



# Initial Environmental Examination

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**PUBLIC**

July 2024

## India: West Bengal Drinking Water Sector Improvement Project

Subproject : Bulk Water Supply for 4 Blocks of Nandakumar, Chandipur, Nandigram I and Nandigram II at Purba Medinipur District

Package No: WBDWSIP/WW/EM/01

Part 1 of 3: Main Report (Pages 1 – 140) and Appendices 1 - 13

Prepared by Public Health Engineering Department, Government of West Bengal for the Asian Development Bank (ADB). This is an updated version of the initial environmental examination report originally posted in November 2023 available at <https://www.adb.org/projects/documents/ind-49107-006-iee-25>.

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**Asian Development Bank**

**COMMENTS RESPONSE MATRIX – PACKAGE EM01 UPDATED IEE**

<b>SI No</b>	<b>Comment By ADB</b>	<b>Reply by PMU</b>	<b>Page no</b>
1	The report says that additional 200 trees will be affected. Is this because of the change in length of transmission lines? Please add a sentence to briefly discuss.	After completion of alignment survey, it is noted that further 201 trees need to be felled. This is not due to change in transmission pipeline. This is only assessed after complete survey. Added sentence	5
2	Please add the Drinking Water Source Quality Standards and update the discussion as appropriate.	Drinking water source standard added in the Tables 14A to 14G and statement done under para 72	Tables and 56
3	Please update this table to include entire years for 2020, 2021, 2022, 2023, and 2024 to date. Please put a note if certain period were not monitored and the reason.	Tables 14A to 14G shows water quality data of Rupnarayan River from 2019 to 2024	Page 49 to 56
4	Please specify the standard used. Is it for what classification of surface water? Also, not all parameters in Table 24 meet the desirable limit indicate (example, Fluoride, and sulfate). Please review and update accordingly.	Data corrected, typographical error Standard specified in the Table. Statement corrected in para 91	Page 66, 67
5	Now it is almost 1000? Please check and update accordingly. 698 +98 +201	Statement corrected.	Page 70 para 95
6	Please discuss in brief details about these 201 trees (species, dbh, IUCN conservation status).	Tree felling NOC for 201 nos. tree along RWTM in between Ganjanarayanpur to Nandakumar Market beside SH-4 has been obtained and tree felling under progress. The trees are predominant species of Coconut, Mango, Palm and <i>Acacia auriculiformis (Accacia)</i> and no species are under list of Endangered species of IUCN	Page 79, Table 30
7	Please clarify, another section of the report says felling of additional 201 trees is under progress (?). But here it says felling and compensatory tree planting for almost 1000 trees are completed?	Tree felling has been completed and compensatory plantation (about 4000 trees) is done against 800 no of trees (698+98) felled. Compensatory plantation against newly obtained NOC (for 201 nos. of trees) will be complied after felling of complete 201 trees. Statement corrected	Page 86 para 133
8	Please make sure all measures in para 153 is included here.	All the points from Para 153 are included in the table	Page 124, Table 34
9	Please attach the Annexure to this permit (list of tree species with DBH and numbers)	Annexure part pf NOC included	Page 319

# **Initial Environmental Examination**

SFG Log: 6143

**Updated**

**Project Number: 49107-006**

**July 2024**

**IND: West Bengal Drinking Water Sector Improvement Program - Bulk Water Supply for 4 Blocks of Nandakumar, Chandipur, Nandigram I and Nandigram II at Purba Medinipur District**

**Package No: WBDWSIP/WW/EM/01**

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

## ABBREVIATIONS

ADB	–	Asian Development Bank
CPCB	–	Central Pollution Control Board
CTE	–	Consent to Establish
CTO	–	Consent to Operate
DSISC		Design, supervision and institutional support consultant
EAC	–	Expert Appraisal Committee
EHS	–	Environmental, Health and Safety
EIA	–	Environmental Impact Assessment
EMP	–	Environmental Management Plan
GRC	–	Grievance redress committee
GRM	–	Grievance redress mechanism
GOI	–	Government of India
GoWB	–	Government of West Bengal
HSGO	–	Head, Safeguards and Gender Officer
IBPS	–	Intermediate Booster Pumping Station
IEE	–	Initial Environmental Examination
IWD	–	Irrigation and Waterways Department
MoEFCC	–	Ministry of Environment, Forest and Climate Change
WBPCB	–	West Bengal Pollution Control Board
NOC	–	No Objection Certificate
PHED	–	Public Health Engineering Department
PIU	–	Project Implementation Unit
PMC	–	Project Management Consultant
PMU	–	Project Management Unit
PWSS	-	PHED 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**

°C	Degree Celsius
km	kilometre
lpcd	litres per capita per day
m	metre
Mgd	million gallons per day
Mld	million litres per day
mm	millimetre
Nos	Numbers
sq.km	Square Kilometer

### **NOTES**

- (i) The fiscal year (FY) of the Government of India and its agencies ends on 31 March.
- (ii) In this report, "\$" refers to US dollars.

### **CURRENCY EQUIVALENTS (As of 15<sup>th</sup> September 2023)**

<b>Currency Unit</b>	–	<b>Indian Rupees (INR)</b>
INR1.00	–	\$0.0125
\$1.00	=	INR 79.84

This is the updated initial environmental examination prepared after finalization of design and after adding night work construction management plan is a document of the borrower. The views expressed herein do not necessarily represent those of ADB's Board of Directors, Management, or staff, and may be preliminary in nature.

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## EXECUTIVE SUMMARY

1. The proposed West Bengal Drinking Water Sector Improvement Project (WBDWSIP) aims to provide safe, reliable and continuous drinking water in accordance with guidelines of Ministry of Drinking Water and Sanitation, Government of India and with the Vision 2020 of GoWB to about 6 million people in selected Arsenic, Fluoride, and Salinity affected areas of North 24 Parganas, South 24 Parganas, Bankura and East Medinipur districts. The Project will ensure drinking water security through 24/7 piped water supply schemes in the areas covered, strengthen the institutional structures and build the capacities of stakeholders at all levels of service delivery for sustainable operation and maintenance and sustained public health improvement.
2. WBDWSIP will be implemented over a 6-year period beginning in 2018, and will be funded by ADB via a sector loan modality. Specific sub project will be implemented over period of 3 years after award of contract and total operate and maintenance period is of 2 years thereafter.
3. The Subproject. Creation of surface water based bulk water supply system to meet the water demand for the blocks of Nandakumar, Chandipur, Nandigram I and Nandigram II blocks in Purba Medinipur district under the WBDWSIP. The sub-project will also help in reducing the incidence of ground water depletion and intrusion of salinity in ground water. The selected blocks are located in the western bank of the river Rupnarayan. spreading over 39 Gram Panchayats and covering 345 villages and 745 habitations (as per Census 2011). The subproject includes the following work components: (i) Raw water intake (fixed jetty type) of 112 MLD and pumphouse – electric substation, (ii) 107 MLD capacity water treatment plant with all appurtenances, civil & electro-mechanical works, including Chlorination sludge lagoons, (iii) 17.85 km long raw water pumping mains, (iv) 35.097 km long DI K9 and MS clear water transmission mains of assorted diameter 600 mm – 1000 mm to carry treated water from WTP to proposed GLSRs of Nandigram I & II blocks,, (v) Construction of RCC Bridge of width 5.0 m over Haldi River having length 600 m approx. for carrying 1000 mm dia (K9 grade) and other utility, (vi) Operation and maintenance of the Plant for a period of two years after commissioning and takeover.
4. **Project implementation arrangements.** Public Health Engineering Department (PHED) of Government of West Bengal is the executing and implementing agency for the WBDWSIP. Project Management Unit (PMU) exclusively established in PHED for the WBDWSIP will implement the project. PMU is assisted by district level Project Implementation Units. Safeguard and Gender Cell (SGC) in the PMU is responsible for safeguards compliance. Project Management Consultant and PIU-wise Design, Supervision and Institutional Support Consultant (DSISC) will assist PMU and PIUs in implementation and management of the project.
5. **Screening and assessment of potential impacts.** ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. As per the GoI EIA Notification, 2006, this subproject does not require EIA study or environmental clearance. The potential environmental impacts of the subproject have been assessed using ADB's Rapid Environmental Assessment Checklist for Water Supply. The potential negative impacts were identified in relation to pre-construction, construction and operational period.
6. **Categorization.** Based on results of the assessment and ADB's SPS, the subproject is classified as environmental Category B, i.e., the subproject is judged to be unlikely to have any significant adverse environmental impacts. However, an initial environmental examination is required/advisable. The environmental category continues to "B" and ADB cleared IEE report has been updated covering the night work under the project and minor change in pipeline length.

7. **Description of the Environment.** The subproject component's locations are in four selected blocks of Nandakumar, Chandipur, Nandigram-II and Nandigram-I of Purba Medinipur District was carved out from the erstwhile Midnapur District on and from January 1, 2002. This is situated on the southern fringes of the State of West Bengal. The total area of the district is 4151.64 square kilometers. It extends from 21.38'N to 22.03'N and 87.27'E to 88.12'E. The district is bordered by Paschim Medinipur in the north and west, Bay of Bengal in the south, state of Orissa in the south west and Hoogly river in the east. The district has a long coastline of 65.5 km along its southern and south eastern boundaries with Tamaluk, Haldia, Contai and Egra as its 4 Sub- Divisions. The district comprises of 25 Blocks and 5 Municipalities.

8. 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. The vast expanse of land is formed of alluvium and is composed of younger and coastal alluvial. The district has a long coastline of 65.5 km along its southern and south eastern boundary. Average elevation of the district is within 10 m 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. Coastal blocks are affected by cyclones and tornadoes occasionally and tidal floods are quite regular. This district has a variety of soil-alluvial along the rivers and sandy saline soil in the coastal belt. Project area is blessed with plenty of water bodies – rivers, streams and ponds, etc. The major rivers are Kasai, Kaliaghai, Rupnarayan and Hughli (Bhagirathi/Ganga).

9. For the specific package work component's locations are in four selected blocks of Nandakumar, Chandipur, Nandigram-I and Nandigram-II which are located on the western bank of the river Rupnarayan. As far as possible, based on the land availability, project components are located within the existing water facilities. Total population of the selected 4 project blocks is 782,171 (rural 759,679 and urban 22,492) as per 2011 census. The total project area is 590.26 sq. km out of which the rural area is 580.56 sq. kms. The select 4 blocks comprises 39 number Gram Panchayets, 345 villages and 745 habitations.

10. **The Raw water source is Rupnarayan river.** It is navigable throughout the year in its lower portion This is a perennial river and has abundant flow throughout the year. The proposed Intake location is in between the proposed Panskura intake (27 km upstream) and the existing Geonkhali intake location (14 km downstream) on the Rupnarayan river. There are no notable pollution sources near the intake. There are no wastewater disposal points in the upstream vicinity of the intake. The distance of the Kolaghat Thermal Power Station (KTPS) from the proposed intake location is 16 km in the upstream. Quality of river water is, in general, of acceptable quality and that 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, although this is within the permissible limits as per Drinking Water Standards (IS:10500-2012). Permission for withdrawal of 117 MLD Raw water from Rupnarayan river at Mouza - Mirpur/Ichapur, Block Nandakumar has been obtained from the Irrigation & Waterways Department, Govt. of West Bengal vide letter no. 237 -1, 1-4M-02/2015 dated 08th June, 2017.

11. Conventional Water Treatment Plant of 107 MLD with all appurtenances, civil & electro-mechanical works, including Chlorination sludge lagoons, will be constructed on a land parcel measuring 18 acres owned by Land Revenue Department Government of West Bengal located in Mouza Jalpai-Sitalpur under Sitalpur Gram Panchayat of Nandakumar block at a distance of about 17.1 km from the proposed intake location. Land is already under possession of project authority. The land parcel is free of any encumbrances and not in use. The Topography is flat and as per local enquiries carried out during field visits, the site is not prone to flooding, and is easily accessible by NH 116 B. Overall, there are no notable sensitive environmental features in the project sites.

12. **Potential environmental impacts.** The subproject is unlikely to cause significant adverse impacts considering: (i) the components will involve general civil construction work with limited or no impact during operational period; (ii) there are no significant sensitive environmental features in the project sites and (iii) predicted impacts are site-specific and likely to be associated with the construction process and are produced because the process is invasive, involving excavation and earth movements.

13. Raw water transmission mains proposed to be laid from intake sump cum pump house to the water treatment plant (WTP) is approximately 17.85 km will be laid within the RoW of Irrigation Dept., PWD Roads, State Highway and National Highways Authority and the diameter of the pipe will be 1400 mm. The clear water transmission main from WTP to 2 block level Ground Storage reservoirs cum booster pumping stations will be laid along the edge of the roads (NH 116B, some part PMGSY, Irrigation dept. and PWD). It is proposed that the primary transmission mains of about 35 km (600-1000 mm dia.) shall be laid primarily through open cut method. However, the laying of the transmission mains through open cut method may not be feasible at major junctions (State/National Highway Crossings), railway tracks, congested market areas including a couple of drainage canals. The transmission mains have to cross the railway lines between Deshpran Railway Station and Lavan Satyagrah Smarak Railway Station at Magrajpur and between Nandakumar & Tamluk at Talpukur (on the Howrah-Digha Route). It is single lane broad gauge track. It is proposed that the transmission mains shall be laid by trenchless method in these stretches. Construction of RCC Bridge of width 5.0 m over Haldi River at Narghat bridge site having length 600 m approx. for carrying 1000 mm dia. (K9 grade) and other utility is also proposed.

14. Construction activities shall be confined to the selected sites, and the interference with the general public and community around is minimal. There will be temporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupational health and safety aspects. During the construction phase of pipeline work along the public roads, impacts arise from the construction dust and noise; disturbance to residents, businesses, traffic by the construction work, and from the need to dispose of large quantities of waste soil. Of the approximately 53 km length of transmission mains, an estimated 1.5 km will be laid by jack pushing method, especially at sections crossing main roads, congested areas and railway tracks etc., The social impacts (access disruptions) due to construction activities are minimal.

15. Anticipated impacts of water supply during operation and maintenance will be related to operation of WTP, handling and application of chlorine, operation of pump houses, and repair and maintenance activities. Various provisions are already made in the design: to recirculate wastewater from WTP; collect, thicken and dispose sludge; chlorine safety; use energy efficiency equipment, etc., Water supply system will be operated using the standard operating procedures. It is unlikely that there will be any significant negative impacts. Application and handling of chlorine

gas will involve certain risks, and appropriate measures are included in EMP.

16. **Environmental Management Plan.** An environmental management plan (EMP) has been developed to provide mitigation measures to reduce all negative impacts to acceptable levels. Locations and site-selection of the proposed infrastructures were considered to further reduce impacts. The EMP includes design and location related measures such as (i) minimizing tree cutting; (ii) Compensatory measures are suggested in the form of carrying out / planting trees in the ratio of 1:5 (iii) wash water recovery in WTP to improve the efficiency and avoid wastewater generation and disposal; (iv) collection, treatment and beneficial use of treated sludge; (v) chlorine safety, (vi) energy efficient pumping system, and (vii) noise controls.

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

18. The contractor is required to submit 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; (iv) application of Health and Safety Plan for personal protection and protection from COVID 19 infection; and (v) budget for SEMP implementation to PIU, for review & approval. No work is allowed to commence prior to approval of SEMP. A copy of the EMP/approved SEMP kept on site during the construction period at all times. The EMP is included in the bid and contract documents. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

19. **Consultation, disclosure and grievance redress mechanism.** The stakeholders were involved in developing the IEE through discussions on-site and through public consultation at several places in the subproject area, after which the views expressed were incorporated into the IEE and in the planning and development of the project. The IEE made available at public locations and will be 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 is described within the IEE to ensure any public grievances are addressed quickly.

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

21. **Conclusion and Recommendations.** The residents of the project area will be the major beneficiaries of the improved water supply system, as they will be provided with a constant supply of better-quality water, piped into their homes at an appropriate pressure. The project will improve the over-all health condition of the project area by controlling water borne diseases, so people should spend less on healthcare and lose fewer working days due to illness. 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.

22. As per ADB SPS, the project is classified as environmental **Category B** and does not require further environmental impact assessment. However, to conform to government guidelines WTP requires Consent to Establish (CTE) and Consent to Operate (CTO) from West Bengal Pollution Control Board. Consent to Establish for WTP was obtained from WBPCB. This IEE report has been updated covering the night work under the project and minor change in pipeline length. After complete survey of transmission main pipeline, it is noted that further 201 trees need to be felled. Tree felling details and NOC attached in the Appendix. Report will be reviewed and approved by PMU, and further submitted to ADB for approval. In case of any change of location, design and scope IEE will be updated further for approval of ADB.

## I. INTRODUCTION

### A. Background

1. The proposed West Bengal Drinking Water Sector Improvement Project (WBDWSIP) aims to provide safe, reliable and continuous drinking water in line with guidelines of Ministry of Drinking Water and Sanitation, Government of India and with the Vision 2020 of GoWB to about 6 million people in selected Arsenic, Fluoride, and Salinity affected areas of North 24 Parganas, South 24 Parganas, East Medinipur and Bankura districts. The Project will ensure drinking water security through 24/7 piped water supply schemes in the areas covered, strengthen the institutional structures and build the capacities of stakeholders at all levels of service delivery for sustainable operation and maintenance and sustained public health improvement

2. WBDWSIP will be implemented over a 6 -year period beginning in 2018, and will be funded by ADB via a sector loan modality. Specific sub project will be implemented over period of 3 years after award of contract and total operate and maintenance period is of 2 years thereafter. The Program will have following key outputs:

3. **Output 1: Drinking Water Infrastructure Constructed and Upgraded.** Program will provide 70 lpcd potable water through metered household connections on a 24/7 basis to each household in the rural areas, and potable bulk water at the prescribed national standards to the en-route census towns and habitations. The distribution systems will be designed on district metering area (DMA) basis, provided upto household level including community and government institutions (Schools, Anganwadis, etc.) complete with district meters and domestic water meters, and integrated with smart water management and monitoring tools at the district, block, and Gram Panchayat (GP) levels, such as SCADA, and GIS. Bulk water supply systems will be interconnected on a grid-based supply system where feasible. PHED will be responsible for operating, maintaining and monitoring the bulk water systems, upto boundary of the GP, whereas the GPs will operate and maintain the distribution network within the GPs. The Zilla Parishads (ZP), administrative body at the district level, and Panchayat Samiti (PS)s, administrative body at the block level, will be involved in coordinating, technical support and monitoring role at the district and block level

4. **Output 2: Institutional Strengthening and Capacity Building for Operational Sustainability Achieved.** Project will create/strengthen sustainable service delivery institutional structures within the district, block and GP levels, as well as for PHED West Bengal headquarters, introduce innovative practices and high technology on smart water management to create a model for rural water service delivery and bulk water supply systems for the state and the country. It will also provide support to piloting innovations on rural sanitation and Arsenic and Fluoride treatment in drinking water systems in selected districts. Project management, design and construction supervision and the capacity building consultancy services will be included under this output. It will have the following subcomponents: (i) Smart water management; (ii) Institutional strengthening, IEC, and capacity building, and (iii) Piloting of innovative and high-technology systems on sanitation improvement and Arsenic, Fluoride and Salinity management in selected areas.

5. WBDWSIP targets three districts: North 24 Parganas districts are the most Arsenic-affected district in West Bengal; Bankura is heavily affected by Fluoride, and East Medinipur is affected by Salinity. These districts are also one of the most water-stressed districts in West Bengal as they are reliant on depleting groundwater sources. Overall, the Project is intended to meet the

requirements of “VISION 2020”, endorsed by the GOWB and in line within the guidelines and implementation frame-work of National Rural Drinking Water Program (NRDWP).

6. Presently, the demand of the rural areas within the fold of the selected 4 blocks is met from ground water sources. With increase in population, and increase in ground water withdrawal (for agricultural and drinking water purposes), the ground water resources are getting depleted. Also, in select areas along the coastal regions, the ground water is affected by Salinity. 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.

7. Primarily the prioritization and appraisal of the WS Scheme is based on the Preliminary Project Report prepared by the PHED, as a part of its endeavor to provide Piped Water Supply to the rural areas as per the plan outlined in “VISION-2020”. The selected 4 blocks have been prioritized by PHED for comprehensive coverage with surface based WS Scheme and is proposed for implementation under the WBDWSIP funded by ADB. The objective of the subproject is to provide sustainable water supply at a rate 70 litres per capita per day (lpcd) to each household in all habitations in the 4 selected blocks. A detailed description of the components is provided in Section III.

## **B. Purpose of this IEE Report**

8. ADB requires the consideration of environmental issues in all aspects of the Bank's operations, and the requirements for environmental assessment are described in ADB's Safeguard Policy Statement (SPS), 2009. The potential environmental impacts of the subproject have been assessed using ADB Rapid Environmental Assessment Checklist for Water Supply (**Appendix 1**). Checklist is reviewed further after finalization of scope. Potential negative impacts were identified in relation to pre-construction, construction and operation of the improved infrastructure, and results of the assessment show that the subproject is unlikely to cause significant adverse impacts. The updated initial environmental examination (IEE) has been prepared in accordance with ADB SPS's requirements for environment Category B projects.

9. Initial bidding stage IEE was based on the preliminary project report prepared by PHED; a technical due diligence report prepared by the project preparatory technical assistance (PPTA) team. Earlier IEE updated during November 2020 on the basis of activities undertaken and design prepared by Design, Build and Operate (DBO) contractor and it was updated on October 2023 during implementation stage by DBO contractor to reflect final design and scope. The approved updated IEE is further updated now covering the night work under the project and minor change in pipeline length. The updated IEE is based mainly on field reconnaissance surveys, secondary sources of information, base line (pre construction) and during construction data of environmental parameters. 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 and during construction monitoring by the contractors, which continued presently. The results are reported as part of the environmental monitoring report and forms the basis to ensure no degradation takes place during subproject implementation. Stakeholder consultation has been an integral part of the IEE.

## **C. Report Structure**

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

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

## II. DESCRIPTION OF THE PROJECT

### A. Project Area

11. Proposed project area falls in Purba Medinipur district of West Bengal. The Purba Medinipur District was carved out from the erstwhile Midnapur District on and from January 1, 2002. Purba Medinipur district lies between north latitudes 21° 36' 35" and 22°57'10" and east longitudes 86° 33'50" and 88°12' 40" and covers an area of 4151.64 square kilometers. The district is bounded by Paschim Medinipur in the north and west, Bay of Bengal in the south, state of Orissa in the south west and Hoogly river in the east. The district has a long coastline of 65.5 km along its southern and south eastern boundary. Total population of the district according to 2011 census is 5,09,4238.

12. The subproject component's locations are in four selected blocks of Nandakumar, Chandipur, Nandigram-II and Nandigram-I (**Figure 1**). As far as possible, based on the land availability, project components are located within the existing water facilities. Total population of selected 4 project blocks (hereinafter referred to as the Project area) is 782,171 (rural 759,679 and urban 22,492) as per 2011 census. The total project area is 590.26 sq. km out of which rural area is 580.56 sq. kms. The entire project area is located on the western bank of the River Roopnarayan and bounded by Tamluk block in the north, Khejuri I, Khejuri – II Block in the south and Bhagawanpur – I, Bhagawanpur – II and Moyna blocks in the West and Mahisadal and Haldia blocks in the East. The project area does not include any statutory town (Municipality) but includes 4 Census towns apart from the 39 Gram Panchayets. Details of Project area including Census Towns in each block is shown below:

**Table 1: Details of Project area and Census Towns**

Sl. No	Block	1Area (In Sq. Kms)		Number of Gram Panchayats	Census Towns	
		Total	Rural		Number	Names
1	Nandakumar	165.70	165.70	12	-	-
2	Chandipur	137.58	132.69	10	2	Kotbar and Erashal
3	Nandigram-I	181.84	179.28	10	1	Nandigram
4	Nandigram-II	105.74	102.89	7	1	Ashadtalya
<b>Total</b>		<b>590.26</b>	<b>580.56</b>	<b>39</b>	<b>4</b>	

*Source: Census 2011*

### B. Existing Water Supply Situation

13. Incidence of ground water level depletion and intrusion of salinity in ground water is reported from vast area of the district. High. Iron concentration in groundwater is also recorded in the district. The water demand is met through (i) Piped Water Supply Scheme (PWSS) with ground / sub-surface / 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 355 Villages (as per Census 2011) in the 39 nos. of Gram Panchayets (GPs) in the 4 blocks of Nandakumar, Chandipur, Nandigram-I and Nandigram-II, 111 villages have been covered with PWSS, while the remaining 244 are still uncovered. The Command area of the scheme comprising of the Villages (and Habitations) covered existing Piped Water Supply Schemes (PWSS) is tabled below:

<sup>1</sup> Reference: District Census Handbook-2011: Purba Medinipur

**Table 2: Coverage of Villages / Habitation through PWSS**

Sl. No.	Block	GP	Villages			Habitations		
			Uncovered	Covered	Total	Uncovered	Covered	Total
1	Nandakumar	12	55	46	101	94	106	200
2	Chandipur	10	79	35	114	114	74	188
3	Nandigram I	10	78	21	99	165	38	203
4	Nandigram II	7	32	9	41	108	46	154
<b>Total</b>		<b>39</b>	<b>244</b>	<b>111</b>	<b>355</b>	<b>481</b>	<b>264</b>	<b>745</b>

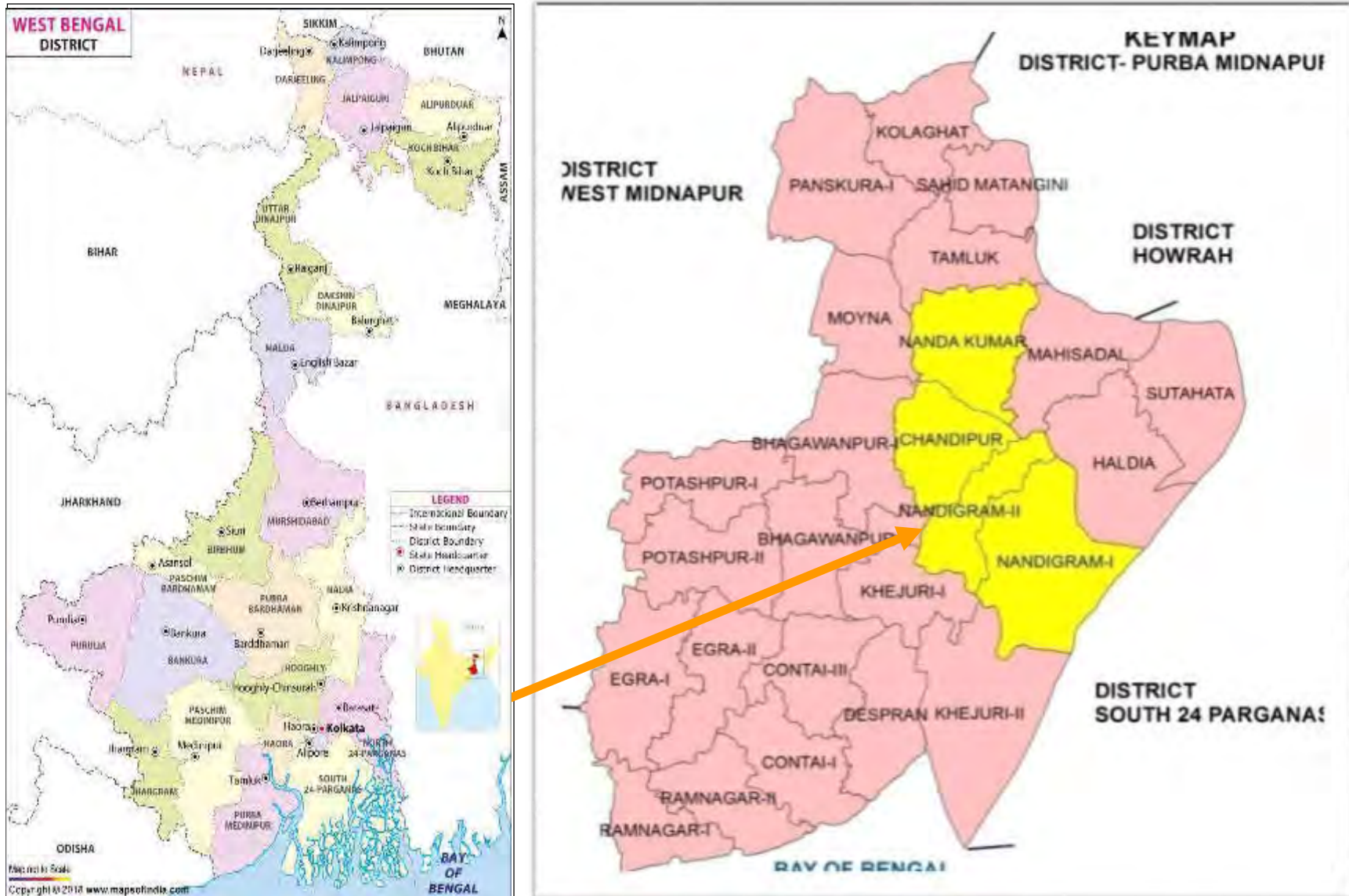
14. An estimated 40% of the population is presently being covered under piped water supply (As per Census 2011 data), corresponding to the 111 Villages covered. The details of the population presently covered under Piped Water Supply system is worked out below:

**Table 3: Population Covered under PWSS**

Sl. No.	Block	Population (As per 2011 census)	Population		% of Population	
			Uncovered	Covered	Uncovered	Covered
1	Nandakumar	2,62,998	1,20,099	1,42,899	45.7%	54.3%
2	Chandipur	1,88,119	1,06,479	81,640	56.6%	43.4%
3	Nandigram I	2,07,835	1,61,701	46,134	77.8%	22.2%
4	Nandigram II	1,23,219	85,809	37,410	69.6%	30.4%
<b>Total</b>		<b>7,82,171</b>	<b>4,74,088</b>	<b>3,08,083</b>	<b>60.6%</b>	<b>39.4%</b>

15. **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. However, none of these schemes covered any part of the select 4 blocks of the project area.

Figure 1: Map showing location of the 4 select project blocks in Purba Medinipur



### C. Proposed Project

16. The assessment of net water demand is derived based on (i) Domestic Water Demand @70 Lpcd and (ii) Institutional Water Demand as 5% of the Domestic Water Demand. Again, Gross Water Demand to be worked out considering (i) Transmission and Distribution Losses as 10% of the demand and (ii) Treatment Plant Losses as 5%. The net and gross water demand pertaining for the 4 blocks in the design years is worked out below:

**Table 4: Net and Gross Water Demand-Design Years**

SI No	Block	Net Water Demand (In Mld)			Raw Water Demand (In Mld)		
		Yr-2020	Yr-2035	Yr-2050	Yr-2020	Yr-2035	Yr-2050
1	Chandipur	16.0	20.4	26.1	18.7	23.9	30.5
2	Nandakumar	21.9	26.8	32.9	25.6	31.4	38.5
3	Nandigram I	17.9	23.2	30.1	20.9	27.1	35.2
4	Nandigram II	10.5	13.4	17.1	12.3	15.7	20.0
<b>Total</b>		<b>66.3</b>	<b>83.8</b>	<b>106.2</b>	<b>77.4</b>	<b>98.0</b>	<b>124.2</b>

17. The present works relates to the surface water based piped water supply 4 blocks of East Medinipur, namely Nandakumar, Chandipur, Nandigram-I and II. The raw water source for the 4 blocks is the Rupnarayan river, near Mirpur village in the Nandakumar block. The overall scheme has been conceived considering a base year of 2020, intermediate design year of 2035 and an ultimate design year of 2050.

18. The overall improvement plan is to tap the surface water from River Rupnarayan at Mirpur/Ichapur of Nandakumar block which is under Irrigation and Waterways Department, Government of West Bengal (GoWB), treat the water at Water Treatment Plant (WTP) located at a distance of about 17.8 km in Mouza Jalpai-Sitalpur under Sitalpur Gram Panchayat of Nandakumar block. Laying of about 35 km long Clear water transmissions main from WTP to centrally located ground level storage reservoirs (cum booster pumping stations) in Nandigram I and II blocks, for further pumping and distribution, that will be developed through another subproject under the WBDWSIP (Package - EM 02). Chandipur and Nandakumar blocks are not considered under distribution and storage of water under package EM-02 but intake and WTP covered all the 4 blocks under package EM-01. The Irrigation and Waterways Department (I&WD) has already given a permission of drawl of 117 MLD raw water vide letter no. 237 -1, 1-4M-02/2015 dated 8th June, 2017 (**Appendix 20**). Further visit to the transmission mains alignment locations indicated that the impact on traffic and road side business activities (shops, markets), especially in congested areas of the blocks, will be reduced by laying pipelines with appropriate diameters depending upon the road width. **Table 5** best explains the measures adopted for reducing impacts for transmission mains.

**Table 5: Road Width and Diameter cum Length of Transmission Mains (Raw Water & Clear Water)**

Name of the Road	Width of Road (m)	Chainage (km)	Dia. of pipe to be laid (mm)	Trench width for laying of Pipeline (mm)	Road Ownership
<b>Raw Water Transmission Main</b>					
Intake to Ganjanarayanpur	3.0	0.00-3.950	1400	2500-3000	Irrigation
Ganjanarayanpur to Nandakumar Junction	10.5	3.950-12.570	1400	2500-3000	SH-4

Name of the Road	Width of Road (m)	Chainage (km)	Dia. of pipe to be laid (mm)	Trench width for laying of Pipeline (mm)	Road Ownership
Nandakumar Rotary crossing of NH 41	20	12,570-12,810	1400	Trenchless	NH-41
Nandakumar Junction to WTP	20	12.810-17.85	1400	2500-3000	NH – 116B
<b>Clear Water Transmission Main</b>					
WTP To Magrajpur Railway Crossing (Clear Water)	20	0.00-4.770	1000	2000	NH-116B
Magrajpur Railway Crossing to Mongalchak	3.5	4.770-13.980	600-1000	1200-2000	Irrigation
Mongalchak bridge to Reapara-Terpakhya (via Nandigram II GLSR)	3.5	13.980- 22.920	600-1000	1200-2000	PWD
Reapara to Nandigram I (GLSR)	10	22.920-35.097	600-1000	1200-2000	PWD

Source: Public Health Engineering Department, Project Implementation Unit, East Medinipur

19. Following **Table 6** shows the nature and size of the various components of the subproject. Location of subproject components, layout plans and site photos are shown in **Figure 2 to Figure 9**.

**Table 6: Proposed Water Supply Subproject Components**

Infrastructure	Function	Description	Location
<p><b>1. Raw water intake sump with fixed type Jetty and pump house, substation.</b></p> <p><b>2. Supply, Installation &amp; Commissioning of Raw Water Vertical Turbine pump sets – 6 sets for the Intake Jetty complete with all appurtenances including electric substation at the shore</b></p> <p><b>3. Design and Construction of Pipe Supporting Structures over River Rupnarayan for a Length of approximately 600m.</b></p>	Withdrawal of raw water from Rupnarayan river	<p>Construction of Intake with Raw Water Jetty on the Rupnarayan River for extracting raw water capacity 112 MLD with pumphouse of tentative dimension 27 m x 15 m and substation 16.5 m x 35.5 m.</p> <p>Subcomponents of Intake System are Intake Pump House, Intake Jetty, Admin cum SCADA Building, Substation Building, PDB cum MCC Room.</p> <p>Rupnarayan is perennial river and Tidal effect is less pronounced.</p> <p>Rupnarayan river, which is perennial and has abundant flow throughout the year. Quality of river water is in general of acceptable quality, which can be used for potable purposes after conventional treatment and</p>	<p>Raw water source for the subproject is Rupnarayan River. It is navigable throughout the year in its lower portion. The proposed intake substation is located at Mirpur/ Ichapur Mouza of Nandakumar block, (Co- ordinate: Latitude:22.245787; Longitude:87.956771) which is under Irrigation and Waterways Department, Government of West Bengal (GoWB), The location is in between the proposed Panskura Intake and the existing Geonkhali intake locations. The Panskura intake points 27 km, upstream, whereas the Geonkhali intake is located about 14 km downstream of the proposed Intake location. The distance of the Kolaghat Thermal Power Station (KTPS) from the proposed intake location is 16 km in the upstream.</p> <p>The raw water intake sump</p>

Infrastructure	Function	Description	Location
		<p>disinfection. However, the salinity levels in the river water have increased during recent times, in the lean season, although this is within the permissible limits as per Drinking water standards (IS:10500-2012).</p> <p>The Irrigation and Waterways Department (I&amp;WD) has already given a permission of drawl of 117 Mld raw water vide through letter no. 237 -1, 1-4M-02/2015 dated 08th June, 2017 for drinking water purpose under the WBDWSIP (<b>Appendix 20</b>)</p>	<p>cum pump house and substation will be constructed on a private land parcel measuring 74.116 Decimal. Area located at Mouza Mirpur, JL No. 54, Dag No. 694,695, 697,698,704 land has been procured from 8 land owners. Also, Third Party Certification already been done. (<b>Appendix 21</b>)</p>
<p><b>Raw water Transmission Main from Intake to WTP</b></p>	<p>Raw water main will be laid to supply raw water from river intake to WTP with the help of raw water pumping machineries.</p>	<p>The raw water main is proposed to follow the shortest possible route. keeping in view the velocity considerations to avoid silting and other physical considerations. Based on an assessed velocity (of minimum 1.2m/s and maximum 2.4m/s), the pipe 1400 mm diameter and approx. length is 17.85 km. Provision has been made for rail/road crossing by Jack-Push/ Trenchless method where required including restoration of roads. .</p>	<p>Raw water transmission mains proposed to be laid from intake sump cum pump house to the water treatment plant (WTP) is of approximately 17.85 km. in length. The pipeline will be laid within the RoW of Irrigation dept. and PWD road (intake to Nandakumar junction – 12.6 km) and NH116 B (Nandakumar Junction to WTP – 5.2 km) The pipeline will be laid using open cut method except junction. It was observed during the transect walks along the raw water transmission stretch that there are shops, kiosks or road side vendors</p>
<p><b>Water Treatment Plant complete with all appurtenances, Admin building, electrical substation, civil &amp; electromechanical works, including Chlorination sludge lagoons</b></p>	<p>Treatment of raw water to meet the drinking water standards.</p> <p>Conventional water treatment is proposed to treat the raw water from the river Rupnarayan.</p>	<p>107 MLD capacity conventional WTP with the following process:</p> <ul style="list-style-type: none"> <li>• Alum coagulation &amp; flocculation</li> <li>• Pre-settling Pond of tentative dimension 98m X 90 m - 2 no.</li> <li>• Rapid gravity filtration, Disinfection with chlorination.</li> <li>• Clear Water Reservoir with Pump house;</li> <li>• Wash water recovery</li> <li>• Sludge drying beds</li> </ul>	<p>The WTP will be constructed on a land parcel measuring 18.03 acres owned by Land Revenue Department Government of West Bengal located in Mouza Jalpai-Sitalpur under Sitalpur Gram Panchayat of Nandakumar block (Coordinate: Latitude:22.152518, Longitude:87.900588).</p> <p>The location of WTP is suitable, due to its close proximity to the NH 116 B. The land is connected by an approach road to the nearby</p>

Infrastructure	Function	Description	Location
		<ul style="list-style-type: none"> <li>• Water quality testing laboratory</li> <li>• Miscellaneous infrastructure (Administrative Building, Laboratory Building, Staff Quarters, Guard Rooms, Internal roads and pathways, Electrical Sub-station).</li> <li>• Provision of SCADA (The operation of the entire Water Treatment plant shall be fully automated with PLC and SCADA system installed in place with provision of manual overriding)</li> </ul>	<p>villages. The land parcel is free of any encumbrances and not in use. The land was owned by Land Revenue Department Government of West Bengal (Vested Land) has been transferred to PHED through Block Land Revenue Office (BLRO) for construction of the WTP (<b>Appendix 20</b>). Impact related to land acquisition and involuntary resettlement is not anticipated for construction of WTP.</p> <p>The land topography is flat. As per local enquiries carried out during field visits, the site is not prone for flooding. The vulnerability mapping of the district for flood prone areas also indicates that the site is not prone to flooding.</p> <p>The proposed WTP site is required to be developed (earth filling) including proper drainage infrastructure considering the flat topography and the adjoining high embankment. Overall, there are no notable sensitive environmental features in the project sites.</p>
<b>Clear Water Transmission Main</b>	Clear Transmission main from the WTP to Intermediate Boosting Pumping station (IBPS) cum Ground Level Storage Reservoirs (GLSRs) in Nandigram I and Nandigram II. (Chandipur and Nandakumar GLSR not considered under the package)	The treated water from the WTP will be conveyed to ground level storage reservoirs, one in each block. Since, the location of the Intake and WTP is on one side of the Project area, a single transmission main will laid with progressively reduced diameters is proposed to feed the proposed ground	About 35.097 km Clear water transmission main of DI K9 of assorted diameter of 600 mm – 1000 mm will be laid for conveying clear water from WTP to the Intermediate Boosting Pumping station (IBPS) cum Ground Level Storage Reservoirs (GLSRs) in Nandigram I and Nandigram II blocks
<b>Construction of RCC Bridge over Haldi River near Narghat.</b>	To carry Clear Transmission main from the WTP to Intermediate Boosting Pumping station (IBPS) cum Ground Level Storage Reservoirs (GLSRs) in Nandigram I and Nandigram II.	Construction of RCC Bridge of width 5.0 m over Haldi river having length 600 m approximately for carrying 1000 mm dia (K9 grade) clear water pipe and other utilities. NOC has been obtained from concerned authority ( <b>Appendix.11</b> )	Over Haldi River at Narghat bridge site
<b>Operation and</b>	Contractor shall be	For a period of two years	Operation and Maintenance of

Infrastructure	Function	Description	Location
maintenance	responsible for operation, maintenance and management of the entire water supply services under this contract in service area	after commissioning and takeover	the water supply system will be carried out by Public Health Engineering Department directly or through an external operator. Operation will involve treatment of water in the WTP, disinfection with chlorine, conveying clear water by pumping from booster pumping station to 2 GLSRs in one in each block of Nandigram I and Nandigram II blocks for distribution in their respective zones via distribution system (comprising of overhead tanks and distribution pipes that will be developed through another subproject under the WBDWSIP)

Source: Government of West Bengal, Public Health Engineering Department, Project Implementation Unit, East Medinipur

20. Before and during implementation of the project number of NOC have been collected. Few relevant NOC attached in the Appendix 11, 12,13 and 19

SI no	Name	Location	Remarks
1	IOCL Pipeline (Two crossing)	Near Talukur,Nandakumar	NOC partly Obtained*(Appendix 13). Agreement to be finalized
		Maharaja Nandakumar	NOC Yet to be obtained
2	Railway Crossing	Near Talpukur	NOC Obtained* (Appendix 13)
3	Railway Crossing	Near Magrajpur	NOC Obtained*(Appendix 13)
4	Irrigation & Waterways Department	Intake to Ganj Narayanpur	NOC Obtained* (Appendix 11)
		Pipe Supporting Bridge Over River Haldi	
		CWRM (Magrajpur to Mangalchak)	
5	National Highway(116B)	From Nandakumar to Chandipur	NOC Obtained *(Appendix 12)
6	National Highway (41)	Nandakumar Rotary	Final NOC to be obtained
7	State Highway no (SH-04)	From Ganjnarayanpur to Nandakumar Rotary	NOC Obtained
8	Inland Waterways Authority of India	Withdrawal permission of 117 MLD surface water through construction of intake on River Rupnaryan	NOC Obtained* (Appendix 20)
9	West Bengal State Rural Development	BGSY roads of Nandigram-I, Nandigram-II, Chandipur & Nandakumar Blocks	NOC Obtained

	Agency		
10	Public works Directorate	Reyapara to Tengua	NOC Obtained
		Chandipur Nandigram Road	
		Nandigram Tekhali Road	
		Reyapara Terapekhia Road	
		Tengua to Basulichak Road	
		Tengua to Nandigram Bus Stand	
		Tengua Terapekhia Road	

(\* NOC attached in Appendix)

21. The scope of land acquisition and involuntary resettlement is identified based on the field visits to each of the water supply component locations and transect walk along the raw and clear water transmission mains pipeline alignment proposed in Nandigram I & II blocks under the package. No compulsory acquisition of private land is anticipated, as procurement of land for public purpose mainly involving infrastructure projects will be through direct purchase (negotiated settlement) as per a government directive. The entire civil works under the subproject for the transmission line are proposed within the boundaries or RoW of government roads (Irrigation dept. road, Gram Panchayat roads, PWD roads, National Highways). Previously it was selected that the clear water transmission mains will traverse along the left flank of the road as it passes through Chandipur Bazar towards Nandigram I block. To avoid impact on market area new alignment has been selected and that shows the clear water transmission mains will traverse along the left side of the road as it passes through Magrajpur towards Terapakhya and Terapakhya to Manoharpur GLSR site of Nandigram II block.

22. The subproject is primarily designed to improve environmental quality and living conditions of the people through provision of clear water supply. Groundwater in the project area is contaminated with salinity and water level is also depleting. The project will benefit the general public by contributing to the long-term improvement of water supply system and community livability in the project blocks. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and environmentally-sound engineering and construction practices. The benefits arising from this subproject include: (i) increased availability of potable water at appropriate pressure to all households (ii) reduced time and costs in accessing alternative sources of water. (iii) better public health particularly reduction in waterborne and infectious diseases; (iv) reduced risk of groundwater contamination; and (v) reduced risk of contamination of treated water supplies.

#### **D. Energy Efficiency Measures included in the subproject**

23. The water supply project is designed with utmost consideration to energy efficiency. Gravity flow systems adopted. In water supply system, water losses (UFW) are usually very high, reducing the losses and improving the efficiency of the system is identified as the most important component under WBDWSIP.

24. To make the project energy efficient, as part of this project, energy efficiency measures are being considered and incorporated into the subproject designs where appropriate.

25. Energy efficient, high-performance motors and transformers shall be provided for optimum utilization of energy during construction and operation of the project.

26. Component of luminaries shall be 'energy efficient low loss' type. CFL/LED type of luminaries shall be used for office/ all indoor areas except pump house area. HPSV or HPMV luminaries shall be used for pump house area and other outdoor areas. Street/ area lighting shall be of LED type and controlled by time switch/ photocell for automatic switching of luminaries. Specification of solar lighting shall be as per Ministry of New and Renewable Energy. Fixtures shall be energy efficient and ballast shall be electronic low loss type.

27. Supervisory Control and Data Acquisition (SCADA) has been proposed for entire system of water supply. SCADA shall support and include a multi-level real-time auditing and advising of energy optimization process and Real-time process performance software. The key benefits of a performance auditing system would be a more energy efficient plant, improved reliability & safety, and increased profitability.

## **E. Work Progress**

28. Up to 30<sup>th</sup> April 2024, work progress are as follows,

### *Intake Substation and Approach Bridge*

- Approach Bridge: 21 out of 27 piles has completed
- Substructure of LT Transformer Room, HT Panel Room and PBD cum MCC Room is completed. Superstructure of HT Transformer and Panel room, PDB cum MCC room is under construction

### *Raw Water Transmission Main*

- 8.808 km Raw Water pipeline laid out of 17.85 km.

### *Water Treatment Plant*

- Piling work of CWR, CWPH, Chlorination building, Back Wash Overhead Tank, Sludge Sump, Admin building, Store cum Operator Room, Electrical Substation, Chemical House, Staff Quarter, Stilling Chamber cum flash mixer, IPS cum Flocculator, Filter House is completed.
- Substructure of CWPH, Chemical House, Back wash Water storage tank, Staff quarter, Guard Room, Stilling Chamber & Flash mixer, Chlorination building, Store cum Operator room, Sludge sump, Electrical Substation and Filter Annex building are completed. Substructure of Filter house is in progress.
- Super structure of Chlorination building, Store cum operator room, Filter annex building, Staff quarters is completed.
- Super structure of CWPH, Chemical House, Back wash Water storage tank, Guard Room, Stilling Chamber & Flash mixer, Chlorination building, Sludge sump, Electrical Substation is in progress.

### *Clear Water Transmission Main*

- 13.452 km of 900mm dia. DI (K9) and 3.966 km of 1000 mm of DI (K9) i.e total 17.418 km Primary CWRM pipe laying completed out of 35.097 km. Rest under progress.

## **F. Implementation Schedule**

29. The project is implemented on a design build and operation (DBO) contract. Contract has

been awarded in favor of L & T and notice to proceed (NTP) on 19th February,2020.

Figure 2: Location of project Components at East Medinipur

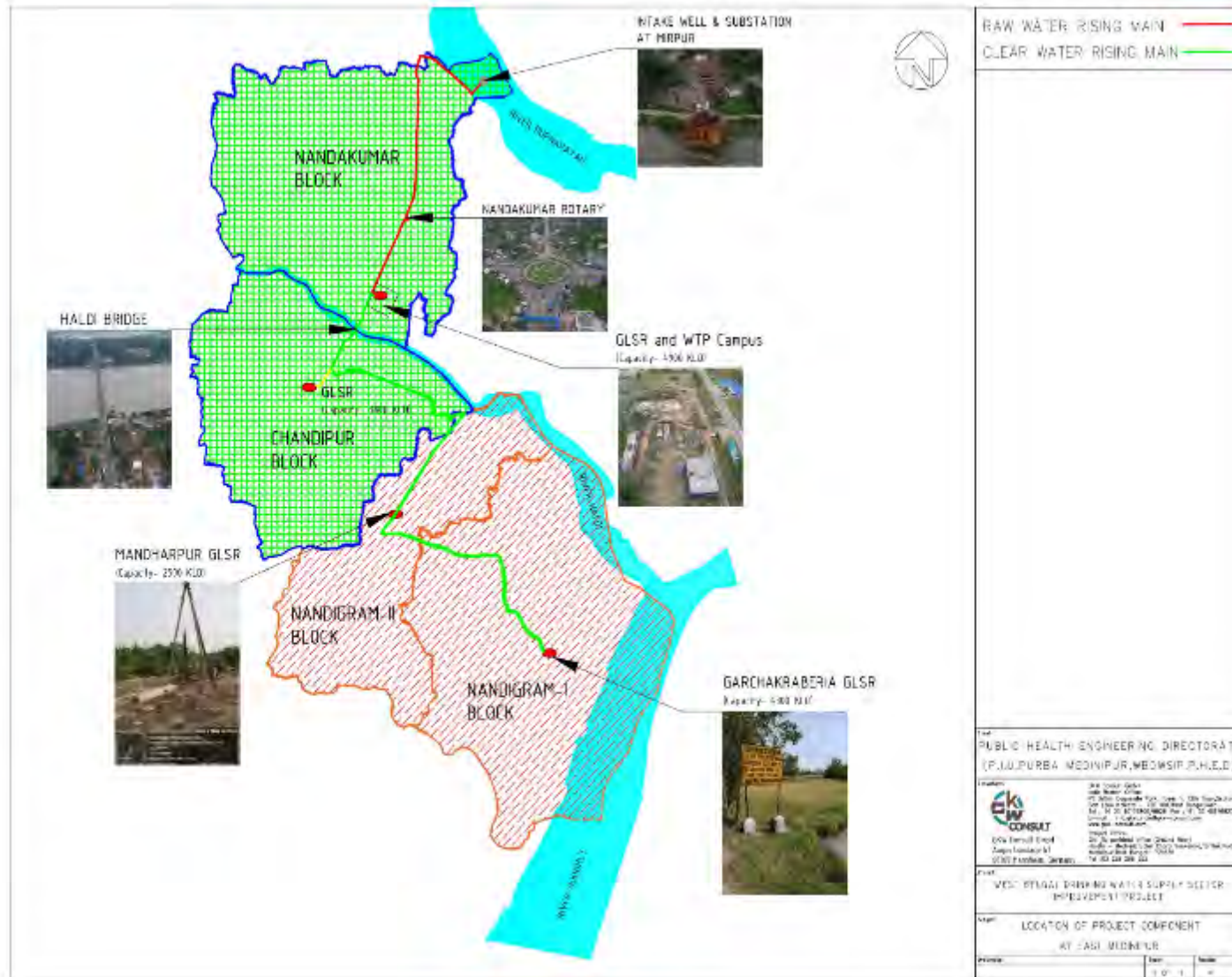


Figure 3.1: Google map showing Updated Clear Water Transmission Main Line with reference to the Previous Alignment shown in Red

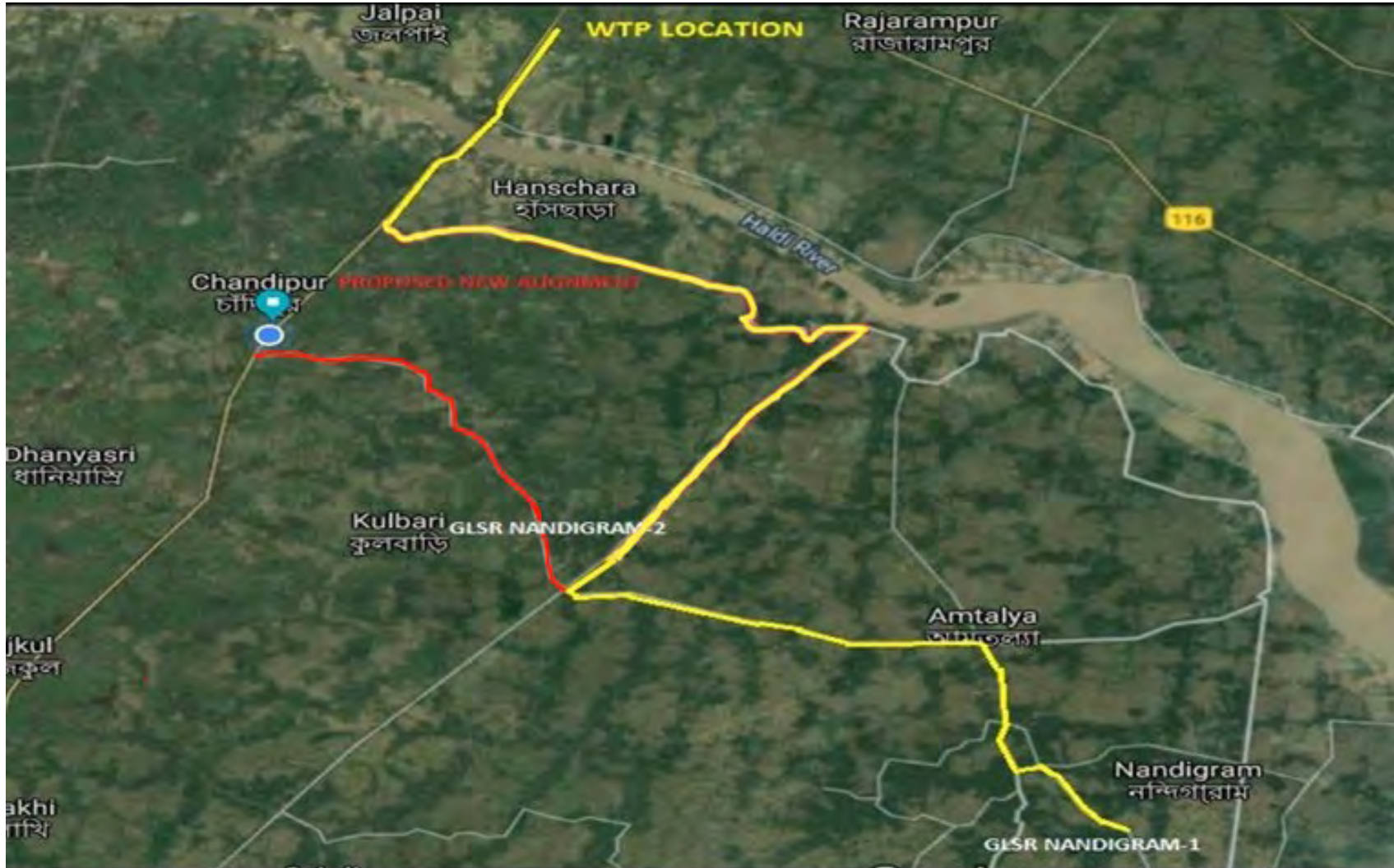


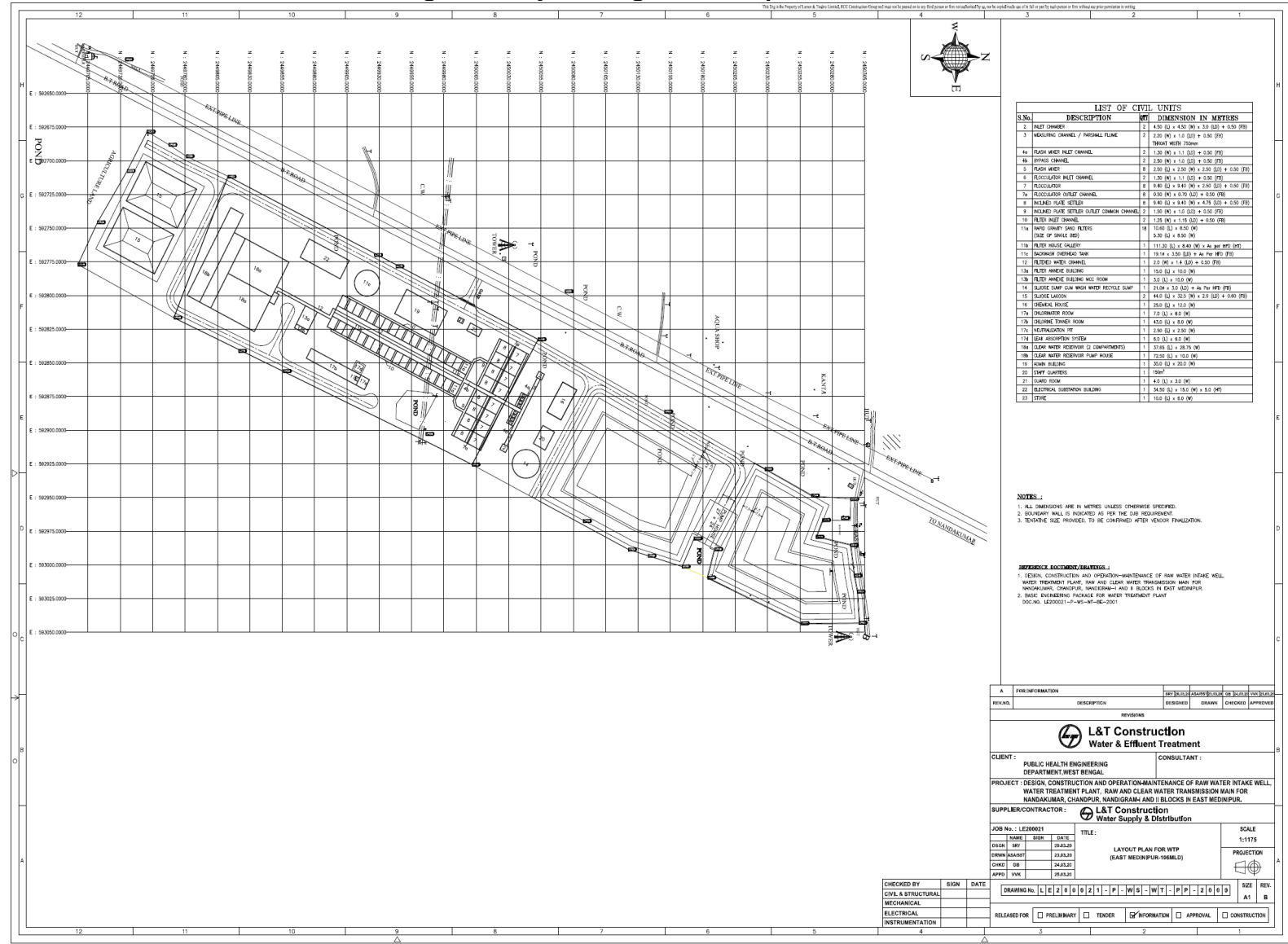
Figure 3.2: Google map showing raw water transmission pipeline from intake to WTP and also clear water main to both GLSR with marking of location.







Figure 6: Layout Diagram of Proposed WTP



LIST OF CIVIL UNITS		
S.No.	DESCRIPTION	DIMENSION IN METERS
1	INLET CHANNEL	2 4.50 (W) x 4.50 (D) x 3.00 (H) ± 0.00 (FF)
2	MEASURING CHANNEL / PARALLEL FLUME	2 2.25 (W) x 1.0 (D) ± 0.00 (FF) SLOPE WITH 1:50
4a	FLASH WEIR INLET CHANNEL	2 1.50 (W) x 1.1 (D) ± 0.00 (FF)
4b	SPRING CHANNEL	2 2.50 (W) x 1.0 (D) ± 0.50 (FF)
5	ROUGH WEIR	8 2.50 (W) x 1.50 (D) x 3.00 (D) ± 0.50 (FF)
6	FLOCCULATED INLET CHANNEL	2 1.20 (W) x 1.1 (D) ± 0.00 (FF)
7	FLOCCULATORS	8 6.40 (L) x 3.40 (W) x 3.00 (D) ± 0.50 (FF)
8	FLOCCULATED OUTLET CHANNEL	8 3.50 (W) x 0.70 (D) ± 0.00 (FF)
9	INCLUDED FLAKE SETTLER	8 6.40 (L) x 3.40 (W) x 4.75 (D) ± 0.50 (FF)
10	INCLUDED FLAKE SETTLER	2 1.50 (W) x 1.0 (D) ± 0.00 (FF)
10	INCLUDED FLAKE SETTLER	2 1.75 (W) x 1.0 (D) ± 0.00 (FF)
11a	INLET CHANNEL	2 1.75 (W) x 1.0 (D) ± 0.00 (FF)
11b	INLET CHANNEL	2 1.75 (W) x 1.0 (D) ± 0.00 (FF)
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NOTES:  
 1. ALL DIMENSIONS ARE IN METRES UNLESS OTHERWISE SPECIFIED.  
 2. BOUNDARY WALL IS INDICATED AS PER THE JOB REQUIREMENT.  
 3. TENTATIVE SIZE PROVIDED TO BE CONFIRMED AFTER VENDOR FINALIZATION.

REFERENCE DOCUMENTS/STANDARDS:  
 1. 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.  
 2. BASIC ENGINEERING PACKAGE FOR WATER TREATMENT PLANT  
 DOC.NO. LE200021-P-W5-WT-BE-001

FOR INFORMATION		REV	DATE	BY	CHKD	APPD	DATE
REVISED	DESCRIPTION	DATE	BY	CHKD	APPD	DATE	

**L&T Construction**  
Water & Effluent Treatment

CLIENT : PUBLIC HEALTH ENGINEERING DEPARTMENT, WEST BENGAL  
 CONSULTANT : L&T Construction

PROJECT : 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.

SUPPLIER/CONTRACTOR : L&T Construction  
Water Supply & Distribution

JOB No. : LE200021

NAME	DATE
DESIGN	24.03.20
DRAWN	24.03.20
CHECKED	24.03.20
APPROVED	24.03.21

TITLE : LAYOUT PLAN FOR WTP (EAST MEDINIPUR-INDIA)  
 SCALE : 1:1175  
 PROJECTION :

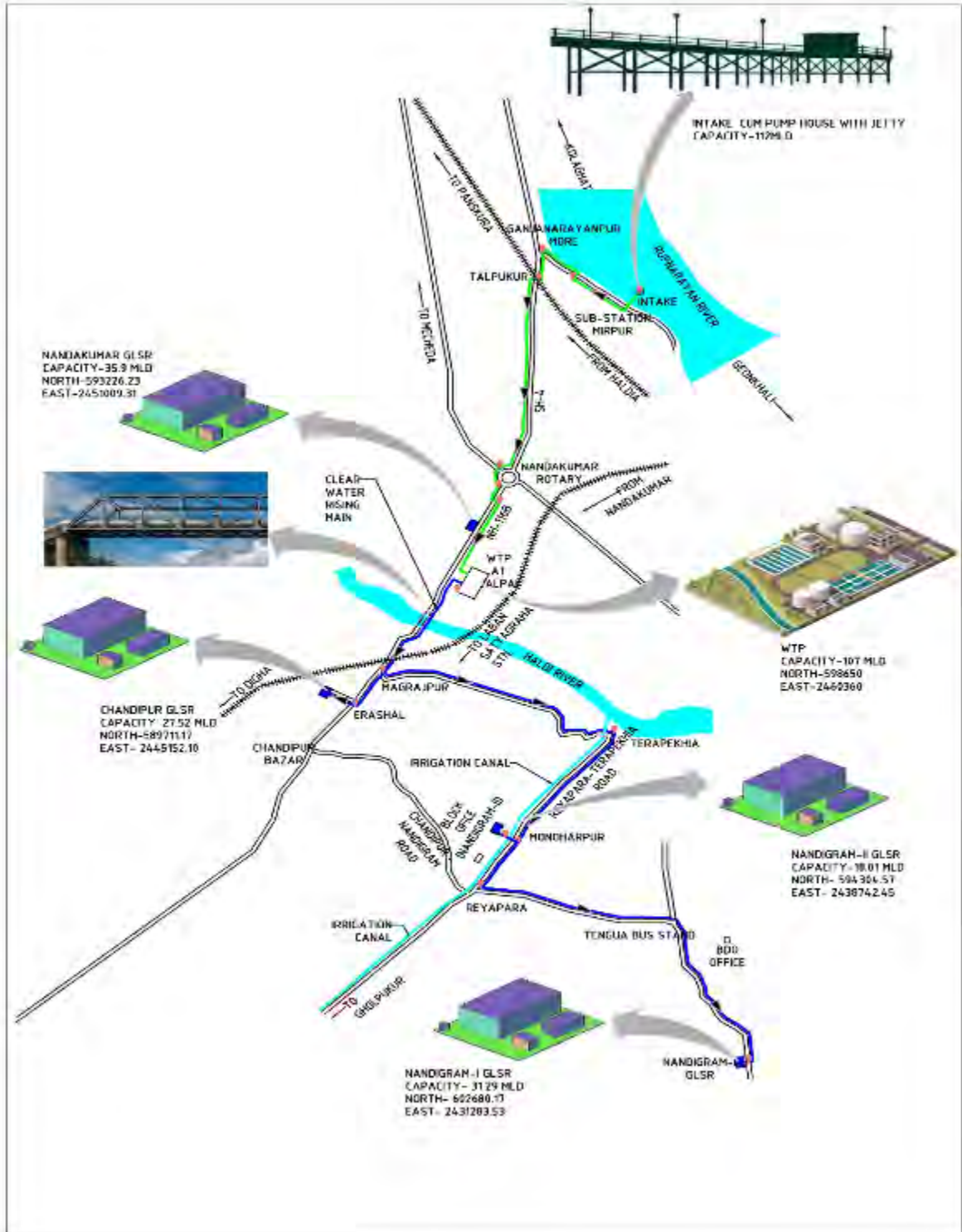
CHECKED BY	SIGN	DATE
CIVIL & STRUCTURAL		
MECHANICAL		
ELECTRICAL		
INSTRUMENTATION		

DRAWING No. LE 2 0 0 2 1 - P - W 5 - W T - P - 2 0 0 9

RELEASED FOR :  PRELIMINARY  TENDER  INFORMATION  APPROVAL  CONSTRUCTION



Figure 8: Raw water and Clear Water Transmission Complete Layout



**Figure 9: Field Visit Photographs of East Medinipur Bulk Water Supply Project Showing Subproject Locations**



**Proposed Intake location – Soil testing continued within River**



**Sub-station and pump house location**



**Boring work at Intake Approach Bridge**



**Piling works in progress at Intake Pump house**



**Pile concreting in Admin cum SCADA building at Intake site**



**Pipeline alignment near Nandakumar Bazar**



Near Nandakumar Circle



Diving pit near Nandakumar (NH116B)

**Water Treatment Plant**



Proposed WTP site – demarcation of area with project board



WTP site- work continued



RC wall concreting work at WTP



Column casting of Chemical house at WTP



**Haldi River - Narghat bridge crossing - Pipe crossing bridge will be constructed**



**Narghat bridge crossing - Soil testing continued**

**Clear Water Route near Narghat Crossing**



**Clear Water main pipe will come from this way and through trenchless method it will cross the Narghat Railway Crossing.**



**From here it will cross the rail way crossing through trenchless method**



**Pipe will cross from these lands**





**Magrajpur Railway crossing**

**Clear Water Main**



**Magrajpur to Terapekhiya**



**Terapekhiya to Tengua Mor**



**Nandigram Bus stand- Clear water route**



**CWRM Pipe laying work in progress near Mangalchak**

### **III. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

#### **A. ADB Policy**

30. 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.

31. **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:

- **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.
- **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.
- **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.
- **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a FI.

32. **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.

33. **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.

- for environmental category A projects, draft EIA report at least 120 days before Board consideration;
- final or updated EIA and/or IEE upon receipt; and
- environmental monitoring reports submitted by the Project Management Unit (PMU) during project implementation upon receipt.

34. **Consultation and Participation.** ADB SPS require borrower to conduct meaningful consultation<sup>2</sup> with affected people and other concerned stakeholders, including civil society, and facilitate their informed participation. The consultation process and its results are to be documented and reflected in the environmental assessment report.

35. **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.

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

37. **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.

38. **Occupational Health and Safety.** ADB SPS requires the borrower to ensure that workers<sup>3</sup> are provided with a safe and healthy working environment, taking into account risks

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<sup>2</sup>As per ADB SPS, 2009, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle;<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>3</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.

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.

**39. Community Health and Safety.** ADB SPS requires the borrower to identify and assess risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and shall establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

**40. 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 included in the EMP.

**41. 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>4</sup>; WHO Interim Guidance (and its updates) on Water, Sanitation, Hygiene and Waste management for the COVID 19 virus (**Appendix 23**) and Sector Specific (Water and Sanitation) Guidelines<sup>5</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**

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<sup>4</sup><https://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

<sup>5</sup><https://www.ifc.org/wps/wcm/connect/e22c050048855ae0875cd76a6515bb18/Final%2B-%2BWater%2Band%2BSanitation.pdf?MOD=AJPERES>

42. **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.

43. 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 the Environmental Clearance if appropriate.

44. Category B projects require environmental clearance from the State Environment Impact Assessment Authority (SEIAA). The State level EAC categorizes the project as either B1 (requiring EIA study) or B2 (no EIA study), and prepares TOR for B1 projects within 60 days. On completion of the study and review of the report by the EAC, the SEIAA issues the Environmental Clearance based on the EAC recommendation. The Notification also provides that any project or activity classified as category B will be treated as category A if it is located in whole or in part within 10 km from the boundary of protected areas, notified areas or inter-state or international boundaries.

45. 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.

46. **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 7**.

**Table 7: Applicable Environmental Regulations**

Law	Description	Requirement
Water (Prevention and Control of Pollution) Act of 1974, Rules of 1975, and amendments	Act was enacted to provide for the prevention and control of water pollution and the maintaining or restoring of wholesomeness of water. Control of water pollution is achieved through administering conditions imposed in consent issued under to this Act. All pollution potential activities will require Consent to Establish (CTE) from West Bengal Pollution Control Board (WBPCB) before starting implementation and Consent to Operate (CTO) before commissioning.	WTP requires CTE and CTO from WBPCB.  CTE of WTP have been obtained from WBPCB dated 05.11.2020, Refer Memo No. 321-56-hl-nc-b/20. <b>(Appendix 2)</b>
Environment (Protection) Act, 1986 and CPCB Environmental Standards.	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards	<b>Appendix 3</b> provides applicable standards for ambient air quality. <b>Appendix 4</b> provides vehicular emission norms

Law	Description	Requirement
Noise Pollution (Regulation and Control) Rules, 2000 amended up to 2010.	Rule 3 of the Act specifies ambient air quality standards in respect of noise for different areas/zones.	<b>Appendix 5</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); - CTE and CTO from WBPCB; - Compliance to conditions and emissions standards stipulated in the CTE and CTO.	All relevant forms, prescribed fees and procedures to obtain the CTE and CTO can be found in the WBPCB website ( <a href="http://www.wbpcb.gov.in">www.wbpcb.gov.in</a> ). CTE of WTP have been obtained from WBPCB dated 05.11.2020, refer Memo No. 321-56-hl-nc-b/20. <b>(Appendix 2)</b> CTO will be applied after completion of construction work. Application needs to be submitted for others as per requirement.
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, & practices to be discarded - failure to comply will lead to legal action, stoppage of work etc., -All construction activities under WBDWSIP shall follow the norms	
West Bengal Inland Fisheries Act, 1984(Amendment) Act, 1997	- Act to conserve, develop, propagate, protect, exploitation of inland fish and fisheries. -No discharge of wastewater, pollutants into inland water bodies that may affect fish. -Prohibits conversion of fishery area (any water area, naturally or artificially depressed land, irrespective of ownership, measuring 0.035 hectares (ha) or more, which retains water for more than 6 months and capable of being used as fishery) for any other purpose. - prohibits filling up fishery areas to convert into solid land, e. g., for any construction. - Prohibits dividing water area into parts to make any part less than 0.035 ha. -if conversion/ filling up is for development works, prior permission is required	Project sites is not located in such areas
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 & Demolition Waste Management Rules, 2016	Rules to manage construction & to waste resulting from construction, remodeling, repair and demolition of any civil structure. Rules define C&D waste as waste comprising of building materials, debris resulting from construction, re-modeling, repair and	Construction & demolition waste generated from the project construction shall be managed and disposed as per the rules ( <b>Appendix 8</b> )

Law	Description	Requirement
	demolition of any civil structure.	
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 9</b> provides applicable labor laws including amendments issued from time to time applicable to establishments engaged in construction of civil works.
West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006	This Act has put restriction on felling of trees in the State unless until permitted by the Tree Officer. Any person desiring to fell a tree shall apply in writing to the tree officer for permission in that behalf. It further defines clauses for planting adequate number of trees, planting in place of fallen/destroyed trees, preservation of trees and adoption of trees.	In case of tree felling NOC needs to be obtained from concerned department. Tree felling permission of 98 nos. of trees from Intake to Ganganarayanpur (raw water transmission main) has been obtained from Forest Department. Tree felling done. Tree felling permission of 698 numbers of trees from Mograjpur to Chakpatna clear water transmission main have been obtained from Forest Department. Tree felling done. Tree felling permission for 201 nos. tree in the stretch of Ganjanarayanpur to Nandakumar Market have been obtained from DFO. Tree felling is under progress. NOC of tree cutting attached as <b>Appendix 26</b>
Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010	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).

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

47. **Other Permission from Statutory Authorities.** Clearances / permissions to be obtained prior to start of construction. **Table 8** shows the list of clearances/permissions required for project construction. This list is indicative and the contractor should ascertain the requirements prior to start of the construction, and obtain all necessary clearances/permission prior to start of construction.

**Table 8: Clearances and permissions required for Construction activities**

Sl. No	Activity	Status under which Clearance is Required	Implementation	Supervision	Remarks
1	Permission for Abstraction of water from Rupnarayan river	Abstraction of raw water from surface water sources within the state is accorded by the Irrigation and Waterways Department (I&WD).	PIU	PMU	Irrigation and Waterways Department (I&WD) has already given a permission of drawl of 117 Mld raw water for drinking water purpose under the WBDWSIP ( <b>Appendix 20</b> )
2	Construction of new WTP	Consent to establish and consent to operate from WBPCB	PIU, DSISC & Contractor	PMU	CTE have been obtained from WBPCB dated

Sl. No	Activity	Status under which Clearance is Required	Implementation	Supervision	Remarks
					05.11.2020, Refer Memo no. 321-56-hl-nc-b/20 attached as <b>(Appendix 2)</b> .
3	Tree Cutting	State forest department Preliminary survey along raw water transmission main indicates that trees present within the alignment will be impacted	PIU & Contractor	PIU and PMU	Joint verification with Forest dept. along raw water transmission main done and finalized requirement of felling of 98 nos. tree. NOC has been obtained from Forest Dept Tree felling done. <b>(Appendix 26)</b> . Joint verification with Forest dept. from Magrajpur to Chakpatna clear water transmission main have been done and finalized the requirement of felling of 698 nos. of tree. NOC has been obtained from forest dept. Tree felling has been done. Compensatory plantation of 490 trees against 98 nos. felling and plantation of more than 5 times against 698 nos. of tree felling has been done. Tree felling permission for 201 nos. tree (SH 4) in the stretch of Ganjanarayanpur to Nandakumar Market have been obtained from DFO. Tree felling is under progress. NOC attached as <b>Appendix 26</b> .
4	Hot mix plants, Crushers and Batching plants	Consent to operate under Air Act, 1981 from WBPCB	Contractor	PIU	Not required till now
5	Storage, handling and transport of hazardous materials	Hazardous Wastes (Management and Handling) Rules, 2016 Manufacturing, Storage and Import of Hazardous Chemicals Rules, 1989 from WBPCB	Contractor	PIU	Not required till now
6	Sand mining, quarries and borrow areas	Permission from District Collector/ State Department of Mining	Contractor	PIU	Obtained from licensed quarries
7	New quarries and borrow areas	Environmental clearance under EIA Notification 2006	Contractor	PIU	Not required

Sl. No	Activity	Status under which Clearance is Required	Implementation	Supervision	Remarks
8	Temporary traffic diversion measures	District traffic police	Contractor	PIU	Traffic management plan submitted and approved along with SEMP ( <b>Appendix 10</b> )
9	Permits for Pipe Laying along Irrigation land, PWD, State Highways, PMGSY and National Highways	NOC from Irrigation Dept., SH & NH Authority and PWD and PMGSY	Contractor-PIU, DSISC	PIU	NOC obtained from concerned authority NOC of Haldi river crossing have been obtained from I&W Department ( <b>Appendix 11</b> )
10	Pipe Laying work below Railway Line	The raw water rising main from Intake to WTP and Clear water main from WTP to GLSRs at Nandigram I & II has to cross the Railway tracks, twice. Necessary permission is required from the Divisional Railway Manager, South-Eastern Railway, Kharagpur to lay water transmission mains at Railway line crossings.	PIU, DSISC and contractor	PMU	NOC have been obtained from Railway department for Railway crossing near Talpukur and Mogrampur. NOC attached as <b>Appendix 13</b> . Work at specific area have been started after receiving of NOC from Railways

48. **ADB Safeguard Policy Statement Requirements.** During the design, construction, and operation of the project the PMU and PIUs will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety (EHS) Guidelines. 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.

## IV. DESCRIPTION OF THE ENVIRONMENT

### A. Methodology Used for Baseline Study

49. **Data collection and stakeholder consultations.** Data for this study has been primarily collected through comprehensive literature survey, discussion with stakeholder agencies, and field visits to the proposed subproject sites.

50. **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.

51. **Ocular inspection.** Several visits to the project sites were made during IEE preparation period in 2017-18 to assess the existing environment (physical, biological, and socioeconomic) and gather information with regard to the proposed sites and scale of the proposed project. A separate socioeconomic study was conducted to determine the demographic information, existing service levels, stakeholder needs and priorities. During updation of report (2019-24) several time field visit, discussion with stakeholder and generation of primary data with the help of respective contractor have been conducted by environment safeguard team.

### B. Physical Resources

#### 1. Location, Area & Connectivity

52. The 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 Hoogly, Rupnaryan river in the East. Tamluk, Haldia, Contai and Egra are its 4 Sub-Divisions. The average elevation of the district is within 10m above mean sea level. The district has a long coastline of 65.5 km along its southern and south eastern boundary.

53. 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 km (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 9: 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

54. The select four blocks Nandakumar, Chandipur, Nandigram-II and Nandigram-I block of Purba Medinipur District is situated on the western bank of the River Rupnarayan and bounded by Tamluk Block in the north, Khejuri I, Khejuri – II Block in the south and Bhagawanpur – I, Bhagawanpur – II and Moyna Block in the West and Mahisadal and Haldia blocks in the East. The total project area is 590.26 Sq. km. The project area does not include any statutory town (Municipality) but includes 4 Census towns. Administrative profile of the 4 blocks is given below:

**Table 10: Block-wise Profile of Project Area**

General Information of Block	Project Blocks			
	Nandakumar	Chandipur	Nandigram I	Nandigram II
Subdivision	Tamluk	Tamluk	Haldia	Haldia
Block Headquarter	Nandakumar	Math Chandipur	Nandigram	Reyepara
Geographical area (in Sq. km,)	165.70	137.58	181.84	105.74
Panchayat Samity	1	1	1	1
No. of Gram Panchayats	12	10	10	7
No. of Inhabited Village	100	135	98	40
No. of Mouza	100	111	99	41
No. of Gram Samsad	186	134	140	91

55. **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 km, of which the 42 km is within Purba Medinipur district.

## 2. Topography, Soils and Geology

56. 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 south eastern boundary.

57. 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.

58. **Soils.** Major part of the district is covered by alluvial soil except a narrow belt along the sea 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. 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.

59. **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 comprises 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.

60. 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 are nacious in the north and northwest to mostly argillaceous in the south and southeast. The thickness of the newer alluvium varies between 10 and 60m m the northwest - southeast direction. The thickness of older alluvium varies between 50m in the northwest to over 90 m in the southeast direction. The newer alluvium is devoid of any significance 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.

### 3. Seismology

61. As per the seismic zoning map of India, project area in both the districts 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.,

### 4. Climatic Conditions

62. 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. Average annual temperature varied from 10°C to 38.6°C. The mean monthly temperature over the past 10 years is tabled below:

**Table 11: Average Monthly Temperature in Purba Medinipur District**

Month	°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

63. Average annual rainfall in the district has varied from a low of 1531.2 mm in 2017, to a high of 2659.6 mm in 2021. The monthly rainfall from 2017 to 2021 is tabled below:

**Table 12: Average Annual Rainfall in Purba Medinipur District**

Month	Years and Rainfall in mm				
	2017	2018	2019	2020	2021
January	0.0	0	0	49.6	0
February	0.0	1.1	137.5	10.5	0
March	58.7	1	28.6	30.2	0
April	19	66.4	58.7	71.4	15.3
May	89.1	114.3	61.8	431	323.9
June	158	261.9	143.6	209.5	384.2
July	484.5	347.7	154.7	171.6	422.5
August	223.8	263.5	422.8	403.6	326.2
September	227.7	377.3	421.1	219.4	811.9
October	216.2	202.7	330.5	217.2	291.6
November	32.2	9	159	3.8	4.3

<sup>6</sup>Source: Meteorological Department, Govt. of India

Month	Years and Rainfall in mm				
	2017	2018	2019	2020	2021
December	22	8.6	10.4	0	79.7
<b>Total</b>	<b>1531.2</b>	<b>1653.5</b>	<b>1928.7</b>	<b>1817.8</b>	<b>2659.6</b>

## 5. Surface Water

64. 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 13: Major Rivers flowing through Purba Medinipur District**

Sl. No	Name of River	Catchment area (In Sq. Kms) <sup>7</sup>	Length (In Kms)
1	Rupnarayan	1226	80
2	Kaliaghai	1913	121
3	Haldi	614	42
4	Rasulpur	1556	19
5	Pichabani	808	-

65. Catchment maps of Rupnarayan-Haldi-Rasulpur-Pichabani Sub-basin and Kaliaghai sub-basin are also presented below:



**Figure 10: Catchment Area Map of Rupnarayan- Haldi- Rasulpur- Pichabani Sub-basin**

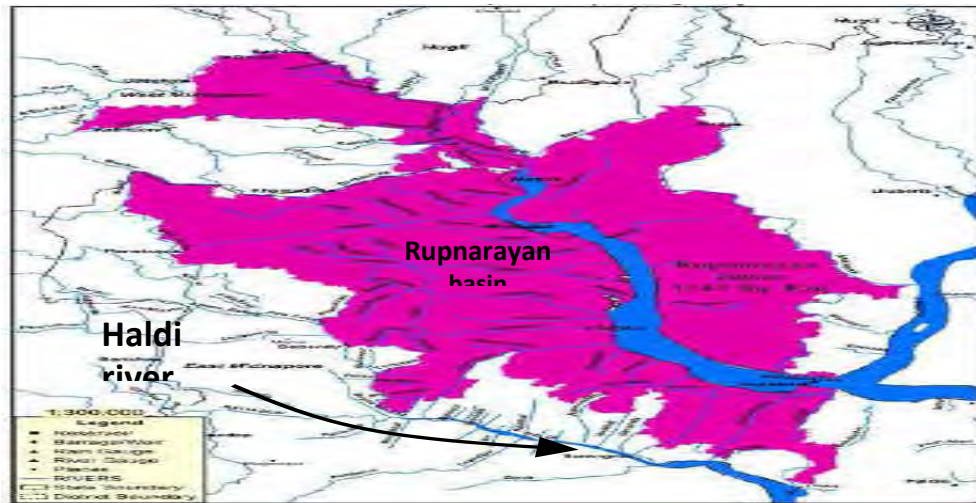
<sup>7</sup> Data Source: Annual Flood Report-2015, Issued by Irrigation and Waterways Directorate



**Figure 11: Catchment area map of Kaliaghai sub-basin**

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

67. **Rupnarayan River.** Project water source is River Rupnarayan and the river intake is proposed at Ichhapur Mouza in Nandakumar block. The river is formed from the confluence of Shilabati and Dwarakeswar 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 south-eastward through the districts of Bankura and Paschim Medinipur to meet with Dwarakeswar. Dwarakeswar river (also known as Dhalkishore) originates from Tilboni hill of Chhota Nagpur Plateau in Purulia district and enters Bankura district near Chatna. The river mainly flows south-eastward and after entering into Hooghly district it turns south near Arambag town. After receiving contributions from other minor tributaries, Dwarakeswar finally joins with Shilabati to form river Rupnarayan. The Kana Dwarakeswar, Polashpai, Durbachaty are the tributaries of the Rupnarayan. The river is the main tributary of Hooghly and receives tidal discharge from Bay of Bengal, apart from the major tributaries like Dwarakeswar, Shilabati, Kangsabati, Mundeshwari and also from a number of drainage channels like Kata khal, Bakshi Khal, Chandreshwar Khal of Paschim Medinipur.

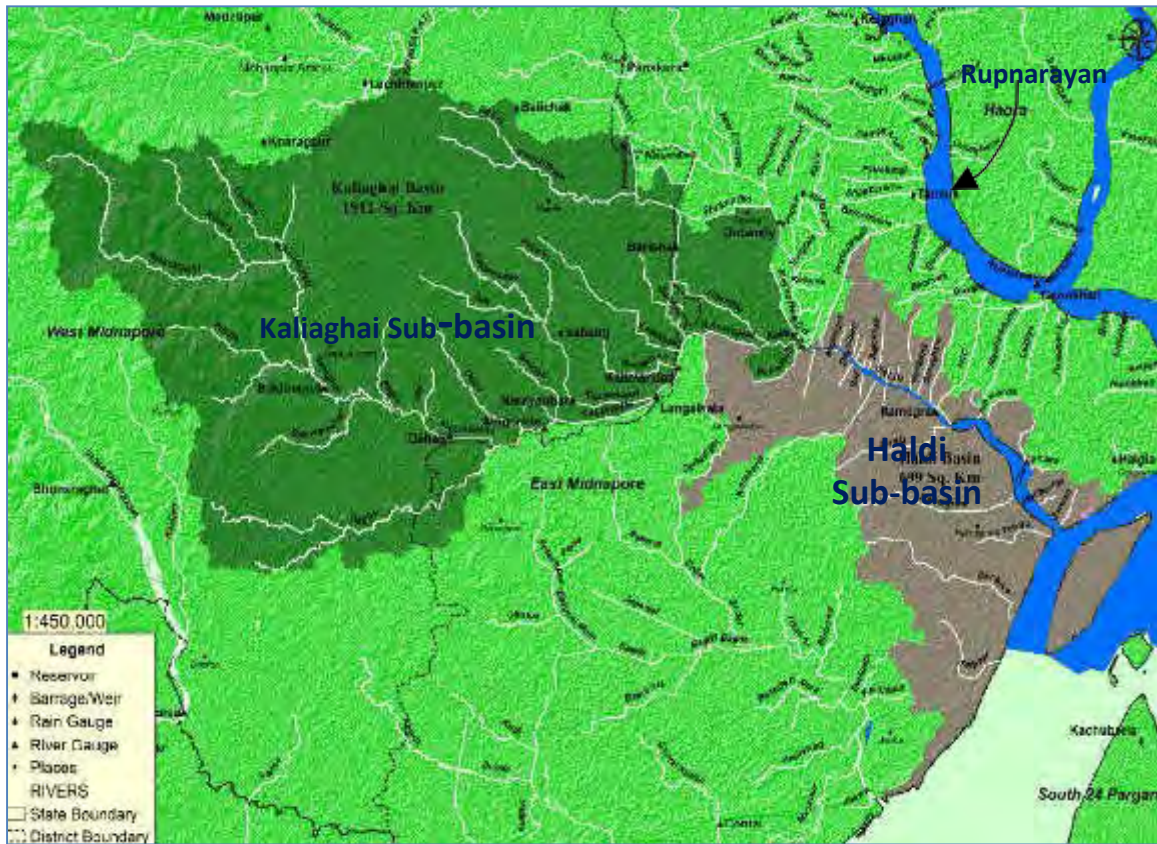


**Figure 12: Rupnarayan Sub-basin**

68. **New Cosseye.** 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 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 Kms.

69. **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 121km.

70. **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 13: Kaliaghai-Haldi Sub-basin**

71. **Surface Water quality.** The State Pollution Control Board has a monitoring station on the Rupnarayan, near Geonkhali, at the confluence of River Hooghly. Analytical tests carried out once in each month are published in the Central Pollution Control Board (CPCB) website. The water quality parameters indicate an increase in the chloride (salinity) concentration during March to June, every year. The advent of the 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 below.

**Table 14A: 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 min
<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	---

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: West Bengal Pollution Control Board)

**Table 14B: 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	<b>5000</b>
<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	<b>1500</b>
<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	<b>600</b>
<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	<b>3</b>
<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	<b>4 min</b>
<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	---

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: West Bengal Pollution Control Board)

**Table 14C: 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	
<b>Total Coliform (MPN/100ml)</b>	4600			7900					7000	7900	4600	4900	<b>5000</b>
<b>Faecal Coliform (MPN/100ml)</b>	930			4600					4600	3300	3300	2400	---
<b>TDS (Mg/l)</b>	302			4092					252	304	540	316	<b>1500</b>
<b>TSS (Mg/l)</b>	126			595					286.66	313.33	210	162	-
<b>Chloride (Mg/l)</b>	188.59			739.77					75.43	56.57	8.39	79.74	<b>600</b>
<b>BOD (Mg/l)</b>	0.95			0.9					3.65	1.95	1.9	1.9	<b>3</b>
<b>DO (Mg/l)</b>	7.8			5.9					7.2	5.4	5.7	7.5	<b>4 min</b>
<b>Conductivity (us/cm)</b>	623.3			6725					281.6	305.9	656.3	498.1	---
<b>Turbidity (NTU)</b>	100			158					318.67	345	303	166	---
<b>Total Hardness as CaCO<sub>3</sub></b>	302			479					75	71	71	164	---

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: West Bengal Pollution Control Board)

\* Data of following months are not available

**Table 14D: 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	
<b>Total Coliform (MPN/100ml)</b>	7000	8400	7900	9400	8400	7000	6300	28000	7900	9400	11000	7000	<b>5000</b>
<b>Faecal Coliform (MPN/100ml)</b>	2700	210	4600	4600	6300	3300	3100	17000	4600	4600	4900	3900	---
<b>TDS (Mg/l)</b>	276	452	736	2012	580	650	744	3944	226	588	232	264	<b>1500</b>
<b>TSS (Mg/l)</b>	56	108	184	508	120	114	158	350	140	182	132	238	
<b>Chloride (Mg/l)</b>	66.95	35.83	358.33	924.11	141.44	235.74	282.89	1650.2	29.99	199.94	69.97	235.35	<b>600</b>
<b>BOD (Mg/l)</b>	1.9	1.55	1.95	1.45	0.55	1.25	1.25	1.75	0.85	1.25	1.2	0.95	<b>3</b>
<b>DO (Mg/l)</b>	7.9	5.4	5.3	6.5	6.6	7	7	5.9	5.4	5.3	5.7	7.2	<b>4 min</b>
<b>Conductivity (us/cm)</b>	399.1	455.3	1233	3474	626	1158	904.2	5749	349.7	763.9	373.5	495.2	---
<b>Turbidity (NTU)</b>	40.2	35.8	149	220	56.8	98.9	105	281	147.8	222	248	160	---
<b>Total Hardness as CaCO<sub>3</sub></b>	181	179	2700	972	972	1620	167	670	135	173	130	152	---

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: West Bengal Pollution Control Board)

**Table 14E: 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	<b>5000</b>
<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	<b>1500</b>
<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	<b>600</b>
<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	<b>3</b>
<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	<b>4 min</b>
<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	---

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: West Bengal Pollution Control Board)

**Table 14F: 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									<b>5000</b>
<b>Faecal Coliform (MPN/100ml)</b>	3300	4900	4600	7000									---
<b>TDS (Mg/l)</b>	202	484	860	3692									<b>1500</b>
<b>TSS (Mg/l)</b>	180	96	94	208									
<b>Chloride (Mg/l)</b>	68.45	285.8	799.75	1569.51									<b>600</b>
<b>BOD (Mg/l)</b>	1.55	2.55	1.7	2.75									<b>3</b>
<b>DO (Mg/l)</b>	7.2	5.2	5.6	5.9									<b>4</b>
<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									---

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: West Bengal Pollution Control Board)

**Table 14G: 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>
BOD	2.75	3 max	mg/l
Chromium Total	BDL		mg/l
Copper	BDL		mg/l
Iron	0.16		mg/l
Lead	0.012		mg/l
Mercury	BDL		mg/l
Nickel	BDL		mg/l
Zinc	0.23		mg/l
a-BHC	BDL		ppb
a-Endosulphan	NT		ppb
Aldrin	NT		ppb
Anilophos	NT		ppb
b-Endosulphan	NT		ppb
Aldrin	NT		ppb
Anilophos	NT		ppb
b-Endosulphan	NT		ppb
Chlorpyriphos	BDL		ppb
Dieldrin	BDL		ppb
g-BHC	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 O2(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

Water Quality			
Parameter	Test Result	Permissible Limit	Unit
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 max	mg/l
Total Fixed Solids (TFS)	3022.00		mg/l
Total Hardness as CaCo3	574.20	---	mg/l
Total Suspended Solids (TSS)	208.00		mg/l
Turbidity	23.20	---	NTU
Arsenic	BDL		mg/l
Cadmium	BDL		mg/l

72. Haldia PHED division is monitoring the Rupnarayan river water quality near the proposed intake location since May 2017 to understand the water quality with special emphasis to salinity problem during lean months. **Table 14A to 14G** shows the surface water results of Rupnarayan river year wise from 2019 till date. Most recent April 2024 month monitoring result is shown in the **Table 14G**. From **Table 14G** it is found that the Total Coliform and Faecal Coliform concentration for the month of April is well above the permissible limit and increased rapidly compared to previous month. 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. During 2019- 2024 in few occasions it is noted that TDS and Chlorine are above the surface water quality standard.

73. 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 4 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, although this is within the permissible limits as per Drinking water standards (IS:10500-2012).

**Table 15: Rupnarayan River Water Analysis Results at the Intake Point (Month: July, 2019)**

High Tide																			
Parameter	Unit	Standard As Per IS:10500																	
			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		6.5-8.8	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	5 to 10	120	618	278	446	267	466	411	112	125	51.6	69.1	46	110	37.7	54	37	193
TDS	mg/L	500-2000	645	1571	978	971	1067	1037	1245	592	702	824	778	764	768	789	485	494	388
Alkalinity	mg/L	200-600	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
<b>CHEMICAL PARAMETERS</b>																			
Hardness	mg/L	300-600	232	408	360	342	412	320	448	232	452	480	424	392	416	392	224	240	212
Iron	mg/L	0.3-1.0	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	250 -1000	125	1045	145	673	129	742	142	122	128	134	119	125	113	127	124	134	126
Low Tide																			
Parameter	Unit	Standard As Per IS:10500																	
			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		6.5-8.8	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	5 to 10	152	618	306	104	137	269	318	165	116	48	80.5	47.3	129	44.9	47	28	162
TDS	mg/L	500-2000	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	300-600	216	408	280	448	460	464	268	428	440	464	416	380	412	388	216	228	220
Iron	mg/L	0.3-1.0	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	250 -1000	148	1045	453	126	1343	138	589	136	123	128	126	122	124	118	116	125	117

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

**Table 16: Rupnarayan River Water Analysis Results at the Intake Point (Month: August 2019)**

High Tide												
Parameter	Unit	Standard As Per IS:10500										
			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		6.5-8.8	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	5 to 10	47.6	74.2	361	561	276	211	236	42	260	258
TDS	mg/L	500-2000	1210	616	834	885	901	436	238	464	210	220
Alkalinity	mg/L	200-600	116	120	128	144	185	108	184	180	200	188
Conductivity	(µS/Cm)		2002	1043	1413	1522	1768	738	403	783	260	382
CHEMICAL PARAMETERS												
Hardness	mg/L	300-600	304	288	280	352	398	324	448	264	420	456
Iron	mg/L	0.3-1.0	0.08	0.12	0.19	0.49	0.79	0.14	0.37	2.12	0.64	0.41
Chloride	mg/L	250 -1000	121	115	132	160	196	115	148	240	188	128
Low Tide												
Parameter	Unit	Standard As Per IS:10500										
			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		6.5-8.8	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	5 to 10	60	84.1	296	284	260	245	235	80	204	208
TDS	mg/L	500-2000	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
CHEMICAL PARAMETERS												
Hardness	mg/L	300-600	280	300	268	420	404	332	400	304	408	408
Iron	mg/L	0.3-1.0	0.07	0.14	0.15	0.21	0.81	0.13	0.28	2.44	0.59	0.53
Chloride	mg/L	250 -1000	123	126	124	145	185	107	160	268	168	116

N.B.-LT= LT =Low Tide; HT=High Tide

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

## 6. Groundwater

74. 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.



**Figure 14: Hydro-geological Map of Purba Medinipur District**

75. **Ground Water Potential and availability.** All the 4 blocks of the project area are categorized as coastal blocks as per the Central Ground Water Board (CGWB) brochure. The ground water in the 4 blocks (as well as 12 other coastal blocks) occurs under semi-confined to confined condition in both the litho-systems and receives recharge from a distant area. Thus, it is difficult to ascertain the exact amount of recharge. However, an attempt was made by CGWB to evaluate the quantum of sub-surface outflow of groundwater through the deeper confined aquifers in the coastal blocks (considering average Transmissivity at 2000 m<sup>2</sup>/day) as presented below:

**Table 17: Sub-surface outflow of ground water from coastal blocks**

Sl. No	Block	Average Hydraulic gradient (l)	Maximum length of flow path (L) {Km}	Annual ground water flow in MCM
--------	-------	--------------------------------	--------------------------------------	---------------------------------

1	Mahishadal and Nandakumar	1: 5068	16.22	2.336
2	Nandigram-I, II and Chandipur	1: 5447	17.74	2.377

76. **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 Network 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.

77. **Ground Water Availability.** The most striking and interesting area from quality point of view is that fresh ground water in coastal area occurs within a depth span of 120-300 m bgl. The upper aquifers within 120 m bgl contain saline water. In Contai sub basin (around Contai town) covering approximately 150 sq.km besides, the near surface aquifer 5 to 12m thick there are three to four distinct aquifers within a depth of 250 m bgl 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 18: Blocks in Purba Medinipur affected by Salinity**

Sl. No	Name of Block	Aquifer Potential and Chemical quality
1	Tamluk, Sahid Matangini, Mahisadal, Nandakumar, Sutahata, 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.

78. In Digha - Ramnagar area the sand dunes in the coastal area formed by sea contain fresh ground water. The dune sand alternating with thin clay and gravelly clay bed down to a depth of 6-8 m bgl forms near surface aquifer. The top thick clay bed of the coastal aquifers as discussed above underlies this near surface aquifer. The near surface aquifer emerges under the sea on the continental shelf, thus sea water having easy access into this aquifer. The general gradient of the near surface aquifer is towards sea, but it was found that minor movements of the saline- fresh water contact were due to & fro movement of the sea and further controlled by the ocean tides.

## 7. Air Quality

79. West Bengal State Pollution Control Board (WBPCB) monitors air quality and noise level in the State. WBPCB have monitoring stations located at various places across the state covers major cities, district headquarters and industrial locations. There are no monitoring stations in the project blocks. In Purba Medinipur district, ambient air quality is monitored by WBPCB at Tamluk town. Daily average data collected from 1st July 2020 to 31st July 2020 shows that all the monitored ambient air quality parameters are within the National Ambient Air Quality Standards (NAAQS). Dust particle in the ambient air is mainly due to dusty roads and traffic movement.

**Table 19: Ambient air quality at Tamluk (monthly average)**

Sl. No.	Parameters	Tamluk	NAAQ Standard (24- hour average)
1	PM 10, $\mu\text{g}/\text{m}^3$	85.32	100
2	SO <sub>2</sub> , $\mu\text{g}/\text{m}^3$	24.13	80
3	NO <sub>2</sub> , $\mu\text{g}/\text{m}^3$	24.49	80

Source: CPCB

**C. On site Ambient Air Quality, Surface water Quality and Ambient Noise Level Monitoring: Primary data (Source: Project monitoring results)**

**1. Ambient Air Quality Monitoring**

80. The baseline status of the ambient air quality at the project area has been assessed through scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance program has been based on the following considerations:

- Meteorological conditions.
- Topography of the study area.
- Likely impact area.

81. Ambient air quality monitoring was carried out for pre-construction and during construction stages as per CBCB guidelines in the surrounding areas of the project site to assess the ambient air quality. To know the baseline ambient air quality at a larger distance, air quality survey has been conducted at 5 locations over a period of Pre- Monsoon Season. Similarly, during construction monitoring has been carried out in winter season. Major air pollutants viz, PM<sub>10</sub>, PM<sub>2.5</sub>, Sulphur Dioxide (SO<sub>2</sub>), Nitrogen Dioxide (NO<sub>2</sub>), & Carbon Monoxide (CO) representing the basic air pollutants in the region were identified for Ambient Air Quality Monitoring (AAQ). The ambient air quality monitoring results are shown in **Table 20 and 21**.



Figure15: Monitoring Location Air Quality and Noise Level

Table 20: Ambient Air Quality Monitoring Report (During Pre-Construction Period)

Sl. No.	Station Code	Location	Date	Parameters				
				PM10 ( $\mu\text{g}/\text{m}^3$ )	PM2.5 ( $\mu\text{g}/\text{m}^3$ )	CO ( $\text{mg}/\text{m}^3$ )	SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )
1	AQ1	WTP-Banbhera	06.07.2020	73.73	34.96	0.377	8.23	38.27
2	AQ2	Intake-Mirpur	06.07.2020	65.49	32.43	0.325	7.98	37.96
3	AQ3	Totabaria	07.07.2020	70.44	34.12	0.346	8.06	37.35
4	AQ4	Near Haldi River	07.07.2020	58.85	27.80	0.218	7.3	36.74
5	AQ5	Magrajpur	08.07.2020	62.26	30.33	0.282	7.64	37.05
<b>National Ambient Air Quality Standard</b>				<b>100</b>	<b>60</b>	<b>2</b>	<b>80</b>	<b>80</b>
<b>WHO Standard</b>				<b>100</b>	<b>50</b>	<b>-</b>	<b>50</b>	<b>-</b>

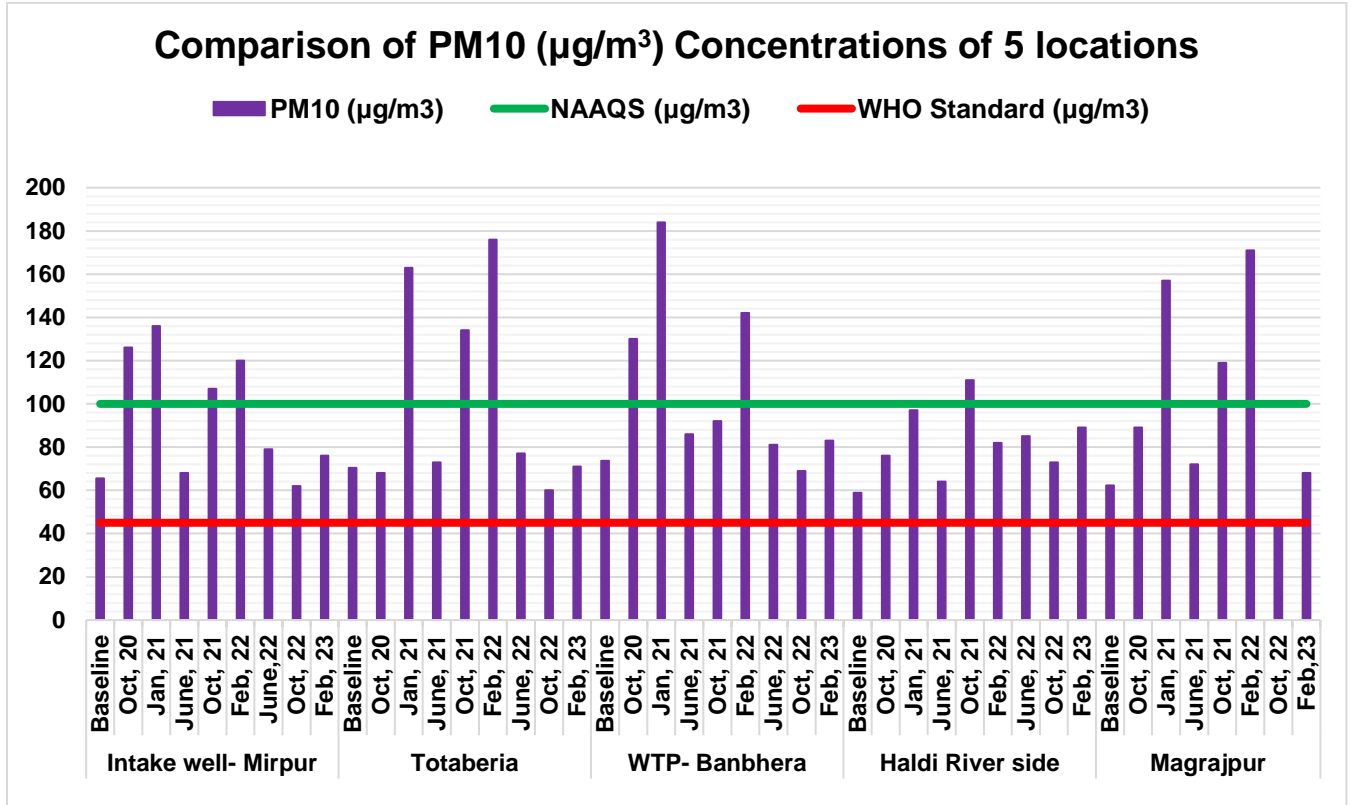
Source- Project monitoring data

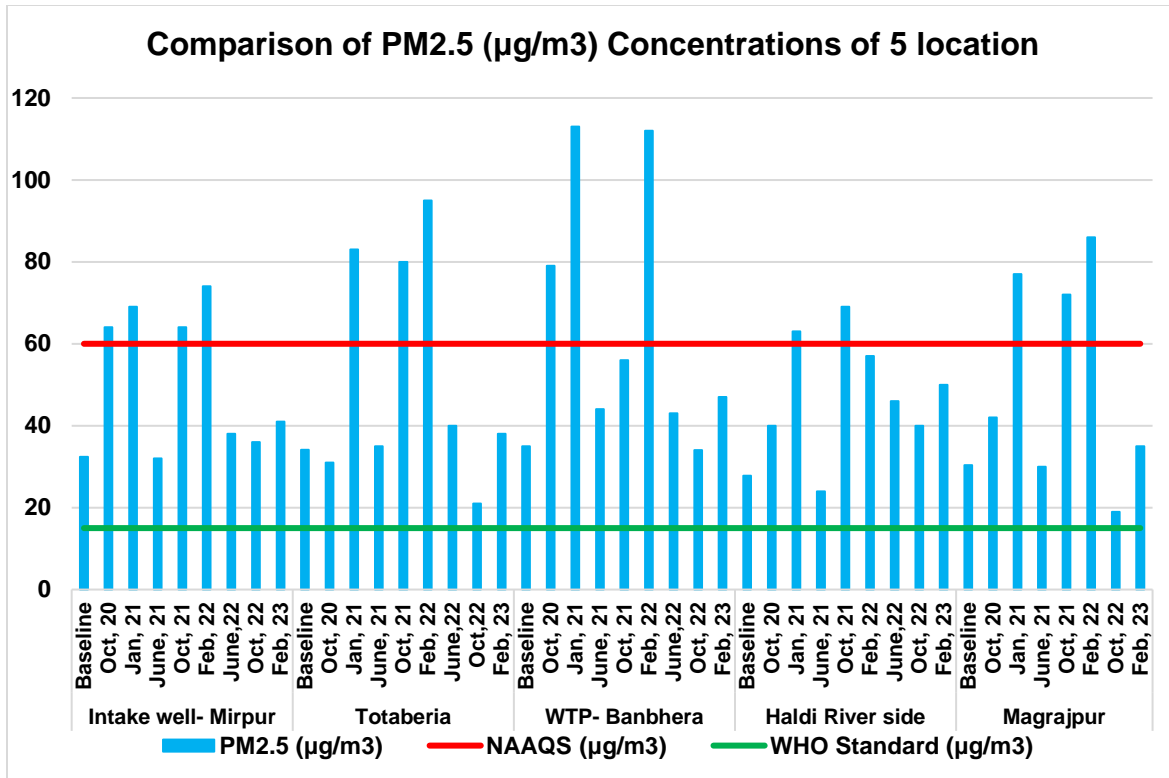
Table 21: Ambient Air Quality Monitoring Data -During Construction

Sl. No.	Station Code	Location	Date	Parameters				
				PM10 ( $\mu\text{g}/\text{m}^3$ )	PM2.5 ( $\mu\text{g}/\text{m}^3$ )	CO ( $\text{mg}/\text{m}^3$ )	SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )
1	AQ1	Intake well-Mirpur	14.02.23	76	41	0.721	6.3	26.8
2	AQ2	Totabaria	15.02.23	71	38	0.686	6.3	27.2
3	AQ3	WTP	14.02.23	83	47	0.789	6.8	28.5
4	AQ4	Haldi Rriver Side (Narghat Bridge)	15.02.23	89	50	0.801	7.1	29.4

Sl. No.	Station Code	Location	Date	Parameters				
				PM10 ( $\mu\text{g}/\text{m}^3$ )	PM2.5 ( $\mu\text{g}/\text{m}^3$ )	CO ( $\text{mg}/\text{m}^3$ )	SO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )	NO <sub>2</sub> ( $\mu\text{g}/\text{m}^3$ )
5	AQ5	Magrajpur	14.02.23	68	35	0.709	6	26.5
<b>National Ambient Air Quality Standard</b>				<b>100</b>	<b>60</b>	<b>2</b>	<b>80</b>	<b>80</b>
<b>WHO Standard (2021)</b>				<b>45</b>	<b>15</b>	<b>-</b>	<b>50</b>	<b>-</b>

Source- Project monitoring data





**Figure 16: Comparison of Air Quality data with the standard**

82. From above graphs it is visible that PM 10 Concentrations of February month is Relatively higher than October month as Construction work Started during this tenure. For February month highest concentration of both PM10 and PM2.5 were found near Narghat Bridge and the lowest concentrations were found near Magrajpur.

83. During construction ambient Air Quality Monitoring reveals that the minimum and maximum concentrations of pollutants at all the 5 AAQ stations were found to be as follows.

- For PM<sub>10</sub> – Max. conc. is 89 µg/m<sup>3</sup> & Min Conc. 68 µg/m<sup>3</sup>
- For PM<sub>2.5</sub> – Max Conc. 50 µg/m<sup>3</sup> & Min Conc. 35 µg/m<sup>3</sup>
- For NO<sub>x</sub> - Max Conc. 29.4 µg/m<sup>3</sup> & Min Conc. 26.5 µg/m<sup>3</sup>
- For SO<sub>2</sub> - Max Conc. 7.1 µg/m<sup>3</sup> & Min Conc. 6 µg/m<sup>3</sup>
- For CO – Max Conc. 801 mg/m<sup>3</sup> & Min. Conc. 686 mg/m<sup>3</sup>
- All the pollutant concentration levels are within limit as per NAAQ standards.
- The various sources of air pollution in the region are dust rising from unpaved roads, domestic fuel burning, vehicular traffic, agricultural activities, other industries, etc.

## 2. Ambient Noise Level Monitoring

84. Noise often defined as unwanted sound, interferes with speech communication, causes annoyance, distracts from work, disturb sleep, thus deteriorating quality of human environment.

85. Pre-construction stage Noise levels were measured in residential areas and other settlements located in and around the project site.

86. The noise analysis within the study area was recorded using portable sound level meter. The analysis reveals that the noise's well within the permissible range. The locations of Noise level monitoring are presented in following Table.

**Table 22: Ambient Noise Level Monitoring Report- Pre construction**

Sl. No.	Station Code	Location	Date	Leq dB (A) Day Time	Leq dB (A) Night Time
1.	N1	WTP- Banbhera	07.07.2020	52.46	45.25
2.	N2	Intake- Mirpur	07.07.2020	53.96	52.26
3.	N3	Totabaria	08.07.2020	50.0	37.33
4.	N4	Near Haldi River	08.07.2020	46.31	53.57
5.	N5	Magrajpur	09.07.2020	48.72	53.08

Source- Project monitoring data

87. Ambient noise levels were measured at 5 locations around the proposed project site. During day time the maximum noise level was found as 53.96 Leq dB(A) and during night time as 52.26 Leq dB(A). Overall noise level varied from 46.31 to 53.96 Leq DB(A) during day time and from 37.33 to 53.57 Leq dB(A) during night time. Thus, noise levels at all locations were observed to be within the prescribed limits of CPCB particularly during day time. Night time noise level above the standard at 3 locations. Movement of truck at night time may be the reason of high noise level in compared to day time noise.

88. During construction monitoring has also been conducted at same locations. Results are shown below.

**Table 23: Noise Level Monitoring Data (Package- EM/01)- During Construction**

Sl. No.	Station Code	Village Name	Study Area	Date	Leq dB (A) Day Time	Leq dB (A) Night Time
1	N1	Intake & Substation	Residential	14.02.2023- 15.02.2023	62.0	51.3
2	N2	Totabaria	Residential	15.02.2023- 16.02.2023	58.3	46.4
3	N3	WTP-Banbhera	Residential	14.02.2023- 15.02.2023	61.4	55.0
4	N4	Haldi Rriver (Narghat Bridge)	Residential	15.02.2023- 16.02.2023	61.7	50.2
5	N5	Magrajpur	Residential	15.02.2023- 16.02.2023	60.5	51.1
<b>Code/Category</b>		<b>Leq Day Time dB(A) - Standard</b>		<b>Leq Night Time dB(A) - Standard</b>		
<b>A/Industrial</b>		<b>75</b>		<b>70</b>		
<b>B/Commercial</b>		<b>65</b>		<b>55</b>		
<b>C/Residential</b>		<b>55</b>		<b>45</b>		
<b>D/Ecological-Sensitive</b>		<b>50</b>		<b>40</b>		
<b>Note: National level Central Pollution Control Board's, CPCB's (Govt. of India) guideline/ protocol used for sampling</b>						

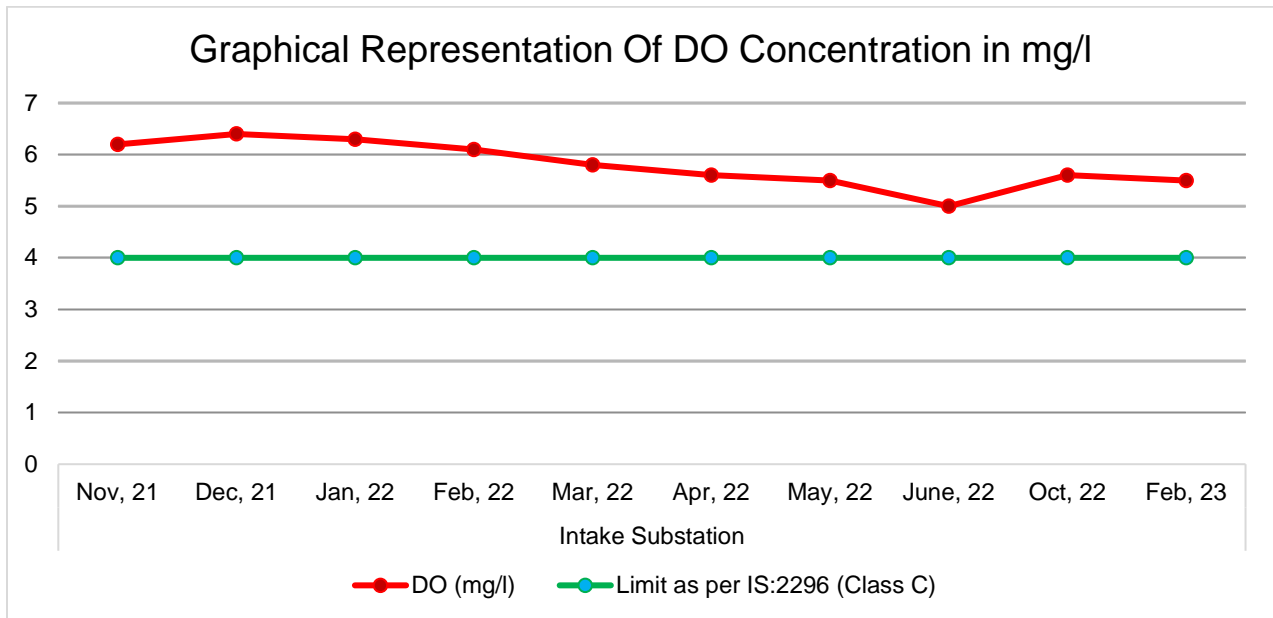
Source- Project monitoring data

89. During construction Ambient noise levels were measured at 5 locations around the proposed project site. During day time the maximum noise level was found as 61.7 Leq dB(A)

and during night time as 55.0 Leq dB(A). Overall noise level varied from 58.3 to 61.7 Leq DB(A) during day time and from 46.4 to 55.0 Leq dB(A) during night time. Thus, noise levels at all the locations were observed to be above the limits of CPCB both during day and night time. Increase in noise level during construction in compared to base line is due to project activity at specific location.

### 3. Surface Water Quality Monitoring

90. The Quality of Surface water was studied by collecting 2 water samples from Rupnarayan River. Standard procedures were followed for the sampling and analysis of physico-chemical and biological parameters of water. Following table shows the details of location of water sampling stations, testing results are shown in **Table 24 and 25**.



91. As per surface water quality criteria by CPCB and Bureau of India standard (BIS) the water of Rupnarayan River falls under Class C. All the parameter of surface water mentioned below table, are within the standard. Also DO concentration is high at sampling location, always above the minimum requirement 4 mg/l. Dissolved oxygen (DO) is one of the most important indicators of water quality. It is essential for the survival of fish and other aquatic organisms. Oxygen dissolves in surface water due to the aerating action of winds. Oxygen is also introduced into the water as a by-product of aquatic plant photosynthesis. When dissolved oxygen becomes too low, fish and other aquatic organisms cannot survive.

**Table 24: Surface Water Quality Monitoring Report**  
**{Location: Intake (Rupnarayan River)- Pre construction**  
**Date of Sampling- 09.07.2020**

Sl no	Parameters	Unit	Result	Desirable limit as per IS: 2296:1982 and CPCB
1.	Colour	Hazen	2.0	300.0
2.	Odour	-	Unobjectionable	Unobjectionable
3.	pH (at 25°C)	-	7.35	6 to 9
4.	Turbidity	NTU	203	-
5.	Conductivity	µS/cm	323.88	-
6.	Total Hardness as CaCO <sub>3</sub>	mg/L	95	-
7.	Ca Hardness as CaCO <sub>3</sub>	mg/L	58.9	-
8.	Mg Hardness as CaCO <sub>3</sub>	mg/L	36.1	-
9.	Total Alkalinity as CaCO <sub>3</sub>	mg/L	82	-
10.	Total Dissolved Solid (TDS)	mg/L	217	1500
11.	Total Suspended Solid (TSS)	mg/L	20	-
12.	Total Solid (TS)	mg/L	237	-
13.	Chloride as Cl	mg/L	34.71	600
14.	Iron as Fe	mg/L	<0.1	50
15.	Silica as SiO <sub>2</sub>	mg/L	12.46	-
16.	Calcium as Ca	mg/L	23.61	-
17.	Magnesium as Mg	mg/L	8.77	-
18.	Copper as Cu	mg/L	BDL	1.5
19.	Manganese as Mn	mg/L	BDL	-
20.	Nitrate as NO <sub>3</sub>	mg/L	20.75	50
21.	Sulfate as SO <sub>4</sub>	mg/L	101.49	400
22.	Fluoride as F	mg/L	BDL	1.5
23.	Sodium as Na	mg/L	BDL	-
24.	Potassium as K	mg/L	BDL	-
25.	Cadmium as Cd	mg/L	BDL	0.01
26.	Arsenic as As	mg/L	BDL	0.2
27.	Lead as Pb	mg/L	BDL	0.1
28.	Zinc as Zn	mg/L	1.48	15
29.	Total Coliform / 100ml	-	<1, <10, <100	5000
30.	Faecal Coliform /100ml	-	<1, <10, <100	--
31.	E.Coli / 100ml	-	<1, <10, <100	-

Source- Project monitoring data

**{Location: Totaberia (Rupnarayan River)}**  
**Date of Sampling: 09.07.2020**

Sl no	Parameters	Unit	Result	Desirable limit as per IS:2296:1982 and CPCB
1.	Colour	Hazen	2.0	300.0
2.	Odour	-	Unobjectionable	Unobjectionable
3.	pH (at 25°C)	-	7.42	6 to 9
4.	Turbidity	NTU	224	-
5.	Conductivity	µS/cm	426.87	-
6.	Total Hardness as CaCO <sub>3</sub>	mg/L	114	-
7.	Ca Hardness as CaCO <sub>3</sub>	mg/L	66.5	-
8.	Mg Hardness as CaCO <sub>3</sub>	mg/L	47.5	-
9.	Total Alkalinity as CaCO <sub>3</sub>	mg/L	94	-

Sl no	Parameters	Unit	Result	Desirable limit as per IS:2296:1982 and CPCB
10.	Total Dissolved Solid (TDS)	mg/L	286	1500
11.	Total Suspended Solid (TSS)	mg/L	32	-
12.	Total Solid (TS)	mg/L	318	-
13.	Chloride as Cl	mg/L	78.1	600
14.	Iron as Fe	mg/L	<0.1	50
15.	Silica as SiO <sub>2</sub>	mg/L	13.72	-
16.	Calcium as Ca	mg/L	26.65	-
17.	Magnesium as Mg	mg/L	11.54	-
18.	Copper as Cu	mg/L	BDL	1.5
19.	Manganese as Mn	mg/L	BDL	-
20.	Nitrate as NO <sub>3</sub>	mg/L	22.14	50
21.	Sulfate as SO <sub>4</sub>	mg/L	110.3	400
22.	Fluoride as F	mg/L	BDL	1.5
23.	Sodium as Na	mg/L	BDL	-
24.	Potassium as K	mg/L	BDL	-
25.	Cadmium as Cd	mg/L	BDL	0.01
26.	Arsenic as As	mg/L	BDL	0.2
27.	Lead as Pb	mg/L	BDL	0.1
28.	Zinc as Zn	mg/L	1.48	15
29.	Total Coliform / 100ml	-	<1, <10, <100	5000
30.	Faecal Coliform /100ml	-	<1, <10, <100	--
31.	E.Coli / 100ml	-	<1, <10, <100	-

Source- Project monitoring data

**Table 25: Surface water (River) monitoring result- During construction (EM01)**

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	COD 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
Intake & substation	15.0 2.23	7.62	138	2.1	61.7	<0.1	0.94	14	2.8	5.5	83.6	92.4	<1.4	110	27	0.36
Narayannpur	15.0 2.23	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2
Desirable Limit as per IS:2296 (Class C) and CPCB		6 to 9	1500	--	600	1.5	50	--	3	4 min	--	--	0.1	5000	--	--

Source: Project data

#### D. Ecological Resources

92. Purba 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 phytoplanktons 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.

93. Due to pressure of expanding population forces, the availability of natural diversity of wild fauna in the district Purba 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 Animones - 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 (Dwarkeswar, 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.

94. 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 the project area, and consists of agricultural, habitation areas and water bodies etc.

95. All the proposed project sites are vacant and there is no notable tree cover. Some trees required to be cut for laying of water transmission mains. Survey indicates that approx. 1000 trees are located at impact zone and relevant NOC for tree felling have been obtained. As per compensatory tree plantation norms (1:5) 5x (698+98) =3980 trees are already been planted. Compensatory plantation for newly obtained NOC (201 nos) will be done later after feeling of complete 201 trees.

## E. Economic Development

### 1. Land use

96. The distribution of the 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 4 blocks are given below (**Table 26-28**):

**Table 26: Land Use Characteristics of the District**

Land Use	Area (in Acre)	Percentage
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 27: Land Use Characteristics of Chandipur Block**

Land use category	Area (in Acre)
Net area under cultivation	29557.13
Area under pasture, orchard	88.95
Homestead land	2372.21
Residual area	1731.29
Area in which more than one crop is grown	14826.32
Gross cropped area	42440.34

Source: District Land and Land Reform Department, GoWB

**Table 28: Land Use Characteristics of Nandakumar, Nandigram I & II**

Land use Category	Blocks		
	Nandakumar (in Acre)	Nandigram I (in Acre)	Nandigram II (in Acre)
Rural Settlement	18014.58	7930.06	7933.62
Brick kiln	623.81	56.08	169.65
Agricultural (Single Crop)	5148.52	10659.56	5489.11
Agriculture (Double/Multi Crop)	14043.49	10165.44	11612.38
Horticulture Plantation	1385.71	390.71	38.35
Aquaculture	243.07	989.00	194.45
River	882.41	6616.71	520.96
Lakes/Ponds / Tanks	30.32	1.57	160.27
Forest	-	1.29	-
Social Forestry	-	1181.88	-
Inland Natural	-	72.26	-
With Scrub	-	6848.96	-
<b>Total</b>	<b>40371.91</b> <b>(163.38 Sq. Km)</b>	<b>44913.52</b> <b>(181.76 Sq. Km)</b>	<b>26118.79</b> <b>(105.70 Sq. Km)</b>

Source: District Land and Land Reform Department, GoWB

## 2. Industry & Agriculture

97. **Agriculture.** Purba Medinipur district is one of those districts which are blessed with rainfall and perennial rivers. The area receives more than 1,800-2,250 millimeters. 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.

98. **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.

99. **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.

100. **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 man power 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 have 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 SmallScale 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.

101. Betel vine is a major source of livelihood in Purba Medinipur district, particularly in Tamluk and Contai subdivisions.

102. 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. Large number of heavy engineering, chemical, small-scale cluster are growing up in Haldia.

### 3. Infrastructure

103. **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 utilised extensively. Various sources of irrigation like river, canal, tank etc. are 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.

104. **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).

105. **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.

106. **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 etc. is very common, and is creating unhygienic conditions.

107. **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. 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 the condition is generally poor, with many roads in need of repairs and resurfacing.

## **F. Socio Cultural Resources**

### **1. Demography**

108. 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 District is that it has recorded the highest Literacy Rate in the State at 87.0% as per Census 2011, surpassing the state capital Kolkata. Total population of the project area, comprising 4 community development blocks in the district, is 782,171 (2011 census). 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 Population of schedule castes is higher in the project districts.



Figure 17: Population Density Map of Purba Medinipur

Table 29: Demographic Characteristics

Demographic parameters	WB state	Purba Medinipur	Nandakumar Block	Chandipur Block	Nandigram I Block	Nandigram II Block
Population (2011)	91,276,115	5094238	262998	188119	207835	123219
Geographical area (sq.km)	88,752	4713.00	165.70	137.58	181.84	105.75
Total households	20,380,315	11,14,170	59,240		42,289	26,902
Decadal Growth rate (2001- 11)	13.84%	15.4 %	12.02%	11.24%	13.86%	12.25%
Sex ratio	950	938	958	932	968	954
Population Density, (per sq. km)	1028	1,081	1587	1367	1142	1165
literacy rate	76.26%	87.02	85.56%	87.81%	85.89%	89.16%
literacy rate (male)	81.69%	92.32	55%	54%	54%	54%
literacy rate (female)	70.54%	81.37	45%	46%	46%	46%
% of urban population	31.87%	11.63	0	0	2.79	4.28
SC Population	23.5%	14.63	14.21%	10.15%	18.58%	12.89%
ST Population	5.8%	0.55	0.24%	0.11%	0.07%	0.16%
Total workers	38.08%	37.49	39.39	36.09	31.87	34.89
Male workers	57.07%	57.65	29.81	29.10	27.48	28.96
Female workers	18.08%	15.99	9.80	6.99	4.38	5.93
Main workers	28.14%	22.1	23.46	15.47	15.52	17.50
Marginal workers	9.94%	15.37	15.93	20.62	16.34	17.39
Cultivators	14.72%	18.07	1.82	2.29	2.73	3.61
Agricultural Labourers	29.32%	36.76	7.73	11.06	4.31	11.09
Household industry workers	7.09%	6.22	2.40	2.74	0.72	0.45
Other workers	48.87%	38.95	3.97	1.81	7.33	3.12

Source: Census 2011

## 2. History, Culture and Tourism

109. 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.

110. 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) 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.

111. 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 trading 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 Ghandhiji in 1944

112. 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


113. **Tourist Attractions.** The coastal region of Purba Medinipur district is in the face of river Hoogly. 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 Barghobhima, 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.** Following table shows project site environmental features.

**Table 30: Site Environmental Features**

Infrastructure	Location & Environmental Features	Site Photograph
<p><b>Head works (River water Intake with Fixed type Jetty with arrangement for housing pumping machineries and electric substation)</b></p>	<p>The proposed Intake point is located at Ichhapur/ Mirpur Mouza in Nandakumar. block (Co-ordinate: Latitude:22.245619. and Longitude:87.956967).</p> <p>It is located between the proposed Pankura river intake and the existing Geonkhali intake locations. The Panskura WTP is 27 km, upstream of the Intake location proposed for the sub-project, whereas the Geonkhali WTP is located 14 km downstream of the proposed Intake location.</p> <p>Raw water source is Rupnarayan river, which is perennial and has abundant flow throughout the year. 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, although this is within the permissible limits as per Drinking water standards (IS:10500-2012) Permission for withdrawal of 117 MLD Raw water from Rupnarayan river at Mouza Mirpur/Ichapur, Block Nandakumar has been obtained from the Irrigation &amp; Waterways Department, Govt. of West Bengal vide letter no. 237 -1, 1-4M- 02/2015 dated 08th June, 2017.</p> <p><b>(Appendix 20)</b></p> <p>The raw water intake sump cum pump house and substation will be constructed on a private land parcel measuring 74.116 Decimal. Area located at Mouza Mirpur, JL No. 54 Dag No. 694,695, 697,698,704 Land has been procured from 8 land owners. Third Party Certification already been done. The proposed land is laying vacant and not being used for any commercial or agricultural purpose. The land owners have given their consent Hence, no land acquisition or involuntary resettlement impact is anticipated. Land possession detail attached as <b>Appendix 21.</b></p> <p>Shifting of the Intake location downstream may only result in poor water quality (an increase in the TDS and Chloride concentration). The shifting the intake further upstream would only magnify any impacts resulting from the effluent / discharge from the Kolaghat Thermal Power Plant (KTPP).</p>	<div> </div> <p><b>Proposed location of Intake at Ichhapur / Mirpur Mouza (Co-ordinate: Latitude:22.245619 Longitude:87.956967)</b></p> <div> </div> <p><b>Present intake location</b></p> <div> </div> <p><b>Proposed Pump house and Electric substation Site at Mirpur Mouza – Rupnarayan River</b></p>

Infrastructure	Location & Environmental Features	Site Photograph
	<p>The distance of the KTPP from the proposed WTP location is 16 km. Also, it is preferable to locate the Intake (and WTP) within the same block, which is proposed to be served. There are no notable pollution sources near the intake. There are no wastewater disposal points in the upstream vicinity of the intake. As per design no tree felling is required. The pumping station and substation site is located near to embankment road of river Rupnarayan. This is important that runoff from the construction areas, which may contain silt and chemical traces do not enter these water bodies.</p> <p>However, given the proximity and tidal actions in the river, seasonal variation in the water quality needs to be studied through a Salinity modeling to ensure long term sustainability of the scheme</p>	
<p><b>Water Treatment Plant</b></p>	<p>The proposed WTP constructed on a land parcel measuring 18.03 acres owned by Land Revenue Department Government of West Bengal located in Mouza Jalpai-Sitalpur under Sitalpur Gram Panchayat of Nandakumar block. The land parcel is free of any encumbrances and not in use. The coordinates of the WTP location are 22.152518 N Latitude and 87.900588 E Longitude. The Topography is flat. The location of WTP is suitable, due to its close proximity to the NH 116 B. The land is connected by an approach road to the nearby villages. Land is under possession of project Executing and Implementation agency.</p> <p>As per local enquiries carried out during field visits, the site is not prone for flooding. The vulnerability mapping of the district for flood prone areas also indicates that the site is not prone to flooding.</p> <p>The proposed WTP site is developed (earth filling) including proper drainage infrastructure considering the flat topography and the adjoining high embankment.</p> <p>There are no sensitive ecological receptors in and around the WTP site. Tree cuttings is not envisaged. If required, compensatory afforestation shall be carried out as per replacement ratio of 1:5.</p>	 <p style="text-align: center;"><b>Proposed WTP Location</b></p>

Infrastructure	Location & Environmental Features	Site Photograph
<p><b>Raw water (RW) and Clear water (CW) Transmission Mains</b></p>	<p>Raw water transmission mains proposed to be laid from intake sump cum pump house to the water treatment plant (WTP) is approximately 17.85 km. The pipeline will be laid within the RoW of irrigation land and State Highway Road (intake to Nandakumar junction – 12.6 km) and NH 116 B (Nandakumar Junction to WTP – 5,2 km)</p> <p>Trees are present along the raw water pipe laying route (Intake to Ganjanarayanpur). Joint verification with Forest dept. along raw water transmission main done and finalized requirement of felling of 98 nos. tree. NOC has been obtained from Forest Dept (<b>Appendix 26</b>) with mention of requirement of planting of 490 trees (ratio of 1:5) as compensatory afforestation. Tree felling done and compensatory plantation carried out. Tree felling NOC for 201 nos. tree along RWTM in between Ganjanarayanpur to Nandakumar Market beside SH-4 has been obtained and tree felling under progress. The trees are predominant species of Coconut, Mango, Palm and <i>Acacia auriculiformis</i> (<i>Accacia</i>) and no species are under list of Endangered species of IUCN.</p> <p>It was observed during the transect walks along the raw water transmission stretch that there are shops, kiosks or road side vendors. To deal with the IR issues sectional approach has been adopted. The preparation of resettlement plan based on the sectional approach - done</p> <p>About 35.097 km Clear water transmission main of DI K9 and MS of assorted diameter 600 mm – 1000 mm will be laid for conveying clear water from WTP to the Intermediate Boosting Pumping station (IBPS) cum Ground Level Storage Reservoirs (GLSRs) in Nandigram I and Nandigram II blocks. The clear water transmission mains pipelines will be laid within the RoW of Government land {(i) WTP to Magrajpur Crossing (NH-116B) – 4.8 km, (ii) Magrajpur Crossing to Mongalchak (Irrigation) – 9.1 km, (iii) Mongalchak to Reapara-Terpakhya (PWD Road) - 9 km and (iv) Reapara to Nandigram I GLSR (PWD Road) – 12.2 km}</p> <p>The rising main is proposed to be laid primarily through open cut method. However, the laying of the rising main through open cut method may not feasible at major junctions (National Highway Crossing), below railway tracks, congested market areas including a</p>	 <p>Pipeline has to be placed above RCC bridge over Haldi river</p>  <p>Laying of Pipeline has to be done across the railway track (Laban Satyagrah Smarak Railway Station at Chnadipur) – Magrajpur crossing</p>  <p>Railway crossings at Talpukur near Byabottarhat,</p>

Infrastructure	Location & Environmental Features	Site Photograph
	<p>couple of drainage canals. The transmission main has to cross the railway line between Deshpran Railway Station and Laban Satyagrah Smarak Railway Station at Chnadipur (on the Howrah- Digha Route). It is single lane broad gauge track.</p> <p>Jack pushing method will be adopted for below Railway crossings at i) Near Byabottarhat- Talpukur crossing, ii) Laban Satyagraha Station at Chandipur- Magrajpur crossing and iii) Below NH Crossing at Nandakumar Junction to reduce traffic disruptions. The clear water transmission mains will traverse along the left side of the road as it passes through Magrajpur Bazar towards Terapakhya and Terapakhya to Manoharpur GLSR site of Nandigram II block.</p> <p>Most challenging aspects of the laying of the transmission main relates to the laying of pipeline across the Haldi river. The width of the river varies from 540m – 600m. Construction of RCC Bridge of width 5.0 m over Haldi River having length 600 m approx. for carrying 1000 mm dia (K9 grade) and other utility is proposed.</p> <p>The clear water transmission main line crosses river Haldi. It is important that runoff from the construction areas, which may contain silt and chemical traces do not enter these water bodies.</p> <p>There is no forest land being affected due to proposed pipe laying works. As per survey few trees, shrubs and bushes are present all along the road. There is no IUCN listed flora or fauna present along the project corridor.</p> <p>Walk through along the stretch from Magrajpur to Terapekhiya, there are few trees are present along the side of the road and around 40 water bodies are present. Proper precaution needs to be taken to stop water pollution during work. Also, shops, kiosks will be potentially impacted.</p> <p>Mograjpur to Chakpatna clear water transmission main have been done and finalized the requirement of felling of 698 nos. of tree. Tree felling has been done and compensatory plantation against tree felled carried out.</p>	 <p>RWM Alignment: Intake point – WTP Section</p>  <p>CWM Alignment: Magrajpur-Terapekhiya Section</p>   <p>Trees and water bodies along the route</p>

## V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

114. 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.

115. 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.

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

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

118. The ADB Rapid Environmental Assessment Checklist in [http://www.adb.org/documents/guidelines/environmental\\_assessment/eaguidelines002.asp](http://www.adb.org/documents/guidelines/environmental_assessment/eaguidelines002.asp) has been used to screen the project for environmental impacts and to determine the scope of the IEE. Updated Rapid Environmental Assessment checklist is attached as **Appendix 1**.

119. In the case of this project (i) most of the individual elements involve straightforward construction and operation, so impacts will be mainly localized and not greatly significant; (ii) most of the predicted impacts are associated with the construction process, and are produced because that process is invasive, involving excavation and earth movements; and some works are located in the reservoir 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 (Gram panchayat) and access to the project location is through public rights-of-way and existing roads hence, land acquisition and encroachment on private property will not occur.

## A. Pre-Construction Impacts – Design & Location

120. **Design of the Proposed Components.** Technical design of the (i) intake facilities at river; (ii) water treatment plant; (iii) raw and clear water mains, (iv) other items like flow meters, follows the relevant national planning and design guidelines, focusing on providing a robust system which is easy to operate, sustainable, efficient and economically viable. Following environmental considerations are included in the project:

- (i) Discontinuation of current unsafe & unsustainable groundwater sources and creating a new comprehensive surface water (river) based water supply system
- (ii) Recovering wash water from treatment process to optimize the water use
- (iii) Treatment and reuse of sludge from treatment process
- (iv) Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage
- (v) Reducing the incidence of water borne diseases by providing 100% population with potable water supplies
- (vi) Preparation and implementation of a water quality surveillance program including development of a laboratory as part of the project by DBO contractor to ensure that supplied water meets the drinking water standards
- (vii) Development of laboratory with all necessary environment, health and safety measures and adopting international standard procedures for water quality testing
- (viii) Using low-noise and energy efficient pumping systems
- (ix) Installing the noise-producing pumps and motors etc., in enclosed buildings with noise reducing walls, and also maintaining adequate buffer to the nearby inhabited areas
- (x) Provision of appropriate personal protection equipment to the workers and staff

121. **Water Source Sustainability.** The source of water supply is River Rupnarayan, which is a perennial river and principal source of water supply for the Purba Medinipur district and many other areas. The proposed Intake location is in between the proposed Panskura WTP and the existing Geonkhali WTP. The Panskura WTP is 27 km, upstream of the Intake location proposed for the sub-project, whereas the Geonkhali WTP is located 14 km downstream of the proposed Intake location. Rupnarayan river has abundant flow throughout the year.

122. The river Rupnarayan, 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, traverses south-eastward through the districts of Bankura and Paschim Medinipur to meet with Dwarakeswar. Dwarakeswar river (also known as Dhalkishore) originates from Tilboni hill of Chhota Nagpur Plateau in Purulia district and enters Bankura district near Chatna. The river mainly flows south-eastward and after entering into Hooghly district it turns south near Arambag town. After receiving contributions from other minor tributaries, Dwarakeswar finally joins with Shilabati to form river Rupnarayan. The Kana Dwarkeshwar, Polashpai, Durbachaty are the tributaries of the Rupnarayan. The river is the main tributary of Hooghly and receives tidal discharge from Bay of Bengal, apart from the major tributaries like Dwarkeshwar, Shilabati, Kangsabati, Mundeshwari and also from a number of drainage channels like Kata khal, Bakshi Khal, Chandreshwar Khal of Paschim Medinipur. River Rupnarayan, is perennial in nature and owing to numerous large tributaries it carries huge quantities of water throughout the year.

123. The main source of surface water for this district is River Rupnarayan. The other rivers of the district, like River Haldi, Cossye and Kaliaghai are not perennial or carry insignificant water

during the non-monsoon season.

124. **Rupnarayan River Water quality and Suitability as Drinking Water Source.** The West Bengal Pollution Control Board has a monitoring station on the Rupnarayan, near Geonkhali, at the confluence of River Hooghly. Monthly tests carried out are published in the Central Pollution Control Board (CPCB) website. The water quality parameters indicate an increase in the chloride concentration during March to June, every year. The advent of the salinity in the river has increased over the years during the lean period.

125. Haldia PHED division is 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. The analytical results (**Tables 15 and 16** in earlier section) during high tide and low tide period for the month of July and August 2019 reveals high turbidity in all the samples. TDS is above the desirable limit (500mg/l) but well within the permissible limit of 2000 mg/l in all samples. Chloride concentration is above the desirable limit of 250mg/l in most of the samples both during High and low tide period, but is below the permissible limit ( 1000mg/l) except 3 samples.

126. 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 4 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, although this is within the permissible limits as per Drinking water standards (IS:10500-2012). Conventional water treatment and disinfection which is proposed in the project is adequate to make the water usable for drinking purposes. A regular water quality regime needs to be established for checking the raw water quality. The water supplied to the consumers at all times must meet the drinking water standards (**Appendix 6**).

127. Shifting of the Intake location downstream may only result in poor water quality (an increase in the TDS and Chloride concentration) due to tidal action. Shifting of the intake further upstream would only magnify any impacts resulting from the effluent / discharge from the Kolaghat Thermal Power Plant (KTPP). The distance of the KTPP from the proposed WTP location is 16 km. Also, it is preferable to locate the Intake and WTP within the block, which is proposed to be served. Thus, as presented above, in terms of water availability and quality of water, selected source, Rupnarayan River, is adequate and suitable to meet the project water demand, and there are unlikely to be any issues related source sustainability during the project life cycle. However, given the proximity and tidal actions in the river, seasonal variation in the water quality needs to be studied through developing a salinity modeling to ensure long term sustainability of the scheme.

128. **Use of Chlorine as disinfectant.** It is proposed to use chlorine at WTP to disinfect the water prior to supply to consumers. There is invariably a safety risk when considerable quantities of chlorine are handled at the WTP. (Chlorine cylinders will be brought by trucks to the site, installed and operated to disinfect the water supplies). Since facilities are located in the urban area, precautions will thus be needed to ensure the safety of both workers and citizens.

129. The average dose of chlorine for pre-chlorination will be about 4mg/l and that for post-chlorination will be about 2 mg/l. With the design capacity of WTP 27 Mgd, nearly 750 kg of chlorine will be consumed daily. Chlorine cylinders (called tonners of capacity 900 kg) will be

procured from nearest manufacturing unit and stored at the site. Tonners sufficient for a month will be stored in the storage; i.e., 45-50 cylinders will be stored at the WTP.

130. To avoid any risk to workers and public, the chlorination facility at the WTP should be designed developed with all appropriate safety features and equipment to meet with any accidental eventuality, which may include:

- (i) Chlorine neutralization pit with a lime slurry feeder
- (ii) Chlorine absorption and neutralization facility
- (iii) Proper ventilation, lighting, entry and exit facilities
- (iv) Visible and audible alarm facilities to alert chlorine gas leak
- (v) Facility for isolation in the event of major chlorine leakage
- (vi) Eye wash & shower facility
- (vii) Personal protection and safety equipment for the operators in the chlorine plant (masks, oxygen cylinders, gloves, etc.,)
- (viii) Provide training to the staff in safe handling and application of chlorine; this shall be included in the contract of Chlorinator supplier
- (ix) Supplier of Chlorinator equipment shall provide standard operating manual for safe operation and as well as maintenance and repairs; preferably these shall be provided both in English and Bengali Languages

131. **Energy Efficiency.** Owing to almost flat topography of the project area, the water supply system requires pumping (using the electrical energy) to transport and supply water at requisite terminal pressure to the consumers. The raw water from the river intake will be pumped to WTP inlet; within WTP it is mostly gravity flow, but requires energy to operate. From clear water reservoir at the WTP, water will be pumped to 2 GLSRs cum booster pumping stations located in, Nandigram I and Nandigram II blocks. To optimize the power consumption, the hydraulic design shall follow optimal approach, and the following shall also consider in design and selection of pumping systems. According to Manual for the Development of Municipal Energy Efficiency Projects in India (jointly developed by Bureau of Energy Efficiency (BEE) and International Finance Corporation in 2008), energy savings, at minimum, of 25% to 40% is possible with appropriate measures. The following measures shall be considered and incorporated into the subproject designs:

- (i) Installation of Energy Efficient Motors
- (ii) Efficient Pumping system operation
- (iii) Installation of Variable Frequency Drives (VFDs)

132. **Waste Water & Sludge from WTP - treatment and disposal.** Water treatment process will generate sludge from sedimentation of particulate matter in raw water, flocculated and precipitated material resulting from chemical coagulation, residuals of excess chemical dosage, plankton etc. and waste from rinsing and back washing of filter media containing debris, chemical precipitates, straining of organic debris and plankton. Following are included in the subproject design to dispose the sludge and back wash:

- **Provision of recirculation system for backwash water** – backwash water from filter beds will be re circulated to WTP inlet and mixed with raw water; this arrangement will minimize wastage of water, which otherwise would have disposed to open drains, and also avoids the pollution of receiving water body. Since backwash water is recovered and recirculated in the WTP, no wastewater will be generated from water treatment process. Water treatment process will generate sludge from sedimentation of particulate matter in raw water,

flocculated and precipitated material resulting from chemical coagulation, residuals of excess chemical dosage, plankton etc. and waste from rinsing and back washing of filter media containing debris, chemical precipitates, straining of organic debris and plankton. In the WTP sludge will be collected, thickened and disposed off or reused as soil conditioner. Sludge will be tested periodically for heavy metal concentration.

- **Provision of sludge drying** - accumulated sludge from clariflocculator will be flushed to sludge drying beds, for natural drying.
- **Dried sludge will be used as soil conditioner**- Periodic testing of dried sludge will be conducted to ensure that it does not contain heavy metals that make it unsuitable for food crops. Tests will be conducted to confirm the concentrations below the following standards. As there are no specific standards notified for sludge reuse, the compost quality standards notified under the Municipal Solid Waste Management & Handling Rules, 2016 have been adopted here. The MSWMH Rules stipulate that “In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely;

133. **Tree cutting at selected project sites.** The identified substation site at Mirpur of Nandakumar block having few trees, but as per final design no tree felling is required, but tree felling is required along Transmission mains routes. Almost 1000 trees will be affected and NOC has been obtained from Forest Dept. As per NOC obtained, Tree felling has been completed and compensatory plantation (about 4000 trees) is done against 800 no of trees (698+98) felled. Compensatory plantation against newly obtained NOC (for 201 nos of trees) will be complied after felling of complete 201 trees.

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

- Minimize removal of trees by adopting to site condition and with appropriate pipe laying layout design.
- Obtain prior permission for tree cutting
- Plant and maintain 5 trees for each tree that is removed

134. **Development of WTP Site.** The Ground level of the WTP site and surroundings are about 2 m below the road embankment. The Topography is flat. As per local enquiries carried out during field visits, the site is not prone for flooding, and presently is under agricultural use partly and fallow rest of the area. The vulnerability mapping of the district for flood prone areas also indicates that the site is not prone to flooding. The WTP site is developed (earth filling) including proper drainage infrastructure considering the flat topography and the adjoining high embankment.

135. **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 will (i) identify the locations and operators of these utilities to prevent unnecessary disruption of services during construction phase; and (ii) instruct construction contractors to prepare a contingency plan to include actions to be done in case of unintentional interruption of services.

136. **Site selection of construction work camps, stockpile areas, storage areas, and disposal areas.** Priority is to locate these near the project location. However, if it is deemed necessary to locate elsewhere, sites to be considered will not promote instability and result in destruction of property, vegetation, irrigation, and drinking water supply systems. Residential areas will not be considered for setting up construction camps to protect the human environment

(i.e., to curb accident risks, health risks due to air and water pollution and dust, and noise, and to prevent social conflicts, shortages of amenities, and crime). Extreme care will be taken to avoid disposals near forest areas, water bodies, or in areas which will inconvenience the community. All locations would be included in the design specifications and on plan drawings. Material stockpiles shall be protected by bunds during the monsoon to arrest the silt laden runoff into rivers/ drains. The subproject is likely to generate soil from excavations, which needs to be disposed safely or utilized locally.

137. **Site selection of sources of materials.** Significant quantities of coarse aggregate and fine aggregate will be required for construction works. Requirement of gravel is limited. Contractor should procure these materials only from the quarries permitted/licensed by Mines and Geology Department. Contractor should, to the maximum extent possible, procure material from existing quarries, and creation of new quarry areas should be avoided as far as possible. If new quarries are required then the contractor will be responsible for obtaining all permissions and clearances, including environmental clearance for mining. It will be the construction contractor's responsibility to verify the suitability of all material sources and to obtain the approval of Department of Mines & Geology and local revenue administration.

## **B. Construction Impacts**

138. Main civil works in the subproject include construction of Intake with Fixed type Jetty with arrangement for housing pumping machineries, water treatment plant, pumping stations, at the identified sites. These works will be confined to sites, and construction will include general activities like site clearance, excavation for foundations, and creation of concrete structures will be one of the major construction activities for this project, as many of the subproject components will be fixed to concrete plinths and most will be housed in buildings with at least some concrete structural elements. Most such structures will be constructed from reinforced concrete (RC), where steel reinforcing rods and bars are placed and attached by hand to create an interior skeleton for the foundations, walls, columns, plinths, etc. and heavy-duty metal and timber/plywood formwork is bolted around the outside to build a mould into which pre-mixed concrete is poured. Once the concrete has set, the formwork is removed, and the concrete surface is finished by masons by hand if necessary. Some buildings, such as the pump station, facilities, etc., may be constructed from brick work, in which case this work will be done using standard house-building techniques.

139. Most of the technical components of the WTP (intake pump station, intake screens, pre- and post-treatment systems and reverse osmosis racks) comprise a variety of pre-fabricated elements, which are installed on site as ready-made individual units. These will be directly brought from the manufacturers place to the sites lifted into position by crane, affixed to plinths or other installation points, and connected up to pipework and the electricity supply.

140. 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., will have negative impacts, which needs to be avoided or mitigated properly.

141. Subproject also includes laying of approximately 17.85 km raw water transmission main pipeline from intake to WTP and about 35 km long clear water transmission main pipeline from WTP to 2 GLSRs sites at Nandigram I & II blocks. This alignment crosses some important roads (NH-116B and SH-4) which carry significant traffic, railway tracks and river Haldi. Considering this, it is proposed to lay the pipeline partly by trenchless technology, especially at the junctions

where the pipeline crosses busy roads. In the other sections it will be laid by open cut method. Appropriate trenchless technology will be adopted by the contractor such as modern micro tunneling with boring pipe jacking technique. Although the main purpose of trenchless here is to lay the pipelines at the sections where it crosses main roads to avoid road closures and traffic disruptions, other important issues such as large-scale public inconvenience, safety, and blocking access to properties, business and houses will also be considered while selecting the sections for trenchless approach. Pipe crossing RCC bridge will also be constructed over River Haldi. All mitigation measures will be applied for protection of river water.

142. 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 1.2 m – 3.0 m wide and 2 to 3 m depth. Earth work excavation will be undertaken by machine (backhoe excavator) and include danger lighting and using sight rails and barricades at every 100 m., 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 2-3 m deep, there is risk of collapse of trenches or damage to surrounding buildings. Necessary precautions 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 or leakages. The minimum working hours is 8 hours daily, the total duration of each stage depends on the soil condition and other local features. About 95% of the excavated soil will be used for refilling the trench after placing the pipe and therefore residual soil after pipe laying and refilling is not significant.

143. Although pipe laying work involves quite simple techniques of civil work, the invasive nature of excavation and pipeline alignment in the built-up areas of the select project blocks 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. 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 153.

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

145. **Sources of Materials.** Significant amount of sand and coarse aggregate will be required for this project, which will be sourced from quarries. Quarries inevitably cause extensive physical changes; as construction materials are excavated from the ground, leaving large cavities, or 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 will therefore be important to ensure that construction materials for this project are obtained from government approved licensed quarries only, to ensure these controls are in place. Contractor should avoid new borrow pits / quarries as far as possible, if necessary, all the permissions, including conduct of environmental assessment, and environmental clearance as necessary shall be obtained prior to start of quarrying activity. The contractor should also make a concerted effort to re-use as much excavated material from this project as possible. The construction contractor will be required to:

- (i) Obtain construction materials only from government approved quarries with prior approval of 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, including Environmental Clearance (EC) prior to approval by PIU

146. **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 individual and confined work sites like WTP, pumping station etc., will be mainly during the initial construction phase of earth work, as the site is confined, dust can be effectively controlled with common measures. Dust generation will be significant during 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:

147. **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 7**).
- (ii) Provide a dust screen around the construction sites at WTP work site;
- (iii) Damp down the soil and any stockpiled material on site by water sprinkling;
- (iv) Use tarpaulins to cover the loose material (soil, sand, aggregate etc.,) when transported by trucks;
- (v) Clean wheels and undercarriage of haul trucks prior to leaving construction site/quarry
- (vi) Control dust generation while unloading the loose material (particularly aggregate, soil) at the site by sprinkling water and unloading inside the barricaded area
- (vii) Stabilize surface soils where loaders, support equipment and vehicles will operate by using water and maintain surface soils in a stabilized condition
- (viii) Apply water and maintain soils in a visible damp or crusted condition for temporary stabilization
- (ix) Apply water prior to levelling or any other earth moving activity to keep the soil moist throughout the process
- (x) Cover the soil stocked at the sites with tarpaulins
- (xi) Control access to work area, prevent unnecessary movement of vehicle, public trespassing into work areas; limiting soil disturbance will minimize dust generation
- (xii) Ensure that all the construction equipment, machinery is fitted with pollution control devices, which are operating correctly, and have a valid pollution under control (PUC) certificate

148. **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) All safety measures will be applied during laying of pipeline near IOCL oil pipeline. All conditions as provided by IOCL authority needs to be followed.
- (vii) 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.
- (viii) 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.
- (ix) 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.

149. **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 streams. Project area is flat and receives considerable rainfall, although mostly confined during the monsoon months. The Pump house and electric substation site is located near to embankment road of river Rupnarayan, the clear water transmission main line crosses river Haldi. It is important that runoff from the construction areas, which may contain silt and chemical traces do not enter these water bodies. Impact will be temporary, and may not be significant, but needs to be mitigated. During construction of pipe carrying bridge (approx. 600 m) over river Haldi no construction materials will be stored near River and no disposal of waste is allowed on the river. All 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, rivers;
- (vi) Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling;
- (vii) Construction activity of bridge should not affect water flow of the river;
- (viii) Dispose any wastes generated by construction activities in designated sites; and
- (ix) Conduct surface quality inspection according to the Environmental Management Plan (EMP).

150. **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 off only clarified water into drainage channels/streams after sedimentation in the temporary ponds, and
- (iii) Consider safety aspects related to pit collapse due to accumulation of water

151. **Generation of Construction Wastes.** Solid wastes generated from the construction activities are excess excavated earth (spoils), discarded construction materials, cement bags, wood, steel, oils, fuels and other similar items. Domestic solid wastes may also be generated from the workers' camp. Improper waste management could cause odor and vermin problems, pollution and flow obstruction of nearby watercourses and could negatively impact the landscape. 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. Not to store spoil materials near the river. Excess excavated soils should be disposed off to approved designated areas immediately
- (iv) If disposal is required, the site shall be selected preferably from barren, infertile lands; site should locate away from residential areas, forests, water bodies/river 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 off 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 including waterbodies; 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

152. **Noise and Vibration Levels.** Intake and substation sites, WTP cum booster pumping station, and primary transmission main laying routes are located predominantly in a rapidly

developing area. All these sites are located close to habitation areas, where there are houses, schools and hospitals, religious places and businesses. The sensitive receptors are the general population in these areas. Increase in noise level may be caused by excavation, particularly breaking of cement concrete or bitumen roads for laying of pumping main, 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 minimize sound impact to surrounding sensitive receptor;
- (iii) Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s;
- (iv) Identify any buildings at risk from vibration damage and avoiding any use of pneumatic drills or heavy vehicles in the vicinity;
- (v) Horns should not be used unless it is necessary to warn other road users or animals of the vehicle's approach; and
- (vi) 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.

153. **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 (Ix)	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.

154. **Accessibility.** Excavation along the roads for laying of transmission main pipeline, hauling of construction materials and operation of equipment on-site can cause traffic problems. Roads connecting GLSR sites are narrow (particularly road at gram panchayat area and irrigation dept. land areas) and carry considerable local traffic, mainly comprise bicycles, 2 wheelers, Mini trucks, auto rickshaws, buses etc. Cultivation is predominant in the area and large number of vehicles carrying vegetable produce to market can be seen in the area. Primary main pipeline work will be conducted along roads from intake to WTP and WTP to GLSR locations, which has potential to create accessibility to issues to surrounding houses and business, and may also affect the traffic movement. Works related to all the remaining components will 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:

- (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.

#### 155. **Pipeline works**

- (i) Confine work areas along the roads to the minimum possible extent; all the activities, including material & waste/surplus soil stocking should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required
- (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 Traffic Police for temporary road diversions, where necessary, and for provision of traffic aids if transportation activities cannot be avoided during peak hours

156. **Socio-Economic – Income.** Only pumphouse cum electric substation site at Mirpur of Nandakumar block is under private ownership, have been purchased at market price with the willingness of the land owners to sell their property for the project. The entire civil works proposed under the subproject for the transmission main is proposed within the boundaries or RoW of government roads (mainly panchayat roads, PWD roads, SH, NH and Irrigation dept. 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.

157. **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.

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

- (i) Comply with all national, state and local labour laws (see **Appendix 9**);
- (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 24**) 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>8</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 H&S orientation training including COVID 19 to all new workers to ensure that they are apprised of the basic site rules of work at the site, personal protective protection, and preventing injuring to fellow workers;
- (vii) Provide visitor orientation if visitors to the site can gain access to areas where hazardous conditions or substances may be present. Ensure also that visitor/s do not enter hazard areas unescorted;
- (viii) Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;
- (ix) Complete use of PPEs as per work type and site condition
- (x) Complete protection of workers, use of floating jacket during work within the River;
- (xi) Training of safety needs to be provided to workers during work within the river.
- (xii) Recommended safety measures will be applied during execution of project near IOCL oil pipeline
- (xiii) Ensure moving equipment is outfitted with audible back-up alarms;
- (xiv) 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;
- (xv) Disallow worker exposure to noise level greater than 85 dBA for duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.
- (xvi) Provide supplies of potable drinking water;
- (xvii) Provide clean eating areas where workers are not exposed to hazardous or noxious substances.

159. **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

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<sup>8</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

- 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.

160. **Asbestos Materials.** Existing water distribution network is partly asbestos cement (AC) pipes, and because of the health risks these will 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. If there are underground asbestos cement (AC) pipes in the existing systems, the project design should include that the AC pipes are left undisturbed in the ground. The contractors will follow EHS guidelines when working in sites where these are present. Prior to site clearance & trench excavation for pipes, exact location of underground AC pipes should be ascertained with the Public Health Engineering Department (PHED). Replacement of the existing AC pipes will involve risks of handling and disposal. 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>9</sup>, and amongst other things, should involve:

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

161. ADB does not have a specific AC policy but the safeguards policy has principle and requirements to follow international accepted/recognized practices and protection of workers and community. World Bank's Environment, Health and Safety Guidelines is followed.

162. **Work within River.** Since during construction of intake and pipe carrying bridge over Haldi River worker should have to work within River, special precaution particularly using safety equipment and training on swimming and mitigation under emergency situation is necessary. River training and protection work shall include construction of guide bunds, guide walls, bank protection, flooring and approach embankment protection as required for ensuring safety of the structures and their approaches against damage by flood / flowing water. Construction of various components shall conform to IRC:89 and these Specifications or as directed by the Engineer.

163. **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 will be required to:

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<sup>9</sup> In the USA, standards and approaches for handling asbestos are prescribed by the Occupational Health and Safety Administration (OHSA) and the Environmental Protection Agency (EPA) and can be found at <http://www.osha.gov/SLTC/asbestos>

- (i) 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 minimize driving risk and disturbance to communities
- (iv) Adopt standard and safe practices for micro tunneling
- (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) Community safety needs to be maintained near IOCL pipeline area
- (xi) Control dust pollution – implement dust control measures as suggested under air quality section
- (xii) Maintain regularly the vehicles and use of manufacturer-approved parts to minimize potentially serious accidents caused by equipment malfunction or premature failure.
- (xiii) Provide road signs and flag persons to warn of on-going trenching activities.

164. Guidelines for Safety during Monsoon/Heavy Rainfall attached as **Appendix 19**

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

- (i) As far as possible located the camp site within the work sites (at Intake and WTP 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). The camp site is selected at Banbhera, and at running condition;
- (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 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 COVID 19 health risk. All Health and safety procedure to follow for operation of camp (H & S plan for COVID 19 will be used as ref. document) during stay, cooking, eating, use of toilet- common space etc.
- (xi) Self- hygiene, disinfection of entire camp and toilet, maintaining of social distancing to be continued for protection from COVID 19 infection
- (xii) Unknown person not allowed within the camp
- (xiii) Maintenance of hygienic environment at staying area, cooking area and toilet
- (xiv) Camp provided with proper drainage, there shall not be any water accumulation;
- (xv) Provided 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 bio-degradable 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.

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

166. Operation and Maintenance of the water supply system will be carried out by Public Health Engineering Department directly or through an external operator. Operation will involve treatment of water in the WTP, disinfection with chlorine, conveying clear water by pumping from booster pumping station to 2 GLSRs in one in each block of Nandigram I and Nandigram II blocks for distribution in their respective zones via distribution system (comprising of overhead tanks and distribution pipes) that will be developed through another subproject (package EM-02) under the WBDWSIP.

167. During its operation phase, WTP will treat 107 MLD of water every day, which will be upgraded later. The main impact of WTP operation is from (i) generation of wastewater and sludge, (ii) noise from operation of pumps and motors, (iii) chlorine gas leakage risk, and (iv) consumption of electricity. All of these are duly considered in the design of WTP, and various measures such as the following are already incorporated into the project design:

- (i) Recirculation and recovery of wastewater including backwash water generated from treatment process - backwash water from filter beds will be sent to a sump,

and after allowing adequate time for settlement of solids, clarified water will be pumped back to WTP inlet. This arrangement will avoid pollution and also minimize wastage of water.

- (ii) Collection of accumulated sludge, thickening, drying and reuse
- (iii) Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage
- (iv) Using low-noise and energy efficient pumping systems
- (v) Installing the noise-producing pumps and motors etc., in enclosed buildings with noise reducing walls, and also maintaining adequate buffer to the nearby inhabited areas
- (vi) Provision of appropriate personal protection equipment to the workers and staff
- (vii) Developing chlorine facility with all necessary safety measures

168. Provision of Backwash water management has been taken in the Bid Document. There is following provision of Backwash Water re-using and Sludge disposal System. Since backwash water is recovered and recirculated in the WTP, no wastewater will be generated from water treatment process. Water treatment process will generate sludge from sedimentation of particulate matter in raw water, flocculated and precipitated material resulting from chemical coagulation, residuals of excess chemical dosage, plankton etc. and waste from rinsing and back washing of filter media containing debris, chemical precipitates, straining of organic debris and plankton. In the WTP, sludge will be collected, thickened and disposed off or reused as soil conditioner. Sludge will be tested periodically for heavy metal concentration.

169. Water supply system will be operated using the standard operating procedures following an operating manual, which will be prepared by the DBO contractor. This will cover all necessary items such as preventive maintenance, periodic maintenance and emergency maintenance, replacement of pumps, motors, and other electro-mechanical parts as per the design life to optimize energy use and system efficiency etc., Adequate resources – technical and financial, has been taken into consideration in the project design. Manual will also include safety awareness and mock drills for chlorine safety. Thus, considering the design and proposed operational procedures, it is unlikely that there will be any significant negative impacts due to WTP operation.

170. 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 periodically to detect any problems and allow remedial action if required. Any repairs will be small-scale involving manual, temporary, and short-term works involving regular checking and recording of performance for signs of deterioration, servicing and replacement of parts.

171. The project is designed to deliver potable water in sufficient quantities to the consumers in their homes with proper terminal pressure. Source water quality data shows that Rupnarayan river water is suitable for drinking after conventional treatment and disinfection, and WTP has been designed to treat the source water to meet the drinking water standards. The quality of water supplied will be affected by the raw water quality and as well as treatment efficiency at the WTP. 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 by DBO contractor to ensure that supplied water meets the drinking water standards

- (ii) Water quality surveillance program to cover source, WTP and consumer end water quality
- (iii) Development of laboratory with all necessary environment, health and safety measures and adopting international standard procedures for water quality testing

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

173. Biological hazards are among the environmental risks that may adversely impact the health and wellness of the workers and the community. Breakouts of diseases such as diarrhea, flu or pandemics such as the COVID-19 shall be avoided. Designs and implementation of treatment systems shall ensure that disease-causing pathogens or viruses are disinfected and will not cause any health issues. The World Health Organization has released an interim guidance on Water, Sanitation, Hygiene and Waste Management for the COVID-19 virus (**Appendix 24**). Measures on managing wastewater and fecal waste and keeping water supplies safe is critical to avoid the start or spread of any disease.

174. The residents of the project area will be the major beneficiaries of the improved water supply system, as they will be provided with a constant supply of better-quality water, piped into their homes at an appropriate pressure. The project will improve the over-all health condition of the project area by controlling water borne diseases, so people should spend less on healthcare and lose fewer working days due to illness. 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.

## VI. PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

### A. Overview

175. 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 are a must as per the ADB policy.

176. Most of the main stakeholders have already been identified and consulted during preparation of this updated 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 (Intake, WTP and transmission mains pipeline), 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

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

#### 1. Consultation during Project Preparation

178. **Institutional consultations** were conducted with the project agencies, and Government Departments such as PHED, Asst. District Magistrate (Dev.), Tamluk HQ, Panchayat 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.

179. **Focus-group discussions** with affected persons and other stakeholders were conducted to learn their views and concerns. A socio-economic household survey has been conducted in the project area, covering sample households, to understand the household characteristics, health status, and the infrastructure service levels, and also the demand for infrastructure services. General public and the people residing along the project activity areas were also consulted during visits to the project sites. Photographs of consultation are provided in **Appendix 14**. Further a project-level consultation workshop also been conducted in the project area. Main issues discussed are,

- Awareness and extent of the project and development components
- Benefits of Project for the economic and social upliftment of Community
- Labour availability in the Project area or requirement of outside labour involvement
- Local disturbances due to Project Construction Work
- Necessity of tree felling etc. at project sites
- Water logging and drainage problem if any
- Climatic Conditions

- Drinking water problem
- Forest and sensitive area nearby the project site
- Movement of wild animal etc.
- Pollution level during construction period specially dust and noise pollution
- Health and Hygiene
- Safety of residents during construction phase
- Solid waste disposal system
- Requirement of enhancement of other facilities

180. Consultations were conducted 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. Consultations were held with stakeholders including temporarily affected persons, land sellers, beneficiaries/local people, poorest of poor households (non-titleholders on government land), Gram Panchayat Pradhans, Panchayat members/public representatives, Panchayat officials, and PHED engineers. Public consultation meetings were held at all the proposed sub-project locations selected sections of transmission mains network.

181. Public consultation meetings were held at all the water supply component locations that are proposed under the package. **Table 31** provides an outline where the consultations were conducted and the number of participants. A total of 102 participants attended the consultation meetings out of which 45.0 % were females. Details public consultation are provided in **Appendix 14**.

**Table 31: Public Consultation held for Water Supply Project in Purba Medinipur District**

Sl. No.	Date	Gram Panchayat	Location	Total No. of Participants	No. of Female Participants
1	09/06/17	Chandipur	Sitalpur	20	16
2	23/07/17	Vekutia	Vekutia GP	34	25
3	22/07/17	Vekutia	Bhimkata	26	22
4	09/06/17	Garchakraberia	Garchakraberia	20	12
5	09/06/17	Reyapara	Khodambari	14	7
6	14/09/18	Nandigram	BDO office, Nandigram	8	0
7	29/10/18	Mirpur	Ichapur	19	1
8	23/06/20	Mirpur	Mirpur	23	05
9	03/08/20	Nandakumar	Nandakumar Block Office	60	14
10	25/02/21	Nandapur Boragoni	Gram Panchayat	20	00
11	27/02/21	Dibakarpur	Gram Panchayat	12	02
12	11/01/21	Mirpur	Ichapur	31	02
13	22/04/21	Chandipur	BDO office	23	02
14	16/07/21	Narghat	Narghat Pragati Sangha	12	00
15	19.07/21	Nandigram II	Nandigram II BDO Office	36	07
16	26/07/21	Khodambari I	GP office	30	05

Sl. No.	Date	Gram Panchayat	Location	Total No. of Participants	No. of Female Participants
17	12/11/21	Nandigram II	Nandigram II BDO office	29	02
18	15/06/22	Nandigram	Nandigram GP	100	06
19	13/03/23	Sonachura	Sonachura GP	07	02
20	06.12.23	Mirpur	lcchapur	11	1
21	25.01.24	Uttarsonamui	Shrikrishnapur	11	1
22	24.02.24	Chandipur	Shitalpur	15	2
23	27.02.24	Reyapara	Khodambari	11	1
24	21.03.24	Byabattarhatpasc him	Byabottarhat	11	1
25	16.04.24	-	Kumararah	10	2
26	19.04.24	Dibakarpur	Dibakarpur	11	2
<b>TOTAL</b>				<b>604</b>	<b>140</b>

182. The consultations primarily highlighted the proposed developmental interventions, perceived impacts and mitigation measures and public participation during implementation. Community members largely spoke about the insufficient or no availability of potable water for use of drinking and domestic purpose; presently portable water is tapped from ground water, in the form of dug well, hand pump, etc. Average cost of purchasing packaged water per family per month was discussed; it was mentioned that water tariff will be fixed considering the affordability of the common people. Frequent power cut, bad weather, breakdown of pumps is other phenomenon also described by the local residents which they perceive as their barriers to collect water to meet their daily requirements. Consultations at Govt. schools also highlighted the fact that, due to sudden breakdown in water supply system Midday meal services at schools got disrupted and even at sometimes the management of the school have to declare forced holiday due to shortage or non-availability of water at school premises.

183. The participants conveyed their support for the project that benefits the community with safe drinking water. They expressed concern over the present quality of drinking water they consume and appreciated government's effort of distributing clear and treated water. It was reported by the participants that excessive dependence on ground water has resulted into fast declining of ground water levels in the district. Furthermore, proximity of the district to coastal zone has resulted into varied degrees of salinity in ground water in different blocks of East Midnapur. The blocks under the subproject - Nandigram I & II (presently will be benefited from the package) and Chandipur, Nandkumar (will be benefited from 2<sup>nd</sup> phase of the project) are ranked moderate in terms of ground water affected by salinity. Affordability of water tax has been a pertinent question raised by the Gram Panchayat members and the community - however almost all agreed to pay the water charges if they get the facility of household good potable water connections. Creating job opportunities was the other question of the Gram Panchayat.

184. It has been observed that people are very happy about the project as the project area currently faces severe water problem due to lack of any potable water supply system due to depletion of groundwater level and salinity problem. People are very much willing to extend their cooperation as the project will be provide much needed potable water and enhance living standard of the public. There are no negative impacts perceived by the community, however, project team explained the likely issues during construction and proposed EMP to manage the negative impacts. Increasing traffic and disturbance to agricultural vehicle movement (vegetable

transport from fields to market) during the work is raised during the meeting, and it was informed that proper care will be taken for movement of construction vehicles including traffic management plan, prior information to people etc., It was also informed no road closures anticipated due to this work, and if needed during the construction phase, alternative access will be provided. These measures are included in the EMP.

## **2. Consultation during construction**

185. Prior to start of construction, PIU in coordination with the local bodies 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.

186. A constant communication will be established with the affected communities to redress the environmental issues likely to surface during construction and operational phases and also regarding the grievance redress mechanism. Local body (panchayat)/PIU and Design, Supervision and Institutional Support Consultant (DSISC) will organize public meetings and appraise the communities about the progress on the implementation of EMP. Meeting will also be organized at the potential hotspots/sensitive locations during the construction.

## **C. Information Disclosure**

187. Executive summary of the IEE 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 accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. Electronic version of the updated IEE in English and Executive Summary in Bengali will be placed in the official website of the PHED, PMU after approval of the IEE by Government and ADB. Stakeholders made aware of grievance register and redress mechanism.

188. Public information campaigns to explain the project details to a wider population will be conducted. Public disclosure meetings will be conducted at key project stages to inform the public of progress and future plans. Prior to start of construction, the PMU/PIU distributed leaflets showing scope of the work. A board showing the details of the project displayed at the construction site for the information of general public.

189. Local communities 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.

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

191. At minimum, the following documents shall be made available at the offices of project agencies - PMU, PIU and Block level offices for public reference, and shall also be uploaded on respective websites.

- (i) Summary of project and final IEE (in Bengali and English)

- (ii) Draft IEE Report (in English)
- (iii) Final IEE Report (in English)
- (iv) Updated/amended IEE (in English)
- (v) Corrective action plan prepared during project implementation (English)
- (vi) Semi-annual Environmental Monitoring Reports (English)

192. A concise summary of project and draft IEE report (in Bengali), providing all necessary details of proposals, implementation arrangements, subproject locations, likely issues and mitigation and monitoring measures and grievance redress mechanism, shall be made available to the stakeholders at consultation meetings. This should also provide contact information of project agency. This summary shall also be displayed at the notice boards of PMU, PIU and other public places. During project implementation, relevant information about any major changes to project scope will be shared with beneficiaries, affected persons, vulnerable groups, and other stakeholders. The following documents will be submitted to ADB for disclosure on ADB website. PMU will send written endorsement to ADB for disclosing these documents:

- final IEE;
- a new or updated IEE and corrective action plan prepared during project implementation, if any; and
- environmental monitoring reports

## VII. GRIEVANCE REDRESS MECHANISM

### A. Project Specific Grievance Redress Mechanism

193. A common Grievance Redress Mechanism (GRM) 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 conducted to ensure that awareness on the project and its grievance redress procedures is generated. The campaign will ensure that the poor, vulnerable and others are made aware of grievance redress procedures and entitlements per project entitlement matrix, and PMU and concerned PIUs will ensure that their grievances are addressed.

194. 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 15**). Notification was issued on constitution and function of GRC. GRC Notifications of District – State level, PMU, PIU – field levels are attached in **Appendix 16**.

195. 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.

196. 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 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.

197. 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.

198. 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 18**), 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 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. PIU level GRC is already set up.

199. 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.

200. **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.

201. 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.

202. **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).

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

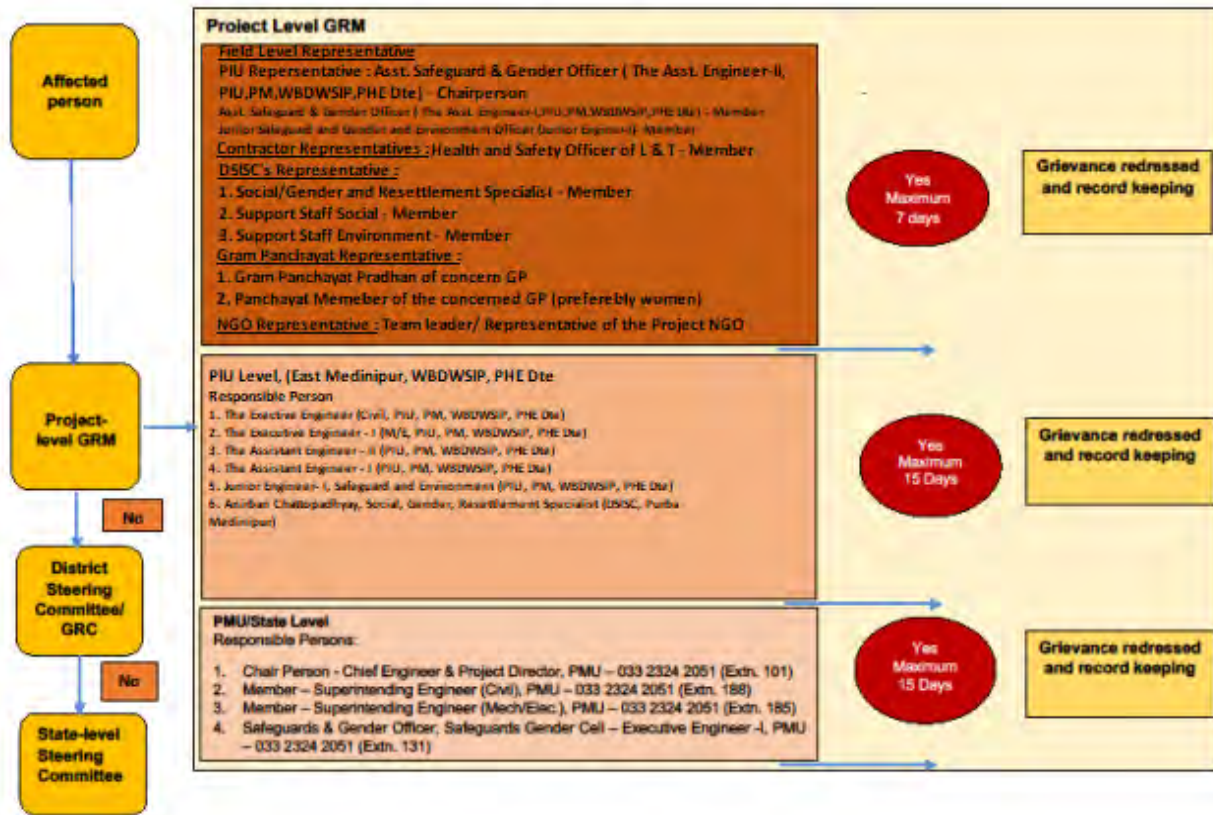
204. **Information Dissemination Methods of the Grievance Redress Mechanism.** The PIU, assisted by DSISC is responsible for information dissemination to affected persons on grievance redressal procedure. Gram Panchayat/coverage area/affected area-wide public awareness campaigns are being conducted to 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. A Sample Grievance Registration Form is attached in **Appendix 15**.

205. **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.

206. **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. The grievance redress process is shown in **Figure 18**.

207. **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.

## Grievance Redress Mechanism



**Figure 18: 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

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

209. The EMP will guide 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 will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a pro-active, 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. The EMP includes a monitoring program to measure the environmental condition and effectiveness of implementation of the mitigation measures. It will include observations on- and off-site, document checks, and interviews with workers and beneficiaries.

210. 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. Traffic and Spoil Management plan as part of SEMP is attached as **Appendix 10**.

211. A copy of the EMP/approved SEMP 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.

212. 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 shall allocate budget for compliance with these SEMP measures, requirements and actions.

213. The following tables show the potential environmental impacts, proposed mitigation measures and responsible agencies for implementation and monitoring.

**Table 32: Design Stage Environmental Impacts & Mitigation Measures**

Field	Anticipated Impact	Mitigation Measures	Responsibility of Mitigation	Cost and Source of Funds
Design of water supply system	Source sustainability and efficiency	<ul style="list-style-type: none"> <li>• Discontinuation of current unsafe &amp; unsustainable groundwater sources and creating a new comprehensive surface water (river) based water supply system</li> <li>• Recovering wash water from treatment process to optimize the water use</li> <li>• Treatment and reuse of sludge from treatment process</li> <li>• Designing the entire system to maintain optimal flow and terminal pressure, and optimizing the overall energy usage</li> <li>• Reducing the incidence of water borne diseases by providing 100% population including urban poor with potable water supplies</li> <li>• Preparation and implementation of a water quality surveillance program including development of a laboratory as part of the project by DBO contractor to ensure that supplied water meets the drinking water standards</li> <li>• Development of laboratory with all necessary environment, health and safety measures and adopting international standard procedures for water quality testing</li> <li>• Using low-noise and energy efficient pumping systems</li> <li>• Installing the noise-producing pumps and motors etc., in enclosed buildings with noise reducing walls, and also maintaining adequate buffer to the nearby inhabited areas</li> <li>• Provision of appropriate personal protection equipment to the workers and staff</li> </ul>	DBO Contractor/ project implementation unit (PIU)	Project Costs
Chlorine usage as disinfectant at WTP	Chlorine handling & application risk – health & safety risk to workers and general public	<ul style="list-style-type: none"> <li>• Provide the following measure at the chlorine application unit:               <ul style="list-style-type: none"> <li>➢ Chlorine neutralization pit with a lime slurry feeder</li> <li>➢ Chlorine absorption and neutralization facility</li> <li>➢ Proper ventilation, lighting, entry and exit facilities</li> <li>➢ Visible and audible alarm facilities to alert chlorine gas leak</li> <li>➢ Facility for isolation in the event of major chlorine leakage</li> <li>➢ Eye wash &amp; shower facility</li> <li>➢ Personal protection and safety equipment for the operators in the chlorine plant (masks, oxygen cylinders, gloves, etc..)</li> </ul> </li> <li>• Provide training to the staff in safe handling and application of chlorine; this shall be included in the contract of Chlorinator supplier</li> <li>• Supplier of Chlorinator equipment shall provide standard operating manual for safe operation and as well as maintenance and repairs; preferably these shall be provided both in English and Bengali Languages</li> </ul>	DBO Contractor / PIU	Project Costs
Layout plan of pump house cum and electric substation, WTP and Transmission main routes	Tree cutting	<ul style="list-style-type: none"> <li>• Minimize removal of trees by adopting to site condition and with appropriate layout design and alignment selection.</li> <li>• Obtain prior permission for tree cutting</li> <li>• Plant and maintain 5 trees for each tree that is removed</li> </ul>	DBO Contractor / PIU	Project Costs

**Table 33: Pre- Construction Stage Environmental Impacts & 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;</li> <li>Require construction contractor to prepare a contingency plan to include actions to be taken in case of unintentional interruption of services; and</li> <li>Contractor prepared spoils (waste) management plan and traffic management plan (part of SEMP, attached in <b>Appendix 10</b>)</li> </ul>	DBO Contractor in Collaboration with PIU and with approval of 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; Worker camp constructed at Banbhera.</li> <li>Not to store spoil materials near the River.</li> <li>If it is deemed necessary to locate elsewhere, consider sites that will not promote instability</li> </ul>	DBO 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 Implementation for	Monitoring of Mitigation	Cost and Source of Funds
		<p>and result in destruction of property, vegetation, irrigation, and drinking water supply systems;</p> <ul style="list-style-type: none"> <li>• Do not consider residential areas;</li> <li>• Take extreme care in selecting sites to avoid direct disposal to water body which 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 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</li> </ul>			

Field	Anticipated Impact	Mitigation Measures	Responsible Implementation for	Monitoring of Mitigation	Cost and Source of Funds
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 Clearance (EC) prior to approval by PIU</li> </ul>	DBO Contractor to prepare list of approved quarry sites and sources of materials with the approval of PIU	<ul style="list-style-type: none"> <li>List of approved quarry sites and sources of materials;</li> </ul>	Project cost
Consents, permits, clearances, NOCs, etc.	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. (Ref <b>Appendix 2 for obtained CTE</b>)</li> <li>Ensure that all necessary approvals for construction to be obtained by contractor</li> </ul>	PIU and PMC	<ul style="list-style-type: none"> <li>Incorporated in final design and communicated to contractors.</li> </ul>	<ul style="list-style-type: none"> <li>Cost of obtaining all consents, permits, clearance, NOCs, etc. prior to start of civil works responsibility of PIU.</li> </ul>

Field	Anticipated Impact	Mitigation Measures	Responsible Implementation for	Monitoring of Mitigation	Cost and Source of Funds
		<p>are in place before start of construction provisions if any</p> <ul style="list-style-type: none"> <li>• Acknowledge in writing and provide report on compliance all obtained consents, permits, clearance, NOCs, etc.</li> <li>• Include in detailed design drawings and documents all conditions and provisions if necessary</li> </ul>			
Asbestos Cement Pipes	Health Risk due to exposure to asbestos materials	<ul style="list-style-type: none"> <li>• Obtain details on location of underground AC pipes</li> <li>• Locate the new piper carefully to avoid encountering AC pipes</li> <li>• Leave the AC pipes undisturbed in the ground.</li> </ul>	DBO 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 34: Construction Stage Environmental Impacts & Mitigation Measures**

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
Environmental Management Plan (EMP) Implementation Training and OHS plan	Irreversible impact to the environment, workers, and community	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 & S awareness, core labour laws, applicable environmental	Contractor	Project cost/PMU cost

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
including COVID 19 H & S plan		laws, etc.		
Air Quality	Emissions from construction vehicles, equipment, and machinery used for installation of pipelines resulting to dusts and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Infrastructure	<p><b>For all construction works</b></p> <ul style="list-style-type: none"> <li>• Comply with the Direction of West Bengal Department of Environment under the Air Act, 1981 in controlling air pollution from construction activities</li> <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 around the construction sites at Intake and WTP work sites</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 and maintain soils in a visible damp or crusted condition for temporary stabilization</li> <li>• Apply water prior to leveling or any other earth moving activity to keep the soil moist throughout the process</li> <li>• Cover the soil stocked at the sites with tarpaulins</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, machinery is fitted with pollution control devices, which are operating correctly, and have a valid pollution under control (PUC) certificate</li> </ul> <p><b>Pipeline works</b></p> <ul style="list-style-type: none"> <li>• Barricade the construction area using hard barricades (of 2 m height) on both sides and provide dust/wind screen (such geo textile fabric) up to 3 m height (1m above the hard barricading)</li> <li>• Initiate site clearance and excavation work only after barricading of the site is done</li> </ul>	DBO 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>• 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: 100 – 200 m section should be demarcated and barricaded</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.</li> <li>• The traffic, pedestrian movement and wind will generate dust from backfilled section. Road restoration shall be undertaken immediately.</li> </ul>		
Surface water quality	<p>Mobilization of settled silt materials, and chemical contamination from fuels and lubricants during construction can Contaminate nearby surface water quality.</p> <p>Ponding of water in the pits / foundation excavations</p>	<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;</li> <li>• Place storage areas for fuels and lubricants away from any drainage leading to water bodies;</li> <li>• Not to dispose any waste materials on the river Haldi during construction of bridge</li> <li>• Store fuel, construction chemicals etc., on an impervious floor, also avoid spillage by careful handling. Not to store fuel near working area in and around the river.</li> <li>• Construction activity of bridge should not affect water flow of the river;</li> <li>• Dispose any wastes generated by construction activities in designated sites;</li> <li>• Conduct surface quality inspection according to the Environmental Management Plan (EMP).</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> </ul>	DBO 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>• Pump out the water collected in the pits / excavations to a temporary sedimentation pond; dispose off 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>		
Noise Levels	Increase in noise level due to earth-moving and excavation equipment, and the transportation of equipment, materials, and people	<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, and use portable street barriers to minimize sound impact to surrounding sensitive receptor; and</li> <li>• Maintain maximum sound levels not exceeding 80 decibels (dBA) when measured at a distance of 10 m or more from the vehicle/s.</li> <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> </ul>	DBO Contractor	Cost for implementation of mitigation measures responsibility of contractor.
Landscape and aesthetics – waste generation	Impacts due to excess excavated earth, excess construction materials, and solid waste such as removed concrete, wood, packaging materials, empty containers, spoils, oils, lubricants, and other similar items.	<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 off to approved designated areas immediately;</li> <li>• If disposal is required, the site shall be selected preferably from barren, infertile lands; site should locate away from residential areas, forests, water bodies and any other sensitive land uses</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 off in disposal sites approved by local authorities/WBPCB;</li> <li>• Prohibit burning of construction and/or domestic waste;</li> <li>• Ensure that wastes are not haphazardly dumped thrown within and around the project site, waterbody, and adjacent areas; provide proper collection bins, and create awareness to use the dust bins.</li> </ul>	DBO 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>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>	DBO 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;</li> <li>If tree-removal will be required, obtain tree-cutting permit and</li> <li>Plant 5 native trees for every one that is removed.</li> </ul>	DBO 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 &amp; waste/surplus soil stocking should be confined to this area. Proper barricading should be provided; avoid material/surplus soil stocking in congested areas – immediately removed from site/ or brought to the as and when required</li> <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> </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
		<ul style="list-style-type: none"> <li>Keep the site free from all unnecessary obstructions;</li> <li>Coordinate with Traffic 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 labour force as far as possible</li> <li>Comply with labor laws</li> </ul>	DBO 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 (<b>see Appendix 9 of this IEE</b>). Labour License, All Risk policy, and WC Policy attached as <b>Appendix 18</b>.</li> <li>Develop and implement site-specific occupational health and Site-specific occupational health and safety (OHS) Plan and Supplementary H &amp; S plan for 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 developed for the project and H &amp; S plan; and (f) documentation of work-related accidents;</li> <li>Ensure that qualified first-aid can be provided at all times. Equipped first-aid stations shall be easily accessible throughout the site;</li> <li>Complete protection of workers, use of floating jacket during work within the River;</li> <li>Training of safety needs to be provided to workers during work within the river.</li> <li>All safety arrangement recommended by IOCL authority during pipe laying work near oil pipeline needs to be maintained (<b>Appendix 13</b>)</li> <li>Provide medical insurance coverage for workers;</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> </ul>	DBO 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>• 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>• Ensure the visibility of workers through their use of high visibility vests when working in or walking through heavy equipment operating areas;</li> <li>• Ensure 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.</li> <li>• Disallow worker exposure to noise level greater than 85 dBA for a duration of more than 8 hours per day without hearing protection. The use of hearing protection shall be enforced actively.</li> <li>• Standard Operating Procedure (SOP) for the project and Supplementary H &amp; S plan for COVID 19 prepared which cover, <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> </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	<ul style="list-style-type: none"> <li>• Leave AC pipes in-situ untouched</li> </ul>	DBO 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 kmph) for playing on unpaved roads, construction tracks</li> <li>• Night-time haulage will be by exception only, as approved by the PIU to minimise 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> </ul>	DBO 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>• Public access to all areas where construction works are on-going 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> <li>• The period of time when the pipeline trench is left open will be minimized through careful planning</li> <li>• During laying of water pipeline near IOCL oil pipeline all safety arrangement needs to be applied for community safety.</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	<ul style="list-style-type: none"> <li>• Temporary air and noise pollution from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants</li> <li>• Unsanitary and poor living conditions for workers</li> </ul>	<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) The camp is constructed at Banbhera.</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 facilities constructed with materials like GI sheets, tarpaulins, etc., shall not be allowed as accommodation for workers</li> <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> </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>• 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>• Not to dispose solid waste on the river water.</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 nature of works and feasibility at site)	Occupational and community hazards which can arise during work at night in extreme and unavoidable cases	<ul style="list-style-type: none"> <li>(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.</li> <li>(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.</li> <li>(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.</li> <li>(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</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>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 with fewer delays for the travelling public and for construction workers to work more safely in lower volume traffic.</p> <p>(ix) Contractors should have hand held noise level meter for measurement of noise during night hours</p> <p>(x) Contractors should have hand held lux meter for the measurement of illumination during night hours</p> <p>(xi) Preferably electrical connections are available for running equipment's otherwise sound proof/super silent Diesel Generator set should be available</p> <p>(xii) Sound level should not increase as per EMP</p> <p>(xiii) Illumination should be adequate as required according to nature of works</p> <p>(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</p> <p>(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</p> <p>(xvi) Workers engaged in night works should have adequate rest/sleep in day time before start of night works</p> <p>(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</p> <p>(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</p> <p>(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</p> <p>(xx) Horns should not be permitted by equipment and vehicles</p>		

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		(xxi) Workers should not shout and create noise (xxii) First aid and emergency vehicles should be available at site (xxiii) Emergency preparedness plan should be operative during night works (xxiv) Old persons and pregnant women and women having small kids should not work in night time (xxv) All the vehicles and equipment being used at night works should have adequate type of silencers/enclosures/mufflers to reduce noise (xxvi) All the vehicles should be checked for working head lamps, tail lamps, inner lights etc. before start of night work. (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; (xxviii) Night works should be stopped early in the morning at least one hour before start of pedestrian/traffic movement; (xxix) After completion of night works all the site should be cleaned and maintained obstruction free for day time movement of vehicles and pedestrians; (xxx) Drivers and workers should be alert and responsive during night works; (xxxi) All the wages to workers working in night hours should be as per the applicable labour acts; (xxxii) Avoid any nuisance which may create problems to nearby habitants and work peacefully during night hours; and (xxxiii) Night works should not be conducted near hospitals and during peak seasons such as peak tourist season, students' exam times etc.		
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>	DBO Contractor	Contractor cost
Submission of EMP implementation report	Unsatisfactory compliance to EMP	<ul style="list-style-type: none"> <li>• Appointment of EHS Supervisor to ensure EMP implementation</li> <li>• Timely submission of monitoring reports including pictures</li> </ul>	DBO contractor	Contractor cost
Post-construction clean-up	Damage due to debris, spoils,	<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;</li> </ul>	DBO Contractor	Cost for implementation

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
	excess construction materials	<ul style="list-style-type: none"> <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>		of mitigation measures responsibility of contractor.

**Table 35: Operation Stage Environmental Impacts & Mitigation Measures**

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
WTP operation – malfunction and effect on efficiency	Public health, safety & environmental impacts	<ul style="list-style-type: none"> <li>Operate as per the Operational Manual following Standard Operating Procedures as per the WTP design</li> <li>Undertake preventive and periodic maintenance activities as required</li> <li>Ensure periodic training to staff in WTP operation, especially in chemical handling &amp; dosing, filter backwash, etc.,</li> <li>Replace pumps, motors and other parts as per the operating life prescribed by manufacturer</li> <li>Maintain the mechanical parts as per the maintenance plan to avoid any hazards</li> <li>Ensure that all safety apparatus at WTP including personal protection equipment is in good condition all times; and are at easily accessible and easily identifiable place; periodically check the equipment, and conduct mock drills to deal with emergency situations</li> <li>Ensure that backwash recirculation system and sludge management system are operated as per the manual</li> </ul>	DBO Contractor	Operating costs
Check for blockage and leakage problems reducing the water losses	Loss of water, increased demand and inconvenience to consumers & general public	Effectiveness of leak detection and water auditing to reduce the water losses	DBO Contractor	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 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 as developed for COVID 19 pandemic during</li> </ul>	DBO Contractor	Operating costs

Field	Anticipated Impact	Mitigation Measures	Responsible for Mitigation	Cost and Source of Funds
		<ul style="list-style-type: none"> <li>operation and maintenance</li> <li>o Use fall protection equipment when working at heights.</li> <li>o Maintain work areas to minimize slipping and tripping hazards.</li> <li>o Implement a training program for operators who work with chlorine regarding safe handling practices and emergency response procedures.</li> <li>o Prepare escape plans from areas where there might be a chlorine emission.</li> <li>o Install safety showers and eye wash stations near the chlorine equipment and other areas where hazardous chemicals are stored or used.</li> <li>o Prohibit eating, smoking, and drinking except in designated areas</li> </ul>		
Increased in sewage generation	Water pollution, and impacts on public health and environment	<ul style="list-style-type: none"> <li>o Sanitation and sewerage/septage facilities needs to be improved/provided in the project area to suit the increased sewage generation</li> </ul>	PHED & respective local bodies	To be identified

**Table 36: Construction Stage Environmental Monitoring Plan**

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Construction disturbances, nuisances, public & worker safety,	All work sites	Implementation of dust control, noise control, traffic management, & safety measures. Site inspection checklist to review implementation is appended at <b>Appendix 22</b>	Weekly during construction	Supervising staff and safeguards specialists	No costs required
Ambient air quality	5 locations (Intake, WTP, Transmission mains route)	<ul style="list-style-type: none"> <li>• PM10, PM2.5 NO2, SO2, CO</li> </ul>	<ul style="list-style-type: none"> <li>(i) Once before start of construction.</li> <li>(ii) Yearly 3-times (except monsoon) during construction (3-year period considered)</li> </ul>	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (50 samples x 9000 per sample = 450,000)
Ambient noise	5 locations (Intake, WTP, Transmission mains route)	<ul style="list-style-type: none"> <li>• Day time and night time noise levels</li> </ul>	<ul style="list-style-type: none"> <li>(i) Once before start of construction</li> <li>(ii) Yearly 3-times, (except monsoon) during construction (3-year period considered)</li> </ul>	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (50 samples x 1350 per sample = 67,500)

Surface water quality	One location (Rupnarayan River intake)	<ul style="list-style-type: none"> <li>pH, TDS, Oil &amp; grease, Cl, F, NO<sub>3</sub>, TC, FC, Hardness, Turbidity BOD, COD, DO, Total Alkalinity and Salinity</li> </ul>	<p>(i) Once before start of construction</p> <p>(ii) Monthly (yearly 12 times) (3-year construction period considered)</p> <p>(iii) Salinity of river water should be checked at 2-3 points downstream of intake, may at an interval of 1 km, 2 km.</p>	DBO Contractor	Cost for implementation of monitoring measures responsibility of contractor (37 samples x 5400 per sample =200,000)
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**Table 37: Operation Stage Environmental Monitoring Plan**

Monitoring field	Monitoring location	Monitoring parameters	Frequency	Responsibility	Cost & Source of Funds
Monitoring of quality of Water supplied to consumers	Consumer end-random sampling in all zones	pH, Nitrite, Nitrate, Turbidity, BOD, TDS, Chloride, Total Alkalinity, total coliform and Faecal coliform	Monthly once	DBO Contractor / PHED	O&M costs (water quality will be tested at the internal laboratory part of WTP)
Sludge quality and suitability as manure	WTP	Analysis for concentration of heavy metals and confirm that value are within the following limits (all units are in mg/kg dry basis except pH) <ul style="list-style-type: none"> <li>• Arsenic - 10.00</li> <li>• Cadmium - 5.00</li> <li>• Chromium - 50.00</li> <li>• Copper - 300.00</li> <li>• Lead - 100.00</li> <li>• Mercury - 0.15</li> <li>• Nickel - 50.00</li> <li>• Zinc - 1000.00</li> <li>• PH - 5.5-8.5</li> </ul>	Yearly once	DBO Contractor / PHED	O&M costs (testing to be done At an accredited external laboratory)

## B. Implementation Arrangements

214. 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 is 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 supported by a Design, Supervision and Institutional Support Consultant (DSISC).

215. **Safeguards Compliance Responsibilities.** A Safeguard and Gender Cell (SGC) have 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 have 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/SEMPs reflect final project designs;
- (iv) Ensure that EMPs are included in bidding documents and civil works contracts;
- (v) Ensure proper implementation of SEMPs 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 SEMP 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.

216. The SGC 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.

217. **Project Implementation Unit.** At each PIU, an Assistant Engineer given additional responsibilities of safeguard tasks and 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.

218. The PIUs assisted by DSISC teams 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 /

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

219. **Civil works contracts and contractors.** IEEs are to be included in bidding and contract documents. The PMU and PIUs are 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 has already appointed an Environment, Health and Safety (EHS) supervisor to implement EMP. The EHS Supervisor update the EMP and submit SEMP for approval of PIU. Contractors will carry out all environmental mitigation and monitoring measures outlined in SEMP, 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 measure 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, water 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

220. PMU HSGO and PIU Safeguard Officers are 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 conducted to the contractors upon their mobilization by PIU Safeguard Officers supported by DSISCs.

221. The following **Table 38** 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 will be customized for the available skill set after assessing the capabilities of the target participants and the requirements of the project by the Environmental Safeguard of PMC.

**Table 38: Outline Capacity Building Program on EMP Implementation**

Description	Target Participants and Venue	Estimate (₹)	Cost and Source of Funds
1. Introduction and Sensitization to Environmental Issues (1 day) - ADB Safeguards Policy Statement - Government of India and West Bengal applicable safeguard laws, regulations and policies including but not limited to core labor standards, occupational health and safety, etc. - Incorporation of EMP into the project design and contracts - Monitoring, reporting and corrective action planning	All staff and consultants involved in the project  At PMU (combined program for all subprojects)	₹100,000.00	<b>PMU Cost</b>
2. EMP implementation (1 day) - EMP mitigation and monitoring measures - Roles and responsibilities - Public relations, - Consultations - Grievance redress - Monitoring and corrective action planning - Reporting and disclosure - Construction site standard operating procedures (SOP) - Health & safety, specifically health risk from COVID 19. -- Chance finds (archeological) protocol - AC pipe protocol	All PIU staff, contractor staff and consultants involved in the subproject  At PIU (Purba Medinipur)	₹50,000 (Lump sum)	<b>PMU Cost</b>

Description	Target Participants and Venue	Estimate (₹)	Cost and Source of Funds
- Traffic management plan - Waste management plan - 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 due to spreading of COVID 19 - Traffic management plan - Spoils management plan - Waste management plan - Chance find protocol - O&M plans - Post-construction plan	All staff and consultants involved in the project  All contractors prior to award of contract or during mobilization stage.  At PIU (Purba 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 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

222. 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 approved the report and permit commencement of works.

223. 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.

224. 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 23**.

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

**E. Environmental Management Plan (EMP) Implementation Cost**

226. 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 39: Cost Estimates to Implement the EMP**

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
<b>A. Implementation staff</b>							
1	EHS Supervisor	Construction	Per month	36	50,000	18,00,000	DBO contract
<b>Subtotal (A)</b>						<b>18,00,000</b>	
<b>B. Mitigation Measures</b>							
1	Consent for establishments & consent for operation from WBPCB	Pre construction	Lump sum			200,000	Project costs
2	Provision for tree cutting & compensatory plantation measures (1: 5 ratio replantation)	Construction	Per tree	200	2,500	500,000	DBO contract
3	Traffic management at work sites (Pavement Markings, Channelizing Devices, Arrow Panels and Warning Lights)	Construction	Lump sum	-	-	300,000	DBO contract
4.	Civil Works (Water Sprinkling for dust suppression; Barricading; Rain Water Harvesting for water conservation etc.)	Construction	Lump sum	-	-	400,000	DBO Contract
5.	Arrangement of resources for prevention of health	Construction	Lump sum	-	-	200,000	Contractors cost supported

	Particulars	Stages	Unit	Total Number	Rate (INR)	Cost (INR)	Costs Covered By
	risk from COVID 19 pandemic						from Project cost on actual basis
	<b>Subtotal (B)</b>						<b>16,00,000</b>
<b>C. Monitoring Measures</b>							
1	Air quality monitoring	Construction	per sample	50	9,000	450,000	DBO contract
2	Noise levels monitoring	Construction	Per sample	50	1,350	67,500	DBO contract
3	Surface water monitoring	Construction	Per sample	37	5,400	200,000	DBO contract
4	Source water quality, water quality at consumer end, sludge quality	Operation	Lump sum for 2 years	-	-	322,500	DBO Contract
	<b>Subtotal (C)</b>					<b>10,40,000</b>	
<b>D. Capacity Building</b>							
1	Introduction and sensitization to environment issues	Pre- construction	lump sum			100,000	PMU
2	EMP implementation	Construction	lump sum			50,000	PMU
3	Preparation of plans and protocols (traffic management plan, waste (spoils) management plan etc.	Construction	lump sum			25,000	PMU
			lump sum			50,000	Contractors cost
4.	Contractors Orientation to Workers on EMP implementation	Prior to dispatch to worksite	Lump sum			50,000	Contractors cost
5.	Experiences and best practices sharing	Construction /Post-Construction	lump sum			100,000	PMU
	<b>Subtotal (D)</b>					<b>375,000</b>	
	<b>Total (A+B+C+D)</b>				<b>INR</b>	<b>48,15,000</b>	

Summary of EMP Cost

Contractor Cost	-	₹ 41,40,000.00
PMU Cost	-	₹ 6,75,000.00
<b>Total Cost</b>	-	<b>₹ 48,15,000.00</b>

## IX. CONCLUSION AND RECOMMENDATIONS

227. The process described in this document has assessed the environmental impacts of all elements of the proposed bulk water supply subproject for Nandakumar, Chandipur, Nandigram I and Nandigram II blocks of Purba Medinipur district. All potential impacts were identified in relation to pre-construction, construction, and operation phases. Planning principles and design considerations have been reviewed and incorporated into the site planning and design process wherever possible. Thus, environmental impacts resulting from project design or location were not considered significant.

228. Presently, the demand of the rural areas within the fold of the selected 4 blocks is met from ground water sources. With increase in population, and increase in ground water withdrawal (for agricultural and drinking water purposes), the ground water resources are getting depleted. Also, in select areas along the coastal regions, the ground water is affected by Salinity. 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. As a part of its endeavor to provide Piped Water Supply to the rural areas as per the plan outlined in "VISION- 2020", the selected 4 blocks have been prioritized by PHED for comprehensive coverage with surface-based Water Supply Scheme and is proposed for implementation under the WBDWSIP funded by ADB. The objective of the subproject is to provide sustainable water supply at a rate 70 litres per capita per day (lpcd) to each household in all habitations in the selected blocks.

229. The raw water source is Rupnarayan river, which carries significant quantities of water throughout the year, even during the lean flow season (February to May). It is navigable throughout the year in its lower portion. The Quality of river water is good and is suitable for drinking water supply after conventional treatment and disinfection. However, during the lean flow season salinity is high (TDS and Chloride concentrations are above the desirable limit but within the permissible limit of Drinking Water Specifications IS:10500). However, given the proximity and tidal actions in the river, seasonal variation in the water quality needs to be studied to ensure long term sustainability of the scheme. Permission for withdrawal of 117 MLD Raw water from Rupnarayan river at Mouza - Mirpur/Ichapur, Block Nandakumar has been obtained from the Irrigation & Waterways Department, Govt. of West Bengal vide letter no. 237 - 1, 1-4M-02/2015 dated 8th June, 2017.

230. The subproject components are located in Nandakumar, Chandipur, Nandigram I and Nandigram II blocks of Purba Medinipur district. The raw water intake sump cum pump house and substation has been constructed on a private land parcel measuring 74.116 Decimal. Area located at Mouza Mirpur, JL No. 54, Dag No. 694,695,697,698,704 land and procured from 6 land owners. The proposed land is laying vacant and not being used for any commercial or agricultural purpose. The WTP with booster pumping facilities will be constructed (distance of 17.1 km from the intake location) on a land parcel measuring 18 acres owned by Land Revenue Department Government of West Bengal located in Mouza Jalpai-Sitalpur under Sitalpur Gram Panchayat of Nandakumar block. All the facilities are located in rapidly developing areas, which are surrounded by residential and commercial areas. Land for substation is covered with few trees, but as per final design no trees need to be removed at Intake substation land, few trees are present within the impact zone of raw water transmission pipeline. NOC was obtained for felling of 98 nos. and 201 nos. trees within raw water pipe laying area. From Mograipur to Dibakarpur clear water transmission main have been done and finalized the requirement of felling of 698 nos. of tree. NOC has been obtained from forest dept. Tree felling has been done along the clear water transmission main. Compensatory plantation has been done at different areas of the block. Of the approximately 53

km length of transmission mains in some stretches Jack pushing method will be adopted especially at sections crossing main roads, congested areas, and railway tracks. Construction of RCC Bridge of width 5.0 m having length of approximately 600 m over Haldi River near Narghat for carrying clear water mains of 1000 mm dia (K9 grade) and other utility. The social impacts (access disruptions) due to construction activities are minimal. Overall, there are no notable sensitive environmental features in the project sites.

231. The civil works contract under the WBDWSIP have specific provisions related to impact avoidance for pipeline laying activities as well as construction work near common property resources. 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. These measures will be part of the contract and will be implemented through it, with careful monitoring by the concerned PIU.

232. Construction activities will be confined to the selected sites, and the interference with the general public and community around is minimal. There will be temporary negative impacts, arising mainly from construction dust and noise, hauling of construction material, waste and equipment on local roads (traffic, dust, safety etc.), mining of construction material, occupational health and safety aspects including COVID 19 risk and prevention. During the construction phase of pipeline work along the public roads, impacts will arise from the construction dust and noise; disturbance to residents, businesses, traffic by the construction work, and from the need to dispose of large quantities of waste soil. The social impacts (access disruptions) due to construction activities are minimal. To minimize social impact at congested commercial / market place and main road pipe laying will be done at night. Accordingly, night work management plan is developed. Trenchless technology is suggested at critical sections where pipeline crosses the main transportation corridors. These are the general impacts of construction in semi-urban, rural and habitation areas, and there are well developed methods of mitigation that are suggested in the EMP.

233. Anticipated impacts of water supply during operation and maintenance will be related to operation of WTP, handling and application of chlorine, operation of pump houses, and repair and maintenance activities. Various provisions have already been made in the design to: recirculate wastewater from WTP; collect, thicken and dispose of sludge; chlorine safety; use energy efficient equipment, etc. Water supply system will be operated using the standard operating procedures following an operating manual, which will be prepared by the DBO contractor. Thus, considering the design and proposed operational procedures, it is unlikely that there will be any significant negative impacts due to operation of water supply system. It is important that proper O&M system as per the SOPs is must. Application and handling of chlorine gas will involve certain risks, and appropriate measures are suggested for safe application including PPEs, awareness programs and mock drills. The DBO Contractor will implement the operation stage EMP. There may be requirement of repairs in pipelines due to leaks and pipe bursts. Proper design and selection of good quality pipe material will mean that leaks are minimal. Leak repair work will be similar to the pipe-laying work.

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

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

236. The EMP assist the project agencies and DBO contractor in mitigating the environmental impacts, and guide them in the environmentally-sound execution of the proposed project. A copy of the EMP/approved SEMP shall be kept on-site during the construction period at all times. The EMP has been made binding on all contractors operating on the site, and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document shall constitute a failure in compliance.

237. Groundwater in area is contaminated with salinity and water level is depleting. The project will benefit the general public by contributing to the long-term improvement of water supply system and community livability in the project area. The potential adverse environmental impacts are mainly related to the construction period, which can be minimized by the mitigating measures and environmentally-sound engineering and construction practices. The cost estimate (budgetary provision) for mitigating the anticipated impacts by proposed subproject component is approx. INR 48,15,000/- (Rupees Forty-eight lakhs fifteen thousand only) for effective implementation of the Environment Management Plan

238. The residents of the project area will be the major beneficiaries of the improved water supply system, as they will be provided with a constant supply of better-quality water, piped into their homes at an appropriate pressure. The project will improve the over-all health condition of the project area by controlling water borne diseases, so people should spend less on healthcare and lose fewer working days due to illness. 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.

239. Therefore, as per ADB SPS, the project is classified as environmental Category B and does not require further environmental impact assessment. However, to conform to government guidelines WTP requires Consent to Establish (CTE) and Consent to Operate (CTO) from West Bengal Pollution Control Board. Application has already been submitted (online) to West Bengal Pollution Control Board for getting CTE of WTP.

240. This IEE report has been updated covering the planned night work time management under the project and minor change in pipeline length. No additional impact is expected. The updated report reviewed and approved by PMU and will be send to ADB for approval

241. **Recommendations.** PMU, PIUs, and contractors to ensure that: (i) package wise details and evidences such as photographs/display board for grievance redress mechanism (GRM)/health and safety (H&S) measures taken at work sites due to COVID 19 pandemic are included in monthly monitoring report; and (ii) ensure that efficient implementation of the H&S Plan developed by the project in response to COVID-19 pandemic. Important protocols or measures in the H&S Plan are to ensure that the following are complied with at the offices and worksites of the project: (i) screening of employees and workers; (ii) record keeping of screening

results; (iii) availability and use of appropriate PPEs; (iv) social distancing; (v) proper office set up reconfiguration to ensure social distancing; (vi) new office and work site meeting arrangements; and (vii) regular disinfection of work areas, vehicles and equipment; among others. PIU safeguards officer with the assistance of the safeguard experts of PMC/DSISCs and Contractors EHS officers of all districts are reminded to take precautions, provide continuous induction and continue conducting regular safeguards implementation trainings including implementation monitoring of regular usage of PPEs and COVID-19 related safety measures. Key reminders for the PMU, PIUs, contractors, and workers to comply with the following occupational health and safety measures as stated in the agreed OHS Plan:

- (i) Ensure project staff, consultants, contractors, and workers have in their mobile devices the Aarogya Setu App, which is a mobile application developed and recommended by the government to proactively reach out to and inform the users of the app regarding risks, best practices and relevant advisories pertaining to the containment of COVID-19;
- (ii) Mandatory isolation of the personnel or workers, either asymptomatic or showing symptoms, who have had direct contact with anyone tested positive for COVID-19. Follow the isolation procedures issued by the government;
- (iii) Proper disposal of used PPE following guidelines and procedures issued by the government;
- (iv) Conduct daily briefing on the developments of COVID-19 in the state or country, either through emails, meetings or daily toolbox talks;
- (v) When possible, allow work from home arrangement based on the nature of jobs;
- (vi) If necessary, pick up and drop off facility be extended to staff (based on the distance of the staff residence from office and on availability of safe mode of transport);
- (vii) Avoid face to face meetings – critical situations requiring in-person discussion must follow social distancing. Do not convene in-person meetings of more than 10 people;
- (viii) If possible, conduct all meetings via conference calls. Recommend use of cell phones, texting, web meeting sites and conference calls for project discussions;
- (ix) Contractor to help its workers arrange a systematic procurement of all daily needs and groceries at worksites. This will avoid each and every worker going to shops for these daily needs;
- (x) Contractor to arrange for contactless payment of wages to workers, where possible;
- (xi) Allow distributed breaktimes for workers to maintain social distancing and reduce contact;
- (xii) Remind employees and workers to maintain good health by getting adequate sleep; eating a balanced and healthy diet, avoiding alcohol/smoking; and consuming plenty of fluids; and
- (xiii) Remind employees and workers to extend their adherence to the H&S protocols at their respective homes. Infection may happen beyond the borders of offices and work sites.

## Appendix 1 : Updated REA Checklist

### WATER SUPPLY

#### 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) – Nandakumar, Chandipur, Nandigram I and Nandigram II blocks of Purba Medinipur District: Bulk Water Supply Subproject**

**Sector Division: Urban Development**

SCREENING QUESTIONS	Yes	No	REMARKS
<b>A. Project Siting</b>			
<b>Is the project area...</b>			
▪ Densely populated?		√	Project area is not densely populated Subproject activities extend to the Nandakumar, Chandipur, 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 as such 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		√	
<b>B. Potential Environmental Impacts</b>			
<b>Will the Project cause...</b>			
• Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?		√	Not expected as per site conditions. There is no waste water discharge in upstream of water source; i.e Rupnarayan river Water surveillance program will be included to monitor the raw water quality.
• Impairment of historical/ cultural monuments/ areas and loss/damage to these sites?		√	No impact expected. No cultural monuments and historical sites near project locations.

SCREENING QUESTIONS	Yes	No	REMARKS
<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. Water from the river to be used and with no risk of land subsidence.
<ul style="list-style-type: none"> <li>Social conflicts arising from displacement of communities?</li> </ul>		√	Project does not involve land acquisition /displacement. No social conflicts envisaged
<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>		√	Project involves new surface water source development on river Rupnarayan which is perennial in nature. Adequate capacity of raw water is already available. Water abstraction permission is given by the Irrigation & Waterways Department, Government of West Bengal and only allocated water shall be used for proposed water supply project. There is no ground water abstraction as a part of this sub project.
<ul style="list-style-type: none"> <li>Unsatisfactory raw water supply (e.g., excessive pathogens or mineral constituents)?</li> </ul>		√	Raw water quality is tested and found that it is suitable 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, although this is within the permissible limits as per Drinking water standards (IS:10500-2012). Water quality testing should be done before treatment and after treatment.
<ul style="list-style-type: none"> <li>Delivery of unsafe water to distribution system?</li> </ul>		√	The water treatment plant will ensure all quality criteria set by CPCB for drinking water standards. Treated water meeting drinking water standards at WTP will be delivered to distribution system. 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>		√	Water quality surveillance program will be included to monitor the raw water quality.
<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 need to be developed in the project area
<ul style="list-style-type: none"> <li>Inadequate disposal of sludge from water treatment plants?</li> </ul>		√	Appropriate provisions for sludge drying and disposal is included in the project
<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>		√	Adequate buffer is available; all the pumping stations will be located in enclosed buildings with noise control walls to minimize noise propagation. A green belt area will be developed surrounding the boundary wall of the water treatment plant. Trees with thick canopy will be planted in order to reduce the noise levels reaching the nearby surroundings.
<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. At congested area pipe laying will be done at night time to minimize occupational & community impact. Night work management plan as developed, will be applied.
<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>		√	Measures for safe handling, storage and usage of chlorine are included. Contractor/ operator 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

SCREENING QUESTIONS	Yes	No	REMARKS
<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>		√	Operation and Maintenance recommended by the manufacturers, and the existing norms and guidelines for ensuring the safety of workers will be followed. Measures for safe handling, storage and usage of chlorine are included.
<ul style="list-style-type: none"> <li>Dislocation or involuntary resettlement of people</li> </ul>		√	There is no resettlement of people for project implementation. Further review will be conducted under social assessment process.
<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 labour force as far as possible; in case if it is unavoidable, labour 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 including river bridge will be allowed during rains.
<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>		√	The Contractor shall prepare an O&M manual for approval of the Employer and training will be given to the staff operating the plant to ensure proper O&M.
<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. Online monitoring of process water is proposed as part of the subproject and ensured by the Contractor. Care should be taken during O&M period to ensure that corrosive chemicals are not entered in distribution networks.
<ul style="list-style-type: none"> <li>Accidental leakage of chlorine gas?</li> </ul>		√	There is risk that inappropriate handling, storage or use of chlorine may cause serious accidents due to leakage causing severe health risks. Measures for safe handling, storage and usage of chlorine are included in EMP.
<ul style="list-style-type: none"> <li>Excessive abstraction of water affecting downstream water users?</li> </ul>		√	Rupnarayan River carries huge flow, and the water abstraction for the project is negligible even during lean seasons and hence extraction will not affect any downstream users.
<ul style="list-style-type: none"> <li>Competing uses of water?</li> </ul>		√	Project involves new source development. Adequate capacity of raw water is already available. 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>	√		Sanitation & sewerage needs to be improved
<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 & sewerage needs to be improved. Additional wastewater and appropriate sludge treatment and disposal facility will be part of this subproject.

SCREENING QUESTIONS	Yes	No	REMARKS
<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 is envisaged.
<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, specifically during excavation for pipe laying, equipment and vehicle operation. for which mitigation measures will be adopted by contractor

**A Checklist for Preliminary Climate Risk Screening**

**Country/Project Title: India / West Bengal Drinking Water Sector Improvement Project (WBDWSIP)  
 – Nandakumar, Chandipur, Nandigram I and Nandigram II blocks of Purba  
 Medinipur District: Bulk Water Supply Subproject  
 Sector: Urban Development  
 Subsector: Water Supply  
 Division/Department: SARD/SAUW**

Screening Questions		Score	Remarks
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 amount of rains and construction works may be impacted during rainy season. Entire Purba Medinipur 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 : CTE of Water Treatment Plant

NOC A/0164647

### WEST BENGAL POLLUTION CONTROL BOARD

Paribesh Bhawan  
1QA, Block - LA, Sector III, Bidhannagar  
Kolkata - 700 105

Memo No. 32-1-56-h1-mc-b/20

Dated 05/11/2020

From :  
Member Secretary,  
West Bengal Pollution Control Board

To  
The Assistant Engineer-I (Civil)  
P.I.U Purba Medinipur, WBDWSIP, P.H.E Dte.,  
Govt. of West Bengal  
(Old Zilla Parishad Building)  
Maniktala, Tamluk, Purba Medinipur - 721636

Sub: Consent to Establish (NOC) from Environmental Point of View

Ref: Your letter No. 18/09/2020

## WEST BENGAL

Dear Sirs,

In response to the application for Consent to Establish (NOC) for proposed Unit of M/s W.B.D.W.SIP,

P.H.E Directorate, Govt. of West Bengal.

for manufacturing/stocking of water treatment plant for water supply to Nandigram-II at Mauza - Taluk, Sitalapur Gram\*\*

this is to inform you that this Board hereby grants the Consent to Establish (NOC) from the environmental point of the above subject to the following conditions and special conditions annexed.

\*\* Block in East Medinipur  
\*\* Panchayat of Nandigram-II, Dist - East Medinipur.

1. The quality of sewage and trade effluent to be discharged from your factory shall satisfy the permissible limits as prescribed in IS : 2490 (Pt. I) of 1974, and/or its subsequent amendment and Environment (Protection) Rules 1986.
2. Suitable measures to treat your effluent shall be adopted by you in order to reduce the pollutional load so that the quality of the effluent satisfies the standards mentioned above.
3. You shall have to apply to this Board for its consent to operate and discharge of sewage and trade effluent according to the provisions of the water (Prevention & Control of Pollution) Act, 1974. No sewage or trade effluent shall be discharged by you without prior consent of this Board.
4. All emission from your factory shall conform to the standards as laid down by this Board.
5. No emission shall be permitted without prior approval of this Board and you shall apply to this Board for its consent to operate and atmospheric emission as per provision of the Air (Prevention & Control Pollution) act, 1981.
6. No industrial plant, furnace, flues, chimneys, control equipment, etc. shall be constructed/reconstructed/erected/re-erected without prior approval of this Board.

NOC NO164647

7. You shall comply with
- Water (Prevention and Control of Pollution) Cess Act, 1977, if applicable.
  - Water (Prevention and Control of Pollution) Cess Act, 1978, if applicable.
  - Environment (Protection) Act, 1986
  - Environment (Protection) Rules, 1986
  - Hazardous Wastes (Management and Handling) Rules, 1989 and Amended Rules, 2000
  - Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 and Amended Rules, 2000
  - Manufacture, Use, Import and Storage and Hazardous Micro-Organisms, Genetically Engineered Organisms or Cell Rules, 1989
  - The Public Liability Insurance Act, 1991 and Amended Act, 1992
  - The Public Liability Insurance Rules, 1991 and Amended Rules 1993
  - Biomedical Wastes (Management & Handling) Rules, 1998 and Amended Rules 2000 if applicable.
  - Recycled Plastics Manufacture and Usage Rules 1999, if applicable and
  - Ozone Depleting Substances (Regulation & Control) Rules, 2000, if applicable
8. You will have to abide by any other stipulations as may be prescribed by any authority/local bodies/Government Departments etc.

**SPECIAL CONDITION :**

See Annexure.

Gross Capital Investment of Rs. 95,00,00,000

Any violation of the aforesaid conditions shall entail cancellation of this Consent to Establish (NOC)

Yours faithfully,  
*[Signature]*  
Member Secretary,  
West Bengal Pollution Control Board  
Environmental Engineer  
Dated: 05/11/20  
W. B. Pollution Control Board  
Operation & Execution Cell

Memo No. ....

Copy forwarded for information to :

- Chief Inspector of Factories, Government of West Bengal, N. S. Building, Kolkata-700 001
- Director of Industries/Director of Cottage & Small Scale Industries, Government of West Bengal, N. S. Building, Kolkata-700 001
- Guard file, West Bengal Pollution Control Board.
- Environmental Engineer, W. B. Pollution Control Board  
Asansol/ Sub-R.O./WBPC Board  
Himalaya Bhawan Vili, Panpur Sahid Khudiram Sarani 10, Camac Street  
Delhi Road, Dankuni Kalyani Expressway City Centre, Durgapur-16 2nd Floor  
Dist. Hooghly P.O. Narayanpur Dist. Burdwan Kolkata-700 017  
Dist. 24 Pgs. (N)  
Paribesh Bhawan Block-05 at 40 Paribahan Nagar  
10A, LA-Block, Sector-III Flats Complex Matigara, Siliguri  
Salt Lake City, Adjacent to Priyambada Dist.-Darjeeling  
Kolkata - 700 098 Housing Estate  
P.O. : Khanjanchak,  
P.S. Durgachak  
Haldia-721602  
Dist. : Purba Medinipur  
Satya Chowdhury Asansol Sub-Regional Office  
Indoor Stadium ADDA Commercial Market (2nd Floor)  
Balurchar Bandh Road Opposite Asansol Fire Station  
Malda-732101 G.T. Road, Asansol-713 301  
Member Secretary,  
West Bengal Pollution Control Board

**Annexure to NOC Sl. NO164647**

Special Conditions issued to **Water Treatment Plant -117 MLD** by **WBDWSIP, PHE Directorate, Govt. of West Bengal** located at **Mouza-Jalpai & Sitalpur, JL No.70 & 71** under **Sitalpur Gram Panchayat of Nandakumar Block, Dist-East Medinipur.**

**A. Emission:- Nil**

**B. Raw Water Treatment :-**

Raw river water (117 MLD) : to be abstracted from river Rupnarayanpur at Mirpur/Ichapur of Nandakumar Block and pumped to the WTP(Water Treatment Plant) site at Mouza-Jalpai & Sitalpur for treatment in WTP as per process description and finally treated water to be supplied to Nandakumar, Chandipur, Nandigram-I & Nandigram-II Block in East Medinipur District through the supply pipeline.

**C. Solid Waste :-** WTP sludge to be used for landfilling and PVC/Plastic waste /gunny bags to be sold.

**D. General :-**

1. The unit shall take proper measures to control air, water and noise pollution.
2. This NOC is valid only subject to obtaining permission/clearances from the other Competent Authorities as applicable.
3. Ambient noise level not to exceed the permissible limit.
4. No addition/alteration/modification can be done without prior permission from the State Board.
5. The unit shall obtain Consent to Operate of the State Board before starting operation.
6. Good housekeeping to be maintained.
7. Adequate green belt around the unit to be developed.
8. This NOC is valid upto **31.10.2027** for setting up the Water Treatment Plant – 117 MLD capacity.

  
Environmental Engineer  
West Bengal Pollution Control Board  
Environmental Engineer  
W. B. Pollution Control Board  
Operation & Execution Cell

**Appendix 3 : 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 <sup>d</sup>	
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,	100 (Annual) 400 (24-hr)			100 (Annual) 400 (24-hr)

Parameter	Location <sup>a</sup>	India Ambient Air Quality Standard	WHO Air Quality Guidelines ( $\mu\text{g}/\text{m}^3$ )		Applicable Per ADB SPS <sup>e</sup>
	Rural and Other Areas				
	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:

- 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.
- Smoke shall not exceed above value throughout the operating load points of the test cycle.
- The testing shall be done as per D2 – 5 mode cycle of ISO: 8178- Part 4.
- The above mentioned emission limits shall be applicable for Type Approval and Conformity of Production (COP) carried out by authorised agencies.
- 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.
- Stack height (in metres), for genset shall be governed as per Central Pollution Control Board (CPCB) guidelines.

## Stack Height Requirement

### DIESEL GENERATOR SETS : STACK HEIGHT

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

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

H = Total height of stack in metre

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

KVA = Total generator capacity of the set in KVA

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

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

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

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

## Appendix 4 : Vehicle Exhaust Emission Norms

### 1. Passenger Cars

Norms	CO (g/km)	HC+ NOx (g/km)
1991 Norms	14.3-27.1	2.0(Only HC)
1996 Norms	8.68-12.40	3.00-4.36
1998 Norms	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)
1991 Norms	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 5 : Applicable 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> As 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 6: 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 10200: 2012.

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

<sup>c</sup> As 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

### 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 7 : 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 8: Extract from Construction and Demolition Management Rules, 2016

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

### NOTIFICATION

New Delhi, the 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**  
**[Sec 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 9 : Salient Features of Major Labor Laws Applicable to Establishments Engaged in Construction of Civil Works**

- (i) Workmen Compensation Act, 1923 - The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- (ii) Payment of Gratuity Act, 1972 - Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more or on death at the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- (iii) Employees' PF and Miscellaneous Provisions Act, 1952 - The Act provides for monthly contributions by the employer plus workers @10 % or 8.33 %. The benefits payable under the Act are: (a) Pension or family pension on retirement or death as the case may be; (b) deposit linked insurance on the death in harness of the worker; (c) payment of PF accumulation on retirement/death etc.
- (iv) Maternity Benefit Act, 1951 - The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- (v) Contract Labour (Regulation and Abolition) Act, 1970 - The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided by the Principal Employer by Law. The principal employer is required to take Certificate of Registration and the Contractor is required to take a License from the designated Officer. The Act is applicable to the establishments or Contractor of principal employer if they employ 20 or more contract labor.
- (vi) Minimum Wages Act, 1948 - The employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act if the employment is a scheduled employment. Construction of Buildings, Roads, Runways are scheduled employment.
- (vii) Payment of Wages Act, 1936 - It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- (viii) Equal Remuneration Act, 1979 - The Act provides for payment of equal wages for work of equal nature to Male and Female workers and not for making discrimination against Female employees in the matters of transfers, training and promotions etc.
- (ix) Payment of Bonus Act, 1965 - The Act is applicable to all establishments employing 20 or more workmen. The Act provides for payments of annual bonus subject to a minimum of 8.33
- (x) % of wages and maximum of 20 % of wages to employees drawing Rs. 3,500/- per month or less. The bonus to be paid to employees getting Rs. 2,500/- per month or above up to Rs.3,500/- per month shall be worked out by taking wages as Rs.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.
- (xi) 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.

(xii) 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.


(xiii) 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.

(xiv) 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.

(xv) 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

(xvi) 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 10 SEMP part – Spoil and Traffic Management Plan  
Spoil Management Plan (SMP)**

 <b>L&amp;T Construction</b> <i>Water &amp; Effluent Treatment</i>	Design, Construction and Operation- Maintenance of Raw Water Intake Well, Water Treatment Plant, Raw and Clear Water Transmission Main for Nandakumar, Chandipur, Nandigram-I and II Blocks in East Medinipur-1 (EM-01).	Doc. No. L&T/ SEMP /01 Last Revision No. 00 Last Revision Date : 00 Page 44 of 73 Original Issue Date :			
	Site Specific Environmental Management Plan				
<h1>SPOIL MANGEMENT PLAN</h1>					
<h2>WBDWSIP MEDINIPUR EM-01</h2>					
Location :Intake Pump House and WTP					
Rev.	Date	Prepared By	Checked By	Approved By DSIC	Approved By PIU
00	11.07.2020	Mr. Subrata Kumar Das (EHS Officer)	Mr. M Sudhakar (Project Manager)		Assistant Engineer-I (C) PIU, PURBA MEDINIP P. H. E. Div.
		<i>SKD</i>	<i>M Sudhakar</i>	<i>DSIC</i>	<i>16/07/2020</i>

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## **1. INTRODUCTION OF SMP:**

SMP is to describe how the project will manage the spoil generated and reuse related to design and construction works. This is an integral part of EMP. The objective of SMP is to reuse of spoil from works.

## **2. SCOPE:**

This Spoil Management Plan developed for WTP, Intake and Pipeline laying works. We do not anticipate any excess Spoil for disposal as all excavated material will be reuse at site only.

## **3. LEGAL AND OTHER REQUIREMENTS:**

In this project, there is no legal litigation at site for land and working area or site. Disposal of spoil will be confirming the Environmental Protection Rules and Regulations of Govt. of India and the State Govt.

## **4. ROLES AND RESPONSIBILITY:**

### **SITE ENGINEER:**

- Will strictly work as per drawing.
- Will stay at site during activity is going on.
- Will see excess earth is kept at a particular place after completion of backfilling.
- Will ensure quality of the work by discussing daily about the type of activity on that day with the workmen.
- Will check site drain outlets are not blocked due to excavated earth on the drain.

### **SAFETY PERSONNEL:**

- Will constant Job specific Tool Box Talk with Supervisor and Workmen.
- Will check excavated earth kept away from top.
- Will check if any underground pipeline is there or live electric cable the water should be sprayed to avoid dust hazard from excavation.
- Necessary Safety signage, Cones & FRP Barricading Board to be used.
- Vehicles reverse horn etc. to be checked will ensure zero tolerance in safety.

### **WORKER:**

- They will start activity only after Tool Box Talk done.
- They will wear job specific safety items before start of work.
- During working inside the excavated trench, they should use ladder for easy access.
- They should barricade the area of activity with Safety barricading tape.
- Worker should be skilled to carry out the work.

It is the responsibility of the Engineers and all department head to implement this procedure and ensure that delegated staff and worker under their supervision carry it out in this project. Major roles and responsibilities are mentioned below:

- Excavated earth should be utilized like refilling at site only.
- Traffic movement should not be obstructed by dumping soil during the work.
- No low land, pond, ditch etc. will be filled up by extra soil outside the work place.
- Ensuring no accident occurs during rainy season by excavated earth during or finished the work.
- All the drains, outlet should be free from excavated earth.

**5. IDENTIFICATION AND ASSESSMENT OF SPOIL ASPECTS AND IMPACTS:**

In this project, places will be identified jointly along with design engineer for utilization. Main places where the excavated earth can be utilized are the trench of pipes and backfilling location.

**6. SPOIL VOLUMES AND CHARACTERISTICS:**

There is no excess earth in this project as the same earth is to be used to fill the low land area.

**7. SPOIL REUSES OPPORTUNITIES, IDENTIFICATION AND ASSESMENT:**

In this project, there is no excess quality of excavated earth; total excavated earth should be reuse as per plan.

**8. ON SITE SPOIL MANAGMENT APPROACH:**

In this project, no need of the approach as there is no extra soils for disposal.

**9. SPOIL TRANSPORTATION METHODOLOGY:**

In this project, no need for spoil transport as there is no extra soils for disposal.

**10. MONITORING, REPORTING, REVIEW AND IMPROVEMENTS:**

Monitoring, Reporting and all necessary improvements will be done as per requirements.

**Spoil Details-**

<b>Sl. No.</b>	<b>Location</b>	<b>Name of Structure</b>	<b>Excavation Total Qty (C.U.M)</b>	<b>Back Filling Total Qty (C.U.M)</b>	<b>Reuse Excess Qty (C.U.M)</b>
1	Banbherha	WTP and Intake	244714 m <sup>3</sup> (approx.)	12100 m <sup>3</sup> (approx.)	232614 m <sup>3</sup> (approx.)

# Traffic Management Plan (TMP)

 <b>L&amp;T Construction</b> Water & Effluent Treatment	Design, Construction and Operation Maintenance of Raw Water Intake Well, Water Treatment Plant, Raw and Clear Water Transmission Main for Nandakumar, Chandipur, Nandigram-I and II Blocks in East Medinipur-I (EM-01).	Doc. No. L&T/ SEMP /01 Last Revision No. 00 Last Revision Date : 00 Page 47 of 73 Original Issue Date :
	Site Specific Environmental Management Plan	

**TRAFFIC MANGEMENT PLAN**  
**WBDWSIP MEDINIPUR EM-01**  
  
 LOCATION - Intake & WTP

Rev.	Date	Prepared By	Checked By	Approved By DSIC	Approved By PIU
00	11.07.2020	Mr Subrata Kumar Das (EHS Officer)	Mr. M Sudhakar (Project Manager)		Assistant Engineer-I (Civ) PIU, PURBA MEDINIPUR P. H. E. Div.
		<i>SKAN</i>	<i>[Signature]</i>	<i>[Signature]</i>	<i>[Signature]</i> 16/07/20

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## **1. PURPOSE**

Main purpose is to prevent accident between vehicles, pedestrians and employees and also minimise inconvenience to the vehicle. To stop property damage and prevent injury to persons arising from site traffic and site transport.

## **2. SCOPE**

The procedure is applicable for MS/DI pipe laying area.

## **3. RESPONSIBILITY**

It is the responsibility of the Engineers and all department head to implement this procedure and ensure that delegated staff under their supervision carries it out.

## **4. LEGAL REQUIREMENT**

The Building and Other Construction Workers (Regulations of Employment and Conditions of Service) Act 1996 and Central Rule 1998 Rule 48, 88 and 95, Motor Vehicle Act 1988.

## **5. REQUIREMENTS**

### **5.1 General**

- All road works create inconvenience and are a potential hazard to the safety of all road users and those employed in carrying out the work.
- All the effects should be reduced to the minimum, and to ensure that the works are properly guarded, lighted and signed.
- A clear and early warning of any obstruction to all road users should be provided.
- All areas where work is going on should be clearly demarcated by proper barricading and entry into these areas should be restricted to only authorize personnel.
- Site access for local people.

### **5.2 Planning Stage**

Particular attention should be given to:

- Traffic signs
- Cones
- Barriers
- FRP Barricading Board
- Road hazard warning lights
- Information boards and
- Site lighting
- Site access for local people
- Consider necessity to traffic control systems such as temporary traffic lights or Stop/Go boards.
- Access should be planned to eliminate dangerous movements of site traffic (e.g. reversing of vehicles) and personnel (e.g. crossing dual carriageways).
- Provision of adequate lighting while working at night.
- All persons working on the road shall wear high visibility jackets.

### **5.3 On Site**

The working space shall be defined and “A PLACE FOR EVERYTHING AND EVERYTHING IN ITS PLACE” to be follow.

### **5.4 Operators/Drivers**

- Only Experienced operators and drivers with valid licensed has been appointed.
- One copy of license has been collected.
- Refreshment training conducted for all operators and drivers.
- Operators/Drivers authentication and validation to operate the particular machinery displayed in the machine/vehicles.

### **5.5 Equipment**

- Drivers undertake a daily visual inspection of their vehicles include steering, brakes, mirrors, lights, horn, tyres and windshield wipers.
- Safety Department along with Plant and machinery department shall check the vehicles as a monthly basis.
- All vehicles have reverse horns and it is in working properly.
- All vehicles, preventive maintenance schedule has to be followed strictly.

#### **5.6 Roads**

For safe operation we are following the below safety measure:

- Safe width of road has been provided.
- Flag man deployed at every traffic point to control the vehicles and pedestrians.
- Speed limits 10km/hr within the working area.
- Caution board has been placed in every location within the site.
- Workers are working with reflective jacket as well as required PPE's.
- Road for use of pedestrian has been identified.
- Reverse horn used in vehicles.
- While reverse vehicles ensuring Banks man.
- Do's and Don'ts displayed at site office.

#### **5.7 Loading and Unloading**

- Only authorized persons were engage loading/unloading.
- Materials loaded within the permitted safe weight limit (as per RTO) for the truck.
- Ensuring Soil and Sand loaded trucks are covered with tarpaulin while transporting
- During Toolbox talk's intimation has been delivered to all drivers/operators that when the drivers leave the driving seat, the engine of the truck shall be switched off, the gear engaged and parking brakes applied. On slopes, wheel blocks shall be applied.
- Helper has been provided with all vehicles.
- After unloading, the banks man ensuring that the tipper is lowered before moving.
- Turn buckle and side stoppers used while transporting as required.

#### **5.8 Working Area**

- The working area has been restricted from unauthorized entry.
- The working space has been defined.

Particular attention has been taken in working area:

- Traffic signs
- Cones
- Barriers
- Information boards, and
- Site lighting
- Adequate lighting has been provided at working area at night.
- All persons wear high visibility jackets.

Traffic Plan (Drawing)

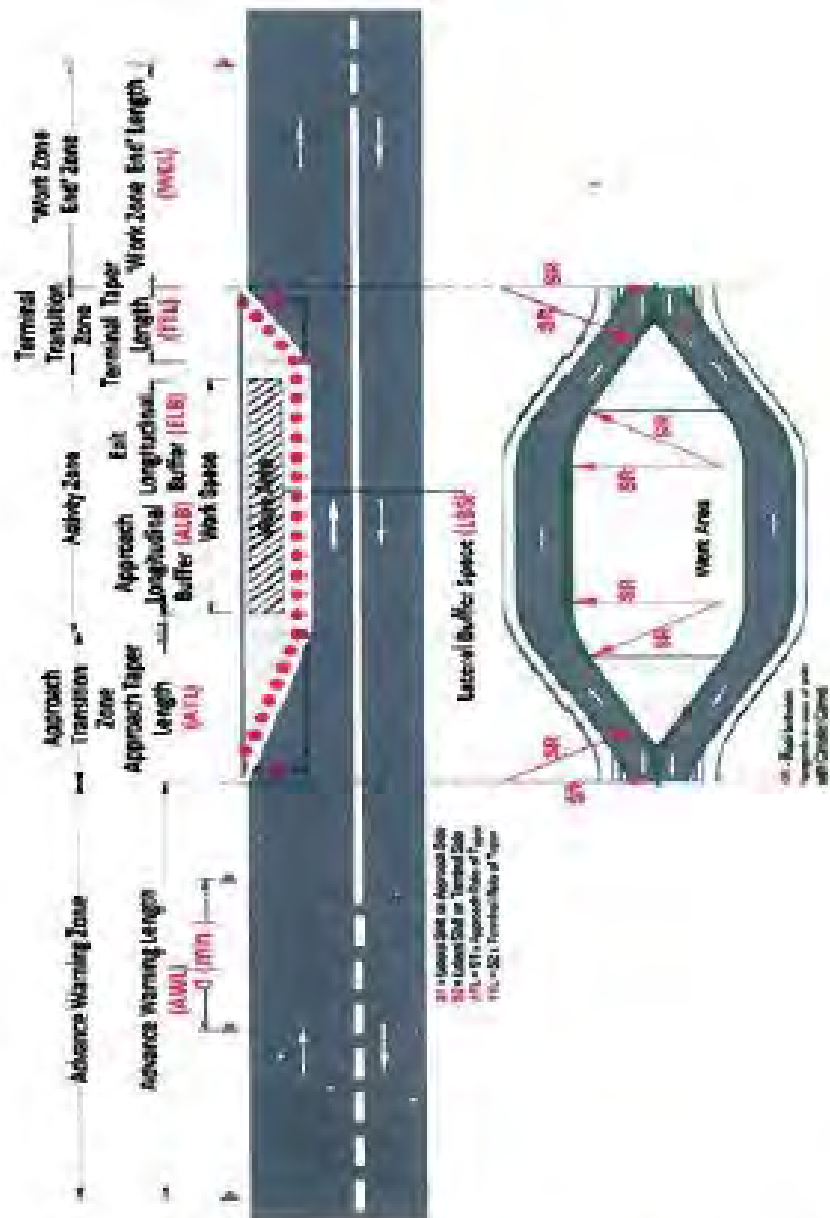




Fig.1. Lay Out of Temporary Traffic Control Zone

## Appendix 11: NOC for construction of pipe supporting bridge over Haldi River and pipe laying permission from Irrigation Department

<p><b>Government of West Bengal</b>                  Office of The Superintending Engineer                  Project Implementation Unit, Parha Medinipur                  W.B. Drinking Water Sector Improvement Project                  Public Health Engineering Directorate</p>		<p style="text-align: right;"><b>Address:</b>                  Bar Padumbasan                  (Old Zilla Parishad Office Building)                  Maniktala, Tamruk, Parha Medinipur, 721636                  Email : se.piuparhad.adb@wbphed.gov.in                  Phone – (03228) 266250</p>
<p>Memo No: <u>403</u> /SE/PIU/PM</p>		<p>Dated Tamruk the, 27/11/2021  <u>04.12.2021</u>                  Received - 04.12.21</p>
<p>To                  The Team Leader                  DSISC, East Medinipur</p>		
<p>Sub: N.O.C for Construction of Pipe Supporting Bridge Over River Haldi.                  Ref: - Memo No - 4W-1058/526 dated Kolkata The 23.06.2021</p>		
<p>Sir,</p> <p>Enclosed please find here with the approved &amp; vetted GAD for the structure as mentioned in the subject.</p> <p>This is for your further course of action</p> <p>Thanking You</p> <p>Enclose: As stated</p>		
		<p>Yours Faithfully</p>  <p><b>Superintending Engineer</b>                  PIU, PM, WBDWSIP, PHE Dte.</p>
<p>Memo No: <u>1-4</u> /SE/PIU/PM</p> <p><i>Copy forwarded for information to:-</i></p> <ol style="list-style-type: none"> <li>1. The Project Director, PMU, WBDWSIP, PHE Dte.</li> <li>2. The Chief Engineer, PMU, WBDWSIP, PHE Dte.</li> <li>3. The Superintending Engineer (Civil), PMU, WBDWSIP, PHE Dte.</li> <li>4. The Executive Engineer (Civil), PIU, PM, WBDWSIP, PHE Dte.</li> </ol>		<p>Dated Tamruk the, 27/11/2021</p> <p><b>Superintending Engineer</b>                  PIU, PM, WBDWSIP, PHE Dte.</p>
<p>Memo No: <u>15-6</u> /SE/PIU/PM</p> <p><i>Copy forwarded for information to:-</i></p> <ol style="list-style-type: none"> <li>1. The Deputy Team Leader, RMC, WBDWSIP</li> <li>2. The Project Manager (EM-01), L&amp;T.</li> </ol>		<p>Dated Tamruk the, 27/11/2021</p> <p><b>Superintending Engineer</b>                  PIU, PM, WBDWSIP, PHE Dte.</p>
<p style="text-align: center;"><i>Attn: [Signature]</i>  <u>04.12.2021</u>                  04/12/2021</p>		<p><b>Superintending Engineer</b>                  PIU, PM, WBDWSIP, PHE Dte.</p>



Office of the Director of Designs  
CENTRAL DESIGN OFFICE  
Irrigation & Waterways Directorate  
Government of West Bengal  
Jalasampad Bhawan (1<sup>st</sup> Floor), Salt Lake City, Kolkata-700 091  
e-Mail: [cdobwdb@gmail.com](mailto:cdobwdb@gmail.com)

Memo. No. 4W-1058/526

Dated, Kolkata, the 23<sup>rd</sup> June 2021

From: -

T. R. Barua,  
Director of Designs,  
Central Design Office,  
I & W Directorate,  
Govt. of West Bengal.

To,

The Superintending Engineer,  
PIU, PM, WBDWSIP,  
PHE Dte.  
Purba Medinipur.

Subject: Vetting of waterway for proposed pipe carrying bridge at River Haldi to implement "Surface Water Based Piped Water Supply Scheme for Nandigram - I & II, Chandipur and Nandakumar Blocks" (ADB Aided Projects)

Reference: i. Memo No. 779 dated 10-05-2021 of the Executive Engineer, East Midnapore Division authenticating the H.F.L.  
ii. Your Memo No. 309/SE/PIU/PM dated 18-09-2020 sending the proposal to EMD, I & W Dte.

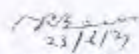
Sir,

Enclosed please find herewith a copy of the GAD of the structure mentioned under subject duly vetted for waterway only.

Please note that the vetting sheet was communicated to you through Whatsapp Message on 04-06-2021.

This is for your information and necessary action please.

Thanking you.

  
23/6/21  
Director of Designs.

Memo. No. 4W-1058/526/1

Dated, Kolkata, the 23<sup>rd</sup> June 2021

Copy submitted for his kind information to the Chief Engineer (D & R), I & W Dte., Govt. of West Bengal.

Director of Designs.

Memo. No. 4W-1058/526/2

Dated, Kolkata, the 23<sup>rd</sup> June 2021

Copy with a copy of vetted GAD forwarded for his information and necessary action to the Executive Engineer, East Midnapore Division, I & W Dte., Govt. of West Bengal.

Director of Designs.

## NOC of raw water pipe laying- Irrigation Dept.- Intake to Ganjanaryanpur - RWTM

- 124 -



Irrigation & Waterways Department  
Jalasampad Bhavan, 3rd Floor, Western Block  
Bidhannagar, Salt Lake City, Kolkata 700091

Memo No. 82 - IFC  
IW/O/IFC-4M-09/2019

Dated, 26<sup>th</sup> February'2020

**From:** Joint Secretary to the  
Government of West Bengal

**To:** Principal Secretary  
Public Health Engineering Department  
Government of West Bengal  
6<sup>th</sup> Floor, New Secretariat Building  
Kolkata - 700 001

**Sub:** *Permission for laying of raw water rising Main (1422 mm diameter) from intake at Mirpur to Ganjanarayanpur for 'Surface water based piped water scheme for Nandigram-I & II, Chandipur and Nandakumar Blocks'.*

**Ref:** Memo No. 13/EE/PIU/PM dated 14.01.2020 of the Executive Engineer, PIU, PM, WBDWSIP, PHE Dte and T.O. No. 460 - IFC dated 22.11.2019.

Sir,

This is in continuation to earlier permission issued by this Department to you vide Memo No. 460 - IFC dated 22.11.2019 in respect to laying of 1422 mm dia raw water rising Main along Rupnarayan embankment (on the country side) of this Department from Mirpur to Ganjanarayanpur in Purba Medinipur District in connection with their proposed Surface water based piped water scheme for Nandigram-I & II, Chandipur and Nandakumar Blocks. Original proposal had only one crossing under Rupnarayan embankment at the intake point at Mirpur. Now, Executive Engineer, PIU, PM, WBDWSIP, PHE Dte, prayed for permission for 2 (Two) nos more crossings at 2.66 Km. and 3.77 Km. from intake point under the said embankment and proposes to lay the said pipeline both at country side and river side along the embankment.

I am now directed to convey the 'No Objection' (NoC) of this Department towards your proposed laying of 1422 mm dia raw water rising Main along Rupnarayan embankment (on the country side and river side) of this Department from Mirpur to Ganjanarayanpur in Purba Medinipur District including one crossing at the intake point at Mirpur and two additional crossings at 2.66 Km. and 3.77 Km. from intake point, subject to your compliance of the same

3. Executive Engineer, East Midnapore Division  
Irrigation & Waterways Directorate  
Government of West Bengal  
Ratnali, P.O- Radhaballavpur, Tamluk  
District: Purba Midnapore, PIN: 721627

4. Executive Engineer  
PIU, PM, WBDWSIP, PHE Dte.  
Office of the Superintending Engineer  
PIU, Purba Medinipur, WBDWSIP, P.H.E.DTE.  
Barpadumbasan (Old Zilla Parishad Office Building)  
Maniktala, Tamluk, Purba Medinipur, PIN: 721636

- This has reference to his application vide Memo No.13/EE/PIU/PM dated  
14.01.2020.

*m. chakraborty* 26/2/2020  
(M. Chakraborty)  
Joint Secretary to the  
Government of West Bengal

(4a)

Irrigation  
Intake to  
Ganjanarayanpur

Irrigation & Waterways Department  
Jalasangrad Bhavan, 3rd Floor, Western Block  
Bidhannagar, Salt Lake City, Kolkata 700091

Memo No. 460 - IFC  
IW/O/IFC-4M-09/2019

Dated, 22<sup>nd</sup> November, 2019

**From:** Joint Secretary to the  
Government of West Bengal

**To:** Principal Secretary  
Public Health Engineering Department  
Government of West Bengal  
6<sup>th</sup> Floor, New Secretariat Building  
Kolkata - 700 001

**Sub:** *Permission for laying of raw water rising Main (1422 mm diameter) from intake at Mirpur to Ganjanarayanpur for 'Surface water based piped water scheme for Nandigram-I & II, Chandipur and Bandkumar Blocks'.*

**Ref:** Memo No. 33/EE/PIU/PM dated 28.08.2019 of the Executive Engineer, PIU, PM, WBDWSIP, PHE Dte.

Sir,

Public Health Engineering Department, proposes to lay 1422 mm dia raw water rising Main along Rupnarayan embankment (on the country side) of this Department from Mirpur to Ganjanarayanpur in Purba Medinipur District in connection with their proposed Surface water based piped water scheme for Nandigram-I & II, Chandipur and Bandkumar Blocks including one crossing at the intake point at Mirpur.

I am now directed to convey the 'No Objection' (NoC) of this Department towards your proposed laying of 1422 mm dia raw water rising Main along Rupnarayan embankment (on the country side) of this Department from Mirpur to Ganjanarayanpur in Purba Medinipur District including one crossing at the intake point at Mirpur, subject to your compliance of the following terms & conditions:

1. Laying of 1422 mm dia underground pipeline for the purposes as stated by the concerned Executive Engineer, PIU, PM, WBDWSIP, PHE Dte. shall be in accordance with the G.A Drawing submitted by them and vetted by the Engineer-in-Charge [Executive Engineer, East Midnapore Division], Irrigation & Waterways Directorate, and should conform to the stipulations made therein. In case of any deviation there from, this Department reserves the right

*28.11.19*

to stop work without any prior notice. Safety & security of 1422 mm dia underground pipeline and its appurtenants at all times will be a sole responsibility of PHE Dte. The vetted drawing may be collected from the office of the Executive Engineer, East Midnapore Division, Irrigation & Waterways Directorate.

2. The proposed pipeline alignment should be laid minimum 1.5 m below the top level of the embankment at the crossing point of the embankment and the proposed pipeline for crossing the embankment shall preferably be a single one without any joint below the embankment.
3. The proposed pipeline shall be laid along the country side of the embankment having minimum clearance of 1 m from the toe of the embankment and the depth shall be minimum 1.2 m below the ground level at the toe of the embankment on the countryside
4. All necessary precautions shall be taken by the PHE Dte in order to avoid incurring any damages to the embankment during laying of their pipeline, if damaged, shall be restored back to its original formation by PHE Dte. at their own cost to the full satisfaction of Engineer-in-Charge [Executive Engineer, East Midnapore Division], Irrigation & Waterways Directorate. Adequate protection of the embankment at the upstream and downstream of crossing shall be taken by PHE Dte.
5. It is imperative that the plots of land on which the 1422 mm dia underground pipeline will be laid, shall remain to be the Govt. property of this Department and PHE Dte. will have no claim whatsoever, on the land.

Violation of the above terms & conditions in any manner will lead to cancellation of this 'No Objection' (NoC).

Yours faithfully,

*sdt*

(M. Chakraborty)  
Joint Secretary to the  
Government of West Bengal

Memo No. 460 /1(2) - IFC

Dated, 22<sup>nd</sup> November, 2019

Copy forwarded for kind information to the:

1. O.S.D. to Hon'ble Minister-in-Charge  
Irrigation & Waterways Department  
Government of West Bengal  
Jalasampad Bhavan, 1<sup>st</sup> Floor  
Saltlake - 700 091

**NOC from Irrigation dept for pipe laying from Magrajpur to Mangalchak and canal crossing near Magrajpur railway crossing- CWTM**



Government of West Bengal  
Irrigation & Waterways Dte.  
Office of the Executive Engineer  
Contai Irrigation Division  
Contai, Purba Medinipur

Tel: 03220 255162 & e-mail id: ciddivision.2012@gmail.com

Memo No. 198/WBIW/CID (Ext. Jirna Vahiny)

Dated, 9<sup>th</sup> February 2021

To  
The Superintending Engineer  
PIU, Purba Medinipur, WBDWSIP  
Public Health Engineering Dte.  
Tamluk, Dist. Purba Medinipur

Sub: No Objection Certificate for laying of pipeline (CWRM) from Magrajpur to Mangalchak including canal crossing near Magrajpur rail crossing to implement "Surface Water Based Piped Water Supply Scheme for Nandigram- I & II, Chandipur and Nandakumar Blocks," (ADB Aided Project)

Ref: 1. Your letter vides Memo No. 17/EE/PIU/PM, dated, 3<sup>rd</sup> February 2021.  
2. Memo No. 388/SE/PIU/PM, dated, 11<sup>th</sup> November 2020 of SE/PIU, Purba Medinipur, WBDWSIP, PHED.  
3. This office letter bearing Memo No. 901, dated, 13<sup>th</sup> November 2020.

Sir,

Already a No Objection in this connection was accorded vides this office letter under reference. Now considering the social effects and far distance of the river from the embankment as stated in your letter under reference and recommendation of the SDO, Etamogra Sub- Division, implementation of the work at riverside is hereby accepted. Hence, No Objection for implementation of the work, laying of pipeline (CWRM) from Magrajpur to Mangalchak including canal crossing near Magrajpur rail crossing to implement "Surface Water Based Piped Water Supply Scheme for Nandigram- I & II, Chandipur and Nandakumar Block" is hereby accorded further in terms of strict compliance of the following guidelines:

1. Pipeline shall be laid over the berm land or sub berm existing at the river side of the embankment.
2. No excavation for laying of pipeline will be allowed over the crest or top of embankment.
3. Slope of the embankment if damaged during execution shall be mended immediately.
4. The trench to be excavated at the country side berm land of the right bank of River Haldi shall be made as narrow as possible.
5. The executing authority is requested that the entire work must be implemented by keeping close contact and monitoring of the Sub- Divisional Officer, Etamogra Irrigation Sub- Division, I&WD.

You are requested to send the detail layout plan over the embankment cum road from Magrajpur to Mangalchak including canal crossing near Magrajpur rail crossing at the earliest.

**Sd/- U. Hazra**

Executive Engineer  
Contai Irrigation Division  
Irrigation & Waterways Dte.

Page No. 1 of 2 (see overleaf)

1. Copy submitted for kind information to the Superintending Engineer, Western Circle- III, I & W Dte. Tamluk.
2. Copy forwarded for information and taking necessary action to the Sub- Divisional Officer, Etamogra Irrigation Sub- Division.

*WBIW 9.2.2021*  
Executive Engineer  
Contai Irrigation Division  
Irrigation & Waterways Dte.

## Appendix 12 : NOC from National Highways Authority

### NOC from NH- 116B

F. No. RW/NH/12017/2019/UTILITIES/53/KOL  
Government of India  
Ministry of Road Transport & Highways  
Office of the Chief Engineer-cum-Regional Officer  
Room No.106, 1<sup>st</sup> Floor, CGO Complex, C Wing, DF Block, Salt Lake, Kolkata - 700 064.  
Tel.+91 33 2358-6940/2358-6941/2358-6942/2321-8613; Email - roc.morth@gmail.com

Dated, the 16<sup>th</sup> June ,2020

To,  
The Chief Engineer (NH),  
Public Works (Roads) Directorate,  
Govt. of West Bengal,  
Khadya Bhawan, 11A, Mirza Ghalib Street,  
Kolkata - 700 087.

Sub: Permission for laying Raw Water & Clear Water Pipeline from along km 0.00 to km 12.79 NH-116B for surface piped water "supply scheme for Nadigram-I, Nandigram-II, Chandipur & Nadakumar Block within Purba Medinipur District under WBSRDA, PHE dte"(ADB Project)- reg.

Ref: (i) CE (NH) P.W.(Roads) Dte, Kolkata letter No. 2P-13/2019/121-R/W, dt. 23.12.2019.  
(ii) CE (NH) P.W.(Roads) Dte, Kolkata letter No. 2P-13/2019/66-R/W, dt. 06.09.2019.  
(iii) Ministry's Circular no. RW/NH-33044/29/2015/S&R(R), dated 22.11.2016.

Sir,

Please refer to letter cited under ref.(ii) submitting therewith the subject mentioned proposal for approval.

2. As per the Ministry extant policy the proposal was hosted on the Ministry's official website for 30 days (from 29.01.2020 to 28.02.2020) for seeking claim and objections from general public. However, So far no comment has been received to this office within stipulated time.

3. The Proposal has been examined as per Ministry's guidelines issued vide letter under ref. (iii) and found to be generally in order. Accordingly, taking into cognizance of the undertaking furnished by CE & PD, PMU, WBDWSIP, PHE Directorate, Government of West Bengal vide memo No. PMU/WBDWSIP/PHE/139/1121, dated 10.12.2019 stating that in case of future expansion of NH-116B, the instant pipeline shall be shifted promptly by PHE at their own cost and risk, initial permission is hereby granted for five years from the date of issue of this letter subject to following conditions.

(i) The Applicant shall take all type of safety required measure during execution of the work as per the Affidavit submitted by PHE Dte ;

(ii) The applicant needs to submit the safety clearance certificate from the respective authorities such as Directorate of Electricity, Chief Controller of Explosives, Petroleum and Explosives safety Organization, Oil Industry Safety Directorate, State/Central Pollution Control Board and any other Statutory clearances as applicable, which must be obtained by the applicant before execution of the work;

(iii) The applicant shall ensure that there shall be no traffic disruption during execution and after execution of the work;

Page 1 of 2

- (iv) Applicant shall intimate the Executive Engineer (NH), Div. II about its work programme before start of the work and abide by all safety rules & regulations during the execution of work. The work shall be carried out under the supervision of EE, NH Div. No. II, West Bengal;
- (v) The Executive Engineer, NH Division No. II, shall get a performance Bank Guarantee for Rs. 41,81,250/- with validity up to one year as per Clause 6 of Ministry's Circular dated 22.11.2016 prior to signing of lease agreement under intimation to this office;
- (vi) Pipeline laying along the road are proposed using open trenching method only which may be agreed. In this regard, the depth of trench may be 1.5m plus dia of distribution pipeline & the sides of trench should be done as nearby vertical as possible. The trench width should be at least 30cm wide, but not more than 60cm wide than the outer diameter of the utility pipe. Filling of the
- (vii) trench shall conform to the specifications provided in Clause No 3.5 of Ministry Circular No. RW/NH-33044/29/2015/S&R(R) dated 22.11.2016.
- (viii) PHE dte shall shift pipeline at its own cost in future during up-gradation / expansion of NH-116B to 4-lane/ 6 -lane within the time not exceeding 90 days. In case delay on part of PHE dte. towards shifting their utility, the additional financial implication, if any has to borne by the PHE, Dte.
- (ix) This permission is valid for 5 years from the date of issue of this letter, which is to be renewed on expiry. Failing which the NOC shall be treated as null & void;


4. The applicant (PHE dte) has already submitted license fee for Rs. 92,23,320/- (Rupees Ninety two lakh twenty three thousand three hundred twenty only) to RPAO (NH), Kolkata, Bank Account through NTPR portal vide transaction no. 23475906062000000498 dated 06.06.2020.

5. It is therefore requested to take further necessary action under intimation to this office.

\*  
#

Yours faithfully,

Encl. - One set of proposal.

  
(Samiran Saha)  
Executive Engineer (SG)  
for Chief Engineer -RO


Copy for information & necessary action to:-

1. The Superintending Engineer, NH Circle-I, Public works (Roads) Directorate.
2. The Executive Engineer, NH Div -II, Public works (Roads) Directorate.
3. The Executive Engineer, PIU, Purba Medinipur, WBDWSIP, PHE Dte, Bar Padumbasan (Old Zilla Parishad Office Building), Maniktala, Tamuk, Pura Medinipur, Pin- 721636, West Bengal

**Appendix 13 : NOC for Water Transmission Mains at Railway line crossings and IOCL area: Magrajpur railway crossing NOC**

(b)

**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\\_sdb@gmail.com](mailto:piu_pm_sdb@gmail.com) ;  
[ee\\_piupurmed.adb@whphed.gov.in](mailto:ee_piupurmed.adb@whphed.gov.in)  
Phone - (03228) 266250

---

*Memo No: 217 / EE / PIU / PM* *Dated Tamluk the, 03 / 12 / 2020*  
*Received on 7.11.20*

**To**  
**The Project manager (EM-01)**  
Larsen & Toubro Ltd.

**Sub:** Way leave permission of proposed laying of 1600 mm dia casing pipe at 3.0 m below natural ground level under railway track formation for passing of 1400 mm dia MS carrier pipe water main between **Mast No. TD 15/1 to TD 15/2** in between **Nandakumar & Lavan Satyagraha** Railway Station at TMZ-Digha section at Kharagpur Division of South Eastern Railway by PHE Department, East Medinipur. (ADB aided Project) - Reg. Submission of Guidelines supplied by the South Eastern Railway Authority.

**Ref:** i) Package No-WBDWSIP/DWW/ICB/EM01/2018-19  
ii) LOA No: PMU/WBDWSIP/PHED/124/1205. Dated: 30.12.2019  
iii) No. W/DRG/WL/SER-KGP-2019-10, dt. 03.12.2020 of the Divisional Railway Manger (Engg.), S. E. Railway, Kharagpur.

In reference to the above, forwarding herewith NOC along with guidelines supplied by South Eastern Railway Authority to be strictly maintained before and during laying of pipeline by means of technology as per agreement under railway track as stated.

You are therefore requested to comply above by letter and spirit.

**Encl:** As Stated.

*CM/02*  
*for m/a*  
*7/12/20*

*8/12/20*

**Sd/-**  
**Executive Engineer**  
PIU, PM, WBDWSIP, PHE Dte.  
  
*Dated the, 03 / 12 / 2020*

*Memo No: 217 / 1-4 / EE / PIU / PM*  
**Copy forwarded to:-**  
1. The Superintending Engineer, PIU, PM, WBDWSIP, PHE Dte.  
2. The Executive Engineer-I (M/E), PIU, PM, WBDWSIP, PHE Dte.  
3-4. The Assistant Engineer-I & II, PIU, PM, WBDWSIP, PHE Dte.

**Sd/-**  
**Executive Engineer**  
PIU, PM, WBDWSIP, PHE Dte.  
  
*Dated the, 03 / 12 / 2020*

*Memo No: 217 / 5 / EE / PIU / PM*  
**Copy forwarded to:-**  
1. The Deputy Team Leader, DSISC, East Medinipur, with a request to supervise responsibly above work complying guidelines of Railway Authority to avoid any complicity.

**Sd/-**  
**Executive Engineer**  
PIU, PM, WBDWSIP, PHE Dte.

S.E.Railway

Office of the DRM(Engg.) KGP

Dated: 03.12.2020.

No. W/DRG/WL/SER-KGP-2019-10.

To,

✓ Shri Sagar Bandyopadhyay  
Executive Engineer/PHE Dte.  
PIU,W.B.D.W.S.I.P.Maniktala,  
Old zila parishad Building,Tamluk  
Purba Medinipur,Tamluk-721636.

Sub :- Way leave permission for proposed laying of 1600 mm dia casing pipe at 3.0 m below natural ground level under railway track formation for passing of 1400 mm dia MS carrier pipe water main in between mast No. TD 15/1 to TD 15/2 in between Nandkumar & Lavan Satyagraha railway station of TMZ-DIGHA Section in Kharagpur Division of S E Railway by PHE department, East Medinipur

Ref :- (i) PHE's Online Application ID :SER-KGP-2019-10 dt.03.04.2019.  
(ii) This office ccts no. -W/DRG/WL/SER-KGP-2010-10 dt.04.05.2020  
(iii) PHE letter no. 118/EE/PIU/PM dt.06.07.2020  
(iv) BG. No-1056NDDG00006421 dt.13.08.2020 upto 12.08.2021  
(v) ADFM/KGP Letter no: DAK/BR/Money Receipts/pt Dtd 11.11.2020

In terms of sanctioned drawing vide DRM/Engg/DRG No. 20267/KGP/2020 and detailed Estimate bearing No. 05/WL/DRG/KGP/2020-21 (sanctioned by the competent authority of both side) you have deposited total amount of Rs. 11,37,125/- (Rupees Eleven lakh Thirty seven thousand One hundred Twenty five only) (Rs. 10,52,005/- vide M.R. No. 362022, dt. 16.07.2020 deposited at GRC,S.E.Railway, as you have already deposited P&E charges Rs. 83,116/- vide M.R. No. 354111, dt. 06.09.2019 & Registration charges Rs.2000/- vide MR No. 361509, dt. 24.04.2019 ) towards Railway's supervision charges Rs.2,98,698/-, way leave charges Rs. 6,64,957/- & GST Rs.1,73,460/- for ten years from the year 2020-21 to 2029-30.

The final Way Leave permission is hereby issued in favour of Executive Engineer/PHE Dte, PIU,W.B.D.W.S.I.P.Maniktala, Old zila parishad Building,Tamluk,Purba Medinipur,Tamluk-721636, along with Xerox copy of agreement and original money receipts for Way leave permission for proposed laying of 1600 mm dia casing pipe at 3.0 m below natural ground level under railway track formation for passing of 1400 mm dia MS carrier pipe water main in between mast No. TD 15/1 to TD 15/2 in between Nandkumar & Lavan Satyagraha railway station of TMZ-DIGHA Section in Kharagpur Division of S.E.Railway by PHE department, East Medinipur, The work will have to undertake as per drawing and design completing all the formalities with other departments of railway if due and in presence of railway engineers.

It may please be noted that Rs.2000/- (Two Thousand only) which you have deposited as registration charge has been adjusted in the detailed estimate. In terms of the Agreement & Estimate, an amount of requisite way leave charges, revised as per Railway Board's guide line time to time has to be deposited with the Railway towards the annual Way Leave charges from the year 2030-31 and onwards. In the event of failure to deposit the same, Railway will have full power to suspend the permission and take action accordingly without any notice.

Divisional Railway Manager ( Engg )  
S.E.Railway, Kharagpur.

Copy to :-

- (1) Sr.DFM S.E.Railway/ Kharagpur for information
- (2) Sr. DSTE/CO/KGP, Sr. DEE/G, Sr. DEE/TRD/KGP for information and necessary action (Encl: One copy of approved DRG No.20267/KGP/2020)
- (3) ADEN /TMZ for information and necessary action. (Encl: One copy of approved DRG No.20267/KGP/2020). Receipt of Bank Guarantee to DRM/Engg/KGP to be checked before giving permission of execution of the work at site.
- (4) S.S.E. (Works) TMZ & S.S.E. (P.Way)/Tamluk for information and necessary action.

Divisional Railway Manager ( Engg )  
S.E.Railway, Kharagpur.