

# Initial Environmental Examination

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India: Additional Financing: West Bengal Drinking  
Water Sector Improvement Project

Water Supply Distribution System for Nandigram I  
and II Blocks (Purba Medinipur District)

Packages: WW/EM/02, EM/03 and EM/04

## CURRENCY EQUIVALENTS

(as of 31 May 2024)

Currency unit	–	Indian rupee (₹)
₹1.00	=	\$0.01
\$1.00	=	₹83.05

## 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	–	protected 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 <sup>3</sup> /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 <sup>2</sup>	square kilometer

### NOTE

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

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## EXECUTIVE SUMMARY

The ongoing West Bengal Drinking Water Sector Improvement Project (the ongoing project) will provide safe, sustainable, and inclusive drinking water services to about 1.65 million people in the arsenic-, fluoride-, and salinity-affected areas of Bankura, North 24 Parganas, and Purba Medinipur districts of West Bengal (project districts). It will introduce an innovative institutional framework and advanced technology for smart water management (STWM) to enable efficient service delivery in the project districts.

The additional financing (the project) will finance the cost overrun of the ongoing project, and a minor change in scope to (i) secure alternate safe drinking water sources for project areas in Purba Medinipur, and (ii) prepare a sustainable drinking water supply project proposal for salinity affected areas of South 24 Parganas and uncovered areas of Purba Medinipur. The overall project will provide a minimum of 70 liters per capita per day of continuous potable water through metered connections to all eligible consumers.

**Package EM/02 and EM/03.** The provision of water supply distribution system in salinity (surface and groundwater) affected blocks of Nandigram I & II in Purba Medinipur district is taken up under **Package EM/02** 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. **Package EM/02** subproject included the following work components: (i) Construction and Commissioning of two Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR) at Nandigram I and II blocks; (ii) Construction of 20 new overhead reservoirs (OHRs) at Nandigram I block and 9 new OHRs at Nandigram II blocks; (iii) Laying of 98.18 km secondary clear water rising main from GLSRs to OHRs; (iv) laying of 2338.25 km distribution network and (v) provision of domestic water meters for household water connections with water meters. A contract was awarded to the contractor with above scope of works. However, later, due to shortage of funds, the scope for the running package was reduced. The scope was revised to include (i) Construction and Commissioning of two Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR) at Nandigram I and II blocks; (ii) Construction of 10 new overhead reservoirs (OHRs) at Nandigram I block and 5 new OHRs at Nandigram II blocks; (iii) Laying of 98.18 km secondary clear water rising main from GLSRs to OHRs; (iv) laying of 1943.44 km distribution network in 22 zones covering both Nandigram I and II, and (v) provision of domestic water meters for household water connections (approx. 64818 nos.) with water meters. Under the running package 98.18 km secondary clear water rising main from GLSRs to OHRs is under implementation.

**Package EM/03.** Now, additional financing from ADB is considered to complete the entire package. **Package EM/03** is proposed to take up the remaining 10 nos. new OHRs in Nandigram I and 4 nos. new OHRs in Nandigram II, and a distribution pipeline of 427.25 m in 7 zones of Nandigram I. Under the package, provision of domestic water meters for household water connections (approx. 20379 nos.) with water meters is considered.

**Package EM/04 (Interim salinity mitigation measures).** The scope of the interim salinity mitigation measures includes the construction of additional pre-sedimentation tanks (or pre-settling ponds) of about 45 million liters capacity and installation of 3 heavy-duty tubewells of 2 million liters per day total capacity. The additional storage capacity from the proposed tanks/ponds will provide buffer storage capacity throughout the tidal cycle when there is elevated salinity in Rupranayan River. Smart water management system will allow real-time monitoring, forecast and online water resource management to ensure sustainability.

**Project Implementation Arrangements.** The Public Health Engineering Department (PHED) of Government of West Bengal is the executing and implementing agency for the WBDWSIP. The same implementation arrangement will be adopted for the Additional Financing components. Project Management Unit (PMU) exclusively established in PHED for 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.

**Screening and Assessment of Potential Impacts.** ADB SPS 2009 requires screening and assessment of potential environmental impacts of projects. Potential environmental impacts of the subproject were screened using ADB rapid environmental assessment checklist. The potential negative impacts during the design/pre-construction, construction and operation stages were assessed through an initial environmental examination (IEE). As per the Government of India, Environmental Impact Assessment (EIA) Notification, 2006, this subproject does not require EIA study or environmental clearance.

**Categorization.** Based on results of the assessment and ADB's SPS, packages which will be funded through the Additional Financing are classified as environmental Category B, i.e., unlikely to have any significant adverse environmental impacts. Accordingly, this updated IEE has been prepared.

**Description of the Environment.** Project components will be located in Nandigram I, II, Nandakumar blocks of Purba Medinipur district. The district is bordered by Paschim Medinipur in the north and west, Bay of Bengal in the south, state of Orissa in the southwest and Hooghly River in the east. The district has a long coastline of 65.5 km along its southern and southeastern boundaries. Purba Medinipur district is part of the lower Indo-Gangetic Plain and Eastern coastal plains. Topographically, the district can be divided into two parts – (i) almost entirely flat plains on the west, east and north, (ii) the coastal plains on the south. Coastal blocks are affected by cyclones and tornadoes occasionally and tidal floods are quite regular. The average elevation of the district is within 10 meters above mean sea level (msl). The climate of the district is tropical. Average temperatures vary from 10.0°C to 38.6°C. Rainfall occurs regularly and unevenly during the monsoon. The average normal rainfall is 1750 mm. This district has a variety of soil-alluvial along the rivers and sandy saline soil in the coastal belt. The Project area has plenty of water bodies – rivers, streams and ponds, etc. The major rivers are Kasai, Kaliaghari, Rupnarayan and Hooghly (Bhagirathi/Ganga). River water is an important source of irrigation. The district has a low 899-hectare forest cover, which is 0.02% of its geographical area.

Project sites are mostly located in rural habitations in government-owned lands. The two pre-settling ponds will be within and near the WTP compound under the original loan, while the location of the 3 new deep tubewells will be within the WTP and GLSR sites. Sites are mostly vacant, and some are low-lying lands covered with few trees. There are no notable sensitive environmental features like protected areas or culturally important sites in the project sites. Few small trees are present in Manoharpur. Some of the sites are near densely populated areas like marketplaces.

**Potential Environmental Impacts.** The Project will have site-specific, short-term, and localized impacts during construction which can be mitigated or minimized to acceptable levels with good construction practices and measures defined in the EMP. Temporary negative impacts during construction include dust and noise, increase in road traffic due to hauling of materials and

restriction of access/disturbance due to construction of water supply pipelines along public roads, waste generation and occupation and community health and safety issues.

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 pipe-laying work. Therefore, no notable operation phase impacts are anticipated from the subproject.

**Groundwater availability and salinity.** Based on the 2022 feasibility study, fresh and potable groundwater is available at the deeper aquifer in Purba Medinipur at 120-300 meters depth. However, according to CGWB, overexploitation of groundwater from the deeper freshwater aquifer may lead to saline water intrusion into the freshwater aquifer. Considering the concern expressed by CGWB, only a few additional (3 HDTWs) on a pilot basis are considered for the interim salinity mitigation project. Hydrogeological investigations and installation of pilot HDTWs shall be planned / developed as recommended in the feasibility report.

**Environmental Management Plan.** An environmental management plan (EMP) has been developed and included as part of this IEE, which outlines the following: (i) mitigation measures for environmental impacts during implementation; and (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting. In accordance with this EMP, the Contractor will be required to prepare a site-specific environmental management plan (SEMP). Contractor will submit its SEMP for approval to the project implementation unit (PIU) or regional project management unit (Divisional/Regional Office). The EMP and SEMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a proactive, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with. Copies of the EMP and SEMP shall be kept on-site during the construction phase. The Contractor will be responsible for the organization, direction, and execution of environmental management related activities during construction of the proposed subproject. The Contractor will also undertake all activities in accordance with the relevant environmental requirements, including consent documentation and other regulatory and/or statutory and contractual requirements. Required permits/clearances for groundwater resource development shall be obtained.

**Groundwater Development and Management Plan (Design, Construction and Operation).** The EMP includes design, construction and operation stage measures to ensure safe and sustainable groundwater source development and extraction and ensure that the Project will not result in irreversible, diverse or unprecedented adverse impact. Required permits/clearances for groundwater resource development shall be obtained. This includes, among others, the conduct of hydrogeological studies/confirmatory site-specific groundwater studies/surveys, ensuring minimum spacing (1000 meters) between two adjacent HDTW, periodical monitoring of water level and chemical quality of existing and newly constructed tube wells, preparation and implementation of source protection plan for tube wells, proper construction of tube wells including casing pipes to prevent water contamination and proper well decommissioning.

**Information Disclosure, Consultation and Grievance Redress Mechanism.** The stakeholders were 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 will be made available at public locations and disclosed to a wider audience via the ADB and PHED/PMU websites. The consultation process will be 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 in a transparent and timely manner.

**Monitoring and Reporting.** The PMU, PIU and consultants are responsible for monitoring and reporting. During construction, results from internal monitoring by the contractor will be reflected in their monthly EMP implementation reports to the PIU. PIU with assistance of DSISC, will monitor the compliance of Contractor, prepare a quarterly environmental monitoring report (QEMR) and submit to PMU. The PMU will oversee the implementation and compliance and will submit Semi-Annual Environmental Monitoring Report (SEMR) to ADB. ADB posts the environmental monitoring reports on its website. Monitoring reports are also posted in the project website.

**Conclusion and Recommendations.** The Project will provide safe, sustainable, and inclusive drinking water services in Nandigram I and II block in Purba Medinipur. The benefits arising from this subproject include: (i) increased availability of potable water at appropriate pressure to all households including rural poor, (ii) reduced time and costs in accessing alternative sources of water, (iii) better public health particularly reduction in waterborne and infectious diseases, and (iv) reduced risk of groundwater contamination.

The project is Category B for environment and is unlikely to cause significant adverse impact with diligent implementation of the EMP. The IEE will be included in the bid and contract documents. Updated IEE will be prepared based on the final design of the project components and will be submitted to ADB for review and clearance prior to contract award and/or the start of construction.

## I. INTRODUCTION

### A. Background

1. The ongoing West Bengal Drinking Water Sector Improvement Project (the ongoing project) will provide safe, sustainable, and inclusive drinking water services to about 1.65 million people in the arsenic-, fluoride-, and salinity-affected areas of Bankura, North 24 Parganas, and Purba Medinipur districts of West Bengal (project districts). It will introduce an innovative institutional framework and advanced technology for smart water management (STWM) to enable efficient service delivery in the project districts.

2. **Impact and outcome:** The ongoing project is aligned with the following impact: drinking water security ensured in West Bengal. The project will have the following outcome: safe, sustainable, and inclusive drinking water service received in project districts. The outputs are:

- (i) **Output 1:** Climate-resilient drinking water infrastructure constructed;
- (ii) **Output 2:** Institutions and capacity of stakeholders for drinking water service delivery strengthened.

3. WBDWSIP targets three districts: North 24 Parganas district which is the most arsenic-affected district in West Bengal; Bankura which is heavily affected by fluoride, and East Medinipur which 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 framework of NRDWP.

4. **Additional financing.** The ongoing project, designed as a sector loan, is experiencing major cost overruns, as at the time of the appraisal of the ongoing project estimates for some of the subprojects were prepared based on feasibility studies rather than detailed engineering designs. In addition, some subprojects required substantial changes during the design and implementation after further surveys. For example, the raw water intake for Purba Medinipur was changed to a different location during implementation as the original location did not have assured water availability and acceptable salinity levels.<sup>1</sup> This also resulted in a change in the location of the WTP and realignment of the transmission pipelines. Moreover, the infiltration gallery was changed to raw water intake and WTP in Bankura during the implementation. Cost increased by \$32.0 million because of these changes. The distribution network, originally planned at 4,800 km, increased to 7,200 km and the number of service reservoirs increased from 110 to 126 during the finalization of the design increasing the cost by \$78.0 million.<sup>2</sup> Physical variations due to the redesigned heavy foundations for the service reservoirs because of poor soil conditions in Purba Medinipur and other physical variations have increased the cost by \$20.0 million. The delays attributed to the coronavirus disease pandemic and the increase in raw material prices led to a price escalation of \$56.0 million (footnote 12). An increase in goods and services tax and in electricity charges to be incurred during the 2-year O&M period, recurrent costs, and project consultants costs added \$29.0 million. The aggregated cost overrun is estimated at \$131.4 million after subsuming contingencies and savings under the ongoing project.

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<sup>1</sup> During confirmatory surveys, it was found that the location identified at the time of feasibility studies had inadequate raw water availability and high salinity beyond permissible limit.

<sup>2</sup> One contract package estimated at \$20.0 million is yet to be tendered. It comprises of 390 kms of additional distribution pipe network and 14 service reservoirs in Purba Medinipur.

5. The additional financing (the project) will finance the cost overrun of the ongoing project, and a minor change in scope to (i) secure alternate safe drinking water sources for project areas in Purba Medinipur, and (ii) prepare a sustainable drinking water supply project proposal for salinity affected areas of South 24 Parganas and uncovered areas of Purba Medinipur.

## **B. Purpose of the Initial Environmental Examination Report**

6. 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 Project was screened using the ADB Rapid Environmental Assessment Checklist for Water Supply (**Appendix 1**). Screening shows that the Project is unlikely to cause significant adverse impacts and is therefore Category B for the environment. Accordingly, this IEE has been prepared in accordance with the requirements of the ADB SPS, 2009.

7. This IEE report is prepared based on the revised scope of works under Package EM/02 under the original loan, and the proposed new Packages EM/03 and EM/04 (salinity mitigation measures) under additional financing. For Package EM/02, the scope was revised to include (i) Construction and Commissioning of two Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR) at Nandigram I and II blocks; (ii) Construction of 10 new overhead reservoirs (OHRs) at Nandigram I block and 5 new OHRs at Nandigram II blocks; (iii) Laying of 98.18 km secondary clear water rising main from GLSRs to OHRs; (iv) laying of 1943.44 km distribution network in 22 zones covering both Nandigram I and II, and (v) provision of domestic water meters for household water connections (approx. 64818 nos.) with water meters. Package EM/03 will take up the remaining 10 nos. of new OHRs in Nandigram I and 4 nos. of new OHRs in Nandigram II, and a distribution pipeline of 427.25 m in 7 zones of Nandigram I. Provision of domestic water meters for household water connections (approx. 20379 nos.) with water meters is also proposed under Package EM/03. Package EM/04 (salinity mitigation measures) is proposed to cover the construction of two additional pre-sedimentation tanks of 45 million liters total storage capacity and installation of three new deep tubewells with total of 2 million liters per day production capacity. In total, Packages EM/02 and EM/03 include 29 OHR zones and 29 pipeline zones where design has been completed, SEMP's have been submitted by the contractor and construction activities are continued in accordance with ADB SPS's requirement.

8. 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. Also, after start of construction, environmental monitoring has been completed and it will be continued as per EMP. The results are reported as part of the environmental monitoring report and forms the basis to ensure no degradation takes place during subproject implementation, which started zone wise. Stakeholder consultation has been an integral part of the IEE.

## **C. Report Structure**

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

- (i) Executive summary;
- (i) Introduction;

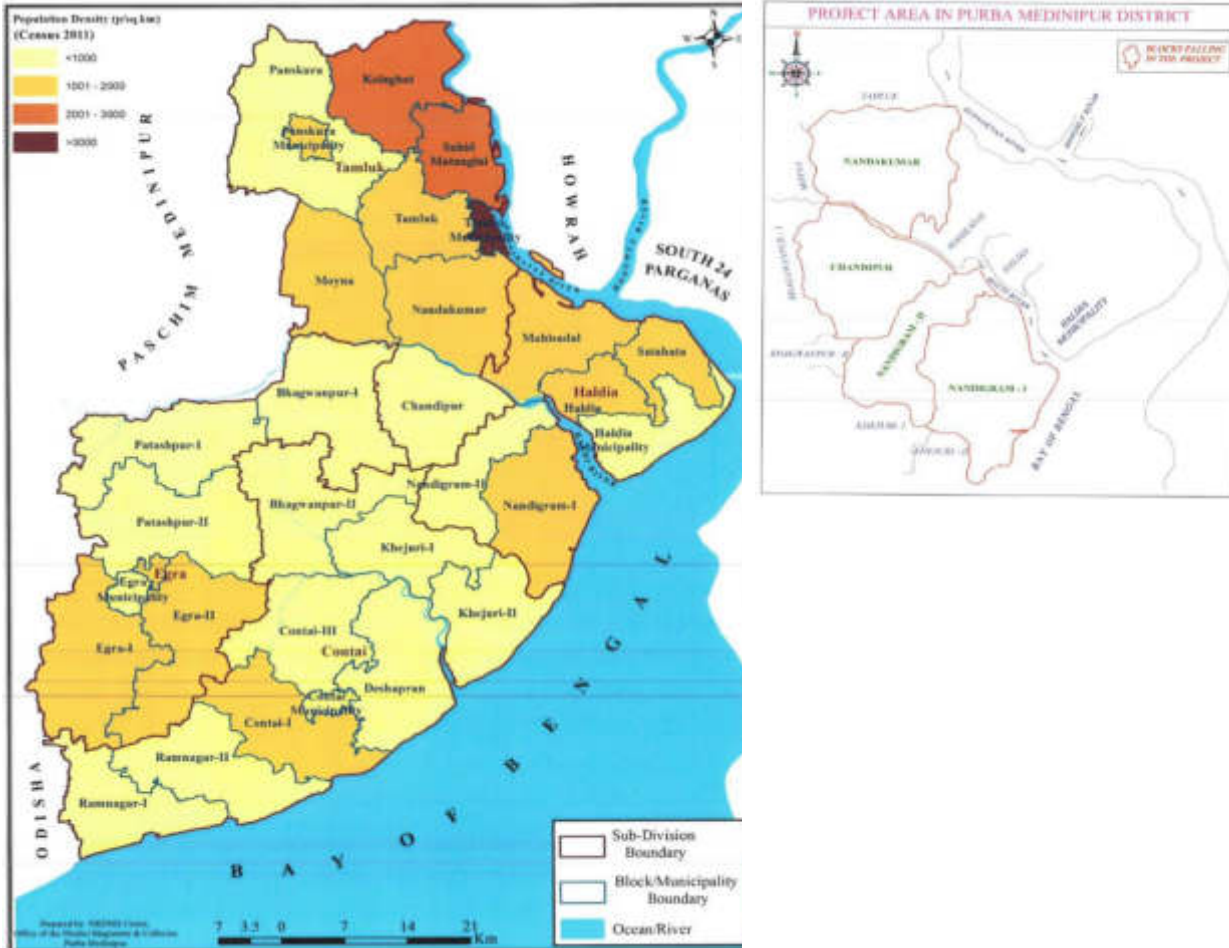
- (ii) Description of the project;
- (iii) Policy, legal and administrative framework;
- (iv) Description of the environment;
- (v) Anticipated environmental impacts and mitigation measures;
- (vi) Public consultation and information disclosure;
- (vii) Grievance redress mechanism;
- (viii) Environmental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

## II. DESCRIPTION OF THE PROJECT

### A. Project Location

10. The additional financing components will be in Purba Medinipur, specifically, Nandigram I, II and Nandakumar. Purba Medinipur district is bounded by Paschim Medinipur in the north and west, Bay of Bengal in the south, state of Orissa in the southwest and Hooghly River in the east. The district has a long coastline of 65.5 km along its southern and southeastern boundary.

**Figure 1: Project Location and Project Area in Purba Medinipur District**



### B. Existing Water Supply Situation

11. The CGWB in its ground water brochure has indicated 3 major issues related to Purba Medinipur, namely: (i) salinity in ground water primarily in the coastal blocks; (ii) iron concentration beyond permissible limit and (iii) declining ground water levels.

12. In rural areas potable water is primarily tapped from ground water, in the form of dug wells, hand pumps and shallow / deep tube wells. The rationale for abstraction of ground water is based on the significantly lower costs than developing surface water sources. Ground water usually requires less treatment than surface water (as turbidity and suspended solids are lower). Unless

such contamination is detected through laboratory tests the communities will not know that continued use of groundwater impacts health.

13. Most of the habitations continue to depend on ground water sources for their daily needs but they run the risk of getting affected either with declining ground water levels and or poor ground water quality (ground water being affected by iron or salinity in the case of Purba Medinipur).

14. Ground water in the blocks is affected by salinity to varying degrees. The coastal blocks are more vulnerable and salinity intrusion is higher in comparison to the remaining blocks. The blocks where ground water is affected by salinity have been categorized based on the severity and tabled below:

**Table 1: Blocks affected by Salinity**

Sl. No	Ground water affected by Salinity	Name of Blocks	Number of Blocks
1	Severe	Contai-I, II and III, Ramnagar-I, II	5
2	Moderate	Tamluk, Sahid Matangini, Mahisadal, Nandakumar, Sutahata, Haldia, Nandigram-I, Nandigram-II, Chandipur, Khejuri-I and II	11
3	Mildly affected	Bhagawanpur I, II, Egra I, II, Moyna, Panskura-I, II, Potashpur I and II	9

Source: Central Ground Water Board

15. **Blocks affected by declining ground water levels.** As per the CGWB report, ground water exploration needs to be restricted in the 5 coastal blocks of Tamluk-I, Mahishadal-I, Sutahata-I & II and Contai -III, considering declining ground water levels. For the remaining 11 coastal blocks, caution is to be exercised with the ground water exploration. Among the other blocks, Moyna has been categorized as semi-critical considering declining ground water levels. Based on the available data of the CGWB, the blocks have been arranged in the order of ground water development potential. The criticality of the blocks with respect to ground water development and potential is presented below:

**Table 2: Blocks affected by Declining Ground Water Levels**

Sl. No	Ground water development potential	Name of Blocks	Number of Blocks
1	Poor	Tamluk, Mahishadal, Sutahata, Haldia and Contai -III	5
2	Poor to medium	Moyna, Sahid Matangini, Nandakumar, Nandigram-I & II, Chandipur, Khejuri-I & II, Contai-I, II, Ramnagar-I & II	12
3	Medium to High	Bhagawanpur-I, II, Egra-I, II, Panskura-I, II, Potashpur-I, II	8

Source: Central Ground Water Board

16. **Water supply system.** Water demand is met through (i) Piped Water Supply Scheme (PWSS) with ground / sub-surface / surface water source, conveyed either through direct pumping and or through an Overhead Tank (OHT), or (ii) spot sources (primarily hand pumps and shallow tube wells). As per information available in the project report of PHED, out of the 140 Villages (as per Census 2011) in the 17 nos. of Gram Panchayats (GPs) in the 2 blocks of Nandigram-I and Nandigram-II, 30 villages have been covered with PWSS, while the remaining 110 are still uncovered. The command area of the scheme comprising of the villages (and habitations) covered by existing Piped Water Supply Schemes (PWSS) is in the table below:

**Table 3: Coverage of Villages / Habitation through PWSS**

Sl. No.	Block	GP	Villages			Habitations		
			Uncovered	Covered	Total	Uncovered	Covered	Total
1	Nandigram I	10	78	21	99	165	38	203
2	Nandigram II	7	32	9	41	108	46	154
<b>Total</b>		<b>17</b>	<b>110</b>	<b>30</b>	<b>140</b>	<b>273</b>	<b>84</b>	<b>357</b>

Source: PHED

17. An estimated 27% of the population is presently being covered under piped water supply (As per Census 2011 data), corresponding to the 30 villages covered. The details of the population presently covered under Piped Water Supply system is worked out below:

**Table 4: Population Covered under PWSS in Project Area**

Sl. No.	Block	Population (As per 2011 census)	Population		% of Population	
			Uncovered	Covered	Uncovered	Covered
1	Nandigram I	2,07,835	1,61,701	46,134	77.8%	22.2%
2	Nandigram II	1,23,219	85,809	37,410	69.6%	30.4%
<b>Total</b>		<b>3,31,054</b>	<b>2,47,510</b>	<b>83,544</b>	<b>73.76%</b>	<b>26.3%</b>

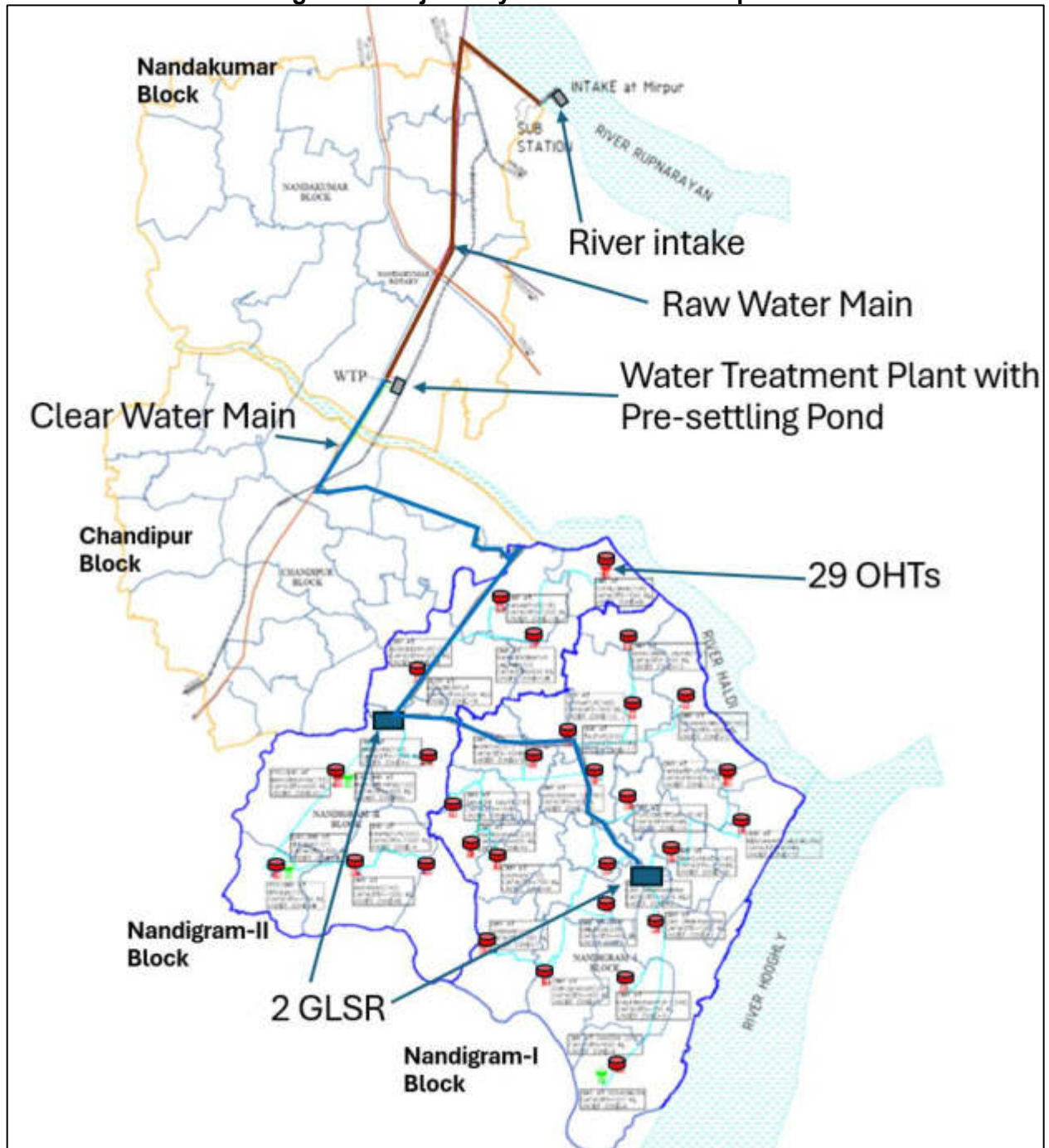
Source: PHED

18. **Piped Water Supply Scheme (PWSS) with surface water source.** The PHED has commissioned only one surface water-based piped water supply scheme. The WS Scheme involves raw water abstraction from river Rupnarayan at Geonkhali, and a WTP of capacity 52.3 MLD including treatment and conveying the clear water to the Haldia town. Another on-going surface water-based water supply scheme covers 112 mouzas and one census town in Kolaghat block. The capacity of the WTP is 31 MLD and draws water from the river Rupnarayan. None of these schemes covered any part of the select 2 blocks of the project area.

### **C. Water Supply Scheme under WBDWSIP and the Proposed Additional Financing**

19. For the blocks of Nandigram I & II, the raw water will be abstracted from Rupnarayan river which will be pumped to the proposed 106 MLD WTP under the ongoing project. The WTP will then pump treated water to the IBPS cum GLSR at Nandigram I & II blocks.

Figure 2: Project Layout in Purba Medinipur



Source: PHED.

20. Salient features of the scheme is given below:

**Table 5: Salient Features of the Scheme**

<i>Blocks</i>	<i>Habitation</i>	<i>Mouza</i>	<i>No. of G.P.</i>	<i>No. of Household</i>	<i>Population (2011)</i>	<i>Design Population on in 2046</i>	<i>Total Clear Water Demand in KLD in GLSR (2046)</i>
<i>Nandigram-I</i>	203	99	10	42289	207835	346045	29,134
<i>Nandigram-II</i>	154	41	7	26902	123219	199984	16,837

21. **Package EM/02.** Under the original **Package EM/02**, the following components were planned - two Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR) at Nandigram I and II blocks; 20 new OHRs in Nandigram I and 9 new OHRs at Nandigram II; laying of 2338.2 km of distribution networks with pipe diameter of 75.7 mm to 500 mm, laying of 98.18 km secondary rising main with pipe diameter of 400 to 600 mm and provisions of household service connections with domestic water meters.

22. A contract was awarded to the construction agency with the above scope of works. Later, due to shortage of funds, the scope for the running package was reduced. Revised scope now includes (i) Construction and Commissioning of two Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR) at Nandigram I and II blocks; (ii) Construction of 10 new overhead reservoirs (OHRs) at Nandigram I block and 5 new OHRs at Nandigram II blocks; (iii) Laying of 98.18 km secondary clear water rising main from GLSRs to OHRs; (iv) laying of 1943.44 km distribution network in 22 zones covering both Nandigram I and II, and (v) provision of domestic water meters for household water connections (approx. 64818 nos.) with water meters. Under the running package 98.18 km secondary clear water rising main from GLSRs to OHRs is under implementation.

23. **Package EM/03.** Now with additional financing from ADB, new package is considered to complete the entire work. In the new package (**Package EM/03**), 10 nos. new OHRs in Nandigram I and 4 nos. new OHRs in Nandigram II will be constructed. Distribution pipeline of 427.25 m will be laid at 7 zones of Nandigram I block. Under the package, provision of domestic water meters for household water connections (approx. 20379 nos.) with water meters are also considered.

24. **Salinity Ingress in Rupranayan River.** Rupranayan river, the surface water source for the subproject of WBDWSIP in Purba Medinipur, is linked to the Bay of Bengal through the Hooghly Estuary. In the dry season, water in Rupranayan River becomes saline due to ingress of saline water from the Bay of Bengal during high tide. At the peak of the dry season in May, salinity becomes too high in the river at the water intake throughout the tidal cycle. (Source: DPR for Interim Salinity Mitigation Measure).

25. **Package EM/04 (Interim Salinity Mitigation Measure).** Interim salinity mitigation measure, Package EM/04 is proposed under additional financing. The package will include the construction of two additional pre-sedimentation tanks of 45 million liters total storage capacity and installation of three new deep tubewells with total of 2 million liters per day production capacity in Purba Medinipur. The two new pre-settling ponds will be in Nandakumar block. Pond 3 (10 MLD) will be constructed within the water treatment plant (WTP) land, and pond 4 (35 MLD) will be constructed on a land belonging to PHED near the WTP. Pre-settling ponds 1 and 2 are already part of the project scope under the package WBDWSIP/DWW/EM/01 which includes the

construction of WTP.<sup>3</sup> With due caution, the three heavy duty tubewells (HDTW) with total of 2 million liters per day production capacity will be constructed (until 2031) within the government-owned land within the WTP site and at each of the two GLSR sites (at Monohorpur in zone 6 and Gar Chakraberia in zone 2). Discharge of each tube well (HDTW) is taken as 45 m<sup>3</sup>/hr and running of each tube well per day is taken as 16 hrs in two phases

26. The components of Packages EM/02, EM/03 and EM/04 are provided in **Table 6A, 6B & 6C.**

**Table 6A: Components under Revised Scope of original Package DWW/EM/02**

Sl. No.	Project Component	Details
1.	<b>Construction of IBPS cum GLSR</b>	Intermediate booster pumping station cum ground level storage reservoir of capacity 4300 KL at Garchakraberia in Nandigram-I and 2500 KL at Monohorpur in Nandigram-II block with chlorination building, Operators room cum office building, guard room and other allied works
2	<b>Secondary Clear water rising main from GLSR to OHRs</b>	98.18 km of secondary clear water rising main: 64.10 km in Nandigram I and 34.08 km in Nandigram II. The diameter of pipeline ranges from 400-600 mm DI K9.
3	<b>Construction of OHRs</b>	Construction of 10 new overhead reservoirs in Nandigram-I block and 5 new overhead reservoirs (OHRs) in Nandigram II block.
4	<b>Distribution Network</b>	Approx 1944 km of distribution network: Approx. 1053 km in Nandigram I and approx. 891 km in Nandigram II block. The diameter of pipeline ranges from 90 mm to 200 mm for HDPE and from 200 mm to 500 mm for DI K7.
5	<b>Domestic Water Meters</b>	64818 house service connections

Source: PHED

Note- Existing three nos. of PHED OHRs (Nandigram I: 1 no. and Nandigram II: 2 nos.) will also be utilized

**Table 6B: Components under the new Package DWW/EM/03**

Sl. No.	Project Component	Details
1.	<b>Construction of IBPS cum GLSR</b>	Already included in Existing scope of work.
2	<b>Secondary Clear water rising main from GLSR to OHRs</b>	Already included in Existing scope of work.
3	<b>Construction of OHRs</b>	Construction of 10 new overhead reservoirs in Nandigram-I block and 4 new overhead reservoirs (OHRs) in Nandigram II block. Capacity ranging from 250 to 1500 KL.

<sup>3</sup> Construction of WTP is ongoing as part of the present scope of work.

Sl. No.	Project Component	Details
4	Distribution Network	427.25 km of distribution network in Nandigram I. The diameter of pipeline ranges from 90 mm to 200 mm for HDPE and from 200 mm to 500 mm for DI K7.
5	Domestic Water Meters	20379 house service connection

**Table 6C: Components under the proposed Package DWW/EM/04 (Interim Salinity Mitigation Measure)**

Sl. No.	Project Component	Details
1	Construction of Pre-settling ponds	Construction of 2 new pre-settling ponds in Nandakumar block. The 2 new ponds i.e. pond 3 (10 MLD) will be constructed on the water treatment plant (WTP) land and pond 4 (35 MLD) will be constructed on land belonging of PHED near the WTP. Pre-settling ponds 1 and 2 is already part of the project scope under the package WBDWSIP/DWW/EM/01 which includes construction of WTP. <sup>4</sup>
2	Construction of Tube wells	<p>With due caution additional three nos HDTW tubewells (yr. 2031) will be constructed within the government-owned land at the WTP and at each of the two GLSRs. (at Monohorpur in zone 6 and Gar Chakraberia in zone 2)</p> <p>Discharge of each tube well (HDTW) is taken as 45 m<sup>3</sup>/hr Running of each tube well per day is taken as 16 hrs in two phases</p> <p>Total additional tube well to be constructed for Blending to minimize Salinity: 3 nos (Yr.2031)</p> <p>For the HDTW it is assumed that the pumped groundwater will have sufficient water quality to be directly applicable as potable water without the need for treatment in the WTP. This implies that the additional HDTW can be directly linked to the clear water reservoirs and ground level storage reservoirs (GLSR).</p>
3.	Other proposed works	<p>(i) <b>Smart Water Management Pumping</b></p> <p>(ii) <b>Realtime Monitoring, Forecast and Online Water Resource Management.</b> To ensure sustainability, avoidance of overexploitation of groundwater, and precise change from one raw water source to another, the Smart Water Management system will be extended to monitoring and management of groundwater resources as well as surface water (River Rupnarayan)</p>

Source: DPR, 2024

<sup>4</sup> Construction of WTP is ongoing as part of the present scope of work.

27. The components under the revised package EM/02 and new package (EM/03) is discussed below:

28. **Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR).** Package EM/02 includes the construction of two IBPS cum GLSR including chlorination building, administrative building cum SCADA room, operator room, electrical building, guard post and allied works. The proposed IBPS cum GLSRs at Nandigram – I is proposed to be constructed on a vested land parcel under Garchakraberia Mouza of Kalicharanpur village. The other IBPS-cum-GLSR for Nandigram - II is proposed on a parcel of land owned by Irrigation and Waterways Department (I&WD) Govt. of West Bengal under Monohorpur Mouza of Reyapara Gram Panchayat. Both the land under possession of the project authority. **Table 7** provides the details of IBPS cum GLSRs under the project. The government land parcels identified for IBPS-cum-GLSR construction are unused vacant plots free of any encumbrances. Hence, no involuntary resettlement impact is anticipated due to proposed construction of two IBPS/GLSR on government owned land parcels.

**Table 7: Details of IBPS/GLSR under the Package EM/02**

Block Name	Village	Gram Panchayat	Storage reservoir Capacity	Ownership (Pvt./ Govt.)	Present Land use	Latitude/Longitude
Nandigram I	Garchakraberia	Kalicharanpur	4300 KL	Vested-Govt. land	Unused Vacant Plot	Lat. 21.98304 Long.87.99461
Nandigram II	Monohorpur	Reyapara	2500KL	I&WD Govt. of Bengal	Unused Vacant Plot	Lat. 22.050894 Long.87.913918

Source: PHED

29. **Overhead Reservoirs.** A total of 29 new overhead reservoirs (OHRs) are proposed to be constructed under the Package EM/02 and EM/03. 20 OHRs in Nandigram I and 9 OHRs in Nandigram II Block. The existing three nos. of PHED OHRs (Nandigram I Block: 1 no. and Nandigram II Block: 2 nos.) will also be utilized. Details of OHRs shown in Table below.

**Table 8: Details of OHR in Nandigram- I & Nandigram- II**

Block	New OHR Site	Total no of Land Parcel	Private Land	Vested and Land of Other Dept.
Nandigram-I	20 Nos.	20 Nos.	Nil	20 Nos.
Nandigram-II	9 Nos.	9 Nos.	Nil	9 Nos.
<b>Total</b>	<b>29</b>	<b>29 Nos.</b>	<b>0 Nos.</b>	<b>29 Nos.</b>

30. Out of 20 OHRs to be constructed in Nandigram I block, (i) 19 OHRs locations are proposed on government owned vested lands and land parcels owned by different Govt. depts (Refugee Rehabilitation & Resettlement Dept, Govt of West Bengal, Block Development Office and Gram Samsabad), and (ii) 1 OHR is proposed to be constructed on patta land.

31. In Nandigram II block all 9 new OHRs are proposed to be constructed on government lands.

32. **Table 9A, 9B, 10A and 10B** provides land ownership details of the land parcels where OHRs are proposed to be constructed. All the identified lands for the OHRs are vacant, unused

and free of any encumbrances. **Table 34A under Section IV** shows environmental features in and around the OHRs.

33. No OHR locations are changed of latest selected locations. There are no sensitive environmental areas in and around the newly proposed lands.

**Table 9A: Overhead and Ground Level Reservoirs as per revised scope of running package EM/02 in Nandigram I Block (10 nos)**

Ground Level Reservoir and Overhead Reservoir Zone	Name of Village	Gram Panchayat	Capacity (KL)	Ownership Status	Land handed over to the Contractor
GLSR	Gar Chakraberia	Kalicharanpur	4300	PHED	Yes
Zone- 2 OHR	Gar Chakraberia	Kalicharanpur	1000	PHED	Yes
Zone- 3 OHR	Kalicharnapur	Kalicharanpur	750	PHED	Yes
Zone- 5 OHR	Samsabad	Samsabad	1250	PHED	Yes
Zone- 7 OHR	Jambari	Gokulnagar	700	PHED	Yes
Zone- 10 OHR	Durgapur	Vekutia	900	PHED	Yes
Zone- 12 OHR	Manuchak Jalpai	Vekutia	600	PHED	Yes
Zone- 13 OHR	Parbatipur	Mahammadpur	900	PHED	Yes
Zone- 15 OHR	Kendamari Jalpai	Kendamari Jalpai	600	PHED	Yes
Zone- 19 OHR	Haripur	Haripur	500	PHED	Yes
Zone- 20 OHR	Banasri Gauri	Haripur	700	PHED	Yes

**Table 9B: Overhead Reservoirs under the new Package EM/03 in Nandigram I Block (10 nos)**

Ground Level Reservoir and Overhead Reservoir Zone	Name of Village	Gram Panchayat	Capacity (KL)	Ownership Status	Land handed over to the Contractor
Zone- 1 OHR	Gangra	Sonachura	900	PHED	Yes
Zone- 4 OHR	Chak Chilinga	Samsabad	400	PHED	Yes
Zone- 6 OHR	Gokulnagar	Gokulnagar	900	PHED	Yes
Zone- 8 OHR	Naynan	Daudpur	750	PHED	Yes
Zone- 9 OHR	Marisdanga	Dautpur	600	PHED	Yes
Zone- 11 OHR	Dinabandhupur	Vekutia	600	PHED	Yes
Zone- 14 OHR	Purushottampur	Mahammadpur	250	PHED	Yes
Zone- 16 OHR	Bhasurkata	Kendamari Jalpai	1000	PHED	Yes
Zone- 17 OHR	Tajpur	Nandigram	400	PHED	Yes
Zone- 18 OHR	Nandigram CT	Nandigram	900	PHED	Yes

**Table 10A: Overhead and Ground Level Reservoirs as per revised scope of running package EM/02 in Nandigram II Block (5 nos)**

Ground Level Reservoir and Overhead Reservoir Zone	Name of Village	Gram Panchayat	Capacity (KL)	Ownership Status	Land handed over to the Contractor
GLSR	Monoharpur	Reyapara	2500	PHED	Yes
Zone- 3 OHR	Birulia	Gholpukuria	400	PHED	Yes
Zone- 6 OHR	Monoharpur	Reyapara	1250	PHED	Yes
Zone- 7 OHR	Kanakpur	Boyal-I	1250	PHED	Yes
Zone- 8 OHR	Narasinghapur Jalpai	Boyal-II	600	PHED	Yes

Ground Level Reservoir and Overhead Reservoir Zone	Name of Village	Gram Panchayat	Capacity (KL)	Ownership Status	Land handed over to the Contractor
Zone- 9 OHR	Gopalchak	Boyal-II	500	PHED	Yes



Source: Information received from PHED and field visit to OHR location


**Table 10B: Overhead Reservoirs under new Package EM/03 in Nandigram II Block (4 nos)**

Ground Level Reservoir and Overhead Reservoir Zone	Name of Village	Gram Panchayat	Capacity (KL)	Ownership Status	Land handed over to the Contractor
Zone- 1 OHR	Kamalpur	Amdabad-II	1000	PHED	Yes
Zone- 2 OHR	Amdabad	Amdabad-I	1500	PHED	Yes
Zone- 4 OHR	Hanu Bhuiya	Gholpukuria	600	PHED	No
Zone- 5 OHR	Bhetutria	Kodambari-I	1250	PHED	Yes

34. As mentioned above, three numbers of existing OHRs under EM02 at Sonachura, at zone 1 of Nandigram I and Birulia in zone 3 and Hanu Bhunya, in zone 4 of Nandigram II block will be utilized for supply of water under this package. Minor repairing work 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 used as filling material at low lying area after getting NOC from concerned department/ local public. Details of those reservoirs are described below.

**Table 11: Existing Overhead Reservoirs (3 nos.)**

Infrastructure	Details	Proposed Rehabilitation	Compliance with environmental regulatory framework	Photographs
OHR at Birulia, zone 3	Location: Birulia G.P: Birulia Under Nandigram II Block Construction year: 2015-16 Capacity: 500 KL	Minor civil repairs such as color washing and renovation of chamber, replacement of pipes, connections, electrical and mechanicals parts as required, SCADA control. It will be finalized after final survey of existing OHR.	No requirements under existing laws	
OHR at Hanu Bhunya, zone 4	Location: Hanu Bhunya G.P: Birulia Under Nandigram II Block Construction year: 2015-16 Capacity: 400 KL	Minor civil repairs such as color washing and renovation of chamber, replacement of pipes, connections, electrical and mechanicals parts as required, SCADA control. It will be finalized after final survey of existing OHR.	No requirements under existing laws	

Infrastructure	Details	Proposed Rehabilitation	Compliance with environmental regulatory framework	Photographs
OHR at Sonachura, zone 1	Location: Sonachura G.P: Sonachura Under Nandigram I Block Construction year: 2012 Capacity: 227 KL	Minor civil repairs such as color washing and renovation of chamber, replacement of pipes, connections, electrical and mechanicals parts as required, SCADA control. It will be finalized after final survey of existing OHR.	No requirements under existing laws	

35. **Secondary Clear Water Rising Main.** A secondary clear water rising main will be laid from GLSR to all OHRs. Design length of secondary clear water rising main pipeline 98.18 km (64.10 km in Nandigram I and 34.08 km in Nandigram II blocks). The diameter of pipeline ranges from 400-600 mm. There are no trees, archeological protected areas, water body, environment sensitive areas exist within the impact zone of pipeline laying area. This work is continued under present package EM/02.

36. **Distribution Network.** As per running contract, water supply distribution network for an estimated length of approx. 2338.4 km downstream of the 29 numbers of overhead reservoirs are proposed including supply, laying and commissioning of the water supply distribution network of approx. 1444.015 km in Nandigram I and approx. 891.278 km in Nandigram II block. Now the scope of running package was changed. Also, new scope has been developed for new package. Details of the distribution pipeline is provided in **Table 12 A and 12 B** show zone wise details of distribution network. **Table 34B and 34C under Section IV** shows environmental features in and around the pipeline.

**Table 12A: Details of Distribution Network as per revised scope of running package EM/02 in Nandigram I & II Blocks (22 Zones)**

Zones	Unit	HDPE PIPE				DI PIPE						Total Length (m)
		90 mm	110 mm	140 mm	200 mm	200 mm	250 mm	300 mm	350 mm	400 mm	500 mm DI K9	
<b>Nandigram-I Block</b>												
<b>Zone 1</b>	Rm	16,175	70,305	26,793	12,542	3,497	971	1,922	32			<b>132237</b>
<b>Zone 2</b>	Rm	10,601	54,000	24,814	11,009	395	2,728	259	503	558		<b>104867</b>
<b>Zone 3</b>	Rm	6,918	46,706	13,657	4,717	3,464	1,919	603	0	104		<b>78088</b>
<b>Zone 4</b>	Rm	3,965	36,204	11,344	4,914	235	249	2,495	27			<b>59433</b>
<b>Zone 5</b>	Rm	4,426	22,752	10,645	3,017		1,186	816	0	995	141	<b>43978</b>

Zones	Unit	HDPE PIPE				DI PIPE						Total Length (m)
		90 mm	110 mm	140 mm	200 mm	200 mm	250 mm	300 mm	350 mm	400 mm	500 mm DI K9	
<b>Zone 6</b>	Rm	7,854	53,286	23,525	11,955	393	1,064	2,585			85	<b>100747</b>
<b>Zone 7</b>	Rm	12,964	67,057	10,271	4,871	5,776	1,112	99	0	16		<b>102166</b>
<b>Zone10</b>	Rm	28,487	51,082	11,201	5,091	624	1,598	245	874	354		<b>101904</b>
<b>Zone 12</b>	Rm	5,088	29,892	8,907	3,123	426	583	45	97			<b>49008</b>
<b>Zone 13</b>	Rm	13,833	32,631	15,966	6,653	6,100	570	2,593	556	1,330	406	<b>78475</b>
<b>Zone 15</b>	Rm	4,367	57,769	20,369	11,001		2,992	1,783	37			<b>98319</b>
<b>Zone 19</b>	Rm	7,988	38,163	14,706	5,610	962		892	237			<b>68785</b>
<b>Zone 20</b>	Rm	1,977	17,571	9,328	3,532		1,687	430	15			<b>35644</b>
<b>Total length in m</b>	<b>Rm</b>	<b>124643</b>	<b>577418</b>	<b>201526</b>	<b>88035</b>	<b>21872</b>	<b>16659</b>	<b>14767</b>	<b>2378</b>	<b>3357</b>	<b>632</b>	<b>1053651 (1053.651 Km)</b>
<b>Nandigram-II Block</b>												
<b>Zone 1</b>	Rm	6,066	40,093	17,340	9,237	6,266	3,278	1,592	1,135	163		<b>85170</b>
<b>Zone 2</b>	Rm	11,153	67,089	21,503	10,576	8,636	5,543	149	911	724	328	<b>126612</b>
<b>Zone 3</b>	Rm	5,804	42,015	7,881	6,456	1,161	851	825				<b>64993</b>
<b>Zone 4</b>	Rm	7,590	65,945	37,423	14,402	6,242	1,703	760	558			<b>134623</b>
<b>Zone 5</b>	Rm	22,478	50,216	20,900	8,394	5,138	2,593	2,033	122	221		<b>112095</b>
<b>Zone 6</b>	Rm	11,768	93,323	21,714	10,187	10,236	1,278	2,502	415		392	<b>151815</b>
<b>Zone 7</b>	Rm	18,902	45,556	6,739	14,650	9,455	2,572	1,989	238	427	137	<b>100665</b>
<b>Zone 8</b>	Rm	4,944	27,852	11,973	4,315	4,028	2,077	339	168			<b>55696</b>
<b>Zone 9</b>	Rm	3,073	36,608	11,939	2,922	4,494	416	138	19			<b>59609</b>
<b>Total length in m</b>	<b>Rm</b>	<b>91,778</b>	<b>4,68,697</b>	<b>1,57,412</b>	<b>81,139</b>	<b>55,656</b>	<b>20,311</b>	<b>10,327</b>	<b>3,566</b>	<b>1,535</b>	<b>857</b>	<b>891278 (891.278 Km)</b>
<b>Total of N-I &amp; N-II</b>	<b>Rm</b>	<b>2,16,421</b>	<b>10,46,115</b>	<b>3,58,938</b>	<b>1,69,174</b>	<b>77,528</b>	<b>36,970</b>	<b>27,458</b>	<b>5,944</b>	<b>4,892</b>	<b>1,489</b>	<b>1944929 (say 1944 Km)</b>

**Table12B: Details of Distribution Network under new Package EM/03 in Nandigram I Block (7 Zones)**

Zones	Unit	HDPE PIPE				DI PIPE						Total Length
		90 mm	110 mm	140 mm	200 mm	200 mm	250 mm	300 mm	350 mm	400 mm	500mm	
<b>Nandigram-I Block</b>												
<b>Zone 8</b>	Rm	6,249	46,575	13,409	4,668	2,713	592	245	606	1,561		<b>76,618</b>
<b>Zone 9</b>	Rm	5,072	15,381	7,261	3,908	2,226	368	45				<b>34,261</b>
<b>Zone11</b>	Rm	3,068	43,089	19,033	4,242	1,757	2,747	1,783	33			<b>75,752</b>
<b>Zone 14</b>	Rm	9,495	19,728	7,838	3,422	887	1,559	314				<b>43,243</b>
<b>Zone 16</b>	Rm	3,402	51,369	17,161	3,841	3,402	494	2,377	496	502		<b>83,044</b>
<b>Zone 17</b>	Rm	5,618	18,594	9,339	3,484	1,343	1,863	32				<b>40,273</b>
<b>Zone 18</b>	Rm	6,117	45,417	11,671	4,150	3,200	2,342	266	220	289	392	<b>74,064</b>
<b>Total length</b>	<b>Rm</b>	<b>39,021</b>	<b>2,40,153</b>	<b>85,712</b>	<b>27,715</b>	<b>15,528</b>	<b>9965</b>	<b>5062</b>	<b>1355</b>	<b>2,352</b>	<b>392</b>	<b>4,27,255</b> <b>(427.255 Km)</b>

37. The distribution pipelines for supplying clear water from the OHRs will be laid within the RoW of Gram Panchayat roads. Total length of 2371 km of distribution pipelines (running and proposed packages) will be laid in Nandigram I & II blocks. The diameter of pipeline ranges from 75.7 mm to 500 mm, and the road widths vary between 3.75 to 5.5 meters and pipe diameters are planned in accordance with road widths.

38. Impacts due to pipe laying activity will be assessed and reconfirmed further during implementation of the project through detailed measurement surveys. 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: Reyapara Bazar, Nandigram Bazar, Haripur Bazar, Pirabani Bazar, etc.) of the blocks, will be minimized by laying of pipelines with appropriate diameters depending upon the road width. Field visit conducted to market area confirms the assessment of no impacts, based on the design. DSISC will update summary of some of the roads through which the distribution pipeline will traverse along with the diameter of pipe to be laid and trench width to indicate IR impacts once the detail design is complete for all zones.

39. It needs to be mentioned that during the laying of the pipelines along the market areas or any congested place within the blocks, if there are any potential access disruption identified, the civil works contract for running Package WW/EM/02 have specific provisions related to impact avoidance for pipe laying activities as well as construction work near common property resources (schools, health centers, ICDS Centers, etc.). The works contractor will be required to maintain access to shops and residences or other buildings along pipe alignments and to institutions located close to proposed sites, and safety through hard barricading of excavated alignments/sites. Care will be taken to avoid/mitigate economic impacts through the following measures: (a) announcement of proposed civil works in advance (to enable shop owners to stock up and remain unaffected if goods vehicles are unable to reach them during construction), (b) provision of planks to ensure pedestrian access; (c) careful timing of implementation to avoid peak sale hours/days or school timings; (d) night work in commercial areas, where possible; (e) minimizing construction period to the extent possible; (f) assistance to mobile vendors if any present during construction, to shift nearby; (g) signage with project details and contact details for grievance redress; and (h) proper traffic management.

40. These measures are the part of the contract and will be implemented through it, with careful monitoring by the concerned PIU. The distribution network will traverse through PWD, PMGSY village roads. Ownership of the roads needs to be ascertained following the detail measurement survey and impacts due to pipelaying activity will be assessed and reconfirmed further after finalization of detailed design for all the zones and finalization of alignment of the distribution pipelines. PHED obtained NOC for the same from PWD and self-certification (on "No Objection") on use of PMGSY roads RoW from the respective Gram Panchayats. The NOCs and the self-certifications would be appended to the updated DDR. The IBPS-cum-GLSR for Nandigram – II is proposed on a parcel of land owned by (I&WD) Govt. of West Bengal. PHED has obtained NOC from Irrigation and Waterways Department for the same.

41. **House Service Connection:** Provision of house service connection includes updating the consumer database and providing domestic water meters. Under the running package EM/02, and new package EM/03, 64,818 nos. and 20,379 nos. of house connection are considered, respectively.

42. Proposed components under the proposed **Package EM/04** are discussed below:

43. **Pre-settling ponds.** A total of 4 pre-settling ponds will be constructed under the original loan and additional financing. Ponds no. 1 and 2 will (45 ML capacity) be constructed within the WTP<sup>5</sup> as sub-component of package WBDWSIP/DWW/EM/01. The 2 new ponds, Pond 3 be constructed within the water treatment plant (WTP) land and Pond 4 on a land belonging to PHED near the WTP. The layout plan of the WTP including the 4 pre-settling ponds is provided as **Appendix 19** and the location marked on Google Earth is at **Appendix 20**. All the land parcels are free of encumbrances / vacant and not being used for any productive purpose by any individual or community. The land parcels belong to PHED.

**Heavy Duty Tubewells.** On a pilot basis, three HDTW are considered for the interim salinity mitigation project. The HDTW tube wells are proposed to be constructed (until year 2031) within the government-owned land at the WTP and at each of the two GLSRs (at Monohorpur in zone 6 and Gar Chakraberia in zone 2). These locations may change depending on the result of hydrogeological investigations. The discharge from existing HDTWs of PHED in Nandakumar, Chandipur, Nandigram I & II, ranges from 30 m<sup>3</sup>/hr to 67 m<sup>3</sup>/hr. The discharge of the three pilot HDTWs may be taken at 45m<sup>3</sup>/hr. Hydrogeological investigations will be conducted to determine the sustainable abstraction rate and installation of pilot HDTWs shall be planned/developed as per the recommendations in the 2022 feasibility report.<sup>6</sup> A sample design of HDTW is shown in Appendix xx.

#### D. Implementation Schedule

44. Package EM/02 is implemented based on an Item rate contract (Ad measurement contract), with provision of design activity included as part of the contract. A contract was awarded to Larsen & Tubro (L&T) and the letter of acceptance was issued on 12th September 2019. The notice to proceed was issued on 7 Novemberer, 2019. The total period of design and construction is 36 months. After which the item rate contractor will operate and maintain facilities for a period of 2 years.

45. Package EM/03 and EM/04 will also be based on item rate contract with design, construction, and operation and maintenance included.

#### E. Project Status

46. **Table 13A, 13B, 13C and 13D** provide the status of Site-Specific Environment Management Plans (SEMPs) as per scope.

**Table 13A: Status of Submitted SEMPs - disclosed document under Revised Package EM/02 Scope of work – Nandigram I**

Overhead and Ground Level Reservoir Zone	Name of Village	Gram Panchayat	SEMP Status		Status
			OHSR (Y/N)	Pipeline (Y/N)	
GLSR	Gar Chakraberia	Kalicharanpur			Submitted
Zone- 2	Gar Chakraberia	Kalicharanpur	Y	Y	Submitted
Zone- 3	Kalicharnapur	Kalicharanpur	Y	Y	Submitted

<sup>5</sup> Construction of WTP is ongoing as part of the existing scope.

<sup>6</sup> Feasibility Report on Construction of Additional Heavy-Duty Tube well (HDTW) in Nandakumar, Chandipur, Nandigram I & II Blocks of Purba Medinipur District, West Bengal to Meet the Water Demand During Lean Period prepared by the Project Management Consultant of WBDWSIP (5/4/2022)

Overhead and Ground Level Reservoir Zone	Name of Village	Gram Panchayat	SEMP Status		Status
			OHSR (Y/N)	Pipeline (Y/N)	
Zone- 5	Samsabad	Samsabad	Y	Y	Submitted
Zone- 7	Jambari	Gokulnagar	Y	Y	Submitted
Zone- 10	Durgapur	Vekutia	Y	Y	Submitted
Zone- 12	Manuchak Jalpai	Vekutia	Y	Y	Submitted
Zone- 13	Parbatipur	Mahammadpur	Y	Y	Submitted
Zone- 15	Kendamari Jalpai	Kendamari Jalpai	Y	Y	Submitted
Zone- 19	Haripur	Haripur	Y	Y	Submitted
Zone- 20	Banasri Gauri	Haripur	Y	Y	Submitted

**Table 13B: Status of Submitted SEMP's - disclosed document under Revised Package EM/02 Scope of work – Nandigram II**

Overhead Reservoir Zone	Name of Village	Gram Panchayat	SEMP Status		Status
			OHSR (Y/N)	Pipeline (Y/N)	
GLSR	Monoharpur	Reyapara			Submitted
Zone- 3	Birulia	Gholpukuria	Y	Y	Submitted
Zone- 6	Monoharpur	Reyapara	Y	Y	Submitted
Zone- 7	Kanakpur	Boyal-I	Y	Y	Submitted
Zone- 8	Narasinghapur Jalpia	Boyal-II	Y	Y	Submitted
Zone- 9	Gopalchak	Boyal-II	Y	Y	Submitted

**Table 13C: Status of Submitted SEMP - disclosed document under the proposed Package EM/03 – Nandigram I**

Overhead and Ground Level Reservoir Zone	Name of Village	Gram Panchayat	SEMP Status		Status
			OHSR (Y/N)	Pipeline (Y/N)	
Zone- 1	Gangra	Sonachura	Y	Y	Submitted
Zone- 4	Chak Chilinga	Samsabad	N	Y	OHSR SEMP to be submitted
Zone- 6	Gokulnagar	Gokulnagar	Y	Y	Submitted
Zone- 8	Naynan	Daudpur	Y	Y	Submitted
Zone- 9	Marisdanga	Dautpur	Y	Y	Submitted
Zone- 11	Dinabandhupur	Vekutia	Y	Y	Submitted
Zone- 14	Purushottampur	Mahammadpur	N	Y	OHSR SEMP to be submitted
Zone- 16	Bhasurkata	Kendamari Jalpai	Y	N	Pipeline SEMP to be submitted
Zone- 17	Tajpur	Nandigram	N	Y	OHSR SEMP to be submitted
Zone- 18	Nandigram CT	Nandigram	Y	N	Pipeline SEMP to be submitted

**Table 13D: Status of Submitted SEMP - disclosed document under under the proposed Package EM/03 – Nandigram II**

Overhead Reservoir Zone	Name of Village	Gram Panchayat	SEMP Status		Status
			OHSR (Y/N)	Pipeline (Y/N)	
Zone- 1	Kamalpur	Amdabad-II	N	Y	OHSR SEMP to be submitted
Zone- 2	Amdabad	Amdabad-I	N	Y	OHSR SEMP to be submitted
Zone- 4	Hanu Bhuiya	Gholpukuria	Y	Y	Submitted
Zone- 5	Bhetutria	Kodambari-I	Y	Y	Submitted

47. **Overhead Reservoir (OHR):** Till 31<sup>st</sup> May 2024 piling work is completed at 15 OHRs. Super structure works is in progress at nine locations. Zone wise present status of implementation till 31<sup>st</sup> May 2024 is mentioned below;

Sub structure Pile work progress till 31 <sup>st</sup> May, 2024				Pile Cap works – OHR till 31 <sup>st</sup> May, 2024	OHSR Superstructure
OHSR Location	Pile Dia (mm)	Pile completed	Total Scope of pile		
<b>Nandigram I block</b>					
Garchakraberia (Zone-2)	500	50	50	Pile cap work is in progress	
Kalicharanpur (Zone-3)	500	43	43	Work paused from 23.05.2021	
Samsabad (Zone - 5)	500	72	72	Pile cap completed	6 <sup>th</sup> lift column Shuttering & 5 <sup>th</sup> bracing beam concreting.
Jambari (Zone -7)	500	36	36	Pile cap work is in progress	
Durgapur (Zone 10)	500	67	67	Pile cap completed	1 <sup>st</sup> lift column concreting
Manuchak Jalpai (Zone -12)	500	48	48	Pile cap completed	6 <sup>th</sup> lift column concreting

Sub structure Pile work progress till 31 <sup>st</sup> May, 2024				Pile Cap works – OHR till 31 <sup>st</sup> May, 2024	OHSR Superstructure
OHSR Location	Pile Dia (mm)	Pile completed	Total Scope of pile		
Parbatipur (Zone-13)	500	50	50	Work paused from 09.11.2023	
Kendamari Jalpai (Zone -15)	500	34	34		
Haripur (Zone -19)	500	24	24	Pile cap completed	Conical wall, Ring beam & Walkway reinforcement binding work completed
Banasri gouri (Zone -20)	500	36	36	Pile cap completed	Bottom dome reinforcement binding, Conical wall shuttering
<b>Nandigram II block</b>					
Birulia (Zone -3)	500	24	24	Pile cap completed	Conical wall, Ring beam & Walkway reinforcement work completed
Manoharpur (Zone -6)	500	86	86	Pile cap completed	Up to 1 <sup>st</sup> bracing beam bottom reinforcement. Shuttering completed.
Kanakpur (Zone -7)	500	75	75	Pile load test completed on 21.03.2024	
Narasinghapur Jalpai (Zone -8)	500	32	32	Pile cap completed	Up to 1 <sup>st</sup> bracing beam bottom reinforcement, shuttering completed.
Gopalchak (Zone -9)	500	50	50	Pile cap completed	3 <sup>rd</sup> bracing beam & 4 <sup>th</sup> lift column concreting

Source: Monthly Progress Report, May,2024

48. **Distribution Network:** Total 1076.368 km HDPE and 82.307 km of DI K7 pipe (Total – 1158.675) have been laid within 22 different pipelaying zones up to 31<sup>st</sup> May, 2024. Zone wise pipe laying status up to May 2024 is shown in Table below.

Pipe laying work progress till 31 <sup>st</sup> May, 2024												
Block Name	Zone Name	Zone No	UoM	HDPE Pipe: PE 100; PN-10				DI Pipe: Class K-7				
				90MM	110MM	140MM	200MM	200MM	250MM	300MM	350MM	400MM
Nandigram I	Gangra	01	KM	11.448	58.464	23.785	11.665	3.04	0.82	1.699	0	0
	Garchakrabe ria	02	KM	4.482	22.68	20.561	9.273	0.376	2.485	0.176	0.394	0
	Kalicharanpu r	03	KM	3.474	23.412	11.016	3.365	3.035	1.688	0.525	0	0
	Chakchilling a	04	KM	1.14	15.972	10.661	3.383	0	0.24	1.398	0	0
	Samsabad	05	KM	1.461	10.091	4.61	1.817	0	0	0	0	0
	Gokulnagar	06	KM	6.369	41.829	20.904	9.515	0.22	1.037	2.471	0	0
	Jambari	07	KM	5.139	33.387	6.161	2.137	1.592	0.84	0	0	0
	Durgapur	10	KM	13.191	29.268	7.832	4.123	0.33	0.962	0.333	0	0
	Manuchak Jalpai	12	KM	3.023	21.955	6.82	1.693	0.055	0.475	0.871	0	0
	Parbatipur	13	KM	2.557	11.968	11.048	4.484	3.621	0.539	0.43	0.545	1.037

	Kendamari Jalpai	15	KM	1.469	28.073	17.497	10.48	0	1.413	1.078	0	0
	Haripur	19	KM	2.172	16.004	9.675	2.853	0.588	0	0.65	0	0
	Banasri Gouri	20	KM	0.939	9.269	6.307	2.885	0	0.391	1.226	0	0
	<b>Total (KM)</b>			<b>56.864</b>	<b>322.399</b>	<b>156.877</b>	<b>67.673</b>	<b>12.856</b>	<b>10.890</b>	<b>10.857</b>	<b>0.929</b>	<b>1.037</b>
Nandigram II	Kamalpur	01	KM	2.653	22.674	10.94	7.095	3.388	1.347	0.654	1.033	0
	Amdabad	02	KM	3.072	29.892	13.913	8.72	5.168	3.436	0	0.353	0
	Birulia	03	KM	2.207	27.993	4.737	4.381	0.687	0.535	0.426	0	0
	Gholpukuria	04	KM	3.95	43.536	24.078	8.158	2.734	0.950	0.580	0.238	0
	Bheturia	05	KM	8.629	28.859	12.417	5.09	2.918	1.155	0.429	0	0
	Manoharpur	06	KM	3.082	57.207	12.86	7.64	5.848	0.022	1.2045	0	0
	Kanakpur	07	KM	14.772	23.917	3.924	10.887	6.63	1.369	0	0	0
	NS Jalpai	08	KM	2.552	18.853	10.093	1.886	0.692	2.107	0.328	0	0
	Gopalchak	09	KM	1.238	21.423	7.18	2.047	1.4915	0	0	0	0
	<b>Total (KM)</b>			<b>42.155</b>	<b>274.354</b>	<b>100.142</b>	<b>55.904</b>	<b>29.557</b>	<b>10.922</b>	<b>3.623</b>	<b>1.624</b>	<b>0</b>

Source: Monthly Progress Report, May,2024

49. **Secondary Rising Main:** Total 53.17 km of DI K9 pipe have been laid within 2 blocks of Nandigram up to 31<sup>st</sup> May, 2024. Diameter-wise pipe laying status up to May 2024 is shown in Table below.

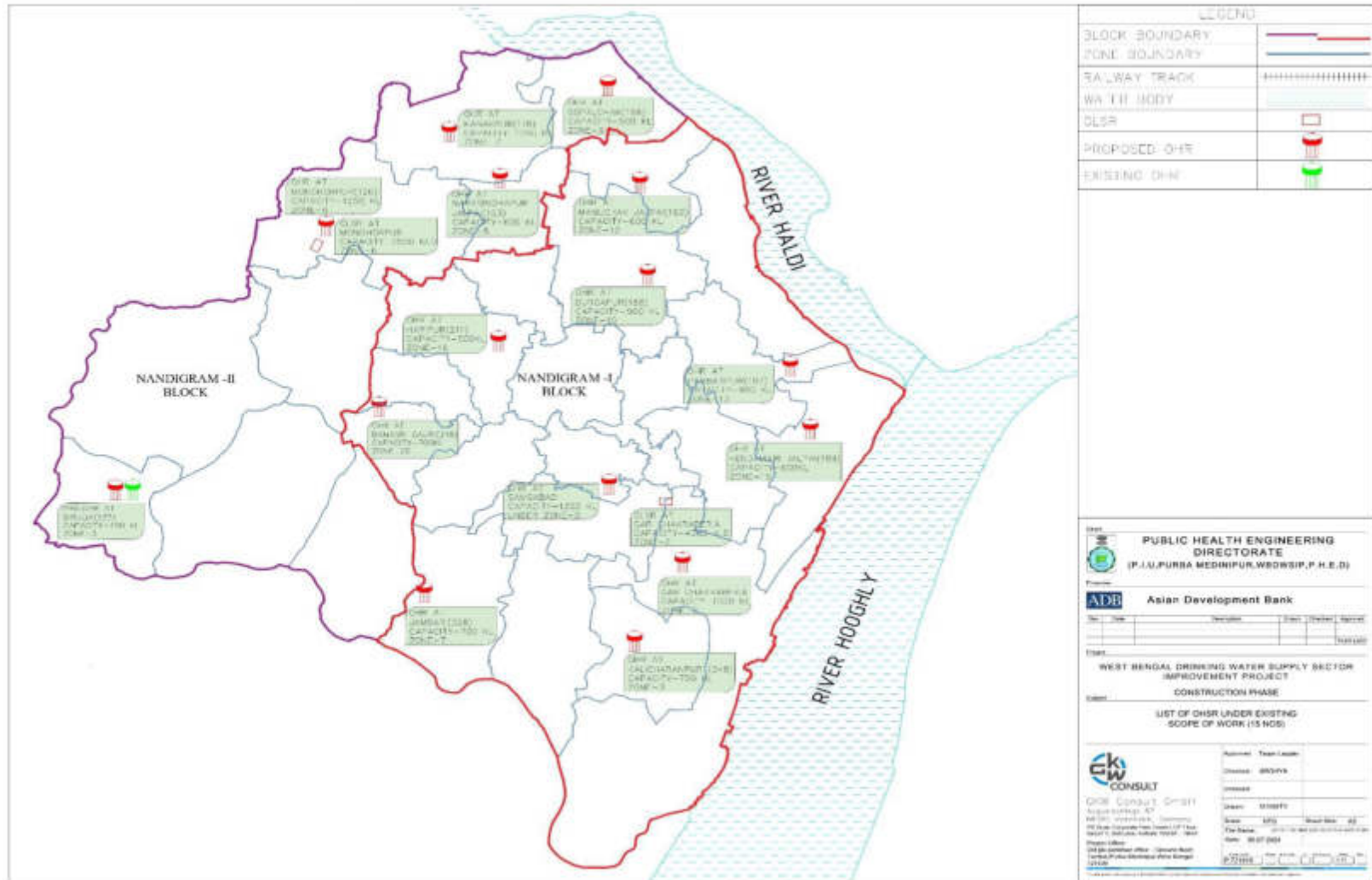
DI Pipe: Class K-9									
Block Name	UOM	150MM	200MM	250MM	300MM	350MM	400MM	500MM	Total
Nandigram I	KM	1.906	9.966	12.409	4.40	0	1.98	0	30.661
Nandigram II	KM	0.926	7.062	4.078	4.002	1.382	4.036	1.022	22.508
<b>Total</b>	<b>KM</b>	<b>2.8325</b>	<b>17.028</b>	<b>16.487</b>	<b>8.402</b>	<b>1.382</b>	<b>6.016</b>	<b>1.022</b>	<b>53.169</b>

Source: Monthly Progress Report, May,2024

50. This initial environmental examination (IEE) has been updated for the all 29 OHR locations (15 OHR under the running Package EM/02, OHR-Nandigram I - 10, Nandigram II - 05, and 14 OHR under new Package EM/03, Nandigram I - 10, Nandigram II - 04) and 29 Pipeline zones (22 zones under the running Package EM/02, Nandigram I -15, Nandigram II- 07 and 7 zones under new Package EM/03 in Nandigram I - 07) where design has been completed mostly and most of the SEMP's submitted by the contractor and construction activities has been continued.

51. Zone wise location of all 29 new OHRs are shown in **Figure 1 and 2** below. **Figure 3A & 3B** shows location of GLSRs and **Figure 4A, 4B** shows Proposed Secondary Transmission pipeline from GLSRs to OHRs under Nandigram I and II blocks.

Figure 3: Components under the Running Package EM/02





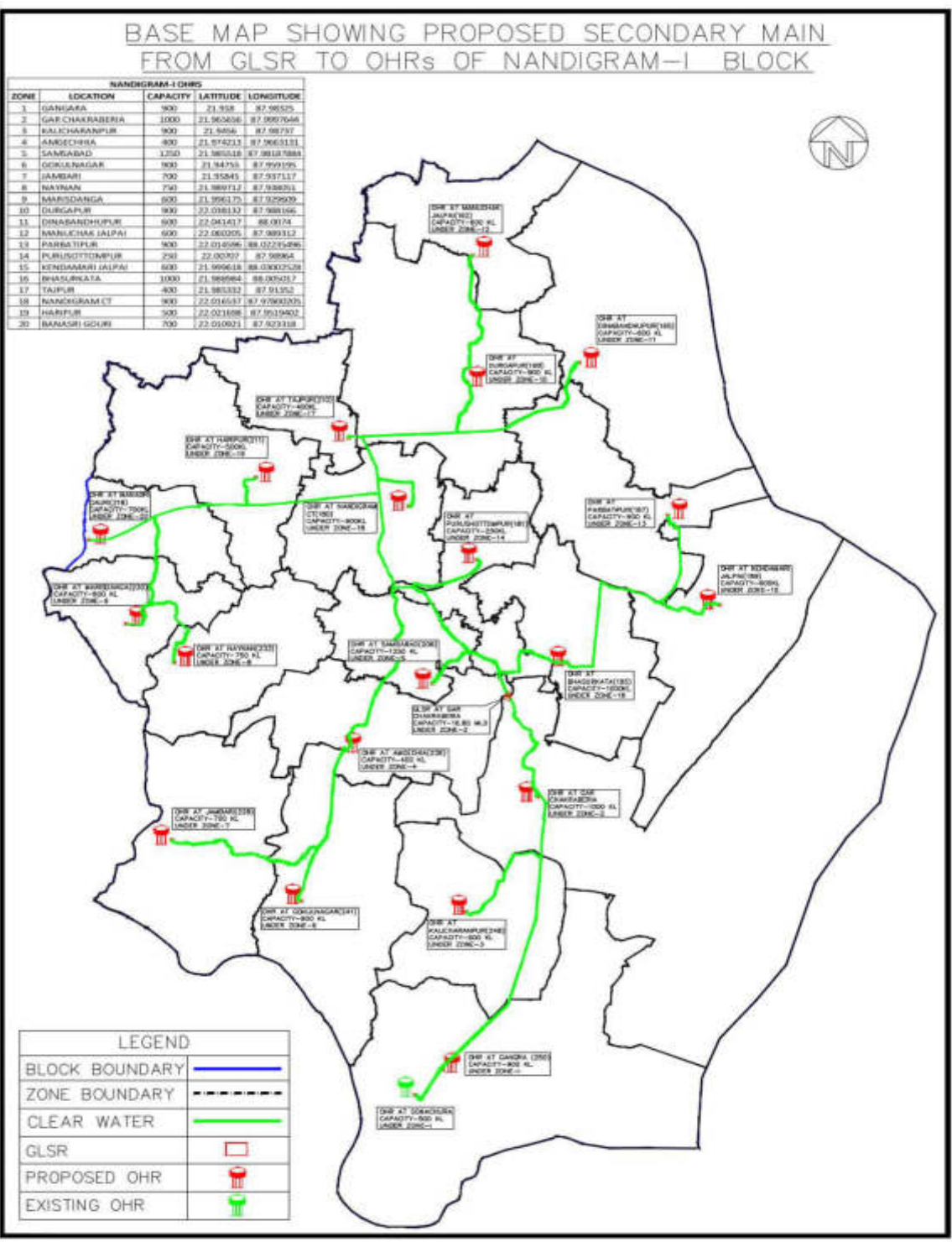
**Figure 5A: Google map location of Nandigram I GLSR**



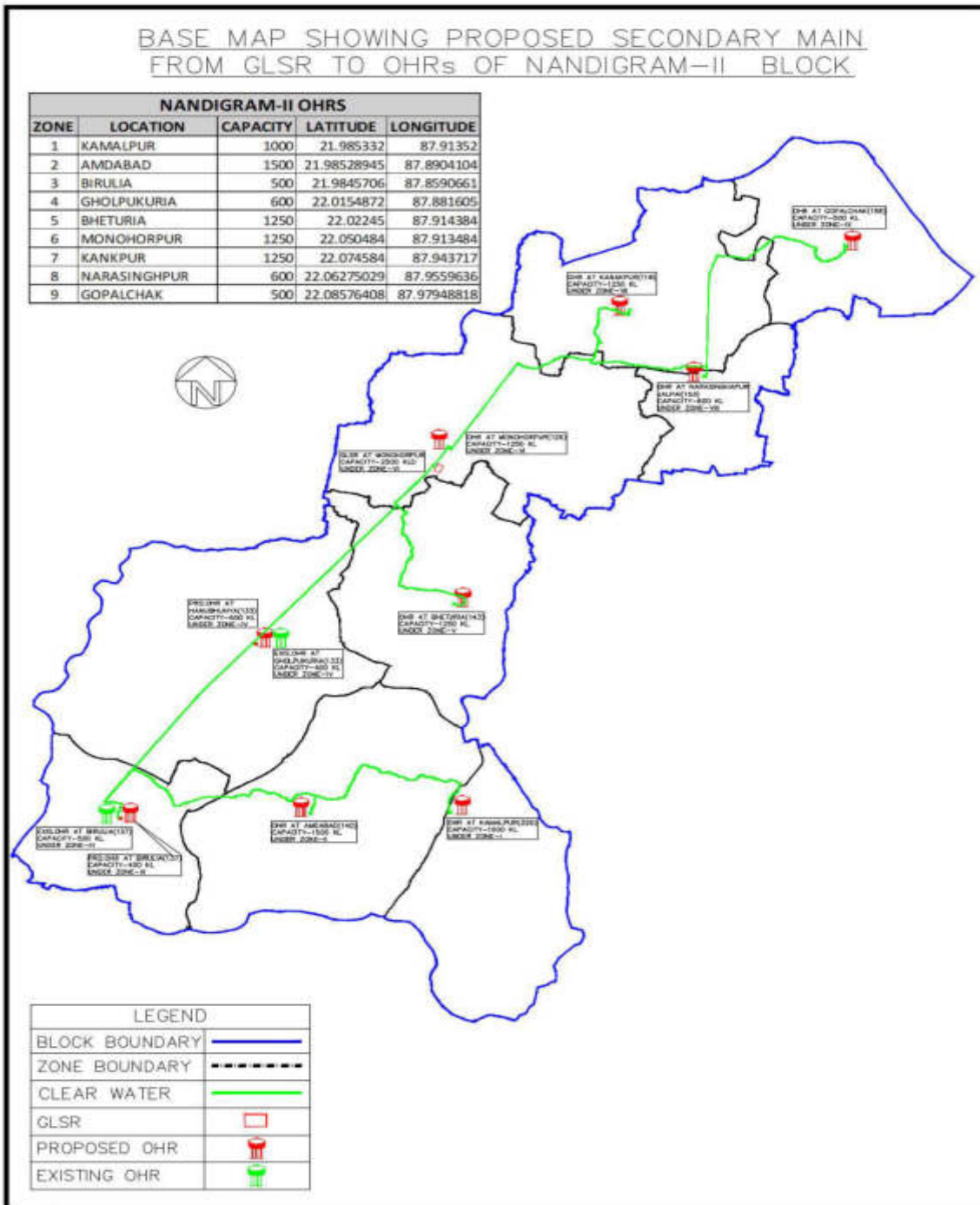
**Figure 5B: Google map location of Nandigram II GLSR**



Figure 6A: Base map showing proposed Secondary Main from GLSR to OHRs of Nandigram I block



**Figure 6B: Base map showing proposed Secondary Main from GLSR to OHRs of Nandigram II block**



### III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

#### A. ADB Policy

52. 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.

53. **Screening and Categorization with that of ADB SPS 2009.** ADB uses a classification system to reflect the significance of a project's potential environmental impacts. A project's category is determined by the category of its most environmentally sensitive component, including direct, indirect, cumulative, and induced impacts in the project's area of influence. Each proposed project is scrutinized as to its type, location, scale, and sensitivity and the magnitude of its potential environmental impacts. Projects are assigned to one of the following four categories:

- (i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- (ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for Category A projects. An initial environmental examination is required
- (iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- (iv) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

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

55. **Public Disclosure.** ADB posts the safeguard documents on its website as per following protocols as well as disclose relevant information to local communities: in an accessible place (e.g., local government offices, libraries, community centers, etc.), and a summary translated into local language for the project affected people and other stakeholders.

- (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 Project Management Unit (PMU) during project implementation upon receipt.

56. **Consultation and Participation.** ADB SPS require borrower to conduct meaningful consultation<sup>7</sup> with affected people and other concerned stakeholders, including civil society, and

<sup>7</sup> As per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage

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

57. **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.

58. **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 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.

59. **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.

60. **Occupational Health and Safety.** ADB SPS requires the borrower<sup>8</sup> to ensure that workers<sup>9</sup> 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.

61. **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

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and is carried out on an ongoing basis throughout the project cycle;<sup>1</sup> (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

<sup>8</sup> 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

<sup>9</sup> 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.

measures and plans to address them in a manner commensurate with the identified risks and impacts.

62. **Physical Cultural Resources.** Borrower is responsible for siting and designing the subproject to avoid significant damage to physical cultural resources. ADB SPS requires that 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 shall be included in the EMP.

63. **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;<sup>10</sup> WHO Interim Guidance (and its updates) on Water, Sanitation, Hygiene and Waste management for the COVID 19 virus and Sector Specific (Water and Sanitation) Guidelines<sup>11</sup>}. These standards contain performance levels and measures that are normally acceptable and applicable to projects. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of India regulations differ from these levels and measures, the PMU and PIUs will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU and PIUs will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS.

## B. National Environmental Laws

64. **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.

65. Category A projects require Environmental Clearance from the central Ministry of Environment, Forest and Climate Change (MoEFCC). 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 MOEFCC prepares comprehensive terms of reference (TOR) for the EIA study. On completion of the study and review of the report by the EAC, MoEFCC considers the recommendation of the EAC and provides Environmental Clearance if appropriate.

66. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1

<sup>10</sup> <https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

<sup>11</sup> <https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

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

67. None of the components of this water supply distribution system subproject falls under the ambit of the EIA Notification 2006, and therefore no EIA Study or environmental clearance is required for the subproject.

68. **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 14**.

**Table 14: Applicable Environmental Regulations**

<b>Law</b>	<b>Description</b>	<b>Requirement</b>
Environment (Protection) Act, 1986 and Central Pollution Control Board Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	<b>Appendix 2</b> provides applicable standards for ambient air quality. <b>Appendix 3</b> provides vehicular emission norms
Noise Pollution (Regulation and Control) Rules, 2000 amended upto 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	<b>Appendix 4</b> 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); - Consent to establish (CTE) and consent to operate (CTO) from West Bengal Pollution Control Board (WBPCB); - Compliance to conditions and emissions standards stipulated in the consent to establish and consent to operate.	Applicable as per requirement. Emission should be within the standard.
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 West Bengal Drinking Water Sector Improvement Project shall follow the Norms	<b>Appendix 5</b> 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	Project sites located in such areas will require prior permission

Law	Description	Requirement
	<p>inland water bodies that may affect fish.</p> <p>-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 any other purpose.</p> <p>-prohibits filling up fishery areas to convert into solid land, e. g., for any construction.</p> <p>-Prohibits dividing water area into parts to make any part less than 0.035 ha.</p> <p>-if conversion/ filling up is for development works, prior permission is required.</p>	
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 <b>(Appendix 6)</b>
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.	<b>Appendix 7</b> provides applicable labour laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.
The Child Labour (Prohibition and Regulation) Act, 1986	Prohibits employment of children below 14 years of age in certain occupations and processes Employment of child labor is prohibited in building and construction Industry.	No child labour shall be employed
Minimum Wages Act, 1948	Minimum wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of buildings, roads and runways are scheduled employment.	Applicable to all construction works in the project All construction workers should be paid not less than the prescribed minimum wage
Workmen Compensation Act, 1923	Provides for compensation in case of injury by accident arising out of and during the	Compensation for workers in case of injury by accident

Law	Description	Requirement
	course of employment.	
Equal Remuneration Act, 1979	Provides for payment of equal wages for work of equal nature to male and female workers and not for making discrimination against female employees in the matters of transfers, training and promotions etc.	Equal wages for work of equal nature to male and female workers
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 DFO 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 may be required for construction work at reservoir sites and laying of pipeline. In that case, prior permission should be obtained as per requirement From Bhutar More to Garchakraberia (Sonachura GP) along the clear water main pipeline tree felling required. NOC ( <b>Appendix 18</b> ) has been obtained from Forest dept. for felling of 63 nos. trees and tree felling has been completed.
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, remains, and monuments protected by ASI or the State Department of Archaeology.	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).
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 authorized actual user or shall be disposed of in an authorized disposal facility. (4) The hazardous and other wastes shall be transported from an occupier's establishment to an authorized actual user or to an authorized disposal facility in accordance with the provisions of these rules. (5) The occupier who intends to	Contractor to comply all the requirements of this Act during construction works.

Law	Description	Requirement
	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- (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.	

### C. Other Permission from Statutory Authorities

69. Clearances / permissions to obtained prior to start of construction. **Table 15** 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 construction and obtain all necessary clearances/permission prior to start of construction.

**Table 15: Clearances and permissions required for Construction activities**

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision	Remarks
1	Tree Cutting	State forest department/ Revenue (Tehsildar)	PIU	PIU	NOC obtained. For Tree felling – cutting completed.
2	Hot mix plants, Crushers and Batching plants	Consent to establish and consent to operate under Air Act, 1981 from WBPCB	Contractor	PIU	-
3	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules. 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989	Contractor	PIU	No hazardous material stored
4	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mining	Contractor	PIU	-

S. No	Construction Activity	Statute under which Clearance is Required	Implementation	Supervision	Remarks
5	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor	PIU	-
6	Temporary traffic diversion measures	District traffic police	Contractor	PIU	Informed to Traffic police as per requirement
7	Road cutting for pipe laying works	Panchayet and PWD	Contractor	PIU	Obtained partly from Panchayet and PWD
8.	Groundwater abstraction	Permissions from Central Ground Water Board Authority or State Water Investigation Department under Section 4 of the Environmental Protection Act (EPA) (1986).	Contractor	PIU/ DSC	To be obtained

70. PMU is responsible for overall supervision in getting all clearances and provides details to ADB through semi-annual report.

## IV. DESCRIPTION OF THE ENVIRONMENT

### A. Methodology Used for Baseline Study

71. **Data collection and stakeholder consultations.** Data for this subproject has been primarily collected through comprehensive literature survey, discussion with stakeholders and field surveys for the sub project sites. Later, primary data was collected for select zones as part of pre-construction baseline survey in accordance with monitoring requirements specified in the previous IEE. The monitoring data are included in respective sections below.

72. 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 on land use, soil, geology, hydrology, climate, socioeconomic profiles, and other planning documents collected from Government agencies and websites.

73. **Ocular inspection.** Several visits to the project sites were made during IEE preparation 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.

74. **Field Surveys.** During updation of IEE report (2020 to 2024) 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 Environment

75. **Location, Area and Connectivity.** The district of Purba Medinipur District was carved out from the erstwhile Midnapur District on and from January 1, 2002. This coastal district is situated on the southern fringes of the State of West Bengal. The total area of the district is 4151.64 square kilometers. It spans from 21.38'N to 22°31'N and 87.27'E to 88.12'E. The district is surrounded by Ghatal Sub-Division of Paschim Medinipur District in the north, Bay of Bengal in the south, Paschim Medinipur district in the West and Hooghly, Rupnarayan river in the East. Tamluk, Haldia, Contai and Egra are its 4 Sub-Divisions. The average elevation of the district is within 10 meters above mean sea level. The district has a long coastline of 65.5 km along its southern and southeastern boundary.

76. Purba Medinipur district is divided into 4 sub-divisions, 21 police stations, 25 development blocks, 5 municipalities and 223 gram panchayats. According to the 2011 census Purba Medinipur district has a population of 5,094,238. Purba Medinipur has a sex ratio of 936 females for every 1000 males. The district has a population density of 1,076 inhabitants per square kilometer (2,790/sq mi). According to the 2011 census, the district has a literacy rate of 87.66%. The detail of the blocks including the statutory towns and census towns under each of the administrative sub-divisions is presented below:

**Table 16: Administrative Sub-Division: Purba Medinipur**

Sl. No.	Sub-Division	Block Details	Statutory Town	Census Towns
1	Tamluk	Nandakumar, Moyna, Tamluk, Shahid Matangini, Panskura, Kolaghat and Chandipur	Panskura, Tamluk	Goasafat, Anantapur, Dakshin Baguan, Kakdihi, Shantipur, Kolaghat, Amalhara, Mihitikri, Kharisha, Kotbar and Ershal
2	Haldia	Mahisadal, Nandigram-I, Nandigram-II, Sutahata and Haldia	Haldia	Garh Kamalpur, Nandigram, Ashadtalya, Barda
3	Egra	Bhagawanpur-I, Egra-I, Egra-II, Patashpur-I and II	Egra	Benudiya, Hinch Gerya
4	Contai	Contai-I, Deshopran, Contai-II, Khejuri-I, II, Ramnagar-I, II and Bhagawanpur-II	Contai	Basantia and Khadalgobra

77. The select two blocks Nandigram-I and Nandigram-II block of Purba Medinipur District (hereinafter referred to as the project area) is situated on the western bank of the River Rupnarayan and total project area is 287.58 sq. km out of which rural area is 282.17 sq. km. Project area is bounded by Mahishadal and Haldia CD blocks, across the Haldi in the north, Kakdwip and Sagar CD blocks, both in South 24 Parganas district, across the Hooghly estuary in the east, Khejuri I and Khejuri II CD Blocks in the south and Chandipur and Bhagabanpur II CD Blocks in the west. The project area does not include any statutory town (Municipality) but includes 2 Census towns apart from the 17 Gram Panchayats. Administrative profile of the 2 blocks is given below:

**Table 17: Block-wise Profile of Project Area**

General Information of Block	Project Blocks	
	Nandigram I	Nandigram II
Subdivision	Haldia	Haldia
Block Headquarter	Nandigram	<u>Reyepara</u>
Geographical area (in Sq. km.)	181.84	105.74
Panchayat Samity	1	1
No. of Gram Panchayats	10	7
No. of Inhabited Village	98	40
No. of Mouza	99	41
No. of Gram Samsad	140	91

78. Nandigram- I block has total geographical area of 181.84 sq.km and average elevation of the block is 7 meters above mean sea level(msl). It is bounded by Nandigram I CD Block is bounded by Haldia CD Block, across the Haldi in the north, Kakdwip and Sagar CD Blocks, both in South 24 Parganas district, across the Hooghly estuary, in the east, Khejuri I and Khejuri II CD Blocks in the south and Nandigram II CD Block in the west. It is located 40 km from Tamluk, the district headquarters.

79. Nandigram II block has total geographical area of 105.74 sq.km and average elevation of the block is 5 meters above mean sea level(msl). Nandigram II CD Block is bounded by Mahishadal and Haldia CD Blocks, across the Haldi in the north, Nandigram I CD Block in the east, Khejuri I CD Block in the south and Chandipur and Bhagabanpur II CD Blocks in the west. It is located 33 km from Tamluk, the district headquarters.

80. **Road Network and Connectivity.** NH-41 (new number is NH-116) is entirely in Purba Medinipur district and connects Kolaghat (NH-6) to Haldia, a total length of 116 km. National Highway-6 passes through the northern fringe of the district (passing Panskura and Kolaghat blocks. SH-4 connects Digha Foreshore in Purba Medinipur to Jhalda in Purulia, passing through Contai Municipality, Nandakumar and Panskura Municipality. The total length is 466 km, of which 163 km is within Purba Medinipur. SH-5 connects Contai in Purba Medinipur to Rupnarayanpur in Bardhamann district, passing through Egra Municipality. The total length is 376 kms, of which the 42 km is within Purba Medinipur district.

81. Nandigram I CD Block has 6 ferry services and 22 originating/ terminating bus routes. The nearest railway station is 23 km from the block headquarters. There are two ferry service across the Haldi River between Haldia and Nandigram – one between Haldia Township and Nandigram and the other between Pari Chak ferry ghat in Haldia and Nandigram. The ferry services are available every 20 minutes Nandigram II CD Block has 1 ferry service. The nearest railway station is 14 km from the block headquarters of Nandigram II.

82. **Topography.** The district is part of the lower Indo-Gangetic Plain and Eastern coastal plains. Topographically, the district can be divided into two parts – (a) almost entirely flat plains on the west, east and north, (b) the coastal plains on the south. The vast expanse of land is formed of alluvium and is composed of younger and coastal alluvial. The average elevation of the project area ranges from 6m – 10m above mean sea level. The district has a long coastline of 65.5 km along its southern and southeastern boundary.

83. The district is characterized by gently sloping flat alluvial terrain, which gradually merges to deltaic plain towards farther south. The elevation of land mass ranges from 10 m above mean sea level in the northern part to 3 to 4m above mean sea level in the coast, after that the land gradually dips into the Bay of Bengal in the vicinity of coast falling in Ramnagar and Contai blocks a series of sand dunes stretching ENE-WSW direction are present, which are indicative of palaeo shoreline.

84. **Soils.** A major part of the district is covered by alluvial soil except a narrow belt along the coast in the extreme south where saline soil saline alkali soil, non-saline alkali soil and degraded alkali soils developed. The soil of the district is alluvial type, as the district under coastal alluvium and its deposition. The soil of this region consists of different layers like sand, silt and clay. The district is situated on flood plains of the rivers Rupnarayan and river Haldi and therefore huge amount of clay is dominating in soil texture. Due to this specialty of soil, water logging in this region during monsoon is very common. Due to poor permeability, the soils are imperfect to poorly drain. Due to this physical quality of the soils, land use pattern of the area is also affected to a larger extent.

85. **Geology.** The district is underlain by unconsolidated alluvium sediments of Quaternary age, which is overlain by linear continuous beach ridges (sand dunes) along the present-day coastline around Digha-Ramnagar-Contai deposited by the wave action of the sea. The thickness of the alluvial sediments increases towards east and southeast following the basin configuration. The Quaternary formation comprises newer alluvium of recent age and older alluvium of Pleistocene age The older alluvium is restricted to the fringe area of the platform terrain towards west and northwest and is overlain by newer alluvium towards east, south and south east. The older alluvium comprises predominantly of yellow lo reddish brown clays with kankar and ferruginous gravel and sand. fine to medium. The newer alluvium consists predominantly of clay with occasional intercalation of silt and fine sand and is light grey in colour. It is restricted to the

coastal tract and marginal alluvium plains. The Quaternary sediments are underlain by semi-consolidated Tertiary sediments of Mio-Pliocene age. The Tertiary sediments comprise of alternations of graded sand-silt-clay sequence suggesting cyclic sedimentation. In contrast to Quaternaries the Tertiaries are grey in colour with deeper litho-facies being steel grey.

86. The subsurface borehole data indicates that there is lateral facies variation often resulting in the coalescing of granular zones and / or their gradation zones silty / clayey beds towards east, south and southeast. The top of the Tertiary sediment is generally represented by grey clay. This grey clay-bed is persistent throughout the area and is considered as 'marker bed' which separates the upper litho system (Quaternary sediments) and lower litho system (Tertiary sediments). The quartzo-feldspathic unconsolidated Quaternary sediments vary considerably in thickness from 120m in the west to over 150m in the east and from 150m in the northwest to over 180m in the southeast. It is predominantly areacious in the north and northwest to mostly argillaceous in the south and southeast the thickness of the newer alluvium varies between 10 and 60m in the northwest - southeast direction. The thickness of older alluvium varies between 50m in the northwest to over 90m in the southeast direction. The newer alluvium is devoid of any significant granular zones. The semi-consolidated Tertiary sediments are most extensive and underlie the entire alluvial as well as coastal plains. The thickness of the Tertiary formation increases towards the coastal area being more than 300m. The semi-consolidated Tertiary sediments are most extensive and underlie the entire alluvial as well as coastal plains.

87. **Seismology.** As per the seismic zoning map of India, project area in the district falls under Zone III, which is classified as Moderate Damage Risk Zone in India. Project area is also vulnerable to various natural calamities like flood, cyclone (mainly coastal blocks including Nandigram I block) and embankment erosion etc.

88. **Climate.** The climate of the project area is humid and subtropical to tropical, characterized by a hot and dry summer from March to May/June, a south-west monsoon season from June to September, a pleasant post-monsoon from October to November and a cool winter from December to February. Majority of the rain is received during the south-west monsoon, from late June to September end. It also receives pre-monsoon torrential rains in summers between March and May. The mean monthly temperature over the period 2011 to 2020 is table below:

**Table 18: Average Monthly Temperature in Purba (East) Medinipur District**

Month	<sup>12</sup> Monthly Mean Temperature in °C																			
	2011		2012		2013		2014		2015		2016		2017		2018		2019		2020	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
January	25	13	25	15	25	17	26	13	28	18	29	18	29	17	28	17	28	19	27	18
February	28	17	29	17	28	16	28	17	32	21	33	23	34	20	33	22	32	22	30	20
March	31	22	31	23	32	28	31	22	35	23	37	25	36	23	38	25	35	25	35	25
April	32	25	33	26	33	25	34	26	39	27	43	29	42	27	38	27	40	28	39	26
May	33	26	34	27	33	27	34	27	41	29	41	29	42	29	39	29	41	30	37	26
June	32	27	34	28	33	27	34	28	37	29	38	29	39	30	39	31	39	30	36	29
July	32	27	32	27	34	37	32	27	34	28	34	28	34	28	34	28	35	28	34	28
August	31	26	32	26	31	30	32	27	34	27	33	27	34	28	33	28	33	27	33	28
September	31	26	..	..	33	26	33	27	34	27	33	26	34	28	33	27	31	26	33	27
October	33	24	32	23	31	24	33	24	33	24	33	24	32	25	32	24	30	24	31	25
November	30	19	29	19	..	..	30	18	32	22	31	20	30	22	32	22	31	22	30	22
December	30	10	26	14	27	19	27	14	29	19	30	18	29	20	26	18	27	18	29	19

<sup>12</sup>Source: Meteorological Department, Govt. of India

89. Annual rainfall in the district has varied from a low of 1342 mm in 2012, to a high of 2659 mm in 2021. The month-wise annual rainfall from 2011 to 2021 is tabled below.

**Table 19: Annual Rainfall in Purba Medinipur District**

Month	Years										
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
January	3	56	2	0	15.3	5.2	0.0	0	0.3	12.4	0
February	10	9	5	72	8.7	58.4	0.0	1.1	25.6	11.9	0
March	13	1	1	10	25.4	13.2	58.7	1	45.3	35.6	0
April	76	47	31	6	126.1	6	19	66.4	87.7	152.1	15.3
May	112	43	191	187	77.3	138.5	89.1	114.3	113.7	326.4	323.9
June	309	116	290	236	146.4	175.1	158	261.9	170.7	118.7	384.2
July	272	310	292	354	585.4	309.5	484.5	347.7	220.1	141	422.5
August	384	249	436	464	214.8	426.4	223.8	263.5	437.9	411.6	326.2
September	335	368	365	298	209.1	268.4	227.7	377.3	393.4	195.2	811.9
October	24	79	465	102	24.4	153.6	216.2	202.7	398.1	170.2	291.6
November	-	25	-	0	0.0	72.5	32.2	9	81	0	4.3
December	-	39	-	0	16.8	0.0	22	8.6	2.6	0	79.7
<b>Total</b>	<b>1538</b>	<b>1342</b>	<b>2078</b>	<b>1729</b>	<b>1449.7</b>	<b>1626.8</b>	<b>1531.2</b>	<b>1653.5</b>	<b>1976.4</b>	<b>1575.1</b>	<b>2659.6</b>

Source: Meteorological Department, Govt. of India

90. **Surface Water.** Project area is blessed with plenty of water bodies – rivers, streams and ponds, distributed across the district. The drainage / river basin system of Purba Medinipur is controlled primarily by the Rupnarayan, Haldi, Rasulpur-Pichabani sub-basin and the Kaliaghai sub-basin. The Rupnarayan flows through the north, north-eastern fringe of the district separating the district from Hooghly district. A brief account of the major rivers flowing through Purba Medinipur is given below:

**Table 20: Major Rivers flowing through Purba Medinipur District**

Sl. No	Name of River	Catchment area (In Sq. Kms)	Length (In Kms)
1	Rupnarayan	1226	80
2	Kaliaghai	1913	121
3	Haldi	614	42
4	Rasulpur	1556	19
5	Pichabani	808	-

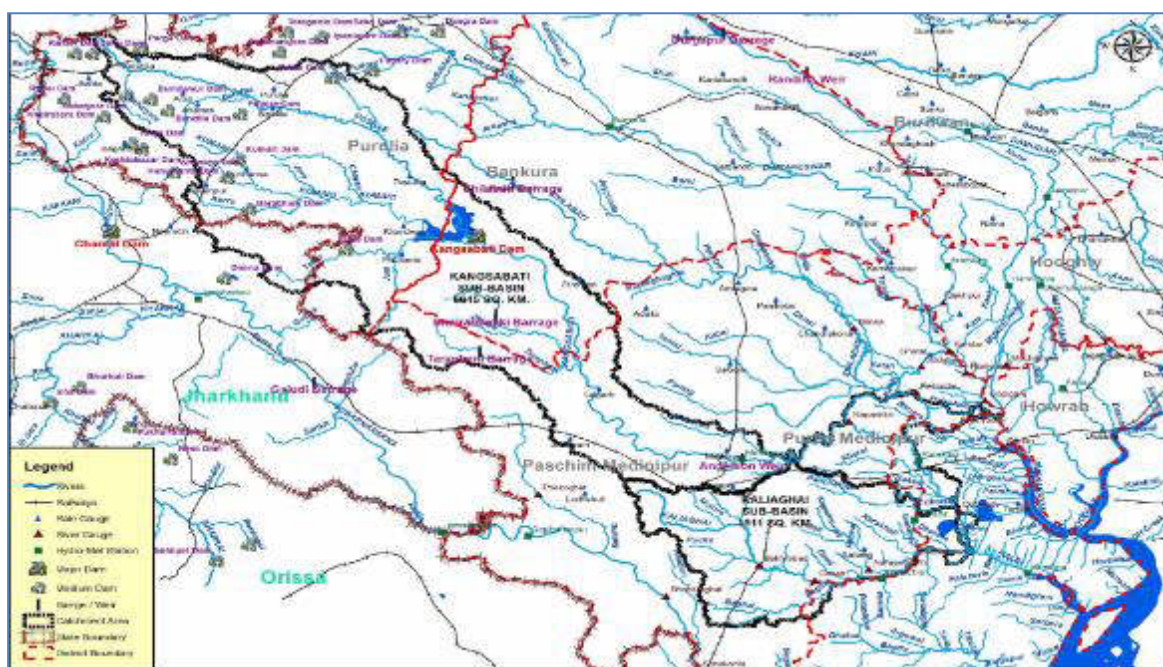
91. **Rivers and River Basin System of Purba Medinipur.** The drainage / river basin system of Purba Medinipur is controlled primarily by the Rupnarayan, Haldi, Rasulpur-Pichabani sub-basin and the Kaliaghai sub-basin.

**Figure 7: Rupnarayan-Haldi-Rasulpur-Pichabani Sub-basin**



92. Catchment map of the Kaliaghai sub-basin is also presented below:

**Figure 8: Kaliaghai Sub-Basin**



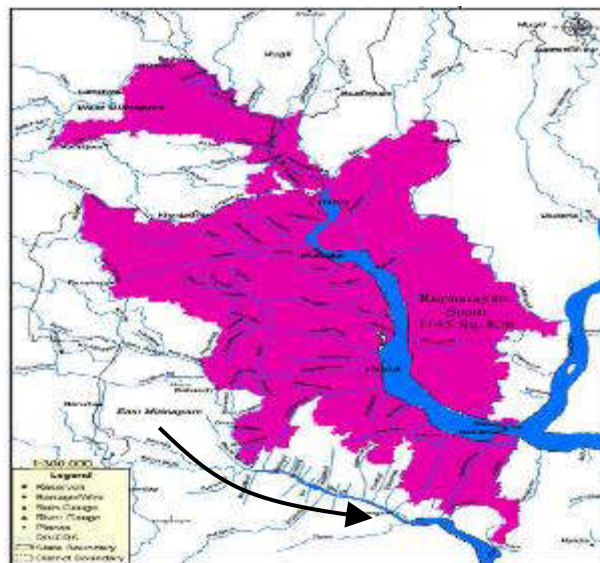
93. A brief account of the major rivers forming the river basin system in Purba Medinipur is presented below:

94. **Rupnarayan.** The river is formed from the confluence of Shilabati and Dwarkeshwar at Bandar near Ghatal town of Paschim Medinipur district. The Shilabati (also known as Silai)

emerges from hilly terrain of Chhota Nagpur Plateau in the Purulia district, traverse's south-eastward through the districts of Bankura and Paschim Medinipur to meet with the Dwarakeswar river. The Dwarakeswar river (also known as Dhalkishore) originates from Tilboni hill of Chhota Nagpur Plateau in Purulia district and enters Bankura district near Chatna. It mainly flows south-eastward and after entering into Hooghly district it turns south near Arambag town. After receiving contributions from other minor tributaries, the Dwarakeswar finally joins with Shilabati to form the river Rupnarayan.

95. The Kana Dwarkeshwar, Polashpai, Durbachaty are the tributaries of the Rupnarayan. The Rupnarayan river is the main tributary of the Hooghly and receives tidal flow from Bay of Bengal, as well as flow from the major tributaries of Dwarkeshwar, Shilabati, Kangsabati, and Mundeshwar. It also receives flow from a number of drainage channels, like Kata Khal, Bakshi Khal, and Chandreshwar Khal of Paschim Medinipur.

**Figure 9: Rupnarayan Basin Map**

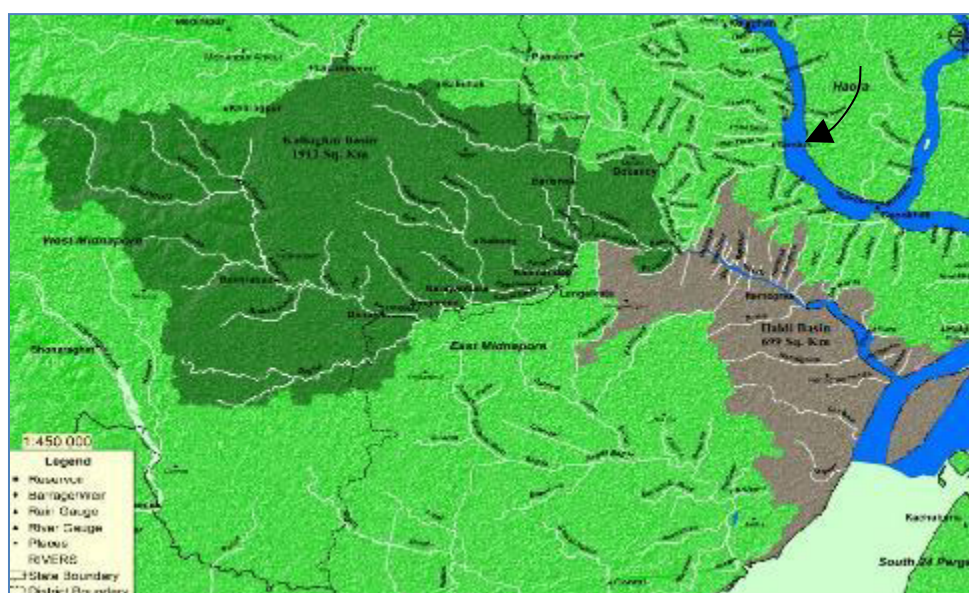


96. **New Cossye.** The New Cossye is an offshoot of the Kangsabati river. Kangsabati River (also variously known as the Kasai and Cossye) rises from the Chota Nagpur plateau in the state of West Bengal, India and passes through the districts of Purulia, Bankura and Paschim Medinipur in West Bengal before draining in the Bay of Bengal. After rising at Murguma near Jhalda in the Chota Nagpur plateau in Purulia district, it passes by Purulia, Khatra and Ranibandh in Bankura district, and then enters Paschim Medinipur in the Binpur area. Further down, after entering into the district of Paschim Medinipur it joins with combined streams of Bhairab Banki and Tarafeni rivers. After flowing further east in a tortuous course it bifurcates into two rivers at Kapastikri of Paschim Medinipur. Northern branch, known as Old Cossye after flowing through certain distance, further bifurcates into two courses at Daspur of Paschim Medinipur. One course, named as Palaspai Khal flow further east to outfall into the Rupnarayan and the main course, known as Durbachaty flows south-easterly along the border of both Medinipur districts to outfall into river Rupnarayan. The southern course, known as New Cossye, flows further south-easterly direction to meet with river Kaliaghai at Dheubhanga of Purba Medinipur district, forms river Haldi which flows eastwardly into the river Hooghly at Haldia. Kherai-Bakshi khal is the main tributary of river New Cossye. The total length of Kangsabati is around 465 km and the New Cossye is 108 km.

97. **Kaliaghai River.** The river Kaliaghai trickles out from Dudhkundi of Jhargram in Paschim Medinipur district and flows south-easterly through Purba Medinipur to meet the other arm of Kangsabati (New Cossye) to form Haldi. During the course of its journey, it is fed by the flow of its tributaries namely Kapaleswari, Deuli, Baghai and Chandia. Total length is 121 km.

98. **River Haldi.** It is formed by joining of New Cossye and Kaliaghai and after traversing south-eastwards outfalls into the river Hooghly near Haldia town. The river divides the district into two parts; the northern part can be categorized as drainage area of Tamluk and the southern part can be categorized as Rasulpur-Nandigram drainage area, except upper catchment discharges from Kaliaghai-New Cossye sub-basins. The lower portion of the river Haldi is affected by over bank spills and drainage problem during the monsoon as entire stretch of 42 km of the river falls under the tidal influence of river Hooghly.

**Figure 10: Kaliaghai-Haldi Sub-basin**



99. **Rasulpur River.** The river Rasulpur flows through the Paschim Medinipur and Purba Medinipur. The river is formed by three streams namely Bagda, Sarpai and Madhakhali. It is the main drainage channel in Contai Sub-Division of Purba Medinipur district. The river ultimately outfalls into the river Hooghly. The length of this river is 19 km.

100. **Pichabani-Negua Channel River** Pichabani is the main drainage channel which is used to drain out rain water from Dubda basin under Egra block of Purba Medinipur district. The river outfalls into the Bay of Bengal. The catchment area of the sub-basin is 808 Sq. Kms.

101. **Surface Water Quality.** The State Pollution Control Board have monitoring station on the River Rupnarayan, near Kolaghat Rail bridge and near Geonkhali, before the confluence of River Hooghly. Analytical tests carried out once in each month are published in the West Bengal Pollution Control Board (WBPCB) website. It is observed that Total Coliform, Faecal Coliform, concentration of chloride and TDS concentration considerably high in number of months. **Table 21** below shows water quality data of Rupnarayan River.

**Table 21: Water Quality Parameters of Rupnarayan River (Source: West Bengal Pollution Control Board, WBPCB)**

Parameter	2023												2024					Surface water quality criteria by CPCB for Class C
	Jan	Feb	Mar	Apr	May	June	5000	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
<b>Total Coliform (MPN/100ml)</b>	7900	8400	7900	7000	7000	7900	---	9400	7900	7000	7900	---	7000	7900	9400	14000	22000	<b>5000</b>
<b>Faecal Coliform (MPN/100ml)</b>	4900	4600	210	3300	3400	4600	<b>1500</b>	4900	4600	3300	3300	---	3300	4900	4600	7000	14000	---
<b>TDS (Mg/l)</b>	622	324	548	428	724	2222		1722	218	204	302	---	202	484	860	3692	2608	<b>1500</b>
<b>TSS (Mg/l)</b>	98	182	30	332	326	444	<b>600</b>	150	136	406	390	---	180	96	94	208	132	
<b>Chloride (Mg/l)</b>	96.35	688.36	137.97	954.6	980.69	955.94	<b>3</b>	1077.4	28.29	43.39	61.68	---	68.45	285.8	799.75	1569.51	1319.59	<b>600</b>
<b>BOD (Mg/l)</b>	1.9	0.8	2.5	2.05	0.95	1.3	<b>4</b>	1.15	2.35	2.9	1.55	---	1.55	2.55	1.7	2.75	1	<b>3</b>
<b>DO (Mg/l)</b>	7	6.2	5.9	5.6	6	5.3	---	6	5.1	5.1	6.4	---	7.2	5.2	5.6	5.9	5	<b>4 min</b>
<b>Conductivity (us/cm)</b>	376.2	2496	720.7	3184	3260	3270	---	3945	415.7	427.4	521.8	---	499.4	1210	2112	5471	3695	---
<b>Turbidity (NTU)</b>	95.2	200.4	130.53	72.85	212.1	67.39	---	20.54	112	316	68.1	---	217	79	74.15	23.2	57.6	---

Rupnarayan river according to Surface water quality criteria by CPCB falls under Class C and also BIS 2296: Drinking water source after conventional treatment and disinfection

Source: WBPCB website

Table 22: Water Quality Parameters of Rupnarayan River (May 2024)

<b>Station:</b> RUPNARAYAN BEFORE CONFL. TO RIVER GANGA NEAR GEONKHALI, WEST BENGAL	<b>River Basin:</b> Rupnarayan	<b>CPCB Station Code:</b> 1337
<b>Sample Date:</b> 21/05/2024	<b>Sample Time:</b> 13:35	
<b>Human Activities:</b> Bathing and washing	<b>Weather:</b> Clear	<b>Water Body:</b> Rupnarayan
<b>Frequency Of Monitoring:</b> Quarterly	<b>Use Based Class:</b> C	<b>Approximate Depth (Bottom/Table):</b> 0.50 m
<b>Color &amp; Intensity:</b> Turbid	<b>Odour:</b> None	<b>Visible effluent discharge:</b> None
<b>Parameter</b>	<b>Test Result</b>	<b>Unit</b>
Ammonia-N	0.11	mg/l
BOD	1.00	mg/l
Conductivity	3695.0	µs/cm
Dissolved O <sub>2</sub> (DO)	5.0	mg/l
Fecal Coliform	14000	MPN/100ml
Fecal Streptococci	490	MPN/100ml
Nitrate-N	0.44	mg/l
pH	8.40	Unit
Temperature (Water)	33	°C
Total Coliform	22000	MPN/100ml
Boron	BDL	mg/l
Calcium	73.96	mg/l
Chloride	1319.59	mg/l
COD	15.00	mg/l
Fluoride	0.28	mg/l
Magnesium	61.65	mg/l
Phenolphthalein Alkalinity	8.00	mg/l
Phosphate-P	0.17	mg/l
Potassium	---	mg/l
Sodium	---	mg/l
Sulphate	263.75	mg/l
Total Alkalinity	134.00	mg/l
Total Dissolved Solids (TDS)	2608.00	mg/l
Total Fixed Solids (TFS)	2350.00	mg/l
Total Hardness as CaCo <sub>3</sub>	438.60	mg/l
Total Suspended Solids (TSS)	132.00	mg/l
Turbidity	57.60	NTU

**Standard IS 2296 1991 Class C- Drinking water source after conventional treatment and disinfection**

STANDARD- Total Coliform – 5000 MPN, TDS- 1500 mg/l, BOD – 3 mg/l, Chloride – 600 mg/l, BOD – 3 mg/l, DO – Min 4.0 mg/l,

Source: West Bengal Pollution Control Board, WBPCB

102. The analytical results (**Table 23 & 24**) during high tide and low tide period for the month of July and August 2019 reveal high turbidity in all the samples. TDS is above the permissible limit of 1500 mg/l in few cases. Chloride concentration is above the standard (600 mg/l) in few cases. The maximum chloride concentration observed is 1343 mg/l (dated 9th July,2019). Also, the contractor is monitoring the Rupnarayan river water quality at the proposed intake location to understand the water quality with special emphasis to salinity problem during lean months. Water quality testing results at intake point for the month of May 2024 is shown in **Table 25**. It is noted that all parameters are within the standard.

103. In order to get more detailed information on the appropriateness of the Intake location, turbidity sensors are proposed to be installed at the suggestive intake location. Based on available flow / discharge, including raw water quality, the river Rupnarayan would be more appropriate choice as the preferred source for the selected blocks. Quality of river water is in general of acceptable quality, which can be used for potable purposes after conventional treatment and disinfection. However, the salinity levels in the river water have increased during recent times, in the lean season.

104. **Salinity hazards in Rupnarayan river.** Increase in the chloride (salinity) concentration during March to June is observed every year. The advent of salinity in the river has increased over the years during the lean period. Summary of the critical water quality parameters for the few years is summed up in Appendix 22. Haldia PHED division has been monitoring the Rupnarayan river water quality at the proposed intake location since May 2017 to understand the water quality with special emphasis to salinity problem during lean months. April 2024 monitoring results (Appendix 22) shows that chloride concentration is 1569.51 (mg/l) and above permissible limit. Total dissolved solid concentration is 3692 mg/l which is above the permissible limit.

**Table 23: Rupnarayan River Water Analysis Results at the Intake Point  
(Month: July,2019)**

High Tide																			
Parameter	Unit	Standard As Per BIS: 2296 class C																	
			2.7.19	3.7.19	4.7.19	5.7.19	10.7.19	12.7.19	15.7.19	17.7.19	19.7.19	22.7.19	23.7.19	24.7.19	25.7.19	26.7.19	29.7.19	30.7.19	31.7.19
pH		6.0 – 9.0	7.19		7.24		7.21		7.25	7.15	7.21	7.23	7.19	7.12	7.13	7.21	7.15	7.19	7.24
Temperature	°C	...	27	31	26	32	29	32	27	26	26	25	25	24	24	24	23	23	28
Turbidity	NTU	...	120	618	278	446	267	466	411	112	125	51.6	69.1	46	110	37.7	54	37	193
TDS	mg/L	1500	645	1571	978	971	1067	1037	1245	592	702	824	778	764	768	789	485	494	388
Alkalinity	mg/L	....	90		124		116		160	116	132	144	124	120	108	100	100	116	108
Conductivity	(µS/Cm)	....	1104	3342	1667	2072	1836	2206	2130	1011	1185	1396	1335	1294	1313	1334	840	826	665
CHEMICAL PARAMETERS																			
Hardness	mg/L	....	232	408	360	342	412	320	448	232	452	480	424	392	416	392	224	240	212
Iron	mg/L	50	0.14	0.35	0.51	0.23	0.46	0.25	0.53	0.15	0.11	0.68	0.11	0.08	0.12	0.04	0.08	0.06	0.19
Chloride	mg/L	600	125	1045	145	673	129	742	142	122	128	134	119	125	113	127	124	134	126

Source: Haldia Sub District Laboratory Public Health Engineering Directorate; Haldia, Purba Medinipur

Low Tide																			
Parameter	Unit	Standard As Per BIS: 2296 class C																	
		Date	1.7.19	3.7.19	5.7.19	8.7.19	9.7.19	11.07.19	12.7.19	16.7.19	19.7.19	22.7.19	23.7.19	24.7.19	25.7.19	26.7.19	29.7.19	30.7.19	31.7.19
pH		<b>6.0 – 9.0</b>	7.25	7.79	7.62	7.2	7.22	7.17	7.84	7.19	7.18	7.19	7.15	7.14	7.17	7.19	7.12	7.16	7.21
Temperature	°C	...	28	31	32	24	26	25	32'	27	26	25	25	24	24	24	23	23	28
Turbidity	NTU	...	<b>152</b>	<b>618</b>	<b>306</b>	<b>104</b>	<b>137</b>	<b>269</b>	<b>318</b>	<b>165</b>	<b>116</b>	<b>48</b>	<b>80.5</b>	<b>47.3</b>	<b>129</b>	<b>44.9</b>	<b>47</b>	<b>28</b>	<b>162</b>
TDS	mg/L	<b>1500</b>	541	1571	761	1058	1092	1233	728	1203	692	810	775	762	770	783	485	471	404
Alkalinity		....	104			100	112	128		124	128	132	112	116	112	96	100	112	100
Conductivity	(µS/Cm)	....	930	3342	1619	1792	1863	2011	1548	2014	1145	1377	1325	1290	1310	1323	746	786	693
<b>CHEMICAL PARAMETERS</b>																			
Hardness	mg/L	....	216	408	280	448	460	464	268	428	440	464	416	380	412	388	216	228	220
Iron	mg/L	<b>50</b>	0.34	0.35	0.19	0.17	0.28	0.31	0.19	0.19	0.09	0.42	0.09	0.04	0.15	0.07	0.05	0.04	0.12
Chloride	mg/L	<b>600</b>	148	1045	453	126	1343	138	589	136	123	128	126	122	124	118	116	125	117

**Table 24: Rupnarayan River Water Analysis Results at the Intake Point  
(Month: August,2019)**

High Tide												
Parameter	Unit	Standard As Per BIS: 2296 class C										
		Date	7.8.19	8.8.19	9.8.19	13.8.19	14.8.19	16.8.19	19.8.19	20.8.19	21.8.19	22.8.19
pH		6.0 – 9.0	7.29	7.2	7.18	7.23	7.13	7.16	7.19	7.29	7.12	7.2
Temperature	°C	...	25	25	24	29	28	24	28	26	28	27
Turbidity	NTU	...	47.6	74.2	361	561	276	211	236	42	260	258
TDS	mg/L	1500	1210	616	834	885	901	436	238	464	210	220
Alkalinity	mg/L	....	116	120	128	144	185	108	184	180	200	188
Conductivity	(µS/Cm)	....	2002	1043	1413	1522	1768	738	403	783	260	382
<b>CHEMICAL PARAMETERS</b>												
Hardness	mg/L	....	304	288	280	352	398	324	448	264	420	456
Iron	mg/L	50	0.08	0.12	0.19	0.49	0.79	0.14	0.37	2.12	0.64	0.41
Chloride	mg/L	600	121	115	132	160	196	115	148	240	188	128
Low Tide												
Parameter	Unit	Standard As Per BIS: 2296 class C										
		Date	7.8.19	8.8.19	9.8.19	13.8.19	14.8.19	16.8.19	19.8.19	20.8.19	21.8.19	22.8.19
pH		6.0 – 9.0	7.21	7.14	7.13	7.17	7.19	7.11	7.15	7.35	7.18	7.27
Temperature	°C	...	25	25	24	29	28	24	28	26	28	27
Turbidity	NTU	...	60	84.1	296	284	260	245	235	80	204	208
TDS	mg/L	1500	1211	842	760	1143	997	452	237	360	356	208
Alkalinity		....	116	112	116	132	192	112	237	184	184	176
Conductivity	(µS/Cm)	....	2002	1414	1284	1968	1892	761	402	611	204	356
<b>CHEMICAL PARAMETERS</b>												
Hardness	mg/L	....	280	300	268	420	404	332	400	304	408	408
Iron	mg/L	50	0.07	0.14	0.15	0.21	0.81	0.13	0.28	2.44	0.59	0.53
Chloride	mg/L	600	123	126	124	145	185	107	160	268	168	116

Source: Haldia Sub District Laboratory Public Health Engineering Directorate; Haldia, Purba Medinipur

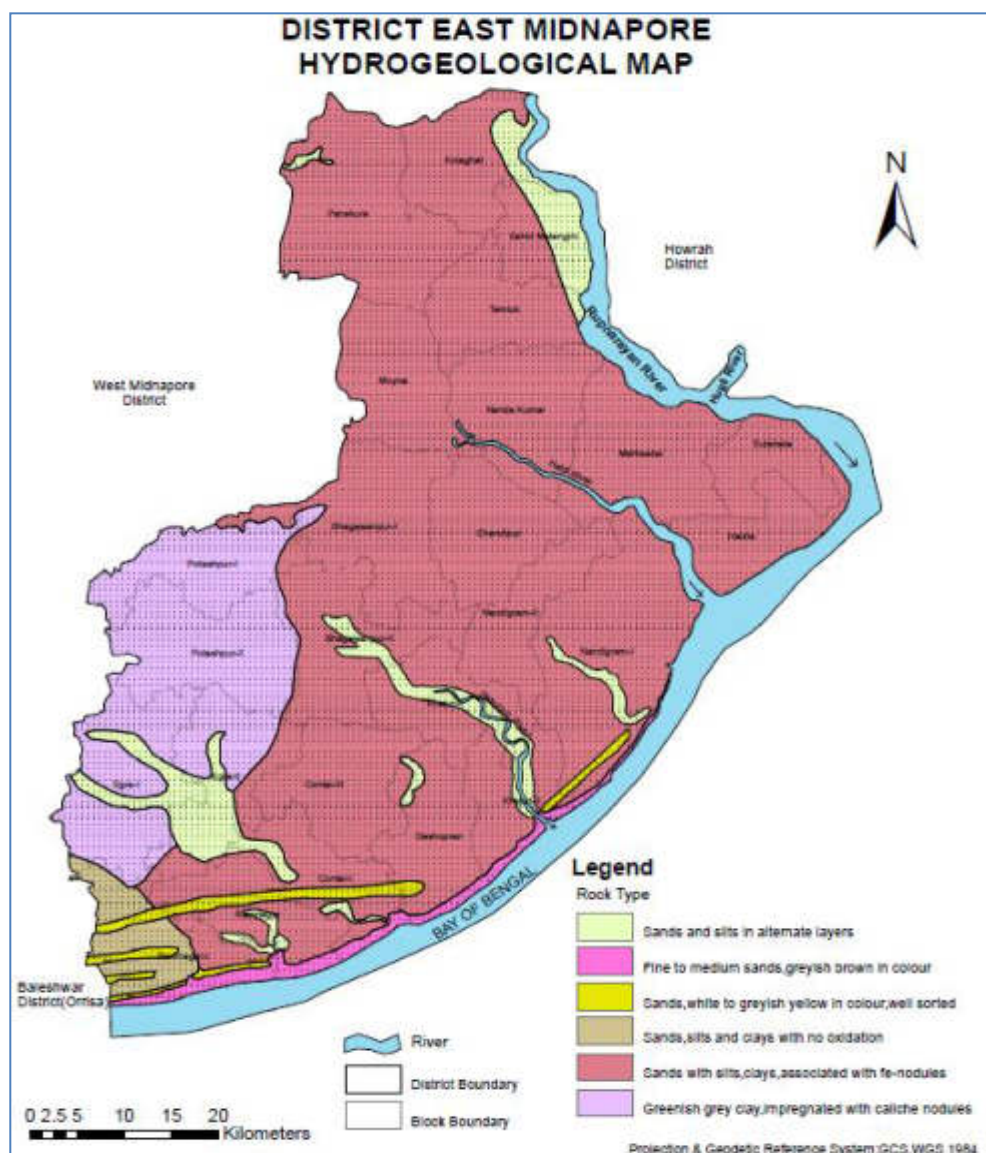
Table 25: Rupnarayan River Water Analysis recent - Intake site

Location Name	Date	Parameters														
		pH (25 °C)	TDS in mg/l	Turbidity (NTU)	Chloride as Cl in mg/l	Fluoride as F in mg/l	Nitrate as NO <sub>3</sub> in mg/l	CO D in mg/l	BOD in mg/l	DO in mg/l	Total alkalinity as CaCO <sub>3</sub> in mg/l	Hardness as CaCO <sub>3</sub> in mg/l	Oil & Grease in mg/l	Total Coliform MPN/100 ml	Faecal Coliform MPN/100 ml	Salinity in ppt
<b>Intake &amp; substation</b>	02.03.2024	7.51	132	1.8	44	<0.1	0.82	10	2.6	5.6	88	85.4	<1.4	94	31	--
<b>Desirable Limit as per IS:2296 (Class C)</b>		<b>6.5 to 8.5</b>		--	<b>600</b>	<b>1.5</b>	<b>50</b>	--	<b>3</b>	<b>4</b>	--	--	<b>0.1</b>	<b>5000</b>	--	--

(Monitoring done by package contractor, March 2024)

105. **Hydrogeological profile.** The Quaternary sediments are underlain by tertiary sediments. A 30-50 m thick blanket of clay at the top is underlain by sand-clay sequence down to explored depth of 400m bgl. Ground water in the district occurs under semi-consolidated to confined condition in both the litho systems. In general, the area is underlain by a single aquifer in each litho system, which splits up into multiple aquifers with the intervening clay/sandy clay layers. In Quaternary sediments this single aquifer has been spilled up into two regionally extensive aquifers whereas in Tertiary sediments four such regionally extensive aquifers have come out from the single aquifer. A hydrogeological map of the district Purba Medinipur is shown in Figure below. Diagram showing litho-strata from existing PHED schemes are shown in Appendix 21.

**Figure 11: Hydrogeological Map of Purba (East) Medinipur District**



106. **Groundwater quality.** The chemical quality of ground water as determined from the analysis of water samples collected during various hydro-geological studies including the studies conducted upper Kasai-Subarnarekha (UNDP) Project as well as monitoring of National Hydrograph Net Work Stations. The analytical data indicates that ground water in upper litho system indicates Ca- Mg- HCO<sub>3</sub> types in alluvial plain and mixed type in coastal plain but ground

water in the lower litho system in both the areas shows variation in the quality. Ground water in both the litho systems are neutral to mildly alkaline in alluvial area and mildly alkaline to distinctly alkaline in coastal area. All the chemical constituents are in general within permissible limit for human consumption except the occurrence of iron which exceeds the permissible limit in some places.

107. **Ground Water Availability and salinity.** A profile description of groundwater resources in Purba Medinipur is available at the CGWB although it is some years old. Near the coastal zone, the groundwater in the near surface shallow aquifer is saline and fresh water is only found at a depth of 120-300 m below ground level and groundwater development can only be done through deep tube wells. The blocks Tamluk, Nandakumar, and Mahisadal along the Rupnarayan River as well as Nandigram-I, Nandigram-II and Chandipur in the vicinity of the proposed water intake, are all in this category. Yields of existing PHED heavy-duty tube wells tapping within 220-300 m depth vary between 30-67 m<sup>3</sup>/hr for a drawdown of 2.98- 7 m. The static water level generally varies between 9-13 m bgl. The ground water in the coastal area occurs under semi-confined to confined conditions. CGWB has evaluated the quantum of sub-surface outflow of groundwater through the deeper confined aquifers in the coastal blocks, see which sums up to 20 MCM per year. For comparison, the daily water intake to the WTP of 106 mld corresponds to around 40 MCM per year, i.e. this can meet six months' supply.

**Table 26: Hydrological parameters of heavy-duty tube wells of PHED for Nandakumar, Chandipur, Nandigram i & ii blocks, Purba Medinipur district**

SI. No	Block name	Location	Drilling depth (mbgl)	Strainer position	SWL (mbgl)	Discharge (m <sup>3</sup> /hr)	Draw down (m)
1	Nandakumar	Dakshin Dhalhara	220	171.24201.74	9	30	4
		Khejurberia	250	177-207	13	53	4.55
		Bargodargo dar	237	188-212	12	45	4.2
2	Chandipur	Kulbari	274	203-233	9.77	67	2.98
		Kotebarh	256	195-225	11	62	5.5
		Saripur	275	231-262	12.5	62	7.07
3	Nandigram II	Rashikachak	275	261-231	12	60	7
		Jalpai	286.50	213-244	11	62	6.5
		Dakshin Gumai	227	180-210	10	60	7
4	Nandigram I	Sitamanda	294	219-249	11	62	7
		Tajpur	292	241-259	11.5	64	6.5

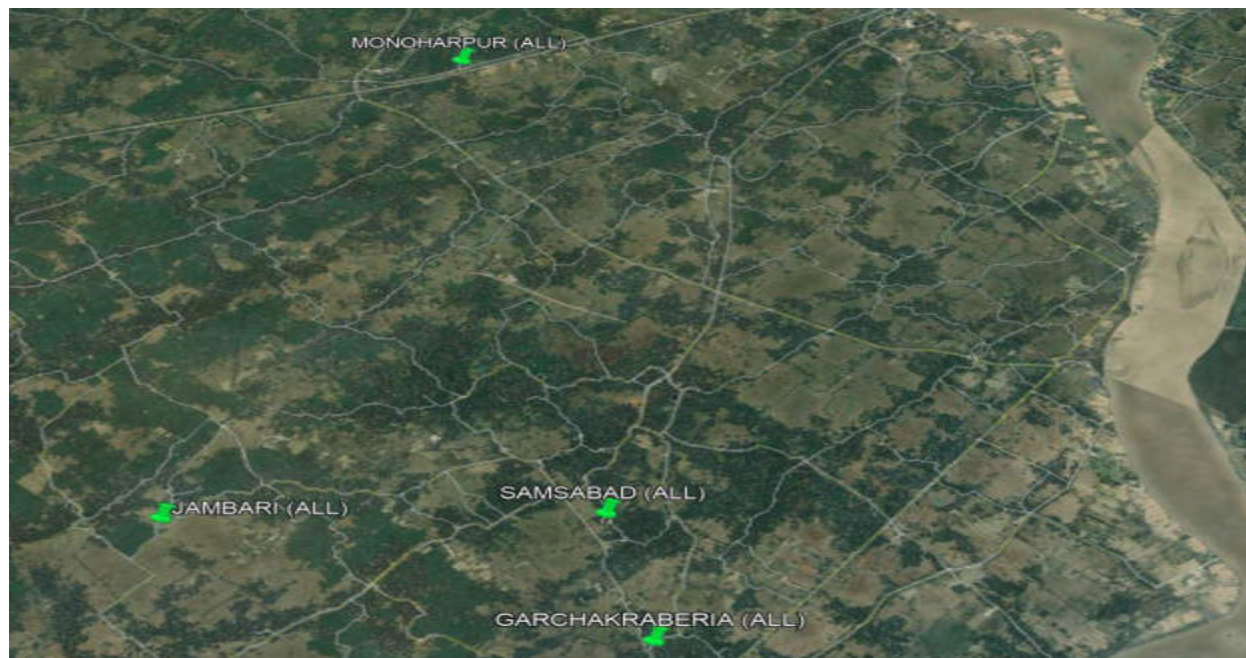
108. The upper aquifers within 120mbgl contain saline water. In Contai sub basin (around Contai town) covering approximately 150 sq.km, the near surface aquifer is 5 to 12m thick. There are three to four distinct aquifers within a depth of 250mbgl in the sub-basin and all these horizons contain saline water. Here the brackish/fresh water interface does not show any deterioration in quality with time, which is suggestive of poor flushing. **Table 27** shows blocks of East Medinipur affected by salinity. The CGWB has recommended ground water development in all the 4 blocks to be done very cautiously and logically considering the quantum of subsurface outflow through the deeper aquifers. Over exploitation of ground water from the deeper freshwater aquifer will create inequilibrium condition with the overlying and underlying saline aquifers, which may invite saline water into the fresh water aquifer.

**Table 27: Blocks in East Medinipur affected by Salinity**

Sl. No	Name of Block	Aquifer Potential and Chemical quality
1	Tamluk, Sahid Matangini, Mahisadal, Nandakumar, Sutamata, Haldia, Nandigram-I, Nandigram-II, Chandipur, Khejuri-I and II	Upper aquifer within 120mbgl is brackish/ saline. Potential fresh aquifer is below 120 m bgl. The aquifer is under Confined condition. HDTW tapping granular zone of 30-40m within depth of 300mbgl yield 100-200 m <sup>3</sup> /hr. Ground water is Na-Ca-Cl-HCO <sub>3</sub> Type.
2	Contai-I, II and III	Upper aquifer within 120mbgl is brackish/saline. Potential fresh aquifer is below 120 m bgl. Aquifer is under Confined condition. HDTW tapping granular zone of 30-40m within depth of 300m below ground level yield 100m <sup>3</sup> /hr.
3	Ramnagar-I, II	Ground water is fresh in Dune sand down to depth of 12mbgl. Upper aquifer within 120m bgl is brackish/ saline. Potential fresh aquifer is below 120 m bgl. Aquifer is under Confined condition. Ground water is Na-Ca-Ma-HCO-Cl type
4	Bhagawanpur I, II, Egra I, II, Moyna, Panskura I, II, Potashpur I and II	Upper aquifer is unconfined to semi confined condition. 20-100mbgl tapped by LDTW having yield 15-30 m <sup>3</sup> /hr. HDTW tapping cumulative thickness of 30m within depth of 180m having yield of 60-150 m <sup>3</sup> /hr.

109. **Air Quality.** Onsite ambient air quality monitoring has been done to assess the ambient air quality for construction activity within project area of Nandigram -I & II blocks. Monitoring have been carried out at ten (10) location around proposed project area (Nandigram I and II) during month of October 2020. In ten air quality monitoring location quantify the quality of ambient air at construction stage of Nandigram -I and II blocks. During selection of monitoring locations, sensitive locations were considered as priority. Details of monitoring locations (mainly latest – 2024) are shown in **Figure 12** and given **Table 28**. Monitoring results are shown in **Table 28**. It is noted that both PM10 and PM2.5 are within the standard.

**Figure 12: Monitoring locations of Ambient Air Quality, Ambient Noise Level Soil Surface & Ground water sampling pack EM/02 – Latest during 2024**



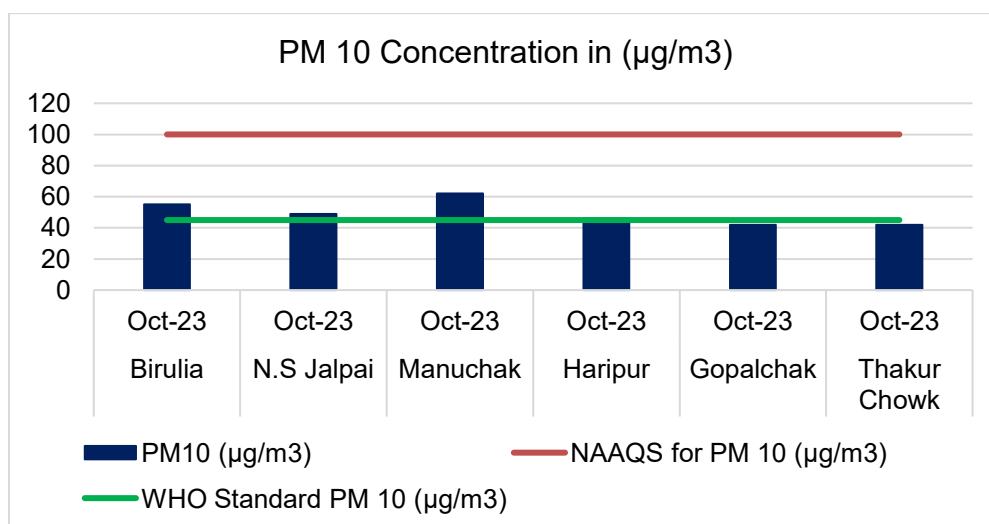
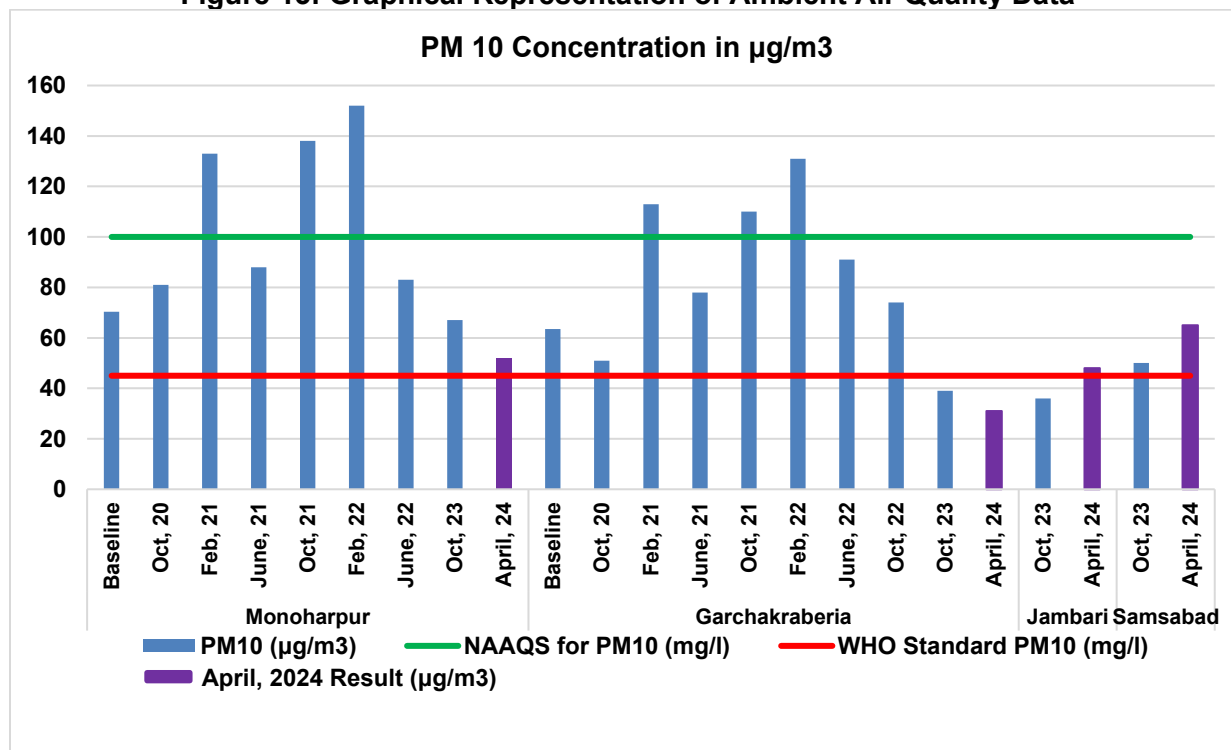
**Table 28: During Construction Ambient Air Monitoring Data- 2023-2024**

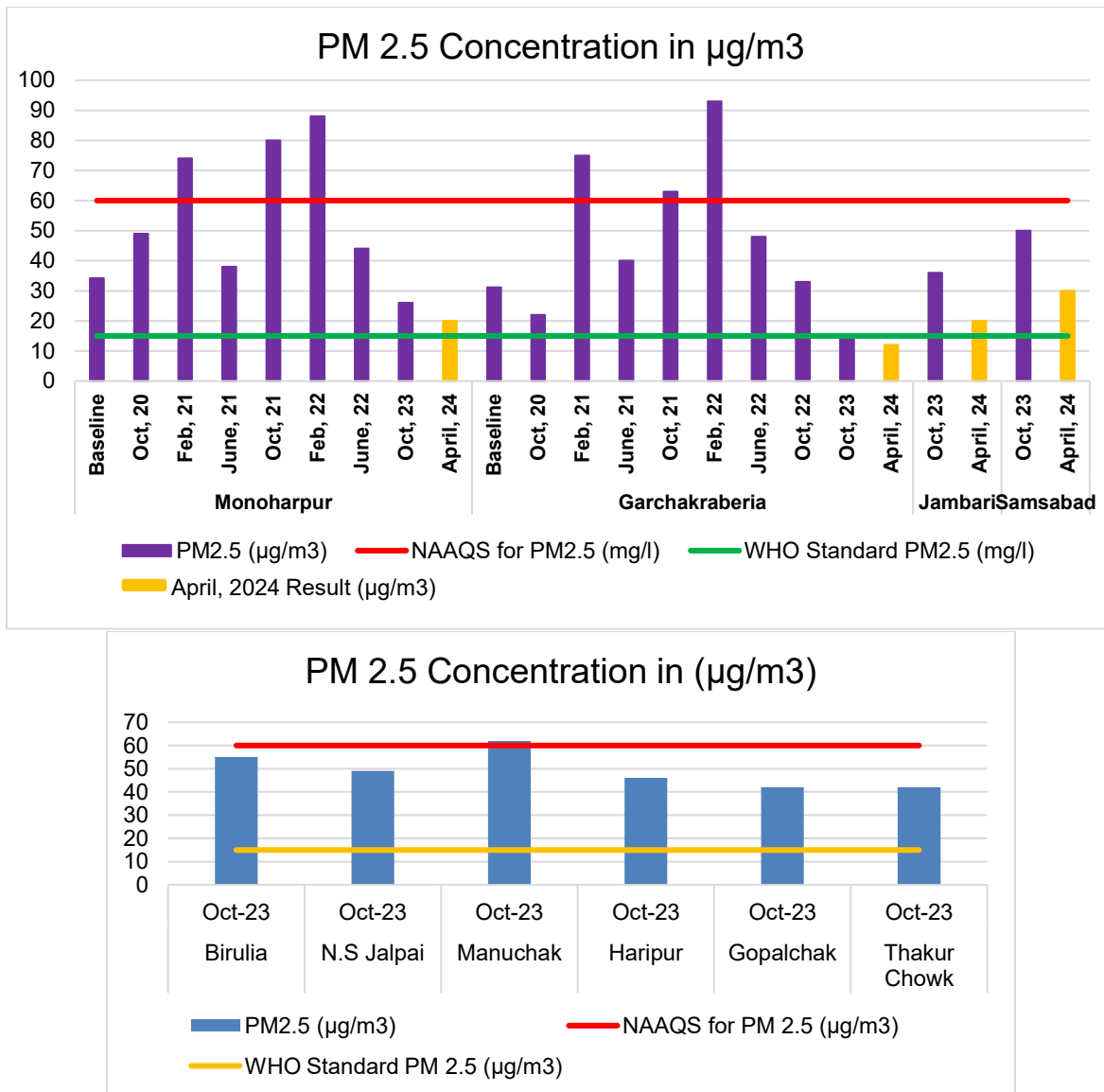
Sl no.	Village name	Study area	Date	Parameters				
				PM10 ( $\mu\text{g}/\text{m}^3$ )	PM2.5 ( $\mu\text{g}/\text{m}^3$ )	CO ( $\mu\text{g}/\text{m}^3$ )	SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )
1	Manoharpur GLSR	Sensitive	25.10.2023-26.10.2023	67	26	480	5	23.8
			<b>30.04.2024-01.05.2024</b>	<b>52</b>	<b>20</b>	<b>755</b>	<b>6.7</b>	<b>27.1</b>
2	Birulia	Rural Residential	25.10.2023-26.10.2023	55	21	709	5.4	21.7
3	N.S Jalpai	Rural Residential	26.10.2023-27.10.2023	49	19	606	5.2	19.6
4	Manuchak	Rural Residential	27.10.2023-28.10.2023	62	20	778	5.3	22.3
5	Haripur OHSR	Rural Residential	27.10.2023-28.10.2023	46	16	572	4.6	21.7
6	Garchakraberia	Rural Residential	28.10.2023-29.10.2023	39	14	549	4.9	21
			<b>29.04.2024-30.04.2024</b>	<b>31</b>	<b>12</b>	<b>606.3</b>	<b>5.4</b>	<b>22</b>
7	Jambari OHSR	Sensitive	29.10.2023-30.10.2023	36	11	595	4.4	20.9
			<b>29.04.2024-30.04.2024</b>	<b>48</b>	<b>20</b>	<b>732</b>	<b>6.1</b>	<b>25.4</b>
8	Gopalchak	Rural Residential	26.10.2023-27.10.2023	42	17	561	4.6	20.5
9	Thakur Chowk (Labour Colony)	Rural Residential	28.10.2023-29.10.2023	42	18	652	4.5	22.9
10	Samsabad OHSR	Rural Residential	29.10.2023-30.10.2023	50	23	583	5	21.9
			<b>30.04.2024-01.05.2024</b>	<b>65</b>	<b>30</b>	<b>801</b>	<b>7.2</b>	<b>29.5</b>

Sl no.	Village name	Study area	Date	Parameters				
				PM10 (µg/m³)	PM2.5 (µg/m³)	CO (µg/m³)	SO <sub>2</sub> (µg/m³)	NO <sub>2</sub> (µg/m³)
<b>National Ambient Air Quality Standard</b>				<b>100</b>	<b>60</b>	<b>2000</b>	<b>80</b>	<b>80</b>
<b>WHO Standard (2021) AQG- Air quality guideline</b>				<b>45</b>	<b>15</b>	<b>-</b>	<b>50</b>	<b>-</b>

(Project generated data by contractor, October 2023, March 2024)

**Figure 13: Graphical Representation of Ambient Air Quality Data**





110. From the above comparison graph (**Figure13**), it is clearly visible the difference between baseline and during construction particulate matter concentration. The average baseline  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  concentration for April 2024 was  $42 \mu\text{g}/\text{m}^3$  and  $20.5 \mu\text{g}/\text{m}^3$  respectively. Highest  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  concentration have been found at Samsabad ( $65 \mu\text{g}/\text{m}^3$  &  $30 \mu\text{g}/\text{m}^3$  respectively).  $\text{PM}_{10}$  and  $\text{PM}_{2.5}$  concentration is decreased for all the location compared to baseline period result. The decrease in concentration is due to completion of major construction activities around the monitoring locations and high moisture content in atmosphere. Because of excess moisture content in atmosphere, particulate matter concentration will be low. Although all the parameters are within permissible limit of National Standard.

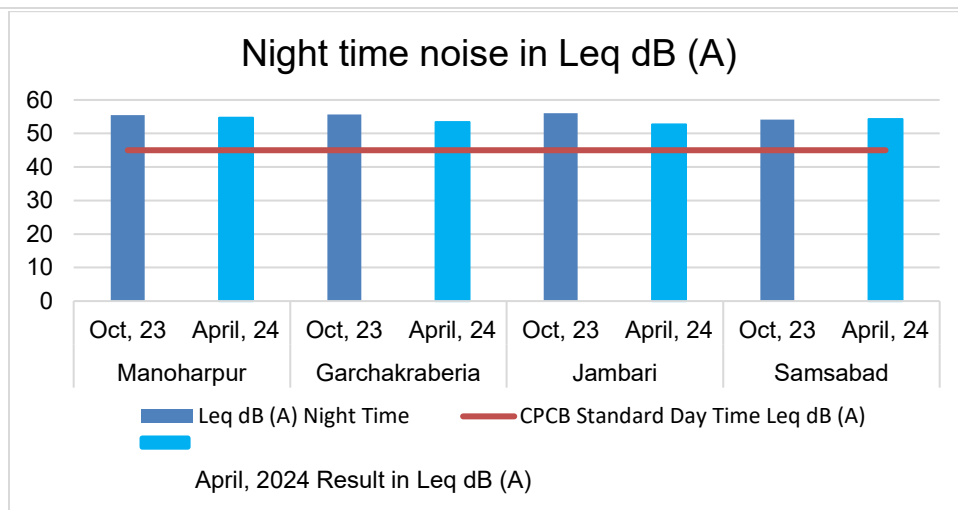
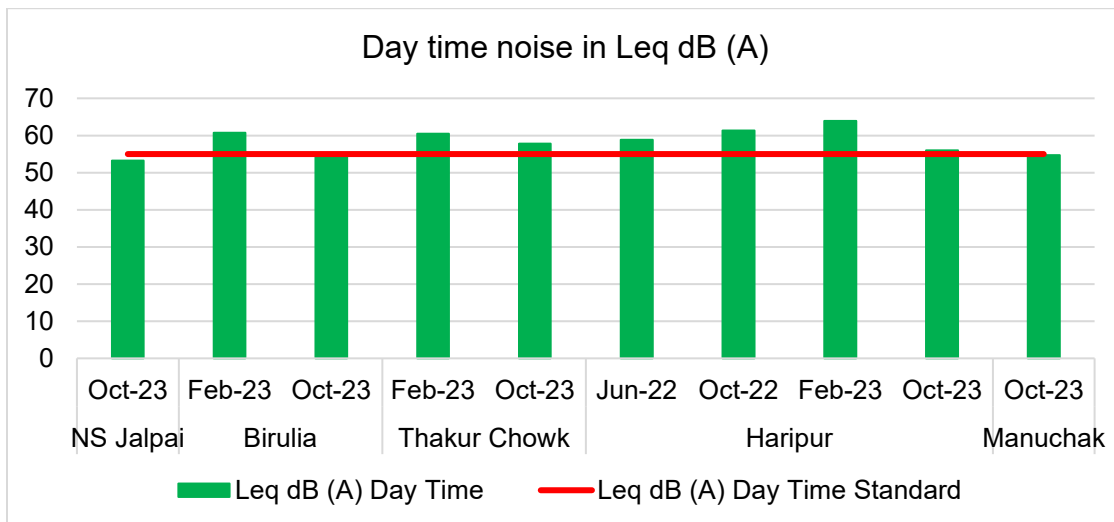
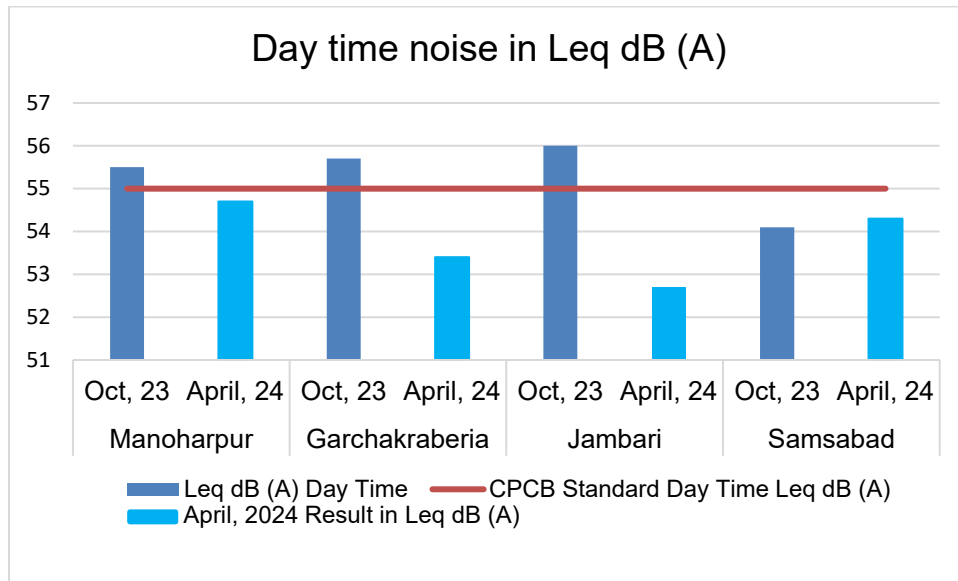
111. **Noise Level.** During construction noise level monitoring have been conducted in 20 locations considering category of area/zones in the proposed study area (Nandigarm -I & II blocks) including Industrial, commercial, residential and silence zones etc. The noise levels have been monitored during day and night at all the monitoring locations covering project area during month of October 2023 and April 2024. Details of monitoring locations are shown in **Figure 10** and location and results are given **Table 29**.

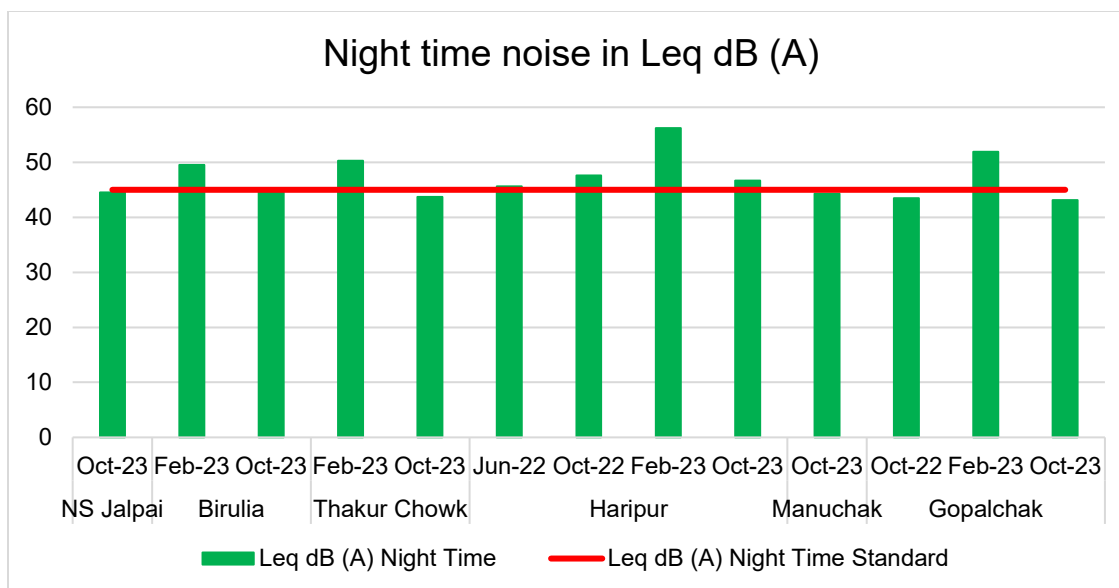
**Table 29: During Construction Noise Monitoring Data**

Sl. No.	Village Name	Study Area	Date	Average dB	
				Leq dB (A) Day Time	Leq dB (A) Night Time
1	Haripur, Near OHR	Residential	February 2022	58.8	45.6
			October 2022	61.3	47.6
			February 2023	63.9	56.2
			October 2023	56	46.7
2	Manoharpur	Silent Zone	October 2023	55.5	46.8
			<b>April 2024</b>	<b>54.7</b>	<b>43.8</b>
3	NS Jalpai	Residential	October 2023	53.2	44.5
4	Gopalchak	Residential	October 2022	57.6	43.5
			February 2023	60.3	51.9
			October 2023	56.9	43.1
5	Garchakraberia	Residential	October 2023	55.7	43.2
			<b>April 2024</b>	<b>53.4</b>	<b>42.4</b>
6	Thakur Chowk	Residential	February 2023	60.5	50.3
			October 2023	57.8	43.7
7	Manuchak	Residential	October 2023	54.7	44.3
8	Birulia	Residential	February 2023	60.7	49.5
			October 2023	54.3	45
9	Jambari	Residential	October.2023	56	45.4
			<b>April 2024</b>	<b>52.7</b>	<b>44.2</b>
10	Samsabad	Residential	October 2023	54.1	42.8
			<b>April 2024</b>	<b>54.3</b>	<b>44.2</b>
<b>Code/Category</b>				<b>Leq Day Time/ Leq Night Time dB(A) - Standard</b>	
<b>A/Industrial</b>				<b>75/70</b>	
<b>B/Commercial</b>				<b>65/55</b>	
<b>C/Residential</b>				<b>55/45</b>	
<b>D/Ecological- Sensitive</b>				<b>50/40</b>	

(Project generated data by contractor, 2022- 2024) (Noise Level standard in **Appendix 4**)  
Standard Residential Area- Day -55 dBA, Night – 45 dBA

**Figure 14: Graphical Representation of Noise Level Data**





112. From the above graph, it is noticeable that due to construction activities in and around the sampling locations noise (day as well as night) is above CPCB permissible limit as per residential aspect. Where day time noise standard is 55 dB(A), the graph is showing during construction noise is above the 55 dB(A) at few occasions. It is also higher than the baseline monitoring data. Some other factors like relative humidity and temperature also play a major role on these noise data.

113. **Water Quality.** Physico-chemical and biological parameters have been determined to establish the during construction status of the existing surface water (pond water) and groundwater sources. Ten (10) surface water and Ten (10) groundwater samples were collected during construction. Sampling locations for surface water and groundwater quality monitoring shown in **Figure 10** and listed in **Table 29 and 30** respectively. Results show that most of the occasion parameters of surface water is within the limit, except BOD and DO levels in few samples.

Table 30: During Construction Surface Water Monitoring Data

Location Name	Date	Parameters												
		pH (25 °C)	Turbidity (NTU)	Chloride as Cl in mg/l	Fluoride as F in mg/l	Nitrate as NO <sub>3</sub> in mg/l	CO D in mg/l	BO D in mg/l	DO in mg/l	Total alkalinity as CaCO <sub>3</sub> in mg/l	Hardness as CaCO <sub>3</sub> in mg/l	Oil & Grease in mg/l	Total Coliform MPN/100ml	Faecal Coliform MPN/100ml
Manoharapur	25.10.2023	7.85	1.9	27.4	<0.1	2.1	8	2.5	4.9	114.4	98	2.3	30	12
	<b>30.04.2024</b>	<b>7.63</b>	<b>2.8</b>	<b>39.1</b>	<b>&lt;0.1</b>	<b>0.97</b>	<b>10</b>	<b>2.8</b>	<b>5.8</b>	<b>117.6</b>	<b>134.6</b>	<b>2.8</b>	<b>40</b>	<b>11</b>
Haripur	25.06.2022	7.72	3.6	96.7	0.52	1.2	10	3.1	5.6	223.7	138.6	<1.4	22	7
	11.10.2022	7.59	1.5	24.3	<0.1	2.8	4	<2	5.6	110	99.8	<1.4	27	12
	18.02.2023	7.68	1.3	26.4	<0.1	3.2	8	2.5	5.2	105.6	92	2.7	34	17
	27.10.2023	7.53	1.8	45.8	<0.1	3.2	4	1.7	5.1	127.6	90.2	2.9	40	17
NS Jalpai	26.10.2023	7.45	2.4	35.2	<0.1	2.3	4	1.9	3.7	136.4	117.6	2.9	40	17
Manuchak	27.10.2023	7.81	2.2	48.9	<0.1	2.3	8	2.9	5.2	140.8	133.3	3.1	50	22
Garchakraberia	28.10.2023	7.37	2.6	45	<0.1	3.2	10	3.9	5.4	132	101.9	2.8	60	33
	<b>29.04.2024</b>	<b>7.52</b>	<b>4.2</b>	<b>52.8</b>	<b>&lt;0.1</b>	<b>2.1</b>	<b>12</b>	<b>2.7</b>	<b>5.9</b>	<b>121.8</b>	<b>130.7</b>	<b>3.3</b>	<b>70</b>	<b>22</b>
Birulia	25.10.2023	7.31	2.1	23.5	<0.1	1.8	6	2.7	4.2	123.2	105.8	2.5	22	7
Jambari	29.10.2023	7.27	1.7	30.4	<0.1	2.6	10	3.1	5.5	92.4	108	2.3	60	26
	<b>29.04.2024</b>	<b>7.31</b>	<b>3.1</b>	<b>35.2</b>	<b>&lt;0.1</b>	<b>1.4</b>	<b>8</b>	<b>2</b>	<b>6.2</b>	<b>109.2</b>	<b>103</b>	<b>2.2</b>	<b>50</b>	<b>17</b>
Thakurchak	18.02.2023	7.85	1.9	21.5	<0.1	2.7	4	1.3	3.5	96.8	94.1	2	34	12
	28.10.2023	7.42	2	31.3	<0.1	2.5	6	2.7	4.4	114.4	94.1	2.1	34	12
Gopalchak	11.10.2022	7.56	3.5	89.8	0.5	0.7	15	5.8	5.6	162.8	153.6	<1.4	21	9
	18.02.2023	7.16	3.2	71	0.7	1.2	12	5.6	4.9	193.6	140.8	1.8	27	12
	26.10.2023	7.56	2.8	41.1	<0.1	2.7	10	3.1	5.4	145.2	125.4	2.5	30	13
Samsabad	29.10.2023	7.67	2.8	6	<0.1	3.3	6	1.8	4.1	149.6	137.2	2.8	40	21
	<b>30.04.2024</b>	<b>7.64</b>	<b>6.9</b>	<b>47</b>	<b>&lt;0.1</b>	<b>1.26</b>	<b>15</b>	<b>3.6</b>	<b>5.5</b>	<b>155.4</b>	<b>170.3</b>	<b>&lt;1.4</b>	<b>60</b>	<b>27</b>
<b>Surface water quality criteria by CPCB and IS:2296 (class B outdoor bathing)</b>		<b>6.5-8.5</b>	<b>--</b>	<b>--</b>	<b>1.5</b>	<b>--</b>	<b>--</b>	<b>3</b>	<b>5 min</b>	<b>--</b>	<b>--</b>	<b>--</b>	<b>500</b>	<b>--</b>

(Project generated data by contractor, 2023-2024)

Table 31: During Construction Ground Water Monitoring Data

Location Name	Date	Parameter													
		pH (25 °C)	Turbidity (NTU)	Total Alkalinity as CaCO <sub>3</sub> in mg/l	TDS in mg/l	Total Hardness as CaCO <sub>3</sub> in mg/l	Magnesium (as mg) in mg/l	Chloride as Cl in mg/l	Sulfate as SO <sub>4</sub> in mg/l	Nitrate as NO <sub>3</sub> in mg/l	Iron as Fe in mg/l	Copper As Cu in mg/l	Lead as Pb in mg/l	Total Arsenic as As in mg/l	Mercury as Hg in mg/l
Haripur	25.06.2022	7.44	<1	265.6	440	229.7	25.6	74.4	12.1	2.9	0.16	<0.02	<0.01	<0.01	<0.001
	11.10.2022	7.47	<1	259.6	328	192	20.3	67.4	13.5	1.5	0.19	<0.02	<0.01	<0.01	<0.001
	18.02.2023	7.61	<1	246.4	292	208	22.1	52.7	16.4	1.9	0.17	<0.02	<0.01	<0.01	<0.001
	27.10.2023	7.35	<1	211.2	352	207.8	12.2	64.6	31.4	1.36	0.27	<0.02	<0.01	<0.01	<0.001
Manuchak	27.10.2023	7.41	<1	158.4	258	145	9.4	50.9	23.5	<0.5	0.15	<0.02	<0.01	<0.01	<0.001
Manoharpur	25.10.2023	7.26	<1	211.2	308	172.5	14.1	56.7	27.2	1.12	0.28	<0.02	<0.01	<0.01	<0.001
	30.04.2024	7.33	<1	201.6	340	209.9	16.2	60.7	33.7	0.76	0.34	<0.02	<0.01	<0.01	<0.001
NS Jalpai	26.10.2023	7.31	<1	211.2	338	203.8	22.6	62.6	30.6	0.87	0.36	<0.02	<0.01	<0.01	<0.001
Garchakrabe ria	28.10.2023	7.19	<1	202.4	310	188.2	12.2	56.7	30.3	0.68	0.24	<0.02	<0.01	<0.01	<0.001
	29.04.2024	7.29	<1	184.8	308	190.1	15.2	52.8	36.4	0.61	0.27	<0.02	<0.01	<0.01	<0.001
Birulia	17.02.2023	7.16	<1	224.4	282	188	20.2	60.8	21.4	1.7	0.18	<0.02	<0.01	<0.01	<0.001
	25.10.2023	7.23	<1	215.6	314	192.1	15.1	54.8	23.9	1.7	0.23	<0.02	<0.01	<0.01	<0.001
Jambari	29.10.2023	7.33	<1	189.2	322	203.8	14.1	60.7	28.9	0.81	0.29	<0.02	<0.01	<0.01	<0.001
	29.04.2024	7.19	<1	197.4	346	221.8	16.2	68.5	31.9	0.71	0.35	<0.02	<0.01	<0.01	<0.001
Gopalchak	11.10.2022	7.65	<1	268.4	436	230.4	24	104.8	35.9	2.5	0.17	<0.02	<0.01	<0.01	<0.001
	18.02.2023	7.37	<1	264	346	244	26.9	71	33.2	2.1	0.23	<0.02	<0.01	<0.01	<0.001
	26.10.2023	7.24	<1	206.8	312	196	13.2	52.8	28.9	0.76	0.21	<0.02	<0.01	<0.01	<0.001
Thakurchow k	18.02.2023	7.31	<1	184.8	216	136	12.3	42.6	16.2	2.1	0.11	<0.02	<0.01	<0.01	<0.001
	28.10.2023	7.26	<1	228.8	368	231.3	22.6	66.5	34.2	1.08	0.34	<0.02	<0.01	<0.01	<0.001
Samsabad	29.10.2023	7.17	<1	167.2	272	160.7	9.4	50.9	23.8	0.53	0.17	<0.02	<0.01	<0.01	<0.001
	30.04.2024	7.23	<1	163.8	284	174.2	13.3	56.7	25.3	<0.5	0.26	<0.02	<0.01	<0.01	<0.001
Acceptable Limit		6.5 to 8.5	1 NTU	200	500	200		250	200	45	0.3	0.05	0.01	0.01	0.001
Permissible limit in the absence of alternate source		No Rel axat ion	5	400	2000	600		1000	400	No relaxati on	1.0	1.5	No relax ation	0.05	No relaxation

(Project generated data by contractor, 2023 - March)

114. Level of hardness, alkalinity are high and above the acceptable limit in few ground water samples. Concentrations of heavy metals like copper, lead, mercury and arsenic are below the detection limit. Drinking water quality standard is shown in **Appendix 8** and surface water quality classification criteria enclosed as **Appendix 9**.

### C. Ecological Resources

115. The district has a low 899-hectare forest cover, which is 0.02% of its geographical area. There are no forest areas or protected areas in and around the project location, and consists of agricultural, habitation areas and water bodies etc.

116. Purba (East) Medinipur district has a visible coastline of approximately 60 km with Bay of Bengal and the coastal area is geographically contiguous with the Mangrove forests under Sundarban Reserve Forests lying towards East. The Forest area under district Purba Medinipur is characterized by coastal sand dunes, high salinity of the soil, low turbidity and thinner vegetative coverage affected by shore currents. The coastal tract extending from the estuary of river Hugli (Hooghly) to the North-East and Junput to the South-West; is enriched with a rich ecological diversity. Twenty-eight species of benthic algae providing an opulent source of food, energy and cover for many organisms; eight species of phytoplankton and many plant varieties associated with Mangroves have been identified so far in the district. In the more stabilized dunes tall evergreen shrubs and trees of *Casuarina* species grows abundantly. Most famous species among them is known as Jhau in colloquial Bengali. Shrubs and bushes of species *Pandanus* (known as Keora/Keya or Ketaki in Bengali language) which is a small branched tree or shrub with fragrant flowers, also grows copiously in this region. The distillate water generated from this plant has a powerful aroma and is used widely for medicinal and culinary purposes. The large evergreen tree of Cashew nut is also grown in the coastal areas of the district, both commercially and in natural habitat. The plant species grown around the seashore acts as the major contributor for stabilizing the tender coastline and creates buffer against the soil erosion caused by natural as well as human induced forces. Mat-reeds (*Cyperus corymbosus*) known as Madur Kathi in Bengali grows in abundance in the low-lying water-logged areas, swamps and marshy lands in the mouth of rivers Hooghly and Haldi. Floral species present in the project blocks are indigenous in nature. Commonly seen plant species are Tamarind (*Tamarindus indica*), Neem (*Azadirachta indica*), Gulmohur (*Delonix regia*), Jhau (*Casuarina equisetifolia*), Sisso (*Dalbergia sisso*), Babul (*Acacia nilotica*), Peepal (*Ficus religiosa*) etc.

117. Due to pressure of expanding population forces, the availability of natural diversity of wild fauna in the district Purba/East Medinipur is limited to the coastal region only. Despite having a small expansion, there is still significant diversification of animal species in the coastal areas of the district. The major types fauna observed in the coastal Purba Medinipur are Rabbits, Crabs, Horseshoe Crabs, Rats, different types of Snakes like Cobra, Krait, Banded Krait; Snails, Oysters, Clams, Starfish, Jellyfish, Limpets (*Patella vulgata*), large predatory sea-snails like Shankha or Conch (*Turbinella pyrum*), Sea-Urchins etc. Zoological classification of the large varieties of fauna of district Purba Medinipur depicts that there are about 68 species of Arthropods including 12 types of Crabs, 13 varieties of Prawns and 21 varieties of Shrimps living nearby the seacoast. A total of 51 species of Fish variety has been reported so far by fishermen folks and the zoologists. Among the smaller animals living inside the sea waters are 17 species of Zooplanktons – including Copepoda (small crustaceans), Chaetognatha (predatory Marine-Worm), Rotifera (microscopic and near-microscopic pseudo-coelomate animals), larvae of Blue Shrimp (Meen); 22 species of polychaete (paraphyletic class of annelid marine worms), 12 species of Actinaria (Sea Anemones - a group of water-dwelling, predatory animals). Sea Cucumber (Holothuroida), Sea-pen

(Cnidaria), Lingula (Brachyopoda) is found in the coastal islands of Talsari, Sankarpur, Junput and Nayachar islands. Around forty-eight species of Mollusca have also been reported so far along the sea coast of district Purba Medinipur. Eighty-four species of macrophytes belonging to 73 genera and 34 families were recorded from the riverine beds of six major rivers (Dwarkanwar, Kansai, Keleghai, Rupnarayan, Shilabati and Subarnarekha) of South West Bengal from March 2001 to February 2002. Result on similarity indices showed that river Rupnarayan considerably differs from other rivers in terms of species composition and abundance of macrophytes. It is famous for the Hilsa fish that live in it and are used in Bengali cuisine.

## D. Economic Development

### 1. Land use

118. The distribution of the particular types of land use in Purba Medinipur 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. Around 60 per cent of the total reported area of the district is under cultivation. 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. The land use pattern of the district and select 2 blocks are given below (**Table 32 & 33**).

**Table 32: Land Use Characteristics of Purba (East) Medinipur District**

<i>Land Use</i>	<i>Area (in Acre)</i>	<i>Percentage</i>
Urban / Rural Settlement	275711.41	26.9%
Sea Port	1946.58	0.2%
Brick Kiln	3165.87	0.3%
Industry	8472.11	0.8%
Tourism	1311.19	0.1%
Agricultural (Single Crop)	143645.65	14.0%
Agricultural (Double/ Multiple Crop)	476532.16	46.5%
Horticulture Plantation	18946.81	1.8%
Aquaculture	8113.62	0.8%
Forest / Social Forestry / Archeological Site	4307.11	0.4%
Inland Natural	2120.01	0.2%
Waste-land	10393.03	1.0%
Salt Pan	3236.24	0.3%
Rivers / Lakes / Ponds / Tanks / Canals	66913.08	6.5%
Others	1074.28	0.1%

Source: District Land and Land Reform Department, GoWB

**Table 33: Land Use Characteristics of Nandigram I & II Blocks**

<b>Landuse Category</b>	<b>Blocks</b>	
	<b>Nandigram I (in Acre)</b>	<b>Nandigram II (in Acre)</b>
Rural Settlement	7930.06	7933.62
Brick kiln	56.08	169.65
Agricultural (Single Crop)	10659.56	5489.11
Agriculture (Double/Multi Crop)	10165.44	11612.38
Horticulture Plantation	390.71	38.35
Aquaculture	989.00	194.45
River	6616.71	520.96
Lakes/Ponds / Tanks	1.57	160.27

Landuse Category	Blocks	
	Nandigram I (in Acre)	Nandigram II (in Acre)
Forest	1.29	-
Social Forestry	1181.88	-
Inland Natural	72.26	-
With Scrub	6848.96	-
<b>Total</b>	<b>44913.52 (181.76 Sq. Km)</b>	<b>26118.79 (105.70Sq. Km)</b>

Source: District Land and Land Reform Department, GoWB

## 2. Industry & Agriculture

119. **Agriculture.** Purba (East) Medinipur district is one of those districts which are blessed with rainfall and perennial rivers. The area receives more than 1,800-2,250 mm of rainfall during rainy season. As the district is low lying flat surface characterized with clay to silty clay type of soils, water logging during kharif seasons is a major threat to exploitation of land potentiality. The major crops grown in the area are Paddy, (Aus, Aman and Boro), Wheat, Potato, Oilseed, Vegetables, Pulses, Jute, Betel vine, Mat stick etc.

120. In 2013-14, Nandigram I CD Block produced 44,514 tonnes of Aman paddy, the main winter crop, from 23,845 hectares, 3,069 tonnes of Boro paddy, the spring crop, from 810 hectares, 6,514 tonnes of Aus paddy, the summer crop, from 3,187 hectares, 41 tonnes of jute from 3 hectares and 7,209 tonnes of potatoes from 429 hectares. It also produced pulses and oil seeds. Betelvine is a major source of livelihood in Purba Medinipur district, particularly in Tamluk and Contai subdivisions. Betelvine production in 2008-09 was the highest amongst all the districts and was around a third of the total state production. In 2008-09, Purba Medinipur produced 2,789 tonnes of cashew nuts from 3,340 hectares of land.

121. In 2013-14, Nandigram II CD Block produced 11,449 tonnes of Aman paddy, the main winter crop, from 8,527 hectares, 5,451 tonnes of Boro paddy, the spring crop, from 1,470 hectares, 292 tonnes of Aus paddy, the summer crop, from 143 hectares and 4,112 tonnes of potatoes from 230 hectares. It also produced pulses and oil seeds. Betelvine is a major source of livelihood in Purba Medinipur district, particularly in Tamluk and Contai subdivisions. Betelvine production in 2008-09 was the highest amongst all the districts and was around a third of the total state production. In 2008-09, Purba Medinipur produced 2,789 tonnes of cashew nuts from 3,340 hectares of land.

122. **Animal Husbandry.** With regard to animal husbandry, Purba Medinipur 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.

123. **Fishery.** Purba Medinipur district has 26,962.52 hectares of water area in the form of small, medium and large tanks, canals and others. Besides, there are also some riverine resources. There is ample scope for fish production both in fresh water, brackish water as for its marine variety. During last three decades the Fisheries Department, Government of West Bengal has made efforts in the field of seed and table fish production by motivating people with training

and financial assistance through F.F.D.A. This has resulted in employment generation and uplifted socio-economic condition of the fishermen community.

124. Purba Medinipur's net district domestic product derives one fifth of its earnings from fisheries, the highest amongst all the districts of West Bengal. The net area available for effective pisciculture in Nandigram I CD Block in 2013-14 was 1,040.45 hectares. 6,520 persons were engaged in the profession and approximate annual production was 40,022 quintals. The net area available for effective pisciculture in Nandigram II CD Block in 2013-14 was 600.00 hectares. 3,355 persons were engaged in the profession and approximate annual production was 22,860 quintals.

125. **Industry.** The district has an excellent transport and communication network of national highways and railways. A major existing industrial base at Haldia & Kolaghat, availability of skilled manpower at comparative low rates, abundance of electric power and a business environment conducive for industrial growth both from the labour and political fronts are few plus points for promotion and development of Micro & Small Medium Enterprises (MSME) in this district. Aquaculture and shrimp farming has been taken up in a big way in the coastal belt of this district and floriculture and horticultural activities are concentrated in a major portion of Tamluk Sub-division. In Haldia a large number of heavy engineering, chemical, small-scale cluster are growing up. Similarly, in Contai, Egra, Digha, Tamluk, Mahishadal and Kolaghat a wide number of Small-scale Industries are spread over in these areas. Handloom weaving is a traditional in this district where a considerable number of people are engaged in this activity. Betelvine is a major source of livelihood in Purba Medinipur district, particularly in Tamluk and Contai subdivisions.

126. The fast-developing port at Haldia is an alternative to Kolkata port, where big ships are not able to anchor. Kolaghat Thermal Power Station at Mecheda is a major thermal power station in West Bengal. A large number of heavy engineering, chemical, small-scale cluster are growing up in Haldia.

### 3. Infrastructure

127. **Irrigation.** Purba Medinipur district is well endowed with rivers and canals. Purba Medinipur district has a special position in West Bengal with a large area being covered with irrigation facilities. Paddy cultivation dominates in the district where irrigation facility is utilized extensively. Various sources of irrigation like river, canal, tank etc. is available in the district. Irrigation sources like Deep Tube well, Shallow Tube Well, Lift Irrigation, Ponds, and other sources are also made available in the district. The agricultural sector is largely dependent on the Low-Capacity Deep Tube wells (around 50%) or High-Capacity Deep Tube wells (around 27%) for irrigation. The average size of land holding in Purba Medinipur, in 2005-06, was 0.73 hectares against 1.01 hectares in West Bengal.

128. **Water Supply.** Total number of piped water supply schemes (PWSS) that have been commissioned in Purba Medinipur is 86. A total of 32 water supply schemes are presently ongoing in Purba Medinipur of which 31 are based on ground water and one scheme is based on surface water from the river Rupnarayan. PHED has successfully completed 5 piped water supply schemes in the urban areas of Purba Medinipur. These PWSS are for Haldia, Contai, Tamluk, Egra and Panskura. The piped water supply schemes in Egra and Panskura are being maintained by the respective municipality, whereas the surface based piped water scheme in Haldia is maintained by the Haldia Development Authority (HDA). Based on the existing WS Schemes (Commissioned and ongoing), and from database of IMIS, the overall coverage of Piped Water

Supply for the district is 37%. The coverage in each block varies from a low of 8% (in Khejuri block) to a high of 98% (in Kolaghat block).

129. **Sewerage & Drainage.** There is no sewage collection system in the project area. Households mainly depend on individual sanitation systems like pit latrines, flush latrines, some connected to septic tanks. Due to flat topography, low laying lands, high rainfall and several water bodies around, project area is prone flooding. Open drains along the roads are provided in some places.

130. **Solid Waste Management.** There is no proper solid waste management system in the project area. Respective village Panchayats are responsible for SWM services their areas. Villages lack solid waste collection and disposal systems. Due to this, disposal of solid waste in water bodies, canals and ponds is very common, and is creating unhygienic conditions.

131. **Transport.** The project area is well connected with good railway network and road transport through National Highway-6, 116, and State Highway-4. Tamluk the district headquarters is nearly 30 km from the project area. The block is also well connected by road and railway with the District Head Quarter – Tamluk and is 80 km from the State capital city of Kolkata. NH-41 (new number is NH-116) is entirely in Purba Medinipur district and connects Kolaghat (NH-6) to Haldia, a total length of 116 km. National Highway-6 passes through the northern fringe of the district (passing Panskura and Kolaghat blocks). SH-4 connects Digha Foreshore in Purba Medinipur to Jhalda in Purulia, passing through Contai Municipality, Chandipur and Nandakumar. The total length is 466 km, of which 163 km is within Purba Medinipur.

132. Nandigram I CD Block has 6 ferry services and 22 originating/ terminating bus routes. The nearest railway station is 23 km from the block headquarters. There are two ferry service across the Haldi River between Haldia and Nandigram – one between Haldia Township and Nandigram and the other between Pari Chak ferry ghat in Haldia and Nandigram. The ferry services are available every 20 minutes Nandigram II CD Block has 1 ferry service. The nearest railway station is 14 km from the block headquarters of Nandigram II.

133. Due to high population density, traffic on the roads is considerable. Most of the roads are maintained by Public Works Department, except the roads in municipalities, which are maintained by the respective urban local bodies. Road condition is generally poor, with many roads in need of repairs and resurfacing.

134. **Electricity.** 99 or 100% of mouzas in Nandigram I CD Block were electrified by 31 March 2014. There were 57 fertilizer depots, 12 seed stores and 31 fair price shops in the CD Block. 41 or 100% of mouzas in Nandigram II CD Block were electrified by 31 March 2014. There were 21 fertilizer depots, 2 seed stores and 21 fair price shops in the CD Block.

135. **Education.** In 2013-14, Nandigram I CD Block had 121 primary schools with 9,373 students, 10 middle schools with 991 students, 10 high schools with 8,759 students and 14 higher secondary schools with 16,093 students. Nandigram I CD Block had 1 general college with 1,504 students and 329 institutions for special and non-formal education with 18,647 students. Sitananda College at Nandigram was established in 1960. It offers courses in arts and science.

136. In 2013-14, Nandigram II CD Block had 92 primary schools with 7,267 students, 7 middle schools with 2,163 students, 10 high schools with 5,197 students and 13 higher secondary

schools with 11,631 students. Nandigram II CD Block had 2 technical/ professional institutes with 200 students and 203 institutions for special and non-formal education with 10,998 students.

137. **Healthcare.** In 2014, Nandigram I CD Block had 1 block primary health centre and 2 primary health centres, with total 46 beds and 9 doctors (excluding private bodies). It had 30 family welfare sub centres. 3,958 patients were treated indoor and 165,506 patients were treated outdoor in the hospitals, health centres and sub-centres of the CD Block.

138. In 2014, Nandigram II CD Block had 1 rural hospital and 2 primary health centres, with total 30 beds and 10 doctors (excluding private bodies). It had 19 family welfare sub centres. 3,599 patients were treated indoor and 69,988 patients were treated outdoor in the hospitals, health centres and sub-centres of the CD Block.

## E. Socio Cultural Resources

### 1. Demography

139. The total population in rural and urban community development (CD) blocks in Purba Medinipur is 5.095 million, belonging to 1.112 million households. The percentage of urban share of Population of Purba Medinipur District has increased from 8.3% (In 2001) to 11.6% (In 2011) of total Population of respective Census. The average household size in the district is 4.6, and the sex ratio for the overall population of the CD block in the district is 938 females per 1000 males. The sex ratio among the scheduled caste and schedule tribe is 943 and 969 respectively in the district. An estimated 14.63% of the population in the CD blocks of the district comprises scheduled castes, while scheduled tribes is a meagre 0.55% of the total population. The most important feature of Purba Medinipur Districts that it has recorded the highest Literacy Rate in the State at 87.0% as per Census 2011, surpassing the state capital Kolkata. Population density is moderate in the project area. Sex ratio is much lower than the state and district averages. Literacy rate is comparatively higher in the blocks. Main language spoken in the project area is Bengali.

**Table 34: Demographic Characteristics**

Demographic parameters	West Bengal State	Purba (East) Medinipur District	Nandigram I Block	Nandigram II Block
Population (2011)	91,276,115	5094238	207835	123219
Geographical area (sq.km)	88,752	4713.00	181.84	105.75
Total households	20,380,315	11,14,170	42,289	26,902
Decadal Growth rate (2001-11)	13.84%	15.4 %	13.86%	12.25%
Sex ratio	950	938	968	954
Population Density, (per sq. km)	1028	1,081	1142	1165
literacy rate (%)	76.26%	87.02	85.89%	89.16%
literacy rate (male) (%)	81.69%	92.32	54%	54%
literacy rate (female) (%)	70.54%	81.37	46%	46%
% of urban population	31.87%	11.63	2.79	4.28
SC Population (%)	23.5%	14.63	18.58%	12.89%
ST Population (%)	5.8%	0.55	0.07%	0.16%
Total workers (%)	38.08%	37.49	31.87	34.89
Male workers (%)	57.07%	57.65	27.48	28.96

Demographic parameters	West Bengal State	Purba (East) Medinipur District	Nandigram I Block	Nandigram II Block
Female workers (%)	18.08%	15.99	4.38	5.93
Main workers (%)	28.14%	22.1	15.52	17.50
Marginal workers (%)	9.94%	15.37	16.34	17.39
Cultivators (%)	14.72%	18.07	2.73	3.61
Agricultural Labourers (%)	29.32%	36.76	4.31	11.09
Household industry workers (%)	7.09%	6.22	0.72	0.45
Other workers (%)	48.87%	38.95	7.33	3.12

Source: Census 2011

## F. History, Culture and Tourism

140. The history of Purba Medinipur district comprising part of erstwhile Medinipur district is mostly associated with the ancient port city of Tamralipta or Tamralipti. This port city is believed to be the exit point of the trade route for the South and South-East Asia during Mauryan era. It was located on the bank of Rupnarayan river and was connected by roads with the major ancient cities like Rajgriha, Shravasti, Patiliputra, Varanasi and Taxila (Takshashila). Tamralipta, the port in ancient India, is believed by scholars to have been around modern-day Tamluk. It is mentioned in the writings of Ptolemy (150 AD), the Greco-Egyptian writer, Faxian (earlier referred to as Fa Hien) (405-11 AD), the Chinese Buddhist monk, who travelled to India on foot, and Xuanzang (earlier referred to as Hiuen Tsiang) (seventh century AD), the Chinese Buddhist monk, scholar, traveler and translator. It was the main port used by Ashoka, the Mauryan emperor. With too much siltation the port lost its importance around 8th century A.D.

141. Archaeological remains show continuous settlement from about 3rd century BC. It was known as Tramralipti (in the Purans and the Mahabharata) or Tamralipta (in Mahabharata) or Tamalika (in historical documents) or Tamalitti (in foreigners' descriptions) or Tamoluk (in the British Raj). It was a seaport, now buried under river silt. For this reason, Tamluk has many ponds and lakes remaining today. In the Mahabharata (Bhishma Parva/Nabam Adhyay) while describing the names of the holiest rivers and kingdoms of India, Sanjay took the name of "Tramralipta" to Dhritarastra. Tamluk was also known as Bhivas (in religious texts) and Madhya Desh (as the Middle State of Utkal/Kalinga and Banga). According to Jain sources, Tamralipti was the capital of the kingdom of Venga and was long known as a port.

142. Purba Medinipur, has an illustrious history of literature, culture and trade. The composer of the Bengali version of the epic Mahabharata Mukundaram Chakraborti did his work in the parlour of Zamindar Bankura Roy of Ahrah village of the undivided Midnapore district. The district also gave shelter to another great poet Kashiram Das. The tradition was carried forward by another great stalwart of 19th Century Iswarchandra Vidyasagar, who pioneered primary education in Bengali Language through his book "Varnaparichaya". The literary tradition was carried throughout 19th and 20th centuries by numerous writers, who wrote in well-known literary magazines at that time and promoted the literary environment of the district. The district of Midnapore was also involved in freedom struggle of India. Famous names like Kshudiram Bose, Matangini Hazra and Birendranath Sasmal evoke emotional response from Bengalis throughout the state even today. Residents of Contai and Tamluk participated actively in Gandhiji's Quit India and Salt Act violation movements. In fact, parallel governments were formed there and were disbanded only under the request of Gandhiji in 1944.


143. West Bengal has rich and unique culture and tradition. West Bengal celebrates many pujas (worship) and festivals. The Bengali proverb “Baro Mase Tero Parbon” (thirteen festivals in twelve months) indicates the abundant of festivity in the State. The State is a perfect example of communal harmony that is reflected in all the festivals. Peoples of different religion, caste and creed use to celebrate and participate in all the festivals together. Durga Puja, Dol Yatra or The Festival of Colours, Ratha Yatra or The Chariot Journey Festival, Eid ul-Fitr, Muharram, Christmas, Buddha Purnima and Mahavir Jayanti are the major festivals. District Level Festivals of Purba Medinipur. are Karam Puja, Bishalakshmi Debi, Pilgrimage to Damodar, Bhim Mela, Jamai Sasth. There are several places of religious importance in the project districts.

144. **Tourist Attractions.** The coastal region of Purba Medinipur district is in the face of river Hooghly. With good coastal, landform, seasonal, rural and heritage diversity, it offers potential for tourism in its typical coastlines and rural areas. The famous tourist spots are Tamluk (Temple of Devi Barghobhim, Archeological Museum, Rakhit Bati), Panskura, Haldia town, Mahishadal Rajbari and the museum. Digha- Sankarpur can very well claim to be the most popular sea beach in West Bengal. Digha is now connected to Kolkata by rail also, which has increased its accessibility to the common man.





#### **G. Subproject Site Environmental Features**



145. Environmental Features in and around the selected subproject sites are presented in the **Tables- 35A, 35B and 35C** below.




**Table 35A: Site Environmental Features of Nandigram I & II Blocks (Revised Package EM/02 Components)**




Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
1	Garchakra beria  (IBPS cum GLSR)	Kalicharan pur	Vested	Vacant Unused Plot	<p>The GLSR of capacity 4300KL for, Nandigram I block is proposed to be located on easily accessible area such that the length of the primary transmission main is minimum and pumping costs is optimal.</p> <p>The identified GLSR site is on vested low laying land filled with water. and having few trees, which not required to be felled for the construction. The proposed GLSR land is low laying and earth filling is done</p> <p>The vulnerability mapping of the district for flood prone areas indicates that the GLSR site is not prone to flooding.</p> <p>No environmental sensitive area nearby.</p>	

Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
1	Gar Chakraberia (OHR-Zone 2)	Kalicharanpur	PWD	Vacant Unused Plot. Adjacent to the project site, one school is present nearby. Both GLSR and OHR are located in same plot	The proposed OHR site is a low laying land surrounded by some trees. Those trees will not be removed for construction. No impact	
2	Kalicharanpur (OHR-Zone 3)	Kalicharanpur	RR & R Dept.	Vacant Unused Plot	No specific environmental features. Only bushes around the OHR site Few Trees located nearby. clearance to be done only for ground vegetation and small bushes. No impact expected	
3	Samsabad (OHR-Zone 5)	Samsabad	Vested	The proposed OHR site is adjacent to the crematorium land.	No such environmental features are present. Only adjacent to the OHR site, low laying land is present. Nearby Crematorium will be not affected No impact.	
4	Jambari (OHR-Zone 7)	Gokulnagar	BDO Vested	Vacant Unused Plot	No specific environmental features- like trees, sensitive areas, water body etc. No impact	





Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
5	Durgapur (OHR-Zone 10)	Vekutia	Vested	Vacant Unused Plot	Low laying land filled with water. No specific environmental features- like trees, sensitive areas, water body etc. No impact	
6	Manuchak Jalpai (OHR-Zone 12)	Vekutia	Patta-Govt. land	Vacant Unused Plot	Low laying land filled with water and surrounded by some trees. Expected no impact.	
7	Parbatipur (OHR-Zone 13)	Mahammadpur	Vested	Vacant Unused Plot	Few Trees at boundary No specific environmental features- like sensitive areas, water body etc. nearby No impact	
8	Kendamari Jalpai (OHR-Zone 15)	Kendamari Jalpai	Vested	Vacant Unused Plot with narrow approach road	No specific environmental features- like trees, sensitive areas, water body etc. No impact	





Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
9	Haripur (OHR-Zone 19)	Haripur	Vested	Vacant Unused Plot	Crematorium is adjoining with the plot. No eco sensitive or archaeological site are present within the vicinity. No impact on Crematorium.	
10	Bansari Gauri (OHR-Zone 20)	Haripur	Patta-Govt. land	Vested Land	The proposed OHR site is surrounded by some trees in plot boundary. No other environment sensitive area nearby. No impact on trees	
Sl. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Environmental Features	Location and activity at project sites
<b>Nandigram – II Block</b>						



Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
1	Monoharpur (IBPS cum GLSR)	Reyapara	I &W Department  The IBPS-cum-GLSR for Nandigram –II block is proposed on a parcel of land owned by (I&W Dept) Govt. of West Bengal. NOC from Irrigation and Waterways Department has obtained.	Trees are present. One big banyan tree is there that may be saved.	The GLSR of capacity 2500 KL for, Nandigram II block is proposed to be located on easily accessible area such that the length of the primary transmission main is minimum and pumping costs is optimal. The identified GLSR site is on Irrigation & Waterways department land and have a big banyan tree but the tree has been saved by applying judicial design.  The vulnerability mapping of the district for flood prone areas indicates that the GLSR site is not prone to flooding. No environmental sensitive area nearby.	
2	Birulia (Existing + New OHR) (OHR – Zone 3)	Gholpukuria	PHED land	Beside existing OHR	No specific environmental features Area within existing campus of PHED. No impact expected	
3	Monoharpur (OHR-Zone 6)	Reyapara	I &W Department  NOC from Irrigation and Waterways Department has obtained	Vacant Unused Plot	The proposed project site is having a big banyan tree and the tree has been saved by adopting judicial design. There is no impact	


Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
4	Kanakpur (OHR-Zone 7)	Boyal-I	Vested	Vacant Unused Plot	No specific environmental features- like trees, sensitive areas, water body etc. No impact	
5	Narsinghapur Jalpai (OHR-Zone 8)	Boyal-II	Vested.	Vacant Unused Plot	No specific environmental features- like trees, sensitive areas, water body etc. No impact	
6	Gopalchak (OHR-Zone 9)	Boyal-II	Vested	Vacant Unused Plot	One primary school is there adjacent to the proposed project site No impact on primary school. No other sensitive areas	




**Table 35B: Site Environmental Features of Nandigram I & II Blocks (Package EM/03 Components)**

Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
1	Gangra (OHR- Zone 1)	Sonachura	Vested	Vacant Unused Plot	The proposed project site is a low laying land filled with water. No specific environmental features- like trees, sensitive areas, water body etc. nearby. No impact	
2	Chakchilinga (OHR- Zone 4)	Samsabad	Vested	Vacant Unused Plot	No specific environmental features Few Trees located nearby. clearance done only for ground vegetation and small bushes. No impact on trees	
3	Gokulnagar (OHR- Zone 6)	Gokulnagar	Vested	Vacant Unused Plot	Proper approach road is not available. For construction of approach road, some trees may be affected No other environmental features nearby	
4	Naynan (OHR- Zone 8)	Daudpur	Vested	Vacant unused plot	No specific environmental features- like trees, sensitive areas, water body etc. No impact	

Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
5	Marisdanga (OHR- Zone 9)	Dautpur	Vested	Some trees are on approach road	No trees are present at OHR site. Some trees may need to remove during construction of approach road. No other environmental features	
6	Dinabandhupur (OHR- Zone 11)	Vekutia	Vested	Vacant Unused Plot	Approach road need to be constructed. Canal adjacent to the OHR site. No specific environmental features- like trees, sensitive areas, water body etc. No impact	
7	Purushottampur (OHR- Zone 14)	Mahammadpur	Vested	Vacant Unused Plot	The proposed OHR site is a low-lying land surrounded by some trees and crematorium land. No impact expected	
8	Bhasur Kata (OHR- Zone 16)	Kendamari Jalpai	Vested	Vacant Unused Plot	Agricultural land. No specific environmental features- like trees, sensitive areas, water body etc. No impact expected	

Sl. No	Name of Mouza (GLSR/OHR)	Name of GP	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Location & Environmental Features	Location and activity at project sites
<b>Nandigram – I Block</b>						
9	Tajpur (OHR- Zone 17)	Nandigram	PHED land	Vacant unused plot Canal has passed adjoining to the project site.	No specific environmental features- like trees, sensitive areas, water body etc. No impact	
10	Nandigram (CT) (OHR- Zone 18)	Nandigram	Vested	Vacant Unused Plot	Low laying land filled with water. No eco sensitive or archaeological sites are present within the vicinity. No impact	

Sl. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Environmental Features	Location and activity at project sites
<b>Nandigram – II Block</b>						
1	Kamalpur (OHR- Zone 1)	Amdabad-II	Vested	Vacant Unused Plot	Surrounded by some trees having girth size of less than 30cm and one crematorium is located nearby. No impact expected on sensitive area.	

Sl. No	Name of Mouja (GLSR/OHR)	Name of G P	Ownership (Pvt./Govt.)	Description of Immediate surroundings of the plot (Present Land use)	Environmental Features	Location and activity at project sites
<b>Nandigram – II Block</b>						
2	Amdabad (OHR- Zone 2)	Amdabad-I	Vested	Vacant Unused Plot	Low laying land No specific environmental features- like trees, sensitive areas, water body etc. No impact	
3	Hanu Bhunya (Existing+ New OHR) (OHR – Zone 4)	Gholpukuria	PHED land	Nearby existing OHR site	No specific environmental features Area within existing campus of PHED. No impact expected	
4	Bheturia (OHR – Zone 5)	Kodambari-I	Vested	Vacant Land	No specific environmental features- like trees, sensitive areas, water body etc. No impact	

**Table 36A: Zone wise site environmental features of distribution network of Nandigram I**

Zone No	Location	Total Length of pipeline (m)	Environmental Features							
			Tree Present*	Forest Nearby	Archaeological Site	Low laying road-flooded with water	Water Body**	Sensitive area- Religious place	Sensitive area- educational institute	Sensitive area- Crematorium/ burial ground nearby
Z-1	Gangra	132237	Yes	No	No	No	Yes	No	No	No
Z-2	Garchakraberia	104867	Yes	No	No	Yes	Yes	Yes***	Yes****	No
Z-3	Kalicharanpur	78088	Yes	No	No	No	Yes	No	No	No
Z-4	Chak Chillinga	59433	Yes	No	No	Yes	Yes	No	No	No
Z-5	Samsabad	43978	Yes	No	No	No	Yes	No	No	Yes*****
Z-6	Gokulnagar	100747	Yes	No	No	Yes	Yes	No	No	No
Z-7	Jambari	102166	Yes	No	No	Yes	Yes	No	No	No
Z-8	Naynan	70073	Yes	No	No	No	Yes	No	No	No
Z-9	Marisdanga	31287	Yes	No	No	Yes	Yes	No	No	No
Z-10	Durgapur	101904	Yes	No	No	No	Yes	No	No	No
Z-11	Dinabandhupur	69240	Yes	No	No	No	Yes	No	No	No
Z-12	Manuchak Jalpai	49008	Yes	No	No	No	Yes	No	No	No
Z-13	Parbatipur	78475	Yes	No	No	No	Yes	No	No	No
Z-14	Purushottampur	39463	Yes	No	No	No	Yes	No	No	Yes*****
Z-15	Kendamari Jalpai	98319	Yes	No	No	No	Yes	No	No	No
Z-16	Bhasurkata	75856	Yes	No	No	No	Yes	No	No	No
Z-17	Tajpur	36806	Yes	No	No	Yes	Yes	No	No	No
Z-18	Nadigram CT	67639	Yes	No	No	Yes	Yes	No	No	No
Z-19	Haripur	68785	Yes	No	No	No	Yes	Yes***	No	Yes*****
Z-20	Banasrigouri	35644	Yes	No	No	No	Yes	Yes***	No	No
Total	1444015 m (1444.015 Km)									

(Note - \* - Existing trees not in impact zone, \*\* - No impact on water body, \*\*\* No impact on sensitive areas- religious place, \*\*\*\* - No impact on educational institute, \*\*\*\*\* - Crematorium not affected, outside the working area)

(Note: Zone Z- 16 – Bhasurkata, Zone Z-18- Nandigram CT – after preliminary design)

Note- Shaded zones under new scope of work

**Table 36B: Zone wise site environmental features of distribution network of Nandigram II**

Zone No	Location	Total Length (m)	Environmental Features							
			Tree Present*	Forest Nearby	Archaeological Site	Low laying road-flooded with water	Water body**	Sensitive area-Religious place	Sensitive area-educational institute	Sensitive area-Crematorium/burial ground nearby
Z-1	Kamalpur	85170	Yes	No	No	Yes	Yes	Yes***	No	Yes*****
Z-2	Amdabad	126612	Yes	No	No	No	Yes	No	No	Yes*****
Z-3	Birulia	64993	Yes	No	No	No	Yes	Yes***	No	No
Z-4	Hanu Bhunya	134623	Yes	No	No	Yes	Yes	No	No	No
Z-5	Bheturia	112095	Yes	No	No	Yes	Yes	No	No	No
Z-6	Monoharpur	151815	Yes	No	No	No	Yes	Yes***	Yes****	No
Z-7	Kanakpur	100665	Yes	No	No	No	Yes	Yes***	No	No
Z-8	Narasinghapur Jalpai	55696	Yes	No	No	No	Yes	No	No	No
Z-9	Gopalchak	59609	Yes	No	No	No	Yes	No	Yes	No
Total	891278 m (891.278 Km)									

(Note - \* - Existing trees not in impact zone, \*\* - No impact on water body, \*\*\* No impact on sensitive areas- religious place, \*\*\*\* - No impact on educational institute, \*\*\*\*\* - Crematorium not affected, outside the working area)

**Distribution Lines.** Total length of 2371 km of distribution pipelines will be laid in Nandigram I & II blocks. Under the revised scope of EM/02, there will be approx. 1944 km of distribution network: Approx. 1053 km in Nandigram I and approx. 891 km in Nandigram II block will be laid. The diameter of pipeline ranges from 90 mm to 200 mm for HDPE and from 200 mm to 500 mm for DI K7. For Package EM/03, 427.25 km of distribution network in Nandigram I will be laid. The diameter of pipeline ranges from 90 mm to 200 mm for HDPE and from 200 mm to 500 mm for DI K7.

The distribution network will traverse through PWD, PMGSY / village roads; Ownership of the roads needs to be ascertained following the detail measurement survey and impacts due to pipe laying activity will be assessed and reconfirmed after finalization of detailed design for all zones and finalization of alignment of the distribution pipelines. PIU needs to obtain NOC for the same from PWD and self-certification (on "No Objection") on use of RoW of PMGSY roads from the respective Gram Panchayats.

Pipelines will be laid along the public roads (buried in a trench). Where there is adequate land in the road shoulder beside tarmac, pipe line will be buried in the earthen shoulder. Where there is no space in road shoulder, pipeline will be 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 will be avoided by using proper mitigation measures. Such civil work disruptions will be mitigated during construction by the contractor through simple measures such as provisions of planks for pedestrian access to shops and proper traffic management. Some of these trees may require to be removed for laying of pipes. Total number of trees to be felled will be re-confirmed during implementation phase. Utmost care would be taken to avoid cutting of trees by adopting suitable alignment changes as required during laying of pipelines. In unavoidable cases, prior permission to be obtained for tree cutting. In such cases it is required to plant and maintain 5 trees for each tree that is removed.

**PHOTO GALLERY OF CLEAR WATER DISTRIBUTION NETWORK AT NANDIGRAM I & II BLOCK**



**Reyapara Bazar**



**Tengua More**



NANDIGRAM BAZAR



## V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

146. 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 to be conducted during the implementation phase is also recommended to reduce the impact.

147. 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.

148. The ADB Rapid Environmental Assessment Checklist was used to screen the project for environmental impacts and to determine the scope of the IEE.

149. In the case of this project (i) most of the individual elements involve straightforward construction and operation, so impacts are 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. Design, Location and Pre-Construction Impacts and Mitigation Measures

150. **Location and Construction of tube wells.** With due caution, three nos HDTW tubewells (yr. 2031) will be constructed within the government-owned land at the WTP and at each of the two GLSRs. (at Monohorpur in zone 6 and Gar Chakraberia in zone 2)

151. The CGWB has recommended ground water development in all the 4 blocks, to be done very cautiously and logically considering the quantum of subsurface outflow through the deeper aquifers. Following recommendations are to be followed during construction of tube wells as over exploitation of ground water from the deeper freshwater aquifer will create inequilibrium condition with the overlying and underlying saline aquifers, which may invite saline water into the freshwater aquifer. The following measures will be implemented:

- (i) Hydro-geological investigations and installation of pilot HDTW shall be planned / developed as recommended in the Feasibility Report
- (ii) Investigation of lithological data on existing (3-4) tube wells in the proximity of the project sites listed above including discharge, aquifer tapped and water quality shall be included as part of final site selection. Periodical monitoring (at least 3 times in a year) of water level and chemical quality of water from existing and newly constructed tube wells (tapping deeper aquifers) of PHED are very much essential for further study.
- (iii) Additional monitoring tubewell established and monitoring initiated prior to production tubewell drilling
- (iv) Ground water development in the above Purba Medinipur district needs specially designed tube wells due to overlying brackish/saline aquifers. There is a chance of mixing of brackish water from upper aquifers to the lower fresh water bearing aquifers and would deteriorate the fresh ground water bearing aquifers.
- (v) The tube well may be drilled down to the depth of 300 mbgl with rotary/reverse rotary rig.
- (vi) The formation samples should be collected after 3 m intervals during drilling operation for study.
- (vii) Borehole should be electrically logged (both SP and Resistivity) to delineate the saline and fresh water bearing zones and for proper lithological identifications.
- (viii) Final selection of zones to be screened (30 m cumulative thickness) should be made based on correlation between geological and geophysical logs.
- (ix) The housing pipe (250 mm dia preferably MS pipe) should be of 50 m in length and the blank pipe (MS pipe) may be of 150 mm dia.
- (x) The strainer (150 mm dia) may be made of fibre glass/PVC with 1 – 0.5 mm slot size.
- (xi) The clean quartz gravel of 2-4 mm dia should be poured in between well assembly and bore hole wall up to the clay bed which is below the brackish water bearing zone.
- (xii) The top saline aquifers should be sealed with cement slurry for at least 4-5 m thick. The cement sealing should be done within clay bed which is below the saline/brackish water bearing zones. The cement sealing will be rested on gravel. The local clay should be poured in between well assembly and bore hole wall up to the cement sealing. After cement sealing there will be no operation in the well assembly for 48- 72 hours so that the cement is well settled and form a cake.
- (xiii) The tube well should be developed initially by air compressor and then by turbine pump at different discharges so that sand is free from the tube well and sand free water would be getting during continuous pumping.
- (xiv) The tube well should be run in two or three shifts with an intermittent gap. The minimum spacing between two adjacent HDTW should be maintained (1000 m), so that there will be no chances of interfering of the piezometric surfaces of the two tube wells during running which may lead to the lowering of the piezometric surface.
- (xv) Considering all the hydrological and hydrogeological situation of the area it may be suggested that the 12-15 HP capacity pump should be used.
- (xvi) After construction of new tube wells yield test should be conducted for each tube well. Continuous monitoring should be installed, and monitoring mechanism in the tube wells shall include flow, ground water, salinity / EC in the water abstracted. The data shall be integrated into the proposed SCADA system.

- (xvii) The tube well should be brought in operation as early as possible avoiding idling of the wells after construction. All tube wells shall be installed with remote start-stop arrangement.

152. **Groundwater Quality.** Water quality test reports (Appendix 22) confirm that the groundwater is fit for drinking and meets the drinking water standards (BIS 10500-2012). The contractor will check water quality of all tube wells after drilling to confirm the quality and will ensure that supplied water meets the drinking water standards. If any specific treatment (such as defluorination or softening) is required, it will be included. Monitoring will be conducted regularly during the operation. As there is no proper sewerage treatment system at present, groundwater is at risk of contamination due to discharge of untreated wastewater. The following measures shall be implemented.

- (i) Prepare a source protection plan for tube wells.
- (ii) Prevent flow of untreated wastewater in the drains.
- (iii) Ensure proper construction of tube wells including casing pipes to prevent water contamination from well spaces, and due to flooding. A cement seal between ground level and 5 m below land surface may be provided to avoid surface contamination to the ground water.
- (iv) The tube well should be developed with air compressor followed by pump till the water becomes sand / silt free.
- (v) Awareness programs shall be conducted regarding the sanitation practices and its effect on groundwater quality.
- (vi) Properly decommission and cap existing tube wells that will no longer be used; taking into consideration safety and groundwater contamination risks, undertake decommissioning activities promptly.

153. **Design of the Proposed Components.** Technical design of the (i) overhead reservoirs, (ii) distribution pipelines, and (iii) water connections and flow meters follow 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 consideration 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

154. **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.

155. There are several low-lying land parcels filled with water / ponds in most habitations. Although there is no direct impact as pipelines will not be 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 considered during construction phase. All the selected OHR sites are proposed in Government owned vacant lands, some of which (e. g Gangra, Dinabandhupur, Purushottampur- all 3 under new scope Manuchak Jalpai, - revised existing scope) are low-lying lands and some of the land like Kamalpur, Haripur (both under revised existing scope), Purushottampur (under new scope) are proposed near crematorium. Some pipelaying zone like Garchakraberia, Haripur and Banasri Gouri of Nandigram I and Kamalpur, Birulia Monoharpur, Kanakpur of Nandigram II are having religious places along the pipe line alignment. Also, some pipe will be aligned along the school premises. Design has been made in such a way that it will not impact on religious place and school premises. No significant negative impacts envisaged due to filling up and raising of these low-lying lands, which are not necessarily part of overall natural drainage system. Also, no impact is expected on crematorium. Following measures needs to be implemented:

- (i) Avoid using low-lying lands / ponds for construction of OHRs; alternative 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.

Implement the following measures during construction:

- (iii) Avoid any pipeline work at the time of religious or cultural festival
- (iv) Inform local authority or committee member of particular religious place before execution of work near that religious place.
- (v) Plan activities in consultation with PIU so that activities with the greatest potential hazard for children are conducted during periods when school will be closed.
- (vi) Proper barricading, caution tape and safety signage need to be arranged near the school premises
- (vii) Information should be given to school authority before execution of work near the school.

156. **Tree Cutting at Selected Project Sites.** There are trees in some selected OHR approach road (e.g., Gokulnagar, Marishdanga and Monoharpur). There are few trees also at Garchakraberia GLSR sites. These are mostly trees of local species. Trees may be removed for construction of OHRs, GLSR and approach road to OHRs. Trees are present along all the pipeline areas. All these trees are mainly coconut trees, which planted by local villagers. During pipe laying, roots of these tress coming on the pipe alignment route and with the help of local people contractor trim the roots little bit that it will be no longer a hindrance for pipe laying.

157. As per final design from Bhutar More to Garchakraberia (Sonachura GP) along the clear water main pipeline tree felling is required. NOC (**Appendix 18**) has been obtained from Forest department for felling of 63 nos. trees and tree felling has been completed.

158. The following measures need to be applied 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.

159. **Utilities.** Telephone lines, electric poles and wires, water lines within the proposed project locations may require to be shifted in few cases. To mitigate the adverse impacts due to relocation of the utilities, the contractor, in collaboration with the PHED already identified the OHR locations (e.g., Narasinghapur Jalpai, Monoharpur, Kamalpur, Samsabad) where existing utilities are present.

160. **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 considered do not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas are not being 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 will be taken to avoid disposals near forest areas, water bodies, or in areas which will inconvenience the community. Labour camp has been constructed at Thakur Chak near Reyapara and waste has been depositing at specific place after taking NOC from respective land owner.

161. Necessary pre construction investigations done according to standard specifications. Soil investigation being carried out by the contractor before starting the works to assess type of soil, strata, ground water level and other required indicators and establish soil properties while doing excavation for foundation of structures.

162. **Sources of Materials.** Significant amount of sand and coarse aggregate is required for this project, which 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 should avoid new borrow pits / quarries as far as possible, if necessary, all the permissions, including conduct of environmental assessment, and environmental clearance as necessary shall be obtained prior to start of quarrying activity. The contractor should also make a concerted effort to re-use as much excavated material from this project as possible. The construction contractor will be required to:

- (i) Obtain construction materials only from government approved quarries with prior approval of 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.

## B. Construction Impacts

163. Main civil works in the subproject include construction of one IBPS cum GLSR and 29 overhead reservoirs (Package EM/02- 15 nos., Package EM/03-14 nos.), at the identified sites, and laying of water supply pipelines (secondary transmission & distribution lines). OHR works will be confined to sites, and construction will include general activities like site clearance, excavation for foundations, and creation of concrete structures (staging and reservoir).

164. 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.

165. Subproject also include laying of approx. 2371 km (approx.1944 km under Package EM/02 and approx. 427 km under Package EM/03 long distribution lines. Distribution lines will cover all habitations and will be laid along all internal roads in the project area. Pipelines will be buried along the roads using open cut method.

166. 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 2m deep. Earthwork excavation will be undertaken by machine (backhoe excavator) or manually, while pipe laying works will 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 will be taken while laying so that existing utilities and cables are not damaged and pipes are not thrown into the trenches or dragged, but carefully laid in the trenches. As trenches are only 1.5-2m deep, there risk of collapse of trenches or damage to surrounding buildings is minimal. However, necessary precautions will be taken depending on the soil conditions, and if required measures such as bracing or shoring in the trench will be provided. Once they are laid, pipes will be joined as per specification and then tested for any cracks of leakages. About 85%-95% of the excavated soil will be used for refilling the trench after placing the pipe and the residual soil of 5-15% will be disposed of. Therefore, residual soil volume after pipe laying and refilling is insignificant.

167. 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, will 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.

168. Anticipated impacts during the construction phase are discussed along with appropriate mitigation measures to avoid, minimize or mitigate those impacts to acceptable levels. At congested market/commercial area and main road where day time traffic movement is more, pipe laying will be carried out at night time. Management plan for night works developed and discussed in para 210.

169. **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 from construction vehicles, equipment, and machinery used for excavation and construction will 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 OHR sites etc., is 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 will be required to:

**170. 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, OHR 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) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.,) when transported by trucks;
- (ix) Clean wheels and undercarriage of haul trucks prior to leaving construction site/quarry;
- (x) Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area;
- (xi) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition;
- (xii) Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization;
- (xiii) Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process;
- (xiv) Cover the soil stocked at the sites with tarpaulins;
- (xv) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation;
- (xvi) Ensure that all the construction equipment, machinery is fitted with pollution control devices, which are operating correctly, and have a valid pollution under control (PUC) certificate.

**171. 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 will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately.

172. **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. Due to the location of project, ponds are present along the pipeline for both Nandigram I and II blocks. It is important that runoff from the construction areas, which may contain silt and chemical traces do not enter any water bodies. Impact will be temporary, and may not be significant, but needs to be mitigated. Construction contractor will be 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.
- (ix) Ballah pilling will be used to align the pipe over the surface water bodies.

173. **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 will 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.

174. **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 odour and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape. Construction waste will be disposed in line with the guideline issued by WB Pollution Control Board. Contractor in consultation with PHED will identify disposal sites for stockpile. Stockpiles shall not be situated such that they obstruct natural water pathways. Stockpiles shall 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 shall be implemented by the contractor:

- (i) Prepare and implement a Construction Waste Management Plan
- (ii) As far as possible utilize the debris and excess soil in construction purpose, for example for raising the ground level or construction of access roads etc.,
- (iii) Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed of two 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.

175. **Noise and Vibration Levels.** Most of the works are to be implemented in rural setting, with less populated habitation areas and surrounding extensively cultivated agricultural lands. Noise and vibration impacts are likely to be minimal as most of the OHR sites located outside habitation in agricultural lands. Few OHR 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, will have impact on nearby buildings. This impact is negative but short-term, and reversible by mitigation measures. The construction contractor will be 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 will 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.

176. **Management Plan for Night works.** Following requirements should be fulfilled for construction works at night hours-

- (i) Night works should be avoided at construction sites specially in residential areas and should be performed only when day works are not possible due to excessive traffic/public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.
- (ii) Limit construction activities at night. When necessary, ensure that night work is carefully scheduled and the community is properly informed so they can take necessary measures. Consult community regarding appropriate timing of noisy activities and avoid noisy activities at night. Use noise-control methods (barriers/ shelter/ muffling devices) and maintain a buffer zone if possible. Minimize project transportation, particularly heavy vehicles, through residential areas. Use of high noise generating equipment shall be stopped during night time.
- (iii) Safety gear can greatly affect worker visibility. The decision and maneuver distance – how long it takes a driver to notice the worker and make any path or speed changes – is over 5 times greater with reflective clothing than with regular, dark-colored – or even orange-colored – clothes. With this increased decision and maneuver distance, workers, motorists, and equipment are much less likely to have a collision – chances of damage, injury, or death are reduced.
- (iv) Reflective clothing is not the only available technique to increase visibility at night. Flashing lights on a worker's body or clothing, reflective tape on equipment, and especially proper work area lighting are all good ways to increase visibility.
- (v) Proper lighting at night includes several different levels and designations of lighting. In order to understand appropriate lighting levels for night work, we first need to talk about how it is measured. Lighting is typically measured by what are called "foot-candles". One foot-candle is the luminance cast on a 1 square foot surface by a single candle's light.
- (vi) Visibility & Training: There are two main ways to ensure that motorists and workers experience the safest possible night-time work zone. First is proper safety training, and second is improving visibility throughout the work zone and especially at critical areas like traffic control workers' stations and on any people or equipment.
- (vii) Through proper training and lighting, night time construction can happen as safely as construction in the daytime. This allows contractors and agencies to take advantage of working with fewer delays for the travelling public and for construction workers to work more safely in lower volume traffic.
- (viii) Preferably electrical connections are available for running equipment otherwise sound proof/super silent Diesel Generator set should be available
- (ix) Sound level should not increase as per following-

Type of area of work	Maximum noise level dB(A)
Industrial	70
Commercial	55
Residential	45
Silence zone	40

(x) Illumination should be as follows-

Minimum illumination (lx)	Areas to be illuminated	Type of work activity
54	Illumination throughout the work area	General work area lighting, and performance of visual tasks of large size, or medium contrast, or low require accuracy
108	Illumination of work area and areas adjacent to equipment	Performance of visual tasks of medium size, or low to medium contrast, or medium required accuracy
216	Illumination of task	Performance of visual tasks of small size, or low contrast or high required accuracy or fine finish

- (xi) As far as possible ready-mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site;
- (xii) All the noise activity like hammering, cutting, crushing, running of heavy equipment should be done in day time and avoided in night time;
- (xiii) Workers engaged in night works should have adequate rest/sleep in day time before start of night works;
- (xiv) Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night;
- (xv) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent/retro-reflective arrangements;
- (xvi) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests;
- (xvii) Horns should not be permitted by equipment and vehicles;
- (xviii) Workers should not shout and create noise;
- (xix) First aid and emergency vehicles should be available at site;
- (xx) Emergency preparedness plan should be operative during night works;
- (xxi) Old persons and pregnant women and women having small kids should not work in night time;
- (xxii) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise;
- (xxiii) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night works;
- (xxiv) PIU site engineers and contractors' safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and videographic records as well as register the observations;
- (xxv) Night works should be stopped early in the morning at least one hour before start

- of pedestrian/traffic movement;
- (xxvi) After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians;
- (xxvii) Drivers and workers should be alert and responsive during night works;
- (xxviii) All the wages to workers working in night hours should be as per the applicable labour acts;
- (xxix) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours; and
- (xxx) Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.

177. **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 to WTP to IBPS & GLSR and GLSR to OHR 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 consist of very narrow streets, but the traffic is limited mostly to bicycles and two wheelers, and other transport vehicles. Distribution line works within habitation will have accessibility issues to surrounding houses. Works related to OHRs be 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 will be required to:

178. **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.

179. **Pipeline Works**

- (i) Confine work areas along the roads to the minimum possible extent; all the activities, including material and waste/surplus soil stocking should 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

180. **Socio-Economic – Income.** All the OHRs site of Nandigram I and II have been proposed on suitable government owned vested land and patta land. 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.

181. **Socio-Economic – Employment.** Manpower will be 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 will be required to:

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

182. **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. In addition, protection from COVID 19 infection also to be considered. The construction contractor will be required to:

- (i) Comply with all national, state and local labour laws (**see Appendix 7**);
- (ii) Develop and implement 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 17**) and implemented which included measures such as: (a) excluding public from the site; (b) ensuring all workers are provided with and use personal protective equipment; (c) OHS Training<sup>13</sup> and COVID 19 awareness H & S 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;

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<sup>13</sup> 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.

- (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;
- (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.

183. 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 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.

184. **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),<sup>14</sup> and amongst other things, should involve:

- 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;
- Reporting procedures to inform PIU immediately if AC pipes are encountered;

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<sup>14</sup> In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHS/A) and the Environmental Protection Agency (EPA) and can be found at <http://www.osha.gov/SLTC/asbestos>

- 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.

185. **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 will be provided where necessary to improve safety and provide directions
- (vi) All drivers will undergo safety and training
- (vii) Public access to all areas where construction works are on-going will be restricted through the use of barricading and security personnel
- (viii) Warning signs, blinkers will be 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 will be 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.

186. **Construction Camps.** Contractor may require to set up construction camps cum store – 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 will however be encouraged to engage local workers as much as possible. 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. Worker's camp has been constructed at Thakur Chak near Reyapara. Camp has been developed following COVID 19 pandemic protocol. Potential impacts for setting up camp are negative but short-term and reversible by mitigation measures. The construction contractor will be required to:

- (i) As far as possible located the camp site within the work sites (at IBPS- GLSR and OHR 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) Camp should be protected from health risks such as COVID-19. All Health and safety procedure will be followed for the operation of camp during stay, 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 infections such as COVID 19
- (xii) Unknown person not allowed within the camp
- (xiii) Maintenance of hygienic environment at staying area, cooking area and toilet
- (xiv) Camp shall be provided with proper drainage, there shall not be any water accumulation;
- (xv) Provide drinking water, water for other uses, and sanitation facilities for employees;
- (xvi) Prohibit employees from cutting of trees for firewood; contractor should be provided proper facilities including cooking fuel (oil or gas; fire wood not allowed);
- (xvii) Train employees in the storage and handling of materials which can potentially cause soil contamination;
- (xviii) Recover used oil and lubricants and reuse or remove from the site;
- (xix) Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit for biodegradable waste, and non-biodegradable / recyclable waste shall be collected and sold in local market;
- (xx) Remove all wreckage, rubbish, or temporary structures which are no longer required;
- (xxi) 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.

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

188. **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.

- (i) Consult Archaeological Survey of India (ASI) or West Bengal State Archaeology Department to obtain an expert assessment of the archaeological potential of the site

- (ii) Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available.
- (iii) In case of chance finds, works must be stopped immediately until such time chance finds are cleared by experts

189. **Post-construction clean-up.** Excess debris, spoils, construction materials may pose hazards to the community if not properly disposed of.

- 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.
- Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.

### **C. Operation and Maintenance Impacts**

190. 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.

191. 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.

192. 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, may occur if the water supply gets contaminated with pathogens during leaks/repair and maintenance works. 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. Measures on managing wastewater and fecal waste and keeping water supplies safe are critical to avoid the start or spread of any disease.

193. A Standard Operating Procedure (SOP) for addressing salinity mitigation measures will be prepared and approved by the PMU and needs to be followed during O&M phase.

194. The people of Nandigram I & II blocks are 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.

195. 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

196. Focus-group discussions with local people around the OHR site and with key stakeholders and community people in line with the ADB's requirements pertaining to environmental and social considerations. These consultations helped in identifying the felt needs/concerns and apprehensions of the communities related to the project and their priorities.

197. 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 will ensure that the subprojects are designed, constructed, and operated with utmost consideration to local needs, ensures community acceptance, and will bring maximum benefits to the people. Public consultation and information disclosure is a must as per the ADB policy.

198. 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 will be 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, OHRs 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

199. 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

200. 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.

201. Focus-group discussions were conducted with local people around the OHR site and with key stakeholders and community people in line with the ADB's requirements pertaining to environmental and social considerations. These consultations helped in identifying the felt needs/concerns and apprehensions of the communities related to the project and their priorities. **Appendix 11** shows details of consultation, attendance and photographs. **Table 37** below shows detail of public consultations.

**Table 37: Public Consultations held in Different Water Supply Locations in Nandigram I & II Blocks- During project preparation**

Date	Location	Gram Panchayat/ ULB	Water Works	Total No. of Participants	No. of Female Participants
14.09.2018	BDO Office			Land Owners Total No. 4 Other 4 Members were BDO, Panchayat Representatives, PHED Engineers Total: 8	Nil
09.06.17	Garchakraberia	Kalicharanpur	IBPS/ GLSR	Male: 20 Female: 12 Total: 32	12
09.06.17	Khodambari	Reyapara	IBPS/ GLSR	Male: 7 Female: 7 Total: 14	7
<b>Total</b>				<b>54</b>	<b>19</b>

## 2. Update on Public Consultation

202. The safeguard team and PMC jointly conducted public consultations at 18 places of Nandigram I and II block till March 2023. The consultations were held in presence of Panchayat Pradhan, Upo-pradhan, Gram Panchayat members, Local villagers, Housewives and PHED engineers. These consultations helped to understand the view of community about the project. A total of 386 participants were attended the consultation meeting out of which 154 (40%) were female participants. Table (Table 38) below provides details of locations where these consultations were conducted and the number of participants present during the consultation process. During 2024 consultations have been conducted at few projects location, those are mentioned in Appendix 11. Appendix 11 shows details of consultation, attendance and photographs.

**Table 38: Details of Public Consultation Meeting in Nandigram I and II Block- During document preparation & implementation of the project**

Sl no	Location	Date of Consultation	Zones covered under GP	Total no of Participants	No of Female Participants
1.	Bhekutia	31.10.2019	Zone 10, 11,12	71	56
		08.02.2020	Zone 10, 11,12	18	6
2	Samsabad	24-01-2020	Zone 5	24	10
3	Daudpur GP	21-10-2019	Zone 8, 9	19	4
4	Haripur Gp	22-10-2019	Zone 19, 20	18	2
5	Nandigram I	21-10-2019`	Zone 17,18	19	13
8	Garchakraberia	21-10-2019	Zone 2	16	6
7	Birulia	01-11-2019	Zone 3 (N2)	39	13
8	Daudpur GP	14-12-2020	Zone 8, 9	14	3
9	Boyal-I	08-01-2021	Zone 7	14	5
10	BDO office, Nandigram I block	06.03.2023	All zones under Nandigram I	38	8
11	Kendamari Jalpai GP	13.03.2023	Zone 15	8	2
12	Sonachura	13.03.2023	Zone 1	7	2

Sl no	Location	Date of Consultation	Zones covered under GP	Total no of Participants	No of Female Participants
13	Kalicharanpur	15.03.2023	Zone 3	13	3
14	Haripur GP	16.03.2023	Zone 19	9	1
15	Mahammadpur	15.06.2022	Zone 13	7	0
16	Gokulnagar GP	17.03.2023	Zone 6	16	1
17	Samsabad GP	20.03.2023	Zone 5	10	2
18	Bhekutia GP	20.03.2023	Zone 10	26	17
<b>TOTAL</b>				<b>386</b>	<b>154</b>

203. The public consultations were aimed to discussing on goals of the Project – (i) to supply safe salinity free drinking water to reduce health problem, (ii) use of surface water to save the ground water, (iii) livelihood generation for the poor and marginalized sections of the society, (iv) women empowerment, (v) their present water quality, (vi) and how local people can support to complete this project.

204. Attendees mainly spoke about their happiness as the area was selected for this project. Some of the participants expressed concern about affordability to pay water tax, if imposed and they suggested for employment for local villagers as it will help them economically and overall economy of the project area. The consultations also helped to clarify that all pipelines will be installed in government land along roads and will be laid below ground.

205. It is also 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 saline. 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.

### 3. Consultation during Construction

206. Prior to start of construction in particular zone, PIU in coordination with the local bodies will conduct information dissemination sessions at various places and solicit the help of the local community, leaders/prominent for the project work. Focus group meetings will be 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 will be established with the affected communities to redress the environmental issues likely to surface during construction phase. Public consultation has been arranged at field level and contractor submitting the field level public consultation with Monthly Environmental Compliance Report and sample appended in **Appendix 12**.

#### C. Information Disclosure

207. Executive summary of the final IEE will be 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 will be 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 placed in the official website of the WBPHEd, PMU after approval of the IEE by Government and ADB. Stakeholders made aware of grievance register and redress mechanism.

208. Public information campaigns to explain the project details to a wider population conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans. A board showing the details of the project displayed at the construction site for the information of general public.

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

## **VII. GRIEVANCE REDRESS MECHANISM**

### **A. Project Specific Grievance Redress Mechanism**

210. 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 campaign ensures 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.

211. 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 Gram Panchayat 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 is recorded. The names of the persons to be included in the Field Level GRM are already suggested. The Sample Grievance Registration Form has been translated in Bengali (**Appendix 14**). Notification was issued on constitution and function of GRC. GRC Notifications of PMU, PIU levels are attached in **Appendix 15**.

212. PMU Head, Safeguards and Gender Officer (HSGO) together with PIU Safeguard Officers are entrusted with 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 are encouraged to seek a complaint registration number through the PIU.

213. 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 will be 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 will also be responsible for follow-through for each grievance, periodic information dissemination to complainants on the status of their grievance and recording their feedback (satisfaction/dissatisfaction and suggestions). In the event that certain grievances cannot be resolved at project level, they will be referred to the District Steering Committee (DSC), which will 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 will be referred to the state level Steering Committee.

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

215. The DSC has been set up to monitor project implementation in each district. In its role as a GRC, the DSC will meet every month (if there are pending, registered grievances), determine the merit of each grievance, and resolve grievances within specified time upon receiving the complaint-filing which the grievance will be addressed by the state-level Steering Committee. The Steering Committee will 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 13**), each tier having time-bound schedules and with responsible persons identified to address grievances and seek appropriate persons' advice at each stage, as required. The GRC will continue to function throughout the project duration. The PMU 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.

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

217. **Composition of Grievance Redress Committee and District Steering Committee.** The DSC, acting as GRC have District Magistrate (Chairperson), Additional District Magistrate/DLLRO, Land & Land Reforms, Superintending Engineer, PIU as Member Secretary, Assistant Engineer (Social) 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 as invitee member.

218. 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.

219. **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 has jurisdictional authority across the state (i.e., areas of influence of subproject facilities beyond district boundaries, if any).

220. **Record keeping.** Records of all grievances received, including contact details of complainant, date the complaint is received, nature of grievance, agreed corrective actions and the date these are affected and final outcome will be kept by PIU (with the support of DSISC) and submitted to PMU.

221. **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. Gram Panchayat / coverage area/affected area-wide public awareness campaigns are being conducted to ensure that awareness on grievance redress procedures is generated through the consultation and participation plan. Public awareness campaign is being conducted to ensure that awareness on the project and its grievance redress procedures is generated. The PIU assistant safeguard officers (environment and social) are assisted by DSISC safeguards specialists with information/collateral/awareness material etc. and in conducting project awareness campaigns. The campaign ensures 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 are documented and reported back to the affected persons. The number of grievances recorded and resolved and the outcomes is displayed/disclosed in the PMU and PIU offices, Gram Panchayat/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.

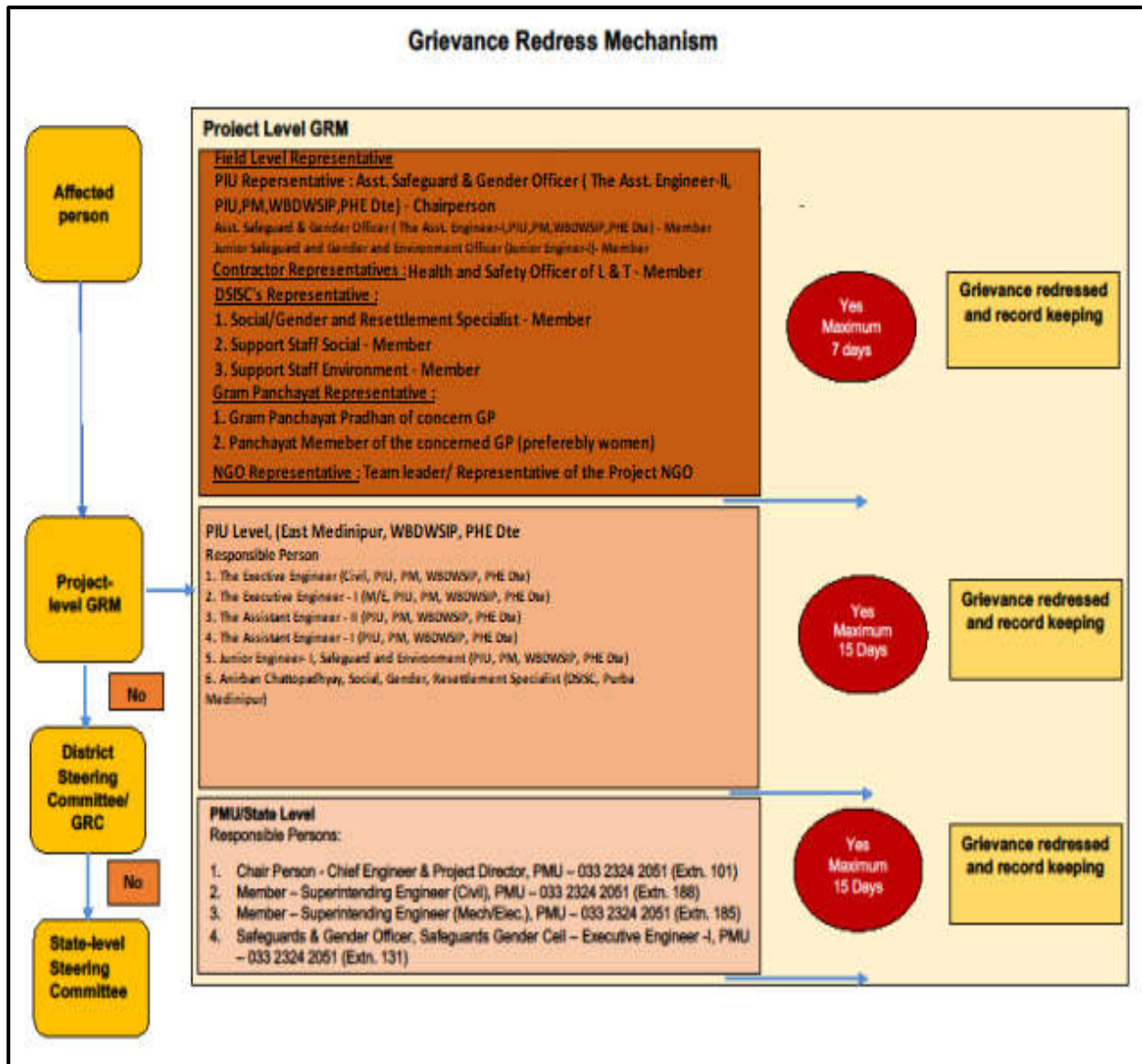
222. **Periodic review and documentation of lessons learned.** The PMU ESC will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent and address grievances.

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

224. **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.

**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

## VIII. ENVIRONMENTAL MANAGEMENT PLAN

### A. Environmental Management Plan

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

226. 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; (ii) provides a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guides and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensures 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 includes observations on- and off-site, document checks, and interviews with workers and beneficiaries.

227. The contractor submits to PIU, for review and approval, a site-specific environmental management plan (SEMP) including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program as per SEMP; and (iv) budget for SEMP implementation. Contractor already submitted Site Specific Environment Management plan for the sites where preliminary activities started and main construction will be commenced shortly. SEMP's are being developed for the zone's where detailed design is completed and construction activities started or to be started. No works are allowed to commence prior to approval of SEMP's zone wise.

228. A copy of the EMP/approved SEMP is being 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.

229. For civil works, the contractor will be 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 will prepare from time to time to monitor implementation of this IEE and SEMP. The contractor has allocated budget for compliance with these SEMP measures, requirements and actions. **Table 14A to 14D** depict status of submitted SEMP's.

230. The following mitigation measures tables (**Tables 39 to 40**) are only for the zones where the construction works has already started or to be started shortly, as mentioned in this report.

231. **Table 41A & 41B and 42** shows Environment Monitoring Plan during construction and operation stages respectively.

**Table 39: Design Stage Environmental Impacts and Mitigation Measures**

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
Groundwater source sustainability	Over pumping leading to depletion of groundwater and intrusion of salinity	<p>The contractor will conduct confirmatory site-specific groundwater studies/surveys and confirm the sustainability of proposed tube well sources. Test alternative locations to identify suitable locations for groundwater abstraction if already chosen locations are not suitable.</p> <p>Follow the recommendations of the CGWB when developing groundwater resources in Purba Medinipur (Refer to Paragraph 181 for the detailed description of the recommendations)</p>	Contractor	DSC, PMU, PIU
Groundwater quality	Groundwater contamination	<p>(i) Prepare a source protection plan for tube wells.</p> <p>(iii) Ensure proper construction of tube wells including casing pipes to prevent water contamination from well spaces, and due to flooding. A cement seal between ground level and 5 m below land surface may be provided to avoid surface contamination of the ground water.</p> <p>(iv) The tube well should be developed with air compressor followed by pump till the water becomes sand / silt free.</p> <p>(v) Awareness programs shall be conducted regarding the sanitation practices and its effect on groundwater quality</p> <p>(vi) Properly decommission and cap existing tube wells that will no longer be used; taking into consideration safety and groundwater contamination risks, undertake decommissioning activities promptly.</p>	Contractor	DSC, PMU, PIU

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
Design of water supply system	Source sustainability and efficiency	(i) Gravity distribution system: designing the entire system to maintain optimal flow and terminal pressure, and optimizing 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 (iii) Minimizing water losses from pipelines by perfect jointing and alignments using appropriate techniques (	Contractor/ Project Implementation Unit (PIU)	Project Costs
Location impacts	Use of low-lying lands / ponds for project resulting in socio economic impact – loss fishery area	(i) Avoid using low-lying lands / ponds for construction of overhead reservoirs (OHRs); alternative 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	PIU	-
Layout plan of OHRs, GLSRs and pipeline alignment	Tree cutting	(i) Minimize removal of trees by adopting to site condition and with appropriate layout design of OHRs, GLSRs 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 (iv) Plant and maintain 5 trees for each tree that is removed	Contractor/PIU	Project Costs

**Table 40: 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	<ul style="list-style-type: none"> <li>• Identify and include locations and operators of these utilities in the detailed design documents to prevent unnecessary disruption of services during construction phase; and</li> <li>• Require construction contractors to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services.</li> </ul>	Contractor in collaboration with Project Implementation Unit (PIU) and with approval of Project Management Unit (PMU)	<ul style="list-style-type: none"> <li>• List of affected utilities and operators;</li> <li>• Bid document to include requirement for a contingency plan for service interruptions (example provision of water if disruption is more than 24 hours), waste management plan and traffic management plan</li> </ul>	Project cost
Construction work camps, stockpile areas, storage areas, and disposal areas.	Conflicts with local community; disruption to traffic flow and sensitive receptors	<ul style="list-style-type: none"> <li>• Prioritize areas within or nearest possible vacant space in the project location;</li> <li>• If it is deemed necessary to locate elsewhere, consider sites that will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems;</li> <li>• Do not consider residential areas;</li> <li>• Take extreme care in selecting sites to avoid direct disposal to water body which will inconvenience the community.</li> <li>• For excess spoil disposal, ensure (a) site shall be selected preferably from barren, infertile lands. In case agricultural land needs to be selected, written</li> </ul>	Contractor to finalize locations in consultation and approval of PIU	<ul style="list-style-type: none"> <li>• List of selected sites for construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas.</li> <li>• Written consent of landowner/s (not lessee/s)</li> </ul>	Project cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Implementation	Monitoring of Mitigation	Cost and Source of Funds
		<p>consent from landowners (not lessees) will be obtained; (b) debris disposal site shall be at least 200 m away from surface water bodies; (c) no residential areas shall be located within 50 m downwind side of the site; and (d) site is minimum 250 m away from sensitive locations like settlements, ponds/lakes or other water bodies.</p> <ul style="list-style-type: none"> <li>• Spoil Management plan prepared zone wise and attached within SEMP</li> </ul>			
Sources of Materials	Extraction of materials can disrupt natural land contours and vegetation resulting in accelerated erosion, disturbance in natural drainage patterns, ponding and water logging, and water pollution.	<ul style="list-style-type: none"> <li>• Obtain construction materials only from government approved quarries with prior approval of PIU;</li> <li>• PIU to review, and ensure that proposed quarry sources have all necessary clearances/ permissions in place prior to approval</li> <li>• Contractor to submit to PIU on a monthly basis documentation on material obtained from each source (quarry/ borrow pit)</li> <li>• Avoid creation of new borrow areas, quarries etc., for the project; if unavoidable, contractor to obtain all clearances and permissions as required under law, including Environmental</li> </ul>	Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	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
		Clearance prior to approval by PIU			
Consents, permits, clearances, Objection Certificates (NOCs), etc.	No Failure to obtain necessary consents, permits, NOCs, etc. can result to design revisions and/or stoppage of works	<ul style="list-style-type: none"> <li>Obtain all necessary consents, permits, clearance, NOCs, etc. prior to award of civil works.</li> <li>Ensure that all necessary approvals for construction to be obtained by contractor are in place before start of construction</li> <li>Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.</li> <li>Detailed design drawings and documents are included.</li> </ul>	PIU/ DSISC and Project Management Consultant (PMC)-before start of construction and contractor during implementation.	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 PIU.
Asbestos Cement Pipes	Health risk due to exposure to asbestos materials	<ul style="list-style-type: none"> <li>Obtain details on location of underground Asbestos Cement pipes</li> <li>Locate the new piper carefully to avoid encountering AC pipes</li> <li>Leave the Asbestos Cement pipes undisturbed in the ground.</li> </ul>	Contractor in coordination with PIU and PMC	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 41: 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 OHS plan including COVID 19 H & S plan	Irreversible impact to the environment, workers, and community	<ul style="list-style-type: none"> <li>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 (OHS) including COVID 19 H &amp; S awareness, core labour laws, applicable environmental laws, etc.</li> </ul>	Contractor	Project cost/PMU cost
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.	<p><b>For all construction works</b></p> <ul style="list-style-type: none"> <li>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”</li> <li>Damp down the soil and any stockpiled material on site by water sprinkling;</li> <li>Use tarpaulins to cover the loose material (soil, sand, aggregate etc..) when transported by trucks;</li> <li>Provide a dust screen/high compound wall around the construction sites (OHRs)</li> <li>Clean wheels and undercarriage of haul trucks prior to leaving construction site/quarry</li> <li>Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area</li> <li>Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition</li> <li>Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process</li> <li>Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation</li> <li>Ensure that all the construction equipment and machineries are fitted with pollution control devices, which are operating</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>correctly, and have a valid pollution under control (PUC) certificate</p> <p><b>Pipeline works</b></p> <ul style="list-style-type: none"> <li>• Barricade the construction area</li> <li>• Initiate site clearance and excavation work only after barricading of the site is done</li> <li>• Confine all the material, excavated soil, debris, equipment, machinery (excavators, cranes etc.), to the barricaded area</li> <li>• Limit the stocking of excavated material at the site; remove the excess soil from the site immediately to the designated disposal area</li> <li>• Undertake the work section wise</li> <li>• 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.</li> <li>• 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.</li> <li>• Backfilled trench at any completed section after removal of barricading will be the main source of dust pollution. The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately.</li> </ul>		
Surface water quality	Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during construction can contaminate nearby surface water quality.	<ul style="list-style-type: none"> <li>• All earthworks be conducted during the dry season to prevent the problem of soil run-off during monsoon season;</li> <li>• Avoid stockpiling of earth fill especially during the monsoon season unless covered by tarpaulins or plastic sheets;</li> <li>• Prioritize re-use of excess spoils and materials in the construction works. If spoils will be disposed, only designated disposal areas shall be used;</li> <li>• Install temporary silt traps or sedimentation basins along the drainage leading to the water bodies; noted no water body at impact zone</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	Ponding of water in the pits / foundation excavations	<ul style="list-style-type: none"> <li>• Place storage areas for fuels and lubricants away from any drainage leading to water bodies;</li> <li>• Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling</li> <li>• Dispose any wastes generated by construction activities in designated sites; and</li> <li>• Create a temporary drainage channel around the work area to arrest the entry of runoff from upper areas into the work area</li> <li>• 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</li> <li>• Consider safety aspects related to pit collapse due to accumulation of water</li> <li>• Surface and ground water quality have been monitored according to the Environmental Management Plan (EMP) and after collection of representative samples from different work sites</li> </ul>		
Groundwater Quality/ Health and Safety	Waterlogging resulting in contamination of local water table due to collection of water in excavated areas and pit collapse	<p>To avoid this the contractor needs to be implement the following measures:</p> <ul style="list-style-type: none"> <li>• Create a temporary drainage channel around the work area to arrest the entry of runoff from upper areas into the work area.</li> <li>• 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.</li> <li>• Consider safety aspects related to pit collapse due to accumulation of water.</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of	<ul style="list-style-type: none"> <li>• Plan activities in consultation with PIU so that activities with the greatest potential to generate noise are conducted during periods of the day which will result in least disturbance;</li> <li>• Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach;</li> <li>• Minimize noise from construction equipment by using vehicle silencers, fitting jackhammers with noise-reducing mufflers,</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	equipment, materials, and people	<p>and use portable street barriers to minimize sound impact to surrounding sensitive receptor; and</p> <ul style="list-style-type: none"> <li>• Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity</li> <li>• 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.</li> <li>• Noise level have been monitored at different work locations</li> </ul>		
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.	<ul style="list-style-type: none"> <li>• Prepare and implement a Construction Waste Management Plan</li> <li>• 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.,</li> <li>• Stockpiles, lubricants, fuels, and other materials should be located away from steep slopes and water bodies;</li> <li>• Avoid stockpiling any excess spoils at the site for long time. Excess excavated soils should be disposed of to approved designated areas immediately;</li> <li>• If disposal is required, the site shall be selected preferably from barren, infertile lands; site should be located away from residential areas, forests, water bodies and any other sensitive land uses</li> <li>• 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</li> <li>• Residual and hazardous wastes such as oils, fuels, and lubricants shall be disposed of in disposal sites approved by local authorities/West Bengal Pollution Control Board (WBPCB);</li> <li>• Prohibit burning of construction and/or domestic waste;</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> <li>• Ensure that wastes are not haphazardly dumped thrown within and around the project site and adjacent areas; provide proper collection bins, and create awareness to use the dust bins.</li> <li>• 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</li> </ul>		
Existing Infrastructure and Facilities	Disruption of service and damage to existing infrastructure at specified project location	<ul style="list-style-type: none"> <li>• Prepare a list of affected utilities and operators if any;</li> <li>• Prepare a contingency plan to include actions to be done in case of unintentional interruption of service</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Ecological Resources – Terrestrial	Loss of vegetation and tree cover	<ul style="list-style-type: none"> <li>• Minimize removal of vegetation and disallow cutting of trees, by adopting best site layout and pipeline alignments. No trees are affected till this report period.</li> <li>• If tree-removal will be required, obtain tree-cutting permit and Plant 5 native trees for every one that is removed.</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Accessibility	Traffic problems and conflicts near project locations and haul road	<p><b>Hauling (material, waste/debris and equipment) activities</b></p> <ul style="list-style-type: none"> <li>• Plan transportation routes so that heavy vehicles do not use narrow local roads, except in the immediate vicinity of delivery sites</li> <li>• Schedule transport and hauling activities during non-peak hours;</li> <li>• Locate entry and exit points in areas where there is low potential for traffic congestion;</li> <li>• Drive vehicles in a considerate manner</li> <li>• Notify affected public by public information notices, providing sign boards informing nature and duration of construction works and contact numbers for concerns/complaints.</li> </ul> <p><b>Pipeline works</b></p> <ul style="list-style-type: none"> <li>• Confine work areas along the roads to the minimum possible extent; all the activities, including material and waste/surplus</li> </ul>	Construction Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>soil stocking should 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</p> <ul style="list-style-type: none"> <li>• Leave spaces for access between mounds of soil to maintain access to the houses / properties</li> <li>• Provide pedestrian access in all the locations; provide wooden/metal planks over the open trenches at each house to maintain the access.</li> <li>• Inform the affected local population 1-week in advance about the work schedule</li> <li>• Plan and execute the work in such a way that the period of disturbance/ loss of access is minimum.</li> <li>• Keep the site free from all unnecessary obstructions;</li> <li>• Coordinate with Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours</li> </ul>		
Socio-Economic - Employment	Generation of temporary employment and increase in local revenue	<ul style="list-style-type: none"> <li>• Employ local labor force as far as possible</li> <li>• Comply with labor laws</li> </ul>	Contractor	Contractor costs
Occupational Health and Safety	Occupational hazards which can arise during work	<ul style="list-style-type: none"> <li>• Comply with all national, state and local core labor laws (see <b>Appendix 7</b> of this IEE). Contractor arranged labour license.</li> <li>• Develop and implement site-specific occupational health and safety (OHS) Plan and Supplementary H &amp; S plan for infectious diseases including COVID 19 have been developed and implemented which included measures such as: (a) excluding public from the site; (b) maintaining social 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 mask, face mask and ear plugs; (d) OHS Training and COVID 19 awareness H &amp; S training for all site personnel; (e) documented procedures to be followed for all site activities including follow of SOP for COVID 19 as</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>developed for the project and H &amp; S plan; and (f) documentation of work-related accidents;</p> <ul style="list-style-type: none"> <li>• Qualified first-aiders have been provided at all times. Equipped first-aid stations (with sufficient disinfectant) are easily accessible throughout the site;</li> <li>• Availability of Ambulance at work site;</li> <li>• WC policy has been received by the contractor of the package;</li> <li>• Secure all installations from unauthorized intrusion and accident risks;</li> <li>• Provide supplies of potable drinking water;</li> <li>• Provide clean eating areas where workers are not exposed to hazardous or noxious substances;</li> <li>• Provide health and safety orientation training including COVID 19 risk and 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;</li> <li>• 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;</li> <li>• Ensured the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;</li> <li>• Ensured moving equipment is outfitted with audible back-up alarms;</li> <li>• 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;</li> <li>• Standard Operating Procedure (SOP) for the project and Supplementary H &amp; S plan for COVID 19 prepared which cover,</li> </ul>		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> <li>○ General instruction to follow to prevent the spread of COVID-19 in construction workplace</li> <li>○ Detail (step-by-step) work procedure to getting the workplace ready under COVID-19 situation</li> <li>○ Worksite prevention practice at work site, office, during meeting, travelling, etc.</li> <li>○ Precaution taken at workmen habitat/ camp</li> <li>○ Control measures taken for deploying new workmen at site</li> <li>○ Use of PPEs: face mask – hand gloves, maintaining social distancing, disinfection, requirement of awareness covered under the H &amp; S plan.</li> </ul> <p>(Separate H &amp; S plan for COVID 19 as supplementary document developed and keep as standalone document to mitigate COVID 19 health risk)</p>		
Asbestos Cement (AC) Materials	Health risks associated with AC pipes	Leave AC pipes in-situ untouched	Contractor	Contractor costs
Community Health and Safety.	Traffic accidents and vehicle collision with pedestrians during material and waste transportation	<ul style="list-style-type: none"> <li>• Restrict construction vehicle movements to defined access roads and demarcated working areas (unless in the event of an emergency)</li> <li>• Enforce strict speed limit (20-30 kph) for playing on unpaved roads, construction tracks</li> <li>• Night-time haulage will be by exception only, as approved by the PIU to minimize driving risk and disturbance to communities</li> <li>• Adopt standard and safe practices for micro tunneling</li> <li>• Temporary traffic control (e.g. flagmen) and signs will be provided where necessary to improve safety and provide directions</li> <li>• All drivers will undergo safety and training</li> <li>• Public access to all areas where construction works are ongoing will be restricted through the use of barricading and security personnel</li> <li>• Warning signs, blinkers will be attached to the barricading to caution the public about the hazards associated with the works, and presence of deep excavation</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> <li>• The period of time when the pipeline trench is left open will be minimized through careful planning</li> <li>• Control dust pollution – implement dust control measures as suggested under air quality section</li> <li>• Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.</li> <li>• Provide road signs and flag persons to warn of on-going trenching activities.</li> </ul>		
Work Camps and worksites	<p>Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants</p> <p>Unsanitary and poor living conditions for workers</p>	<ul style="list-style-type: none"> <li>• As far as possible located the camp site within the work sites; if any camp to be established outside these, then select a camp site away from residential areas (at least 100 m buffer shall be maintained). One worker's camp has been constructed at Thakur Chak near Reyapara. Camp has been developed following all norms and COVID 19 pandemic protocol.</li> <li>• Avoid tree cutting for setting up camp facilities</li> <li>• 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</li> <li>• Separate the workers living areas and material storage areas clearly with a fencing and separate entry and exit</li> <li>• Provide proper temporary accommodation with proper materials, adequate lighting and ventilation, appropriate facilities for winters and summers; ensure conditions of livability at work camps are maintained at the highest standards possible at all times;</li> <li>• Consult PIU before locating project offices, sheds, and construction plants;</li> <li>• Minimize removal of vegetation and disallow cutting of trees</li> <li>• Ensure conditions of livability at work camps are maintained at the highest standards possible at all times; living quarters and construction camps shall be provided with standard materials (as far as possible to use portable ready to fit-in reusable cabins with proper ventilation); thatched huts, and</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be allowed as accommodation for workers</p> <ul style="list-style-type: none"> <li>• Camp should be protected from COVID 19 health risk. All Health and safety procedure to follow for operation of camp (H &amp; S plan for COVID 19 will be used as ref. document) during stay, cooking, eating, use of toilet- common space etc.</li> <li>• Self- hygiene, regular disinfection of entire camp and toilet, maintaining of social distancing to be continued for protection from COVID 19 infection</li> <li>• Unknown person not allowed within the camp</li> <li>• Camp shall be provided with proper drainage, there shall not be any water accumulation</li> <li>• Maintenance of hygienic environment at staying area, cooking area and toilet</li> <li>• Provide drinking water, water for other uses, and sanitation facilities for employees</li> <li>• Prohibit employees from cutting of trees for firewood; contractor should be providing proper facilities including cooking fuel (oil or gas; fire wood not allowed)</li> <li>• Train employees in the storage and handling of materials which can potentially cause soil contamination</li> <li>• Recover used oil and lubricants and reuse or remove from the site</li> <li>• Manage solid waste according to the following preference hierarchy: reuse, recycling and disposal to designated areas; provide a compost pit for biodegradable waste, and non-biodegradable / recyclable waste shall be collected and sold in local market</li> <li>• Remove all wreckage, rubbish, or temporary structures which are no longer required</li> <li>• 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</li> </ul>		
Impacts due to night works (as per	Occupational and community hazards	(i) Night works should be avoided at construction sites specially in residential areas and should be performed only when day	Contractor	Cost for implementation of

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
nature of works and feasibility at site)	which can arise during work at night in extreme and unavoidable cases	<p>works are not possible due to excessive traffic/public/pedestrian movement, site of cultural or religious importance, where there is huge crowd during day hours or any other unavoidable circumstances.</p> <p>(ii) Limit construction activities at night. When necessary, ensure that night work is carefully scheduled and the community is properly informed so they can take necessary measures.</p> <p>(iii) Consult community regarding appropriate timing of noisy activities and avoid noisy activities at night. Use noise-control methods (barriers/ shelter/ muffling devices) and maintain a buffer zone if possible. Minimize project transportation, particularly heavy vehicles, through residential areas. Use of high noise generating equipment shall be stopped during night time.</p> <p>(iv) Safety gear can greatly affect worker visibility. The decision and maneuver distance – how long it takes a driver to notice the worker and make any path or speed changes – is over 5 times greater with reflective clothing than with regular, dark-colored – or even orange-colored – clothes. With this increased decision and maneuver distance, workers, motorists, and equipment are much less likely to have a collision – chances of damage, injury, or death are reduced.</p> <p>(v) Flashing lights on a worker’s body or clothing, reflective tape on equipment, and especially proper work area lighting are all good ways to increase visibility.</p> <p>(vi) Proper lighting at night includes several different levels and designations of lighting.</p> <p>(vii) Visibility &amp; Training: There are two main ways to ensure that motorists and workers experience the safest possible night-time work zone. First is proper safety training, and second is improving visibility throughout the work zone and especially at critical areas like traffic control workers’ stations and on any people or equipment.</p> <p>(viii) Through proper training and lighting, night time construction can happen as safely as construction in the daytime. This allows contractors and agencies to take advantage of working</p>		mitigation measures responsibility of contractor.

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>with fewer delays for the travelling public and for construction workers to work more safely in lower volume traffic.</p> <ul style="list-style-type: none"> <li>(ix) Contractors should have hand held noise level meter for measurement of noise during night hours</li> <li>(x) Contractors should have hand held lux meter for the measurement of illumination during night hours</li> <li>(xi) Preferably electrical connections are available for running equipment's otherwise sound proof/super silent Diesel Generator set should be available</li> <li>(xii) Sound level should not increase as per EMP</li> <li>(xiii) Illumination should be adequate as required according to nature of works</li> <li>(xiv) As far as possible ready-mix concrete from batching plant to be used, otherwise the concrete should be prepared away from residential areas and brought to the site</li> <li>(xv) All the noise activity like hammering, cutting, crushing, running of heavy equipment's should be done in day time and avoided in night time</li> <li>(xvi) Workers engaged in night works should have adequate rest/sleep in day time before start of night works</li> <li>(xvii) Worker engaged for night works should have previous experience of night works and should be physically fit for such works including clear vision in night</li> <li>(xviii) All the necessary provisions of traffic aids such as traffic signals, road signage, barricades, cautions boards, traffic diversion boards etc. should be available with fluorescent /retro-reflective arrangements</li> <li>(xix) Workers should be trained before start of night works about risks and hazards of night works and their mitigation measures and should be provided all the protective aids (PPEs) including fluorescent/retro-reflective vests</li> <li>(xx) Horns should not be permitted by equipment and vehicles</li> <li>(xxi) Workers should not shout and create noise</li> <li>(xxii) First aid and emergency vehicles should be available at site</li> <li>(xxiii) Emergency preparedness plan should be operative during night works</li> </ul>		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<p>(xxiv) Old persons and pregnant women and women having small kids should not work in night time</p> <p>(xxv) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise</p> <p>(xxvi) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night work.</p> <p>(xxvii) PIU site engineers and contractors' safety personnel should closely monitor the safety of works continuously and noise and illumination levels on hourly basis and maintain photographic and videographic records as well as register the observations;</p> <p>(xxviii) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement;</p> <p>(xxix) After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians;</p> <p>(xxx) Drivers and workers should be alert and responsive during night works;</p> <p>(xxxi) All the wages to workers working in night hours should be as per the applicable labour acts;</p> <p>(xxxii) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours; and</p> <ul style="list-style-type: none"> <li>• Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.</li> </ul>		
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.	<ul style="list-style-type: none"> <li>• Consult Archaeological Survey of India (ASI) or West Bengal State Archaeology Department to obtain an expert assessment of the archaeological potential of the site</li> <li>• Include state and local archaeological, cultural and historical authorities, and interest groups in consultation forums as project stakeholders so that their expertise can be made available.</li> <li>• In case of chance finds, works must be stopped immediately until such time chance finds are cleared by experts</li> </ul>	Contractor	Contractor cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Submission of EMP implementation report	Unsatisfactory compliance to EMP	<ul style="list-style-type: none"> <li>• Appointment of Environment, Health and Safety (EHS) Supervisor to ensure EMP implementation</li> <li>• Timely submission of monitoring reports including pictures</li> </ul>	Contractor	Contractor cost
Post-construction clean-up	Damage due to debris, spoils, excess construction materials	<ul style="list-style-type: none"> <li>• Remove all spoils wreckage, rubbish, or temporary structures (such as buildings, shelters, and latrines) which are no longer required; and</li> <li>• All excavated roads shall be reinstated to original condition.</li> <li>• All disrupted utilities restored</li> <li>• All affected structures rehabilitated/compensated</li> <li>• 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.</li> <li>• 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.</li> <li>• The contractor must arrange the cancellation of all temporary services.</li> <li>• Request PIU to report in writing that worksites and camps have been vacated and restored to pre-project conditions before acceptance of work.</li> </ul>	Contractor	Cost for implementation of mitigation measures responsibility of contractor.

**Table 42: 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	<ul style="list-style-type: none"> <li>• Provide appropriate PPE and training on its proper use and maintenance.</li> <li>• Provide specific training on highly infectious diseases like COVID 19 issues and availability of relevant specific PPEs for protection (COVID 19 H &amp; S plan as ref material)</li> <li>• Strictly follow H &amp; S protocol (such as the protocol developed for COVID 19 pandemic) during operation and maintenance</li> <li>• Use fall protection equipment when working at heights.</li> <li>• Maintain work areas to minimize slipping and tripping hazards.</li> <li>• Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures.</li> <li>• Prepare escape plans from areas where there might be a chlorine emission.</li> <li>• Install safety showers and eye wash stations near the chlorine equipment and other areas where hazardous chemicals are stored or used.</li> <li>• Prohibit eating, smoking, and drinking except in designated areas.</li> </ul>	PHED	Operating costs
Increased in sewage generation	Water pollution, and impacts on public health and environment	<ul style="list-style-type: none"> <li>• Sanitation and sewerage/septage facilities needs to be improved/provided in the project area to suit the increased sewage generation</li> </ul>	PHED and respective local bodies	To be identified

**Table 43A: Construction Stage Environmental Monitoring Plan (EM/02)**

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.	Weekly during construction	Supervising staff and safeguards specialists	Cost for implementation and monitoring is responsibility of contractor
Ambient air quality	10 locations (Selected during implementation to represent the overall project area)	<ul style="list-style-type: none"> <li>PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO</li> </ul>	Once before start of construction Yearly 3-times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-year period considered) Testing through NABL approved laboratory	Contractor	Cost for implementation of monitoring measures responsibility of contractor (100 samples x Rs.5000 per sample = Rs.500,000)
Ambient noise	20 locations (Same as air quality monitoring)	<ul style="list-style-type: none"> <li>Day time and night time noise levels (24 hours)</li> </ul>	Once before start of construction Yearly 3 -times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-year period considered) Testing through NABL approved laboratory	Contractor	Cost for implementation of monitoring measures responsibility of contractor (200 samples x Rs,1500 per sample = Rs.300,000)
Surface water quality	10 locations (selected during implementation)	<ul style="list-style-type: none"> <li>pH, Oil and grease, Cl, F, NO<sub>3</sub>, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity</li> </ul>	Once before start of construction Yearly 3-times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-year period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (100 samples x Rs.5000 per sample = Rs.500,000)

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
			Testing through NABL approved laboratory		
Soil quality	10 locations (including, construction camps, workers camps)	<ul style="list-style-type: none"> <li>pH, Elect. Conductivity (at 25°C), Moisture (at 105°C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO<sub>4</sub>), Potassium (as K), Organic Matter, oil and grease</li> </ul>	Once before start of construction Yearly 3-times (for seasons: pre-monsoon, post-monsoon and winter) during construction (3-year period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (100 samples x Rs.5000 per samples = Rs.500,000.00)
Ground Water Quality	10 locations (including workers camp site & Construction camp/storage yards)	<ul style="list-style-type: none"> <li>As per IS10,500: 2012</li> </ul>	Once before start of construction Yearly 3-times during construction (3-year period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (100 samples x Rs.6000 per samples = Rs.600,000.00)

**Table 43B: Construction Stage Environmental Monitoring Plan (EM/03 and EM/04)**

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 other safety measures.  Accidents recorded	Weekly during construction	Supervising staff and safeguards specialists	Cost for implementation and monitoring is responsibility of contractor
Ambient air quality	8 locations (Selected during implementation to represent the overall project area)	<ul style="list-style-type: none"> <li>PM<sub>10</sub>, PM<sub>2.5</sub>, NO<sub>2</sub>, SO<sub>2</sub>, CO</li> </ul>	Once before start of construction Yearly 3-times (for seasons: pre-monsoon, post-monsoon and winter) during construction (2year period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (48 samples x Rs.5000 per sample = Rs.240,000)

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
			Testing through NABL approved laboratory		
Ambient noise	15 locations (Same as air quality monitoring)	<ul style="list-style-type: none"> <li>Day time and night time noise levels (24 hours)</li> </ul>	<p>Once before start of construction</p> <p>Yearly 3 -times (for seasons: pre-monsoon, post-monsoon and winter) during construction (2-year period considered)</p> <p>Testing through NABL approved laboratory</p>	Contractor	Cost for implementation of monitoring measures responsibility of contractor (90 samples x Rs,1500 per sample = Rs.1,35,000)
Surface water quality	8 locations (selected during implementation)	<ul style="list-style-type: none"> <li>pH, Oil and grease, Cl, F, NO<sub>3</sub>, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity</li> </ul>	<p>Once before start of construction</p> <p>Yearly 3-times (for seasons: pre-monsoon, post-monsoon and winter) during construction (2-year period considered)</p> <p>Testing through NABL approved laboratory</p>	Contractor	Cost for implementation of monitoring measures responsibility of contractor (48 samples x Rs.5000 per sample = Rs.240,000)
Soil quality	8 locations (including, construction camps, workers camps)	<ul style="list-style-type: none"> <li>pH, Elect. Conductivity (at 25°C), Moisture (at 105°C), Texture (silt, clay, sand), Calcium (as CaO), Magnesium (as Mg), Permeability, Nitrogen (as N), Sodium (as Na), Phosphate (as PO<sub>4</sub>), Potassium (as K), Organic Matter, oil and grease</li> </ul>	<p>Once before start of construction</p> <p>Yearly 3-times (for seasons: pre-monsoon, post-monsoon and winter) during construction (2-year period considered)</p>	Contractor	Cost for implementation of monitoring measures responsibility of contractor (48 samples x Rs.5000 per samples = Rs.240,000.00)

Monitoring Field	Monitoring Location	Monitoring Parameters	Frequency	Responsibility	Cost and Source of Funds
Ground Water Quality	8 locations (including workers camp site & Construction camp/storage yards)	<ul style="list-style-type: none"> <li>As per IS10,500: 2012</li> </ul>	Once before start of construction Yearly 3-times during construction (2-year period considered)	Contractor	Cost for implementation of monitoring measures responsibility of contractor (48 samples x Rs.6000 per samples = Rs.2,88,000.00)

**Table 44: 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 Fecal coliform	Monthly once	PHED	O&M costs (Water quality will be tested at the internal laboratory part of water treatment plant)
Raw water quality	Groundwater tube wells	Water quality parameters prescribed for raw water sources (salinity, TDS, conductivity, DO, BOD, Coliform, etc.)	Monthly once	PHED	O&M costs (Water quality will be tested at the internal laboratory part of water treatment plant)
Groundwater Resource Monitoring	Groundwater tube wells	Hydrological parameters (depth of water table, drawdown, etc.)	As defined in the standard operations manual	PHED	O&M costs (Water quality will be tested at the internal laboratory part of water treatment plant)

## B. Implementation Arrangements

232. 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 supported by district level Project Implementation Units (PIUs). PMU is headed by a Project Director (PD) in the rank of IAS. Each PIU headed by a Superintending Engineer (SE), reporting to the PD. PMU with the support of PIUs 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).

233. **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 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.

234. 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 SEMP 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.

235. **Project Implementation Unit.** At each PIU, an Assistant Engineer has given additional responsibilities of safeguard tasks and has been designated as Assistant Safeguards Officer. The Safeguard Officer oversee 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.

236. The PIUs are assisted by DSISC teams which 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 sub-contractors, if any, comply with the measures set forth in the EMP;
- (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.

237. **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, COVID 19 risk to employees and local communities surrounding the project sites. The contractor appoints an Environment, Health and Safety (EHS) supervisor to implement EMP. The EHS Supervisor will update the EMP and submit a SEMP for approval of PIU. Contractors will 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 EMP 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

238. 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, SEMP, resettlement plans, DDRs and IPPs (as required) upon the completion of project detailed design; (iv) improved coordination within nodal departments; (v) monitoring and reporting system; and (vi) 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.

239. The following **Table 45** presents the outline of capacity building program to ensure EMP implementation. The estimated cost is ₹375,000 (excluding trainings of contractors which will be part of EMP implementation cost during construction) to be covered by the project's capacity building program. The detailed cost and specific modules are customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the Environmental Specialist of PMC.

**Table 45: 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) <ul style="list-style-type: none"> <li>- ADB Safeguards Policy Statement</li> <li>- 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.</li> <li>- Incorporation of EMP into the project design and contracts</li> <li>- Monitoring, reporting and corrective action planning</li> </ul>	All staff and consultants involved in the project  At PMU (combined program for all subprojects)	₹100,000.00	<b>PMU Cost</b>
2. EMP implementation (1 day) <ul style="list-style-type: none"> <li>- EMP mitigation and monitoring measures</li> <li>- Roles and responsibilities</li> <li>- Public relations, - Consultations</li> <li>- Grievance redress</li> <li>- Monitoring and corrective action planning</li> <li>- Reporting and disclosure</li> <li>- Construction site standard operating procedures (SOP)</li> <li>- Health &amp; safety, specifically health risk from communicable diseases such as COVID 19.</li> <li>-- Chance finds (archeological) protocol</li> <li>- AC pipe protocol</li> <li>- Traffic management plan</li> <li>- Waste management plan</li> </ul>	All PIU staff, contractor staff and consultants involved in the subproject  At PIU (Purba/ East Medinipur)	₹50,000 (Lump sum)	<b>PMU Cost</b>

Description	Target Participants and Venue	Estimate (₹)	Cost and Source of Funds
- Site clean-up and restoration			
3. Plans and Protocols (1 day) - Construction site standard operating procedures (SOP) - AC pipe protocol - Site-specific EMP - Site specific mitigation measures to avoid spreading of communicable diseases like COVID 19 - 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 (Purba/ East Medinipur)	₹25,000 (Lump sum)  ₹50,000 (Lump sum)	<b>PMU cost</b>  <b>Contractors cost</b> 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)	<b>PMU Cost</b>
5. Contractors Orientation to Workers (1 day) - Environment, health and safety in project construction - Health impact and protection from communicable diseases like 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)	₹50,000 (Lump sum)	<b>Contractors cost</b> as compliance to contract provisions on EMP implementation (refer to EMP tables)

#### Summary of Capacity Building cost for EMP Implementation

Contractor Cost	- INR 100,000
PMU Cost	- INR 275,000
<b>Total Cost</b>	<b>- INR 375,000</b>

#### D. Monitoring and Reporting

240. 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.

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

242. 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 16**.

243. ADB reviews project performance against the WBDWSIP and AF 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

244. 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 46A (revised Package EM/02) and 44B** (Package EM/03) shows cost estimation for implementation of Environmental Management Plan.

**Table 46A: Cost Estimates to Implement the Environmental Management Plan (EM/02)**

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
<b>A. Implementation staff</b>							
1	EHS Supervisor	Construction	Per month	36	50,000	1,800,000	Contractor's cost
	<b>Subtotal (A)</b>	<b>1,800,000</b>					
<b>B. Mitigation Measures</b>							
1	Consent for establishments and consent for operation from WBPCB; Other statutory permissions	Pre-construction	Lump sum			50,000	Project costs
2	Provision for tree cutting and compensatory plantation measures (1:5 ratio replantation)	Construction	Per tree	250	2,000	500,000	Contractor's cost
3	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	200,000	Contractor's cost
4.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rain Water Harvesting for water conservation etc.)	Construction	Lump sum	-	-	100,000	Contractor's cost

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
5	Arrangement of resources for prevention of health risk from COVID 19 pandemic	Construction	Provision - Lump sum	-	-	100,000	Contractor's cost supported from Project cost on actual basis
<b>Subtotal (B)</b>		<b>9,50,000</b>					
<b>C. Monitoring Measures</b>							
1	Air quality monitoring	Pre-Construction and Construction periods	per sample	50	5,000	250,000	Contractor's cost
2	Noise levels monitoring	Do	Per sample	100	1,500	150,000	Contractor's cost
3	Groundwater quality monitoring		Per sample	50	6000	300,000	Contractor's cost
4	Surface water quality monitoring	Do	Per sample	50	5,000	250,000	Contractor's cost
5	Soil Quality	Do	Per sample	50	5000	250,000	Contractor's cost
<b>Subtotal (C)</b>		<b>1,200,000</b>					
<b>D. Capacity Building</b>							
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			50,000	PMU
2	EMP implementation	Construction	lump sum			25,000	PMU
3	Preparation of plans and protocols (traffic management plan, waste (spoils) management plan etc.,	Construction	lump sum			12,500	PMU
			lump sum			25,000	Contractor's cost
4.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Contractor's cost
5.	Experiences and best practices sharing	Construction /post-construction	lump sum			50,000	PMU
<b>Subtotal (D)</b>		<b>187,500</b>					
<b>Total (A+B+C+D)</b>		<b>4,137,500</b>					

Contractor Cost - ₹ 4,000,000.00  
PMU Cost - ₹ 137,500.00  
**Total Cost - ₹ 4,137,500.00**

**Table 44B: Cost Estimates to Implement the Environmental Management Plan (EM/03)**

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
<b>A. Implementation staff</b>							
1	EHS Supervisor	Construction	per month	24	50,000	1,200,000	Contractor's cost
	<b>Subtotal (A)</b>	<b>1,200,000/-</b>					
<b>B. Mitigation Measures</b>							
1	Consent for establishments and consent for operation from WBPCB; Other statutory permissions	Pre-construction	Lump sum			30,000	Project costs
2	Provision for tree cutting and compensatory plantation measures (1:5 ratio replantation)	Construction	Per tree	100	2,000	200,000	Contractor's cost
3	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	100,000	Contractor's cost
4.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rain Water Harvesting for water conservation etc.)	Construction	Lump sum	-	-	100,000	Contractor's cost
5	Arrangement of resources for prevention of health risk such as COVID 19	Construction	Provision - Lump sum	-	-	50,000	Contractor's cost supported from Project cost on actual basis
	<b>Subtotal (B)</b>	<b>4,80,000/-</b>					
<b>C. Monitoring Measures</b>							
1	Air quality monitoring	Pre-Construction and Construction periods	per sample	48	5,000	240,000	Contractor's cost
2	Noise levels monitoring	Do	Per sample	90	1,500	135,000	Contractor's cost
3	Groundwater quality monitoring		Per sample	48	6000	288,000	Contractor's cost
4	Surface water quality monitoring	Do	Per sample	48	5,000	240,000	Contractor's cost

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
5	Soil Quality	Do	Per sample	48	5,000	240,000	Contractor's cost
	<b>Subtotal (C)</b>	<b>11,43,000/-</b>					
<b>D. Capacity Building</b>							
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			50,000	PMU
2	EMP implementation	Construction	lump sum			25,000	PMU
3	Preparation of plans and protocols (traffic management plan, waste (spoils) management plan etc.,	Construction	lump sum			12,500	PMU
			lump sum			25,000	Contractor's cost
4.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Contractor's cost
5.	Experiences and best practices sharing	Construction /post-construction	lump sum			50,000	PMU
	<b>Subtotal (D)</b>	<b>187,500/-</b>					
	<b>Total (A+B+C+D)</b>	<b>30,10,500.00</b>					

Contractor Cost - ₹ 28,73,000.00

PMU Cost - ₹ 1,37,500.00

Total Cost - ₹ 30,10,500.00

**Table 46B: Cost Estimates to Implement the Environmental Management Plan (EM/04)**

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By
<b>A. Implementation staff</b>							
1	EHS Supervisor	Construction	per month	24	50,000	1,200,000	Contractor's cost
	<b>Subtotal (A)</b>	<b>1,200,000/-</b>					
<b>B. Mitigation Measures</b>							
1	Consent for establishments and consent for operation from WBPCB; Other statutory permissions	Pre-construction	Lump sum			30,000	Project costs
2	Provision for tree cutting and compensatory	Construction	Per tree	100 <sup>15</sup>	2,000	200,000	Contractor's cost

<sup>15</sup> The number of trees is only an estimate. This may be removed/reduced depending on actual site conditions.

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By	
	plantation measures (1:5 ratio replantation)							
3	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	100,000	Contractor's cost	
4.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rain Water Harvesting for water conservation etc.)	Construction	Lump sum	-	-	100,000	Contractor's cost	
5	Arrangement of resources for prevention of health risk such as COVID 19	Construction	Provision - Lump sum	-	-	50,000	Contractor's cost supported from Project cost on actual basis	
	<b>Subtotal (B)</b>	<b>4,80,000/-</b>						
<b>C. Monitoring Measures</b>								
1	Air quality monitoring	Pre-Construction and Construction periods	per sample	48	5,000	240,000	Contractor's cost	
2	Noise levels monitoring	Do	Per sample	90	1,500	135,000	Contractor's cost	
3	Groundwater quality monitoring		Per sample	48	6000	288,000	Contractor's cost	
4	Surface water quality monitoring	Do	Per sample	48	5,000	240,000	Contractor's cost	
5	Soil Quality	Do	Per sample	48	5,000	240,000	Contractor's cost	
	<b>Subtotal (C)</b>	<b>11,43,000/-</b>						
<b>D. Capacity Building</b>								
1	Introduction and sensitization to environment issues	Pre-construction	lump sum			50,000	PMU	
2	EMP implementation	Construction	lump sum			25,000	PMU	
3	Preparation of plans and protocols (traffic management plan, waste (spoils) management plan etc.,	Construction	lump sum			12,500	PMU	
			lump sum			25,000	Contractor's cost	

Sr. no.	Particulars	Stages	Unit	Total No.	Rate (₹)	Cost (₹)	Costs Covered By	
4.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			25,000	Contractor's cost	
5.	Experiences and best practices sharing	Construction /post-construction	lump sum			50,000	PMU	
	<b>Subtotal (D)</b>	<b>187,500/-</b>						
	<b>Total (A+B+C+D)</b>	<b>30,10,500.00</b>						

**Contractor Cost - ₹ 28,73,000.00**

**PMU Cost - ₹ 1,37,500.00**

**Total Cost - ₹ 30,10,500.00**

## IX. CONCLUSION AND RECOMMENDATIONS

245. The Project will provide safe, sustainable, and inclusive drinking water services in Nandigram I and II block in Purba Medinipur. The benefits arising from this subproject include: (i) increased availability of potable water at appropriate pressure to all households including rural poor, (ii) reduced time and costs in accessing alternative sources of water, (iii) better public health particularly reduction in waterborne and infectious diseases, and (iv) reduced risk of groundwater contamination.

246. The WBDWSIP Additional Financing will fund cost overruns from the original loan, WBDWSIP, and the proposed interim salinity mitigation measures to ensure safe and sufficient water supply in Nandigram I and II blocks in Purba Medinipur.

247. This IEE report is prepared based on the revised scope of works under Package EM/02 under the original loan, and the proposed new Packages EM/03 and EM/04 (salinity mitigation measures) under additional financing. For Package EM/02, the scope was revised to include (i) Construction and Commissioning of two Intermediate Booster Pumping Station cum Ground Level Storage Reservoirs (IBPS cum GLSR) at Nandigram I and II blocks; (ii) Construction of 10 new overhead reservoirs (OHRs) at Nandigram I block and 5 new OHRs at Nandigram II blocks; (iii) Laying of 98.18 km secondary clear water rising main from GLSRs to OHRs; (iv) laying of 1943.44 km distribution network in 22 zones covering both Nandigram I and II, and (v) provision of domestic water meters for household water connections (approx. 64818 nos.) with water meters. Package EM/03 will take up the remaining 10 nos. of new OHRs in Nandigram I and 4 nos. of new OHRs in Nandigram II, and a distribution pipeline of 427.25 m in 7 zones of Nandigram I. Provision of domestic water meters for household water connections (approx. 20379 nos.) with water meters is also proposed under Package EM/03. Package EM/04 (salinity mitigation measures) is proposed to cover the construction of two additional pre-sedimentation tanks of 45 million liters total storage capacity and installation of three new deep tubewells with total of 2 million liters per day production capacity. In total, Packages EM/02 and EM/03 include 29 OHR zones and 29 pipeline zones where design has been completed, SEMP's have been submitted by the contractor and construction activities are continued in accordance with ADB SPS's requirement.

248. There are no environmentally sensitive areas such as protected areas or culturally important sites in the project sites. The components are proposed in government lands. The Project will have site-specific, short-term, and localized impacts during construction which can be mitigated or minimized to acceptable levels with good construction practices and measures defined in the EMP.

249. Based on the Project's feasibility study<sup>16</sup>, fresh and potable groundwater is available at the deeper aquifer in Purba Medinipur at 120-300 meters depth. However, according to CGWB, overexploitation of groundwater from the deeper freshwater aquifer may lead to saline water intrusion into the freshwater aquifer. Considering the concern expressed by CGWB, only a few additional (3 HDTWs) on a pilot basis are considered for the interim salinity mitigation project. Hydrogeological investigations and installation of pilot HDTWs shall be planned / developed as recommended in the feasibility report. The EMP includes design, construction and operation stage measures to ensure safe and sustainable groundwater source development and extraction and

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<sup>16</sup> Feasibility Report on Construction of Additional Heavy-Duty Tube well (HDTW) in Nandakumar, Chandipur, Nandigram I & II Blocks of Purba Medinipur District, West Bengal to Meet the Water Demand During Lean Period prepared by the Project Management Consultant of WBDWSIP (5/4/2022)

ensure that the Project will not result in irreversible, diverse or unprecedented adverse impact. Required permits/clearances for groundwater resource development shall be obtained.

250. Public consultations were conducted during the preparation of the IEE and will continue during project implementation. Grievance redress mechanism has been established under the original loan and will be adopted in the additional financing. The project's grievance redress mechanism provides the citizens with a platform for redressing their grievances, and describes the informal and formal channels, time frame, and mechanisms for resolving complaints about environmental performance.

251. The project is Category B for environment and is unlikely to cause significant adverse impact with diligent implementation of the EMP. The IEE will be included in the bid and contract documents. Updated IEE will be prepared based on the final design of the project components and will be submitted to ADB for review and clearance prior to contract award and/or the start of construction.

## Appendix 1: Rapid Environmental Assessment Checklist (Updated)

**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 Nandigram I & II blocks of Purba Medinipur District.

**Sector:** Urban Development

**Subsector:** Water Supply

**Division/Department:** SARD/SAUW

SCREENING QUESTIONS	Yes	No	REMARKS
<b>A. Project Siting</b>			
<b>Is the project area...</b>			
▪ Densely populated?		√	Project area moderately populated Subproject activities extend to the entire Nandigram I & II blocks 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>B. Potential Environmental Impacts</b>			
<b>Will the Project cause...</b>			
<ul style="list-style-type: none"> <li>Pollution of raw water supply from upstream waste water discharge from communities, industries, agriculture, and soil erosion runoff?</li> </ul>		√	Subproject deals with provision of distribution system. No source augmentation or treatment are part of this package. 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 Rupnarayan river.
<ul style="list-style-type: none"> <li>Impairment of historical/cultural monuments/areas and loss/damage to these sites?</li> </ul>		√	No impact expected. No cultural monuments and historical sites near project locations.
<ul style="list-style-type: none"> <li>Hazard of land subsidence caused by excessive ground water pumping?</li> </ul>		√	Not applicable; subproject does not involve groundwater abstraction.
<ul style="list-style-type: none"> <li>Social conflicts arising from displacement of communities?</li> </ul>		√	Project does not involve land acquisition /displacement. Social impacts are assessed through Resettlement Planning study of subproject
<ul style="list-style-type: none"> <li>Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?</li> </ul>		√	Not applicable; subproject does not involve source development/operation. Water allocation from Rupnarayan River is done for Nandigram I and II blocks by Irrigation department, Government of West Bengal and only allocated water shall be used for proposed water supply project
<ul style="list-style-type: none"> <li>Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?</li> </ul>		√	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. Normally Salinity level is high in Rupnarayan River water for 2-3 months during dry period of the year
<ul style="list-style-type: none"> <li>Delivery of unsafe water to distribution system?</li> </ul>		√	Not anticipated; treated water meeting drinking water standards at WTP will be delivered to distribution system from bulk water supply. Salinity hazard during dry months will be a problem and process of removal of salinity should be adopted.
<ul style="list-style-type: none"> <li>Inadequate protection of intake works or wells, leading to pollution of water supply?</li> </ul>		√	Protection of intake works should be ensured
<ul style="list-style-type: none"> <li>Over pumping of ground water, leading to salinization and ground subsidence?</li> </ul>		√	Not applicable; subproject does not involve groundwater abstraction
<ul style="list-style-type: none"> <li>Excessive algal growth in storage reservoir?</li> </ul>		√	Proper treatment, post chlorination and regular cleaning of storage reservoirs will be conducted during operation.
<ul style="list-style-type: none"> <li>Increase in production of sewage beyond capabilities of community facilities?</li> </ul>	√		Sanitation and sewerage system will be improved/developed in the project area

SCREENING QUESTIONS	Yes	No	REMARKS
<b>B. Potential Environmental Impacts</b>			
<b>Will the Project cause...</b>			
<ul style="list-style-type: none"> <li>Inadequate disposal of sludge from water treatment plants?</li> </ul>		√	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
<ul style="list-style-type: none"> <li>Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?</li> </ul>	√		Low noise pumps and machineries should be used in pumping stations to avoid noise to nearby public.
<ul style="list-style-type: none"> <li>Impairments associated with transmission lines and access roads?</li> </ul>	√		Temporary impairments are anticipated along the new transmission line routes during construction stage.
<ul style="list-style-type: none"> <li>Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.</li> </ul>	√		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.
<ul style="list-style-type: none"> <li>Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?</li> </ul>	√		Contractor has to take precautions in handling and usage of chlorine to avoid any health hazard
<ul style="list-style-type: none"> <li>Dislocation or involuntary resettlement of people</li> </ul>		√	Project does not involve land acquisition /displacement. There is no involuntary resettlement of people for project implementation. Temporary livelihood impacts will be envisaged for which DDR is prepared.
<ul style="list-style-type: none"> <li>Social conflicts between construction workers from other areas and community workers?</li> </ul>		√	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
<ul style="list-style-type: none"> <li>Noise and dust from construction activities?</li> </ul>	√		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.
<ul style="list-style-type: none"> <li>Increased road traffic due to interference of construction activities?</li> </ul>	√		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.
<ul style="list-style-type: none"> <li>Continuing soil erosion/silt runoff from construction operations?</li> </ul>	√		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.

SCREENING QUESTIONS	Yes	No	REMARKS
<b>B. Potential Environmental Impacts</b> <b>Will the Project cause...</b>			
<ul style="list-style-type: none"> <li>• Delivery of unsafe water due to poor O&amp;M treatment processes (especially mud accumulations in filters) and inadequate chlorination due to lack of adequate monitoring of chlorine residuals in distribution systems?</li> </ul>	√		Unsafe water may be delivered if efficient water treatment is not done at WTP
<ul style="list-style-type: none"> <li>• Delivery of water to distribution system, which is corrosive due to inadequate attention to feeding of corrective chemicals?</li> </ul>		√	Not envisaged. Non corrosive materials pipe will be used for distribution networks
<ul style="list-style-type: none"> <li>• Accidental leakage of chlorine gas?</li> </ul>	√		Accidental leakage of chlorine gas may take place during chlorination. Utmost care should be taken.
<ul style="list-style-type: none"> <li>• Excessive abstraction of water affecting downstream water users?</li> </ul>		√	Water for the project is allocated by Government and only allocated water shall be used for water supply services.
<ul style="list-style-type: none"> <li>• Competing uses of water?</li> </ul>		√	Not applicable. Water for the project is allocated by Government and only allocated water shall be used for water supply services.
<ul style="list-style-type: none"> <li>• Increased sewage flow due to increased water supply</li> </ul>	√		Sewerage system will also be improved under this project along with water supply
<ul style="list-style-type: none"> <li>• Increased volume of sullage (wastewater from cooking and washing) and sludge from wastewater treatment plant</li> </ul>	√		Sanitation and sewerage need to be improved.
<ul style="list-style-type: none"> <li>• Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?</li> </ul>		√	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
<ul style="list-style-type: none"> <li>• Social conflicts if workers from other regions or countries are hired?</li> </ul>		√	Outside workers will remain in labor camps and no social conflicts will be envisaged.

SCREENING QUESTIONS	Yes	No	REMARKS
<b>B. Potential Environmental Impacts</b>			
<b>Will the Project cause...</b>			
<ul style="list-style-type: none"> <li>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?</li> </ul>		√	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.
<ul style="list-style-type: none"> <li>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?</li> </ul>	√		Community safety risk may be there during construction during excavation for pipe laying, equipment and vehicle operation, construction of IBPS/GLSR and OHRs 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 Nandigram I & II blocks of Purba Medinipur District.

**Sector:** Urban Development

**Subsector:** Water Supply

**Division/Department:** SARD/SAUW

Screening Questions		Score	Remarks <sup>17</sup>
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 Nandigram I & II blocks receive a large volume of rains and construction works may be impacted during rainy season. Entire Purba Medinipur

<sup>17</sup> 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.

			district and the project are falls 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
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 <sup>a</sup>	India Ambient Air Quality Standard ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>	WHO Air Quality Guidelines ( $\mu\text{g}/\text{m}^3$ )		Applicable Per ADB SPS <sup>e</sup> ( $\mu\text{g}/\text{m}^3$ )
			Global Update <sup>c</sup> 2005	Second Edition 2000	
PM <sub>10</sub>	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 <sub>25</sub>	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 <sub>2</sub>	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 <sub>2</sub>	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 <sub>3</sub> )	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 <sub>3</sub> )	Industrial Residential, Rural and Other Areas	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)

Parameter	Location <sup>a</sup>	India Ambient Air Quality Standard ( $\mu\text{g}/\text{m}^3$ ) <sup>b</sup>	WHO Air Quality Guidelines ( $\mu\text{g}/\text{m}^3$ )		Applicable Per ADB SPS <sup>e</sup> ( $\mu\text{g}/\text{m}^3$ )
			Global Update <sup>c</sup> 2005	Second Edition 2000	
	Sensitive Area	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)
Benzene (C <sub>6</sub> H <sub>6</sub> )	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)

<sup>a</sup> Sensitive area refers to such areas notified by the India Central Government.

<sup>b</sup> Notification by Ministry of Environment and Forests, Government of India Environment (Protection) Seventh Amendment Rules, 2009

<sup>c</sup> WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. *Global update 2005*. WHO. 2006

<sup>d</sup> Air Quality Guidelines for Europe Second Edition. WHO 2000

<sup>e</sup> 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 <sup>-1</sup> )
	NO <sub>x</sub> +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<sub>x</sub> – 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.

## Stack 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 :

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

H = Total height of stack in metre

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

KVA = Total generator capacity of the set in KVA

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

<b>For Generator Sets</b>	<b>Total Height of stack in metre</b>
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 Monoxide; 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 <sup>a</sup> (dBA)		WHO Guidelines Value For Noise Levels Measured Out of Doors <sup>b</sup> (One Hour LA <sub>q</sub> in dBA)		Applicable Per ADB SPS <sup>c</sup> (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

<sup>a</sup> Noise Pollution (Regulation and Control) Rules, 2002 as amended up to 2010.

<sup>b</sup> Guidelines for Community Noise. WHO. 1999

<sup>c</sup> 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 17<sup>th</sup> May 2002 at serial no.94 and its amendments vide GSR No 520(E) dated 1<sup>st</sup> July 2003; GSR 448(E), dated 12<sup>th</sup> July 2004; GSR 315(E) dated 16<sup>th</sup> May 2005; GSR 464(E) dated 7<sup>th</sup> August 2006; GSR 566(E) dated 29<sup>th</sup> August 2007 and GSR 752(E) dated 24<sup>th</sup> October 2008; G.S.R. 215 (E), dated 15<sup>th</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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 1<sup>st</sup> 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 10<sup>th</sup>, 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: Extraction 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 29<sup>th</sup> 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 25<sup>th</sup> 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), dated the 3<sup>rd</sup> 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 devise 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) Application 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 31<sup>st</sup> 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 30<sup>th</sup> 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 Labour 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 <sup>a</sup>			WHO Guidelines for Drinking-Water Quality, 4 <sup>th</sup> Edition, 2011 <sup>b</sup>	Applicable Per ADB SPS <sup>c, d</sup>
	Parameter	Unit	Max. Concentration Limits <sup>d</sup>		
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			

<sup>a</sup> Bureau of India Standard 10500: 2012.

<sup>b</sup> Health-based guideline values.

<sup>c</sup> 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.

<sup>d</sup> 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 less
Outdoor bathing (Organized)	B	Total Coliforms Organism MPN/100ml shall be 500 or less pH between 6.5 and 8.5 Dissolved Oxygen 5mg/L or more Biochemical Oxygen Demand 5 days 20°C 3mg/L or less
Drinking water source after conventional treatment and disinfection	C	Total Coliforms Organism MPN/100ml shall be 5000 or less pH between 6 to 9 Dissolved Oxygen 4 mg/L or more Biochemical Oxygen Demand 5 days 20°C 3 mg/L or less
Propagation of Wild life and Fisheries	D	pH between 6.5 to 8.5 Dissolved Oxygen 4 mg/L or more Free Ammonia (as N) 1.2 mg/L or less
Irrigation, Industrial Cooling, Controlled Waste disposal	E	pH between 6.0 to 8.5 Electrical Conductivity at 25°C micro mhos/cm Max. 2250 Sodium absorption Ratio Max. 26 Boron Max. 2 mg/L

Source: Central Pollution Control Board

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

### **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/DSISC 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 CM/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. DSISC 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 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/CM/ACM DSISC and use of any apparently affected material should be done after permission of SE PIU/CM/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 PPEs 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. Cable 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 monsoon 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/ EE-PIU and Construction Manager DSISC 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 Consultations with Community Members/ Potential Beneficiaries/Stakeholders  
Consultations at Gokulnagar GP Office - Package EM/02**

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram-I	10.11.2023	Gokulnagar GP	PRI members including GP <i>Pradhan</i> (head of GP) with all stakeholders of WBDWSIP Total Participants: 12 Male: 11 Female: 01	PRI Members with all stakeholders of WBDWSIP regarding commencement of work at Jambari OHSR site (under Gokulnagar GP). GP members were appraised about the progress and the completion timeline.	 <p>Gokul Nagar, West Bengal, India MW02+79C, Gokul Nagar, West Bengal 721045, India Lat: 21.8928898° Long: 87.9402181° 10/11/23 02:36 PM GMT +05:30</p>

List of Participants in Consultation held on 10.11.23, at Gokulnagar GP Office - Package EM/02

West Bengal Drinking Water Sector Improvement Project  
Attendance Sheet for Public/Stakeholders Consultation Meeting

District: Purba Medinipur Block: Nandigram I  
 Village (Venue): Gokulnagar Duration of Discussion:  
 Date: 10.11.2023 Time: 2-00 P.M  
 No. of Participants: (Male: \_\_\_\_\_ Female: \_\_\_\_\_)

Sl. No.	Name	Sex	Designation	Signature	Phone Number
1	Dinabandhu Mondal	M	Pladkon	<i>[Signature]</i>	9062018819
2	Sambanta Chatterjee	M	A-E/PHE/ADB	<i>[Signature]</i>	9918934489
3	Deepshankar Roy	M	Asst. Officer-Jr H.C.	<i>[Signature]</i>	9831030067
4	Arijit Ghosh	M	Civil (Exe)	<i>[Signature]</i>	7989900948
5	Sachinjit Das	M	JE/PHE	<i>[Signature]</i>	
6	Soujanya Maity	F	DSISE, Social	<i>[Signature]</i>	7031827214
7	Ankur Kumar Sen	M	DSISE, Enamonal	<i>[Signature]</i>	7980414285
8					
9					
10					
11					
12					
13					
14					
15					

**Stakeholder Consultations at Haripur GP Office - Package EM/02**

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram-I	22.11.2023	Haripur GP	PRI members with all stakeholders of WBDWSIP Total Participants: 10 Male: 8 Female: 02	PRI Members with all stakeholders of WBDWSIP regarding resumption of work of Haripur OHSR. Work resumed upon consultation.	

**List of Participants in Consultation held on 22.11.23, at Haripur GP Office - Package EM/02**


West Bengal Drinking Water Sector Improvement Project  
Attendance Sheet for Public Stakeholders Consultation Meeting

District: Purba Medinipur Block: Nandigram - I  
 Village (Venue): Haripur GP Duration of Discussion: \_\_\_\_\_  
 Date: 22.11.2023 Time: 12:00 P.M.  
 No. of Participants: 09 (Male: 7 Female: 2)


Sl. No.	Name	Sex	Designation	Signature	Phone Number
1	Jayanti D. S.	F	Parishad	J. D. S.	9002133600
2	Muhammad Farid	M	capa-pradhan	M. F.	9733674728
3	Suman Maity	M	-	S. Maity	9735459836
4	Sourabh Ghosh	M	JE (SD)	S. Ghosh	894963179
5	Sourabh Manna	M	Support Engineer DSISC	S. Manna	9564325109
6	Satyajit Das	M	JE/PBE	S. Das	786580415
7	RASU RAJDE	M	LST ASL Haripur	R. Rajde	8584853452
8	Deepshankar Ray	M	JA/A/C.	D. Ray	9831030067
9	Sorajyoti Maity	F	DSISC, Social	S. Maity	7031827214
10					
11					
12					
13					
14					
15					

*S. Maity*

### Stakeholder Consultations at Jambari OHSR site - Package EM/02

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram-I	Jambari OHSR site	24.11.2023	PRI members with all stakeholders of WBDWSIP Total Participants: 17 Male: 16 Female: 01	PRI Members with all stakeholders of WBDWSIP regarding commencement of work at Jambari OHSR. It was decided that required lab testing will be conducted prior to resumption of work. Work resumed upon satisfactory lab testing results.	

### Stakeholder Consultations at Nandigram II BDO office - Package EM/02

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram-II	04.12.2023	Nandigram II BDO office	BDO N-II, PRI members with PIU, L&T, DSISC of WBDWSIP Total Participants: 16 Male: 09 Female: 07	BDO N-II, PRI members with PIU, L&T, DSISC of WBDWSIP regarding progress review. It was that all GPs should be informed prior to execution of any work and that road restoration work should immediately follow pipe laying.	

**Stakeholder Consultations at Nandigram I BDO office - Package EM/02**

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram-I	08.02.2024	Nandigram I BDO office	PRI members with all stakeholders of WBDWSIP Total Participants: 11 Male: 11 Female: 0	BDO N-I, PRI members with PIU, L&T, DSISC of WBDWSIP regarding resumption of work near Tengua crossing. It was decided to resume work shortly.	


**List of Participants in Consultation held on 08.02.24, at Nandigram I BDO office - Package EM/02**

West Bengal Drinking Water Sector Improvement Project  
Attendance Sheet for Public/Stakeholders Consultation Meeting

District: Purba Medinipur Block: Nandigram I  
 Village (Venue): Nandigram I, BDO office Duration of Discussion: WBDWSIP  
 Date: 08.02.2024 Time: 4:00 PM  
 No. of Participants: 10 (Male: \_\_\_\_\_ Female: \_\_\_\_\_)

Sl. No.	Name	Sex	Designation	Signature	Phone Number
1					
2	Sampad Kumar Chatterjee	M	AE/AOB/ho	<i>[Signature]</i>	8918834489
3	KOUSHIK SAHA	M	JE (AI)	<i>[Signature]</i>	9433648138
4	Pradyumn Chatterjee	M	AO/PI	<i>[Signature]</i>	9933569997
5	Satyajit Das	M	AO/SG	<i>[Signature]</i>	
6	Sourabh Mondal	M	AOA/MLL	<i>[Signature]</i>	9554781103
7	Anil Chatterjee	M	AOB/LT	<i>[Signature]</i>	9158341146
8	Arghya K. Sen	M	AOB/DSISC	<i>[Signature]</i>	7980414285
9	Debabrata Ray	M	LET	<i>[Signature]</i>	953030067
10	Pradyumn Chatterjee	M	909316809		
11	M. Subhrajyoti	M	Assistant Nandigram BDO office		9832409979
12					
13					
14					
15					

### Stakeholder Consultations at Khodambari Village - Package EM/02

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram -II	27.02.2024	Khodambari Village	L&T, DSISC of WBDWSIP and villagers of Khodambari Total Participants: 11 Male: 10 Female: 01	Public consultation regarding pipe laying along Khodambari village roads. All concerns related to access was resolved and it was decided to continue work as per schedule.	


#### List of Participants in Consultation held on 27.02.24, at Khodambari Village - Package EM/02

West Bengal Drinking Water Sector Improvement Project  
Attendance Sheet for Public/Stakeholders Consultation Meeting

District: Purba Medinipur Block: Nandigram II  
Village (Venue): Khodambari Duration of Discussion: 45 minutes  
Date: 27.02.2024 Time: 3:00 PM  
No. of Participants: 12 (Male: 11 Female: 01)

Sl. No.	Name	Sex	Designation	Signature	Phone Number
1	Sanku Chandra	M	Resident		
2	...	M	Resident		
3	Sanku Chandra	M	Resident		
4	...	M	Resident		
5	...	M	Resident		
6	Haranta Mondal	M	DSISC	Haranta	
7	Jyoti Singha	M	L&T	Jyoti	
8	Soumesh Mondal	M	DSISC	Soumesh	
9	Hridyansu Ray	M	DSISC	Hridyansu	
10	Arup Kumar	M	DSISC	Arup	
11	Soumyajoti Maity	F	DSISC, Social	Soumyajoti	
12	Aranya K. Sen	M	DSISC, Env	Aranya	
13					
14					
15					

## Stakeholder Consultations at Duragapur Village - Package EM/02

Block	Date	Place	Participants No.	Concerns / Issues discussed	Photographs
Nandigram-I	26.04.2024	Duragapur Village	PRI members with all stakeholders of WBDWSIP Total Participants: 12 Male: 11 Female: 01	Consultation with local public regarding pipe laying along village road ROW. Issue was resolved as it was decided that pipe will be laid adjacent to the road and there will no impact on private parcels.	

## List of Participants in Consultation held on 26.04.24, at Duragapur Village - Package EM/02

West Bengal Drinking Water Sector Improvement Project  
Attendance Sheet for Public/Stakeholders Consultation Meeting

District: Purba Medinipur Block: Nandigram I  
 Village (Venue): Duragapur Duration of Discussion: 1 hour 30 min  
 Date: 26.04.2024 Time: 1.00 P.M.  
 No. of Participants: 12 (Male: 11 Female: 01)

Sl. No.	Name	Sex	Designation	Signature	Phone Number
1.	Tapan Roy	M	Resident		94669 3913
2.	Prashanta Khelari	M	"		
3.	Sanjit Sing.	M	"		
4.	Dhiren Muanu	M	"		
5.	Ram Krishna Das	M	"		
6.	Manik Barman	M	"		
7.	Subanta Mitya	M	"		
8.	Sunandan Choudhary	M	"		
9.	Sripati Das	M	"		
10.	Lacmoy Choudhary	M	"		
11.	Arghya K Sen	M	Gen. Supervisor DSISE		7980414285
12.	Sovajyoti Maity	F	DSISE, Social		7031827214
13.					
14.					
15.					

### Appendix 12: Field Level Public Consultation

Public Consultation during construction (weekly for different working sites) - WBDWSIP

Package- EM 02 (Medinipur DWSP)											
SL. No.	Road/Lane No.	Date	PHE and utility service Connection Restoration- (in case affected) Remarks	Overburden soil / sludge/ silt removal - Remarks	Road Restoration- Remarks	Dust and noise problem- Remarks	Social safety arrangement- Caution tape/ barricade etc. by contractor - Remarks	Problem of local movements due to project activity - Remarks	Other Problem faced if any	Name of the person with address/ contact No.	Signature
1.	JL150/110	03/4/24	-	-	✓	-	-	-	-	SK. Masur	<i>[Signature]</i>
2.	JL170/102	06/4/24	-	-	-	✓	-	-	-	Raja SK.	<i>[Signature]</i>
3.	JL140/52	09/4/24	-	-	-	✓	-	-	-	Md. Gulam	<i>[Signature]</i>
4.	JL140/52	12/4/24	-	-	-	✓	-	-	-	Basanta Binas	<i>[Signature]</i>
5.	JL150/55	17/4/24	-	-	✓	-	-	-	-	Sariful Islam Sariful	<i>[Signature]</i>
6.	JL150/100	19/4/24	-	-	✓	-	-	-	-	Gulam Ali	<i>[Signature]</i>
7.	JL100/170	24/4/24	-	-	✓	-	-	-	-	Md. Selim	<i>[Signature]</i>
8.	JL100/170	27/4/24	-	-	-	✓	-	-	-	Raja Mustajid	<i>[Signature]</i>

Note: At least 8 such consultation in a month  
Need clear view from locals

*[Signature]*  
06/05/24.

(Date & Signature of Safety officer/ Engineer of Contractor)



## Appendix 14: 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 নং					
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	

## Appendix 15: 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.

  
 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.

  
 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, 13<sup>th</sup> 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 240 Million 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.

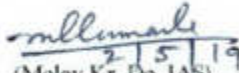
- vii) Postings of Sr. Accounts Officer at PMU and Accounts Officer at PIU- Purba Medinipur is required to be made on urgent basis as the loan disbursement and expenditures have already been started. The ADB officials highlighted the issue during their last mission. AGWB has already replied that there 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.

  
21519

Chief Secretary  
Government of West Bengal

Meeting on 16.04.2019- 1<sup>st</sup> 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 St.		pd.pmu.adb@wbphed.gov.in
8	Dr. Sudip Kt. Sinha Addl. Secretary, Finance		sudipkumar.sinha@yahoo.in
9	Subhasis Ray		Se. Piu/PMU.adb@wbphed.gov.in
10			SE PIU/PMU Pym
11	Sujay Barui		SE/PIU, Bankura
12	Nityananda Khan		SE/ME/PMU. Sema.pau.adb@wbphed.gov.in
13	Saunak Sen		caz.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-	<b>Chairperson</b>
2	The Principal Secretary / Additional Chief Secretary, PHE Department-	<b>Member</b>
3	The Principal Secretary / Additional Chief Secretary, P & RD Department	<b>Member</b>
4	The Principal Secretary/ Additional Chief Secretary, Finance Department	<b>Member</b>
5	The Principal Secretary/ Additional Chief Secretary, I & W Department	<b>Member</b>
6	The Principal Secretary/ Additional Chief Secretary, Public Works Department	<b>Member</b>
7	The Principal Secretary/Additional Chief Secretary, Urban Development & Municipal Affairs Department	<b>Member</b>
8	The Principal Secretary/ Additional Chief Secretary, Land and Land Reforms Department	<b>Member</b>
9	The Engineer-in-Chief, PHE Department	<b>Member</b>
10	The Project Director, WBDWSIP, PHE Directorate	<b>Member Secretary</b>
11	The District Magistrate (each District)	<b>Invitee Member</b>

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



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.

Atk. 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 ADS.
3. The Executive Engineer-I, PMU, WBDWSIP, PHE Dte.
4. The Executive Engineer, PIU, North 24 Parganas / Purba Medinipur / Bankura, WBDWSIP, PHE Dte.

Atk. 16.05.19  
 Chief Engineer & Project Director,  
 PMU, WBDWSIP, P.H.E. Dte.,  
 Govt. of West Bengal.

**PIU Level GRC**

**Government of West Bengal**  
Office of The Superintending Engineer  
Project Implementation Unit, Purba Medinipur  
W.B. Drinking Water Sector Improvement Project  
Public Health Engineering Directorate



**Address:**  
Bar Padumbasan  
(Old Zilla Parishad Office Building)  
Maniktala, Tamluk, Purba Medinipur, 721636  
Email : [piu.pm.adb@gmail.com](mailto:piu.pm.adb@gmail.com) ;  
[se\\_piupurmed.adb@wbphed.gov.in](mailto:se_piupurmed.adb@wbphed.gov.in)  
Phone – (03228) 266250

*Memo No: 238 /SE /PIU /PM*

*Dated Tamluk the, 12 / 12 / 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 Scheme in the district of Purba Medinipur under West Bengal Drinking Water Sector Improvement Project (WBDWSIP), a project level Grievance Redress Mechanism has been developed at PIU Level for PIU, Purba Medinipur, WBDWSIP, PHE Dte. with the following members:

1. **Chairperson** – The Executive Engineer (Civil), PIU, PM, WBDWSIP, PHE Dte.
2. **Member** - The Executive Engineer-I (M/E), PIU, PM, WBDWSIP, PHE Dte.
3. **Assistant Safeguard & Gender Officer** – The Assistant Engineer-II, PIU, PM, WBDWSIP, PHE Dte.
4. **Assistant Environmental Officer** – The Assistant Engineer-I, PIU, PM, WBDWSIP, PHE Dte.
5. **Junior Safeguard & Gender Officer** – The Junior Engineer-I, PIU, PM, WBDWSIP, PHE Dte.
6. **Junior Environmental Officer** – The Junior Engineer-I, PIU, PM, WBDWSIP, PHE Dte.
7. **Social/Gender/Resettlement Specialist** – DSISC, Purba Medinipur

**The function of GRC at PIU level are as follows: -**

- i. Accept Grievances of the Aggrieved persons through grievance redress/suggestion forms in complaints/suggestions boxes or through telephonic hotlines at accessible locations, by e-mail, by post or by writing in a complaint register in PIU office.
- ii. Careful documentation of the name of the complainer, date of receipt of the complaint, address/contact details of the aggrieved person, location of the problem area etc.
- iii. Address and facilitate resolution of Grievances not resolved at the field level within stipulated time (7 days)
- iv. The Assistant Safeguard Officer, PIU, Purba Medinipur, supported by the Social safeguard specialist of DSISC. PIU, Purba Medinipur will be responsible for conducting meeting with the affected/aggrieved person (s) to understand their concerns and help them through the process or grievances of non-literate affected persons and explaining the process of grievance redress mechanism.
- v. If the 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 taken up/ followed by this GRC.
- vi. PMU HSGO together with PIU safeguard officer will have the join responsibility for timely Grievance Redress on safeguards and Gender Issues and for registration of Grievance related disclosure and communication with the aggrieved party.
- vii. If Grievance cannot be resolved at the Project Level, they be refereed 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.

- viii. Any matter deemed higher than the district level or that may require inter-departmental coordination, the require Grievance redress will be referred to the State Level Steering Committee.
- ix. The GRC at PIU, Purba Medinipur will also responsible for follow-through for each grievance periodic information dissemination to complaints on the status of their grievances and recording their feedback (satisfaction/dissatisfaction and suggestions)
- x. Periodically Review the functioning of the GRM at this end as well as level.  
The GRC will continue to function throughout the project duration.



**Superintending Engineer**  
PIU, PM, WBDWSIP, PHE Dte.

*Memo No: 238 / 1 - 9 / SE / PIU / PM*

*Dated Tamluk the. 12 / 12 / 2019*

**Copy forwarded for information and necessary action to:-**

- i) The Chief Engineer & Project Director, PMU, WBDWSIP, PHE Dte.
- ii) The Superintending Engineer (M/E), PMU, WBDWSIP, PHE Dte.
- iii) The Executive Engineer-I, PMU, WBDWSIP, PHE Dte.
- iv) The Executive Engineer, PIU, PM, WBDWSIP, PHE Dte.
- v) The Executive Engineer-I (M/E), PIU, PM, WBDWSIP, PHE Dte.
- vi) The Assistant Engineer-I, PIU, PM, WBDWSIP, PHE Dte.
- vii) The Assistant Engineer-II, PIU, PM, WBDWSIP, PHE Dte.
- viii) The Junior Engineer-I, PIU, PM WBDWSIP, PHE Dte.
- ix) The Deputy Team Leader, DSISC, Purba Medinipur



**Superintending Engineer**  
PIU, PM, WBDWSIP, PHE Dte.

**Field Level GRC**

**Government of West Bengal**  
Office of The Superintending Engineer  
Project Implementation Unit, Purba Medinipur  
W.B. Drinking Water Sector Improvement Project  
Public Health Engineering Directorate



**Address:**  
Bar Padumbasan  
(Old Zilla Parishad Office Building)  
Maniktala, Tamluk, Purba Medinipur, 721636  
Email : [piu\\_pm\\_adb@gmail.com](mailto:piu_pm_adb@gmail.com) ;  
[se\\_piupurmed.adb@wbphed.gov.in](mailto:se_piupurmed.adb@wbphed.gov.in)  
Phone – (03228) 266250

Memo No: 67 / SE / PIU / PM

Dated Tamluk the, 13 / 02 / 2020

**NOTIFICATION**

In order to address Social, Environmental and any other project or subproject related grievances during implementation of Asian Development Bank (ADB) assisted piped water supply scheme in the district of East Medinipur (selected four Blocks Nandigram-I, Nandigram-II, Chandipur- and Nandakumar) 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. Assistant Safeguard & Gender Officer (The Assistant Engineer-II, PIU, PM, WBDWSIP, PHE Dte.) – **Chairperson**
2. Assistant Environment Officer (The Assistant Engineer-I, PIU, PM, WBDWSIP, PHE Dte.) – **Member**
3. Junior Safeguard & Gender Officer (The Junior Engineer-I, PIU, PM, WBDWSIP, PHE Dte) – **Member**
4. Junior Environment Officer (The Junior Engineer-I, PIU, PM, WBDWSIP, PHE Dte) - **Member**
5. Gram-Panchayat Pradhan of the concerned G.P. – **Member**
6. Panchayat Member of the concerned G.P. (Preferably Women) – **Member**
7. Social/Gender and Resettlement Specialist (DSISC) – **Member**
8. Support Staff Social (DSISC) – **Member**
9. Support Staff Environment (DSISC) – **Member**
10. Team Leader/representative of the Project NGO (East Medinipur) – **Member**
11. Health and Safety Officer from respective Project Contractor's representative – **Member**

*Mr Anisban  
for information  
and necessary  
action.  
Jellu  
19/2/20*

**The function of the field level grievance redress committee (GRC) to address field level grievances are as follows:**

- I. Accept grievances of the aggrieved person/s through grievance redress / suggestions forms in complaints / suggestion boxes or through telephonic hotlines at accessible locations, by e-mail, by post or by writing in complaint register in PIU office / field office of contractor.
- II. Careful documentation of the name of the complainant, date of receipt, address / contact details of the aggrieved person/s, location of the problem area and nature of the problem etc.
- III. Address and facilitate resolution of the Grievance / complaint within the stipulated time (7 days).
- IV. Health and Safety Officer of the Project Contractor supported the Social and Environment Safeguard support staffs from DSISC, PIU east Medinipur will be primarily responsible for conducting meeting/s with the affected / aggrieved person/s to understand their concern/s and help them through the process of grievance redress including translating the complaint/s in Bengali or English, recording and registering grievances of non-literate person/s and explaining the process of grievance redress mechanism.
- V. If the Field Level GRC fails to resolve the grievance/s, the matter may be conveyed to the PIU level GRC and the actions suggested may be followed by the field level GRC.
- VI. Field Level GRC will have the primary responsibility for timely grievance redress on safeguard and gender issues and for registration/recording of grievances, related disclosure and communication with the aggrieved party.

- VII. Field level GRC will be responsible for follow-up of each grievance, periodic information dissemination to complainants about the status of their grievance/s and recording their feedback (satisfaction/dissatisfaction and suggestions).

The GRC will continue throughout the WBDWSIP project duration at concerned Block / Gram Panchayats.

*13.2.2020*  
**Superintending Engineer**  
 PIU, PM, WBDWSIP, PHE Dte.

*Memo No: 67 / 1 - 60 / SE / PIU / PM*

*Dated Tamruk the, 13 / 02 / 2020*

**Copy forwarded for information and necessary action to:-**

1. The Chief Engineer & Project Director, PMU, WBDWSIP, PHE Dte.
2. The Superintending Engineer, PMU, WBDWSIP, PHE Dte.
3. The Superintending Engineer (M/E), PMU, WBDWSIP, PHE Dte.
4. The Executive Engineer-I, PMU, WBDWSIP, PHE Dte.
5. The Executive Engineer, PIU, PM, WBDWSIP, PHE Dte.
6. The Executive Engineer-I (M/E), PIU, PM, WBDWSIP, PHE Dte.
7. The Assistant Engineer-I, PIU, PM, WBDWSIP, PHE Dte.
8. The Assistant Engineer-II, PIU, PM, WBDWSIP, PHE Dte.
- 9-12. The Sabhapati, Nandigram-I, Nandigram-II, Chandipur, Nandakumar Panchayat Samity
- 13-16. The Block Development Officer, Nandigram-I, Nandigram-II, Chandipur, Nandakumar Block.
17. The Junior Engineer-I, PIU, PM WBDWSIP, PHE Dte.
- 18-56. The Pradhan, ..... GP, Nandigram - I / Nandigram-II/Nandakumar/Chandipur Panchayat Samity, Purba Medinipur.
57. The Deputy Team Leader, DSISC, Purba Medinipur
58. The Chief Operative Officer, Project NGO for WBDWSIP, Purba Medinipur
59. The Project Manager-EM01, Larsen & Toubro Limited.
60. The Project Manager, EM02, Larsen & Toubro Limited.

*13.2.2020*  
**Superintending Engineer**  
 PIU, PM, WBDWSIP, PHE Dte.

## New GRC & Safeguard Officers- Project and East Medinipur



West Bengal Drinking Water Sector Improvement Project  
(Asian Development Bank funded)

### PROJECT MANAGEMENT UNIT

Public Health Engineering Department,  
Government of West Bengal

Utility Building, 1st Floor, AA-1A (Tank No. 3), New Town, North 24 Parganas, - 700156



Memo No. PMU/WBDWSIP/PHED/94/714


Dated : 04-07-2024

#### OFFICE ORDER

Public Health Engineering Department (PHED) has established a dedicated "Safeguard and Gender Cell(SGC)" at Project Management Unit (PMU) level to ensure the implementation of Environmental and Social Safeguards as per ADB's Safeguard Policy Statement (SPS), 2009 and requisite requirements under Loan No.3696-IND.

#### Environment, Social and GESI- PMU

	Designation	Name	Contact details	Status
1	Superintending Engineer (Civil), PMU, WBDWSIP, Head SGS	Mr. Subhabrata Kundu	+91-9163236086	Available since- January 2024
2	Environment Specialist, PMC	Dr. Ardhendu Mitra	+919830415953	Available since- December 2018
3	Social, Gender & Resettlement Specialist, PMC	Mr. Arup Goswami	+919707020469	Available since April2024

  
**AYESHA RANI A, IAS**  
 Sr. Special Secretary, PHED and  
 Project Director, PMU, WBDWSIP

Memo No. PMU/WBDWSIP/PHED/94/714

Dated : 04-07-2024

Copy forwarded for information to :

- 1) Chief Engineer, PMU, WBDWSIP, PHED
- 2) Superintending Engineer, (Civil), PMU, WBDWSIP, PHED
- 3) Superintending Engineer, (M/E), PMU, WBDWSIP, PHED
- 4) The Executive Engineer – I / II, PMU, WBDWSIP, PHED
- 5) All PIUs, North 24 Paragans / Bankura / Purba Medinipur
- 6) Dy. Team Leader, PMC / Dr. Ardhendu Mitra, Environmental Specialist / Mr. Arup Goswami Social, Gender & Resettlement Specialist, PMC

  
**AYESHA RANI A, IAS**  
 Sr. Special Secretary, PHED and  
 Project Director, PMU, WBDWSIP



West Bengal Drinking Water Sector Improvement Project  
(Asian Development Bank funded)

**PROJECT MANAGEMENT UNIT**

Public Health Engineering Department,  
Government of West Bengal

Utility Building, 1st Floor, AA-IA (Tank No. 3), New Town, North 24 Parganas, - 700156



Memo No. PMU/WBDWSIP/PHED/94 / 357

Dated : 01-04-2024

**OFFICE ORDER**

Public Health Engineering Department (PHED) has established a dedicated Environment and Social Safeguard Unit (ESSU) at project implementation Unit (PIU) level, Purba Medinipur to ensure the implementation of Environmental and Social Safeguards as per ADB's Safeguard Policy Statement (SPS), 2009 and requisite requirements under Loan No.3696-IND.

**Environment, Social and GESI- PIU,Purba Medinipur.**

	Designation	Name	Contact details	Status
1	Executive Engineer, PIU,Purba Medinipur.	Mr.Chinmoy Raha	+91-9475606904	Available since- Jan 2024
2	Assistant Engineer-I PIU,Purba Medinipur.	Dr. Tapash Bera	+91-8597245053	Available since- August 2018
3	Team Leader DSISC,Purba Medinipur	Mr.Abbubakar Molla	+91-7899924214	Available since- February2021
4	Social, Gender & Resettlement Specialist,DSIS,Purba Medinipur	Mr. Anirban Chattopadhyay	+91-8334942333	No mobilization more than 1year
5	Environmental Specialist, DSISC Purba Medinipur.	Mr.Partho Sarathi Mukherjee	+91-7003881499	No mobilization more than 1year


  
**AYESHA RANI A, IAS**  
Sr. Special Secretary, PHED and  
Project Director, PMU, WBDWSIP

Memo No. PMU/WBDWSIP/PHED/94/357

Dated : 01-04-2024

Copy forwarded for information to

- 1) Superintending Engineer,(Civil),PIU,WBDWSIP,PHED

  
**AYESHA RANI A, IAS**  
Sr. Special Secretary, PHED and  
Project Director, PMU, WBDWSIP

## Appendix 16: 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) <sup>18</sup>	Contract Status (specify if under bidding or contract awarded)	If On-going Construction	
				%Physical Progress	Expected Completion Date

### 2. Compliance Status with National/State/Local Statutory Environmental Requirements<sup>19</sup>

<sup>18</sup> If on-going construction, include %physical progress and expected date of completion

<sup>19</sup> 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.

Package No.	Subproject Name	Statutory Environmental Requirements <sup>20</sup>	Status of Compliance <sup>21</sup>	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish <sup>22</sup>

**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 with the 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)		

- Identify the role/s of Safeguards Team including schedule of on-site verification of reports submitted by consultants and contractors.

<sup>20</sup> Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

<sup>21</sup> Specify if obtained, submitted and awaiting approval, application not yet submitted

<sup>22</sup>Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

- 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)<sup>23</sup>**

<b>Impacts (List from IEE)</b>	<b>Mitigation Measures (List from IEE)</b>	<b>Parameters Monitored (As a minimum those identified in the IEE should be monitored)</b>	<b>Method of Monitoring</b>	<b>Location of Monitoring</b>	<b>Date of Monitoring Conducted</b>	<b>Name of Person Who Conducted the Monitoring</b>
<b>Design Phase</b>						
<b>Pre-Construction Phase</b>						
<b>Construction Phase</b>						
<b>Operational Phase</b>						

<sup>23</sup> 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 $\mu\text{g}/\text{m}^3$	SO2 $\mu\text{g}/\text{m}^3$	NO2 $\mu\text{g}/\text{m}^3$

**Water Quality Results**

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity $\mu\text{S}/\text{cm}$	BOD $\text{mg}/\text{L}$	TSS $\text{mg}/\text{L}$	TN $\text{mg}/\text{L}$	TP $\text{mg}/\text{L}$

**Noise Quality Results**

Site No.	Date of Testing	Site Location	LA <sub>eq</sub> (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 17: 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***

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***Annex 1: Pandemic Plan Site Acknowledgement Form***

***Annex 2: Regular Health Monitoring Template***

***Annex 3: Roles & Responsibilities Matrix for Managing COVID 19 risks***

## 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](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><sup>24</sup>;
- 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](mailto: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.

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<sup>24</sup> 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 have 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.
	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.

District name	Inputs (Package No.)	Brief Project Components
	<b>DWW/BK/02B</b>	Design and Construction of Intermediate Pumping Station, Secondary transmission mains, overhead reservoirs including water distribution network and metering works in Taldangra Block.
	<b>DWW/BK/03</b>	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.
	<b>DWW/BK/04</b>	Design and Construction of Overhead Reservoir including Water Supply Distribution Network and Metering Works in Mejhia and Gangajalghati Blocks including Rehabilitation of Existing Scheme.
<b>East Midnapore</b>	<b>DWW/EM/01</b>	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.
	<b>DWW/EM/02</b>	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 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 breathing 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<sup>25</sup>
- Brief and remind staff regularly to cover mouth and nose when coughing or sneezing<sup>26</sup>
- 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°F, staff should be advised to go home and consult doctor and take suitable measures accordingly.<sup>27</sup>
- 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<sup>28</sup> 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

<sup>25</sup> Please refer to effective handwashing techniques should be demonstrated to workers and visual postings on site.

<sup>26</sup> Use of mask should be mandatory in line with local government guidance and international good practice

<sup>27</sup> Please refer to international best practice on use of thermal scanners in the shared referenced WHO Guidance.

<sup>28</sup> 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.

- 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 multiple locations and clearly visible for all, in line with international good practice.<sup>29</sup>
- All restroom/toilet facilities should be cleaned<sup>30</sup>, 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<sup>31</sup>
- 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<sup>32</sup>

<sup>29</sup> Please check free downloadable copies at the WHO webpages.

<sup>30</sup> Check the international good practice methods for disinfecting such frequently used places at the workplace.

<sup>31</sup> The workers with no sick-leave would be supported with additional leave while affected by COVID-19 by the Contractor.

<sup>32</sup> Refer to International good practice within the referenced guidance documents.

**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  
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](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 ASTM D6319- 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 of 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 of 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 spacious (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, breathening 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°C 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<sup>33</sup>

**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.
- 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/ worker
- 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

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<sup>33</sup> 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.

- 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 staffs/ 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<sup>34</sup> 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*)

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<sup>34</sup> Advisory on use of Homemade Protective Cover for Face & Mouth by Govt. of India

- 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*)
- 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(*camp*)
    - 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 number 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<sup>35</sup> 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.

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<sup>35</sup> Advisory on use of Homemade Protective Cover for Face & Mouth by GOI

- 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**

- 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 follows 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 individuals
- 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.<sup>36</sup>

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 identify 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 of IEC poster and responsibility matrix with contact details for display at each site.

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<sup>36</sup> 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.

**Annexure 1 Pandemic Plan Site XXXXX Acknowledgement Form**

<b>Project Name:</b>		<b>Location</b>	
<b>Date:</b>		<b>Client Name:</b>	
<b>S. No.</b>	<b>Description</b>	<b>Yes ( ✓ ) NO</b>	<b>Remarks</b>
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-19?		
9.	Is your locality falling 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		
<b>Declaration by Employee</b>			
I _____ declare that the information given by me above is true and correct to the best of my knowledge.			
Signature of Staff with Date: _____ Appropriate		Medical Professional at site Signature of 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**

<b>Project Name:</b>		<b>Location</b>	
Name:		Client Name:	
<b>S. No.</b>	<b>Description</b>	<b>Yes ( ✓ ) NO</b>	<b>Remarks</b>
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		
<p>Signature of Staff with Date: _____</p> <p>Signature of Admin. with Date: _____</p>			

**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								
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)**

<b>SN</b>	<b>Name</b>	<b>Occupation / Designation</b>	<b>Contact no</b>	<b>Company</b>	<b>Roles &amp; Responsibility</b>
1					
2					
3					
4					
5					
6					
7					
8					

## Appendix 18: Tree felling NOC – Package EM02

## NOC FOR TREE FELLING FOR SONACHURA (63 NOS)

Part I] THE KOLKATA GAZETTE EXTRAORDINARY, FEBRUARY 9, 2007 13

  
 Form for Permission for Felling ~~of~~ <sup>of</sup> Trees in Non-Forest Areas  
 [See Rule 3 (2)]

Permit No. 12/BK-28/22-23 Dated 15-06-2022

Whereas the applicant, Sri/Smt / Messrs Pradhar Sonachura G.P.  
 Address : Sonachura, Nandigram, Purbachal Medinipur has  
 submitted an application with the prescribed fee on 10-06-2022 for permission for felling  
 disposing of trees for the purpose of extension of channel at the following site

(a) Location : Gangrachar P.H. water line

(b) Details of Plots(s) of Land : 253, 250, 251, 249

AND Whereas the undersigned is satisfied with regard to the legality of documents towards  
 the proof of ownership or lease of the land on which such tree stands;

AND Whereas the purpose for which the trees are required to be felled is in conformity  
 with rule 4 (1) of the West Bengal Trees (Protection and Conservation in Non-Forest Areas  
 Rules, 2006 :

AND Whereas an inquiry in the prescribed manner has been carried out on .....  
 and the undersigned has examined the inquiry report with due care

AND Whereas the land in question belongs to the ..... Tea Garden and the applicant  
 has produced a specific scheme framed under the provisions of the Plantations Labour Act,  
 1951 for utilizing the sale proceeds strictly for the purpose of welfare of the labourers;

AND Whereas the applicant is a developer who has already obtained a Certificate of Clearance  
 No. .... dated ..... Issued by the undersigned and sanction of the  
 building / construction plan by the sanctioning authority, viz. ....  
 ..... vide his letter No. .... Dated .....

AND Whereas it is found on inquiry that the proposed felling will not alter nature or character  
 or mode of use of the land.

OR

The Applicant has produced the requisite permission under section 4C of the West Bengal  
 Land Reforms Act, 1955



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THE KOLKATA GAZETTE, EAST BENGAL, FEBRUARY 9, 2007

Part I

AND whereas the applicant has deposited the prescribed security amount for plantation of trees to the undersigned;



OR

The applicant has been exempted by the undersigned from the obligation of plantation of trees under sub-rule (2) of rule 6 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Rules, 2006.

OR

The applicant has expressed his inability to undertake the plantation of trees by himself and has deposited to the undersigned the amount for the designated agency as prescribed under sub-rule (3) of rule 6 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Rules, 2007.

OR

The applicant is a developer and not required to deposit the security amount

- \* Strike off if not applicable.
- \* Strike off the option which is not applicable.

Now, therefore, in persons to the power conferred under sub-section (1) of section 5 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006, the undersigned permits the applicant to undertake the felling of the trees as included in the Annexure.

The undersigned also permits the applicant (not a developer) under the first proviso to section 8 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006, to plant only \_\_\_\_\_ number of trees instead of the number prescribed under sub-rule (1) of rule 6 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) rules 2007. OR permits the applicant to plant .... number of trees over different plots(s) of land (as indicated in Condition No. 3 below) because (give reasons) ..... which is in conformity with sub-rule (2) of rule 6 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Rules, 2007;

The permission as given above is subject to the following conditions:-

This permit is non-transferable and valid only up to 15.06.2026 ~~up~~ before sunset

1. the applicant (if a developer) shall take up plantation of trees in accordance with the approved plantation plan and the Certificate of Clearance within ..... months from the date of sanction of the building / construction plan by the sanctioning authority.
2. The applicant (if not a developer) shall take up plantation of .. number of trees ..... over the Plot(s) No. .... within ..... months from the date of issue of this permit;

Part I]

THE KOLKATA GOVERNMENT ORDINARY, FEBRUARY 9, 2007



3. As provided in section 10 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006, the applicant (if not a developer) shall start preparatory work for plantation within sixty days from the date for permit or the date of receipt of directions from the undersigned, as the case may be, and shall undertake plantation for trees in accordance with such directions;
4. The applicant shall inform the undersigned in writing immediately on completion of the plantation of trees;
5. The applicant shall, within a week of carrying out felling of trees, submit a report to the undersigned indicating the total number of logs and firewood produced against each species;
6. Stamps of the felled trees shall be retained for a least one month from the date felling;
7. The felling and carriage of trees shall not be carried out after the sun-set and before the sun-rise.
8. This permission is subject to the provisions of the West Bengal forest (Establishment and Regulation of Saw Mills and Other Wood-based Industries) Rules, 1983 and The West Bengal Forest Produce Transit Rules, 1959.
9. This permit should be produced for inspection on demand to the undersigned or any of the authorities specified in sections 15 and 17 of the West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006.

(Signature of the Competent Authority)

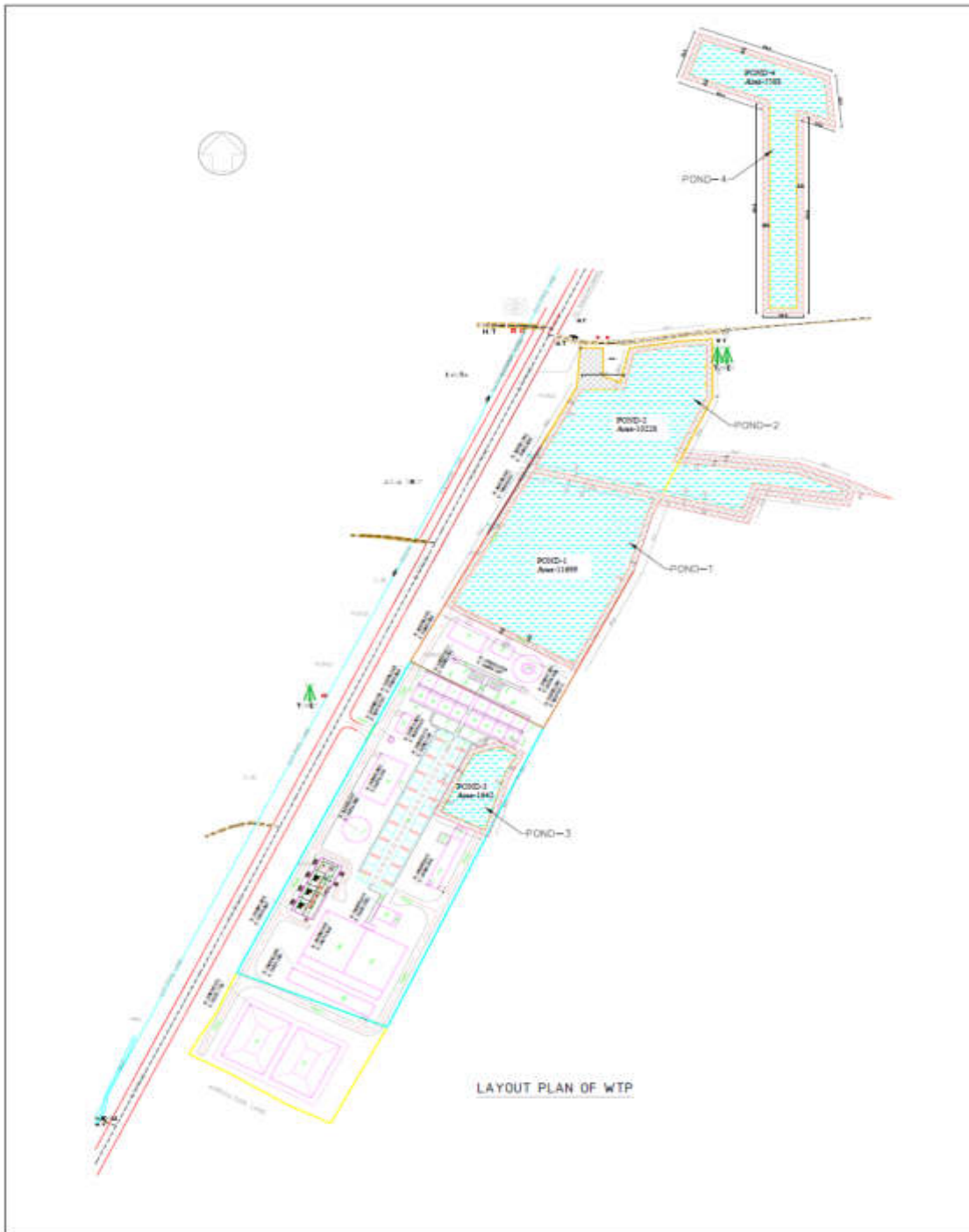
Name : SAMUK JANA  
Designation: Forest Ranger, Bajkul Range

Official Seal : Range Officer  
Bajkul Forest Range



Strike off if not applicable.

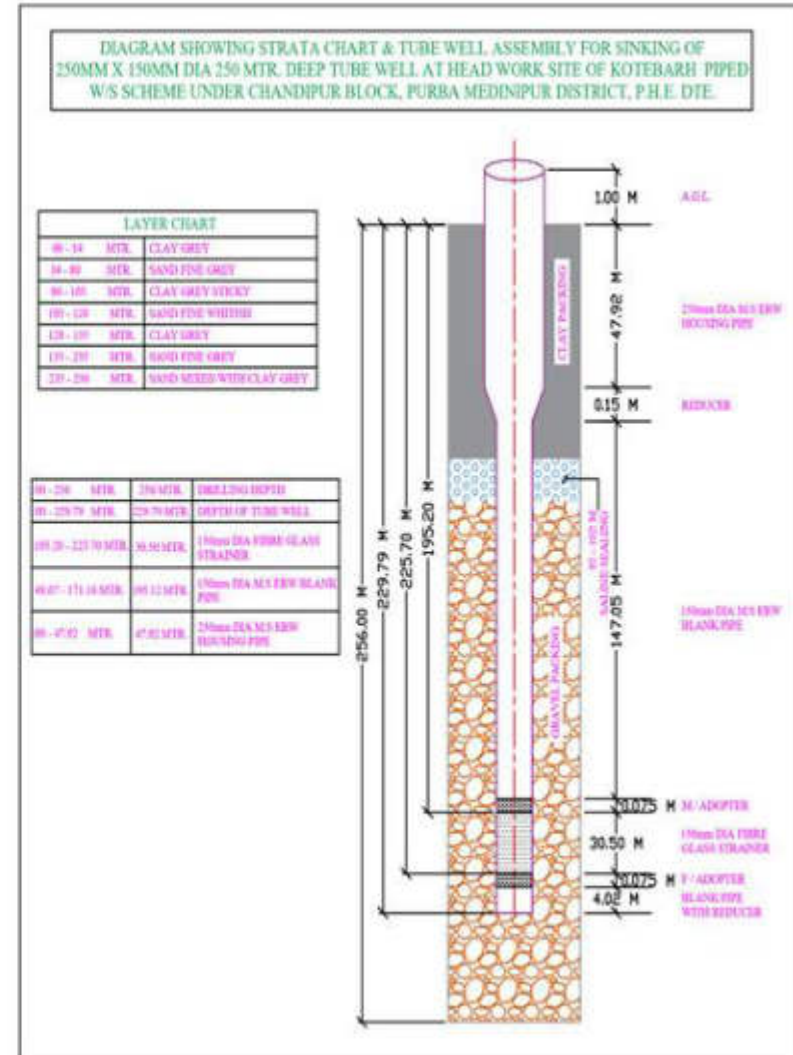
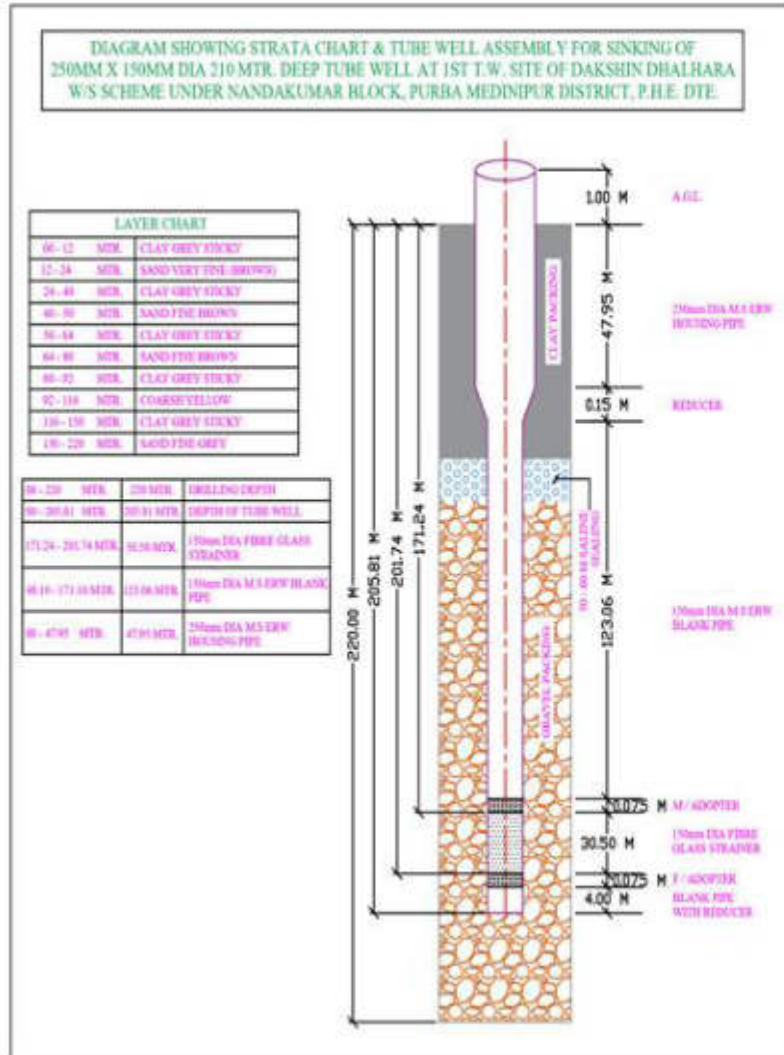
**Appendix 19: Layout plan of the WTP including the 4 Pre-Settling Ponds**

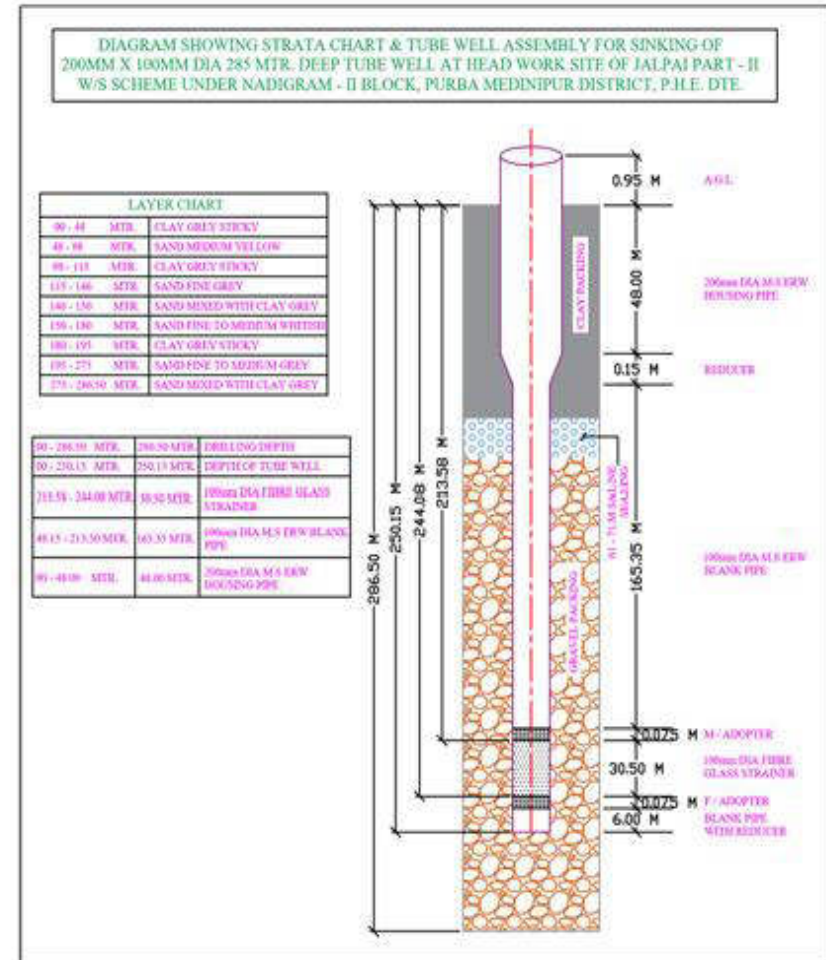
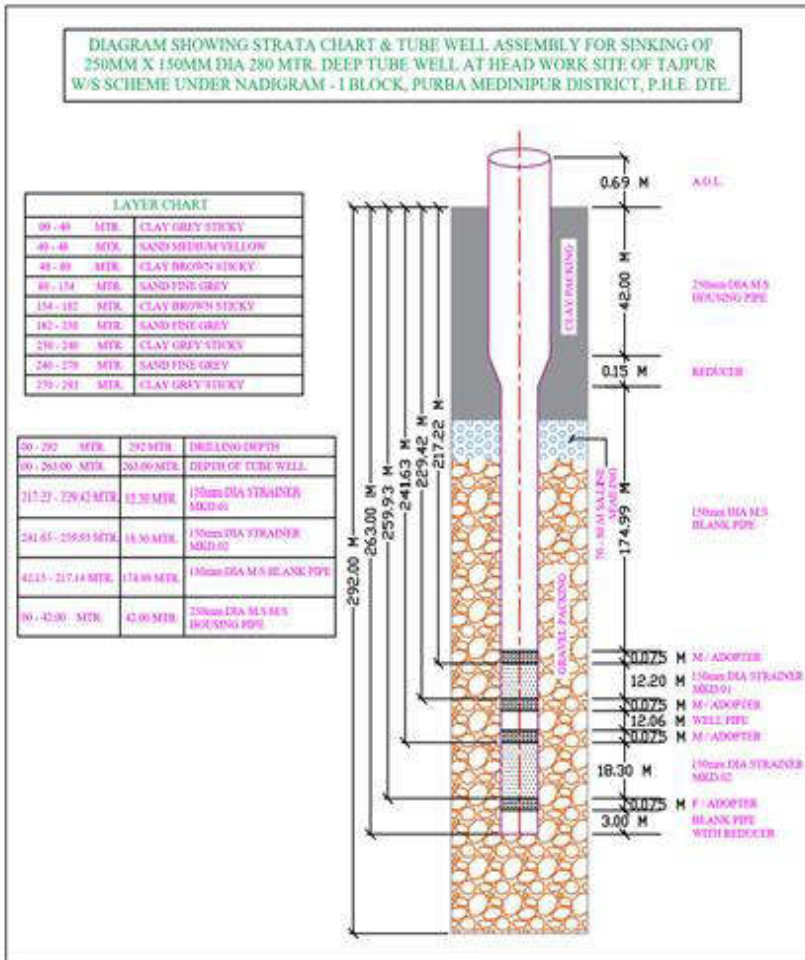


**Appendix 20: The WTP and the 4 Pre-Settling Ponds Marked on Google Earth**



Appendix 21: Lithologs of Existing Tube wells of PHED





**Appendix 22: Surface water quality of Runaraya River (Source: WBPCB)  
Water Quality Parameters of Rupnarayan River (2019)**

Parameter	2019												Surface water quality criteria by CPCB for Class C
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>Total Coliform (MPN/100ml)</b>	28000	17000	22000	22000	22000	22000	17000	14000	13000	14000	17000	13000	5000
<b>Faecal Coliform (MPN/100ml)</b>	13000	8000	11000	11000	11000	11000	8000	7900	7000	2200	3900	1400	---
<b>TDS (Mg/l)</b>	402	136	936	710	2306	1386	3376	566	900	242	432	572	1500
<b>TSS (Mg/l)</b>	108	226	274	244	228	116	544	354	860	84	420	290	
<b>Chloride (Mg/l)</b>	144.6	265.2	799.75	841.44	1066.5	574.06	619.8	639.8	599.81	679.78	639.80	304.01	600
<b>BOD (Mg/l)</b>	2	1.6	2.2	1.1	3.6	0.8	1.7	1.75	2.25	1.45	1.75	2	3
<b>DO (Mg/l)</b>	8.3	7.6	6.7	7	7.2	5.6	5.8	4.5	4.70	5.10	6.20	7.40	4
<b>Conductivity (us/cm)</b>	475	1162	1858	3050	3086	2180	6452	594.8	1911	373.80	1156	497.50	---
<b>Turbidity (NTU)</b>	85.1	177	155	110	408	76.3	556	405	767	140	185	156	---
<b>Total Hardness as CaCO<sub>3</sub></b>	186.85	237.35	247.47	385	443.87	272.73	787.23	297.87	303	356	362	345	---

(Source: West Bengal Pollution Control Board)

## Water Quality Parameters of Rupnarayan River (2020)

Parameter	2020												Surface water quality criteria by CPCB for Class C
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>Total Coliform (MPN/100ml)</b>	17000	14000	9400	ND	11000	14000	9400	8400	7900	9400	11000	9400	5000
<b>Faecal Coliform (MPN/100ml)</b>	2200	4600	2200	ND	4300	8400	3300	3300	3100	4300	6300	5800	---
<b>TDS (Mg/l)</b>	312	228	414	1964	2342	1834	536	200	132	142	504	1252	1500
<b>TSS (Mg/l)</b>	448	48	58	---	326	404	396	464	80	140	98	172	
<b>Chloride (Mg/l)</b>	56.57	113.15	264.03	229.92	773.23	1471.03	886.39	301.75	75.43	150.87	94.29	207.45	600
<b>BOD (Mg/l)</b>	1.80	1.70	0.95	2.67	1.7	0.6	2.55	0.9	2.8	1.5	0.95	1.75	3
<b>DO (Mg/l)</b>	8.70	6.60	6	6.4	7.4	6.1	8.1	6.5	8	8.4	8.1	7	4
<b>Conductivity (us/cm)</b>	857.50	530.70	598.40	2830	474	2182	1112	3045	281.4	266.6	493.9	712.5	---
<b>Turbidity (NTU)</b>	248	67.40	58.30	204	514.41	650	286	429	77.1	96.8	43.5	167	---
<b>Total Hardness as CaCO<sub>3</sub></b>	350	150	160	460	282	273	263	273	133	94	169	207	---

(Source: West Bengal Pollution Control Board)

## Water Quality Parameters of Rupnarayan River (2021)

Parameter	2021												Surface water quality criteria by CPCB for Class C
	Jan	Feb *	Mar *	Apr	May *	June *	Jul *	Aug *	Sep	Oct	Nov	Dec	
Total Coliform (MPN/100ml)	4600			7900					7000	7900	4600	4900	5000
Faecal Coliform (MPN/100ml)	930			4600					4600	3300	3300	2400	---
TDS (Mg/l)	302			4092					252	304	540	316	1500
TSS (Mg/l)	126			595					286.66	313.33	210	162	
Chloride (Mg/l)	188.59			739.77					75.43	56.57	8.39	79.74	600
BOD (Mg/l)	0.95			0.9					3.65	1.95	1.9	1.9	3
DO (Mg/l)	7.8			5.9					7.2	5.4	5.7	7.5	4
Conductivity (us/cm)	623.3			6725					281.6	305.9	656.3	498.1	---
Turbidity (NTU)	100			158					318.67	345	303	166	---
Total Hardness as CaCO <sub>3</sub>	302			479					75	71	71	164	---

\* Data of following months are not available at website

\* (Source: West Bengal Pollution Control Board)

## Water Quality Parameters of Rupnarayan River (2022)

Parameter	2022												Surface water quality criteria by CPCB for Class C
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Total Coliform (MPN/100ml)	7000	8400	7900	9400	8400	7000	6300	28000	7900	9400	11000	7000	5000
Faecal Coliform (MPN/100ml)	2700	210	4600	4600	6300	3300	3100	17000	4600	4600	4900	3900	---
TDS (Mg/l)	276	452	736	2012	580	650	744	3944	226	588	232	264	1500
TSS (Mg/l)	56	108	184	508	120	114	158	350	140	182	132	238	
Chloride (Mg/l)	66.95	35.83	358.33	924.11	141.44	235.74	282.89	1650.2	29.99	199.94	69.97	235.35	600
BOD (Mg/l)	1.9	1.55	1.95	1.45	0.55	1.25	1.25	1.75	0.85	1.25	1.2	0.95	3
DO (Mg/l)	7.9	5.4	5.3	6.5	6.6	7	7	5.9	5.4	5.3	5.7	7.2	4
Conductivity (us/cm)	399.1	455.3	1233	3474	626	1158	904.2	5749	349.7	763.9	373.5	495.2	---
Turbidity (NTU)	40.2	35.8	149	220	56.8	98.9	105	281	147.8	222	248	160	---
Total Hardness as CaCO <sub>3</sub>	181	179	2700	972	972	1620	167	670	135	173	130	152	---

(Source: West Bengal Pollution Control Board)

## Water Quality Parameters of Rupnarayan River (2023)

Parameter	2023												Surface water quality criteria by CPCB for Class C
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>Total Coliform (MPN/100ml)</b>	7900	8400	7900	7000	7000	7900	7900	9400	7900	7000	7900	6300	5000
<b>Faecal Coliform (MPN/100ml)</b>	4900	4600	210	3300	3400	4600	4600	4900	4600	3300	3300	3200	---
<b>TDS (Mg/l)</b>	622	324	548	428	724	2222	1178	1722	218	204	302	232	1500
<b>TSS (Mg/l)</b>	98	182	30	332	326	444	138	150	136	406	390	430	
<b>Chloride (Mg/l)</b>	96.35	688.36	137.97	954.6	980.69	955.94	737	1077.4	28.29	43.39	61.68	78	600
<b>BOD (Mg/l)</b>	1.9	0.8	2.5	2.05	0.95	1.3	2.5	1.15	2.35	2.9	1.55	1.7	3
<b>DO (Mg/l)</b>	7	6.2	5.9	5.6	6	5.3	6.1	6	5.1	5.1	6.4	7	4
<b>Conductivity (us/cm)</b>	376.2	2496	720.7	3184	3260	3270	3280	3945	415.7	427.4	521.8	534.6	---
<b>Turbidity (NTU)</b>	95.2	200.4	130.53	72.85	212.1	67.39	82.67	20.54	112	316	68.1	187	---
<b>Total Hardness as CaCO<sub>3</sub></b>	357	317	117	374	409	452	357	399	129	139	156	165	---

(Source: West Bengal Pollution Control Board)

## Water Quality Parameters of Rupnarayan River (2024)

Parameter	2024												Surface water quality criteria by CPCB for Class C
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
<b>Total Coliform (MPN/100ml)</b>	7000	7900	9400	14000									5000
<b>Faecal Coliform (MPN/100ml)</b>	3300	4900	4600	7000									---
<b>TDS (Mg/l)</b>	202	484	860	3692									1500
<b>TSS (Mg/l)</b>	180	96	94	208									
<b>Chloride (Mg/l)</b>	68.45	285.8	799.75	1569.51									600
<b>BOD (Mg/l)</b>	1.55	2.55	1.7	2.75									3
<b>DO (Mg/l)</b>	7.2	5.2	5.6	5.9									4
<b>Conductivity (us/cm)</b>	499.4	1210	2112	5471									---
<b>Turbidity (NTU)</b>	217	79	74.15	23.2									---
<b>Total Hardness as CaCO<sub>3</sub></b>	178	226	412.8	574.20									---

(Source: West Bengal Pollution Control Board)

## Water quality result of Rupnarayan River (April 2024)

## Secondary Data, Source: WBPCB website

<b>Station:</b> RUPNARAYAN BEFORE CONFL. TO RIVER GANGA NEAR GEONKHALI, WEST BENGAL	<b>River Basin:</b> Rupnarayan	<b>CPCB Station Code:</b> 1337	
<b>Sample Date:</b> 22/04/2024	<b>Sample Time:</b> 13:05		
<b>Human Activities:</b> Bathing, Fishing	<b>Weather:</b> Clear	<b>Water Body:</b> Rupnarayan	
<b>Frequency Of Monitoring:</b> Quarterly	<b>Use Based Class:</b> C	<b>Approximate Depth (Bottom/Table):</b> 1.00 m	
<b>Color &amp; Intensity:</b> Turbid	<b>Oduor:</b> None	<b>Visible effluent discharge:</b> None	
<b>Water Quality</b>			
<b>Parameter</b>	<b>Test Result</b>	<b>Permissible Limit</b>	<b>Unit</b>
<i>BOD</i>	2.75	3 max	mg/l
<i>Chromium Total</i>	BDL		mg/l
<i>Copper</i>	BDL		mg/l
<i>Iron</i>	0.16		mg/l
<i>Lead</i>	0.012		mg/l
<i>Mercury</i>	BDL		mg/l
<i>Nickel</i>	BDL		mg/l
<i>Zinc</i>	0.23		mg/l
<i>a-BHC</i>	BDL		ppb
<i>a-Endosulphan</i>	NT		ppb
<i>Aldrin</i>	NT		ppb
<i>Anilophos</i>	NT		ppb
<i>b-Endosulphan</i>	NT		ppb
<i>Aldrin</i>	NT		ppb
<i>Anilophos</i>	NT		ppb
<i>b-Endosulphan</i>	NT		ppb
<i>Chlorpyriphos</i>	BDL		ppb
<i>Dieldrin</i>	BDL		ppb
<i>g-BHC</i>	BDL		ppb

Malathion	BDL		ppb
Methyl Parathion	BDL		ppb
o,p-DDT	NT		ppb
p,p-DDT	NT		ppb
Ammonia-N	0.13		mg/l
Conductivity	5471.0		µs/cm
Dissolved O <sub>2</sub> (DO)	5.9	4 min	mg/l
Fecal Coliform	7000	5000	MPN/100ml
Fecal Streptococci	330		MPN/100ml
Nitrate-N	0.89	50 max	mg/l
pH	8.40	6.5-8.5	Unit
Temperature (Water)	34		°C
Total Coliform	14000		MPN/100ml
Boron	BDL		mg/l
Calcium	83.52		mg/l
Chloride	1569.51	600	mg/l
COD	18.00	---	mg/l
Fluoride	0.18	1.5 max	mg/l
Magnesium	88.79		mg/l
Phenolphthalein Alkanity	2.00		mg/l
Phosphate-P	BDL		mg/l
Potassium	28.0		mg/l
Sodium	622.1		mg/l
Sulphate	346.24		mg/l
Total Alkalinity	148.00	---	mg/l
Total Dissolved Solids (TDS)	3692.00	1500	mg/l
Total Fixed Solids (TFS)	3022.00		mg/l
Total Hardness as CaCo <sub>3</sub>	574.20	---	mg/l
Total Suspended Solids (TSS)	208.00		mg/l
Turbidity	23.20	---	NTU
Arsenic	BDL		mg/l

<i>Cadmium</i>	<i>BDL</i>		<i>mg/l</i>
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(Source: West Bengal Pollution Control Board)