffic on local roads, which are not in good condition. This will further inconvenience the local community and road users. Potential impact is negative but short term and reversible by mitigation measures. The construction contractor is required to:

226. **Hauling (Material, Waste/debris and Equipment)Activities**
(i) Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites
(ii) Schedule transport and hauling activities during non-peak hours;
(iii) Locate entry and exit points in areas where there is low potential for traffic congestion;
(iv) Drive vehicles in a considerate manner
(v) Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.

227. **Pipeline Works**
(i) Confine work areas along the roads to the minimum possible extent; all the activities, including material and waste/surplus soil stocking be confined to this area. Provide barricading; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required
(ii) Leave spaces for access between mounds of soil to maintain access to the houses / properties
(iii) Provide pedestrian access in all the locations; provide wooden/metal planks over the open trenches at each house to maintain the access.
(iv) Inform the affected local population 1-week in advance about the work schedule
(v) Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.
(vi) Keep the site free from all unnecessary obstructions;
(vii) Coordinate with Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours

228. **Socio-Economic –Income**. Due to non-availability of suitable government owned lands, all the OHSRs except one existing OHSR at Goaldanga proposed on privately owned land parcels, which are vacant land. Private ownership land parcels are purchased at market price with the willingness of the land owners to sell their properly for the project. Resettlement and social issues are being studied in a parallel resettlement planning study of this subproject. Blocking of access to the business / livelihood activities, especially during pipeline laying along the roads, may impact the income of households. However, given the alignment of pipeline, trenchless technology for road crossing, and also the measures suggested for ensuring accessibility during pipeline works, no notable impact is envisaged.

229. **Socio-Economic – Employment**. Manpower are required during the 36-months 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 is required to:

(i) Employ local labour force as far as possible
(ii) Secure construction materials from local market.

230. **Occupational Health and Safety**. Workers need to be mindful of the occupational hazards which can arise from working in height and excavation works. Potential impacts are negative and long-term but reversible by mitigation measures. The construction contractor is required to:

(i) Comply with all national, state and local labour laws (**see Appendix 7);**
(ii) Implement all site-specific occupational health and safety (OHS) Plan and Supplementary H & S plan for COVID 19 issues as per the "**Standard Operating Procedure for Prevention and Risk Minimization of Corona Virus Disease (COVID-19) at the Facilities and Work Sites"** developed by PMU (**Appendix 18)** and implemented measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training[31] and COVID 19 awareness training for all site personnel; (d) documented procedures to be followed for all site activities; and (e) documentation of work-related accidents;
(iii) Ensure that qualified first-aid is provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;
(iv) Provide medical insurance coverage for workers;
(v) Secure all installations from unauthorized intrusion and accident risks;
(vi) Provide health and safety orientation training including COVID 19 awareness 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;;
(vii) 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;

[31] 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.

(viii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
(ix) Ensure moving equipment is outfitted with audible back-up alarms;
(x) 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;
(xi) The use of hearing protection shall be enforced actively.
(xii) Provide supplies of potable drinking water;
(xiii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances.
(xiv) Overall, the contractor should comply with International Finance Corporation's Environment, Health and Safety (EHS) Guidelines[32]on Occupational Health and Safety.

231. Standard Operating Procedure (SOP) for the project and Supplementary H & S plan for COVID 19, which is standalone document to be followed by contractor has been prepared for the project and specific package, which will cover,

- General instruction to follow to prevent the spread of COVID-19 in construction workplace
- Detail (step-by-step) work procedure to getting the workplace ready under COVID-19 situation
- Worksite prevention practice and disinfection procedure at work site, office, during meeting, travelling, etc.
- Precaution taken at workmen habitat/ camp
- Control measures taken for deploying new workmen at site
- Use of PPEs: face mask – hand gloves, maintaining social distancing, disinfection, requirement of awareness covered under the H & S plan.

232. **Asbestos Materials.** Existing water distribution network is mostly asbestos cement (AC) pipes, and because of the health risks these would be left in situ and replaced by new pipes. Details will be obtained from the PHED of the nature and location of all water supply infrastructure, and planning pipeline alignments carefully to avoid any conflict or damage. Given the dangerous nature of this material for both workers and citizens, additional measure should be taken to protect the health of all parties in the event (however unlikely) that AC pipes are encountered. PHED has decided to replace the existing pipes including AC pipes and lay new pipes. This will involve risks of handling and disposal of AC pipes. Further, prior to start of construction works of water supply system, PIU will develop a protocol to be applied in any instance that AC pipes are encountered, to ensure that appropriate action is taken. This should be based on the approach recommended by the United States Environmental Protection Agency (USEPA),[33] and amongst other things, should involve:

[32] International Finance Corporation, World Bank Group EHS Guidelines. General EHS Guidelines - 2.0 Occupational Health and Safety.

[33] 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

(i) Training of all personnel (including manual labourers) to enable them to understand the dangers of AC pipes and to be able to recognise them in situ;
(ii) Reporting procedures to inform PIU immediately if AC pipes are encountered;
(iii) Development and application of a detailed H&S procedure to protect both workers and citizens. This should comply with national and international standards for dealing with asbestos, and should include: (a) removal of all persons to a safe distance; (b) usage of appropriate breathing apparatus and protective equipment by persons delegated to deal with the AC material; and (c) Procedures for the safe removal and long-term disposal of all asbestos-containing material encountered.

233. **Community Health and Safety**. Pipeline works along the road, and hauling of equipment and vehicles have potential to create safety risks to the community. Hazards posed to the public, specifically in high-pedestrian areas may include traffic accidents and vehicle collision with pedestrians. Potential impact is negative but short-term and reversible by mitigation measures. The construction contractor is required to:

(i) Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency)
(ii) Enforce strict speed limit (20-30 kmph) for playing on unpaved roads, construction tracks
(iii) Night-time driving will be by exception only, as approved by the PIU to minimise driving risk and disturbance to communities
(iv) Adopt standard and safe practices for micro tunnelling
(v) Temporary traffic control (e.g. flagmen) and signs provided where necessary to improve safety and provide directions
(vi) All drivers undergo safety and training
(vii) Public access to all areas where construction works are on-going be restricted through the use of barricading and security personnel
(viii) Warning signs, blinkers attached to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation
(ix) The period of time when the pipeline trench is left open, minimized through careful planning
(x) Control dust pollution – implement dust control measures as suggested under air quality section
(xi) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
(xii) Provide road signs and flag persons to warn of on-going trenching activities.

234. **Construction Camps.** Contractor may require to set up construction camps – for temporary storage of construction material (pipes, cement, steel, fixtures, fuel, lubricants etc.), and stocking of surplus soil, and may also include separate living areas for migrant workers. The contractor is encouraged to engage local workers as much as possible. Outside works will be not allowed due to widespread of COVID 19 infection. Operation of work camps can cause temporary air, noise and water pollution, and may become a source of conflicts, and unhealthy environment if not operated properly. Potential impacts are negative but short-term and reversible by mitigation measures. The construction contractor is required to:

(i) As far as possible located the camp site within the work sites (at IBPS, GLSR and Overhead storage reservoir sites); if any camp to be established outside these, then select a camp site away from residential areas (at least 50 m buffer shall be maintained);

(ii) Avoid tree cutting for setting up camp facilities;
(iii) Ensure that a proper compound wall is provided, and erect a wind/dust screen around;
(iv) Camp site shall not be located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas;
(v) Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit;
(vi) Provide proper temporary accommodation with proper materials, adequate lighting and ventilation, appropriate facilities for winters and summers; ensure conditions of liveability at work camps are maintained at the highest standards possible at all times;
(vii) Consult PIU before locating project offices, sheds, and construction plants;
(viii) Minimize removal of vegetation and disallow cutting of trees;
(ix) 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 allowed as accommodation for workers;
(x) Camps should be protected from COVID 19 health risk. All Health and safety procedure to be followed for operation of camps and Standard Operating Procedure developed for COVID 19 will be used as ref. document (**Appendix 18**) during staying , cooking, eating, use of toilet- common space etc.
(xi) Self-hygiene, disinfection of entire camp and toilet, maintaining of social distancing to be continued for protection from COVID 19 infection
(xii) Camp being provided with proper drainage, there shall not be any water accumulation;
(xiii) Provide drinking water, water for other uses, and sanitation facilities for employees;
(xiv) Prohibit employees from cutting of trees for firewood; contractor should be provided proper facilities including cooking fuel (oil or gas; fire wood not allowed);
(xv) Train employees in the storage and handling of materials which can potentially cause soil contamination;
(xvi) Recover used oil and lubricants and reuse or remove from the site;
(xvii) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit for bio-degradable waste, and non-biodegradable / recyclable waste shall be collected and sold in local market;
(xviii) Remove all wreckage, rubbish, or temporary structures which are no longer required;
(xix) At the completion of work, camp area shall be cleaned and restored to pre-project conditions, and submit report to PIU; PIU to review and approve camp clearance and closure of work site.

235. Guidelines for Safety during Monsoon/Heavy Rainfall attached as **Appendix 10.**

C. Operation and Maintenance Impacts

236. Once the construction is over the O&M of the water distribution system will be carried out by PHED (up to habitation) and Gram Panchayat (within habitation). Prior to supply of water,

it will be ensured that the newly laid pipes are properly cleaned and disinfected. In water supply distribution system project, the impacts are primarily due to construction phase activities, and are not generally associated with any significant impacts as a result of activities during operation. During the system design life (15/30 years for mechanical/civil components) it shall not require major repairs or refurbishments and should operate with little maintenance beyond routine actions required to keep the equipment in working order. The stability and integrity of the system will be monitored continuously and any problems detected will be promptly restored. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

237. Recurrence of pipe bursting and leakage problems can be managed by the leak detection, rectification and water auditing surveys. PHED will be required to ensure that the leak detection and rectification time is minimized.

238. Biological hazards are among the environmental risks that may adversely impact the health and wellness of the workers and the community. Breakouts of diseases such as diarrhea, flu or pandemics such as the COVID-19 shall be avoided. Designs and implementation of treatment systems shall ensure that disease-causing pathogens or viruses are disinfected and will not cause any health issues. The World Health Organization has released an interim guidance on Water, Sanitation, Hygiene and Waste Management for the COVID-19 virus (**Appendix 19**). Measures on managing wastewater and fecal waste and keeping water supplies safe is critical to avoid the start or spread of any disease."

239. The people of Indpur block will be the major beneficiaries of the improved water supply system, as they will be provided with a constant supply of better quality water, piped into their homes at an appropriate pressure. The project will improve the over-all health condition of the town as water borne diseases will be reduced, so people should spend less on healthcare and lose fewer working days due to illness, so their economic status should also improve, as well as their overall health. This should also improve the environment of these areas, should deliver major improvements in individual and community health and well-being.

240. The project is designed to deliver potable water in sufficient quantities to the consumers in their homes with proper terminal pressure. To ensure that water delivered to consumers at all times meets the drinking water standards, the following measures are suggested:

(i) Preparation and implementation of a water quality surveillance program including development of a laboratory as part of the project to ensure that supplied water meets the drinking water standards
(ii) Water quality surveillance program to cover consumer end water quality.

VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

A. Overview

241. The active participation of stakeholders including local community, NGOs/CBOs, etc., in all stages of project preparation and implementation is essential for successful implementation of the project. It ensures that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and brings maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

242. Most of the main stakeholders have already been identified and consulted during preparation of this IEE, and any others that are identified during project implementation brought into the process in the future. Primary stakeholders of the subproject are: residents, shopkeepers and businesspeople who live and work near sites where facilities will be built (GLSR,OHSRs and distribution lines), PHED, government and utility agencies responsible for provision of various services in project area, and West Bengal Pollution Control Board. Secondary stakeholders are: NGOs and CBOs working in the area, community representatives, beneficiary community in general, government agencies, Government of India and the ADB.

B. Public Consultation

243. The public consultation and disclosure program is a continuous process throughout the project implementation, including project planning, design and construction.

1. Consultation during Project Preparation

244. Institutional consultations were conducted with the project agencies, and Government Departments such as PHED, Block Development Officer, Panchyat Samity members, Pollution Control Board, Planning, Health and Sanitation wing officials etc. The subproject proposal is formulated in consultation with the local bodies in the project area to suit their requirements.

245. Consultations were held with stakeholders including temporarily local shops owners, business, land sellers, beneficiaries/local people, poorest of poor households (non-titleholders on government land).Public consultation meetings were held at all the proposed project locations for OHSRs and selected sections of the distribution network.

246. Focus-group discussions with affected persons and other stakeholders were conducted to learn their views and concerns. A socio-economic household survey has been conducted in the project area, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted during visits to the project sites.

247. **Table 32** provides details of locations where the consultations were conducted during preparation of the initial IEE and the number of participants present during the consultation process. A total of 51 participants attended that consultation meeting, which included 14 land sellers (including 2 women land sellers) also.

Table 32 :Details Public Consultations held in Indpur Block

Sl. No.	Date	Location	Gram Panchayat	Water Works	Total No. of Participants	No. of Female Participants
1.	09.08.2018	Raghunathpur	Raghunathpur Gram Panchayat Office	GSLR, OHSR and distribution	21 (M-17,F-4) including land sellers	04
2.	09.08.2018	Dhunigarah	In Dhunigarah village	Dhunigarah	30 (M- 22, F-8) Including land sellers	08

248. It has been observed that people are very happy about the project as the project area currently faces severe water problem due to lack of any potable water supply system as the groundwater in the area is fluoride contaminated. People are very much willing to extend their cooperation as the project will be provide much needed potable water and enhance living standard of the public. There are no negative impacts perceived by the community, however, project team explained the likely issues during construction and proposed EMP to manage the negative impacts. Increasing traffic and disturbance to agricultural vehicle movement (vegetable transport from fields to market) during the work is raised during the meeting, and it was informed that proper care will be taken for movement of construction vehicles including traffic management plan, prior information to people etc., It was also informed no road closures anticipated due to this work, and if needed during the construction phase, alternative access will be provided. These measures are included in the EMP.

2. Consultation during Construction

249. Prior to start of construction, PIU in coordination with the local bodies has conducted information dissemination sessions at various places and solicit the help of the local community, leaders/prominent for the project work. Focus group meetings have been conducted to discuss and plan construction work (mainly pipeline work) with local communities to reduce disturbance and other impacts and also regarding the project grievance redress mechanism. A constant communication has been established with the affected communities to redress the environmental issues likely to surface during construction phase. The sample summary of public consultations including FGDs conducted during construction phase is attached in the **Appendix 11.**

250. **Table 33** provides details of locations where the consultations were conducted during construction and the number of participants present during the consultation process. One block level orientation cum training workshop was also organized in last February, 2020. Due to COVID 19 pandemic situation no as such FGD has **been conducted recently.**The process will be continued throughout the implementation period.

Table 33 :Details Public Consultations held in Indpur Block

Sl. No.	Date	Location	Gram Panchayat	Water Works	Total No. of Participants	No. of Female Participants
1.	30.08.19	Indpur block	Bheduasole G.P.	OHR and distribution	41	05
2	07.11.19	Indpur block	Brahmandiha G.P.	OHR and distribution	40	25
3	07.11.19	Indpur block	Brajarajpur G.P.	OHR and distribution	26	1

Sl. No.	Date	Location	Gram Panchayat	Water Works	Total No. of Participants	No. of Female Participants
4	24.01.20	Indpur block	Kurustalia village	OHR and distribution	43	18
5	24.01.20	Indpur block	Kharbari village	OHR and distribution	17	0
6.	25.02.20	Indpur Block Office	---	---	25	6

C. Information Disclosure

251. Executive summary of the updated approved IEE is being translated in Bengali and made available at the offices of PMU, PIU, Block offices, and also displayed on their notice boards. Hard copies of the IEE is accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the IEE in English and Executive Summary in Bengali is placed in the official website of the WBPHED, PMU after approval of the IEE by Government and ADB. Stakeholders are also be made aware of grievance register and redress mechanism.

252. Public information campaigns to explain the project details to a wider population has been conducted. Public disclosure meetings has been conducted at key project stages to inform the public of progress and future plans. Prior to start of construction, the PMU/PIU has issued notification on the start date of implementation in local newspapers. A board showing the details of the project is displayed at the construction site for the information of general public.

253. Local communities are 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 are communicated via advertising, pamphlets, radio broadcasts, road signage, etc.

VII. GRIEVANCE REDRESS MECHANISM

A. Project Specific Grievance Redress Mechanism

254. A common Grievance Redress Mechanism (GRM) has been put in place to redress social, environmental or any other project and/or subproject related grievances. The GRM described below has been developed in consultation with stakeholders. Public awareness campaign has been conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaigns ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per project entitlement matrix, and PMU and concerned PIUs ensure that their grievances are addressed.

255. Affected persons have the flexibility of conveying grievances/suggestions by dropping grievance redress/suggestion forms in complaints/suggestion boxes or through telephone hotlines at accessible locations, by e-mail, by post, or by writing in a complaint register in GP office or PMU or PIU office. 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 and recorded. The names of the persons to be included in the Field Level GRM are already suggested. The Grievance Registration Form has been translated in Bengali (**Appendix 12**). Sample grievance register is attached as **Appendix 12**. No grievances received till the report period. State level and district level steering committee have

been established. Also, PMU, PIU level GRC notification done for Bankura. **Appendix 13** shows all Notification related to Grievance Redressal Committee.

256. PMU / HSGO together with PIU Safeguard Officers have the joint responsibility for timely grievance redressal on safeguards and gender issues and for registration of grievances, related disclosure, and communication with the aggrieved party. The affected persons is also be encouraged to seek a complaint registration number through the PIU.

257. The Grievance Redress Mechanism provides an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project. A two-tier grievance redress mechanism is conceived, one, at project level and another, beyond project level. For the project level GRM, a Grievance Redress Cell is established at PIU; the safeguards officers of the ESSU PIU, supported by the social safeguards specialist of DSICS is 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 grievance redress mechanism. All expedient and minor grievances is resolved at field level; should the PIU fail to resolve any grievance within the stipulated time period, the PMU will be consulted and suggested actions by PMU taken by PIU with DSISC support, within specified time. PIU is also be responsible for follow-through for each grievance, periodic information dissemination to complainants on the status of their grievance and recording their feedback (satisfaction/dissatisfaction and suggestions). In the event that certain grievances cannot be resolved at project level, they are referred to the District Steering Committee (DSC), which also act as Grievance Redress Committee (GRC), particularly in matters related to land purchase/acquisition, payment of compensation, environmental pollution etc. Any higher than district level inter-departmental coordination or grievance redress required is referred to the state level Steering Committee (**Appendix 13**).

258. 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 – major or minor, are registered. In case of grievances that are immediate and urgent in the perception of the complainant, the contractor, and supervision personnel from the PIU supported by design, supervision and institutional support consultant (DSISC) tried to successfully resolve them in consultation with the Member, Panchayat and the GP Pradhan. In case of larger issues, they seek the advice and assistance of the SE PIU. Grievances not redressed through this process within/at the project level within stipulated time period is referred to the DSC/GRC.

259. The DSC has been set up to monitor project implementation in each district. In its role as a GRC, the DSC 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 the grievance will be addressed by the state-level Steering Committee. The Steering Committee resolve escalated/unresolved grievances received. Grievances remaining unresolved by Steering Committee may be referred by affected persons to appropriate courts of law. The multi-tier GRM for the project is outlined below (**Figure 15**), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC continue to function throughout the project duration. The PMU has issued notifications to concerned PHE Divisions to establish the respective PIU (and field) level GRCs, with details of composition, process of grievance redress to be followed, and time limit for grievance redress at each level.

260. An aggrieved person has 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.

261. **Composition of Grievance Redress Committee and District Steering Committee**. The DSC, acting as GRC have District Magistrate (Chairperson), Superintending Engineer, PIU as Member Secretary, Additional Executive Officer, Zilla Parishad, Assistant (Social and Environmental) Safeguard Officers of the Environment and Social Safeguard Units (ESSU) of the PIU, Institutional Support and Capacity Building Officer, PIU, Block Development Officers from respective blocks, and representatives from the affected village panchayat and / or community, if any, eminent citizens, CBOs and NGOs. The DSC/GRC must have a minimum of two women members. In case of any indigenous people impacts in future subprojects, the DSC/GRC must have representation of the affected indigenous people community, including at least one female indigenous person, the chief of the tribe or a member of the tribal council as traditional arbitrator (to ensure that traditional grievance redress systems are integrated) and an NGO working with indigenous people groups.

262. The Steering Committee include Chief Secretary, as chair, Principal Secretary/Additional Chief Secretary, PHED, Principal Secretary, Panchayat and Rural Development, Principal Secretary, Finance, Principal Secretary, Irrigation and Waterways Development Department, Principal Secretary, Public Works Department, Engineering in Chief, PHED, Member Secretary, and Others as invitees.

263. **Areas of Jurisdiction.** The areas of jurisdiction of the GRC, headed by the District Magistrate will be (i) all locations or sites within the district where subproject facilities are proposed, or (ii) their areas of influence within the District. The Steering Committee will have jurisdictional authority across the state (i.e., areas of influence of subproject facilities beyond district boundaries, if any).

264. **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 date these were effected and final outcome will be kept by PIU (with the support of DSISC) and submitted to PMU.

265. **Information Dissemination Methods of the Grievance Redress Mechanism**. The PIU, assisted by DSISC is responsible for information dissemination to affected persons on grievance redressal procedure. GP/coverage 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 PIU safeguard officers (environment and social) will be assisted by DSISC 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 and PIU offices, GP/concerned local panchayat notice boards

and on the web, as well as reported in the semi-annual environmental and social monitoring reports to be submitted to ADB.

266. **Periodic review and documentation of lessons learned.** The PMU ESC will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent and address grievances.

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

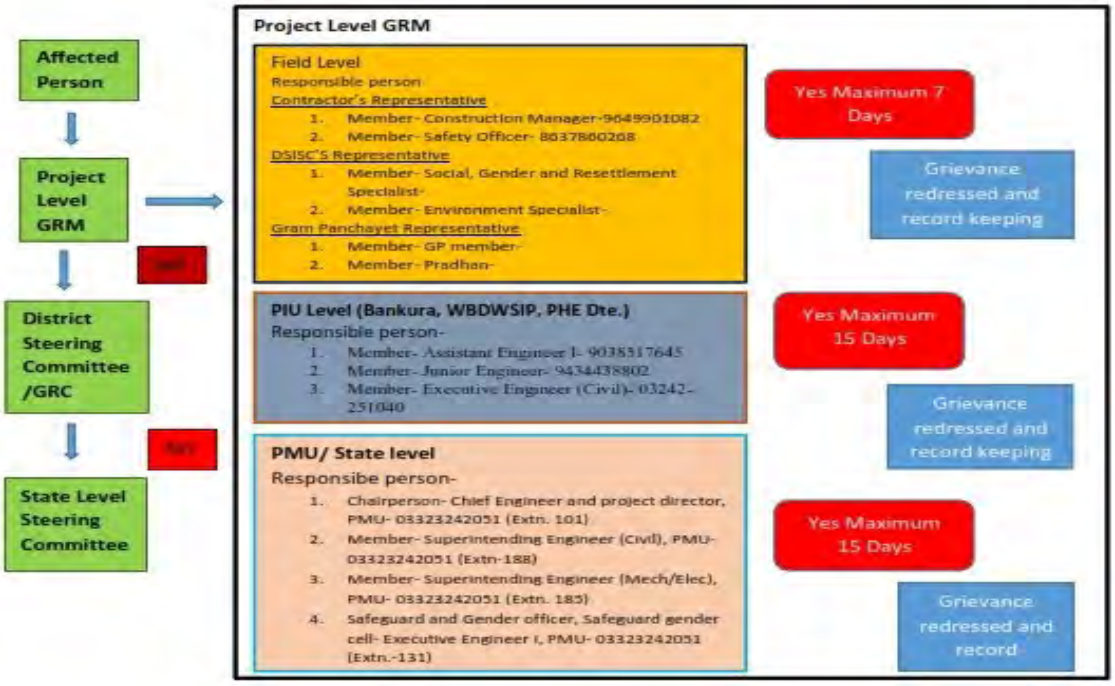


Figure 15 : Grievance Redress Mechanism

DSISC=Design, Supervision and Institutional Support Consultant; ESSU=environmental and social safeguards unit, GRC=grievance redress committee; GRM=grievance redress mechanism, PIU= project implementation unit, PRD = Panchayat and Rural Development; PMU =project management unit, PHED=public health engineering department; SGC=safeguards and gender cell

268. **ADB's Accountability Mechanism.** 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 (CRO) at ADB headquarters or the ADB India Resident Mission. 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, the resident mission). 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.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Environmental Management Plan

269. An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels.

270. The EMP guides the environmentally-sound construction of the subproject and ensure efficient lines of communication between PHED, project management unit (PMU), project implementing unit (PIU), consultants and contractors. The EMP (i) ensures that the activities are undertaken in a responsible non-detrimental manner; (i) provides a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (ii) guides and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iii) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (iv) ensure that safety recommendations are complied with. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

271. The contractor submits to PIU, for review and approval, a Site 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/ SEMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. No works are allowed to commence prior to approval of SEMP.

272. A copy of the EMP/approved SEMP is kept on site during the construction period at all times. The EMP included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

273. For civil works, the contractor is required to (i) carry out all of the mitigation and monitoring measures set forth in the approved SEMP; and (ii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer prepare from time to time to monitor implementation of this IEE and SEMP. The contractor has allocate budget for compliance with these SEMP measures, requirements and actions.

274. The following mitigation measures tables are only for the zones where the construction works has already started, as mentioned in this report.

Table 34: Design Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
Design of water supply system	Source sustainability and efficiency	▪ Gravity distribution system: designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage ▪ Implementation of a water quality surveillance program including development of a laboratory as part of the project to ensure that supplied water meets the drinking water standards ▪ Minimizing water losses from pipelines by perfect jointing and alignments using appropriate techniques ▪ Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies	Contractor/Project Implementation Unit (PIU)	Project Costs
Use of low-lying lands / ponds for project	Socio economic impact – loss fishery area	▪ Avoid using low-lying lands / ponds for construction of overhead storage reservoirs (OHSRs); alternative private lands may be explored within the vicinity; ▪ Review the applicability of West Bengal Inland Fisheries Act, 1984, whether the site falls under the definition of fisher area; obtained permission from Fisheries Department if required prior to start of construction	PIU	-
Layout plan of OHSRs and pipeline alignment	Tree cutting	▪ Minimize removal of trees by adopting to site condition and with appropriate layout design of OHSRs within the sites ▪ Avoid cutting of trees by adopting suitable alignment changes as required during laying of pipelines; ▪ In unavoidable cases, obtain prior permission for tree cutting ▪ Plant and maintain 5 trees for each tree that is removed	Contractor/PIU	Project Costs

Table 35: Pre-construction Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
Utilities	Telephone lines, electric poles and wires, water lines within proposed project area	(i) Operators of these utilities have been identified and included in the detailed design documents to prevent unnecessary disruption of services during construction phase;	Contractor in collaboration with Project Implementation Unit (PIU) and with approval of Project Management Unit (PMU)	(i) List of affected utilities and operators; (ii) Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours),	Project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		(ii) Construction contractor has prepared a contingency plan to include actions to be taken in case of unintentional interruption of services; (iii) Contractor has prepared spoils (waste) management plan zone wise as a part of SEMP		waste management plan and traffic management plan	
Construction work camps, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption to traffic flow and sensitive receptors	(i) Areas within or nearest possible vacant space in the project location (pipe laying site) have been identified; for material stockpile a vacant land at *Danga* has been identified. (ii) If it is deemed necessary to locate elsewhere, sites are being considered that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems; (iii) Residential areas are not being considered; (iv) Extreme care has	Contractor to finalize locations in consultation and approval of PIU	(i) List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas. (ii) Written consent of landowner/s (not lessee/s)	Project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		been taken in selecting sites to avoid direct disposal near water body which may inconvenience the community. (v) Till date, no requirement for excess spoil disposal has been encountered. If required, for excess spoil disposal, (a) sites will be selected from barren, infertile lands. In case agricultural land selected, written consent will be taken from landowners ; (b) debris disposal site will be selected 200 m away from surface water bodies; (c) no residential areas be located within 50 m downwind side of the site; and (d) site will be selected 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural	(i) Construction materials are obtained only from government approved quarries with prior approval	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	(i) List of approved quarry sites and sources of materials;	Project cost-

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
	drainage patterns, ponding and water logging, and water pollution.	of PIU; (ii) PIU ensured that quarry sources have all necessary clearances/ permissions in place prior to approval (iii) Contractor submitted to PIU on a monthly basis documentation on material obtained from each source (quarry/ borrow pit) (iv) Creation of new borrow areas, quarries etc., have been avoided for the project to date; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental Clearance prior to approval by PIU			
Consents, permits, clearances, No Objection Certificates (NOCs), etc.	Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	(i) All necessary consents, permits, clearance, NOCs, etc. prior to award of civil works have been obtained. (ii) All necessary approvals for construction have	PIU and Project Management Consultant (PMC)	Incorporated in final design and communicated to contractors.	Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		been obtained by contractor before start of construction (iii) It has been acknowledged in writing and report on compliance of all obtained consents, permits, clearance, NOCs, etc. are provided. (Ref. SEMPs) (iv) Detailed design drawings and documents are included.			PIU.
Asbestos Cement Pipes	Health risk due to exposure to asbestos materials	(i) Details on location of underground Asbestos Cement pipes will be noted, if encountered (ii) To avoid encountering AC pipes the new pipes has been aligned carefully (iii) Asbestos Cement pipes, if encountered, will be left undisturbed in the ground.	Contractor in coordination with PIU and PMC	(i) Detailed construction drawings showing alignment of AC pipes	No cost required. Mitigation measures are part of terms of reference (TOR) of PIU and DSISC

Table 36 :Construction Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Environmental Management Plan (EMP) Implementation Training and	Irreversible impact to the environment, workers, and community	(i) Project manager and all key workers have undergone training on EMP implementation including spoils/waste management, Standard operating procedures (SOP) for construction works; occupational health and safety (OH&S), including COVID 19 H & S awareness core labour laws,	Contractor	Project cost/PMU cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
OHS plan including COVID 19 H & S plan		applicable environmental laws, etc.		
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons.	**For all construction works** ✓ The air pollution / dust control measures for construction activities stipulated by the "Direction of West Bengal Department of Environment under the Air Act, 1981 Direction No. EN/3170/T-IV-7 /001/2009 dated: 10 December 2009" have been complied with. ✓ The soil and stockpiled material are damped down on site by water sprinkling ✓ Tarpaulins are used to cover the loose material (soil, sand, aggregate etc.,) when transported by trucks; ✓ A dust screen/high compound wall around the construction sites (GLSR and OHSRs) being provided. ✓ Wheels and undercarriage of haul trucks are cleaned prior to leaving construction site/quarry ✓ Sprinkling water and unloading inside the barricaded area have been made to Control dust generation while unloading the loose material (particularly aggregate, soil) at the site ✓ Surface soils are stabilized, where loaders, support equipment and vehicles operate, by using water ✓ Water is used prior to levelling or any other earth moving activity to keep the soil moist throughout the process ✓ Access is controlled to work area, preventing unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance to minimize dust generation ✓ Unnecessary movement of vehicle are prevented to limit the soil disturbance which minimize dust generation. ✓ All construction equipment and machineries are fitted with pollution control devices and have a valid pollution under control (PUC) certificate **Pipeline works** ✓ Construction areas are barricaded ✓ After barricading the site, site clearance is initiated and excavation work is done	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		✓ All the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.,), are confined within the barricaded area ✓ Sites are controlled from the stocking of excavated material and excess soil is reused on-site same day for backfilling of trenches ✓ Sequentially excavation, pipe laying, backfilling and pipe testing section-wise (for a minimum length as possible) are conducted, so that backfilling, stabilization of soil can be done, this avoided stocking of material, and minimized the dust. ✓ Backfilled trench at any completed section after removal of barricading is the main source of dust pollution. The traffic, pedestrian movement and wind generated dust from backfilled section. Road restoration is undertaken immediately and completed on the same-day.		
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during construction can contaminate nearby surface water quality. Ponding of water in the pits / foundation excavations	✓ All earthworks are conducted during the dry season to prevent the problem of soil run-off during monsoon season; ✓ Stockpiling of earth fill especially during the monsoon season are avoided unless covered by tarpaulins or plastic sheets; ✓ Excess spoils and debris are re-used in the construction works. Only designated area, if required, are used for soil disposal ✓ Temporary silt traps or sedimentation basins are installed along the drainage leading to the water bodies. ✓ Storage areas for fuels and lubricants have been placed away from any drainage leading to water bodies. ✓ Fuel, construction chemicals etc., are stored on an impervious floor, also spillage is avoided by careful handling ✓ Construction wastes are disposed in designated sites ✓ Temporary drainage channels are created around the work area to arrest the entry of runoff from upper areas into the work area ✓ The water collected in the pits / excavations are pumped to	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		a temporary sedimentation pond; clarified water is then disposed into drainage channels/streams after sedimentation in the temporary ponds ✓ Safety aspects are considered related to pit collapse due to accumulation of water		
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	✓ Activities are planned in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which results in least disturbance; ✓ Horns are not be used unless it is necessary to warn other road users or animals of the vehicle's approach; ✓ Vehicle silencers, fitting jackhammers with noise-reducing mufflers, and portable street barriers are used in construction equipment to minimize sound impact to surrounding sensitive receptor; and ✓ Buildings which are at risk from vibration damage are identified and use of pneumatic drills or heavy vehicles in the vicinity are avoided. ✓ Local communities are consulted in advance of the work to identify and address key issues, and avoid working at sensitive times, such as religious and cultural festivals .	Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and aesthetics – waste generation	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	✓ Construction Waste Management Plan is prepared and implemented ✓ As far as possible the debris and excess soil are utilized in construction purpose, for example for raising the ground level or construction of access roads etc., ✓ Stockpiles, lubricants, fuels, and other materials are located away from steep slopes and water bodies ✓ If required, for disposal, the site selected will be preferably from barren, infertile lands; site would be located away from residential areas, forests, water bodies and any other sensitive land uses ✓ Domestic solid wastes are properly segregated into biodegradable and non-biodegradable for collection and disposal to designated solid waste disposal site; compost pit is created at workers' camp sites for disposal of	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		biodegradable waste; non-biodegradable / recyclable material is collected separately and sold in the local recycling material market ✓ Residual and hazardous wastes such as oils, fuels, and lubricants are disposed of through approved vendors by West Bengal Pollution Control Board (WBPCB); ✓ Burning of construction and/or domestic waste are prohibited; ✓ Wastes are not haphazardly dumped/ thrown within and around the project site and adjacent areas; proper collection bins are provided, and awareness is created to use the dust bins. ✓ Site clearance and restoration are done immediately after the completion of construction work to restore to the original condition; PIU ensures that site is properly restored prior to issuing of construction completion certificate		
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	✓ list of affected utilities and operators prepared as per requirement; ✓ contingency plan is prepared to include actions to be done in case of unintentional interruption of service	Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	✓ Removal of vegetation is minimized and cutting of trees has been disallowed, by adopting best site layout and pipeline alignments. ✓ 5 native trees are planted for every one that is removed.	Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Accessibility	Traffic problems and conflicts near project locations and haul road	**Hauling (material, waste/debris and equipment) activities** ✓ Transportation routes has been planned so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites ✓ Transport and hauling activities are scheduled during non-peak hours; ✓ Entry and exit points are located in areas where there is low potential for traffic congestion; ✓ Vehicles are driven in a considerate manner ✓ Affected public are notified by public information notices,	Construction Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints. **Pipeline works** ✓ Work areas are confined along the roads to the minimum possible extent; all the activities, including material and waste/surplus soil stocking are confined to this area. barricading is provided; material/surplus soil stocking in congested areas is avoided – immediately reused on-site or removed from site/ or as and when required ✓ Spaces are left for access between mounds of soil to maintain access to the houses / properties ✓ pedestrian access is provided at all the locations; wooden/metal planks are provided over the open trenches at each house to maintain the access. ✓ Affected local population are informed 1-week in advance about the work schedule ✓ The work is planned and executed in such a way that the period of disturbance/ loss of access is minimum. ✓ The site is kept free from all unnecessary obstructions; ✓ Coordinated with Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities could not be permitted during peak hours		
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	✓ Local labor forces are employed as far as possible ✓ labor laws are complied with	Contractor	Contractor costs
Occupational Health and Safety	Occupational hazards which can arise during work	✓ All national, state and local core labor laws are complied with (**Appendix 7**). Labour license attached as **Appendix 14** ✓ Site-specific occupational health and safety (OHS) Plan and Supplementary H & S plan for COVID 19 which will include measures such as have been developed and implemented which included measures such as: (a) excluding public from the site; (b) maintaining social	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		distancing for protection from COVID 19 infection; (c) ensuring all workers are provided with and use personal protective equipment like helmet, gumboot, safety belt, gloves, nose musk and ear plugs; (d) OHS Training and COVID 19 awareness training for all site personnel; (e) documented procedures to be followed for all site activities including follow of SOP for COVID 19 as developed for the project and H & S plan; and (f) documentation of work-related accidents; ✓ Qualified first-aiders have been provided at all times. Equipped first-aid stations are easily accessible throughout the site; ✓ Medical tie-up with local hospitals is provided for workers; ✓ Sample first aid record / format attached as **Appendix 15.** No first aid case recorded till report period. ✓ WC policy has been received by the contractor of the package (**Appendix 14)** ✓ All installations are secured from unauthorized intrusion and accident risks; ✓ Potable drinking water is provided; ✓ Clean eating areas are provided where workers are not exposed to hazardous or noxious substances; ✓ Health and safety orientation training are provided including Covid-19 risk mitigation 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; ✓ Visitor orientation is provided if visitors to the site can gain access to areas where hazardous conditions or substances may be present. visitor/s are not allowed to enter hazardous areas unescorted; ✓ Visibility of workers is ensured through the use of high visibility vests when working in or walking through heavy equipment operating areas; ✓ Moving equipment are outfitted with audible back-up alarms; ✓ Sign boards are provided for hazardous areas such as energized electrical devices and lines, service rooms		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		housing high voltage equipment, and areas for storage and disposal. Signage are in accordance with international standards and are well known to, and easily understood by workers, visitors, and the general public as appropriate; Standard Operating Procedure (SOP) for the project and Supplementary H & S plan for COVID 19 prepared which cover, o General instruction to follow to prevent the spread of COVID-19 in construction workplace o Detail (step-by-step) work procedure to getting the workplace ready under COVID-19 situation o Worksite prevention practice at work site, office, during meeting, travelling, etc. o Precaution taken at workmen habitat/ camp o Control measures taken for deploying new workmen at site o Use of PPEs: face mask – hand gloves, maintaining social distancing, disinfection, requirement of awareness covered under the H & S plan. (Separate H & S plan for COVID 19 as supplementary document developed and keep as standalone document to mitigate COVID 19 health risk)		
Asbestos Cement (AC) Materials	Health risks associated with AC pipes	AC pipes were not found in any of the zones where construction has commenced	Contractor	Contractor costs
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	✓ Movements of construction vehicles are restricted to defined access roads and demarcated working areas (unless in the event of an emergency) ✓ strict speed limit (20-30 kph) is enforced for plying on unpaved roads, construction tracks ✓ Night-time haulage is by exception only, as approved by the PIU to minimize driving risk and disturbance to communities ✓ Temporary traffic control (e.g. flagmen) and signs are provided where necessary to improve safety and provide directions	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		✓ All drivers went through safety and training sessions ✓ Public access to all areas where construction works are on-going are restricted through the use of barricading and security personnel ✓ Warning signs, blinkers are attached to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation ✓ The period of time when the pipeline trench is left open have been minimized through careful planning ✓ Control dust pollution –dust control measures are implemented as suggested under air quality section. ✓ Vehicles are regularly maintained and manufacturer-approved parts are used to minimize potentially serious accidents caused by equipment malfunction or premature failure. Road signs and flag persons are there to warn of on-going trenching activities.		
Work Camps and worksites	Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants Unsanitary and poor living conditions for workers	✓ Camp has not been established yet as most of the labours engaged in pipeline work are local, come from nearby villages. Camp will be established in nearby vacant land to OHSR site or in rented house in nearby village. ✓ All the necessary mitigation measures will be taken care off during establishment of labour camp. ✓ Tree cutting for setting up camp facilities is avoided ✓ Camp site are not located near (100 m) water bodies, flood plains flood prone/low lying areas, or any ecologically, socially, archeologically sensitive areas ✓ The workers living areas and material storage areas are separated clearly with a fencing and separate entry and exit ✓ Proper temporary accommodation with proper materials, adequate lighting and ventilation are provided, appropriate facilities are provided for winters and summers; conditions of liveability at work camps are ensured and maintained at the highest standards possible at all times; ✓ PIU is consulted before locating project offices, sheds, and construction plants; ✓ Removal of vegetation is minimized and cutting of trees disallowed without permission from concerned authorities	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		✓ Conditions of liveability at work camps are ensured and maintained at the highest standards possible at all times; living quarters and construction camps are 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., are not used as accommodation for workers ✓ Camp should be protected from COVID 19 health risk. All Health and safety procedure to follow for operation of camp (H & S plan for COVID 19 will be used as ref. document) during stay, cooking, eating, use of toilet-common space etc. ✓ Self- hygiene, regular disinfection of entire camp and toilet, maintaining of social distancing to be continued for protection from COVID 19 infection ✓ Camps are provided with proper drainage, without any water accumulation ✓ Drinking water, water for other uses, and sanitation facilities for employees are provided. ✓ Employees are prohibited from cutting of trees for firewood; contractor provided proper facilities including cooking fuel (oil or gas; fire wood not allowed) ✓ Employees are trained in the storage and handling of materials which can potentially cause soil contamination ✓ Used oil and lubricants are recovered and removed from the site ✓ Solid waste is managed according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit is provided for biodegradable waste, and non-biodegradable / recyclable waste are collected and sold in local market ✓ All wreckage, rubbish, or temporary structures which are no longer required are removed ✓ At the completion of work, camp area will be cleaned and restored to pre-project conditions, and report will be submitted to PIU; PIU to review and approve camp clearance and closure of work site		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		✓ At the completion of work, camp area will be cleaned and restored to pre-project conditions, and report will be submitted to PIU; PIU to review and approve camp clearance and closure of work site		
Chance Finds	There are no protected properties in the subproject sites. However, in case of chance finds, contractors will be required to follow a protocol as defined in the mitigation measures.	✓ In case of chance findings, Archaeological Survey of India (ASI) and West Bengal State Archaeology Department will be consulted to obtain an expert assessment of the archaeological potential of the site ✓ State and local archaeological, cultural and historical authorities, and interest groups in consultation forums will be included as project stakeholders so that their expertise can be made available. ✓ In case of chance finds, works must be stopped immediately until such time chance finds are cleared by experts	Contractor	Contractor cost
Submission of EMP implementation report	Unsatisfactory compliance to EMP	✓ Appointment done of Environment, Health and Safety (EHS) Supervisor to ensure EMP implementation ✓ Monitoring reports including pictures are timely submitted	Contractor	Contractor cost
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	✓ Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and ✓ 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 re-grassed using the guidelines set out in the revegetation specification that forms part of this document. ✓ The contractor must arrange the cancellation of all temporary services.	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		✓ Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.		

Table 37: Operation Stage Environmental Impacts and Mitigation Measures

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Check for blockage and leakage problems reducing the water losses	Loss of water, increased demand and inconvenience to consumers and general public	Effectiveness of leak detection and water auditing to reduce the water losses	Public Health Engineering Department (PHED)	Operating costs
Occupational health and safety	Health, social and economic impacts on the workers	(i) Provide appropriate PPE and training on its proper use and maintenance. (ii) Use fall protection equipment when working at heights. (iii) Maintain work areas to minimize slipping and tripping hazards. (iv) Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures. (v) Prepare escape plans from areas where there might be a chlorine emission. (vi) Install safety showers and eye wash stations near the chlorine equipment and other areas where hazardous chemicals are stored or used. (vii) Prohibit eating, smoking, and drinking except in designated areas. (viii) Provide specific training on COVID 19 issues and availability of relevant specific PPEs for protection (COVID 19 H & S plan as ref material) (ix) Strictly follow H & S protocol as developed for COVID 19 pandemic	PHED	Operating costs
Increased in sewage generation	Water pollution, and impacts on public health and environment	Sanitation and sewerage/septage facilities needs to be improved/provided in the project area to suit the increased sewage generation	PHED and respective local bodies	To be identified

Table 38 : Construction Stage Environmental Monitoring Plan

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 16**	Weekly during construction	Supervising staff and safeguards specialists	Cost for implementation and monitoring is responsibility of contractor
Tree cutting and plantation	GLSR/IBPS, OHR and pipe laying sites	Obtain permission from concerned authority for any tree cutting and plant trees in the ratio of 1:5	-	Supervising staff and safeguards specialist	Contractors cost
Ambient air quality	5 locations (to be selected during implementation to represent the overall project area)	• PM_{10}, $PM_{2.5}$ NO_2, SO_2, CO	(i) Once before start of construction. (ii) Yearly 3 times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-years period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (50 samples x Rs.5000 per sample = Rs.250,000)
Ambient noise	10 locations (same as air quality monitoring)	• Day time and night time noise levels (24 hours)	(i) Once before start of construction. (ii) Yearly 3 times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-years period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (100 samples x Rs,1500 per sample = Rs.150,000)
Surface water quality	5 locations (to be selected during implementation)	• pH, Oil and grease, Cl, F, NO3, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity	(i) Once before start of construction. (ii) Yearly 3 times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-years period	Contractor	Cost for implementation of monitoring measures responsibility of contractor (50 samples x Rs.5000 per sample = Rs.250,000)

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
			considered)		
Soil quality	5 locations (including , construction camps, workers camps)	pH, Elect. Conductivity (at 25^0C), Moisture (at 105^0C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO4), Potassium (as K), Organic Matter, oil and grease	i) Once before start of construction. (ii) Yearly 3 times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-years period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (50 samples x Rs.5000 per samples = Rs.250,000.00)
Ground Water Quality	5 locations (including workers camp site & Construction camp/storage yards)	• As per IS10,500: 2012	(i) Once before start of construction. (ii) Yearly 3 times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-years period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (50 samples x Rs.6000 per samples = Rs.300,000.00)

Table 39: Operation Stage Environmental Monitoring Plan

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Monitoring of quality of water supplied to consumers	Consumer end-random sampling in all zones	pH, Nitrite, Nitrate, Turbidity BOD, Total Alkalinity, Total coliform and Faecal coliform	Monthly once	PHED	O&M costs (water quality will be tested at the internal laboratory part of water treatment plant)

B. Implementation Arrangements

275. PHED is the Executing and Implementing Agency for the WBDWSIP, responsible for management, coordination and execution of all activities funded under this sector project. PMU, established within the PHED, implement the project. PMU will be supported by district level Project Implementation Units (PIUs). PMU is headed by a Project Director (PD) in the rank of Chief Engineer. Each PIU is headed by a Superintending Engineer (SE), reporting to the PD. PMU with the support of PIUs are responsible for planning, implementation, monitoring and supervision, and coordination of all activities under the WBDWSIP. PMU is supported by Project Management Consultant (PMC) to supervise, monitor and oversee the implementation. Each PIU is supported by a Design, Supervision and Institutional Support Consultant (DSISC).

276. **Safeguards Compliance Responsibilities**. A Safeguard and Gender Cell (SGC) has been established in PMU with the overall responsibility of ensuring compliance with ADB SPS to ensure consistency with PAM. SGC is headed by a Head, Safeguards and Gender Officer (HSGO) and will report to the Project Director directly. The HSGO has overall responsibility in implementation of the resettlement framework, EARF, Resettlement Plans, EMPs, SEMP, GESI action plan, and appropriate monitoring and reporting responsibilities.Key environmental safeguard tasks and responsibilities at the PMU level are as follows:

(i) Ensure subprojects confirms to exclusion criteria and project selection guidelines as stipulated in the EARF;
(ii) Approve subproject environmental category;
(iii) Approve IEEs; ensure that updated IEEs/EMPs reflect final project designs;
(iv) Ensure that EMPs are included in bidding documents and civil works contracts;
(v) Ensure proper implementation of EMPs by contractors;
(vi) Facilitate and ensure compliance with all government rules and regulations regarding site and environmental clearances, as well as any other environmental requirements (e.g. location clearance certificates, environmental clearance certificates), as relevant;
(vii) Oversee public consultation and disclosure;
(viii) Approve quarterly EMP implementation reports;
(ix) Review and approve semi-annual monitoring reports prepared by PMC; and submit to ADB;
(x) Oversee grievances redress process and ensure timely redress;
(xi) Undertake regular review of safeguards related loan covenants, and the compliance in program implementation; and
(xii) Organize periodic capacity building and training programs for WBDWSIP stakeholders, PHED, PMU and PIU staff on safeguards.

277. The SGC is supported by environmental, social and gender safeguard specialists in the PMC. Key safeguard tasks and responsibilities of Environmental Management Specialist of the PMC on environmental safeguards are as follows:

(i) Review and finalize REA checklist and classify the project;
(ii) Review and confirm project selection/ design; ensure compliance with exclusion criteria and project environmental selection guidelines;
(iii) Review and finalize IEE reports including EMPs prepared/updated by PIUs/DSISCs;
(iv) Oversee public consultation and information disclosure activities; ensure timely disclosure;
(v) Provide advise/support in obtaining government clearance/ approvals;
(vi) Review and confirm that IEEs/EMPs are included in bids and contracts;

(vii) Review and confirm SEMPs prepared by contractor;
(viii) Oversee the implementation of SEMP by contractors and ensure corrective actions, where necessary;
(ix) Review and approve quarterly environmental monitoring reports submitted by PIU/DSISCs;
(x) Conduct site visits of project facilities and work sites to oversee implementation;
(xi) Prepare semi-annual environmental monitoring reports and submit to PMU SGC HSGO;
(xii) Oversee grievance redress process; advise on critical grievance related to environmental issues and concerns; and
(xiii) Organize training and capacity development programs.

278. **Project Implementation Unit**. At each PIU, an Assistant Engineer is given additional responsibilities of safeguard tasks and is designated as Assistant Safeguards Officer. The Safeguard Officer oversees the safeguards implementation at PIU level, coordinate public consultations, information disclosure, regulatory clearances and approvals, RP implementation, EMP implementation and grievance redressal. Key environmental safeguard tasks and responsibilities of Safeguard Officer are as follows:

(i) Coordinate public consultation and information disclosure;
(ii) Liaise with local offices of regulatory agencies in obtaining clearances /approvals; assist PMU for clearances obtained at state level;
(iii) Review and approve contractors SEMPs;
(iv) Oversee day-to-day implementation of SEMPs by contractors, including compliance with all government rules and regulations;
(v) Take necessary action for obtaining rights of way;
(vi) Ensure continuous public consultation and awareness;
(vii) Coordinate grievance redress process and ensure timely actions by all parties;
(viii) Review monthly contractor's SEMP Monitoring Reports;
(ix) Review and forward quarterly monitoring reports to PMU; and
(x) Inform PMU of unanticipated impacts and formulate corrective action plan; and
(xi) Recommend issuance of work construction work completion certification to the contractor upon verification of satisfactory post-construction clean-up.

279. The PIUs is assisted by DSISC teams which will include an Environmental Specialist and a Social Safeguards Specialist. Following are the key tasks of Environmental Specialist of DSISC:

(i) Assist PIU in identifying projects/components in compliance with the project exclusion criteria and selection guidelines stipulated in EARF;
(ii) Prepare environmental screening checklists and submit to PMU for categorization; update checklist and category as and when required to reflect project changes, and report to PMU;
(iii) Work closely with PIU and design teams to include environmental considerations in project location, design and technical specifications;
(iv) Identify statutory clearance / permissions / approvals required for subproject; assist PIU in obtaining them;
(v) Assist in including standards/conditions, if any, stipulated in regulatory clearances, consents in the project design;
(vi) Update IEE and EMP to reflect any changes in subproject during detail design / implementation; IEE shall reflect the final project design;
(vii) Lead / assist PIU in public consultation in compliance with the EARF; reflect inputs from public consultation in IEEs, EMPs, and project design;

(viii) Advise / assist PIU in disclosing relevant information on safeguards to stakeholders, affected people etc.;
(ix) Assist / ensure all EMP measures related project design and location and included in the detailed designs;
(x) Integrate EMP into the bid and contract documents (for item rate contracts, include full IEE including EMP in bids);
(xi) Advise contractor in preparation of SEMP as per the final design, prior to start of construction;
(xii) Ensure that all necessary clearances/permission (including those required by Contractor) are in place prior to start of construction;
(xiii) Monitor implementation of SEMP;
(xiv) ensure Contractors including subcontractor's, if any, comply with the measures set forth in the SEMP;
(xv) Assist PIU in establishing GRM for the Project:
(xvi) Assist PIU in grievance redress, advise the contractor on appropriate actions on grievances, ensure timely resolution and proper documentation;
(xvii) Identify, if any, non-compliance or unanticipated impacts; initiate corrective actions, report to PMU;
(xviii) Review and approve monthly monitoring reports submitted by Contractor; consolidate and prepare quarterly Environmental Monitoring Reports (EMR) and submit to PMU; and
(xix) Conduct training and capacity building activities (workshops, hands-on trainings, visits etc.,) in EMP implementation.

280. **Civil works contracts and contractors.** IEEs are included in bidding and contract documents. The PMU and PIUs ensure that bidding and contract documents include specific provisions requiring contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the project sites. The contractor has appointed an Environment, Health and Safety (EHS) supervisor to implement EMP. The EHS Supervisor has updated the EMP and submit an SEMP for approval of PIU. Contractors has carry out all environmental mitigation and monitoring measures outlined in EMP, approved SEMP and their contracts. Key responsibilities of the EHS supervisor are:

(i) Prepare SEMP and submit to PIU for approval prior to start of construction;
(ii) Conduct orientation and daily briefing sessions to workers on environment, health and safety including risk and protection measures for COVID 19;
(iii) Ensure that appropriate worker facilities are provided at the work place and labour camps as per the contractual provisions;
(iv) Records accidents and undertake remedial actions;
(v) Implement SEMP measures and report to PIU/DSISC if any new impacts are surfaced; seek guidance from as required in EMP implementation;
(vi) Conduct environmental monitoring (air, noise etc.,) as per the monitoring plan
(vii) Ensure conduct of water quality surveillance program;
(viii) Prepare monthly SEMP monitoring reports and submit to PIU;
(ix) Work closely with PIU Safeguards Officer and consultants to ensure communities are aware of project-related impacts, mitigation measures and GRM; and
(x) Address any public compliance and grievances effectively and in timely manner.

C. Capacity Building and Training

281. PMU HSGO and PIU Safeguard Officers have been trained by PMC and DSISC's safeguards experts on safeguards issues related to the project, GESI action plan and GRM. The EARF, Resettlement Framework, IPPF 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, Resettlement Framework, IPPF and Gender, ESI action plan, (iii) review, updating and preparation of the IEEs, SEMPs, resettlement plans, DDRs and IPPs (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 have been conducted to the contractors upon their mobilization by PIU Safeguard Officers supported by DSISCs.

282. The following **Table 40** presents the outline of capacity building program to ensure EMP implementation. The estimated cost is ₹325,000 (excluding trainings of contractors which is the part of EMP implementation cost during construction) to be covered by the project's capacity building program. The detailed cost and specific modules is customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the Environmental Safeguard of PMC.

Table 40 :Outline Capacity Building Program on EMP Implementation

Description	Target Participants and Venue	Estimate (₹)	Cost and 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, occupational health and safety, 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 (combined program for all subprojects)	₹100,000	**PMU Cost**
2. EMP implementation (1 day) - EMP mitigation and monitoring measures -Roles and responsibilities - Public relations, - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure - Construction site standard operating procedures (SOP) – Health & safety, specifically health risk from COVID 19 -- Chance find (archeological) protocol - AC pipe protocol - Traffic management plan - Waste management plan - Site clean-up and restoration	All PIU staff, contractor staff and consultants involved in the subproject At PIU (Bankura)	₹50,000 (Lump sum)	**PMU Cost**

Description	Target Participants and Venue	Estimate (₹)	Cost and Source of Funds
3. Plans and Protocols (1 day) - Construction site standard operating procedures (SOP) - AC pipe protocol - Site-specific EMP - Traffic management plan - Spoils management plan - Waste management plan - Chance find protocol - O&M plans - Post-construction plan	1. All staff and consultants involved in the project 2. All contractors prior to award of contract or during mobilization stage. At PIU (Bankura)	₹25,000 (Lump sum) ₹25,000 (Lump sum)	**PMU cost** **Contractors cost** as compliance to contract provisions on EMP implementation (refer to EMP tables)
4. Experiences and best practices sharing - Experiences on EMP implementation - Issues and challenges - Best practices followed	All staff and consultants involved in the project All contractors All NGOs At PMU Kolkata	₹100,000 (Lump sum)	**PMU Cost**
5. Contractors Orientation to Workers (1 day) - Environment, health and safety in project construction Health impact and protection from COVID 19	Once before start of work, and thereafter regular briefing every month once. Daily briefing on safety prior to start of work All workers (including unskilled laborers)	₹25,000 (Lump sum)	**Contractors cost** as compliance to contract provisions on EMP implementation (refer to EMP tables)

Summary of Capacity Building cost for EMP Implementation

Contractor Cost - INR 50,000
PMU Cost - INR 275,000
Total Cost - INR 325,000

D. Monitoring and Reporting

283. Immediately after mobilization and prior to commencement of the works, the contractor has submitted a compliance report to PIU that all identified pre-construction mitigation measures as detailed in the EMP are undertaken. Contractor has confirmed that the staff for EMP implementation (EHS supervisor) is mobilized. PIU has reviewed, and approve the report and permit commencement of works.

284. During construction, results from internal monitoring by the contractor is reflected in their monthly EMP implementation reports to the PIU. DSISC has reviewed and advised contractors for corrective actions if necessary. Quarterly report summarizing compliance and corrective measures taken is prepared by DSISC team at PIU and submitted to PMU. During operation, the contractor has conducted management and monitoring actions as per the operation stage EMP, and submit to PMU a quarterly report on EMP implementation and compliance.

285. Based on monthly and quarterly reports and measurements, PMU(assisted by PMC) submit semi-annual Environmental Monitoring Report (EMR).Once concurrence from the ADB is received the report will be disclosed on PHED/PMU websites. Template of Semi Annual Environment Monitoring Report (SEMR) is enclosed as **Appendix 17.**

286. ADB reviews project performance against the WBDWSIP commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities is commensurate with the project's risks and impacts. Monitoring and supervising of social and environmental safeguards are integrated into the project performance management system.

E. Environmental Management Plan Implementation Cost

287. Most of the mitigation measures require the contractors to adopt good site practices, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. The costs which are specific to EMP implementation and are not covered elsewhere in the projects are given below.

Table 41:Cost Estimates to Implement the Environmental Management Plan

	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
	A. Implementation staff						
1	EHS Supervisor	Construction	per month	36	50,000	1,800,000	Contractors cost
	Subtotal (A)					**1,800,000**	
	B. Mitigation Measures						
1	Consent for establishments and consent for operation from WBPCB; Other statutory permissions	Pre-construction	Lump sum			100,000	Project costs
2	Provision for tree cutting and compensatory plantation measures (1: 5 ratio replantation)	Construction	Per tree	200	1,000	200,000	Contractors cost
3	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	200,000	Contractors cost
4.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rain Water Harvesting for water conservation etc.)	Construction	Lump sum	-	-	200,000	Contractors cost
5	Arrangement of resources for prevention of health risk from COVID 19 pandemic	Construction	Provision - Lump sum	-	-	200,000	Contractors cost supported from Project cost on actual basis
	Subtotal (B)					**900,000**	
	C. Monitoring Measures						

	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
1	Air quality monitoring	Pre-Construction and Construction periods	per sample	50	5,000	250,000	Contractors cost
2	Noise levels monitoring	Do	Per sample	100	1,500	150,000	Contractors cost
3	Groundwater quality monitoring			50	6000	300,000	Contractors cost
4	Surface water quality monitoring	Do	Per sample	50	5,000	250,000	Contractors cost
5	Soil Quality	Do	Per sample	50	5000	250,000	Contractors cost
	Subtotal (C)					**1,200,000**	
	D. Capacity Building						
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			100,000	PMU
2	EMP implementation	Construction	lump sum			50,000	PMU
3	Preparation of plans and protocols (traffic management plan, waste (spoils) management plan etc.,	Construction	lump sum			25,000	PMU
			lump sum			25,000	Contractors cost
4.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Contractors cost
5.	Experiences and best practices sharing	Construction /Post-Construction	lump sum			100,000	PMU
	Subtotal (D)	**325,000**					
	Total (A+B+C+D)	**4,225,000**					

Contractor Cost - ₹3,950,000
PMU Cost - ₹275,000
Total Cost - ₹4,225,000

IX. CONCLUSION AND RECOMMENDATIONS

288. The process described in this document has assessed the environmental impacts of all elements of the proposed water supply distribution system subproject for Indpur Block of Bankura district. 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; thus, environmental impacts as being due to the project design or location were not significant.

289. The main design impacts of water supply system in general are due to abstraction of water. The Raw water source is Mukutmanipur reservoir, which has abundant quantity of water

throughout the year, even during the lean flow season. The Quality of raw water is good and is suitable for drinking water supply after conventional treatment and disinfection. Treated water for the subproject will be provided from bulk water supply system that is being developed under a parallel subproject, and the environmental impacts of which are assessed through an another IEE

290. Due to non-availability of suitable government owned land, all the selected OHSR sites are privately owned vacant lands, some of which are low-lying lands. No significant negative impacts envisaged due to filling up and raising of these low-lying lands, which are primarily private owned, and not necessarily part of overall natural drainage system. Appropriate measures suggested to avoid or minimize the impact. There are trees in some selected OHSR sites (e.g. Bholarkhap, Golakpur, Hatagram OHSRs), and also along the roads where pipelines are being laid. Measures are suggested to avoid, minimize, and carryout compensatory tree plantation in a ratio of 1:5. Proposed pipeline are being laid along ROW of all the roads in the project area. Overall, there are no notable sensitive environmental features in the project sites.

291. Construction activities are confined to the selected sites, and the interference with the general public and community around is minimal. There are temporary negative impacts, arising 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 aspects including COVID 19 risks and prevention. During the construction phase of pipeline work along the public roads, impacts arise from the construction dust and noise; disturbance to residents, businesses, traffic by the construction work, and from the need to dispose of large quantities of waste soil. The social impacts (access disruptions) due to construction activities are minimal. Trenchless technology is suggested at critical sections where pipeline crosses the main transportation corridors. These are the general impacts of construction in semi-urban, rural and habitation areas, and there are well developed methods of mitigation that are suggested in the EMP.

292. Anticipated impacts of water distribution system during O&M will be related to detection and repair of leaks, pipe bursts. These are, however, likely to be minimal, as proper design and selection of good quality pipe material shall mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work. Therefore, no notable operation phase impacts are anticipated from the subproject.

293. The public participation processes undertaken during project design ensured that stakeholders are engaged during the preparation of the IEE. The planned information disclosure measures and process for carrying out consultation with affected people facilitate their participation during project implementation.

294. The project's grievance redress mechanism provides the citizens with a platform for redress of their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

295. The EMP assists the project agencies and contractor in mitigating the environmental impacts, and guide them in the environmentally-sound execution of the proposed project.

296. A copy of the EMP/approved SEMP are kept on-site during the construction period at all times. The EMP is made binding on all contractors operating on the site, and is included in

the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitute a failure in compliance.

297. Groundwater in this block is contaminated with fluoride and water level is depleting. The project will benefit the general public by contributing to the long-term improvement of water supply system and community livability in the project block of Indpur. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and environmentally-sound engineering and construction practices.

298. Therefore, as per ADB SPS, the project is classified as environmental Category B and does not require further environmental impact assessment.

299. This IEE has been updated considering all 20 zones where designs were finalized and approved and SEMPs were submitted by the contractor. With further implementation of the project, if there is any change in design or location, this IEE will be again reviewed, updated and approved by PMU and further submitted to ADB for approval.

300. **Recommendations.** PMU, PIUs, and contractors to ensure that: (i) package wise details and evidences such as photographs/display board for grievance redress mechanism (GRM)/health and safety (H&S) measures taken at work sites due to COVID 19 pandemic are included in monthly monitoring report; and (ii) ensure that efficient implementation of the H&S Plan developed by the project in response to COVID-19 pandemic. Important protocols or measures in the H&S Plan are to ensure that the following are complied with at the offices and worksites of the project: (i) screening of employees and workers; (ii) record keeping of screening results; (iii) availability and use of appropriate PPEs; (iv) social distancing; (v) proper office set up reconfiguration to ensure social distancing; (vi) new office and work site meeting arrangements; and (vii) regular disinfection of work areas, vehicles and equipment; among others. PIU safeguards officer with the assistance of the safeguards experts of PMC/DSISCs and Contractors EHS officers of all districts are reminded to take precautions, provide continuous induction and continue conducting regular safeguards implementation trainings including implementation monitoring of regular usage of PPEs and COVID-19 related safety measures. Key reminders for the PMU, PIUs, contractors, and workers to comply with the following occupational health and safety measures as stated in the agreed OHS Plan:

(i) Ensure project staff, consultants, contractors, and workers have in their mobile devices the Aarogya Setu App, which is a mobile application developed and recommended by the government to proactively reach out to and inform the users of the app regarding risks, best practices and relevant advisories pertaining to the containment of COVID-19;
(ii) Mandatory isolation of the personnel or workers, either asymptomatic or showing symptoms, who have had direct contact with anyone tested positive for COVID-19. Follow the isolation procedures issued by the government;
(iii) Proper disposal of used PPE following guidelines and procedures issued by the government;
(iv) Conduct daily briefing on the developments of COVID-19 in the state or country, either through emails, meetings or daily toolbox talks;
(v) When possible, allow work from home arrangement based on the nature of jobs;
(vi) If necessary, pick up and drop off facility be extended to staff (based on the distance of the staff residence from office and on availability of safe mode of transport);

(vii) Avoid face to face meetings – critical situations requiring in-person discussion must follow social distancing. Do not convene in-person meetings of more than 10 people;

(viii) If possible, conduct all meetings via conference calls. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussions;

(ix) Contractor to help its workers arrange a systematic procurement of all daily needs and groceries at worksites. This will avoid each and every worker going to shops for these daily needs;

(x) Contractor to arrange for contactless payment of wages to workers, where possible;

(xi) Allow distributed breaktimes for workers to maintain social distancing and reduce contact;

(xii) Remind employees and workers to maintain good health by getting adequate sleep; eating a balanced and healthy diet, avoiding alcohol/smoking; and consuming plenty of fluids; and

(xiii) Remind employees and workers to extend their adherence to the H&S protocols at their respective homes. Infection may happen beyond the borders of offices and work sites.

Appendix 1: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST

Water Supply Distribution System

Instructions:
- ❑ This checklist is to be prepared to support the environmental classification of a project. It is to be attached to the environmental categorization form that is to be prepared and submitted to the Chief Compliance Officer of the Regional and Sustainable Development Department.
- ❑ This checklist is to be completed with the assistance of an Environment Specialist in a Regional Department.
- ❑ This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB checklists and handbooks on (i) involuntary resettlement, (ii) indigenous peoples planning, (iii) poverty reduction, (iv) participation, and (v) gender and development.
- ❑ 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: **India : West Bengal Drinking Water Sector Improvement Project (WBDWSIP) – Water Supply Distribution System for Indpur block of Bankura District**.

Sector Division: Urban Development

SCREENING QUESTIONS	Yes	No	REMARKS
A. Project Siting **Is the project area…**			
▪ Densely populated?		√	Project area is not densely populated Subproject activities extend to the entire Indpur block which is mainly rural and are sufficient away from habitations.
▪ Heavy with development activities?		√	Mostly rural area. No heavy development activity is noticed
▪ Adjacent to or within any environmentally sensitive areas?		√	No, environmental sensitive areas nearby
• Cultural heritage site		√	Few religious places are observed but no cultural heritage site is located nearby the project area
• Protected Area		√	No protected area nearby
• Wetland		√	No designated wetland within the project area
• Mangrove		√	
• Estuarine		√	
• Buffer zone of protected area		√	
• Special area for protecting biodiversity		√	No Special area for protecting biodiversity
• Bay		√	

SCREENING QUESTIONS	Yes	No	REMARKS
B. Potential Environmental Impacts Will the Project cause…			
• Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	Subproject deals with provision of distribution system. No source augmentation or treatment are part of this. Treated water will be supplied from bulk water supply system being developed under a parallel subproject, and the treated water quality will meet the drinking water standards . There is no waste water discharge in upstream of water source; i.e. Mukutmanipur reservoir
• Impairment of historical/cultural monuments/areas and loss/damage to these sites?		√	No impact expected. No cultural monuments and historical sites near project locations.
• Hazard of land subsidence caused by excessive ground water pumping?		√	Not applicable; subproject does not involve groundwater abstraction..
• Social conflicts arising from displacement of communities?		√	Project does not involve land acquisition /displacement. Land purchased at market rates. Social impacts are assessed through Resettlement Planning study of subproject
• Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?		√	Not applicable; subproject does not involve source development/operation. Water allocation from Mukutmanipur reservoir is done for Indpur and Taldangra blocks by Irrigation department, Government of West Bengal and only allocated water i.e 44 MLD shall be used for proposed water supply project
• Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?		√	Quality of raw water is in general of acceptable quality, which can be used for potable purposes after conventional treatment and disinfection Raw water may contain pathogens or mineral constituents and efficient treatment process will be required under the project
• Delivery of unsafe water to distribution system?		√	Not anticipated; treated water meeting drinking water standards at WTP will be delivered to distribution system from bulk water supply
• Inadequate protection of intake works or wells, leading to pollution of water supply?		√	Protection of intake works should be ensured
• Over pumping of ground water, leading to salinization and ground subsidence?		√	Not applicable; subproject does not involve groundwater abstraction
• Excessive algal growth in storage reservoir?		√	Proper treatment, post chlorination and regular cleaning of storage reservoirs will be conducted during operation
• Increase in production of sewage beyond capabilities of community facilities?	√		Sanitation and sewerage system will be improved/developed in the project area
• Inadequate disposal of sludge from water treatment plants?		√	Inadequate disposal of sludge from WTP may cause pollution to ground water/soil. The present subproject involves storage and distribution of clear water so no sludge accumulation is envisaged
• Inadequate buffer zone around pumping and treatment plants to alleviate noise and other	√		Low noise pumps and machineries should be used in pumping stations to avoid noise to nearby public.

SCREENING QUESTIONS	Yes	No	REMARKS
B. Potential Environmental Impacts Will the Project cause…			
possible nuisances and protect facilities?			
• Impairments associated with transmission lines and access roads?	√		Temporary impairments are anticipated along the new transmission line routes during construction stage.
• Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.	√		Contractor has to take precautions in handling and usage of chlorine to avoid any health hazard, no other hazardous chemicals are expected to be used during construction works.
• Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?	√		Contractor has to take precautions in handling and usage of chlorine to avoid any health hazard
• Dislocation or involuntary resettlement of people		√	Project does not involve land acquisition /displacement. Land will be purchased at market rates. There is no involuntary resettlement of people for project implementation. Temporary livelihood impacts will envisaged for which RP is prepared
• Social conflicts between construction workers from other areas and community workers?		√	The contractor will be utilizing the local labor force as far as possible; in case if it is unavoidable, labor camps and facilities will be provided appropriately. No conflicts envisaged
• Noise and dust from construction activities?	√		All the construction machineries employed will comply with noise emission standards of Central Pollution Control Board. Dust suppression measures such as water sprinkling will be employed
• Increased road traffic due to interference of construction activities?	√		Excavation and laying pipelines along public roads will interfere with the traffic. Construction material transport will increase traffic on the local roads. Proper traffic management and construction planning will be ensured to minimize the interference.
• Continuing soil erosion/silt runoff from construction operations?		√	Construction work during monsoon shall be carried out with due care so that silt run off due to construction operation is prevented. No construction will be allowed during rains.
• Delivery of unsafe water due to poor O&M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?	√		Unsafe water may be delivered if efficient water treatment is not done at WTP
• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?		√	Not envisaged. Non corrosive materials pipe will be used for distribution networks
• Accidental leakage of chlorine	√		Accidental leakage of chlorine gas may take place

SCREENING QUESTIONS	Yes	No	REMARKS
B. Potential Environmental Impacts Will the Project cause…			
gas?			during chlorination. Utmost care should be taken
• Excessive abstraction of water affecting downstream water users?		√	Water for the project is allocated by Government and only allocated water shall be used for water supply services.
• Competing uses of water?		√	Not applicable. Water for the project is allocated by Government and only allocated water shall be used for water supply services
• Increased sewage flow due to increased water supply	√		Sewerage system will also be improved under this project along with water supply
• Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant	√		Sanitation and sewerage needs to be improved.
• Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Most of the unskilled workers will be hired locally, some of skilled workers will be brought from outside but numbers will not so large to have impacts on social infrastructure and services
• Social conflicts if workers from other regions or countries are hired?		√	Outside workers will remain in labor camps and no social conflicts will envisaged
• 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 operation and construction?		√	No explosives shall be used in project. Fuel and other chemicals will be used in very less quantities which will not have significant impact on community health and safety. Safe handling of fuels and chemicals will be ensured by contractor.
• 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?	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of OHSR etc. for which mitigation measures will be required by contractor

A Checklist for Preliminary Climate Risk Screening

Country/Project Title: India / West Bengal Drinking Water Sector Improvement Project (WBDWSIP) – Water Supply Distribution System for Indpur block of Bankura District.
Sector : Urban Development
Subsector: Water Supply
Division/Department: SARD/SAUW

Screening Questions		**Score**	**Remarks**[34]
Location and Design of project	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	As per local enquiries carried out during field visits and from the vulnerability mapping of the district for flood prone areas indicates that the subproject components are not located in the flood prone/tropical cyclone areas. However, the Indpur block receives a large amount of rains and construction woks may be impacted during rainy season. Entire Bankura district and the project are a fall in Zone III, which is classified as Moderate Damage Risk Zone in India.
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

Options for answers and corresponding score are provided below:

Response	Score

[34] If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): **Medium risk**
Other Comments: No

Appendix 2 :Applicable Ambient Air Quality Standards for ADB funded projects in India

Parameter	Location [a]	India Ambient Air Quality Standard ($\mu g/m^3$)[b]	WHO Air Quality Guidelines ($\mu g/m^3$)		Applicable Per ADB SPS[e] ($\mu g/m^3$)
			Global Update [c] 2005	Second Edition 2000	
PM_{10}	Industrial Residential, Rural and Other Areas	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
	Sensitive Area	60 (Annual) 100 (24-hr)	20 (Annual) 50 (24-hr)	-	20 (Annual) 50 (24-hr)
PM_{25}	Industrial Residential, Rural and Other Areas	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)	-	10 (Annual) 25 (24-hr)
	Sensitive Area	40 (Annual) 60 (24-hr)	10 (Annual) 25 (24-hr)		10 (Annual) 25 (24-hr)
SO_2	Industrial Residential, Rural and Other Areas	50 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	50 (Annual) 20 (24-hr) 500 (10-min)
	Sensitive Area	20 (Annual) 80 (24-hr)	20 (24-hr) 500 (10-min)	-	20 (Annual) 20 (24-hr) 500 (10-min)
NO_2	Industrial Residential, Rural and Other Areas	40 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	40 (Annual) 80 (24-hr) 200 (1-hr)
	Sensitive Area	30 (Annual) 80 (24-hr)	40 (Annual) 200 (1-hr)	-	30 (Annual) 80 (24-hr) 200 (1-hr)
CO	Industrial Residential, Rural and Other Areas	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
	Sensitive Area	2,000 (8-hr) 4,000 (1-hr)	-	10,000 (8-hr) 100,000 (15-min)	2,000 (8-hr) 4,000 (1-hr) 100,000 (15-min)
Ozone (O_3)	Industrial Residential, Rural and Other Areas	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
	Sensitive Area	100 (8-hr) 180 (1-hr)	100 (8-hr)		100 (8-hr) 180 (1-hr)
Lead (Pb)	Industrial, Residential, Rural and Other Areas	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
	Sensitive Area	0.5 (Annual) 1.0 (24-hr)		0.5 (Annual)	0.5 (Annual) 1.0 (24-hr)
Ammonia (NH_3)	Industrial Residential, Rural and Other	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)

Parameter	Location [a]	India Ambient Air Quality Standard	WHO Air Quality Guidelines (µg/m^3)		Applicable Per ADB SPS[e]
	Areas				
	Sensitive Area	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)
Benzene (C_6H_6)	Industrial Residential, Rural and Other Areas	5 (Annual)			5 (Annual)
	Sensitive Area	5 (Annual)			5 (Annual)
Benzo(o)pyrene (BaP) particulate phase only	Industrial Residential, Rural and Other Areas	0.001 (Annual)			0.001 (Annual)
	Sensitive Area	0.001 (Annual)			0.001 (Annual)
Arsenic (As)	Industrial Residential, Rural and Other Areas	0.006 (Annual)			0.006 (Annual)
	Sensitive Area	0.006 (Annual)			0.006 (Annual)
Nickel (Ni)	Industrial Residential, Rural and Other Areas	0.02 (Annual)			0.02 (Annual)
	Sensitive Area	0.02 (Annual)			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.

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.

Stake Height Requirement of DG sets

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]

Appendix 3
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/kmhr)	HC (g/kmhr)	NOx (g/kmhr)	PM(g/kmhr)
1991Norms	14	3.5	18	-
1996 Norms	11.2	2.4	14.4	-
India stage 2000 norms	4.5	1.1	8.0	0.36
Bharat stage-II	4.0	1.1	7.0	0.15
Bharat Stage-III	2.1	1.6	5.0	0.10
Bharat Stage-IV	1.5	0.96	3.5	0.02

Source: Central Pollution Control Board

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

Appendix 4
Ambient Noise Level Standards for ADB funded projects in India

Receptor/ Source	India National Noise Level Standards (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 DG Set

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

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
Writers' Buildings, "G" Block, (2nd. Floor),
Kolkata-700 001.

No. EN/3170/T-IV-7/001/2009 Dated: December 10th, 2009.

DIRECTION

WHEREAS, Department of Environment, Govt. of West Bengal is entrusted to look after the execution of the different environmental laws within the territorial jurisdiction of West Bengal and also responsible for maintaining pollution free environment and also responsible for restraining different environment hazardous activities which are causing serious impact on human beings, other living creatures, plant, micro-organism, property or the environment ;

AND WHEREAS, Department of Environment has already taken different steps for controlling air pollution in the atmosphere generated from the different sources i.e. industrial source, vehicular source and burning of bio-mass;

AND WHEREAS, Department of Environment in exercising the power conferred under section 19 of the Air (Prevention & Control of Pollution) Act, 1981, has already declared entire West Bengal as 'Air Pollution Control Area';

AND WHEREAS, West Bengal Pollution Control Board conducted a study with the help of the Asian Development Bank and it is revealed that the contribution of the construction activities is one of the source of air pollution in Kolkata and its surroundings ;

AND WHEREAS, it is further revealed that burning of old tyres in hot mix plant as a fuel during construction and repairs of road for melting coal tar contributes significant obnoxious element into the air which cause a serious problem of the human beings ;

HENCE, in view of the above and in consultation with the West Bengal Pollution Control Board and in exercise of the power conferred under Air (Prevention & Control of Pollution) Act, 1981 and Environment (Protection) Act, 1986, all the municipalities, local authorities and all other concerned Govt. Departments within the State of West Bengal, are now directed to take immediate steps to implement the following norms which need to be strictly followed by the developers, contractors or any other infrastructure developers ;

- Preventive measures need to be taken: -

a) Wrap construction area/buildings with geotextile fabric, installing dust barriers, or other actions, as appropriate for the location.
b) Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization,
c) Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process;
d) Limit vehicle speeds to 15 mph on the work site.
e) Clean wheels and undercarriage of haul trucks prior to leaving construction site.
f) Apply and maintain dust suppressant on haul routes.
g) Apply a cover or screen to stockpiles and stabilize stockpiles at completion of activity by water and maintain a dust palliative to all outer surfaces of the stockpiles;
h) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition where loaders, support equipment and vehicles will operate;
i) Stabilize adjacent disturbed soils following paving activities with immediate landscaping activity or installation of vegetative or rock cover.
j) Maintain dust control during working hours and clean track out from paved surfaces at the end of the work shift/day. Track out must now extend 50 feet or more and must be cleaned daily, at the minimum.
k) Stabilize sloping surfaces using soil binders until vegetation or ground cover can effectively stabilize the slope,
l) Disposal of debris in consultation with the local authorities following proper environmental management practice.
m) During construction work, including cutting of marbles, ambient noise level should not exceed more than 65 dB(A).

Local Police Station is also directed to render all necessary help to the Local Authorities to implement the aforementioned direction in a befitting manner.

This order will take effect from 01-01-2010 through out the State of West Bengal.

By Order,
Sd/-
(M. L. Meena)
Principal Secretary to the Govt. of West Bengal.
Department of Environment.

Appendix 6
EXTRACT FROM CONSTRUCTION and DEMOLITION MANAGEMENT RULES, 2016

[Published In the Gazette of India, Part-II, Section-3, Sub-section (ii)]
Ministry of Environment, Forest and Climate Change

NOTIFICATION

New Delhi, the 29th March, 2016

G.S.R. 317(E).-Whereas the Municipal Solid Wastes (Management and Handling) Rules, 2000 published vide notification number S.O. 908(E), dated the 25th September, 2000 by the Government of India in the erstwhile Ministry of Environment and Forests, provided a regulatory frame work for management of Municipal Solid Waste generated in the urban area of the country;

And whereas, to make these rules more effective and to improve the collection, segregation, recycling, treatment and disposal of solid waste in an environmentally sound manner, the Central Government reviewed the existing rules and it was considered necessary to revise the existing rules with a emphasis on the roles and accountability of waste generators and various stakeholders, give thrust to segregation, recovery, reuse, recycle at source, address in detail the management of construction and demolition waste.

And whereas, the draft rules, namely, the Solid Waste Management Rules, 2015 with a separate chapter on construction and demolition waste were published by the Central Government in the Ministry of Environment, Forest and Climate Change vide G.S.R. 451 (E), datedthe 3rd June, 2015 inviting objections or suggestions from the public within sixty days from the date of publication of the said notification;

And Whereas, the objections or suggestions received within the stipulated period were duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by sections 6, 25 of the Environment (Protection) Act, 1986 (29 of 1986), and in supersession of the Municipal Solid Wastes (Management and Handling) Rules, 2000, except as respect things done or omitted to be done before such supersession, the Central Government hereby notifies the following rules for Management of Construction and Demolition Waste –

1. Short title and commencement.-(1) These rules shall be called the Construction and Demolition Waste Management Rules, 2016.

(2) They shall come into force on the date of their publication in the Official Gazette.

2. Application.-The rules shall apply to every waste resulting from construction, re-modeling, repair and demolition of any civil structure of individual or organisation or authority who generates construction and demolition waste such as building materials, debris, rubble.

3. Definitions –(1) In these rules, unless the context otherwise requires,-

(a) "ACT' means the Environment (Protection) Act, 1986 (29 of 1986);

(b) **"construction"** means the process of erecting of building or built facility or other structure, or

building of infrastructure including alteration in these entities.;

(c) **"construction and demolition waste"** means the waste comprising of building materials, debris and rubble resulting from construction, re-modeling, repair and demolition of any civil structure;

(d) **"de-construction"** means a planned selective demolition in which salvage, re-use and recycling of the demolished structure is maximized;

(e) "demolition" means breaking down or tearing down buildings and other structures either manually or using mechanical force (by various equipment) or by implosion using explosives.

(f) "form" means a Form annexed to these rules;

(g) "local authority" means an urban local authority with different nomenclature such as municipal corporation, municipality, nagarpalika, nagarnigam, nagarpanchayat, municipal council including notified area committee and not limited to or any other local authority constituted under the relevant statutes such as gram panchayat, where the management of construction and demolition waste is entrusted to such agency;

(h) " schedule" means a schedule annexed to these rules;

(i) "service provider' means authorities who provide services like water, sewerage, electricity, telephone, roads, drainage etc. often generate construction and demolition waste during their activities, which includes excavation, demolition and civil work.

(j) "waste generator" means any person or association of persons or institution, residential and commercial establishments including Indian Railways, Airport, Port and Harbour and Defence establishments who undertakes construction of or demolition of any civil structure which generate construction and demolition waste.

(2) Words and expressions used but not defined herein shall have the same meaning defined in the ACT.

(4) Duties of the waste generator –

(1) Every waste generator shall prima-facie be responsible for collection, segregation of concrete, soil and others and storage of construction and demolition waste generated, as directed or notified by the concerned local authority in consonance with these rules.

(2) The generator shall ensure that other waste (such as solid waste) does not get mixed with this waste and is stored and disposed separately.

(3) Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall segregate the waste into four streams such as concrete, soil, steel, wood and plastics, bricks and mortar and shall submit waste management plan and get appropriate approvals from the local authority before starting construction or demolition or remodeling work and keep the concerned

authorities informed regarding the relevant activities from the planning stage to the implementation stage and this should be on project to project basis.

(4) Every waste generator shall keep the construction and demolition waste within the premise or get the waste deposited at collection centre so made by the local body or handover it to the authorised processing facilities of construction and demolition waste; and ensure that there is no littering or deposition of construction and demolition waste so as to prevent obstruction to the traffic or the public or drains.

(5) Every waste generator shall pay relevant charges for collection, transportation, processing and disposal as notified by the concerned authorities; Waste generators who generate more than 20 tons or more in one day or 300 tons per project in a month shall have to pay for the processing and disposal of construction and demolition waste generated by them, apart from the payment for storage, collection and transportation. The rate shall be fixed by the concerned local authority or any other authority designated by the State Government.

(5) Duties of service provider and their contractors -

(1) The service providers shall prepare within six months from the date of notification of these rules, a comprehensive waste management plan covering segregation, storage, collection, reuse, recycling, transportation and disposal of construction and demolition waste generated within their jurisdiction.

(2) The service providers shall remove all construction and demolition waste and clean the area every day, if possible, or depending upon the duration of the work, the quantity and type of waste generated, appropriate storage and collection, a reasonable timeframe shall be worked out in consultation with the concerned local authority.

(3) In case of the service providers have no logistics support to carry out the work specified in sub-rules (1) and (2) , they shall tie up with the authorised agencies for removal of construction and demolition waste and pay the relevant charges as notified by the local authority.

(6) Duties of local authority-The local authority shall,-

(1) issue detailed directions with regard to proper management of construction and demolition waste within its jurisdiction in accordance with the provisions of these rules and the local authority shall seek detailed plan or undertaking as applicable, from generator of construction and demolition waste;

(2) chalk out stages, methodology and equipment, material involved in the overall activity and final clean up after completion of the construction and demolition ;

(3c) seek assistance from concerned authorities for safe disposal of construction and demolition waste contaminated with industrial hazardous or toxic material or nuclear waste if any;

(4) shall make arrangements and place appropriate containers for collection of waste and shall remove at regular intervals or when they are filled, either through own resources or by appointing private operators;

(5) shall get the collected waste transported to appropriate sites for processing and disposal either through own resources or by appointing private operators;

(6) shall give appropriate incentives to generator for salvaging, processing and or recycling preferably in-situ;

(7) shall examine and sanction the waste management plan of the generators within a period of one month or from the date of approval of building plan, whichever is earlier from the date of its submission;

(8) shall keep track of the generation of construction and demolition waste within its jurisdiction and establish a data base and update once in a year;

(9) shall device appropriate measures in consultation with expert institutions for management of construction and demolition waste generated including processing facility and for using the recycled products in the best possible manner;

(10) shall create a sustained system of information, education and communication for construction and demolition waste through collaboration with expert institutions and civil societies and also disseminate through their own website;

(11) shall make provision for giving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads.

(7) Criteria for storage, processing or recycling facilities for construction and demolition waste and application of construction and demolition waste and its products-

(1) The site for storage and processing or recycling facilities for construction and demolition waste shall be selected as per the criteria given in **Schedule I**;

(2) The operator of the facility as specified in sub- rules (1) shall apply in **Form I** for authorization from State Pollution Control Board or Pollution Control Committee.

(3) The operator of the facility shall submit the annual report to the State Pollution Control Board in **Form II.**

(3) Applicatinn of materials made from construction and demolition waste in operation of sanitary landfill shall be as per the criteria given in **Schedule II.**

(8) Duties of State Pollution Control Board or Pollution Control Committee-

(1) State Pollution Control Board or Pollution Control Committee shall monitor the implementation of these rules by the concerned local bodies and the competent authorities and the annual report shall be sent to the Central Pollution Control Board and the State Government or Union Territory or any other State level nodal agency identified by the State Government or Union Territory administration for generating State level comprehensive data. Such reports shall also contain the comments and suggestions of the State Pollution Control Board or Pollution Control Committee with respect to any comments or changes required:

(2) State Pollution Control Board or Pollution Control Committee shall grant authorization to construction and demolition waste processing facility in **Form-III** as specified under these rules after examining the application received in **Form I**.

(3) State Pollution Control Board or Pollution Control Committee shall prepare annual report in **Form IV** with special emphasis on the implementation status of compliance of these rules and forward report to Central Pollution Control Board before the 31st July for each financial year.

(9) Duties of State Government or Union Territory Administration-

(1) The Secretary in-charge of development in the State Government or Union territory administration shall prepare their policy document with respect to management of construction and demolition of waste in accordance with the provisions of these rules within one year from date of final notification of these rules.

(2) The concerned department in the State Government dealing with land shall be responsible for providing suitable sites for setting up of the storage, processing and recycling facilities for construction and demolition waste.

(3) The Town and Country planning Department shall incorporate the site in the approved land use plan so that there is no disturbance to the processing facility on a long term basis.

(4) Procurement of materials made from construction and demolition waste shall be made mandatory to a certain percentage (say 10-20%) in municipal and Government contracts subject to strict quality control.

(10) Duties of the Central Pollution Control Board - (1) The Central Pollution Control Board shall.-

(a) prepare operational guidelines related to environmental management of construction and demolition waste management;

(b) analyze and collate the data received from the State Pollution Control Boards or Pollution Control Committee to review these rules from time to time;

(c) coordinate with all the State Pollution Control Board and Pollution Control Committees for any matter related to development of environmental standards;

(d) forward annual compliance report to Central Government before the 30th August for each financial year based on reports given by State Pollution Control Boards of Pollution Control Committees.

(11) Duties of Bureau of Indian Standards and Indian Roads Congress -The Bureau of Indian Standards and Indian Roads Congress shall be responsible for preparation of code of practices and standards for use of recycled materials and products of construction and demolition waste in respect of construction activities and the role of Indian Road Congress shall be specific to the standards and practices pertaining to construction of roads.

Schedule III
Timeframe for Planning and Implementation
[See Rule 13]

Sl. No.	Compliance Criteria	Cities with population of 01 million and above	Cities with population of 0.5-01 million	Cities with population of less than 0.5 million
1	Formulation of policy by State Government	12 months	12 months	12 months
2	Identification of sites for collection and processing facility	18 months	18 months	18 months
3	Commissioning and implementation of the facility	18 months	24 months	36 months
4	Monitoring by SPCBs	3 times a year – once in 4 months	2 times a year – once in 6 months	2 times a year – once in 6 months

**The time Schedule is effective from the date of notification of these rules.*

FORM – I
See [Rule 7 (2)]
Application for obtaining authorisation

To,
The Member Secretary

_____Name of the local authority or Name of the agency appointed by the municipal authority :

Correspondence address Telephone No. Fax No.	
Nodal Officer and designation (Officer authorized by the competent authority or agency responsible for operation of processing or recycling or disposal facility)	
Authorisation applied for (Please tick mark)	Setting up of processing or recycling facility of construction and demolition waste
Detailed proposal of construction and demolition waste processing or recycling facility to include the following Location of site approved and allotted by the Competent Authority Average quantity (in tons per day) and composition of construction and demolition waste to be handled	

Appendix 7

SALIENT FEATURES OF MAJOR LABOR LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN CONSTRUCTION OF CIVIL WORKS

(i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.

(ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days' wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.

(iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.

(iv) Maternity Benefit Act, 1951 - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.

(v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.

(vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.

(vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.

(viii) Equal Remuneration Act, 1979 - The Act 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.

(ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33 % of wages and maximum of 20 % of wages to employees drawing ₹3,500/- per month or less. The bonus to be paid to employees getting ₹2,500/- per month or above up to ₹3,500/- per month shall be worked out by taking wages as ₹2,500/- per month only. The Act does not apply to certain establishments. The newly set up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of the Act.

(x) Industrial Disputes Act, 1947 - The Act lays down the machinery and procedure for resolution of industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.

(xi) Industrial Employment (Standing Orders) Act, 1946 - It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the States and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the employer on matters provided in the Act and get the same certified by the designated Authority.

(xii) Trade Unions Act, 1926 - The Act lays down the procedure for registration of trade unions of workmen and employees. The trade unions registered under the Act have been given certain immunities from civil and criminal liabilities.

(xiii) Child Labor (Prohibition and Regulation) Act, 1986 - The Act prohibits employment of children below 14 years of age in certain occupations and processes and provides for regulation of employment of children in all other occupations and processes. Employment of child labor is prohibited in Building and Construction Industry.

(xiv) Inter-State Migrant Workmen's (Regulation of Employment and Conditions of Service) Act, 1979 - The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state). The inter-state migrant workmen, in an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home up to the establishment and back, etc.

(xv) The Building and Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act of 1996 - All the establishments who carry on any building or other construction work and employ 10 or more workers are covered under this Act. All such establishments are required to pay Cess at rate not exceeding 2% of the cost of construction as may be notified by the Government. The employer of the establishment is required to provide safety measures at the building or construction work and other welfare measures, such as canteens, first-aid facilities, ambulance, housing accommodation for workers near the workplace etc. The employer to whom the Act applies has to obtain a registration certificate from the Registering Officer appointed by the Government.

Appendix 8:Drinking Water Standards

Applicable Drinking Water Quality Standards for ADB funded projects in India

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

[a] Bureau of India Standard 10200: 2012.
[b] Health-based guideline values.
[c] Per ADB SPS, the government shall achieve whichever of the ambient air quality standards is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency of the government will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.
[d] Figures in parenthesis are maximum limits allowed in the absence of alternate source.

Appendix 9

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 Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4 mg/L or more Free Ammonia (as N) 1.2 mg/L or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max. 2250 Sodium absorption Ratio Max. 26 Boron Max. 2 mg/L

Source: Central Pollution Control Board
mg/L = milligram per liter, ml = milliliter, MPN = Most Probable Number

Appendix 10
Guidelines for Safety during Monsoon/Heavy Rainfall

Excavation and refilling of earth are common activities, which, if not carefully executed may pose problems to the safety of works as well as passersby and road users during the impending Monsoon.

Normal and heavy rainfall event affect our ongoing works, It should be our conscientious effort to ensure that such events do not prove to be problematic to people and structures in town. During monsoon PIU/PMDSC should ensure that any further excavation work is taken up only after ensuring that the earlier work is in safe stage. It is desired that DCM/ACM & Ex En PIU should inspect all sites during rains and take proactive actions.

[

Some of the precautions and mitigation measures to be taken are discussed below-

[

1. The execution of works having deep excavation in smaller lanes and congested areas should be completed well before monsoon. The works of deep excavation during monsoon should not be preferably taken up or extensive care should be taken for execution of such works.
2. The settlement in refilled trenches of sewerage and water supply lines may occur during monsoon. PMDSC and PIU team should inspect all sites after a storm to identify such reaches and take immediate corrective action by proper refilling and compacting. It is responsibility of all engineers to look after this activity during monsoon and ensure corrective actions from Contractor's side.
3. The contractor's crew should be equipped with vehicle, gum boots, raincoats, torch etc. to tackle such situation during and after rains. Adequate quantities of earth, debris and gravel should be stacked at strategic places so that no time is lost in procuring such material.
4. In trenches where pipe laying has been done and duly tested and approved, refilling should be done and all surplus material relocated to safe disposal sites such that it does not obstruct traffic or waterways.
5. All open ends of WS and WW pipelines should be firmly plugged to prevent debris from entering the pipeline. Manhole covers of sewer lines should be fixed in place to avoid any harm to road users.
6. Drains are primary or secondary carriers of storm water. Any unutilized construction material should be relocated to allow free passage of storm water. Surplus earth should be suitably and immediately be relocated to avoid earth from falling into the drain so that choking does not occur.
7. Overhead works should not be carried on in-weather conditions that threaten the safety of workers. More frequent checks on scaffold and bracings should be done during monsoon season.
8. Additional precautions should be taken of the power lines, ignorance and carelessness can cause major accidents and casualty.
9. Take preventive measures for water logging in working areas by providing dewatering pumps. Place bright and reflective warning signs.
10. Inspection should also be carried out before resumption of work after a shower/rain.
11. Storage of Construction Material: Steel & Cement are vital ingredients for quality construction work but in absence of proper storage, especially during monsoon, cement and steel may rapidly decline in quality and strength. Care should be taken to protect these materials and use of any exposed material should be allowed only after conducting fresh tests. Improper storage of such material should be reported to SE PIU/ACM PMDSC and use of any apparently affected material should be done after permission of SE

PIU/DCM/ACM.

Additional Precautions

1. Adequate set up and resources such as dewatering pumps, electrical routings etc should be planned ahead. Water logging on main roads to be avoided, where construction works are going on.
2. Ensuring the monsoon specific PPE's issued in adequate and are used during monsoon.
3. Use of electric extension box should be avoided; extension cables (if used) should not be wet and damaged. Cables connections should be only weatherproof/waterproof. Electrical and HSE personnel of contractor should visit permanent and running sites regularly. Transparent protective sheets/rain sheds should be placed for the power distribution boards.
4. Welding machines, bar cutting machines etc. should be kept in dry conditions; should not stand in water logged area. Brakers and Drill machines should not be used when raining; dirt/mud should be scrubbed with cloth.
5. Special Trainings to all drivers and operators on safe practices and all vehicles/ equipment's maintenance checks to be more frequent.
6. High boom equipment to be stopped during blowing of high speed wind and rain storm. Arresting of parked vehicles, equipment during mansoon should be done.
7. All chemicals should be stored as per MSDS, chemicals to be protected from water ingress. Chemical waste should be disposed for preventing overflow of chemicals.
8. At labor camps following precautions should be taken:-
    - Maintaining hygiene & proper housekeeping.
    - Additional health checkup camp to identify seasonal diseases
    - Preventive measures on mosquito/parasite breeding mainly in work locations and camps
    - Frequent cleaning of toilets
    - To avoid water borne diseases, high level of cleanliness to be maintained, drinking water containers need to be cleaned and kept covered. Walk areas and pathways to be covered with Murom and soft rock particles (to avoid soft soil conditions).
    - Obstacle free approach to rest sheds, camp and toilets.
    - Proper illumination, provision of battery operated emergency lights
    - No bonfires inside resting sheds. No use of wood.

SE–PIU and DCM/ACM-PMDSC should oversee the arrangements to effectively deal with the eventuality.
EHS officer of contractor should visit each site and camps more frequently. Contractor/EHS officer will also impart training on safe working methods during Monsoon and will keep a daily watch on weather conditions to share with site team to act accordingly.

Contractor should organize Monsoon Health Camps and Monitor Workmen Habitat and Hygiene.

Appendix 11: Summary of Public Consultations

Date	Place	No. Of Participants	Concerns / Issued Discussed	Photographs
09.08.18	Raghunathpur Gram Panchayat Office Bankura	Community Members & Land Owners : 21 [Male : 17 Female : 4]	• Local people were found aware about the upcoming water supply project in their area. Role of ADB & PHED were discussed with them • How the Arsenic / Fluoride contaminates the Ground Water was discussed with them. It was mentioned that, why treated surface water is safer than ground water in all respects. • It was suggested by the participants that, door step Water Connection to be provided to each household without any prejudice and local influence and no partiality or preferences should be allowed in this context. • Door step water connection will be a great relief for the village women as it will reduce their Time Poverty. • The participants were informed that, during construction phase any grievances will be mitigated on priority basis. • It was said by the participants that, local people will extend their full support for successful implementation of the project. • In the question of affordability, the respondents said that, If all the people get better service then everyone will gladly pay the water tariff. **Land Owners:** • Consultation with the land sellers revealed that, they are aware about the side effects of consuming untreated ground water.	 

Date	Place	No. Of Participants	Concerns / Issued Discussed	Photographs
			Local tube wells are checked periodically through Panchayats and health dept. officials. Yet, the quality of the water is not found to be satisfactory due to various reasons like high concentration of iron, salinity and poor taste. • Upon consultation, all the land sellers said that, they are willing to sell their parcel of land at Govt. Price. They have not been forced rather they are happy for having the opportunity to be a part of the project. • The proposed land is laid vacant for several years, they do not have any income from the land. Cultivation was done this year after several years due to better monsoon. It is a rain-fed plot. • All the land sellers have their own livelihood and a permanent place to live so they will not suffer if they are being compensated at actual Govt. Price of the land. • It was further added that, the amount they will receive from the Govt. will enable them to secure their future. hey assure their full co-operation in land purchase process.	

PARTICIPANTS LIST OF CONSULTATION PROGRAMME WITH LAND OWNERS OF PROPOSED GLSR & OHR SITES AND COMMUNITY PEOPLE

Attendance Sheet

COMMUNITY CONSULTATIONS

Location - Raghunathpur Gram panchayat.

Date - 09-08-2018

Sl.No.	Name of Participants	Address /Contact Number	Signature
1	Sushar Murmu	Baga. 7076512665	R.G.P (Murmu)
2,	Chandankar	Baga. 9732202642	
3.	[illegible]	9732203551	[illegible]
4.	Kalyan Chakraborty	9932983689	
5.	Uttam Kr. Mandal	9732162000	
6	[illegible]	7477379558	[illegible]
7	[illegible]	9641780670	[illegible]
8	Bikash Murmu	9474814295 chhalagara.	Murmu
9	Arup Mandal	7431004397	Mandal.
10	Mahadeb Dey	7001328564	

Attendance Sheet

COMMUNITY CONSULTATIONS

Location - Raghunathpur Gram Panchayat

Date - 09-08-2018

Sl.No.	Name of Participants	Address /Contact Number	Signature
11	Bidhan Bauri	9002556796 Rajadi	Bidhan Bauri
12.	Goutam Mandal	9932568354	
13.	Dilip Mandal. Sahayak Raghunathpur GP	9002051218	
14.	Tarapada mandal.	8010171704.	
15.	Sujit Patra	9732207752	
16	Rajani kanta Bauri	764/969220	
17.	Manjulipa Mandal		
18.	Dilip Mandal	8116113626	
19.	Rita Rani Mandal	7063602069	Rita mandal.
20.			

Date	Place	No. Of Participants	Issues Raised By The Participants	Issues Addressed	Photographs
09.08.18	Dhunigarah, Bankura	Community Members : 20 Male : 14 Female : 6 Land Owner : 10 Male : 8 Female : 2	**Community Members :** **(i)** Water Connections should reach every households without any discrimination. **(ii)** Provision for Public Tap should be created at Public Places like Market Area, Bus Stands, Festive Ground, Religious Places etc. **(iii)** If water supply hampers due to damage or choking of line where and how that can be reported. **Land Owners :** **(i)** Provision of employment in the project for members of the family. **(ii)** Before commencement of work at the proposed sites, the appropriate price of the land should be handed over to the respective land lords. **(iii)** If any complaints raised, where and how they can mitigate those issues	24 X 7 piped drinking water will be provided at every doorsteps of the project area. Benefits of treated Surface Water than Ground Water were also explained to the participants. As per the project design, best interest of the common people will always remain primary focus of the project. A trained group of villagers preferably women of the villages will be recruited for Operation & Maintenance of the assets created through the project. As per the SPS 2009 of Asian Development Bank, all land owners will be paid adequate compensation as determined by the Govt. prior to commencement of work. The Grievance Redress Mechanism was explained to the participants.	

PARTICIPANTS LIST OF CONSULTATION PROGRAMME WITH LAND OWNERS AND COMMUNITY PEOPLE AT DHUNIGARAH

Attendance Sheet

COMMUNITY CONSULTATIONS

Location: Dhunigarah.

Date 09-08-2012

Sl No	Name of Participants	Address /Contact Number	Signature
1	এবাদুল ইসলাম মন্ডল	6296718485	এবাদুল ইসলাম মন্ডল
2	মইনুদ্দিন ভূঁইয়া	9732478944	মইনুদ্দিন ভূঁইয়া
3	এবারক খাঁ	—	এবারক খাঁ
4	আবারাক মন্ডল	—	আবারাক মন্ডল
5	আবেরুন মন্ডল	9732105049	আবেরুন মন্ডল
6	আমেনা খাতুন মন্ডল	—	আমেনা খাতুন মন্ডল
7	লতিফা মন্ডল	8001990549	লতিফা মন্ডল
8	আজমিনা মন্ডল	—	আজমিনা মন্ডল
9	রাবিয়া খাতুন	6295822552	রাবিয়া খাতুন
10	মোহাম্মদ সৈয়দ মন্ডল	7477359618	Md. Saud Mondal

***

Attendance Sheet

COMMUNITY CONSULTATIONS

Location - Dhuwigbasak

Date - 09-08-2018

Sl No.	Name of Participants	Address /Contact Number	Signature
11	তাহিদুল মন্ডল	8250704735	Tahidul Mondal
12	ইমাজিম খাঁন	~~9937~~ 9933379707	ইমাজি মন্ডল
13	বাকিবিল্লা মন্ডল	6295340034	বাকিবিল্লা মন্ডল
14	জুমার মন্ডল	8348535824	জুমার মন্ডল
15	Sarfuraj Mondal	8016513445	Sarfuraj Mondal
16	হাবিবুর রহমান	9732370512	Habibur Rahman
17	নাসির মন্ডল	8001351991	নাসির মন্ডল
18	আ: জুকুর খাঁন	9564970587	আ: জুকুর খাঁন
19	আবদুল সবির মন্ডল	8348341342	Abdus Sobhan Mondal
20	আবদুল মন্ডল	8145841502 2	আবদুল মন্ডল

Attendance Sheet

Land Owner -

Location - Dhumiagorah

Date -

Sl No.	Name of Participants	Address /Contact Number	Signature ✓
01	[illegible]	9732105049	Esark Mondal
02	[illegible]	7872644315	[illegible]
03	[illegible]	8001990549	[illegible]
04	[illegible]	9732-28 2896	[illegible]
05	[illegible]	629782	Mojibul Mondal
06	[illegible]	—	[illegible]
07	[illegible]	9563929791	Sautanchel.
08	[illegible]	9732203551	[illegible]
09	[illegible]	9476130179	[illegible]
10	Arim Das	9475982819	Arim Das

SOME PHOTOGRAPHS OF STAKEHOLDER CONSULTATIONS

Summary of Public Consultations

(Package-02A)

BLOCK	MOUZA	GP	OHR/GLSR ZONE CODE	Number of Participants	Concerned/ Issues discussed	Photographs
Indpur Block	Bheduasole Mouza	Bheduasole Gram Panchayat	Venue- Bheduasole G.P Office Date- 30th August, 2019	Community people (41) Male- 36 Female-5	• Given brief description of the project. • Discussed about water borne diseases and fluoride contamination of ground water. • Collected information of total number of tube wells including working and non-working condition present in this GP. Most of the tube wells are in very bad condition. • Collected information about well and water quality of the well available in the villages. They said it was found rock inside well within few meters. • Collect information about drainage and sewerage problems of the villages. • Agricultural status of the villages situated in that GP. • Frequency of drought in the mentioned block is remarkable. • Few local people were found aware about the upcoming water supply project in their area.	 

					• Role of ADB and PHED were discussed with them. • Benefits and importance of treated surface water were discussed. • Participants assured us that they will extend their helping hand for successful implementation of the project. • Availability of local labour during construction time was discussed. Sufficient amount of labours available in the villages. • Discussed about dust pollution, noise pollution, disturbance, road diversion (Traffic conrtol) during construction time. • Discussed to villagers about willingness to pay for safe water. They have no problem to pay for drinking water. • Women of the villages said that door to door water connection will save their time. • Villagers also said that due to scarcity of water sanitation is not maintained properly.	

<table>
<tr><th>Date</th><th>Place</th><th>No. Of Participants</th><th>Concerns / Issued Discussed</th><th>Photographs</th></tr>
<tr><td>07.11.19</td><td>Brahmandiha G.P.</td><td>40</td><td rowspan="3">Discussions:
Discussions were carried out on project facilities and features.
Main goal of the project.
Project covering areas
Water conservation, personal hygiene and health related issues relating to use of safe water were discussed.
Women beneficiary
Grievance registration and redressal system etc.
Concerns of the Participants:
People present were concerned about charges for the facility. They informed that if charges are applicable, they would not be able to utilize the facility as most of the villagers are poor. Also asked about road restoration responsibility after pipe laying activity.</td><td>  </td></tr>
<tr><td>07.11.19</td><td>Brarajpur G.P.</td><td>26</td><td>  </td></tr>
<tr><td>24.01.20</td><td>Kurusthalia</td><td>43</td><td>  </td></tr>
</table>

24.01.20	**Kharbari**	**17**		

Block	Date & Place	No of Participants	Concerns/ Issues Discussed	Photographs
Indpur	**25-02-2020 & Indpur Block office**	**Female: 6 Total participants: 25**	**Discussions:** • Discussions started with briefing about projects basic features and facilities. • All Residential, Commercial, Educational Religious, Health institutions will get potable water from this project. • The project covers Bankura, North & South 24 Parganas and East Midnapore. In Bankura district will cover four blocks namely, Indpur, Taldangra, Mejia & Gangajalghati with 100% block coverage. • Through this project 24x7 drinking water will be provided to every household. Each household will get 70 lpcd water through metered connection. • The project will directly and indirectly benefit people on economic & health aspects of life. • Women's roles and involvement in the project were discussed. • Briefing were given on Grievance redressal Mechanism. • Government order on AMSDF were discussed. • Operation and Maintenance of the whole distribution network system will be handed over to Panchayat after completion. Maintenance of bulk water supply will be PHED's responsibility. • A brief discussion were carried out on Panchayat's and VWSC's roles and responsibilities in the project. • Panchayat will be responsible for O&M of the distribution system. As a wing VWSC will act on behalf of Panchayat for Operation and Maintenance of distribution system. • Construction activities within the project block was briefed. Information were also given on current status and ongoing activities. **Concerns of the Participants:** • People present were mainly concerned about charges for the facility. • Panchayat representatives wanted to know source of fund to maintain the distribution system.	 

PARTICIPANTS LIST OF CONSULTATION PROGRAMME WITH LAND OWNERS OF PROPOSED GLSR & OHR SITES AND COMMUNITY PEOPLE

PHOTOGRAPHS: -

West Bengal Drinking Water Sector Improvement Project

Attendance Sheet for Public Consultation Meeting

District: BANKURA Block: INDPUR

Village (venue): BHEDUASOLE G.P. OFFICE Duration of Discussion: 1 HOUR

Date: 30.08.2019 Time: 11:30 A.M

No. of Participants: 41 (Male: 36 Female: 5)

Sl. No.	Name	Sex	Profession (1. Service 2. Business 3. Agriculture 4. Laingbour 5. Not working 6. other)	Social Category (1. SC 2. ST 3. OBC 4. GEN 5. Other)	Signature
	Sushil Goswami				
1	9474182172	M.	Approach hon.	G.N.	Goswami
2	Bidhan Goswami 9635172014	M	V.R.P	G.N	
3	Asesh Goswami 9732095299	M	—	G	
4	Sahika patra 8016221554	M	V.R.P	Gen	
5	Amit Kar 8927303779	M	V.R.P	Gen,	A. Kar
6	Tareen Roy 9474330429	M	V.R.P	S.C	Roy
7	Bharat Lakshmi Layek 8670488795	M	V.R.P	G.N	Bharat Lakshmi Layek
8		M	Farmer	S.C	Sumanta Dawri
9	Suman Gorai 8001071729	M	V.R.P (volunteer)	Gen	S. Gorai
10	Biswajit Singha 6295143094	M	Farmer	GN	
11	Achintya Patra 6294842806	M	Activist	G	Achintya
12	Sankar Kumar Patra 9002082875	M	Farmer	GN	

24	31	Pailestat Karmaky 967943325	M	—	G.N	—
25	32	Prasanta Mandal 8371858988	M	V.R.P	SC	Prasanta Mandal
26	33	Sosovan Das 8016515208	M	V.R.P	G.N	Sasovan AS
27	34	Minati murmu 7318756661	M	V.R.P	G.N	minatimurmu
28	35	Kanchan Banerjee 6295871604	M	GRS	Gen	[illegible]
29	36	[illegible]	M	Farmer	SC	Jiten Bauri
30	37	Pratiba Kumbhakar 9800402915	M	"	O.B.C	
31	38	শান্তি মন্ডল	F	"	S.C	Shanti Mandal
32	39	Ranjan Roy 9893567680	M	Agro	SC	[illegible]
33	40	সত্য বাউরি	M	Farmer	"	Satyaprasa Bauri
34	41	Swades mahanti 7400275765	M	Business	Gen	Satu
35	42	[illegible] 9547775694	M	"	SC	Bholanath Mandal
36	43	[illegible] 9679398481	M	Member	SC	Roy
37	44	[illegible] 9547520633	M	"	SC	[illegible]
38	45	Ranjit Patra 8001645851	M	"	G.N	[illegible]
39	46	Jayanta Sinha 9434029299	M	Sahayak	Gen	J.Sinha
40	47	8972602416 Biswajit Layek	M	Farmer	SC	Biswajit Layek
41	48	9434865649 Purnima Mandal	F	Business	SC	P. Mandal

13	[illegible]	F	SHG member	S.C	Kabita Bauri
14	Mithu Bauri	F	"	S.C	Mithu Bauri
15	[illegible]	F	"	S.C	Chandana Bau
16	Dr. Gurucharan Bag 8250457565	M	H.M.O	S.C	GBag
17	[illegible] 8083856808	M	Farmer	S.C	Shanta Bauri
18	9800903776 Joyleb Bauri	M	"	SC	[illegible]
19	Uttam Mandal 8972746802	M	"	S.C	[illegible]
20	Anwar Hussain	M	Liasioning Manager	GRN	[illegible]
21	Ranjan Kumar Malik	M	Environment & Forest	Govt	[illegible]
22	Mathya chatterjee 7001792153	M	DSIS C, Bankura	General	Chatterjee
23	Chandan Km. Majee	M	Env. staff	OBC	Majee

West Bengal Drinking Water Sector Improvement Project

Attendance Sheet for Public Consultation Meetings

District: Bankura
Block: Indpur
Village: Gottoria (Bramhandiha GP office)
Duration of Discussion: 1:15
Date: 7-11-2019
Time: 11:00AM
No. of Participants: 40
M: 15 F: 25

Sl. No.	Name	Sex	Profession 1. Service 2. Business 3. Farming 4. Not Working 5. Other	Social Category 1. SC 2. ST 3. OBC 4. Gen 5. Other	Signature
1	Raj Kumar Mondal [illegible]	M	Pradhan	OBC	[illegible]
2	Sonali Patra 9434479198	F	Upa Pradhan	Gen	Sonali Patra
3	Kanai Mondal 9800487062	M	Not	OBC	Kanai Mondal
4	SOUREN DAS 7001995148	M	Other	Gen	[illegible]
5	[illegible] 8116614546	M	[illegible]	[illegible]	[illegible]
6	GOUTAM BAURI 9933817379	M	Not working	SC	Goutam Bauri
7	Amarjyoti Layek 9734377201	M	Not working	SC	A. Layek
8	Raj Kumar Bauri 6294093863	M	Not	SC	Raj Kumar Bauri
9	Jharna Mandal	F	House wife	OBC	Jharna Mandal
10	[illegible] 7047908730	F	Housewife	OBC	[illegible]
11	Renuka Hembram 9732074796	F	A.S.H.A	ST	Renuka Hembram
12	Raimoni Mandi - 9933734244	F	ASHA	ST	Raimoni Mandi
13	Jharna Pathak 8348951722	F	ASHA	Gen	Jharna Pathak
14	Rekha Panda 9635331087	F	ASHA	Gen	Rekha Panda
15	Tonushree Patra 8116654293	F	ASHA	Gen	Tonushree Patra
16	Rekha Mahanty 9002455063	F	ASHA	Gen	Rekha Mahanty
17	[illegible] 8116482343	F	GP: m	Gen	[illegible]
18	Sujata Biswas (ASHA) [illegible]	F	ASHA	Gen	Sujata Biswas
19	Swapna Mal 9932476362	F	ASHA	Gen	Swapna Mal

20	Nilima Nath 954748217	F	ASHA	Gen	Nilima Nath
21	Amita Panda 9830553247	F	ASHA	Gen	Amita panda
22	Archana Mandal [illegible]	F	[illegible]	OBC	Archana Mandal
23	Rita Das 7679585856	F	[illegible]	Gen	Rita Das
24	Rita Pathak [illegible]	F	ASHA	Gen	Rita Pathak
25	Madhuri Panda [illegible]	F	GPM	Gen	Madhuri Panda
26	[illegible]	F	[illegible]	[illegible]	[illegible]
27	Rita Band 7047907412	F	GPM	SC	[illegible]
28	Laxmi Sing Sardar [illegible]	F	GPM	ST	[illegible]
29	Archana Bauri 8116595149	F	GPM	SC	Archana Bauri
30	Namita Mandal [illegible]	F	ASHA	[illegible]	N. Mandal
31	Asmita Kundu [illegible]	F	"	other	A. Kundu
32	Papita Modak 6296162713	F	"	other	P. Modak
33	Bishal Paramanik [illegible]	M	Sigma	OBC	Bishal Paramanik
34	Rohit Rakshit 7001905744	M	Sigma	Gen	R. Rakshit
35	Sumanta Kundu [illegible]	M	[illegible]	Gen	[illegible]
36	Sebapriya Ghosh	M	PIU/[illegible]	"	[illegible]
37	[illegible] Chatterjee [illegible]	M	DSISE	"	Chatterjee
38	SUDIP GHOSH	M	EE/PMU	"	[illegible]
39	PRANAY MUKHERJEE	M	EHS/PMC	Gen	[illegible]
40	Jayanta Chakraborty	M	SSE/PMC	"	[illegible]
41					
42					
43					
44					
45					
46					
47					
48					
49					

West Bengal Drinking Water Sector Improvement Project

Attendance Sheet for Public Consultation Meetings

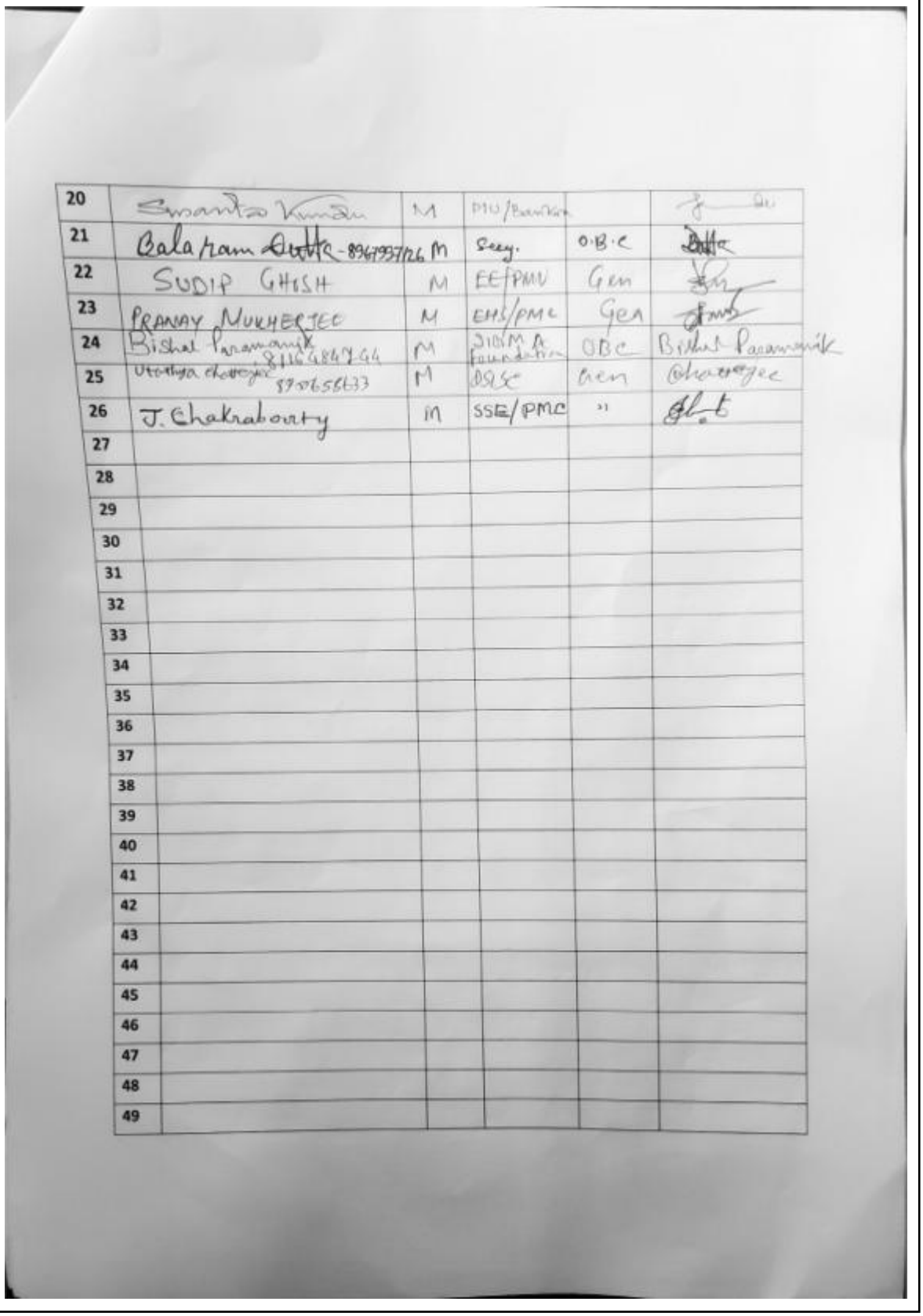
District: Bankura **Block:** Indpur

Village: Mukunia (Brajarajpur GP) **Duration of Discussion:** 1 hr. 15 minutes

Date: 07-11-2019 **Time:** 1:45 PM

No. of Participants: 26 **M:** 25 **F:** 1

Sl. No.	Name	Sex	Profession 1. Service 2. Business 3. Farming 4. Not Working 5. Other	Social Category 1. SC 2. ST 3. OBC 4. Gen 5. Other	Signature
1	Tutu Goswami 7908318542	F	Pradhan Brajarajpur	Gen	[illegible]
2	Samarendra Goswami 8670441099	M	Up. Pradhan Brajarajpur	Gen	[illegible]
3	Milan Paul 9732357525	M	Executive BDO	Gen	[illegible]
4	Bappaditya Patra 9547606005	M	MGNREGS Supervisor	Gen	Bappaditya Patra
5	Saroj Patra 9635406536	M	Contractor	Gen	Saroj Patra
6	Chandi das Goswami 9732013861	M	Farmer	General	Chandi das Goswami
7	Dilip Kumar Roy 9933182724	Mal	Mechanic [illegible]	Gen	[illegible]
8	Gouvendra Nath Dutta 9732098199	M	Farming	OBC	[illegible]
9	Abdul Mondal 9547098365	M	Farmers	S.T	Abdul Mondal
10	Swaranta Hansda 629668119[illegible]	M	Farmers	S.T	Swaranta Hansda
11	Aralinda Hazra 9732263202	M	Farmer	General	A Hazra
12	Swarupa nanda Goswami 9635454036	M	Business	Gen	[illegible]
13	Subrata kumar Pal 9002120284	M	Farmer	Gen	[illegible]
14	Nur Alam Mallick 74790307[illegible]8	M	G.R.S. Brajarajpur	O.B.C	N.A. Mallick
15	Jayanta Goswami 8972524887	M	Brajarajpur G.P	Gen.	[illegible]
16	Parimal Roy 9679145262	M	V.L.E Brajarajpur GP	Gen	Roy
17	Krishna Pada Patra 7029568600	M	MGNREGS Supervisor	Gen	K. Patra
18	Jiten Patra 9933108071	M	Supervisor	Gen	Jiten Patra
19	Debapriya Ghosh	M	PIU/BNK		[illegible]



20	Swantra Kumar	M	PMU/Bandel		
21	Balaram Dutta - 8961937126	M	Secy.	O.B.C	Dutta
22	SUDIP GHOSH	M	EE/PMU	Gen	
23	PRANAY MUKHERJEE	M	EHS/PMC	Gen	
24	Bishal Paramanik 8116484744	M	DIBM A foundation	OBC	Bishal Paramanik
25	Utathya chatterjee 8970656633	M	DSE	Gen	Chatterjee
26	J. Chakraborty	M	SSE/PMC	"	
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					

West Bengal Drinking Water Sector Improvement Project

Attendance Sheet for Public Consultation Meetings

District: Bankura Block: Indpur

Village: Kurusthalia Duration of Discussion: 01 Hr. 15 min.

Date: 24-01-2020 Time: 11:50

No. of Participants: 43 M: 25 F: 18

Sl. No.	Name	Sex	Profession 1. Service 2. Business 3. Farming 4. Not Working 5. Other	Social Category 1. SC 2. ST 3. OBC 4. Gen 5. Other	Signature
1	Umesh ch. Hembram	M	3	2	Umesh ch. Hembram
2	Prasanta Hembram	M	3	2	প্রশান্ত হেমব্রম
3	Jiten Soren	M	3	2	জীতেন সরেন
4	Felaram Hembram	M	3	2	ফেলারাম হেমব্রম
5	Biswajit Murmu	M	3	2	Biswajit Murmu
6	Boluram Hembram	M	3	2	বলুরাম হেমব্রম
7	Santilal Hembram	M	3	2	Santilal Hembram
8	Bablu Mandi	M	3	2	Bablu Mandi
9	Kalyan Murmu	M	3	2	Kalyan murmu
10	Dilip Soren	M	3	2	দিলীপ সরেন
11	Mrityunjay Mandi	M	3	2	mrityunjay Mandi
12	Sikoria Murmu	M	3	2	সিকোরিয়া মুর্মু
13	Prosanta Tudu	M	3	2	প্রসান্ত টুডু
14	Bablu Hembram	M	3	2	Bablu Hembram
15	Debasish Hembram	M	3	2	দেবাশীষ হেমব্রম
16	Alik Mandi	M	3	2	Alik Mandi
17	Gangadhar Handda	M	3	2	গঙ্গাধর হাঁসদা
18	Swapan Kr. Murmu	M	3	2	Swapan Kr. Murmu
19	Ranjan Kr. Mandi	M	3	2	Ranjan Kr. Mandi

20	Sarada Mandi	F	3	2	
21	Mridul Murmu	F	3	2	
22					
23	Sumitra Murmu	F	3	2	
24					
25	Sonali Mandi	F	3	2	
26					
27	Saraswati Hembram	F	3	2	
28					
29	Putki Hembram	F	3	2	
30					
31	Dhanmani Hembram	F	3	2	
32					
33	Kakali Hembram	F	3	2	
34	Sorathi Murmu	F	3	2	
35	Srimati Hembram	F	3	2	
36					
37	Sunil Soren	M	3	2	
38	Sobitri S Tudu	F	3	2	
39	Amita Hembram	F	3	2	
40	Salma Murmu	F	3	2	
41	Bharati Tudu	F	3	2	
42	Jamani Soren	F	3	2	
43	Sakuntala Kisku	F	3	2	
44	Sumitra Soren	F	3	2	
45	Kiyamani Hembram	F	3	2	
46	Anil Murmu	M	3	2	
47	Chitharanjan Murmu	M	3	2	
48	Bhakti Ranjan Hembram	M	3	2	
49	Dablu Soren	M	3	2	
	Durga Hembram	M	3	2	

24-01-2020

Shyama Kumar Hansda
Member
Rajarajpur Gram Panchayat
Jharia Sansad
24/01/2020

West Bengal Drinking Water Sector Improvement Project

Attendance Sheet for Public Consultation Meetings

District: Bankura
Block: Indpur
Village: Kharbari
Duration of Discussion: 50 min.
Date: 24-01-2020
Time: 3:15
No. of Participants: 17
M: 17 F: 0

Sl. No.	Name	Sex	Profession 1. Service 2. Business 3. Farming 4. Not Working 5. Other	Social Category 1. SC 2. ST 3. OBC 4. Gen 5. Other	Signature
1	Sushil Satkhia	M	3	1	
2	Shreedeb Tudu	M	3	2	
3	Sunil Hansda	M	3	2	
4	Sanjoy Mandal	M	5	2	Sanjoy Mandal
5	Baren Mal	M	5	1	
6	Dulal Mandal	M	3	1	Dulal Mandal
7	Basudeb Murmu	M	5	2	
8	Sitaram Tudu	M	3	2	
9	Nabin Hansda	M	3	2	
10	Sumanta Murmu	M	5	2	
11	Nathuram Bauri	M	5	1	
12	Suresh Mandi	M	3	2	
13	Sanjit Tudu	M	3	2	Sanjit Tudu
14	Sujan Mal	M	5	1	Sujan Mal
15	~~Amal~~ Anil Mal	M	5	1	
16	Uttam Mondal	M	5	1	Uttam Mondal
17	Thakur Das Hansda	M	3	2	
18	Krishnapada Dhurmit	M	5	2	
19					

@Chatterjee

Sushil Satkhia
Member
Indpur Gram Panchayet 24.01.2020

BLOCK LEVEL ORIENTATION CUM WORKSHOP FOR WBDWSIP — INDPUR BLOCK.

Name.	Mobile No.	Signature
1. MANISH NANDY	8348942366.	[signature] 25/02/2020.
2. [signature]	8961286348	[signature] 25/2/2020
3. PRAHALAD NISANKE DSISC - Construction Manager	94380-79031	P. Nisanke 25-02-2020
4. Ganesh Chowdhury SIGMA Foundation	9679250335	[signature]
5. Utathya Chatterjee DSISC, Bankura	8900658633	Chatterjee
6. Shantanu [illegible] Bandyopadhyay	993390294C	[signature]
7. Asima Patra	7076949410	APatra
8. [illegible]	9134658049	[signature]
9. Suparna Patra	8116265685	S Patra
10. Jhuma Bauri	8927392570	JBauri
11. Sampa Bhadra	7076345359	SB
12. Asit kumar Saha	9434481487 -	[signature]
13. Aparajita Patra (Layek)	8101986076	A Patra (Layek)
14. Jhuma Bauri	8101644380	Jhuma Bauri
15. Narugopal Mudi	9064642165	[signature]
16. Ratan Khal	9635673975	RKhal
17. Apurba Saha	9609543796	Sahana
18. Ajay Goswami	9800018671	[signature]
19. Dipak Mandal	9064583498	[signature]

Scanned with CamScanner

Name.	P. No.	Signature.
20. Biswajit Bag	9434625929	
21. Utpal Mandal	9474578111	
22. Krishna pada Maji	~~9732055797~~	
23. Raju Maji	9547613713	
24. Raskumar mondal	9064219619	
25. Ajoykumar maiti	7585869800	
26.		
27.		
28.		

Appendix 12: SAMPLE GRIEVANCE REGISTRATION FORM

(To be available in Bengali and English)

The _____Project welcomes complaints, suggestions, queries, and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.
Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing *(CONFIDENTIAL)* above your name. Thank you.

Date	Place of registration	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 update on your comment/grievance?					

FOR OFFICIAL USE ONLY

Registered by: (Name of official registering grievance)	
Mode of communication: Note/letter E-mail Verbal/telephonic	
Reviewed by: (Names/positions of officials reviewing grievance)	
Action taken:	
Whether action taken disclosed:	Yes No
Means of disclosure:	

অভিযোগ নিবন্ধন ফর্মের নমুনা

..... প্রকল্পকে বাস্তবায়িত করার লক্ষে অভিযোগ, পরামর্শ, অনুসন্ধান এবং মন্তব্যের জন্য স্বাগত।

আমরা অভিযোগকারীকে অভিযোগ সহ নাম জানাতে উৎসাহিত করি এবং আপনার সাহচর্যে এসে এর শোধন ও প্রতিক্রিয়া জানাতে সক্ষম হই।

অবশ্যই আপনি আপনার ব্যক্তিগত বিষয় বিস্তারিত ভাবে যুক্ত করতে ইচ্ছাপ্রকাশ করবেন। যে তথ্য আপনি দেবেন, তা অবশ্যই গোপন থাকবে। তাই অনুগ্রহ করে আপনার নাম লিখে / টাইপ করে জানান।

তারিখ	নিবন্ধনের জায়গা		প্রকল্পের শহর প্রকল্পঃ		
যোগাযোগের তথ্য / বিস্তারিত ব্যক্তিগত তথ্য					
নাম		লিঙ্গ	পুরুষ মহিলা	বয়স	
বাড়ীর ঠিকানা					
জায়গা / স্থান					
ফোন নঃ					
ই-মেল					
যেকোন অভিযোগ / পরামর্শ / মন্তব্য / প্রশ্ন অনুগ্রহ করে নিচে বিস্তারিতভাবে (কে, কি, কোথায় এবং কেমন করে) আপনার অভিযোগ জানান যদি কোন সংযুক্তি / চিরকুট / চিঠি অন্তর্ভুক্ত করতে চান, অনুগ্রহ করে সেখানে টিক দিন।					
আপনার অভিযোগ / মন্তব্যের হালনাগাদ (আপডেট) বা প্রতিক্রিয়া কিভাবে পেতে চান?					

Office ব্যবহারের জন্যঃ

অভিযোগ নিবন্ধনকারী আধিকারিকের নামঃ	
যোগাযোগ ব্যবস্থাঃ চিরকুট / চিঠি- ই-মেল- মৌখিক / টেলিফোন-	
নিবন্ধকৃত অভিযোগ পর্যালোচনাকারী আধিকারিকের নাম ও পদঃ	
অভিযোগের বিরুদ্ধে গৃহীত ব্যবস্থা-	
গৃহীত ব্যবস্থা প্রকাশ্যে আনা হয়েছে কি না	হ্যা না
প্রকাশের উপায়	

Grievance Redressal Sheet

Location- Suruliya

Month - OCTOBER.

Date	complaint number	Complaint through phone	complaint details	Action taken by IEC-DMSC	Date case resolved	Remarks	Location	Signature
17.10.20	01	Site	Stone and Sand Stacked upon the main Road	L&T	19.10.20	Problem Sloved	Suruliya	

Appendix 13 : GRC Notification and Committee

State & District Level Steering committee – GRC

Memo no. PMU/WBDWSIP/PHED/104/ 356(1-9) **Dated Kolkata the 07.05.2019**

Copy forwarded for information to:

1. P.A. to the Chief Secretary, Govt. of West Bengal. For kind information of the Chief Secretary.
2. P.A. to the Additional Chief Secretary, I & W Department. For kind information of the Additional Chief Secretary.
3. P.A. to the Additional Chief Secretary, P & R Department. For kind information of the Additional Chief Secretary.
4. P.A. to the Additional Chief Secretary, Finance Department. For kind information of the Additional Chief Secretary.
5. P.A. to the Principal Secretary, PHE Department. For kind information of the Principal Secretary
6. P.A. to the Principal Secretary, Public Works Department. For kind information of the Principal Secretary.
7. P.A. to the Principal Secretary, Urban Development & Municipal Affairs Department. For kind information of the Principal Secretary.
8. P.A. to the Principal Secretary, Land and Land Reforms Department. For kind information of the Principal Secretary.
9. P.A. to the Engineer-in-Chief, PHE Department. For kind information of the Engineer-in-Chief.

07.05.19

Chief Engineer & Project Director
PMU, WBDWSIP, PHE Dte
Government of West Bengal

Memo no. PMU/WBDWSIP/PHED/104/ 356(1-30) **Dated Kolkata the 07.05.2019**

Copy forwarded for information and necessary action to:

1. The District Magistrate, North 24 Parganas/South 24 Parganas/Purba Medinipur/Bankura.
2. The Additional District Magistrate (LR)/DLLRO, Land and Land Reforms Department, North 24 Parganas/ South 24 Parganas/Purba Medinipur/Bankura.
3. The Additional Executive Officer, North 24 Parganas/South 24 Parganas/ Purba Medinipur/Bankura Zilla Parisad.
4. The Superintending Engineer, PIU, North 24 Parganas/Purba Medinipur/Bankura, WBDWSIP, PHED
5. The Superintending Engineer, Western Highway Circle-II/South Western Highway Circle/Eastern Highway Circle/ Southern Highway Circle, PW (Roads) Dte.
6. The Superintending Engineer, Western Circle II/ South Western Circle, PWD
7. The Superintending Engineer, Metropolitan Drainage Circle-I / Eastern Circle / Kangsabati Circle-I, Bankura / Western Circle-II, Medinipore/ Damodar Irrigation Circle, Irrigation and Waterways Dte.
8. The Executive Engineer, PIU, North 24 Parganas/ Purba Medinipur/ Bankura, PHE Dte
9. The Executive Engineer, Barasat Highway Division -I/ South 24 Parganas Highway Division /Tamluk Highway Division/ Bankura Highway Division, PW (Roads) Dte.
10. The Executive Engineer, Tamluk Division/ Bankura Division, PWD
11. The Executive Engineer, Contai Division/ Kangsabati Canal Division –I/ Damodar Headworks, I & W Dte.

07.05.19

Chief Engineer & Project Director
PMU, WBDWSIP, PHE Dte
Government of West Bengal

Public Health Engineering Department
West Bengal Drinking Water Sector Improvement Project
(WBDWSIP)

Minutes of the 1st Meeting of State Level Steering Committee on West Bengal Drinking Water Sector Improvement Project (WBDWSIP) under the Chairmanship of Chief Secretary, West Bengal in the Conference Hall, Nabanna,13th Floor, Howrah, held on 16.04.2019 at 11:00AM.

The list of Members present is attached as Annexure-A

Chief Secretary, Government of West Bengal took the chair and initiated the discussions.

2) Principal Secretary, Public Health Engineering Department apprised the committee that after the approval of Government of West Bengal and the Department of Economic Affairs, Government of India, Loan agreement with Asian Development Bank was signed on 03.10.2018 for an amount of 240Million US Dollar as Loan and 3 million US Dollar as Grant under Japanese Fund for Poverty Reduction(JFPR) for execution of 3 (three) Water Supply Projects in Arsenic affected areas of North 24 Parganas district, salinity affected areas of Purba Medinipur district and fluoride affected areas of Bankura district under WBDWSIP. The objective of the Project is to deliver safe, sustainable and inclusive drinking water services in the aforesaid project districts with provision of 100% house hold metered connection to provide 24 X 7 water supply. One Project Management Unit (PMU) headed by Chief Engineer & Project Director and 3(Three) Project Implementation Units (PIU) headed by Superintending Engineer under P.H.Engineering Department have been established for timely implementation of the Project.

3) Chief Engineer & Project Director described the details of the project through a power point presentation and highlighted the following points in respect of three subprojects:

i) In **Bankura district**, the DPR for Bankura district has been prepared considering 8(eight) blocks namely Taldangra, Indpur, Gangajalghati, Mejhia, Sonamukhi, Patrasayer, Joypur and Kotolpur. But presently the 4(four) blocks, namely Taldangra, Indpur, Gangajalghati and

Mejhia will be covered fully through piped water supply with the financial assistance from ADB. The proposal for remaining 4(four) blocks will be taken up with ADB for additional funding as the ADB officials advised in their *aide memoire* during their last consultation mission on 26-27 March, 2019.

ii) In **Purba Medinipur district**, DPR for 4(four) Blocks namely Nandakumar, Chandipur, Nandigram-I and Nandigram-II has been prepared. But presently 2(Two) Blocks namely Nandigram –I and Nandigram –II will be covered fully through piped water supply with the financial assistance from ADB. But the Water Treatment Plant will be constructed for catering to all 4(four) blocks as mentioned above. The proposal for remaining 2(Two) blocks will be taken up with ADB for additional funding.

iii) In **North 24 Parganas and South 24 Parganas districts**, Haroa and Bhangar-II blocks will be covered fully through piped water supply but Water Treatment Plant is considered for Barasat-II block also. The cost of distribution network for Barasat-II block is not considered under this Loan assignment. Now one DPR has been prepared for distribution network of Barasat-II Block for proposal initiation with ADB.

iv) Presently 4 (four) Consultancy firms and 3 (three) NGOs have been engaged to assist PMU and 3(three) PIUs as per ADB approved Project Administration Manual (PAM). Moreover, Technical Assistance (TA) Consultant has also been engaged by the ADB for Smart Water Management.

v) Purchase of Private land for construction of Intake Structure, Water Treatment Plant and Overhead reservoirs is under process for all the schemes. The land parcels lying with other Government Department are also being processed for Inter Departmental Transfer. All efforts will be taken to get the required parcels of land in possession of PHED well in advance so that project implementation is not affected for want of site at any stage.

vi) Communication has been made with WBIDC for issuance of confirmation to Damodar Valley Reservoir Regulatory Commission

(DVRRC) regarding drawal of 70MLD water from Durgapur Barrage to get the drawal permission from DVRRC. The same was issued by WBIDC on 29.06.2018 addressed to Member Secretary DVRRC but DVRRC again asked for reconfirmation regarding the present requirement. The matter will be taken up again with WBIDC and also referred to me&W Department for taking up with DVRRC for expeditious action.

vii) Postings of Sr. Accounts Officer at PMU and Accounts Officer at PIU-Purba Medinipur is required to be made on urgent basis as the loan disbursement and expenditures have already been started. The ADB officials highlighted the issue during their last mission. AGWB has already replied that there is no sanctioned post of Sr Accounts Officer/ Accounts Officer under the Administrative Control of Works Miscellaneous Section and no scope to provide any regular Sr A.O./A.O. for the post. Proposal for re-designation of Sr Accounts Officer/Accounts Officer Post as Divisional Accounts Officer have been submitted to Finance Department for approval in consultation with the Financial Advisor, PHE Department. The Additional Secretary, Finance Department informed that he will look into the proposal of PHED.

4) Additional Chief Secretary, Irrigation and Waterways Department assured that the issues related to I & W Department will be taken care of on priority basis for smooth implementation of the project.

5) Additional Chief Secretary, Panchayets & Rural Development Department informed that necessity of piped water supply in other water quality affected blocks of North 24 Parganas, South 24 Pargana, Purba Medinipur and Bankura districts also needs to be looked into on urgent basis. The Principal Secretary, PHE Department informed that at present PHE Department has taken up a few surface water based water supply schemes which include ADB and JICA assisted schemes to provide safe and sustainable drinking water in the quality affected blocks of West Bengal under different Programmes which will be commissioned within the next 2 to 3 Years. The present population

covered through piped water supply scheme in west Bengal is about 58% and once the ongoing schemes are commissioned the coverage would reach 72%.

6) Principal Secretary, PHE Department proposed that the Principal Secretaries of P.W. Department, Land and Land Reforms Department and Urban Development & Municipal Affairs Departments may also be incorporated as members of the committee for more effective coordination and collaboration for timely commissioning of projects. In addition, Superintending Engineer/Executive Engineer, PWD, PW (Roads) and ADM (LR)/ DLLRO of the Project districts may also be included as invitee members of the District Level Steering Committee. The Chief Secretary agreed with the proposal. The revised list of members of State Level and District Level Steering Committee is attached as Annexure-B.

Chief Secretary advised that PHED must prepare an action plan and shelf of projects so that the entire state is covered with piped water supply schemes within the next 6 to 7 years by fixing priority in the quality affected blocks. He further advised that proposals for the remaining blocks to be covered under this project may be initiated by the PHE Department as early as possible.

There being no other issues for discussion, the meeting ended with vote of thanks to and from the Chair.

2/5/19

(Malay Kr. De, IAS)

Chief Secretary
Government of West Bengal

Meeting on 16.04.2019- 1st State Level Steering Committee

Subject:-WBDWSIP

Venue:-CS- Conference hall, Nabsanna Time:-11:00am

Attendance Sheet: -

Sl. No	Name	Signature	Email
1	Chief secretary		
2	Additional Chief Secretary, P & RD Department		
3	Additional Chief Secretary, I & WD Department		
4	Additional Chief Secretary, Finance Department		
5	Principal Secretary, PHE Department		
6	Engineer- In – Chief, PHED		
7	Chief Engineer & P.D. WBDWSIP, PHE Dt.		pd.pmu.adb@wbphed.gov.in
8	Dr. Sudip Kr. Sinha Addl. Secretary, Finance	Sinh	sudipkumar.sinha@yahoo.in
9	Subhasis Roy		Se.piupurmed.adb@wbphed.gov.in
10	Debashis Banerjee		SE PIU N&M Pgm
11	Sujoy Barui	16/04/19	SE/PIU, Bankura
12	Nityananda Khan	16/4/19	SE/ME/PMU. Seme.pmu.adb@wbphed.gov.in
13	Saunak Sen	16.4.19	ce2.pmu.adb@wbphed.gov.in.
14			
15			
16			

Annexure-B

A. Restructured State Level Steering Committee for ADB Assisted Project (WBDWSIP) under PHE Department.

Members of the State Level Steering Committee :-

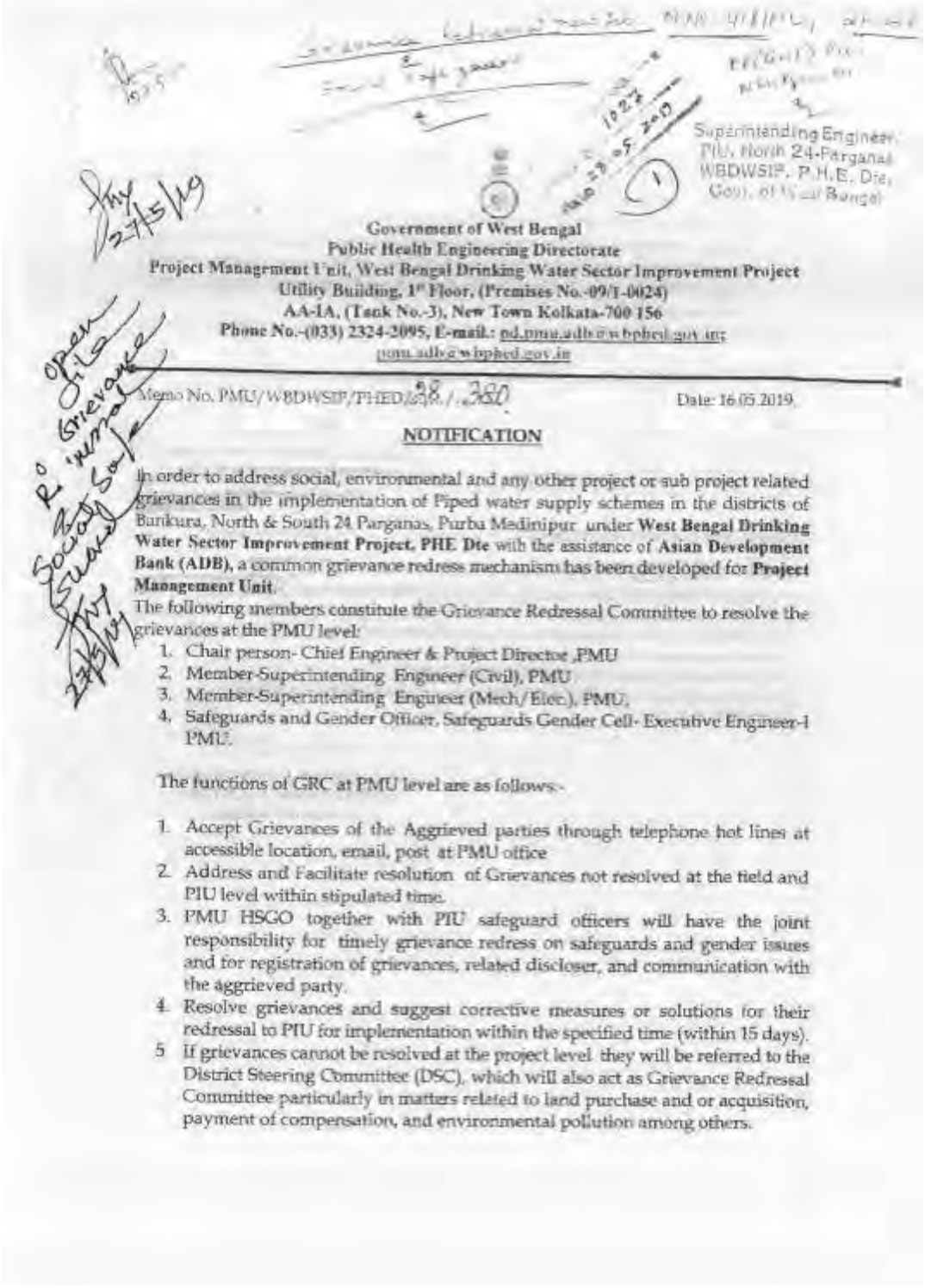
1	The Chief Secretary, Govt. of West Bengal-	**Chairperson**
2	The Principal Secretary / Additional Chief Secretary, PHE Department-	**Member**
3	The Principal Secretary / Additional Chief Secretary, P & RD Department	**Member**
4	The Principal Secretary/ Additional Chief Secretary, Finance Department	**Member**
5	The Principal Secretary/ Additional Chief Secretary, I & W Department	**Member**
6	The Principal Secretary/ Additional Chief Secretary, Public Works Department	**Member**
7	The Principal Secretary/Additional Chief Secretary, Urban Development & Municipal Affairs Department	**Member**
8	The Principal Secretary/ Additional Chief Secretary, Land and Land Reforms Department	**Member**
9	The Engineer-in-Chief, PHE Department	**Member**
10	The Project Director, WBDWSIP, PHE Directorate	**Member Secretary**
11	The District Magistrate (each District)	**Invitee Member**

B. Restructured District Level Steering Committee for ADB Assisted Project (WBDWSIP) under PHE Department

Members of the District Level Steering Committee :-

1	The District Magistrate	**Chairperson**
2	The Additional District Magistrate/DLLRO, Land and Land Reforms	**Member**
3	The Additional Executive Officer, Zilla Parisad	**Member**
4	The Superintending Engineer, PIU (each PIU). PHE Dte	**Member Secretary**
5	The Superintending Engineer/Executive Engineer, PW (Roads)	**Member**
6	The Superintending Engineer/Executive Engineer, PWD	**Member**
7	The Superintending Engineer/Executive Engineer, I & WD	**Member**
8	The Executive Engineer, (PIU), PHE Dte	**Member**
9	The Assistant Engineer, Social Safeguard (PIU) PHE Dte	**Member**
10	The Block Development Officer (each Block)	**Member**
11	Representative of NGO	**Invitee Member**

PMU Level GRC



Superintending Engineer
PIU, North 24-Parganas
WBDWSIP, P.H.E. Dte.
Govt. of West Bengal

Government of West Bengal
Public Health Engineering Directorate
Project Management Unit, West Bengal Drinking Water Sector Improvement Project
Utility Building, 1st Floor, (Premises No.-09/1-0024)
AA-IA, (Tank No.-3), New Town Kolkata-700 156
Phone No.-(033) 2324-2095, E-mail: pd.pmu.adb@wbphed.gov.in;
pmu.adb@wbphed.gov.in

Memo No. PMU/WBDWSIP/PHED/38/...280 Date: 16.05.2019

NOTIFICATION

In order to address social, environmental and any other project or sub project related grievances in the implementation of Piped water supply schemes in the districts of Bankura, North & South 24 Parganas, Purba Medinipur under **West Bengal Drinking Water Sector Improvement Project, PHE Dte** with the assistance of **Asian Development Bank (ADB),** a common grievance redress mechanism has been developed for **Project Management Unit.**

The following members constitute the Grievance Redressal Committee to resolve the grievances at the PMU level:

1. Chair person- Chief Engineer & Project Director ,PMU
2. Member-Superintending Engineer (Civil), PMU
3. Member-Superintending Engineer (Mech/Elec.), PMU,
4. Safeguards and Gender Officer, Safeguards Gender Cell- Executive Engineer-I PMU.

The functions of GRC at PMU level are as follows:-

1. Accept Grievances of the Aggrieved parties through telephone hot lines at accessible location, email, post at PMU office
2. Address and Facilitate resolution of Grievances not resolved at the field and PIU level within stipulated time.
3. PMU HSGO together with PIU safeguard officers will have the joint responsibility for timely grievance redress on safeguards and gender issues and for registration of grievances, related discloser, and communication with the aggrieved party.
4. Resolve grievances and suggest corrective measures or solutions for their redressal to PIU for implementation within the specified time (within 15 days).
5. If grievances cannot be resolved at the project level they will be referred to the District Steering Committee (DSC), which will also act as Grievance Redressal Committee particularly in matters related to land purchase and or acquisition, payment of compensation, and environmental pollution among others.

6. Any matter deemed higher than the district level or that may require inter departmental coordination, the required grievances redress will be referred to the state level steering committee.
7. Careful documentation of the name of the complainant and date of receipt of complaint, address and contact details of complainant, location of the problem area and how the problem was resolved and report the same in the Quarterly Progress Report and Semi Annual Safeguard Monitoring report to be submitted to ADB.
8. Periodically Review the functioning of the GRM at the field and PIU level.

The GRC will continue to function throughout the project duration.

16.05.19

Chief Engineer & Project Director,
PMU, WBDWSIP, P.H.E. Dte.,
Govt. of West Bengal.

Memo No. PMU/WBDWSIP/PHED/...../..... Date: 16.05.2019.

Copy forwarded for information to :-

1. The Superintending Engineer, Civil / (M/E), PMU, WBDWSIP, PHE Dte
2. The Superintending Engineer, PIU, North 24 Parganas./ Purba Medinipur / Bankura, WBDWSIP, PHE Dte. with a directive to constitute the GRC at the PIU level and Field level as suggested in PAM approved by ADB.
3. The Executive Engineer-I, PMU, WBDWSIP, PHE Dte.
4. The Executive Engineer, PIU, North 24 Parganas/ Purba Medinipur/Bankura, WBDWSIP, PHE Dte.

16.05.19

Chief Engineer & Project Director,
PMU, WBDWSIP, P.H.E. Dte.,
Govt. of West Bengal.

District / Project PIU level GRM Notification

GOVERNMENT OF WEST BENGAL
OFFICE OF THE SUPERINTENDING ENGINEER
Project Implementation Unit, Bankura, WBDWSIP, P.H.E DTE.
RABINDRA SARANI: NEAR JAIL MORE: BANKURA: PIN - 722101
Ph No - 03242-241007, 241008:: email:
se.piubankura.adb@wbphed.in & piubankura.adb@wbphed.gov.in

Memo No 443 /SE/PIU-Bankura Dated Bankura the 08/01/2019

NOTIFICATION

In order to address social, environmental and any other project or sub project related grievances in the implementation of Asian Development Bank (ADB) assisted Piped water supply schemes in the district of Bankura under West Bengal Drinking Water Sector Improvement Project (WBDWSIP), a project level Grievance Redress Mechanism has been developed at PIU Level for PIU, Bankura, WBDWSIP, PHE Dte with the following members,

1. Chairperson- Executive Engineer (Civil), PIU, Bankura, WBDWSIP, PHE Dte.
2. Member- Executive Engineer (E/M), PIU, Bankura, WBDWSIP, PHE Dte.
3. Assistant Safeguard and Gender Officer – Assistant Engineer, Head Quarters, PIU, Bankura, WBDWSIP, PHE Dte.
4. Assistant Environmental Officer – Assistant Engineer - I, PIU, Bankura, WBDWSIP, PHE Dte
5. Junior Safeguard and Gender Officer – Junior Engineer, PIU, Bankura, WBDWSIP, PHE Dte.
6. Junior Environmental Officer – Junior Engineer, PIU, Bankura, WBDWSIP, PHE Dte
7. Social/Gender/Resettlement Specialist, DSISC, PIU, Bankura, WBDWSIP, PHE Dte.

The function of GRC at PIU level are as follows-

1. Accept Grievances of the Aggrieved persons through grievance redress/ suggestion forms in complaints/ suggestion boxes or through telephonic hotlines at accessible locations, by e-mail, by post, or by writing in a complaint register in PIU office.
2. Careful documentation of the name of the complainant, date of receipt of the complaint, address/ contact details of the aggrieved person, location of the problem area etc.
3. Address and facilitate resolution of Grievances not resolved at the field level within stipulated time (7 days).
4. The Assistant safeguard Officer, PIU, Bankura supported by the Social safeguard specialist of DSISC, PIU, Bankura will be responsible for conducting meeting with the affected/ aggrieved person (s) 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 grievance redress mechanism.
5. If the PIU level GRC fails to resolve the Grievance, the matter may be conveyed to the GRC established within PMU and the actions suggested by them to be taken up/ followed by this GRC.
6. PMU HSGO together with PIU safeguard officers will have the join responsibility for timely Grievance Redressal on safeguards and Gender Issues and for registration of Grievances, related disclosure and communication with the aggrieved party.
7. If Grievance cannot be resolved at the Project Level, they will be referred to the District Steering Committee (DSC) which will also act as Grievance Redressal Committee, particularly in matter related to Land purchase and or Acquisition, payment of the compensation and environmental pollution among others.
8. Any matter deemed higher than the district level or that may require inter-departmental coordination, the required Grievance redress will be referred to the State Level Steering Committee.
9. The GRC at PIU, Bankura will also be responsible for follow-through for each grievance, periodic information dissemination to complainants on the status of their grievances and recording their feedback (satisfaction / dissatisfaction and suggestions).

Scanned by CamScanner

10. Periodically Review the functioning of the GRM at this end as well as field level.

The GRC will continue to function throughout the project duration.

Yours faithfully

06/06/19
Superintending Engineer
PIU, Bankura, WBDWSIP, PHE Dte

Memo No. 443 / /SE/PIU-Bankura Dated Bankura the 6 / 6 / 2019

Copy forwarded for information and necessary action:-

1) The Chief Engineer & Project Director, WBDWSIP, PHE Dte.
2) Executive Engineer (Civil), PIU, Bankura, WBDWSIP, PHE Dte.
3) Executive Engineer (E/M), PIU, Bankura, WBDWSIP, PHE Dte.
4) Assistant Engineer (HQ), PIU, Bankura, WBDWSIP, PHE Dte.
5) Assistant Engineer – I, PIU, Bankura, WBDWSIP, PHE Dte.
6) Junior Engineer-I, PIU, Bankura, WBDWSIP, PHE Dte.
7) Junior Safeguard and Gender Officer – Junior Engineer, PIU, Bankura, WBDWSIP, PHE Dte.
8) Junior Environmental Officer – Junior Engineer, PIU, Bankura, WBDWSIP, PHE Dte
9) The Team Leader, DSISC, PIU, Bankura, WBDWSIP, PHE Dte.
10) Social/Gender/Resettlement Specialist, DSISC, PIU, Bankura, WBDWSIP, PHE Dte.
11) Support Staff (I & II) - Environmental and Social Safeguards, DSISC, PIU, Bankura, WBDWSIP, PHE Dte.

06/06/19
Superintending Engineer
PIU, Bankura, WBDWSIP, PHE Dte

Scanned by CamScanner

Gram panchayat level GRM notification

GOVERNMENT OF WEST BENGAL
OFFICE OF THE SUPERINTENDING ENGINEER
Project Implementation Unit, Bankura, WBDWSIP, P.H.E.DTE.
RABINDRA SARANI: NEAR JAIL MORE: BANKURA: PIN – 722101
Ph No – 03242-241007, 241008 ::: email:se_bank_wa@wbphed.gov.in,
se.piubankura.adb@wbphed.in& piubankura.adb@wbphed.gov.in

Memo No. 905 /SE/PIU-Bankura Dated Bankura the 24 / 10 /2019

Notification

In order to address Social, environmental and any other project or subproject related grievances in implementation of Asian Development Bank (ADB) assisted piped water supply schemes in the district of Bankura under West Bengal Drinking Water Sector Improvement Project (WBDWSIP), a field level Grievance Redress Mechanism has been developed for different packages under this project with the following members.

1. Safeguard officer from PIU (AE, PHE)- Chairperson
2. Gram-Panchayet Pradhan of the concerned G.P – Member
3. Support Environment safeguard – Member
4. Support Social Safeguard - Member
5. Panchayet Member of the concerned G.P - Member
6. Health and Safety officer from contractor's side- Member

The function of GRC at field level are as follows: -

1. Accept Grievances of the aggrieved persons through grievance redress / suggestion forms in complaints / suggestion boxes or through telephonic hotlines at accessible locations, by e-mail, by post, or by writing in a complaint register in PIU office.

2. Careful documentation of the name of the complainant, date of receipt, address / contact details of the aggrieved person, location of the problem area etc.

3. Address and facilitate resolution of Grievances within stipulated time (7 days).

4. Safety officer of Contractor supported by the Social safeguard support and Environmental Safeguard Support of DSISC, PIU, Bankura will be responsible for conducting meeting with the affected / aggrieved person(s) 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 grievance redress mechanism.

5. If the Field level GRC fails to resolve the Grievance, the matter may be conveyed to the PIU level GRC and the actions suggested by them to be taken up / followed by this GRC.

6. Field level GRC will have the primary responsibility for timely Grievance Redressal on safeguards and Gender Issues and for registration of Grievances, related disclosure and communication with the aggrieved party.

Appendix 14: Labour License and WC Policy

Labour License

GOVERNMENT OF WEST BENGAL
OFFICE OF THE ASSISTANT LABOUR COMMISSIONER , KHATRA
Office Of The Assistant Labour Commissioner, Khatra Dhala| Road PO & PS- khatra Dist.- Bankura Pin-722140

FORM VI
[See Rule 25(1)]

Licence No. : ***KTR16/CLL/000043*** *Date :* ***21st Aug, 2019***

Lic Fees	250
S.Deposit	10000

LICENCE

Licence is hereby granted to ***Larsen & Toubro Limited*** *at* ***Ward No. 9 Holding no. 95/B/11, Uttar Aurobindo Nagar, Junbedia More, Bankura Municipality , Ward- 9, Bankura Sadar , PS - Bankura , District - Bankura, Pin Code - 722101*** *under Section 12(1) of the Contract Labour (Regulation and Abolition) Act. 1970 subject to the conditions specified in Annexure.*

The Licence shall remain in force till: ***19th Aug, 2020.***

AMIT RAY
digitally signed by AMIT RAY
Date: 2019.08.21 15:23:34 +05'30'

Licensing Officer
Under the Contract Labour(R&A) Act. 1970
&
Assistant Labour Commissioner
Khatra, Bankura

Establishment Information:
Project Implimentation Unit, Public Heath Engineering Directorate [BAN08/CLR/000038]
W.Site - Atlakundi, PHE Complex ,
Anchuri, Block - Bankura -I , Bankura Sadar - 722102, PS - Bankura , Bankura
Work site exact location:
Taldangra Project, Vill:- Chechuriya. Near Chechuriya Eco park.
Taldangra, Block- Taldangra , Khatra
PS - Taldangra , District - Bankura, Pin Code - 722152

1 of 2

RENEWAL

[Rule 29]

Renewal vide AIN No.	RENEWAL-LIC-0011249-0010884-30452-2020
1.Date of Renewal	04th Sep, 2020
2.Fees paid for Renewal	₹ 1000 (One Thousand rupees only)
3.Date of Expiry	19th Aug, 2021

Amit Ray

Digitally signed by Amit Ray
Date: 2020.09.04 12:24:46 +05'30'

Signature & Seal

Licensing Officer

P.E. Details:-
Project Implimentation Unit, Public Heath Engineering Directorate (BAN08/CLR/000038)
W.Site - Ailakundi, PHE Complex ,
Anchuri, Block - Bankura -I , Bankura Sadar – 722102, PS - Bankura , Bankura

Worksite Details:-
INDPUR PROJECT, Bheduasole, Block- Indpur , Khatra, PS - Chhatna , District - Bankura, PIN – 722136

ANNEXURE

The licence is subject to the following conditions:

(1). The licence shall be non-transferable.

(2). The number of workmen employed as contract labour in the establishment shall not on any day , exceed 300 (Three Hundred).

(3). Except as provided in the rules the fees paid for the grant, or as the case may be, for renewal of the licence shall be non-refundable.

(4). The rates of wages payable to the workmen by the contractor shall not be less than the rates prescribed for the Schedule of employment under the Minimum Wages Act, 1948, where applicable, and where the rates have been fixed by agreement, settelment or award, not less than the rates fixed.

(5). In cases where the workmen employed by the contractor perform the same or similar kind of work as the workmen directly employed by the principal employer of the establishment, the wage rates, holidays, hours of work and other conditions of service of the workmen of the contractor shall be the same as applicable to the workmen directly employed by the principal employer of the establishment on the same or similar kind of work provided that in the case of any disagreement with regard to the type of work the same shall be decided by the Labour Commissioner, West Bengal, whose decided shall be final.

(6). In other cases the wages rates, holidays, hours of work and conditions of service of the workmen of the contractor shall be such as may be specified in this behalf by the Labour Commissioner, West Bengal.

(7). In every establishment where 50 or more, women having children are ordinarily employed as contract labour there shall be provided 2 rooms of reasonable dimensions for the use of their children under the age of six years. One of such rooms would be used as a play room for the children and the other as bed room for the children. For this purpose the contractor shall supply adequate number of toys and games in the play room and sufficient number of cost and beddings in the sleeping room. The standard of construction and maintenance of the creches may be such as may be specified in this behalf by the Labour Commissioner, West Bengal.

(8). The License shall notify any change in the number of workmen or the conditions of work to the Licensing Officer

WC Policy

ICICI Lombard
GENERAL INSURANCE

Certificate No: 495 Date: 31-Mar-2020

To whomsoever it may concern

This is to certify that we have issued Group Personal Accident Policy No. 4005/102843874/05/000 to M/S. Larsen & Toubro Limited valid for the period 31-03-2020 to 30-03-2021.

This Policy covers all Permanent Workers, Temporary Workers, Sub-contractor's Workers, Piece-rate workers, Trainee Workers working at Project/Office of L&T Ltd and their Subsidiary & Associate Companies, Factories & Consortiums, SPVs, JVs, L&T Infrastructure Development Projects Ltd, L&T Hydrocarbon Engineering Ltd located anywhere in India.

This Policy covers the above workers in the following project site.

LE190278 - Design and Construction of Intermediate Pumping Station, Ground Storage Reservoirs, Overhead Reservoirs, Water Distribution Network and Metering Works in Indpur Block including Secondary Transmission Mains to Indpur and Taldangra Blocks

Principal: The West Bengal Public Health & Engineering Department, Bankura, WB

No of Workers: 250

For ICICI Lombard General Insurance Co Ltd

Rathnakar Nairy K | Associate Vice President – Specialized Industries

ICICI Lombard General Insurance Company Limited AA

Appendix 15: Sample First Aid Record

RECORD OF FIRST AID

Package: Bankura Indpur BK-02A (WBDWSIP/DWW/NCB/BK/02A/2018-19))

MONTH: - August 2020

SL NO	DATE	NAME OF PERSON	SEX	AGE	TIME	DESIGNATION	COMPANY	AGENCY	TYPE OF ACCIDENT	NATURE OF INJURY	LOCATION OF INJURY	ROOT CAUSE	ACTION TAKEN
01	01-08-20	HOLIDAY											
02	02-08-20	SUNDAY											
03	03-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
04	04-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
05	05-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
06	06-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
07	07-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
08	08-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
09	09-08-20	SUNDAY											
10	10-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
11	11-08-20	HOLIDAY											
12	12-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
13	13-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
14	14-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
15	15-08-20	HOLIDAY											
16	16-08-20	SUNDAY											
17	17-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
18	18-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
19	19-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
20	20-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
21	21-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
22	22-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
23	23-08-20	SUNDAY											
24	24-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
25	25-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
26	26-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
27	27-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
28	28-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL
29	29-08-20	HOLIDAY											
30	30-08-20	SUNDAY											
31	31-08-20	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL

Note:-Agency is the object or substance which is most closely associated with the accident causing the injury like machines, equipments, vehicles, hand tools,ladders,scaffolds,explosive,dust,gases,chemical,radiations,fire,water,floor, roof, animals & insects etc.

(Name and Signature of safety officer of Contractor)

Appendix 16:
Sample Environmental Site Inspection Report

157

PKG1- BK/02A

Appendix 18
Sample Environmental Site Inspection Report

Project Name: WBDWSIP Bankura
Contract Number:

NAME: _____ DATE: 25.09.2020
TITLE: _____ DMA: _____
LOCATION: GOTTORIYA OHIR SITE GROUP: _____

WEATHER: Rainy Day

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	YES
Construction site management plan (spoils, safety, schedule, equipment etc.,) prepared	YES
Traffic management plan prepared	P.I
Dust is under control	YES
Excavated soil properly placed within minimum space	YES
Construction area is confined; no traffic/pedestrian entry observed	P.I
Surplus soil/debris/waste is disposed without delay	YES
Construction material (sand/gravel/aggregate) brought to site as & when required only	YES
Tarpaulins used to cover sand & other loose material when transported by vehicles	P.I
After unloading , wheels & undercarriage of vehicles cleaned prior to leaving the site	P.I
No chance finds encountered during excavation	YES
Work is planned in consultation with traffic police	NO
Work is not being conducted during heavy traffic	YES
Work at a stretch is completed within a day (excavation, pipe laying & backfilling)	NA
Pipe trenches are not kept open unduly	NA
Road is not completely closed; work is conducted on edge; at least one line is kept open	NA
Road is closed; alternative route provided & public informed, information board provided	YES
Pedestrian access to houses is not blocked due to pipe laying	NA
Spaces left in between trenches for access	NA
Wooden planks/metal sheets provided across trench for pedestrian	NA

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

Signature

Sign off

Name	CHANDAN KR MAJEE
Position	Support Engr. Safeguard staff DSISC, Bankura.

Larsen & Toubro Ltd. Bankura

Shah Technical Consultant Pvt. Ltd. DSISC Bankura WBDWSIP

Appendix: 17
SAMPLE SEMI-ANNUAL ENVIRONMENTAL MONITORING REPORT TEMPLATE

1. Introduction

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number
1. PMU			
2. PIUs			
3. Consultants			

- Overall project and sub-project progress and status

- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

-

Package Number	Components/List of Works	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M)[35]	Contract Status (specify if under bidding or contract awarded)	If On-going Construction	
				%Physical Progress	Expected Completion Date

[35] If on-going construction, include %physical progress and expected date of completion

2. Compliance Status With National/State/Local Statutory Environmental Requirements[36]

Package No.	Subproject Name	Statutory Environmental Requirements[37]	Status of Compliance[38]	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish[39]

3. Compliance Status With Environmental Loan Covenants

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

4. Compliance Status Withthe Environmental Management Plan (Refer to EMP Tables In Approved IEE/S)

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

Package-wise Implementation Status

Package Number	Components	Design Status (Preliminary Design Stage/Detailed Design Completed)	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
			Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

[36] All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

[37] Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

[38] Specify if obtained, submitted and awaiting approval, application not yet submitted

[39] *Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.*

- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.
- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.
- Include as appendix all supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors.
- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

- Provide the monitoring results as per the parameters outlined in the approved EMP (or site-specific EMP/construction EMP when applicable).
- In addition to the table on EMP implementation, the main text of the report should discuss in details the following items:

  (i) **Grievance Redress Mechanism.** Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

  (ii) **Complaints Received during the Reporting Period.** Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

    - Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
    - Identify muddy water was escaping site boundaries or muddy tracks were seen on adjacent roads.
    - Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these were intact following heavy rain;
    - Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area.
    - Confirm spill kits on site and site procedure for handling emergencies.
    - Identify any chemical stored on site and provide information on storage condition. Attach photograph.
    - Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
    - Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
    - Provide information on barricades, signages, and on-site boards. Provide photographs.
    - Provide information on Checking if there are any activities being under taken out of working hours and how that is being managed.

Summary of Environmental Monitoring Activities (for the Reporting Period)[40]

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
Design Phase						
Pre-Construction Phase						
Construction Phase						
Operational Phase						

[40] Attach Laboratory Results and Sampling Map/Locations

Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

5. Approach and Methodology for Environmental Monitoring of the Project

- Brief description on the approach and methodology used for environmental monitoring of each sub-project

6. Monitoring of Environmental Impacts on Project Surroundings(Ambient Air, Water Quality and Noise Levels)

- Brief discussion on the basis for monitoring
- Indicate type and location of environmental parameters to be monitored
- Indicate the method of monitoring and equipment to be used
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements

As a minimum the results should be presented as per the tables below.

Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Noise Quality Results

Site No.	Date of Testing	Site Location	LA_{eq} (dBA) (Government Standard)	
			Day Time	Night Time

7. Summary of Key Issues and Remedial Actions

- Summary of follow up time-bound actions to be taken within a set timeframe.

8. Appendixes

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- Other

APPENDIX 18 : Standard Operating Procedure for Prevention and Risk Minimization of Corona Virus Disease (COVID-19) at the Facilities and Work Sites of West Bengal Drinking Water Sector Improvement Project (WBDWSIP)

Standard Operating Procedure for Prevention and Risk Minimization of Corona Virus Disease (COVID-19) at the Facilities and Work Sites of
WEST BENGAL DRINKING WATER SECTOR IMPROVEMENT PROJECT (WBDWSIP)

Version 2 - 1 June 2020

Prepared by Project Management Unit,
Public Health Engineering Department,
Government of West Bengal
Phone:033-23242095;
Email: pd.pmu.adb@wbphed.gov.in
Utility Building, 1 st Floor, (Premises No. 09/1-0024), AA-IA (Tank No. 3), New Town, North 24 Parganas, WEST BENGAL, Pin - 700156

Contents

I. SCOPE AND OBJECTIVE

1. The purpose of this Standard Operating Procedure (SOP) is to guide all staff, consultants/ service providers, and contractors engaged under the West Bengal Drinking Water Sector Improvement Project (WBDWSIP or the project) to prevent, minimize, and manage risks to workers and public at large at all project facilities and work sites, which could arise from exposure to Corona virus disease (COVID-19) when restarting/resuming projects and site activities post COVID-19 lockdown.

2. The requirements, restrictions, and guidance contained in this SOP are provided to enable all associated, including staff, consultants and contractors on effective planning and execution of pandemic-specific action and responses and minimize risks, and to comply with the National Directives & Local Authority guidelines on COVID-19.

3. Based on these SOPs, government requirements, and best practice references available, each contractor and service provider will prepare their own site specific risk assessment and based on that, a site-specific health and safety management plan (H&S plan), for COVID-19 affected period and submit to the Project Director for approval at the Project Management Unit (PMU) of the WBDWSIP prior to re-commencement of works and services under the project post COVID-19. The PMU approved H&S Plan will be accepted by the contractor/ service provider and the PMU for implementation throughout the COVID-19 affected period as part of the earlier approved environmental management plan (EMP) or contract of each service and works provider.

4. All contractors, service providers, and consultants must conduct detailed site-specific risk assessment for identification of risks and their evaluation/categorization as acceptable/ unacceptable risks based on which suitable mitigation measures need to be planned. While the overall risk categorization will be guided by the government issued present zone-wise model adopted by the Government (red zone, orange zone, green zone) during the lock-down period, stakeholders should carry out risk assessment based on the approach of scale/severity/probability/duration of potential impacts, which will be commensurate to the potential hazards associated with the activities at sites, and suitable mitigation measures shall be developed and planned around the different levels of risks anticipated during construction / operation phases. The contractors and service providers should keep in mind that once lockdown restrictions are lifted, the “green” zones in rural areas with weak healthcare systems could also change quickly. Migrant workers could offer potential pathways for the spread of the disease from high risk zones to low risk zones and PMUs need to ensure that their workplaces do not become hotspots for the spread. The contractors/ service providers, with approval from PMU, shall update:

- The H&S plan as needed adopting a risk-based approach. For the work packages where maintenance of international good practices in COVID 19 aren’t feasible, the outcome of the risk assessment shall determine re-organization, postponement, or cancellation.
- Assignment roles in Annex 3, as informed by the outcome of the risk assessment process for each specific work package.

5. The contractors, service providers, and staff, should also expand on risks in their site-specific H&S plan of any actions taken to address the risks “outside” their worksite, and include their protocols for (i) reporting to the government/health department if there are suspected cases, (ii) ambulance/transport service protocols if a worker needs to be brought to a health/quarantine facility, and (iii) communications with surrounding communities. Contractors

and service providers with support from PMU and project implementation units (PIUs) should liaise with local health centers including primary healthcare facilities as part of the site wide health and safety management plans including emergency situation management plan. These should also be identified and detailed in the site-specific H&S Plan.

6. Staff, contractors and consultants working under the project and using this SOP should in addition consult the Occupational Safety and Health Act (OSHA) guidelines relating to COVID-19 and guidelines as specified by credible international organizations such as the World Health Organization (WHO), to draw best practices and applicable lessons from other reference documents listed below:

a. *WHO Guidelines (https://www.who.int/docs/default-source/coronaviruse/getting-workplace-ready-for-covid-19.pdf?sfvrsn=359a81e7_6);*
b. *World Health Organization. 2020. Considerations for public health and social measures in the workplace in the context of COVID-19. Geneva. Available here: https://www.who.int/publications-detail/considerations-for-public-health-and-social-measures-in-the-workplace-in-the-context-of-covid-19*[41]*;*
c. *HM Government. 2020. Working safely during COVID-19 in construction and other outdoor work. Guidance for employers, employees and the self-employed. Available here: https://assets.publishing.service.gov.uk/media/5eb961bfe90e070834b6675f/working-safely-during-covid-19-construction-outdoors-110520.pdf;*
d. *The Canadian Construction Association – COVID 19 Standard Protocols. Available here: https://www.cca-acc.com/wp-content/uploads/2020/04/CCA-COVID-19-Standardized-Protocols-for-All-Canadian-Construction-Sites-04-16-20.pdf;*
e. *Indian Council of Medical Research (ICMR), Government of India;*
f. *The Ministry of Home Affairs (MHA), Government of India;;*
g. *OSHA guidance on preparing workplaces for COVID 19;*
h. *Guideline Department of Health & Family Welfare and Labour Department, Government of India;*
i. *Guideline for prevention of COVID 19 Pandemic by Government of West Bengal;*
j. *U.S. Department of Labor Occupational Safety and Health Administration; and*
k. *The Epidemic Diseases (Amendment) Ordinance,2020 (amends the Epidemic Disease Act, 1897)*

7. All parties should note that these SOPs will be updated based on the changing government requirements and information/knowledge on COVID-19. For the latest updated copy of the SOP, the Contractors, service providers, consultants, staff and all stakeholders should refer to the project website, https://wbdwsip.org/ , under Manuals and Guidelines, for the latest updated SOP, or email the Project Director at pd.pmu.adb@wbphed.gov.in, or visit the PMU's office at WBDWSIP Project, Utility Building, 1st Floor, (Premises No. 09/1-0024), AA-IA (Tank No. 3), New Town, North 24 Parganas, West Bengal, Pin – 700156.

[41] This guidance contains some risk factors and an approach to undertaking the risk assessment at workplaces.

II. INTRODUCTION

Project Background

8. Public Health Engineering Department (PHED), Government of West Bengal through its Project Management Unit and Project Implementing Unit is implementing the "West Bengal Drinking Water Improvement Project". The Loan for WBDWSIP (ADB Loan 3696-IND) was signed between Government of India and the Asian Development Bank (ADB).

9. The project will provide safe, sustainable and inclusive drinking water as per the standards set by the Government of India in the arsenic, fluoride, and salinity affected selected areas of Bankura, North & South 24 Parganas, and Purba Medinipur districts of West Bengal (project districts). Project Director (PD) is the main authority of the project and PMU operates centrally from New Town, office under the guidance of PD and project management consultant (PMC) is there to support PMU.

10. All the three districts have individual PIU office headed by SE, PIU located at each district, which reports to PMU. Under each PIU, separate Design Construction Supervision and project Implementation Support Consultants **(**DSISC) team is available to support PIU in project implementation. Apart from there are NGOs in each district to take care different activities allotted to them.

11. It is pertinent to mention that all the districts under this project has basic components like water intake system, raw water rising main, Water Treatment plant, clear water rising main, pumping stations, overhead reservoirs (OHR), ground level storage reservoir (GLSR), distribution system, house metering connection and related electro-mechanical and SCADA system.

12. The project locations, package name and brief project's components is mentioned below:

District name	Inputs (Package No.)	Brief Project Components
North 24 Parganas	**DWW/N24P/01**	Design, Construction and Operation of Water Treatment-Plant, Transmission Main, Boosting Pumping Stations & Ground level reservoirs work in Haroa, Rajarhat, and Bhangar II.
	DWW/N24P/02A	Design and Construction of Overhead Reservoir including design, supply and laying of Water Supply Distribution Network in Haroa Block.
	DWW/N24P/02B	Design and Construction of Overhead Reservoir including design, supply and laying of Water Supply Distribution Network in Bhangar II Block.
Bankura	**DWW/BK/01**	Design, Construction and Operation-Maintenance of Raw Water Intake Well, Water Treatment Plant, Reservoir, Transmission Main for Indpur and Taldangra block in Bankura.

District name	Inputs (Package No.)	Brief Project Components
	DWW/BK/02A	Design and Construction of Intermediate Pumping Station, ground level reservoirs, overhead reservoirs, water distribution network and metering works in Indpur block including secondary transmission mains to Indpur block. transmission mains to Indpur block.
	DWW/BK/02B	Design and Construction of Intermediate Pumping Station, Secondary transmission mains, overhead reservoirs including water distribution network and metering works in Taldangra Block**.**
	DWW/BK/03	Design, Construction and Operation-Maintenance of Raw Water Intake Well, Water Treatment Plant, Raw and Clear Water Transmission Main for Mejhia and Gangajalghati Block in Bankura.
	DWW/BK/04	Design and Construction of Overhead Reservoir including Water Supply Distribution Network and Metering Works in Mejhia and Gangajalghati Blocks including Rehabilitation of Existing Scheme.
East Midnapore	**DWW/EM/01**	Design, Construction and Operation-Maintenance of Raw Water Intake Well, Water Treatment Plant, Raw and Clear Water Transmission Main for Nandakumar, Chandpur, Nandigram-I and II blocks in East Medinipur.
	DWW/EM/02	Construction of Intermediate Pumping Station, Secondary transmission mains, overhead tanks including water distribution network and metering works in Nandigram-I and Nandigram-II block in East Medinipur

13. There are following major offices and project sites are available where suitable remedial measures to be taken as per protocol indicated in this guideline.

Under Office category:

a. PMU and PMC
b. Three number PIU and DSISC offices
c. NGO offices
d. All site offices and camps of Contractors

Under work components:

a. Intake locations included pump house and substations
b. WTP locations
c. Ground Level Storage Reservoirs (GSLRs) cum pump house
d. Overhead reservoirs (OHRs)
e. Pipelines: Raw water rising main, clear water rising main and distribution network system

Coronavirus Disease 2019 (COVID-19)

14. Coronavirus Disease 2019 (COVID-19) is a respiratory disease caused by the SARS-CoV-2 virus. It was spread to many other countries around the world, including the United States. Depending on the severity of COVID-19's international impacts, outbreak conditions—

including those rising to the level of a pandemic—can affect all aspects of daily life, including travel, trade, tourism, food supplies, and financial markets.

15. To reduce the impact of COVID-19 outbreak conditions on businesses, workers, customers, and the public, it is important for all employers to plan now for COVID-19.
The virus is thought to spread mainly from person to-person, including:

- Between people who are in close contact with one another (within about 6 feet).
- Through respiratory droplets produced when an infected person coughs or sneezes. These droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs.

16. It may be possible that a person can get COVID-19 by touching a surface or object that has SARS-CoV-2 on it and then touching their own mouth, nose, or possibly their eyes, but this is not thought to be the primary way the virus spreads.

17. The people most at risk of COVID-19 infection are those who are in close contact with a suspect/confirmed COVID-19 patient and those who care for such patients.

18. This document gives advice on:

- general instruction to follow to prevent the spread or slow transmission of COVID-19 in workplace;
- detail procedure to getting the workplace and office ready under COVID-19 situation;
- worksite prevention practice;
- precaution taken at workmen habitat/camp;
- control measures taken for deploying new workmen at site;
- resources requirement;
- relevant induction and training;
- communication and advancement – COVID Update; and
- declaration – Medical fitness and Filling up work starting Checklist

III. COVID 19 INFECTION SYMPTOMS

a. Most common symptoms:

- fever
- dry cough
- tiredness

b. Less common symptoms:

- aches and pains
- sore throat
- diarrhoea
- conjunctivitis
- headache
- loss of taste or smell
- a rash on skin, or discolouration of fingers or toes

c. Serious symptoms:

- difficulty breathing or shortness of breath
- chest pain or pressure

- loss of speech or movement

d. All concerned should be well briefed to seek immediate medical attention, and where they could go as per the H&S Plan, if they have serious symptoms. They could also call before visiting their doctor or health facility for information at Central help lines at 011 23978046, or West Bengal state helpline number at 1800313444222, 033 23412600, 1070.

e. People with mild symptoms like fever, dry cough, sore throat who are otherwise healthy should manage their symptoms at home. They should isolate themselves from other members at home and stay at separate room.

f. On average it takes 5–6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days.

IV. GENERAL PREVENTION OF INFECTION AND TRANSMISSION OF COVID-19

- Preliminary medical checking of body temperature, symptoms of cold, cough, difficulty in breadthening will be done before worker's entry in the project. Format for daily checking template is attached as **Annexure 2.** Pandemic plan Site acknowledgement form is attached as **Annexure 1.**
- Workers with underlying health conditions such as diabetes, respiratory illness, etc. will be screened before start of work, as part of pre-employment screening tests as specified under Section 10 of this SOP. Contractors and service providers should clearly outline if such health screenings will be undertaken on site through questioning. As needed for cases deemed to be found necessary for further testing, contractors and service providers should seek PMU's support to liaise with local health centers to facilitate these screening and even testing for COVID-19.
- Non-essential physical work that requires close contact between workers should not be carried out
- Work requiring skin to skin contact should not be carried out
- Plan all other work to minimize contact between workers
- Wash hands often with soap for at least 20 seconds[42]
- Brief and remind staff regularly to cover mouth and nose when coughing or sneezing[43]
- Use hand sanitizer (alcohol based as per norms) at office, workplace. Preferably use of contactless, sensor-based/ pedal operated sanitizer to avoid minimum touching
- Regular filling of sanitizers container should be carefully monitored
- Avoid biometric system and head count practice to be followed - Contact less attendance system shall be used.
- Regular thermal screening to be carried out without contact through thermal scanner. Logbook to be maintained mentioning temperature of the staff. In case temperature is found above 100^0C, staff should be advised to go home and consult doctor and take suitable measures accordingly.[44]

[42] Please refer to effective handwashing techniques should be demonstrated to workers and visual postings on site.
[43] Use of mask should be mandatory in line with local government guidance and international good practice
[44] Please refer to international best practice on use of thermal scanners in the shared referenced WHO Guidance. Temperature of 100^0 C??? I guess is 100^0F??

- No person should enter the work site other than the authorized persons mentioned by supervisor during start of work
- All must implement social/physical distancing by maintaining a minimum distance of 6-feet from others[45] at all times to eliminate the potential of cross contamination.
- Avoid face to face meetings – critical situations requiring in-person discussion must follow social distancing
- Conduct all meetings via conference calls, if possible. Do not convene meetings of more than 7 people. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussion
- All individual work group meetings/ talks should follow social distancing.
- At each job briefing/toolbox talk, employees are asked if they are experiencing any symptoms, and are sent home.
- Each worksite should have laminated COVID-19 safety guidelines, responsibility and contact list, and hand washing instructions displayed at multiplle locations and clearly visible for all, in line with international good practice.[46]
- All restroom/toilet facilities should be cleaned[47], and hand washing facility must be provided with soap, hand sanitizer and paper towels
- All surfaces should be regularly cleaned, including tabletops /surfaces, door handles, laptops, printers, records, etc.
- All common areas and meeting areas are to be regularly cleaned and disinfected at least once a day but preferably twice a day
- Provide for or ask workers to bring their own water bottle, and not share.
- Adequate toilets with required facilities should be provided at offices and work sites
- To avoid external contamination, recommend everyone to bring food from home or provide safe food options at site following protocols.
- Maintain Social Distancing separation during breaks and lunch.
- Cover coughing or sneezing with a tissue, then throw the tissue in the trash and wash hands, if no tissue is available then cough /sneeze into your upper sleeves or elbow. Do not cough or sneeze into your hands.
- Brief and remind adequately and regularly on cleaning hands after coughing or sneezing thoroughly by using soap and water (minimum for 20 seconds), and use adequate soap and good quality water or hand sanitizer. The Contractor shall ensure adequate quantities of sanitizer and soap are made available at all locations including site offices, meeting rooms, corridors, washrooms /toilets, etc. as appropriate.
- Brief and regularly remind to avoid touching eyes, nose, and mouth with hands.
- To avoid sharing germs, brief and remind staff to clean up after themselves, and DO NOT make others responsible for moving, unpacking and packing up their personal belongings
- If worker or family member is feeling ill, advise to stay home[48]

---

[45] Social distancing may not be practical for undertaking certain specific activities within the workplace. It is therefore important to review the work method statements for these types of activities to assess impact and how to find safe ways of doing in line with best available guidance.

[46] Please check free downloadable copies at the WHO webpages.

[47] Check the international good practice methods for disinfecting such frequently used places at the workplace.

[48] The workers with no sick-leave would be supported with additional leave while affected by COVID-19 by the Contractor.

- Brief workers to refrain from smoking and other activities that weaken the lungs.
- In worst case scenario if any workers found to be COVID 19 positive, project manager/ employer need to report authority and take appropriate measures as per Government procedure. Tentative format for Roles & Responsibilities Matrix for Managing COVID 19 risks and contact number etc. will be filled up by contractors is appended in **Annexure 3**.

V. DISINFECTION AND MANAGING RISKS AT OFFICE AND WORK SITE[49]

a. *General*

19. All areas in the premises shall be disinfected, or fumigated completely using user friendly disinfectant mediums for all locations viz. Entrance, Meeting room, Conference halls, Cubicles, Cabins, Seating Area, Reception, Entrance Gate of Site, Pota Cabins, Building, Equipment, Washroom, Toilet, Sink, Walls, Open areas available, all other surfaces . Please note that fumigation of humans should not be carried out at any point in any premises.

20. For Disinfection 1% sodium hypochlorite or phenolic disinfectants is generally used. For metallic surfaces like doorknobs, handles, security locks, keys etc. 70% alcohol can be used to wipe down surfaces where the use of bleach is not suitable.

21. Disinfection should be done one to two times in a day and for meeting room it should be done before and after the meetings*.*

b. *Preparedness prior to work resumption*

- Reconfiguration of offices to ensure physical/social distancing. Workstations or tables should be segregated at least 6 ft. apart;
- Contractors to ensure provision of safe and potable drinking water;
- Cleaning of all water coolers and testing the water quality (at outlet) for at least bacteriological contaminant should be ensured and reports should be recorded for reference;
- Heating, ventilation, and air conditioning (HVAC) system cleaning or changing of AC filters, Chillers / cooling water plants to be addressed;
- Entire office premises should have at least one round of pesticide control activity before resuming the office;
- Availability of hand sanitizers in strategic locations and stock of hand sanitizer liquids for refilling them. Preferably contactless, sensor-based/ pedal operated sanitizers to avoid minimum touching;
- The chemical having quaternary ammonium, sodium hypochlorite or hydrogen peroxide as active ingredient should be used for area disinfection;
- Disinfection of the whole work sites and offices before opening.
- Clean visibility dirty surfaces with soap and water prior to disinfection. Areas unoccupied for 7 or more days need only routine cleaning. Maintain existing cleaning practices for outdoor areas;
- Details of disinfection discussed below in section 5.3 and 8

[49] Refer to International good practice within the referenced guidance documents.

Guidance provided by CDC in disinfecting areas based on how long these were unoccupied to be followed (https://www.cdc.gov/coronavirus/2019-ncov/community/pdf/ReOpening_America_Cleaning_Disinfection_Decision_Tool.pdf)

- Disinfection should be continued throughout the implementation of the project;
- Appropriate PPE like Face covers, Masks, Goggles, Gloves, Coats / Aprons, Shoes and appropriate disinfecting gadgets like sprayer, brush, etc. shall be made available at work site;
- ***Face Mask - Face Mask 3 layered IS16289 standard or equivalent;***
- ***Gloves - Glove length should be 240 mm, Cuff should be beaded, Finger Thickness should be at least 5.7mil. AQL (Acceptable Quality Level) should be 1.5 ASTMD6319- 10 / EN 455, EN 374 & EN 388;***
- ***Shoe Cover- Premium quality Disposable Shoe Covers. These shoe covers are used in Protected Areas (EPA) to prevent the dust on the shoes from contamination***
- PPEs need to be washed and disinfected on regular basis.
- In case any COVID 19 symptoms arise for workers, used PPEs will be disposed as per biomedical waste disposal rule of Government of India and relevant international good practice guidance. PPEs disposed off in a bio-hazard bag (yellow bag). Inside would be sprayed with Sodium Hypochlorite (1%) and after tying the exterior will also be sprayed with the same. It would be disposed off at destination hospital. This shall again be followed by hand washing.
- Display board regarding the procedure of disinfection shall be displayed in local language with pictorial demonstration at entrances / prominent places.

c. ***Disinfection at workplaces and site offices***

- Maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment.
- Disinfection of entire office – Before start of office and after end of office walls –weekly once
- Disinfection of toilet – At least 3 times within work period with regular interval
- Disinfecting of surfaces (e.g desktop, laptop, desk, printer, chair, table, door, window, file rack) – Twice in a day - before and after use
- Disinfecting of door knobs, handles, locks – 2 times in a day
- Disinfection of hand tools – 2 times in a day
- When choosing cleaning chemicals for disinfection, projects shall consult with local authorities or *subject matter expert* for appropriate disinfectant against emerging viral pathogens of COVID19. The chemical having quaternary ammonium, sodium hypochlorite or hydrogen peroxide as active ingredient should be used for area disinfection.
- Follow the manufacturer's instructions for use of all cleaning and disinfection products (e.g., concentration, application method and contact time, PPE).
- Focusing disinfection efforts on frequently touched surfaces such as handrails, door handles, etc.

- Conference rooms shall be disinfected before and after the meeting.
- Site offices shall be disinfected on daily basis and social distancing shall be followed at the projects
- Dining area shall be disinfected before and after the dining hours.

d. ***Managing risks During Meetings***

i. ***Before Meeting***

- Consider whether a face-to-face meeting or event is needed, plan for an online meeting using MS teams, skype, or other mediums, or simply conference call.
- If the above step is not feasible, restrict the number participants with important and relevant people.
- Ensure sufficient supplies and materials, including tissues and hand sanitizer for all participants. Have surgical masks available to offer anyone who develops respiratory symptoms.
- Maintaining social distancing of 6 ft to be mandatorily followed.
- Meeting room should be specious (not cramped at all) and number of persons should be restricted accordingly so that social distancing can be maintained
- Advise participants in advance that if they have any COVID 19 symptoms like coughing, sneezing, breadthening or feel unwell, they should not attend.

ii. ***During and after the meeting***

- Briefly explain the participants on the actions being taken to prevent COVID- 19
- Avoid handshake and practice ways to say hello without touching
- Sanitizer should be placed strategically so that it easily accessible to all participants. Preferably contactless, sensor-based/ pedal operated sanitizer to be placed to avoid minimum touching
- Mandatory use of masks by all meeting participants at all times for the entire duration of meetings, except when eating or drinking. During breaktimes like snack or meal times, maintain strict social distancing as well.
- Meeting should be specific and short duration time
- Encourage regular handwashing or use of an alcohol rub by all participants at the meeting
- Encourage participants to cover their face with the bend of their elbow or a tissue if they cough or sneeze. Supply tissues and closed bins to dispose of them.
- Display dispensers of alcohol-based hand rub prominently around the venue.
- If there is space, arrange seats so that participants are at least one meter apart.
- Open windows and doors whenever possible to make sure the venue is well ventilated.
- Soon after the meeting, the area shall be disinfected and dust bins shall be cleared.

VI. PRECAUTION DURING AND AFTER TRAVEL TO/FROM WORKSITE

a. Before traveling

- Make sure your organization and its employees have the latest information on areas where COVID-19 is spreading. Government mobile App – 'Aarogya Setu' or any other form of mobile tracking to be used by all for securing such information
- Based on the latest information, your organization should assess the benefits and risks related to upcoming travel plans at project site
- Avoid sending employees who may be at higher risk of serious illness (e.g. aged employees and those with medical conditions such as diabetes, heart and lung disease) to areas where COVID-19 is spreading.
- Make sure all persons travelling to locations reporting COVID-19 are briefed by a qualified professional (e.g. staff health services, health care provider or local health partner)
- Consider issuing employees who are about to travel with small bottles (under 100 ml) of alcohol-based hand rub. This can facilitate regular handwashing.

b. While traveling

- Encourage employees to wash their hands regularly and stay at least one meter away from people who are coughing or sneezing
- Ensure employees know what to do and who to contact if they feel ill while traveling.
- Ensure that your employees comply with instructions from local authorities where they are traveling. If, for example, they are told by local authorities not to go somewhere they should comply with this. Employees should comply with any local restrictions on travel, movement or large gatherings.

c. *Return from traveling*

- Travel may be prioritized based on risk categories e.g. No travel in containment zone; Restricted travel to Red Zone etc.
- Employees who have returned from an area where COVID-19 is spreading should monitor themselves for symptoms for 14 days and take their temperature twice a day.
- If they develop even a mild cough or low-grade fever (i.e. a temperature of 37.3^0C or more) they should stay at home and self-isolate. This means avoiding close contact (one meter or nearer) with other people, including family members. They should also telephone their healthcare provider or the local health department/ local hospital, giving them details of their recent travel and symptoms.

VII. WORK SITE PREVENTION[50]

a. *Controlled access inside the project*

i. *Offices, camps*

- Prior to entry, a mandatory orientation be provided to the worker/ staff or personnel on the proper use, handling and disposal of disposable PPEs, particularly face masks.

[50] Job specific Analysis (JSA) is critical for all the works under this section in line with the recommendations in footnote 1 of this SOP (see page 6) to inform the level of scope changes/sequencing to work schedules and re-engineering.

- Mandatory requirement of wearing masks upon entry and maintained at all times
- Unauthorized entry is strictly prohibited. All the persons should report office/ camp follow the protocol of COVID 19 and if it is found in order then only, he/she will be allowed to join.
- ***Adopting queue system while entry to buildings, workplaces, passenger hoist, bus, etc.,***
- Avoiding entry of new staff/ workmen from known hotspots of COVID 19
- Allocating separate isolation rooms for Staff and workers.
- Ensuring availability of registered medical practitioner as per tied up between contractors/ offices and local hospital/ health facility
- Ensuring doctor from a government approved dispensary / hospital / COVID19 testing centers
- Contactless thermal scanning. Recording of temperature of each staff/ workers
- Contactless attendance system

ii. ***Intake, WTP, Reservoir, Pumping stations – fixed location***

- Prior to entry, at work site a mandatory orientation be provided to the worker or personnel on the proper use, handling and disposal of disposable PPEs, particularly face masks.
- Mandatory requirement of wearing masks upon entry and maintained at all times while at work sites.
- Pre-approval for deployment of new workmen from Project Manager (PM).
- Unauthorized entry is strictly prohibited. All the persons should report office/ PM follow the protocol of COVID 19 and if it is found in order then only, he/she will be allowed to join.
- ***Adopting queue system while entry to workplaces, bus, etc.,***
- Avoiding entry of new workmen from known hotspots of COVID 19
- To obtain “Self-Declaration Form” from all workmen during screening to identify the COVID-19 risk level of workmen.
- Contactless thermal scanning
- Contactless attendance system

iii. ***Pipe laying locations - Linear project sites***

- Prior to start of work, a mandatory orientation be provided to the worker or personnel on the proper use, handling and disposal of disposable PPEs, particularly face masks.
- Mandatory requirement of wearing masks upon entry and maintained at all times while at work sites.
- Pre-approval for deployment of new workmen from Project Manager (PM).
- Unauthorized entry is strictly prohibited. All the persons should report office/ PM follow the protocol of COVID 19 and if it is found in order then only, he/she will be allowed to join.
- Avoiding entry of new workmen from known hotspots of COVID 19
- To obtain “Self-Declaration Form” from all workmen during screening to identify the COVID-19 risk level of workmen.
- Contactless thermal scanning
- Contactless attendance system

b. ***Managing the social distancing while on deployment and working***

a. Offices, camps

- At office, camp wherever feasible to ensure social distancing.
- Marking shall be made available to facilitate social distancing of 6 ft.
- Working in shifts to minimize crowding in one place wherever possible
- Discourage staff/ workers from using other staff's/ workers' phones, clothes, wallets, things or other work tools and equipment, as far as possible. These items should be disinfected before and after use
- All the trips in bus/ car should be planned in such a way that norms of travelling should be maintained
- Social distancing will be maintained while travelling in bus, car. Seating arrangement (at least one seat apart) will be depending on configuration of bus and car.
- Sanitize conveyance vehicle / bus of staff and workmen prior to start of each trip

b. ***WTP, Intake, Reservoir, Pumping stations – fixed location & pipe laying locations - Linear project sites***

- Developing a strategy by contractor for workmen deployment at sites considering the social distancing requirements and COVID 19 risks which may include:
- Sequence of work - ensure the planning of work as per sequence of work with optimum number of workmen.
- Deploy workmen in different locations, wherever feasible to ensure social distancing.
- Marking shall be made available to facilitate social distancing of 6 ft.
- Staggered deployment of workmen in case of congested work locations
- Working in shifts to minimize crowding of workmen in one place wherever possible
- Plan for working during late shifts / late hours to minimize disruption to traffic / people contact in congested areas
- Discourage workers from using other workers' phones, clothes, wallets, things or other work tools and equipment, as far as possible. These items should be disinfected before and after use
- Clean the phones, clothes and other daily work tools on daily basis. Common property tools at the work sites should be disinfected before and after it is used by a particular worker.
- Identifying multiples access and egress pathways
- Before restarting Identifying multiple rest areas within the site premises considering number of workmen at the project
- All the trips in bus/ car should be planned in such a way that norms of travelling should be maintained
- Restricting the number of users in passenger hoist, bus, etc., Social distancing will be maintained while travelling in bus, car. Seating arrangement (at least one seat apart) will be depending on configuration of bus and car.
- Sanitize conveyance vehicle / bus of staff and workmen prior to start of each trip
- In addition to the regular PPE, nose masks and hand gloves for teams who are screening workmen, conducting medical checkup & disinfection and others those who need to work in proximity to a greater number of people.

- Masks (homemade[51] can be thought of) to be provided to all the persons/labourers on the worksite. The procedures to be followed for maximum precaution to protect all persons/labourers at all times.

All types of PPE must be:

- *Properly fitted and periodically refitted, as applicable (e.g., respirators).*
- *Consistently and properly worn when required.*
- *Regularly inspected, maintained, and replaced, as necessary.*
- *Properly removed, cleaned, and stored or disposed of, as applicable.*
- *Re-usable PPE should be thoroughly cleaned after use and not shared between workers*

c. *Prevention at Workspace*

- Make sure workplace clean and hygienic; all surface and worksite properly sanitized (*For office and all work sites*)
- Adequate provision of safe water should be made available for all staff and contact less water tap should be preferable (*For office and all work sites*)
- First day, before resuming the work on site post lockdown period, mandatory medical check-up for preliminary symptoms will be arranged for all workers. Only medically fit workers will be deployed at site and medical assistance will be arranged for unfit workers. Medical check-up camp also covering COVID 19 pool test should be arranged every month. *(For all work sites*)
- At the start of each shift, confirm with all employees that they are healthy and inform all workers / staffs of reusable and disposable PPE (*For office and all work sites*)
- Use of face masks at all times is mandatory, except when eating or drinking (*For office and all work sites*)
- Outside person should be strictly prohibited at office, camp and worksite (*For office and all work sites*)
- All construction workers will be required to wear cut-resistant gloves or the equivalent.
- Use of eye protection (reusable safety goggles/face shields) is recommended. The supply of eye protection equipment to the workers is considered as a standard part of PPE during construction works. *(For all work sites*)
- In work conditions where required social distancing is impossible to achieve, such employees shall be supplied with standard face mask, gloves, and eye protection. (*For office, camp and all work sites*)
- All employees shall drive to work site in a single occupant vehicle. Staff shall not ride together in the same vehicle (*For office and all work sites*)
- When entering in equipment or vehicle which not sure were the last person to enter, make sure that you wipe down the interior and door handles with disinfectant (with 1% sodium hypochlorite solution daily) prior to entry. Adequate quantity of the disinfectant shall be provided by the Contractor at all such site-specific locations. (*For office and all work sites*)
- Workers should maintain separation of 6 ft from each other. (*For office, camp and all work sites*)

[51] Advisory on use of Homemade Protective Cover for Face & Mouth by Govt. of India

- Multi person activities will be limited where feasible (two persons lifting activities) *(For all work sites*)
- Gathering places on the site such as sheds and/or break areas will be eliminated, and instead small break areas will be used with seating limited to ensure social distancing. *(For all work sites*)
- Contact the cleaning person of the worksite/ office/ camp and ensure proper COVID-19 sanitation processes. Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with gloves, gown and face mask for each cycle of cleaning. The Contractor shall make available adequate supply of PPE and chemicals while the threat of COVID-19 continues. (*For office, camp and all work sites*)
- Clean all high contact surfaces a minimum of twice a day in order to minimize the spread of germs in areas that people touch frequently. This includes but is not limited to desks, laptops, key board, printer etc. and vehicles *(For office)*
- Maintain your good health by getting adequate sleep; eating a balanced, healthy diet, avoid alcohol; and consume plenty of fluids. *(For office and camp)*
- Continuation of works in construction project with workers available on site and no workers to be brought in from outside *(For all work sites*)
- The site offices shall have adequate ventilation. The air conditioning or ventilation systems installed at the site offices would have high-efficiency air filters to reduce the risk of infection. The frequency of air changes may be increased for areas where close personal proximity cannot be fully prevented such as control rooms, elevators, waiting rooms, etc. *(For office and camp)*
- The Contractor shall carry out contactless temperature checks for the workers prior to site entrance, during working hours and after site works to identify persons showing signs of being unwell with the COVID-19 symptoms. *(For all work sites*).

d. ***Washing Facility***

i. ***Offices, camps, work sites***

- All worksites should have access to toilet and hand washing facility.
- Providing hand cleaning facilities at entrances and exits. This should be soap and water wherever possible or hand sanitizer if water is not available
- Preferably contactless, sensor-based/ pedal operated sanitizer to be placed to avoid minimum touching
- Washing facility with hot water, and soap at fire hydrants or other water sources to be used for frequent handwashing for all onsite employees
- All onsite workers must help to maintain and keep work sites clean
- If a worker notices soap or towels are running low or out, immediately notify supervisors
- Garbage bins will be placed next to the hand wash facility for discarding of used tissues/towels with regular removal and disposal facility (end of each day).

e. ***Cleaning Procedures***

- Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with gloves, gown and face mask for each cycle of cleaning.
- Each worksite should have enhanced cleaning and disinfection procedures that are posted and shared including sheds, gates, equipment, vehicles, etc. and

shall be posted at all entry points to the sites, and throughout the project site. These include common areas and high touch points like

- Taps and washing facilities (*office, camp and fixed work sites*)
- Toilet flush and seats (*office, camp and fixed work sites*)
- Door handles and push plates *(office, camp*)
- Handrails on staircases and corridors (*office*)
- Lift and hoist controls (*office*)
- Machinery and equipment controls (*work sites*)
- Food preparation and eating surfaces(*camps*)
- Telephone equipment / mobiles, Keyboards, printer, photocopiers and other office equipment (*office*).

VIII. ***MANAGING COVID 19 RISKS in WORK-CAMPS***

a. ***Cooking***

- Daily thermal screening and health check of the cooks and helpers at the guest houses and camps
- Cooking staff should be prohibited from reporting to work if they experience COVID 19 symptoms
- Cleaning and disinfection on daily basis once the cooking is over
- The cooks and helpers shall wear masks and hand gloves while preparation, serving food to the staffs and workmen
- Adequate provision of safe water should be made available for all staff and contact less water tap should be preferable
- After cooking food items should be covered

b. ***Dining***

- Staggered Timings shall be adopted to limit the no of workmen using the hall to maintain social distance
- Increase the Space of dining facility where possible
- Hand cleaning facilities or hand sanitizer should be available at the entrance of any room where people eat and should be used by workers when entering and leaving the area. Preferably contactless, sensor-based/ pedal operated sanitizer to be placed to avoid minimum touching
- Workers should sit 2 m apart from each other whilst eating and avoid all contact
- Hygiene conditions shall be ensured during serving of foods in Guest houses / Messes / Workmen Stay Places, so that common serving spoons etc. are not touched by all the staff/workmen taking food
- Only Persons serving food shall be allowed to handle the serving spoons, common utensils, etc.
- Tables should be cleaned between each use and sanitized
- All rubbish should be put straight in the bin and not left for someone else to clear up; only covered pedal operated bins should be used and the bins should be cleared and cleaned regularly, with strict adherence to safety protocols for disposal and hygiene maintenance
- All areas used for eating must be thoroughly cleaned and sanitized at the end of each break and shift, including chairs, door handles, etc.
- Regular inspection of the kitchen/ dining area to be conducted by the Admin/ EHS Officer personnel.

c. ***Usage of common facilities***

- Areas or places of high risk for transmission of virus such as doorknobs, handles, latches, handrails in common facilities shall be cleaned and disinfected at regular intervals

d. ***Disinfection***

- Disinfection of the workmen habitat in all the places shall be carried out on a periodical basis and closely monitored by camp in-charge and verified by health & safety officers.

e. ***Toilet Facility***

- Restrict the number of people using toilet facility at any one time
- Sufficient toilets with facility need to be provided, separate for men and women
- Wash hands before and after using the facilities
- Enhance the cleaning regimes for toilet facilities particularly door handles, locks and the toilet flush
- Portable toilets should be avoided wherever possible, but where in use these should be cleaned and emptied more frequently
- Provide suitable and sufficient rubbish bins for hand towels with regular removal and disposal.

f. ***Changing Facilities, Showers and Drying Areas***

- Introduce staggered start and finish times to reduce congestion and contact at all times
- Introduce enhanced cleaning of all facilities throughout the day and at the end of each day
- Consider increasing the number or size of facilities available on camp if possible
- Provide suitable and sufficient garbage bins in these areas with regular removal and disposal.

g. ***Separate Staying arrangement for new workmen/women***

- New workmen shall not be accommodated in the same rooms as the existing workmen Dwelling units / rooms shall be suitably organized to ensure the avoidance of proximity of the workmen groups

h. ***Resources at workmen/women habitat***

- Limiting the number of workmen/women in dwelling units
- Contractor to arrange all daily need items and grocery at site itself and no worker is allowed to go to shops for daily need items.

i. ***Hand washing facilities***

- Dedicated hand washing facilities with soap shall be kept at conspicuous locations in the workmen habitat with sign boards for DO’s and DON’T's in hand washing

j. ***Promoting self-hygiene and cleanliness***

- Pictorial posters in local language shall be placed across the workmen

habitat to create awareness on maintaining self – hygiene and respiratory hygiene

- Masks (homemade[52] can be thought of) to be provided to all the persons/labourers for use at the camp site as well as at the worksite. Increase cleaning/disinfection visits to at least 2 times a day. Cleaning person(s) to be provided with disposable gloves, gown and face mask for each cycle of cleaning.

k. ***Quarantine and isolation rooms***

- Adequate number of rooms shall be identified and reserved to accommodate symptomatic workmen
- Facilities required within the Isolation rooms to be ensured in co-ordination with the local health facility.
- The types of PPEs shall be specified for Caregivers, Isolated person etc.

IX. RESOURCE REQUIREMENT

22. Resources required specifically managing the COVID 19 risk shall be identified, planned, procured, and made available at site in adequate quantities. The resources which are required to manage COVID 19 risks may include:

- Thermal scanners. All persons at the worksite should have their temperature screened with Infrared Thermometer (handheld non-contact).
- Contactless attendance system.
- Liquid Soap & Hand washing arrangement at site in workmen habitat
- Contactless, sensor-based/ pedal operated sanitizer
- Team for cleaning & disinfection.
- Nose/ face masks for teams who are screening workmen, conducting medical checkup & disinfection.
- Hand gloves for teams who are screening workmen, conducting medical checkup & disinfection.
- Quarantine Facilities for accommodating symptomatic workmen.
- Additional rest areas at sites and dining spaces in Workmen habitat
- Ensure availability (even tie-up) of Ambulance equipped with all necessary items like nose masks, first aid kits, aprons, disinfect solutions etc.
- First aid kits with hand sanitizers and hand wash liquids shall be mandatory available in all the vehicle without any lapses.
- Regular notification by state government, district authority should be adhered and all the staff should be compulsorily made aware of that
- Job protection of workers during crisis period of COVID 19 pandemic needs to be ensured.

X. INDUCTION AND TRAINING

a. ***Medical Check-up by Doctor***

[52] Advisory on use of Homemade Protective Cover for Face & Mouth by GOI

- All workmen shall be subjected to stringent medical check-up by the medical practitioner before allowing for EHS Induction.
- The doctor shall consider the additional information provided by the workmen in the screening, while checking the workmen.

b. ***EHS Induction***

- Number of workmen participating in EHS Induction shall be restricted so as to maintain the social distance during training. EHS induction shall be reviewed at each project to include COVID 19 controls & Risk as per H&S Plan (Number of programs may be required to be increased in case more workmen and social distancing during induction).
- In addition to the regular EHS induction, workmen will be trained on COVID 19 risks and the precautionary measures, covering the following topics,
  - Symptoms of COVID 19
  - How virus spreads
  - System and management of symptoms for the cases detected
  - Importance of maintaining social distancing
  - Importance and DO's and DON'T's of hand washing
  - Overview of the precautionary measure taken at site for COVID 19
  - Roles & Responsibility of workmen specific to the precautions towards COVID 19
  - Reporting in case of symptoms similar to Flu

c. ***Importance and DO's and DON'T's of hand washing***

- Overview of the precautionary measure taken at site for COVID 19
- Roles & Responsibility of workmen specific to the precautions towards COVID 19
- Reporting in case of symptoms similar to Flu

d. ***Training & Awareness***

- All the staff members, Emergency Response Team (ERT) Members, Supervisor & all workmen shall be trained specific to COVID 19 risks and controls measures through regular interval CWT (contractor workmen training), Site specific Trainings & daily Tool box talks.
- PMU and PIU to ensure all workers get training on above requirements before start of any construction activity
- During construction period frequent visual and verbal reminders to workers can improve compliance with hand hygiene practices and thus reduce rates of infection. Handwashing posters should also be displayed at work site and labour camps

e. ***Emergency Contact***

- Provide emergency contact number at work site and labour camp for reporting COVID-19 symptoms.

XI. COMMUNICATION AND ADVANCEMENT: COVID-19 UPDATE

23. The Contractor shall be in touch with the Department of Health & Family Welfare and Labour Department to identify any potential worksite exposures relating to COVID-19, including:

- Strictly follow the guidelines issues by Ministry of health
- Contractor strictly follow the instruction of PMU/ PMC and PIU relating to COVID 19 pandemic
- Other workers, vendors, inspectors, or visitors to the worksite with close contact to the individual
- Labour Camps / Work areas such as designated workstations or rooms /sheds
- Work tools and equipment

- Common areas such as break rooms, tables and sanitary facilities.

a. Screening:

Apart from the regular information collected during the screening process, additional self-declaration form shall be obtained to identify the COVID-19 risk level of workmen. This information shall include:

- Place of his latest stay (to identify whether, it is a hotspot)
- Contact with any confirmed or suspected COVID 19 individual
- Contact with persons who have a travel history to hot spots
- Whether they have any symptoms for COVID 19

b. Daily Safety checks for Resuming of work after Lockdown

- Monitor the workmen body temperature.
- Analyze the COVID symptoms.
- Before starting of work Hand sanitizer to be use by all.
- PEP Talk/Toolbox Talk conduct for all workmen before starting of work & covered the COVID precaution measures & site work safety.
- During Work Social distancing should be minimized.
- Regular interval Health check-up conduct for all workmen.
- Health hygiene should be ensured for all.

XII. DOCUMENTATION BY CONTRACTOR

24. In addition to the approved H&S Plan, the contractor for each package under WBDWSIP must keep the following documents ready before re-starting of work:

- Roles, responsibilities and accountability matrix for each site, developed under the H&S Plan, clearly published or visibly shown at all sites for managing COVID 19 risks, including contact number of responsible persons. This should be included as part of their approved H & S plan (Template in Annexure 3).
- Filling up format for Medical Fitness on resuming the duty
- On-line Self-Declaration to be filled by employee resuming duties
- Self-attestation by persons/labour prior to work

25. Prior to starting a work, each labour /worker will self-attest to the supervisor:

- No signs of COVID-19 symptoms within the past 24 hours.
- No contact with an individual diagnosed with COVID-19. (contact means living with a positive person, being within 6 ft of positive person or sharing things of positive person)
- Not undergone quarantine or isolation (in case of any labourer /worker who has been quarantined or isolated previously, the engagement shall be only after obtaining the requisite clearance from trained and registered medical practitioner)

26. The engagement of workers falling in the high-risk category such as workers over the age of 55 years, with underlying medical conditions or health issues, etc. should be done only after obtaining the requisite clearance from trained and registered medical practitioners.[53]

[53] Caution is needed to avoid exclusion from workplace on grounds of one's age. Although there could be a direct correlation of age and underlying health conditions, the emphasis should be on those with underlying health conditions and not necessarily on age.

27. The self-attestation would be verified in collaboration with trained and registered medical practitioners deployed at site through discussions with laborers /workers and/or preliminary checks such as temperature checks, etc. prior to their engagement at site.

28. In addition, the contractor shall mandatorily follow all medical test requirements for the workers prior to their engagement and/or mobilization at site as per the guidelines issued by the Central and State government agencies and WHO from time to time.

29. Persons/Labourers showing COVID-19 symptoms or not providing self-attestation shall be directed to leave the work site and report to the fever clinic/quarantine centre immediately. Labourers should be asked to not return to the work site until cleared by fever clinic/ quarantine centre.

30. Contractors must identity personnel for and report every month the following:

- Filling up Checklist for Post lockdown work resumption compliances at Project Site;
- Filling of Daily Safety checks for resuming of work after Lockdown; and
- Initial submission of and conformation of prominent display on a monthly basis pf IEC poster and responsibility matrix with contact details for display at each site.

Annexure 1 Pandemic Plan Site XXXXX Acknowledgement Form

Project Name:		**Location**	
Date:		**Client Name:**	
S. No.	**Description**	**Yes (✓) NO**	**Remarks**
1.	Temperature (Fever)		
2.	Cold		
3.	Cough		
4.	Difficulty in Breathing		
5.	Are you having any medical illness? (BP, Sugar, Cardiovascular, lung, obesity, kidney etc.)		
6.	Is any of your family members are suffering from above symptoms.		
7.	Have you met any confirmed COVID -19 person?		
8.	Is any of your neighbors are confirmed with Covid-192		
9.	Is your locality falls in covid-19 containment / Red zone area?		
10	Have you done hand sanitization before entering		
11.	Did you travel beyond your state boundaries earlier (holidays/weekly off)		
12.	Any history of international travel		
13.	Have you received - Nose mask & Hand sanitizer		
14.	Mode of travel used to reach site.		
15.	Whether social distancing (Min-6feet) maintained in case of public transport, site related activities and		
16.	Are you aware about Resilience plan, MHA (Ministry of Home Affairs) updates, and National Directives, State Govt order, Local authority order		

Declaration by Employee

I _____declare that the information given by me above is true and correct to the best of my knowledge.

Signature of Staff with Date: _____ Medical Professional at site Signature of Appropriate

authority or any nearby assigned government approved dispensary/hospital

Signature of Admin. with Date: _____ _____

Signature with Date

Signature of PM/TL with Date: _____

Annexure 2: Regular Health Monitoring Template at Site XXX

Project Name:		**Location**	
Name:		Client Name:	
S. No.	**Description**	**Yes (✓) NO**	**Remarks**
1.	Temperature (Fever)		Logbook to be maintained
2.	Cold		
3.	Cough		
4.	Difficulty in Breathing		
5.	Have you done hand sanitization before entering site?		
6.	Has the person wearing mask		

Signature of Staff with Date: _____

Signature of Admin. with Date: _____

Annexure 3: Roles & Responsibilities Matrix for Managing COVID 19 risks* at Site XXXXX

Process	TL/ DTL /PM	Accts & Admin	Office Manager/ Section Inch	All staff	EHSO	ERT Team	CM/ Super-visor	Workmen
Conducting Meeting regarding this H&S PLAN before restarting the Works								
Preparing a site-specific action plan								
Screening of workmen								
EHS Induction								
Access Control measures								
Training on COVID 19 response								
Disinfection								
Risk Control in Workmen Camp								
Social distancing in site office & facilities								
Pre startup checks location / area wise								
Promoting Self Hygiene & Respiratory Hygiene								
Display of posters for COVID 19 Response								
Organizing resources for COVID								
Maintaining social distance								
Monitoring of compliance								
Reporting in case of								
Checks for COVID during safe to start of activities								
Periodical review								
Emergency Response								

(* Note- To be submitted by contractor of each package)

A - Accountability

R – Responsibility

EHSO- Environment, Health and Safety Officer, ERT – Emergency Response Team, PM- Project Manager, CM- Construction Manager

Individual/s in Charge and Responsible for the Activity at Site XXXXX
(COVID-19 Resource Team Members)

SN	Name	Occupation / Designation	Contact no	Company	Roles & Responsibility
1					
2					
3					
4					
5					
6					
7					
8					

Appendix 19: WHO Interim Guidance on Water, Sanitation, Hygiene and Waste Management for the COVID19 virus

World Health Organization

unicef

Water, sanitation, hygiene, and waste management for the COVID-19 virus

Interim guidance
19 March 2020

Background

This interim guidance supplements the infection prevention and control (IPC) documents by summarizing WHO guidance on water, sanitation and health care waste relevant to viruses, including coronaviruses. It is intended for water and sanitation practitioners and providers and health care providers who want to know more about water, sanitation and hygiene (WASH) risks and practices.

The provision of safe water, sanitation, and hygiene conditions is essential to protecting human health during all infectious disease outbreaks, including the COVID-19 outbreak. Ensuring good and consistently applied WASH and waste management practices in communities, homes, schools, marketplaces, and health care facilities will help prevent human-to-human transmission of the COVID-19 virus.

The most important information concerning WASH and the COVID-19 virus is summarized here.

- Frequent and proper hand hygiene is one of the most important measures that can be used to prevent infection with the COVID-19 virus. WASH practitioners should work to enable more frequent and regular hand hygiene by improving facilities and using proven behavior-change techniques.
- WHO guidance on the safe management of drinking-water and sanitation services applies to the COVID-19 outbreak. Extra measures are not needed. Disinfection will facilitate more rapid die-off of the COVID-19 virus.
- Many co-benefits will be realized by safely managing water and sanitation services and applying good hygiene practices.

Currently, there is no evidence about the survival of the COVID-19 virus in drinking-water or sewage. The morphology and chemical structure of the COVID-19 virus are similar to those of other human coronaviruses for which there are data about both survival in the environment and effective inactivation measures. This document draws upon the evidence base and WHO guidance on how to protect against viruses in sewage and drinking-water. This document will be updated as new information becomes available.

1. COVID-19 transmission

There are two main routes of transmission of the COVID-19 virus: respiratory and contact. Respiratory droplets are generated when an infected person coughs or sneezes. Any person who is in close contact with someone who has respiratory symptoms (sneezing, coughing) is at risk of being exposed to potentially infective respiratory droplets.[1] Droplets may also land on surfaces where the virus could remain viable; thus, the immediate environment of an infected individual can serve as a source of transmission (contact transmission).

Approximately 2–10% of cases of confirmed COVID-19 disease present with diarrhoea,[2-4] and two studies detected COVID-19 viral RNA fragments in the faecal matter of COVID-19 patients.[5,6] However, only one study has cultured the COVID-19 virus from a single stool specimen.[7] There have been no reports of faecal–oral transmission of the COVID-19 virus.

2. Persistence of the COVID-19 virus in drinking-water, faeces and sewage and on surfaces.

Although persistence in drinking-water is possible, there is no evidence from surrogate human coronaviruses that they are present in surface or groundwater sources or transmitted through contaminated drinking water. The COVID-19 virus is an enveloped virus, with a fragile outer membrane. Generally, enveloped viruses are less stable in the environment and are more susceptible to oxidants, such as chlorine. While there is no evidence to date about survival of the COVID-19 virus in water or sewage, the virus is likely to become inactivated significantly faster than non-enveloped human enteric viruses with known waterborne transmission (such as adenoviruses, norovirus, rotavirus and hepatitis A). For example, one study found that a surrogate human coronavirus survived only 2 days in dechlorinated tap water and in hospital wastewater at 20 °C.[8] Other studies concur, noting that the human coronaviruses transmissible gastroenteritis coronavirus and mouse hepatitis virus demonstrated a 99.9% die-off in from 2 days[9] at 23 °C to 2 weeks[10] at 25 °C. Heat, high or low pH, sunlight, and common disinfectants (such as chlorine) all facilitate die off.

It is not certain how long the virus that causes COVID-19 survives on surfaces, but it seems likely to behave like other coronaviruses. A recent review of the survival of human

coronaviruses on surfaces found large variability, ranging from 2 hours to 9 days.[11] The survival time depends on a number of factors, including the type of surface, temperature, relative humidity, and specific strain of the virus. The same review also found that effective inactivation could be achieved within 1 minute using common disinfectants, such as 70% ethanol or sodium hypochlorite (for details, see Cleaning practices).

3. Keeping water supplies safe

The COVID-19 virus has not been detected in drinking-water supplies, and based on current evidence, the risk to water supplies is low.[12] Laboratory studies of surrogate coronaviruses that took place in well-controlled environments indicated that the virus could remain infectious in water contaminated with faeces for days to weeks.[13] A number of measures can be taken to improve water safety, starting with protecting the source water, treating water at the point of distribution, collection, or consumption, and ensuring that treated water is safely stored at home in regularly cleaned and covered containers.

Conventional, centralized water treatment methods that use filtration and disinfection should inactivate the COVID-19 virus. Other human coronaviruses have been shown to be sensitive to chlorination and disinfection with ultraviolet (UV) light.[14] As enveloped viruses are surrounded by a lipid host cell membrane, which is not robust, the COVID-19 virus is likely to be more sensitive to chlorine and other oxidant disinfection processes than many other viruses, such as coxsackieviruses, which have a protein coat. For effective centralized disinfection, there should be a residual concentration of free chlorine of ≥0.5 mg/L after at least 30 minutes of contact time at pH <8.0.[15] A chlorine residual should be maintained throughout the distribution system.

In places where centralized water treatment and safe piped water supplies are not available, a number of household water treatment technologies are effective in removing or destroying viruses, including boiling, or using high-performing ultrafiltration or nanomembrane filters, solar irradiation and, in non-turbid waters, UV irradiation and appropriately dosed free chlorine.

4. Safely managing wastewater and faecal waste

There is no evidence that the COVID-19 virus has been transmitted via sewerage systems with or without wastewater treatment. Further, there is no evidence that sewage or wastewater treatment workers contracted the severe acute respiratory syndrome (SARS), which is caused by another type of coronavirus that caused a large outbreak of acute respiratory illness in 2003. As part of an integrated public health policy, wastewater carried in sewerage systems should be treated in well-designed and well-managed centralized wastewater treatment works. Each stage of treatment (as well as retention time and dilution) results in a further reduction of the potential risk. A waste stabilization pond (an oxidation pond or lagoon) is generally considered a practical and simple wastewater treatment technology particularly well suited to destroying pathogens, as relatively long retention times (20 days or longer) combined with sunlight, elevated pH levels, biological activity, and other factors serve to accelerate pathogen destruction. A final disinfection step may be considered if existing wastewater treatment plants are not optimized to remove viruses. Best practices for protecting the health of workers at sanitation treatment facilities should be followed. Workers should wear appropriate personal protective equipment (PPE), which includes protective outerwear, gloves, boots, goggles or a face shield, and a mask; they should perform hand hygiene frequently; and they should avoid touching eyes, nose, and mouth with unwashed hands.

WASH in health care settings

Existing recommendations for water, sanitation and hygiene measures in health care settings are important for providing adequate care for patients and protecting patients, staff, and caregivers from infection risks.[14] The following actions are particularly important: (i) managing excreta (faeces and urine) safely, including ensuring that no one comes into contact with it and that it is treated and disposed of correctly; (ii) engaging in frequent hand hygiene using appropriate techniques; (iii) implementing regular cleaning and disinfection practices; and (iv) safely managing health care waste. Other important measures include providing sufficient safe drinking-water to staff, caregivers, and patients; ensuring that personal hygiene can be maintained, including hand hygiene, for patients, staff and caregivers; regularly laundering bedsheets and patients' clothing; providing adequate and accessible toilets (including separate facilities for confirmed and suspected cases of COVID-19 infection); and segregating and safely disposing of health care waste. For details on these recommendations, please refer to Essential environmental health standards in health care.[16]

1. Hand hygiene practices

Hand hygiene is extremely important. Cleaning hands with soap and water or an alcohol-based hand rub should be performed according to the instructions known as "My 5 moments for hand hygiene".[17] If hands are not visibly dirty, the preferred method is to perform hand hygiene with an alcohol-based hand rub for 20–30 seconds using the appropriate technique.[18] When hands are visibly dirty, they should be washed with soap and water for 40–60 seconds using the appropriate technique.[17] Hand hygiene should be performed at all five moments, including before putting on PPE and after removing it, when changing gloves, after any contact with a patient with suspected or confirmed COVID-19 infection or their waste, after contact with any respiratory secretions, before eating, and after using the toilet.[16] If an alcohol-based hand rub and soap are not available, then using chlorinated water (0.05%) for handwashing is an option, but it is not ideal because frequent use may lead to dermatitis, which could increase the risk of infection and asthma and because prepared dilutions might be inaccurate.[16] However, if other options are not available or feasible, using chlorinated water for handwashing is an option.

Functional hand hygiene facilities should be present for all health care workers at all points of care and in areas where PPE is put on or taken off. In addition, functional hand hygiene facilities should be available for all patients, family members, and visitors, and should be available within 5 m of toilets, as well as in waiting and dining rooms and other public areas.

2. Sanitation and plumbing

People with suspected or confirmed COVID-19 disease should be provided with their own flush toilet or latrine that has a door that closes to separate it from the patient's room. Flush toilets should operate properly and have functioning drain traps. When possible, the toilet should be flushed with the lid down to prevent droplet splatter and aerosol clouds. If it is not possible to provide separate toilets, the toilet should be cleaned and disinfected at least twice daily by a trained cleaner wearing PPE (gown, gloves, boots, mask, and a face shield or goggles). Further, and consistent with existing guidance, staff and health care workers should have toilet facilities that are separate from those used by all patients.

WHO recommends the use of standard, well-maintained plumbing, such as sealed bathroom drains, and backflow valves on sprayers and faucets to prevent aerosolized faecal matter from entering the plumbing or ventilation system,[9] together with standard wastewater treatment.[11] Faulty plumbing and a poorly designed air ventilation system were implicated as contributing factors to the spread of the aerosolized SARS coronavirus in a high-rise apartment building in Hong Kong in 2003.[12] Similar concerns have been raised about the spread of the COVID-19 virus from faulty toilets in high-rise apartment buildings.[13] If health care facilities are connected to sewers, a risk assessment should be conducted to confirm that wastewater is contained within the system (that is, the system does not leak) before its arrival at a functioning treatment or disposal site, or both. Risks pertaining to the adequacy of the collection system or to treatment and disposal methods should be assessed following a safety planning approach,[14] with critical control points prioritized for mitigation.

For smaller health care facilities in low-resource settings, if space and local conditions allow, pit latrines may be the preferred option. Standard precautions should be taken to prevent contamination of the environment by excreta. These precautions include ensuring that at least 1.5 m exists between the bottom of the pit and the groundwater table (more space should be allowed in coarse sands, gravels, and fissured formations) and that the latrines are located at least 30 m horizontally from any groundwater source (including both shallow wells and boreholes).[15] If there is a high groundwater table or a lack of space to dig pits, excreta should be retained in impermeable storage containers and left for as long as feasible to allow for a reduction in virus levels before moving it off-site for additional treatment or safe disposal, or both. A two-tank system with parallel tanks would help facilitate inactivation by maximizing retention times, as one tank could be used until full, then allowed to sit while the next tank is being filled. Particular care should be taken to avoid splashing and the release of droplets while cleaning or emptying tanks.

3. Toilets and the handling of faeces

It is critical to conduct hand hygiene when there is suspected or direct contact with faeces (if hands are dirty, then soap and water are preferred to the use of an alcohol-based hand rub). If the patient is unable to use a latrine, excreta should be collected in either a diaper or a clean bedpan and immediately and carefully disposed of into a separate toilet or latrine used only by suspected or confirmed cases of COVID-19. In all health care settings, including those with suspected or confirmed COVID-19 cases, faeces must be treated as a biohazard and handled as little as possible. Anyone handling faeces should follow WHO contact and droplet precautions[16] and use PPE to prevent exposure, including long-sleeved gowns, gloves, boots, masks, and goggles or a face shield. If diapers are used, they should be disposed of as infectious waste as they would be in all situations. Workers should be properly trained in how to put on, use, and remove PPE so that these protective barriers are not breached.[17] If PPE is not available or the supply is limited, hand hygiene should be regularly practiced, and workers should keep at least 1 m distance from any suspected or confirmed cases.

If a bedpan is used, after disposing of excreta from it, the bedpan should be cleaned with a neutral detergent and water, disinfected with a 0.5% chlorine solution, and then rinsed with clean water, the rinse water should be disposed of in a drain or a toilet or latrine. Other effective disinfectants include commercially available quaternary ammonium compounds, such as cetylpyridinium chloride, used according to manufacturer's instructions, and peracetic or peroxyacetic acid at concentrations of 500–2000 mg/L.[18]

Chlorine is ineffective for disinfecting media containing large amounts of solid and dissolved organic matter. Therefore, there is limited benefit to adding chlorine solution to fresh excreta and it is possible that this may introduce risks associated with splashing.

4. Emptying latrines and holding tanks, and transporting excreta off-site.

There is no reason to empty latrines and holding tanks of excreta from suspected or confirmed COVID-19 cases unless they are at capacity. In general, the best practices for safely managing excreta should be followed. Latrines or holding tanks should be designed to meet patient demand, considering potential sudden increases in cases, and there should be a regular schedule for emptying them based on the wastewater volumes generated. PPE (long-sleeved gown, gloves, boots, masks, and goggles or a face shield) should be worn at all times when handling or transporting excreta offsite, and great care should be taken to avoid splashing. For crews, this includes pumping out tanks or unloading pumper trucks. After handling the waste and once there is no risk of further exposure, individuals should safely remove their PPE and perform hand hygiene before entering the transport vehicle. Soiled PPE should be put in a sealed bag for later safe laundering (see Cleaning practices). Where there is no off-site treatment, in-situ treatment can be done using lime. Such treatment involves using a 10% lime slurry added at 1-part lime slurry per 10 parts of waste.

5. Cleaning practices

Recommended cleaning and disinfection procedures for health care facilities should be followed consistently and correctly.[19] Laundry should be done and surfaces in all environments in which COVID-19 patients receive care (treatment units, community care centres) should be cleaned at least once a day and when a patient is discharged.[17] Many disinfectants are active against enveloped viruses, such as the COVID-19 virus, including commonly used hospital disinfectants. Currently, WHO recommends using

- 70% ethyl alcohol to disinfect small areas between uses, such as reusable dedicated equipment (for example, thermometers);
- sodium hypochlorite at 0.5% (equivalent to 5000 ppm) for disinfecting surfaces.

All individuals dealing with soiled bedding, towels, and clothes from patients with COVID-19 infection should wear appropriate PPE before touching soiled items, including heavy duty gloves; a mask; eye protection (goggles or a face shield); a long-sleeved gown; an apron if the gown is not fluid resistant; and boots or closed shoes. They should perform hand hygiene after exposure to blood or body fluids and after removing PPE. Soiled linen should be placed in clearly labelled, leak-proof bags or containers, after carefully removing any solid excrement and putting it in a covered bucket to be disposed of in a toilet or latrine. Machine washing with warm water at 60–90°C (140–194°F) with laundry detergent is recommended. The laundry can then be dried according to routine procedures. If machine washing is not possible, linens can be soaked in hot water and soap in a large drum using a stick to stir and being careful to avoid splashing. The drum should then be emptied, and the linens soaked in 0.05% chlorine for approximately 30 minutes. Finally, the laundry should be rinsed with clean water and the linens allowed to dry fully in sunlight.

If excreta are on surfaces (such as linens or the floor), the excreta should be carefully removed with towels and immediately safely disposed of in a toilet or latrine. If the towels are single use, they should be treated as infectious waste; if they are reusable, they should be treated as soiled linens. The area should then be cleaned and disinfected (with, for example, 0.5% free chlorine solution), following published guidance on cleaning and disinfection procedures for spilled body fluids.[27]

6. Safely disposing of greywater or water from washing PPE, surfaces and floors.

Current WHO recommendations are to clean utility gloves or heavy-duty, reusable plastic aprons with soap and water and then decontaminate them with 0.5% sodium hypochlorite solution after each use. Single-use gloves (nitrile or latex) and gowns should be discarded after each use and not reused; hand hygiene should be performed after PPE is removed. If greywater includes disinfectant used in prior cleaning, it does not need to be chlorinated or treated again. However, it is important that such water is disposed of in drains connected to a septic system or sewer or in a soakaway pit. If greywater is disposed of in a soakaway pit, the pit should be fenced off within the health facility grounds to prevent tampering and to avoid possible exposure in the case of overflow.

7. Safe management of health care waste

Best practices for safely managing health care waste should be followed, including assigning responsibility and sufficient human and material resources to dispose of such waste safely. There is no evidence that direct, unprotected human contact during the handling of health care waste has resulted in the transmission of the COVID-19 virus. All health care waste produced during the care of COVID-19 patients should be collected safely in designated containers and bags, treated, and then safely disposed of or treated, or both, preferably on-site. If waste is moved off-site, it is critical to understand where and how it will be treated and destroyed. All who handle health care waste should wear appropriate PPE (boots, apron, long-sleeved gown, thick gloves, mask, and goggles or a face shield) and perform hand hygiene after removing it. For more information refer to the WHO guidance, Safe management of wastes from health-care activities.[28]

Considerations for WASH practices in homes and communities

Upholding best WASH practices in the home and community is also important for preventing the spread of COVID-19 and when caring for patients at home. Regular and correct hand hygiene is of particular importance.

1. Hand hygiene

Hand hygiene in non–health care settings is one of the most important measures that can prevent COVID-19 infection. In homes, schools and crowded public spaces – such as markets, places of worship, and train or bus stations – regular handwashing should occur before preparing food, before and after eating, after using the toilet or changing a child's diaper, and after touching animals. Functioning handwashing facilities with water and soap should be available within 5 m of toilets.

2. Treatment and handling requirements for excreta.

Best WASH practices, particularly handwashing with soap and clean water, should be strictly applied and maintained because these provide an important additional barrier to COVID-19 transmission and to the transmission of infectious diseases in general.[17] Consideration should be given to safely managing human excreta throughout the entire sanitation chain, starting with ensuring access to regularly cleaned, accessible, and functioning toilets or latrines and to the safe containment, conveyance, treatment, and eventual disposal of sewage.

When there are suspected or confirmed cases of COVID-19 in the home setting, immediate action must be taken to protect caregivers and other family members from the risk of contact with respiratory secretions and excreta that may contain the COVID-19 virus. Frequently touched surfaces throughout the patient's care area should be cleaned regularly, such as beside tables, bed frames and other bedroom furniture. Bathrooms should be cleaned and disinfected at least once a day. Regular household soap or detergent should be used for cleaning first and then, after rinsing, regular household disinfectant containing 0.5% sodium hypochlorite (that is, equivalent to 5000 ppm or 1-part household bleach with 5% sodium hypochlorite to 9 parts water) should be applied. PPE should be worn while cleaning, including mask, goggles, a fluid-resistant apron, and gloves,[29] and hand hygiene with an alcohol-based hand rub or soap and water should be performed after removing PPE.

References

1. Coronavirus disease (COVID-19) advice for the public. Geneva: World Health Organization; 2020 (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public, accessed 3 March 2020).
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. Lancet. 2020;395:497–506. doi:10.1016/S0140-6736(20)30183-5

3. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020;395:507–13. doi:10.1016/S0140-6736(20)30211-7.
4. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. JAMA. 2020, Feb 7. doi:10.1001/jama.2020.1585
5. Xiao E, Tang M, Zheng Y, Li C, He J, Hong H, et al. Evidence for gastrointestinal infection of SARS-CoV. medRxiv. doi:10.1101/2020.02.17.20023721
6. Holshue ML, DeBolt C, Lindquist S, Lofy KH, Wiesman J, Bruce H et al. for the Washington State 2019-nCoV Case Investigation Team. First case of 2019 novel coronavirus in the United States. N Engl J Med. 2020 Jan 31. doi:10.1056/NEJMoa2001191
7. Zhang Y, Chen C, Zhu S et al. [Isolation of 2019-nCoV from a stool specimen of a laboratory-confirmed case of the coronavirus disease 2019 (COVID-19)]. China CDC Weekly. 2020;2(8):123-4. (In Chinese.)
8. Wang XW, Li JS, Zhen B, Kong QX, Song N, Xiao WJ et al. Study on the resistance of severe acute respiratory syndrome-associated coronavirus. J Virol Methods. 2005;126:171–7. doi:10.1016/j.jviromet.2005.02.005.
9. Gundy P, Gerba CP, Pepper IL. Survival of coronaviruses in water and wastewater. Food Environ Virol. 2009;1:10-14. doi:10.1007/s12560-008-9001-6.
10. Casanova L, Rutala WA, Weber DJ, Sobsey MD. Survival of surrogate coronaviruses in water. Water Res. 2009;43(7):1893–8. doi:10.1016/j.watres.2009.02.002.
11. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J Hosp Infect. 2020;104(3):246–51. doi:10.1016/j.jhin.2020.01.022.
12. Guidelines for drinking-water quality, fourth edition, incorporating the first addendum. Geneva: World Health Organization; 2017 (http://apps.who.int/iris/bitstream/10665/254637/1/9789241549950-eng.pdf, accessed 3 March 2020).
13. SARS-CoV-2 – water and sanitation. Adelaide: Water Research Australia; 2020 (http://www.waterra.com.au/_r9544/media/system/attrib/file/2199/WaterRA_FS_Coronavirus_V10.pdf, accessed 3 March 2020).
14. Essential environmental health standards in health care. Geneva: World Health Organization; 2008 (https://apps.who.int/iris/bitstream/handle/10665/43767/9789241547239_eng.pdf?sequence=1&isAllowed=y, accessed 3 March 2020).
15. My 5 moments for hand hygiene. In: WHO/Infection prevention and control [website]. Geneva: World Health Organization; 2020 (https://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/, accessed 3 March 2020).
16. Siddharta A, Pfaender S, Vielle NJ, Dijkman R, Friesland M, Becker B, et al. Virucidal activity of World Health Organization-recommended formulations against enveloped viruses, including Zika, Ebola, and emerging coronaviruses. J Infect Dis. 2017;215(6):902–6. doi:10.1093/infdis/jiw646.
17. WHO guidelines on hand hygiene in health care settings. Geneva: World Health Organization; 2009 (https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf?sequence=1&isAllowed=y, accessed 3 March 2020).
18. Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: interim guidance, 25 January 2020. Geneva: World Health Organization (https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125, accessed 3 March 2020).
19. Q&A on infection prevention and control for health care workers caring for patients with suspected or confirmed 2019-nCoV. In: WHO/Newsroom [website]. Geneva: World Health Organization; 2020 (https://www.who.int/news-room/q-a-detail/q-a-on-infection-prevention-and-control-for-health-care-workers-caring-for-patients-with-suspected-or-confirmed-2019-ncov, accessed 3 March 2020).
20. Health aspects of plumbing. Geneva: World Health Organization; 2006 (https://apps.who.int/iris/handle/10665/43423, accessed 3 March 2020).
21. Guidelines on sanitation and health. Geneva: World Health Organization; 2018(https://apps.who.int/iris/bitstream/handle/10665/274939/9789241514705-eng.pdf?ua=1, accessed 3 March 2020).
22. Yu ITS, Li Y, Wong TW, Tam W, Chan A, Lee JHW, et al. Evidence of airborne transmission of the severe acute respiratory syndrome virus. N Engl J Med. 2004;350(17):1731-9. doi:10.1056/NEJMoa032867.
23. Regan H. How can the coronavirus spread through bathroom pipes? Experts are investigating in Hong Kong. CNN. 12 February 2020 (https://edition.cnn.com/2020/02/12/asia/hong-kong-coronavirus-pipes-intl-hnk/index.html).
24. Sanitation safety planning: manual for safe use and disposal of wastewater, greywater and excreta. Geneva: World Health Organization; 2015 (https://apps.who.int/iris/handle/10665/171753, accessed 3 March 2020).
25. How to put on and take off personal protective equipment. Geneva: World Health Organization; 2008 (https://apps.who.int/iris/handle/10665/70066, accessed 3 March 2020).
26. Chemical disinfectants: guideline for disinfection and sterilization in healthcare facilities (2008). In: CDC/Infection Control [website]. Atlanta: US Centers for Disease Control and Prevention; 2019 https://www.cdc.gov/infectioncontrol/guidelines/disinfection/disinfection-methods/chemical.html, accessed 3 March 2020).