

# Updated Environmental Assessment and Review Framework

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Project Number: 42266  
March 2016

## IND: Kolkata Environmental Improvement Investment Program – Project 2

Prepared by the Kolkata Municipal Corporation for Asian Development Bank. This is a revised version of the draft originally posted in May 2012 available on <http://www.adb.org/sites/default/files/project-document/73258/42266-013-ind-earf.pdf>

## CURRENCY EQUIVALENTS

(as of 15 February 2016)

Currency Unit	=	Indian rupee/s (Rs)
Rs1.00	=	\$0.01468
\$1.00	=	Rs68.1092

## ABBREVIATIONS

AAS	–	atomic absorption spectrophotometry
ADB	–	Asian Development Bank
Ag	–	silver
Al	–	aluminum
APHA	–	American Public Health Association
As	–	arsenic
ASI	–	Archaeological Survey Of India
ASTM	–	American Society for Testing and Material
Ba	–	barium
BaP	–	benzopyrene
BIS	–	Bureau of Indian Standard
BPS	–	booster pumping stations
Ca	–	calcium
CBO	–	community-based Organizations
Cd	–	cadmium
Cl	–	chlorides
Cl <sub>2</sub>	–	chloramines
C <sub>6</sub> H <sub>5</sub> OH	–	phenolic compound
C <sub>6</sub> H <sub>6</sub>	–	benzene
CITES	–	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	–	Convention on Migratory Species of Wild Animals
CN	–	cyanide
CO	–	carbon monoxide
CPCB	–	Central Pollution Control Board
Cr(+6)	–	chromium
Cr	–	total chromium
CTE	–	consent to establish
CTO	–	consent to operate
Cu	–	copper
DCF	–	deputy conservator of forests
DFO	–	divisional forest officer
DG	–	diesel generator
DMA	–	district metered area
DMC	–	developing member country
DSC	–	design and supervision consultants
DWF	–	dry weather flows
EA	–	executing agency
EAC	–	environmental appraisal committee
EARF	–	environmental assessment and review framework
EC	–	environmental clearance
EIA	–	environmental impact assessment
EKW	–	East Kolkata Wetlands

EKWMA	– East Kolkata Wetlands Management Authority
EMP	– environmental management plan
F	– fluoride
Fe	– iron
FAM	– facility administration memorandum
FGD	– focus group discussion
GC	– gas chromatography
GIS	– geographical information system
GOI	– Government of India
GOWB	– Government of West Bengal
GRM	– grievance redress mechanism
GRC	– grievance redressal committee
GRWW	– Garden Reach water works
Hg	– mercury
H <sub>2</sub> S	– hydrogen sulfide
HPLC	– high pressure liquid chromatography
ICP	– inductively coupled plasma
IEE	– initial environmental examination
INR	– Indian National Rupee
IS	– Indian Standard
IUCN	– International Union for the Conservation of Nature
KEIP	– Kolkata Environment Improvement Project
KEIIP	– Kolkata Environmental Improvement Investment Program
KMA	– Kolkata Metropolitan Area
KMC	– Kolkata Municipal Corporation
KMDA	– Kolkata Metropolitan Development Authority
KMWSA	– Kolkata Metropolitan Water And Sanitation Authority
LWL	– low water level
MBAS	– methylene blue active substances
Mg	– magnesium
Mn	– manganese
MFF	– multitranché financing facility
MOEFCC	– Ministry of Environment and Forest and Climate Change
Mo	– molybdenum
N	– ammoniacal nitrogen
NEERI	– National Environmental Engineering and Research Institute
NGO	– nongovernmental organization
Ni	– nickel
NIOSH	– National Institute of Occupational Safety and Health
NOC	– No objection certificate
NO <sub>x</sub>	– oxides of nitrogen
NO <sub>2</sub>	– nitrogen dioxide
NO <sub>3</sub>	– nitrate
NRW	– non-revenue water
O & M	– operation and maintenance
O <sub>3</sub>	– ozone
P	– dissolved phosphate
PAH	– polynuclear aromatic hydrocarbons
Pb	– lead
PM <sub>10</sub>	– particulate matter (diameter of 10 microns or less)
PM <sub>2.5</sub>	– particulate matter (diameter of 2.5 microns or less)

PMC	–	project management consultant
PMU	–	project management unit
PPMV	–	parts per Million By Volume
PS	–	pumping station
PST	–	pre-settling tanks
PWD	–	Public Works Department
PWW	–	Palta Water Works
REA	–	rapid environmental assessment
RP	–	resettlement plan
ROW	–	right-of-way
S	–	sulfide
SAR	–	subproject appraisal reports
SCADA	–	supervisory control and data acquisition
S&D	–	sewerage and drainage
SEAC	–	State Environment Assessment Committee
SEIAA	–	State Environmental Impact Assessment Authority
Se	–	selenium
SMU	-	Safeguard Monitoring Unit
SPCB	–	State Pollution Control Board
STP	–	sewage treatment plant
SO <sub>2</sub>	–	sulfur dioxide
SO <sub>4</sub>	–	sulfate
SWF	–	storm water flow
SWM	–	solid waste management
SPS	–	Safeguards Policy Statement
TDS	–	total dissolved solids
TKN	–	total Kjeldahl nitrogen
TOR	–	terms of reference
TSS	–	total suspended solids
UFW	–	unaccounted-for water
UTPCC	–	Union Territory Pollution Control Board
V	–	vanadium
WBPCB	–	West Bengal Pollution Control Board
WBIDCL	–	West Bengal Industrial Development Corporation Limited
WTP	–	water treatment plant
Zn	–	zinc

### WEIGHTS AND MEASURES

m <sup>3</sup> /hr	–	cubic meter per hour
M <sup>3</sup>	–	cubic meter
dB(A)	–	decibel
ft	–	feet
ha	–	hectare
km	–	Kilometer
km <sup>2</sup>	–	square kilometer
kw	–	kilowatt
kVA	–	kilovolt ampere
m	–	meter
m/yr	–	meter per year
mg/m <sup>3</sup>	–	milligram per cubic meter

mg/l	–	milligram per liter
mg/nm <sup>3</sup>	–	milligram per normal cubic meter
microcurie/ml	–	microcurie per milliliter
MLD	–	million liters per day
MW	–	megawatt
NTU	–	nephelometric turbidity unit
ng/m <sup>3</sup>	–	nanogram per cubic meter
ppmv	–	parts per million by volume
W	–	watt
µg/m <sup>3</sup>	–	microgram per cubic meter

## NOTES

- (i) The fiscal year (FY) of the Government of India and its agencies begins on 1 April and ends on 31 March. “FY” before a calendar year denotes the year in which the fiscal year ends, e.g., FY 2015 begins on 1 April 2015 and ends on 31 March 2016.
- (ii) In this report, "\$" refers to US dollars.

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## I. INTRODUCTION

### A. Overview

1. The city of Kolkata is the seventh largest metropolis in India, and had 4.5 million residents in 2011. It is the largest city in the state of West Bengal, and has been the biggest contributor to West Bengal's gross state domestic product. The continuous improvement in the city's urban environment is necessary to increase labor productivity through better health status of the urban population, especially when it has been experiencing lower population growth. There have been, however, geographical disparities in access and quality of the water supply and sewerage services, because the Kolkata Municipal Corporation (KMC), an urban local body with a mandate to provide these services under the KMC Act of 1980, has an aging water supply system, and has inadequate sewer coverage in the city's peripheral areas.<sup>1</sup> The Asian Development Bank (ADB) loans have assisted KMC in the expansion of the sewerage coverage through the Kolkata Environmental Improvement Project<sup>2</sup> (KEIP) since 2000. The Kolkata Environmental Improvement Investment Program<sup>3</sup> (KEIIP) will help KMC not only continue sewer network expansion on a larger scale, but also gradually improve efficiency in water supply operations, which will enable KMC to generate operating surplus for capital investment in water supply and sewerage.

2. On 26 September 2013, ADB approved the provision of loans under a multi-tranche financing facility (MFF) for KEIIP for an aggregate amount not exceeding \$400 million. The impact of KEIIP will be improved access to water supply and sanitation in KMC. The outcome will be improved water supply, sewerage and drainage service quality and operational sustainability in selected areas of KMC. Thus KEIIP has three outputs: (i) inefficient water supply assets rehabilitated; (ii) sewerage extension to peripheral areas continued; and (iii) financial and project management capacity further developed.

3. KMC is KEIIP's executing agency. A project management unit (PMU) created under KMC is implementing KEIIP.

4. The first loan under the MFF, Tranche 1 or Loan 3053-IND, amounting to \$100 million, was approved by ADB on 22 October 2013, signed on 3 March 2014 and made effective on 30 May 2014. Project 1, supported by Tranche 1, included subprojects for improvement of infrastructure, operations and sustainability in sewerage, drainage and water supply in KMC. While Project 2, supported by the Tranche 2, will include physical and non-physical investments in water supply and sanitation improvement in KMC. Project 2 is aligned with improved access to water supply and sanitation in KMC as defined by KEIIP.

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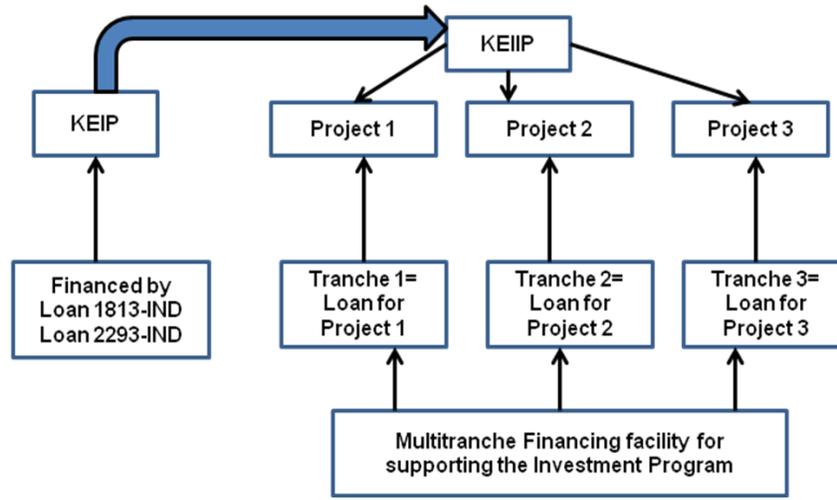
<sup>1</sup> The 1899 Calcutta Municipal Act defined the administrative domain of the municipal authority as covering 25 wards and 48.5 km<sup>2</sup>. Many boundary changes followed, the latest one in January 1984, when Boroughs XI, XII, XIII, XIV, and XV were annexed to KMC. These boroughs are popularly known as the "added areas." Recently The KMC has been further expanded by including Joka area in the southern part of the city creating 3 additional wards under a new Borough XVI..

<sup>2</sup> ADB. 2000. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to India for the Calcutta Environmental Improvement Project*. Manila (Loan 1813-IND, \$250 million, approved on 15 November 2000). The project completion date is 30 June 2012.

ADB 2006. *Report and Recommendation of the President to the Board of Directors: Proposed Supplementary Loan to India for the Kolkata Environmental Improvement Project*. Manila (Loan 2293-IND: \$80 million, approved on 20 November 2006). The project completion date is 30 June 2012.

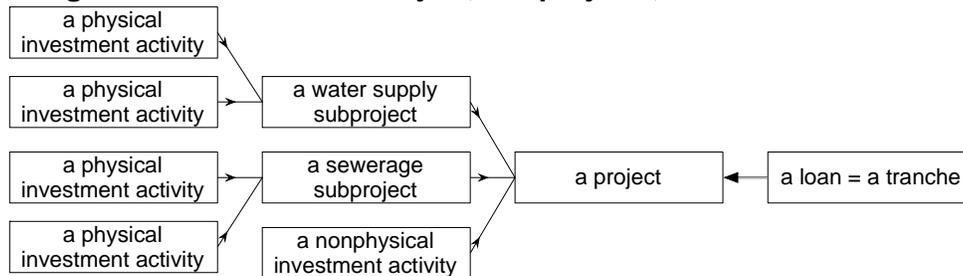
<sup>3</sup> ADB provided project preparatory technical assistance. ADB. 2009. *Technical Assistance to India for Preparing for Kolkata Environmental Improvement Project II*. Manila.

**Figure 1: Relationship between the KEIP and the KEIIP**



5. KEIIP Project 2 will include: (i) water supply, including pumping and transmission system, and (ii) sewerage and drainage (S&D) including dry weather flow (DWF) and storm water flow (SWF) pumping stations and sewage treatment plants (STPs).

**Figure 2: Structure of a Project, Subprojects, and KEIIP Activities**



6. The identified work programs Project 2 under Tranche 2 are listed in Appendix 1 and a detailed description and outputs are given in the following paragraphs.

(i) **Output 1. Inefficient water supply assets rehabilitated, non-revenue water (NRW) reduced and services upgraded.** Project 2, under this output, will assist KMC to:

- (a) Demarcate and hydraulically district metering areas (DMAs) and hydraulically isolate the DMAs, through installation of bulk water meters, procurement of NRW reduction equipment and upgrading of the SCADA, to ensure equitable distribution and reduction in NRW across the overall water supply service area of KMC.
- (b) Upgrade water supply services in Joka and adjoining areas -peripheral areas recently merged into KMC - to deliver a continuous, pressurized supply of safe water to the population. It will include rehabilitation of the existing works; rehabilitation and construction of new transmission mains; construction of new overhead storage tanks and ground level storage

reservoirs; renovation and construction of distribution mains and pipelines; and providing all customers with water connection meters; and

(c) Implementation of performance based water loss/ NRW reduction measures in East Kolkata to provide continuous pressurized supply of safe water, including 20,000 consumer connections and metering, for a population of 200,000 population.

**(ii) Output 2: Sewerage and drainage extension to peripheral areas continued.**

The overall objective of the subprojects is to rehabilitate and expand services in peripheral areas of KMC in South and South Eastern fringes such as Behala, Kasba to upgrade the sanitation status of the areas by collecting and transporting the domestic sewage, to be finally treated and disposed to the existing water bodies as also reducing the water logging problems in the target areas thereby reducing the loss in man hours, loss in properties and improvement in general sanitation of the areas by reduction of the level and duration of the water logging. Construction of a new pumping station in Lalababu Nikashi is expected to provide substantial relief to population in Cossipur area by reduction of chronic water logging problem in the areas.

**(iii) Output 3: Financial and Project Management Capacity Further Developed.**

Under this output, Project 2 will continue to support KMC and the newly established Utility Finance Improvement Unit and Water Loss Management Unit in implementing the policies on NRW reduction, water metering, user charges, and in achieving institutional reforms and full cost recovery of services, and implementing Project 2. Outputs will include (i) training and capacity building of PMU, and (ii) consulting services to engage project management, supervision and design consultants.

7. All subprojects and their components are to comply with relevant safeguard requirements in each loan agreement for the Government of India, the state government of West Bengal, and the Safeguards Policy Statement (SPS), 2009 of ADB as applicable.

8. The provision for the use of frameworks is required for implementation of the investment program under the MFF to guide safeguard assessments in all tranches, as well as in non-sensitive components of each project under the investment program where detailed design takes place. For this purpose, this environmental assessment and review framework (EARF) has been prepared.

**B. Purpose of the EARF**

9. The EARF is a guiding document during implementation. The EARF (i) describes the proposed subprojects; (ii) explains the general anticipated environmental impacts of the subprojects to be financed under the proposed loan; (iii) specifies the requirements that will be followed in relation to subproject screening and categorization, assessment, and planning, including arrangements for meaningful consultation with affected people and other stakeholders and information disclosure requirements and, where applicable, safeguard criteria that are to be used in selecting subprojects and/or components; (iv) assesses the adequacy of the client's capacity to implement national laws and ADB's requirements and identify needs for capacity building; (v) specifies implementation procedures, including the budget, institutional arrangements, and capacity development requirements; (vi) specifies monitoring and reporting requirements; and (vii) describes the responsibilities of the client and of ADB in relation to the

preparation, implementation, and progress review of safeguard documents of subprojects. The subproject selection shall be in accordance with the environmental subproject selection criteria as outlined in this EARF.

10. This EARF is prepared based on (i) ADB's SPS, 2009, and (ii) national and State of West Bengal environmental acts, rules, regulations, and standards. All environmental assessment is required to follow the procedures outlined in this EARF. Any component included in the project shall comply with Government of India environmental requirements and ADB's SPS, 2009. All environmental documents will be endorsed and approved by KMC and cleared by ADB.

11. The EARF ensures that all subprojects under the investment program, throughout the entirety of their project cycle, will not deteriorate or interfere with the environmental sensitivity of a subproject area, but rather improve environmental quality.

### **C. Project Components**

12. The project is categorized as category B in accordance with ADB's SPS, 2009. During project preparation, initial environmental examinations (IEEs) were prepared for the water supply and S&D subprojects, and an environmental audit was conducted on the existing water supply facilities. IEEs concluded that the subprojects will only have small-scale, localized impacts on the environment which are readily mitigated. 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. Mitigation measures and monitoring plans were proposed in the environmental management plan (EMP), which forms part of the IEE.

## **II. ASSESSMENT OF LEGAL FRAMEWORK AND INSTITUTIONAL CAPACITY**

### **A. Environmental Legislations (National and State Laws)**

13. The implementation of the subprojects under the investment program will be governed by the national and State of West Bengal environmental acts, rules, regulations, and standards. These regulations impose restrictions on activities to minimize or mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether national, state, or municipal/local. Compliance is required in all stages of the subprojects' implementation, including design, construction, and operation and maintenance.

14. The following legislations are applicable to the subprojects under the investment program, salient features of which are given in **Appendixes 2–11**:

- (i) Environmental (Protection) Act of 1986, its rules and amendments
- (ii) Environmental Impact Assessment (EIA) Notification of 2006 and 2009
- (iii) Water (Prevention and Control of Pollution) Act of 1974, its rules and amendments
- (iv) Air (Prevention and Control of Pollution) Act of 1981, its rules and amendments
- (v) Central Pollution Control Board (CPCB) Environmental Standards
- (vi) Ancient Monuments and Archaeological Sites and Remains Rules of 1959
- (vii) Wetlands (Conservation and Management) Rules of 2010

- (viii) Hazardous Wastes (Management, Handling and Transboundary Movement) Rules of 2008
- (ix) Noise Pollution (Regulation and Control) Rules of 2000 as amended up to 2011
- (x) National Institute of Occupational Safety and Health Criteria for a recommended standard: occupational noise exposure, NIOSH Publication No. 98-126
- (xi) Indian Standard Drinking Water–Specification, IS 10500, 1991: Bureau of Indian Standards as per revised second revision 2004 and draft revision of 2009
- (xii) West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006
- (xiii) East Kolkata Wetlands (Conservation and Management) Act, 2006
- (xiv) Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989
- (xv) Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended
- (xvi) The Child Labour (Prohibition and Regulation) Act, 1986
- (xvii) Information Required for Irrigation and Waterways Department, Government of West Bengal, for Examining the Availability of Surface Water for the Industrial Project
- (xviii) Direction No. EN/3170/T-IV-7 /001/2009 dated 10 December 2009 of Department of Environment, Government of West Bengal

15. The summary of environmental regulations and mandatory requirements for all subprojects under the investment program is shown in **Table 1**.

**Table 1: Applicable Environmental Regulations**

	<b>Law/Act</b>	<b>Description</b>	<b>Requirement</b>
(i)	Environmental (Protection) Act of 1986, its rules and amendments	This is an umbrella act under which several applicable rules have been framed.	
(ii)	EIA Notification, 2006 and 2009	The EIA Notification of 2006 and 2009 (replacing the EIA Notification of 1994) set out the requirement for environmental assessment in India. This states that environmental clearance is required for certain defined activities/projects, and this must be obtained before any construction work or land preparation (except land acquisition) may commence. Projects are categorized as A or B depending on the scale of the project and the nature of its impacts. Category A projects require environmental clearance from the National Ministry of Environment and Forest (MoEF). Category B projects require environmental clearance from the State Environmental Impact Assessment Authority (SEIAA).	The proposed components of the water supply and S&D subprojects are not listed in the EIA Notification's "Schedule of Projects Requiring Prior Environmental Clearance," and thus environmental clearance is not required for any of the subprojects listed under the EARF.
(iii)	Water (Prevention and Control of	Control of water pollution is achieved through administering	All subprojects involving WTPs and sewerage treatment plants (STPs) will

	<b>Law/Act</b>	<b>Description</b>	<b>Requirement</b>
	Pollution) Act of 1974, its rules and amendments	conditions imposed in consent issued under provision of the Water (Prevention and Control of Pollution) Act of 1974. These conditions regulate the quality and quantity of effluent, the location of discharge, and the frequency of monitoring of effluents. Any component of the investment program having the potential to generate sewage or trade effluent will come under the purview of this act, its rules and amendments. Such projects have to obtain consent to establish (CTE) under Section 25 of the act from WBPCB before starting implementation, and consent to operate (CTO) before commissioning. The Water Act also requires the occupier of such subprojects to take measures for abating the possible pollution of receiving water bodies.	require CTE and CTO from WBPCB. <sup>4</sup>  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> ).
(iv)	Air (Prevention and Control of Pollution) Act of 1981, its rules and amendments	The subprojects having potential to emit air pollutants into the atmosphere have to obtain CTE under Section 21 of the Air (Prevention and Control of Pollution) Act of 1981 from WBPCB before starting implementation, and CTO before commissioning the project. The occupier of the project/facility has the responsibility to adopt necessary air pollution control measures for abating air pollution.	For the subproject, the following will require CTE and CTO from WBPCB: (i) diesel generators, and (ii) hot mix plants, wet mix plants, stone crushers, etc. if installed for construction.  All relevant forms, prescribed fees, and procedures to obtain the CTE and CTO can be found in the WBPCB website ( <a href="http://www.wbpcb.gov.in">www.wbpcb.gov.in</a> ).- Ref. <b>Appendix 2</b> .
(v)	Central Pollution Control Board (CPCB) Environmental Standards	Emissions and discharges from the facilities to be created or refurbished or augmented shall comply with the notified standards notified.	<b>Appendix 3</b> provides applicable standards for ambient air, air emission, effluents, receiving water bodies, and drinking water at the consumer end.
(vi)	Ancient Monuments and Archaeological Sites and Remains Rules of 1959	The rules designate areas within a radius of 100 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	There are no protected properties in the investment program area. However, in case of chance finds, the contractors will be required to follow a protocol as defined in the EMP.

<sup>4</sup> WBPCB has a common CTE and CTO form (Form L) for local authorities, covering all aspects of municipal constructional and operation activities.

	Law/Act	Description	Requirement
		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.	
(vii)	Wetlands (Conservation and Management) Rules, 2010	The rules specify activities which are harmful and prohibited in the wetlands such as industrialization, construction, dumping of untreated waste and effluents, and reclamation. The central government may permit any of the prohibited activities on the recommendation of the Central Wetlands Regulatory Authority.	The subproject is not within the East Kolkata Wetlands, thus no permission from the central government is required.
(viii)	Hazardous Wastes (Management, Handling and Trans-boundary Movement) Rules 2008	According to the rules, hazardous wastes are wastes having constituents specified in Schedule II of the rules if their concentration is equal to or more than the limit indicated in the said schedule (Appendix 5).	If during excavation works, the excavated material is analyzed to be hazardous, they are to be stored and disposed of only in such facilities as may be authorized by the WBPCB for the purpose. The contractors will be required to follow a protocol as defined in the EMP.
(ix)	Noise Pollution (Regulation and Control) Rules of 2000 as amended up to 2011	Rule 3 of the act specifies ambient air quality standards with respect to noise for different areas/zones.	<b>Appendix 3</b> provides applicable noise standards.
(x)	National Institute of Occupational Safety and Health Criteria for a Recommended Standard: Occupational Noise Exposure, NIOSH Publication No. 98-126	NIOSH has laid down criteria for a recommended standard: occupational noise exposure. The standard is a combination of noise exposure levels and duration that no worker exposure shall equal or exceed.	<b>Appendix 4</b> provides applicable NIOSH occupational noise standards.
(xi)	Indian Standard Drinking Water – Specification, IS 10500, 1991: Bureau of Indian Standards as per revised second revision 2004 and draft revision of 2009	Parameters for desirable and permissible concentrations have been indicated.	Supplied water to consumer is required to maintain the standard.
(xii)	West Bengal Trees (Protection and	The act states that those who want to fell trees will have to	Permission from the Divisional Forest Officer (Utilisation Division), Forest

	<b>Law/Act</b>	<b>Description</b>	<b>Requirement</b>
	Conservation in Non-Forest Areas) Act, 2006	obtain permission from the Forest Directorate, Government of West Bengal. Violators (meaning whoever fells or causes to be felled any tree, or cuts, uproots, or otherwise disposes of any fallen tree or contravenes the permission granted) shall be punished with imprisonment up to 1 year or with a fine of Rs.5,000 or both. Also, until plantation of requisite number of trees is undertaken, the violators will be fined Rs.50 for each day of default. In case the development agency or entrepreneur fails to implement the plantation plan, the defaulter might have to face imprisonment of up to 2 years or a fine of up to Rs.10,000 or with both.	Directorate, Government of West Bengal will be required if trees, particularly those looked upon as sacred groves, identified as belonging to an endangered species, or given the status of heritage will be cut/felled.  KMC will have to submit a "Tree Plantation Plan" while they seek approval for a residential/commercial/ industrial project.
(xiii)	East Kolkata Wetlands (Conservation and Management) Act, 2006	On August 2002, 12,500 ha (of the East Kolkata Wetland area was included in the Ramsar List, making it a wetland of international Importance. The Ramsar Convention is playing a vital role by providing certain basic guidelines to draw up suitable plans for the maintenance and sustenance of the wetlands. Among these, the three most important guiding principles are: (i) maintenance of the special characteristics of the ecosystem; (ii) wise use of its resources with an eye towards sustainability; and (iii) economic development for the wetland community. The East Kolkata Wetlands Management Authority (EKWMA) has the power to enforce land use control in the substantially water body-oriented areas and other areas in the East Kolkata Wetlands.	The subproject is not within the East Kolkata Wetlands and no prohibited activities are included in the subprojects; no other activities requiring permission from the central government are planned at present.
(xiv)	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Storage of chlorine (threshold quantity greater than 10 tons but less than 25 tons) in water treatment plants (WTPs) will require clearance from the West Bengal Pollution Control Board (WBPCB).	For subprojects involving WTPs, approval of WPCB is required.
(xv)	Forest (Conservation) Act, 1980 and Forest	As per Rule 6, every user agency that wants to use any forest land for non-forest purposes shall seek	No notified forest land within the subproject areas

	Law/Act	Description	Requirement
	Conservation Rules, 2003 as amended	approval of the central government.	
(xvi)	The Child Labour (Prohibition and Regulation) Act, 1986	No child below 14 years of age will be employed or permitted to work in any of the occupations set forth in the Act's Part A of the Schedule or in any workshop wherein any of the processes set forth in Part B of the Schedule is involved.	No children between the ages of 14 and 18 will work under hazardous conditions.
(xvii)	Information Required for Irrigation and Waterways Department, Government of West Bengal, for Examining the Availability of Surface Water for the Industrial Project	1. The required details for withdrawal of river water for industrial purposes is to be recommended by the WBIDCL. 2. In case of perennial flow such as in the Bhagirathi/Hooghly River system, prior no objection certificate from the Kolkata Port Trust is required before permission is given by the Irrigation and Waterways Department, West Bengal Government. 3. Additional Information is to be furnished to as prescribed pro forma.	No water intake project considered under Tranche 2. No permission is required
(xviii)	Direction No. EN/3170/T-IV-7 /001/2009 dated: 10 December 2009 of Department of Environment, Government of West Bengal	All municipalities, local authorities and all other concerned government departments within the State of West Bengal are to implement norms to be followed by the developers, contractors, or any other infrastructure developers.	The norms include details of preventive measures and practices to be discarded. These measures are aimed towards promoting good construction site management, leading to mitigation of anticipated adverse environmental impacts during general construction activities.

## B. International Environmental Agreements

16. In addition to national and state rules and regulations, international conventions such as the International Union for Conservation of Nature and Natural Resources (IUCN), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Convention on Migratory Species of Wild Animals (CMS), and the Ramsar Convention on Wetlands of International Importance are applicable for selection and screening of subprojects under restricted/sensitive areas. India is a party to these conventions.

17. **International Union for Conservation of Nature (IUCN).** The IUCN Red List of threatened species (also known as the IUCN red list or red data list), founded in 1963, is a comprehensive inventory of the global conservation status of plant and animal species. A series of regional red lists are produced by countries or organizations, which assess the risk of extinction to species within a political management unit. The IUCN red list is set upon precise criteria to evaluate the extinction risk of thousands of species and subspecies. These criteria are

relevant to all species and all regions of the world. The aim is to convey the urgency of conservation issues to the public and policy makers, as well as to help the international community reduce species extinction.

18. **Convention on Migratory Species of Wild Animals (CMS).** CMS was adopted in 1979 and came into force in 1983. CMS, also known as the Bonn Convention, recognizes that states must be the protectors of migratory species that live within or pass through their national jurisdictions, and aims to conserve terrestrial, marine, and avian migratory species throughout their ranges. Migratory species threatened with extinction are listed in Annex I of the convention. CMS parties strive towards strictly protecting these species, conserving or restoring the places where they live, mitigating obstacles to migration, and controlling other factors that might endanger them. Migratory species that need or would significantly benefit from international cooperation and CMS encourages the states to conclude global or regional agreements.

19. **Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).** This is an international agreement between governments that aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. CITES was first formed in the 1960s. Annually, the international wildlife trade is estimated to be worth billions of dollars and to include hundreds of millions of plant and animal specimens. The trade is diverse, ranging from live animals and plants to a vast array of wildlife products derived from them, including food products, exotic leather goods, wooden musical instruments, timber, tourist curios, and medicines. Levels of exploitation of some animal and plant species are high, and their trade, together with other factors such as habitat loss, is capable of heavily depleting their populations and even bringing some species close to extinction.

20. **Ramsar Convention on Wetlands of International Importance, 1971.** The Convention on Wetlands of International Importance is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. According to the Ramsar List of Wetlands of International Importance, there are 25 designated wetlands in India which must be protected. The East Kolkata Wetlands (EKW) were designated a "wetland of international importance" under the Ramsar Convention on August 19, 2002. Activities undertaken in the proximity of EKW shall follow the guidelines of the convention, provisions of the Wetlands (Conservation and Management) Rules, 2010 and East Kolkata Wetlands (Conservation and Management) Act, 2006.

### C. Summary

21. A summary of government and state environmental compliance requirements applicable to the investment program is presented in the **Table 2**.

**Table 2: Action Required Ensuring Subproject Compliance with National and State Environmental Laws and Regulations**

Component Applicable	Legislation	Compliance	Action Required	Authorizing Body
1. All subprojects	EIA Notification of 2006 and 2009 (replacing the EIA Notification of	Environmental clearance is required for certain defined activities/projects, and this must be	To check if the subprojects are included in the list of prescribed activity/activities, and if yes, to determine the category (A or B) based on the prescribed criteria	For category A project, from MOEFCC, GOI; for category B project, from

Component Applicable	Legislation	Compliance	Action Required	Authorizing Body
	1994)	obtained before any construction work or land preparation (except land acquisition) may commence.		state-level expert appraisal committee
	West Bengal Trees (Protection and Conservation in Non-Forest Areas) Rules, 2007	If tree cutting is required, application is to be made and permission obtained before felling of trees from divisional forest officer (Utilisation Division), Forest Division, Government of West Bengal, Kolkata	Submission of Application in Form I (B) ( <a href="http://www.westbengalforest.gov.in">http://www.westbengalforest.gov.in</a> )	Divisional forest officer (Utilisation Division), Forest Division, Government of West Bengal, Kolkata
	Central Pollution Control Board (CPCB) Environmental Standards	Environmental standards related to air emission, effluent, and noise	Adherence to the prescribed standards is made through CTO and CTE.	West Bengal Pollution Control Board
	Ancient Monuments and Archaeological Sites and Remains Rules of 1959	To report chance findings of archaeological material at work sites	To inform the State Archaeological Directorate/Archaeological Survey of India and take actions as per their directives	State Archaeological Directorate/ Archaeological Survey of India
	Wetlands (Conservation and Management) Rules, 2010 and East Kolkata Wetlands (Conservation and Management) Act, 2006	Subproject areas should not be located in notified wetland areas. No prohibited activities should be carried out without authorization. Regulated activities to be done only with authorization	To design avoiding prohibited or regulated activities. If this is not possible take appropriate authorization before construction.	Central Wetland Authority of MOEFCC, GOI for prohibited activities  Government of West Bengal for regulated activities
	Hazardous Wastes (Management, Handling and Trans-boundary	Excess excavated material from construction sites to be tested for selected	If the concentration of analyzed parameters exceeds the prescribed limits, the wastes are to be disposed of in consultation with regulatory authority at approved sites.	West Bengal Pollution Control Board

Component Applicable	Legislation	Compliance	Action Required	Authorizing Body
	Movement) Rules 2008	parameters from the prescribed lists		
	Noise Pollution (Regulation and Control) Rules of 2000 as amended up to 2011	Noise level should not exceed the prescribed increased limit over the ambient noise level at the periphery of the construction sites.	If exceeded, necessary mitigation measures should be adopted.	There is no exemption to this rule.
	National Institute of Occupational Safety and Health Criteria for a Recommended Standard: Occupational Noise Exposure, NIOSH Publication No. 98-126	No worker exposure shall equal or exceed the prescribed combination of noise exposure levels and duration in the zone of noise-producing areas of construction and operation.	To regulate duty hours of workmen for compliance	There is no exemption or authorization of exemption.
	Manufacture, Storage, and Import of Hazardous Chemical Rules, 1989	Storage of chlorine (threshold quantity greater than 10 tons but less than 25 tons) in water treatment plants (WTPs) will require authorization.	To identify major accident hazards and steps for their prevention, prepare on-site emergency plan, inform all persons liable to be affected, and seek authorization with the reports.	WBPCB
2. Water treatment plant	Water (Prevention and Control of Pollution) Act of 1974, its rules, and amendments	CTE and CTO	Application in Form L of WBPCB gives the subproject details. Based on project review and site inspection, WBPCB provides CTE before construction, and stipulates the disposal standards to be met during operation. After completion of construction, CTO is issued confirming compliance with the CTE conditions, if any. Renewal of CTO during operation of STP and WTP is based on the performance of the STP, WTP and compliance with the disposal standards. CTO is renewed every year.	WBPCB
	Manufacture,	Storage of	To identify major accident hazards	WBPCB

Component Applicable	Legislation	Compliance	Action Required	Authorizing Body
	Storage, and Import of Hazardous Chemical Rules, 1989	chlorine (threshold quantity greater than 10 tons but less than 25 tons) in water treatment plants (WTPs) will require authorization.	and steps for their prevention, prepare on-site emergency plan, inform all persons liable to be affected, and seek authorization with the reports.	
	Central Pollution Control Board (CPCB) Environmental Standards	Environmental standards related to air emission, effluent, and noise	Adherence to the prescribed standards are made through CTO and CTE.	West Bengal Pollution Control Board
3. Sewerage treatment plant	Water (Prevention and Control of Pollution) Act of 1974, its rules, and amendments	CTE and CTO from WBPCB	Application in Form L of WBPCB gives the subproject details. Based on project review and site inspection WBPCB, provides CTE before construction, and stipulates the disposal standards to be met during operation. After completion of construction, CTO is issued confirming compliance with the CTE conditions, if any. Renewal of CTO during operation of STP and WTP is based on the performance of the STP, WTP and compliance with the disposal standards. CTO is renewed every year.	
	Central Pollution Control Board (CPCB) Environmental Standards	To comply with the effluent quality authorized under CTO/CTE	To monitor and report treated effluent quality each month for continued operation	West Bengal Pollution Control Board
3. Diesel generators	Air (Prevention and Control of Pollution) Act 1981	CTE and CTO from WBPCB	Application in Form L of WBPCB gives details of capacity, fuel type, stack details, and noise pollution control measures in place, including details of acoustic enclosure/exhaust muffler if required. CTO renewal every year is based on performance.	West Bengal Pollution Control Board
	Rule 3 of the act specifies ambient air quality standards with respect to noise for different	Noise level should not exceed the prescribed limit over the ambient noise level at the periphery of the	If exceeded, necessary mitigation measures should be adopted.	There is no exemption to this rule.

Component Applicable	Legislation	Compliance	Action Required	Authorizing Body
	areas/zones.	construction sites.		

WBPCB – West Bengal Pollution Control Board; CTE – consent to establish; CTO – consent to operate; STP – sewage treatment plant; WTP – water treatment plant; East Kolkata Wetlands Management Authority - EKWMA

#### **D. Assessment of Institutional Capacity**

22. KMC is responsible for the preparation of each subproject environmental assessment report and monitoring of safeguards issues. KMC have successfully ensured the environmental management and monitoring under ongoing KEIIP Tranche 1. Environment Specialist in the PMU is presently acting as environmental coordinators. Basic environmental monitoring and reporting are carried out in the KEIIP through the DSC. Environmental safeguard obligations are now satisfactorily met with the above arrangement, and the institutional capacity is adequate.

23. The executing and implementing agencies of the investment program, however, will require further capacity building measures (i) for a better understanding of the project-related environmental issues, and (ii) to strengthen their role in implementation of mitigation measures and subsequent monitoring. Training programs are included in the investment program. The primary focus of the training is to enable staff to conduct impact assessments, carry out environmental monitoring, and implement the EMP. After participating in such training, the participants shall be able to make environmental assessments for subsequent subprojects, conduct monitoring of environmental plans, understand government and ADB requirements for environmental assessment, management, and monitoring (short and long term), incorporate environmental features into future subproject designs, specifications, and tender/contract documents, and carry out necessary checks and balances during project implementation.

### **III. ANTICIPATED ENVIRONMENTAL IMPACTS**

24. Preliminary lists of subprojects have been identified, and environmental impacts during design, pre-construction, construction, and operation will be reviewed and assessed for each subproject. During subproject construction and implementation, impacts on the physical environment (such as water, air, soil, and noise), on the biological environment (like flora and fauna), and on the socioeconomic environment will be carefully assessed by the project environmental specialists.

25. As the subprojects will be of small scale and often involve improvement or rehabilitation of the existing system and facilities, it is anticipated that impacts will be temporary and of short duration. In such cases, mitigation measures i.e. control of air, dust pollution, checking of water and noise pollution, and protection of biological environment, can address adverse impacts. Other measures such as preparation and implementation of traffic management plans during pipe-laying shall also be done in coordination with the consultant teams, local police, contractors, and the public. Safety measures, both occupational and covering health and hygienic conditions, including careful handling of public utilities along with social aspects, will be considered, and impacts and mitigation measures will be elaborated on in the EMPs.

26. Anticipated environmental impacts for the assessed subproject are provided in the IEE report. For subsequent subprojects to be funded by the investment program, anticipated impacts during design, construction, and operation are identified in **Table 3**.

**Table 3: Anticipated Environmental Impacts Due to Project Implementation**

Impact Field	Anticipated Impact on the Environment
<b>Design Phase</b>	
Environmental clearances	Environmental clearances, consents, and permits are required (Table 2) in order to implement the project. A land allotment letter, if required, is of prime interest. If not pursued on a timely basis, this can delay the project. Necessary environmental clearances and permits have to be obtained and follow the guidelines issued by the authorities.
Utilities	Telephone lines, electric poles and wires, and water pipes (old) existing within right-of-way (ROW) require shifting without disruption of services.
Water supply	Health risk due to temporary closure of existing water supply
Social and cultural resources	Ground disturbance can uncover and damage archaeological and historical remains. Access to sites of cultural/religious importance may be affected during civil construction (especially during pipe-laying works).
Construction work camps, hot mix plants, stockpile areas, storage areas, and disposal areas	Locations may cause encroachment/impact either directly or indirectly on adjacent environments. It may also include the impacts on the people who might lose their homes or livelihoods due to the subproject activities.
Traffic	Traffic flow will be disrupted if routes for delivery of construction materials and temporary blockages during construction activities are not planned and coordinated.
Land for WTP/STP	Conversion of present land use to proposed land use, if not pursued on a timely basis, can delay the project.
<b>Construction Phase</b>	
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.
Air quality	Emissions from construction vehicles, equipment, and machinery used for excavation and construction result in dust and increase in concentration of vehicle-related pollutants such as carbon monoxide, sulfur oxides, particulate matter, nitrous oxides, and hydrocarbons. Sensitive receptors (e.g. hospitals, schools, churches) may be affected temporarily by increased traffic and related impacts during the construction phase (from the proposed detour). Fugitive dust can also impact on roadside air quality during construction. Exhaust fumes from construction machinery, and potential smoke from cooking fires Burning of waste and cleared vegetation Odors from use of toilet "facilities" other than provided facilities
Geology and soil	Strong water flows into open excavations below the water table will occur, causing micro-tunnel collapse. Layers of mixed fill cover natural ground surface in many places. Contamination from spillage of petroleum products, spent engine oil, and oil leaks from construction vehicle maintenance taking place on site
Drainage and hydrology	The proposed development is situated within an existing built-up area where the water supply infrastructures already exist. Due to the nature and locality of the subproject, there is unlikely to be any significant impacts on water resources within the immediate area.
Surface water quality	Mobilization of settled silt materials, run-off from stockpiled materials, and

Impact Field	Anticipated Impact on the Environment
	chemical contamination from fuels and lubricants during construction works can contaminate downstream surface water quality.
Noise and vibration	Sensitive receptors (hospitals, schools, churches) may be affected temporarily by increased traffic and related impacts. Use of heavy vehicles and equipment may generate high levels of noise. Vibrations resulting from blasting, bulk earthworks, micro-tunneling, and compaction may create significant disturbances to nearby people and businesses. Disturbance from afterhours work
Biodiversity, fauna and flora	The proposed development is situated within an existing built-up area where the water supply infrastructures already exist. No areas of ecological diversity occur within the subproject location. Due to the nature and locality of the subproject, there is unlikely to be any significant impacts on biodiversity within the area. The pipe-laying for the transmission mains may, however, affect existing roadside trees.
Ecological resources	Felling of the trees affects terrestrial ecological balance and terrestrial and aquatic fauna/wildlife.
Existing infrastructure and facilities	There is likely to be temporary disruption of infrastructure and services during the pipe-laying of the transmission mains. There are a number of existing infrastructure and services (roads, railway lines, telecommunication lines, power lines and various pipelines) within the vicinity of the subproject.
Aesthetics, landscape character, and sense of place	The presence of heavy duty vehicles and equipment, temporary structures at construction camps, and stockpiles may result in impacts on aesthetics and landscape character.
Accessibility	Due to the location and nature of the subproject, there will be interference with access. Existing public transport facilities and operations will be affected by the road closure and detours. Shops and establishments are located along the transmission mains alignment, and will therefore need to be relocated during construction. This may impact on livelihoods. There will be disruptions to health services, education services, local businesses, transport services, and pedestrian movements due to traffic and construction related noise, visual, and air pollution.
Traffic	Increased volume of construction vehicles on the roads may lead to increased wear and tear of roads in the vicinity of the subproject site. Road safety concerns due to slow moving construction vehicles Traffic flow within the vicinity will be affected. The temporary road closure will result in a decrease in overall network performance in terms of queuing delay and travel times/speeds. The road closure will impact on public transport operations and routing. On-street parking and loading bays will be affected by the proposed road closure. Pedestrian movements will be affected by the road closure.
Socioeconomic – income	Impede the access of residents and customers to nearby shops. Shops may lose business temporarily.
Occupational health and safety	There is danger of construction-related injuries. Open fires in construction camp can result in accidents. Safety of workers and general public must be ensured. Poor waste management practices and unhygienic conditions at temporary ablution facilities can breed diseases. Standing water due to inadequate storm water drainage systems and

Impact Field	Anticipated Impact on the Environment
	<p>inadequate waste management practices pose a health hazard, providing breeding grounds for disease vectors such as mosquitoes, flies, and snails.</p> <p>The use of hazardous chemicals in the micro-tunneling and restoration of roads can pose potential environmental, health, and safety risks.</p> <p>Road safety may be affected during construction, especially when traffic is detoured.</p>
Workers' conduct	Construction workers on site disrupting adjacent land uses by creating noise, generating litter, and possible loitering
Employment generation	<p>The subproject will provide employment opportunities for local people during construction.</p> <p>Expectations regarding new employment will be high, especially among the unemployed individuals in the area.</p> <p>Labor gathering at the site for work can be a safety and security issue, and must be avoided.</p> <p>The training of unskilled or previously unemployed persons will add to the skills base of the area.</p>
Community health and safety	Community hazards can arise during construction (e.g., open trenches, air quality, noise, falling objects, etc.). Trenching on concrete roads using pneumatic drills will cause noise and air pollution. Traffic accidents and vehicle collision with pedestrians may happen during material and waste transportation.
Construction waste	Trenching will produce additional amounts of waste soil. Also, accumulation of debris waste materials and stockpiling can cause environmental visual pollution.
Work camps	Temporary air and noise pollution comes from machine operation, water pollution from storage and use of fuels, oils, solvents, and lubricants. This may cause conflict with residents and problem of waste disposal and disruptions to residents.
Social and cultural resources	The proposed development will not require demolition of ASI- or state-protected monuments and buildings; however there is risk of archaeological chance finds. Sites of social/cultural importance (schools, hospitals, religious place, tourism sites) may be disturbed by noise, dust, vibration, and impeded access.
Clean-up operations, restoration and rehabilitation	Impacts on social or sensitive receptors when post-construction requirements are not undertaken, e.g. proper closure of camp, disposal of solid waste, and restoration of land after subproject construction
<b>Operation and Maintenance Phase</b>	
General maintenance	Maintenance activities may cause disturbance to sensitive receptors, dust, and increase in noise level.
Air quality	Sensitive receptors (e.g. hospitals, schools, churches) may be affected temporarily by increased traffic and related impacts during transmission mains and distribution network maintenance.
Biodiversity, fauna and flora	<p>The proposed development is situated within an existing built-up area where the water supply infrastructures already exist. No areas of ecological diversity are within the subproject location. Due to the nature and locality of the subproject, there is unlikely to be any significant impacts on biodiversity within the area during maintenance work.</p> <p>The use of fertilizers and herbicides in the maintenance of newly planted trees, landscape and vegetation may, however, affect the environment.</p>
Land uses	<p>Due to the location and nature of the subproject, there will be interference with access during maintenance works.</p> <p>Existing public transport facilities and operations will be affected by the road closure and detours.</p>

Impact Field	Anticipated Impact on the Environment
	There will be disruptions to health services, education services, local businesses, transport services, and pedestrian movements due to traffic and maintenance-related noise, visual, and air pollution.
Health and safety	There is danger of operations and maintenance-related injuries. Safety of workers and general public must be ensured. Poor waste management practices and unhygienic conditions at the improved facilities can breed diseases. Standing water due to inadequate storm water drainage systems and inadequate waste management practices pose a health hazard, providing breeding grounds for disease vectors such as mosquitoes, flies, and snails. The use of hazardous chemicals in the WTPs can pose potential environmental, health, and safety risks.
Noise and vibrations	Sensitive receptors (hospitals, schools, churches) may be affected temporarily by increased traffic and related impacts. Disturbance from afterhours work
Workers' conduct	Maintenance workers on site disrupting adjacent land uses by creating noise, generating litter, and possible loitering
Solid waste	Solid waste residuals which may be generated by the WTPs and STPs include process residuals, used filtration membranes, spent media, and miscellaneous wastes. Process residuals primarily consist of settled suspended solids from source water and chemicals added in the treatment process.
Wastewater	Wastewater from the WTPs and STPs include filter backwash and supernatant liquid from the sludge beds/ponds. These waste streams may contain suspended solids and organics from the raw water, dissolved solids, high or low pH, heavy metals, etc.
Hazardous chemicals	Water treatment involves the use of chemicals for coagulation, disinfection, and water conditioning.
Economic development	Impediments to residents and businesses during routine maintenance

#### IV. ENVIRONMENTAL ASSESSMENT FOR SUBPROJECTS AND/OR COMPONENTS

##### A. Environmental Criteria for Subproject Selection

27. Based on the preliminary studies conducted during the project preparation stage and the environmental assessment conducted for the sample subproject, the investment program is classed as category B and unlikely to require EIA for any subproject in accordance with the national environmental assessment regulation. However, the EARF recognizes the possibility of category A subprojects for the following reasons:

- (i) the locations, descriptions, and scope of future subprojects are unknown; and
- (ii) pipes are crossing or adjacent to sensitive areas.

28. Subprojects that would directly affect the core and buffer zones of national reserves, protected areas, wetlands, and highly valued cultural property shall be strictly avoided, the subproject components causing potential impacts relocated, or suitable alternatives found.

29. Improvements in the domestic water supply give rise to greater quantities of waste water. With the current emphasis on environmental health and water pollution issues, there is an increasing awareness of the need to dispose of these waste waters safely and beneficially. KMC shall require end users to connect to the sewerage system.

30. For completeness, additional criteria<sup>5</sup> that prohibit inclusion of activities as follows:
- (i) production or activities involving harmful or exploitative forms of forced labour<sup>6</sup> or child labour<sup>7</sup>;
  - (ii) production of or trade in any product or activity deemed illegal under host country laws or regulations or international conventions and agreements or subject to international phase-out or bans, such as (a) pharmaceuticals<sup>8</sup>, pesticides, and herbicides<sup>9</sup>; (b) ozone-depleting substances<sup>10</sup>; (c) polychlorinated biphenyls<sup>11</sup> and other hazardous chemicals<sup>12</sup>; (d) wildlife or wildlife products regulated under the CITES; and (e) transboundary trade in waste or waste products<sup>13</sup>;
  - (iii) production of or trade in weapons and munitions, including paramilitary materials;
  - (iv) production of or trade in alcoholic beverages, excluding beer and wine<sup>14</sup>;
  - (v) production of or trade in tobacco<sup>13</sup>;
  - (vi) gambling, casinos, and equivalent enterprises<sup>13</sup>;
  - (vii) production of or trade in radioactive materials,<sup>15</sup> including nuclear reactors and components thereof;
  - (viii) production of, trade in, or use of unbonded asbestos fibers<sup>16</sup>;
  - (ix) commercial logging operations or the purchase of logging equipment for use in primary tropical moist forests or old-growth forests; and
  - (x) marine and coastal fishing practices, such as large-scale pelagic drift net fishing and fine mesh net fishing, harmful to vulnerable and protected species in large numbers and damaging to marine biodiversity and habitats.

31. Therefore, the subprojects are not anticipated to have significant environmental impacts. Subprojects will be primarily designed to improve public and environmental health and quality of life for both poor and non-poor residents. Guidelines for subproject selection in **Table 4** provide further guidance to avoid or minimize adverse impacts during the identification and finalization of subprojects.

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<sup>5</sup> Adapted from ADB SPS, 2009 Appendix 5.

<sup>6</sup> Forced labor means all work or services not voluntarily performed, that is, extracted from individuals under threat of force or penalty.

<sup>7</sup> Child labor means the employment of children whose age is below the host country's statutory minimum age of employment or employment of children in contravention of International Labor Organization Convention No. 138 "Minimum Age Convention" ([www.ilo.org](http://www.ilo.org)).

<sup>8</sup> A list of pharmaceutical products subject to phase-outs or bans is available at <http://www.who.int>.

<sup>9</sup> A list of pesticides and herbicides subject to phase-outs or bans is available at <http://www.pic.int>.

<sup>10</sup> A list of the chemical compounds that react with and deplete stratospheric ozone resulting in the widely publicized ozone holes is listed in the Montreal Protocol, together with target reduction and phase-out dates. Information is available at <http://www.unep.org/ozone/montreal.shtml>.

<sup>11</sup> A group of highly toxic chemicals, polychlorinated biphenyls, are likely to be found in oil-filled electrical transformers, capacitors, and switchgear dating from 1950 to 1985.

<sup>12</sup> A list of hazardous chemicals is available at <http://www.pic.int>.

<sup>13</sup> As defined by the Basel Convention; see <http://www.basel.int>.

<sup>14</sup> This does not apply to project sponsors who are not substantially involved in these activities. Not substantially involved means that the activity concerned is ancillary to a project sponsor's primary operations.

<sup>15</sup> This does not apply to the purchase of medical equipment, quality control (measurement) equipment, and any equipment for which ADB considers the radioactive source to be trivial and adequately shielded.

<sup>16</sup> This does not apply to the purchase and use of bonded asbestos cement sheeting where the asbestos content is less than 20%.

**Table 4: Environmental Criteria for Subproject Selection**

	<b>Components</b>	<b>Environmental Selection Guidelines</b>	<b>Remarks</b>
1.	Overall selection guideline (applicable to all components)	Comply with all requirements of relevant national, state, and local laws, rules, and guidelines.	See Section II of this EARF
		Site selection process shall avoid land acquisition and involuntary resettlement where possible, including impacts on vulnerable persons and indigenous peoples.	See resettlement framework and indigenous peoples planning framework.
		Site selection shall avoid where possible locations in protected areas, including notified reserved forests or biodiversity conservation hotspots (wetlands, national reserves, forest reserves, and sanctuaries).	Approval from concerned authority if unavoidable
		Subproject location shall not result in destruction/disturbance to historical and cultural places/values.	
		The subproject shall avoid where possible, and minimize to extent feasible, facilities in locations with social conflicts.	
		The subproject shall avoid where possible tree cutting, and if any trees have to be removed, shall plant two new trees for every one that is lost.	Approval from Forest Department
		The subproject shall retain mature roadside trees which are important/valuable or historically significant. If any trees have to be removed, the subproject shall plant two new trees for every one that is lost.	
		Avoid involuntary resettlement by prioritizing rehabilitation over new construction, using vacant government land where possible, and taking all possible measures in design and selection of site or alignment to avoid resettlement impacts.	
		Designs must be consistent with ADB SPS, 2009 and follow the resettlement framework prepared for the project and agreed on by the government and ADB.	See resettlement framework
	The subproject shall reflect inputs from public consultation and disclosure for site selection.		
2.	Water supply	Comply with all requirements of relevant national law.	See Section II of this EARF
		Locate all new facilities/buildings at least 50 m from houses, shops, or any other premises used by people, thus establishing a buffer zone to reduce the effects of noise and dust and the visual appearance of the site.	Distance restriction may be reviewed depending on site availability and buffer zone planning.
		Locate all new facilities/buildings at sites where there is no risk of flooding or other hazards that might impair functioning of or present a risk of damage to existing water treatment plants, reservoirs, or its environs.	
		Consult the Department of Archaeology regarding the archaeological potential of proposed sites of buildings, primary mains, and distribution network to ensure that these are	

	Components	Environmental Selection Guidelines	Remarks
		located in areas where there is a low risk of chance finds.	
		Avoid all usage of pipes that are manufactured from asbestos concrete.	
		Locate pipelines within road right of way (ROW) as far as possible, to reduce the acquisition of new land.	
		Ensure that pipeline routes do not require the acquisition of land from private owners in amounts that are a significant proportion of their total land holding (>10%).	
		Ensure that communities who relinquish land needed for pipelines or other facilities are provided with an improved water supply as part of the scheme.	
3.	Sewerage and drainage	Comply with all requirements of relevant national and state law, including the Water (Prevention and Control of Pollution) Act 1974	
		Locate STP preferably 250 m from any inhabited areas, in locations where no urban expansion is expected in the next 20 years, so that people are not affected by odor or other nuisance from the plant	Distance restriction may be reviewed depending on the technology adopted for the treatment of waste water, site plant availability, and buffer zone planning
		Locate STP at sites where there is a suitable means of disposal for the treated wastewater effluent (e.g. into a natural water course or SWF canal).	
		Locate STP at sites where there is no risk of flooding or other hazards that might impair functioning of the plant and present a risk of damage to the plant or its environs.	Flood statistics data of the investment program area needs to be reviewed.
		Subproject will be implemented only with consent of State Pollution Control Board.	
		Consult relevant records of national and/or local archaeological agencies regarding the archaeological potential of proposed sites of STP, pumping stations, and main sewers, to ensure that these are located in areas where there is a low risk of chance finds.	
		Locate sewage pipelines within the ROW of roads to eliminate acquisition of new land.	
		Avoid locating sewage pumping stations and wet wells within 50 m of any inhabited areas, and within 100 m of sensitive sites such as hospitals, schools, temples, etc. to minimize nuisance impacts from odor, rodents, etc.	Distance restriction may be reviewed depending on the technology adopted, suitable land availability, and buffer zone planning
		Include measures to ensure the safe disposal of sewage sludge without causing an environmental hazard, and if possible to promote its safe and beneficial use as an agricultural fertilizer.	

## **B. Environmental Assessment Procedures for Subprojects**

### **1. Screening and Classification/Categorization**

32. As soon as sufficient information on a subproject is available, DSC will conduct screening to determine the work's environmental category by completing ADB's rapid environmental assessment (REA) checklist in **Appendix 12** and submitting this to the PMU for review.

33. PMU will submit completed REA checklist to ADB for review. To ensure that the project meets ADB's environmental safeguard requirements, as stipulated in the SPS 2009, subprojects will be screened, and the level of environmental assessment required (EIA/IEE) will be determined. It is anticipated that most eligible subprojects will fall into either category B or C, as subprojects will be of small scale and often involve improvement or rehabilitation of the existing system/facilities. While category C subprojects will not require an environmental assessment, environmental implications will be reviewed.

### **2. Preparation of Environmental Assessment Report**

34. Environmental assessment documents prepared under the investment program shall, to the extent possible, meet both ADB and Government of India requirements in order to streamline the environmental procedures required by both ADB and government.

35. For subprojects projected to have potentially significant adverse environmental impacts (categorized as A), an EIA will be prepared. For subprojects with some adverse environmental impacts, but which are expected to be less significant than those of category A projects, an IEE is required. Appendix 1 of ADB's SPS, 2009 provides the specific outlines and contents to be followed while preparing EIAs/IEEs. **Appendix 13** provides the outline of an ADB EIA or IEE report. Also, the IEEs prepared during project preparation provide good samples which can be followed for preparation of environmental assessments in subsequent tranches.

36. For preparing the EIA and IEE, relevant primary data will be generated and secondary data collected for subproject-influenced sites. An assessment of project impacts and risks on biodiversity and natural resources will also be undertaken. Issues regarding natural and critical habitats will be covered in the EIA/IEE report. In case of subprojects located within buffer zones of protected areas or adjacent to/within the EKW, a review of management plans and consultation with concerned management staff of the protected area, local communities, and key stakeholders will be undertaken and reflected in EIA/IEE report. Pollution prevention for conservation of resources, particularly technology for management of process wastes, will be addressed in the EIA/IEE report. Occupational and community health safety will be properly addressed in the EMP section of the EIA/IEE report. In case subprojects are likely to have adverse impacts on physical cultural resources, appropriate mitigation measures will to be planned and reflected in the EIA/IEE. EIA/IEE will also reflect a meaningful consultation and disclosure process with provision of a grievance redress mechanism.

37. ADB requires that an EMP must be developed as part of the EIAs/IEEs. EMPs describe the environmental management measures that will be carried out to mitigate negative impacts or enhance the environment during implementation of a project, and the environmental monitoring to be conducted to ensure that mitigation is provided and is effective in reducing impacts, or to determine the long-term impacts of a project. EMPs shall outline specific mitigation measures, environmental monitoring requirements, and related institutional

arrangements, including budget requirements for implementation. Where impacts and risks cannot be avoided or prevented, mitigation measures and actions will be identified so that the project is designed, constructed, and operated in compliance with applicable laws and regulations, and meets the requirements specified in this document. The level of detail and complexity of the environmental planning documents and the priority of the identified measures and actions will be commensurate with the project's impacts and risks. Key considerations include mitigation of potential adverse impacts to the level of "no significant harm to third parties," the polluter pays principle, the precautionary approach, and adaptive management. A generic matrix for the EMP is in **Appendix 14**.

38. If some residual impacts are likely to remain significant after mitigation, the EMP will also include appropriate compensatory measures (offset) that aim to ensure that the project does not cause significant net degradation to the environment. Such measures may relate, for instance, to conservation of habitat and biodiversity, preservation of ambient conditions, and greenhouse gas emissions. Monetary compensation in lieu of offset is acceptable in exceptional circumstances, provided that the compensation is used to provide environmental benefits of the same nature and is commensurate with the project's residual impact.

39. All EIAs/IEEs and EMPs will be conducted prior to the award of construction contracts. The bid documents will include the requirement to incorporate necessary resources to implement the EMP. The EMP will form part of the contract document, and, if required will need to be further updated during the construction phase of a subproject.

## **V. CONSULTATION, INFORMATION DISCLOSURE, AND GRIEVANCE REDRESS MECHANISM**

### **A. Public Consultation and Information Disclosure**

40. The public participation process includes (i) identifying interested and affected people (stakeholders); (ii) informing and providing the stakeholders with sufficient background and technical information regarding the proposed development; (iii) creating opportunities and mechanisms whereby they can participate and raise their viewpoints (issues, comments, and concerns) with regard to the proposed development; (iv) giving the stakeholders feedback on process findings and recommendations; and (v) ensuring compliance to process requirements with regards to the environmental and related legislation.

41. The primary stakeholders are: (i) local residents, shopkeepers, and businesspeople who live and work alongside the roads where pipeline will be laid and facilities will be provided; and (ii) custodians and users of socially and culturally important buildings in affected areas.

42. The secondary stakeholders are: (i) KMC as the executing agency; (ii) KEIIP officials as implementation agency; (iii) WBPCB, government department (like Environment Department, Government of West Bengal, Forest Directorate, Government of West Bengal, Ministry of Environment & Forests, and Government of India) and relevant government agencies (like CPCB, NEERI), including state and local authorities responsible for land acquisition; (iv) nongovernment organizations, university professors, and community-based organizations (CBOs) working in the affected communities; (v) other community representatives (prominent citizens, religious leaders, elders, women's groups); (vi) beneficiary community in general; and (vii) ADB, the government, and the Ministry of Finance.

43. The public consultation and disclosure program will remain a continuous process

throughout the subproject implementation. The following methodologies will be used for carrying out public consultation:

- (i) Local communities, individuals affected, traders, and local shopkeepers who are directly affected will be given priority while conducting public consultation.
- (ii) Walk-through informal group consultations will be held along the proposed distribution, transmission mains stretch.
- (iii) The local communities will be informed through public consultation, with briefing on project interventions, including its benefits.
- (iv) The environmental concerns and suggestions made by the participants will be listed, and discussions and suggestions incorporated accordingly in the EMP.

44. Focus group discussions will be organized with affected persons and other stakeholders to hear their views and concerns, so that these can be addressed in subproject design wherever necessary. Regular updates on the environmental component of the subproject will be kept available at the PMU office of KMC.

45. KMC will conduct information dissemination sessions at major intersections and solicit the help of local community leaders and prominent citizens to encourage the participation of the people in discussing various environmental issues.

46. The PMU, with the assistance of DSC, will conduct information dissemination sessions in the subproject areas. During EMP implementation, PMU and DSC will organize public meetings and will apprise the communities about the progress of the implementation of EMP in the subproject works of the investment program.

47. Public meetings with affected communities (if any) will be held to discuss and plan work programs and allow issues to be raised and addressed once construction has started. There will be smaller-scale meetings to discuss and plan construction work with local communities to reduce disturbance and other impacts, and provide a mechanism through which stakeholders can participate in subproject monitoring and evaluation. Local communities will be continuously consulted regarding location of construction camps, access and hauling routes, and other likely disturbances during construction. The road closure, together with the proposed detours, will be communicated via advertising, pamphlets, radio broadcasts, road signages, etc.

48. Public information campaigns via newspaper, radio, and TV are proposed to explain the details of each subproject to a wider population. Public disclosure meetings will be organized at key project stages to inform the public of progress and future plans.

## **B. Information Disclosure**

49. Information is disclosed through public consultation and making relevant documents available in public locations. The following documents will be submitted to ADB for disclosure on its website:

- (i) For category A subprojects:
  - (a) draft EIA (including the draft EMP) at least 120 days prior to management approval of the periodic financing request report;
  - (b) final EIA;
  - (c) a new or updated EIA and corrective action plan prepared during project implementation, if any; and
  - (d) environmental monitoring reports.
- (ii) For category B subprojects:

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

50. KMC will send written endorsement to ADB for disclosing these documents on ADB's website. KMC will also provide relevant safeguards information in a timely manner, in an accessible place and in a form and languages understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.

51. For the benefit of the community, all EIAs/IEEs will be translated in the local language and made available at the offices of KMC, PMU, and DSC. Hard copies of the EIA/IEEs will be accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. An electronic version of the EIA/IEEs will be placed in the official website of the KMC/PMU/state government and the official website of ADB after approval of the IEE by government and ADB. The PMU will issue notifications on its website 1 month ahead of implementation works for each subproject.

### **C. Grievance Redress Mechanism**

52. **Common Grievance Redress Mechanism.** A common grievance redress mechanism (GRM) has been established for social, environmental or any other subproject related grievances.

53. **Grievance Redress Process.** PMU will maintain a Complaint Cell at KEIIP office located in 206 A J C Bose Road Kolkata 700017 headed by a designated Grievance Officer (currently the Administrative Officer) under Project Director. The Complaint Cell will also serve as Public Information Centers, where, apart from grievance registration, information on the Project, subprojects, social and environmental safeguards, etc can be provided.

54. At every Borough of KMC under which works are in progress, a Public Relations & Grievance Redressal Unit is to be established for information disclosure on request from public and for receipt of complaints.

55. At Contractors' site offices, complaint and suggestion books will be available for lodging any complaint. The concerned Executive Engineers of KEIIP will monitor these books and if possible take necessary actions for redressal of minor complaints with intimation to the complainant.

56. The Grievance Registration/Suggestion Form will be available at the Complaints Cell and in Borough Offices and will also be downloadable from the KEIIP/KMC websites. Grievances/ suggestions of affected persons can be dropped in suggestion boxes or conveyed through phone or mail. Affected Persons will also be able to register grievances - social, environmental or other, personally at the Complaint Cell and at Borough offices of KMC. The Grievance Officer and designated official at the Boroughs will be able to correctly interpret/record verbal grievances of non-literate persons and those received over telephone.

57. All complaints (unresolved at local site/Borough level) relating to KEIIP will be sent to the Project Director, KEIIP including those received in the KMC/KEIIP website for redressal. The Grievance Officer will resolve simple unresolved issues and in case of complicated issues, consult/seek the assistance of the Environment/Social Specialist of the DSC/PMU. Grievances

not redressed through this process within one month of registration will be brought to the notice of the Project Director, KEIIP. Action taken in respect of all complains will be communicated to the complainant by letter, over phone or e-mail or WhatsApp as the case may be.

58. Periodic community meetings with affected communities to understand their concerns and help them through the process of grievance redress (including translation from local dialect/language, recording and registering grievances of non-literate affected persons and explaining the process of grievance redress) will be conducted if required. The above Grievance Redress Process will be discussed with the stakeholders at the proposed disclosure workshop.

59. **Grievance Redressal Committee (GRC).** A PMU level GRC has already been constituted by the Project Director to address grievances. Grievances not resolved at borough level referred to PMU level. However all grievances that cannot be resolved at PMU level will be referred to a apex grievance redress committee (GRC).<sup>17</sup> Still unresolved issues will be referred through a appropriate court of law.

- (i) The time limit for grievance redressal will be as follows,
  - (a) Site level – 7 days
  - (b) Borough level – 7 days
  - (c) GRC – PMU level – 15 days
  - (d) Apex GRC- 15 days

60. **Consultation Arrangements.** This will include group meetings and discussions with affected persons, to be announced in advance and conducted at the time of day agreed on with affected persons and conducted to address general/common grievances; and if required with the Environment/Social Specialist of PMU/DSC for one-to-one consultations. Non-literate affected persons/ vulnerable affected persons will be assisted to understand the grievance redress process, to register complaints and with follow-up actions at different stages in the process.

61. **Record-keeping.** Records will be kept by PMU/Borough Office/Contractors' site office of all grievances received including contact details of complainant, date the complaint was received, nature of grievance, agreed corrective actions and the date these were in effect, and final outcome.

62. **Information Dissemination Methods of the GRM.** Grievances received and responses provided will be documented and reported back to the affected persons. (**Appendix 15** -Sample Grievance Registration Form). The number of grievances recorded and resolved and the outcomes will be displayed/disclosed in the offices of the different Boroughs of KMC and web. The phone number where grievances are to be recorded will be prominently displayed at the construction sites.

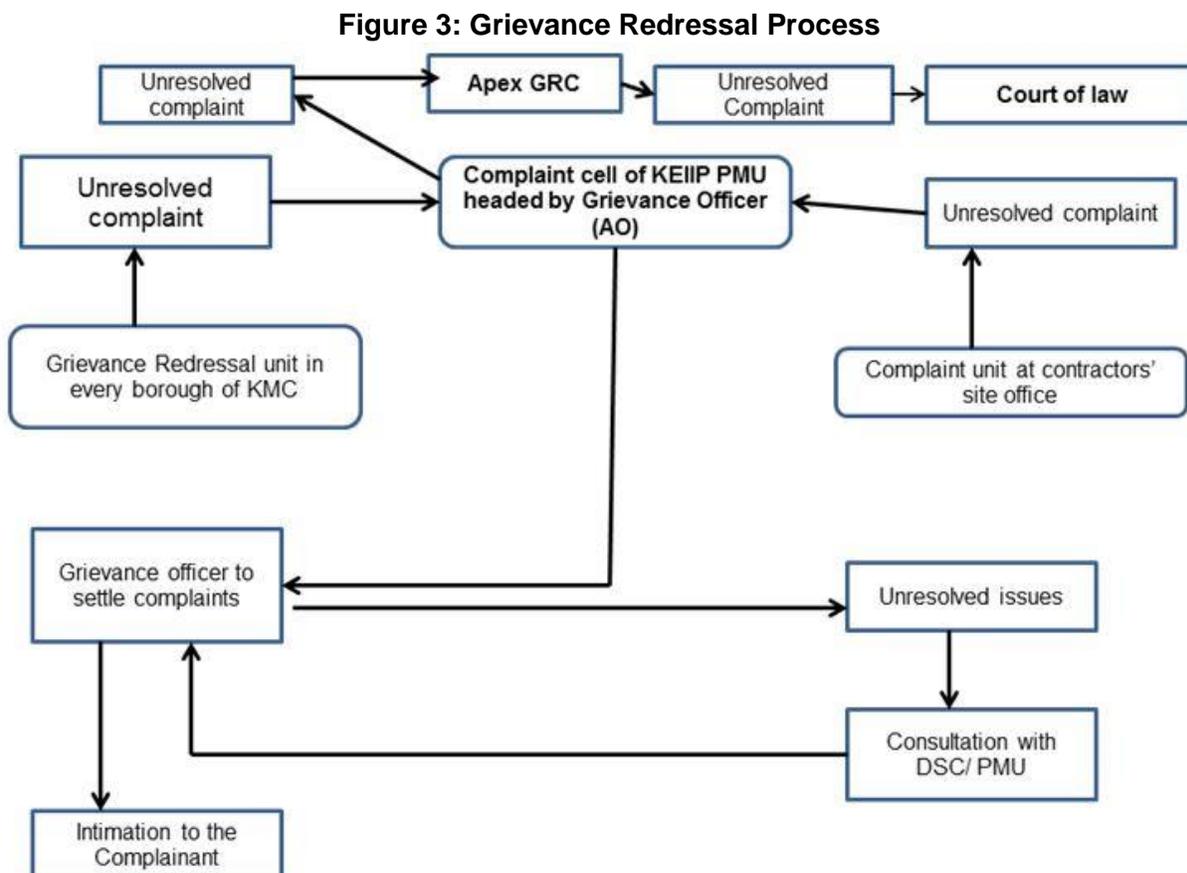
63. **Periodic Review and Documentation of Lessons Learned.** PMU will periodically review the functioning of the GRM and effectiveness of the mechanism, especially on the Project's ability to prevent and address grievances.

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<sup>17</sup> The apex GRC will have the following members: KMC Commissioner as Chairperson, KEIIP Project Director, Director General, KEIIP, Environment/Social Safeguard Officer, Administrative Officer as the convener, representatives of APs, Community Based Organizations (CBOs), and eminent citizens. The GRC must have at least two women members.

64. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication and reporting / information dissemination) will be borne by PMU.

65. **Figure 3** shows GRM flow chart.

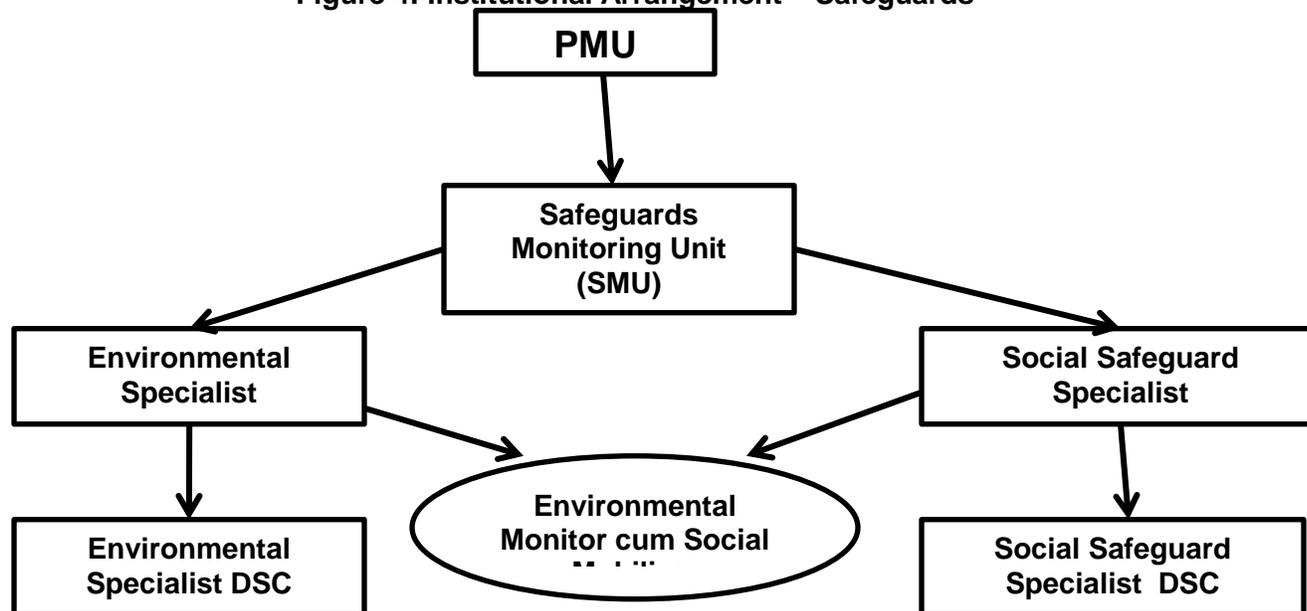


## VI. INSTITUTIONAL ARRANGEMENT AND RESPONSIBILITIES

66. The existing institutional arrangement for implementation of the KEIP, which has been functioning satisfactorily, will continue (Figure 4). The investment program will be implemented and monitored by the PMU. The Environmental Specialist in SMU will be PMU's environmental specialists. The responsibilities of the environmental specialists will ensure that (i) environmental safeguard issues are addressed; (ii) EMP is implemented; (iii) physical and non-physical activities under the subproject are monitored; and (iv) monitoring reports are prepared on time and submitted to ADB.

67. PMU will be supported by the design and supervision consultants (DSC). An environment specialist will be engaged to ensure that (i) EMP is implemented; (ii) surveys and measurements are undertaken; (iii) inspections and observations throughout the construction period are recorded to ensure that safeguards and mitigation measures are provided as intended; and (iv) statutory clearances and permits from government agencies and other entities are obtained prior to start of civil works.

Figure 4: Institutional Arrangement – Safeguards



Notes: PMU = project management unit; DSC = design and supervision consultants

68. **Table 5** gives the institutional roles and responsibilities in all phases of the investment program.

**Table 5: Institutional Roles and Responsibilities: Environmental Safeguards**

Phase	PMU / SMU	DSC	ADB
Appraisal stage of all subprojects under the investment program	PMU to review the REA checklists and draft EIA/IEE PMU to disclose the approved EIA/IEE on its website PMU to ensure disclosure of information throughout the duration of the subproject	DSC to conduct REA for each subproject using checklists and to prepare EIA/IEE	ADB to review the REA checklists and reconfirm the categorization. ADB will review and approve EIA reports (category A) and IEE reports (category B) subprojects. ADB will disclose the submitted EIA/IEE report on its website.
Detailed design phase of all subprojects under the investment program	PMU with the assistance of DSC to incorporate the EMP, environmental mitigation and monitoring measures into contract documents	DSC to revise the IEE and EMP in accordance with detailed design changes if warranted DSC to ensure incorporation of EMP in bid documents and contracts DSC to prepare inventory of utilities to be affected by the subproject.	ADB will review and approve updated EIA reports (category A) and IEE reports (category B) subprojects. ADB will disclose updated EIA/IEE report on its website.
Pre-construction phase of all subprojects under	DSC to conduct public consultation and	DSC to ensure statutory clearances and permits	

Phase	PMU / SMU	DSC	ADB
the investment program	disclosure during IEE process and comments to be reflected in the IEE report PMU to monitor the disclosure and public consultation PMU and DSC to approve contractor's proposed locations for construction work camps, storage areas, hauling roads, lay-down areas, and disposal areas for solid and hazardous wastes	from government agencies and other entities are obtained prior to start of civil works DSC to consult affected people and ensure RP is implemented prior to start of civil works DSC to ensure disclosure of information prior to start of civil works and throughout the duration of the construction period DSC to approve contractor's site-specific environmental plan (such as traffic management plan, waste management plan, locations for camp sites, storage areas, lay-down areas, and other sites/plans specified in the EMP) DSC to conduct baseline environmental conditions and inventory of affected trees	
Construction phase of all subprojects under the investment program	SMU of PMU assist monitoring during implementation of the project. SMU of PMU will review 6-monthly monitoring and EMP implementation report, including the status of project compliance, with statutory clearances and with relevant loan covenants, and submit the 6-monthly report to ADB and seek permission to disclose the same in the investment program website	DSC to monitor the implementation of mitigation measures by contractor DSC to prepare monthly progress reports, including a section on implementation of the mitigation measures (application of EMP and monitoring plan) DSC (as per EMP) will conduct environmental quality monitoring during construction stage (ambient air and noise and water quality) DSC to prepare the 6-monthly monitoring report on environment by focusing on the progress in implementation of the EMP, issues encountered, measures	ADB to review the 6 monthly monitoring report, provide necessary advice if needed to the PMU and approve the same ADB to disclose environmental monitoring reports on its website

Phase	PMU / SMU	DSC	ADB
		adopted, and follow-up actions required, if any	
Pre-operation phase (commissioning and defect liability period)	PMU to review monitoring report of DSC on post-construction activities by the contractors as specified in the EMP	DSC to apply for the CTOs prior to commissioning DSC to monitor and approve post-construction activities by the contractors as specified in the EMP	
Operation phase of all subprojects under the investment program	KMC to conduct monitoring, as specified in the environmental monitoring plan WBPCB to monitor the compliance of the standards regarding drinking water quality, groundwater, ambient air, and effluent quality from treatment plant, as applicable		

Notes: WBPCB = West Bengal State Pollution Control Board, KMC = Kolkata Municipal Corporation, CTE = consent to establish, CTO = consent to operate, DSC = design and supervision consultant, EIA = environmental impact assessment, EMP = environmental management plan, IEE = initial environmental examination, PMU = project management unit, REA = rapid environmental assessment, SMU= Safeguard Monitoring Unit

69. The Safeguards Monitoring Unit will:

- (i) prepare the REA checklist, to draft the EIA/IEE and to disclose the approved EIA/IEE in the website
- (ii) ensure that Environmental Clearance (EC), Consent to Establishment and Consent to Operate and other certificates, as required, are obtained in time from appropriate authorities and to ensure compliances with conditions imposed.
- (iii) ensure incorporation of the EMP, environmental mitigation and monitoring measures into the contract documents
- (iv) monitor disclosure and public consultation arranged by DSC during IEE process and to ensure that comments are reflected in the IEE report
- (v) ensure disclosure of information throughout the duration of the subproject through suitable visual means and publications
- (vi) provide necessary input for grievance redress
- (vii) approve contractor's proposed locations for construction work camps, storage areas, hauling roads, lay-down areas, and disposal areas for solid and hazardous wastes on recommendations of DSC
- (viii) guide the Contractor for drawing up of Site Environmental Management Plan and to approve the same
- (ix) induct the Contractor for taking up the construction following environmental and social safeguards
- (x) facilitate scheduled monitoring during implementation of the project.
- (xi) carry out regular onsite monitoring and guide the Contractor to adopt the required site management standard.
- (xii) ensure the required health and safety measures at work sites

- (xiii) obtain in time and to review the monthly monitoring report of the Contractors
  - (xiv) prepare 6-monthly monitoring and EMP implementation report, including the status of project compliance, statutory clearances and relevant loan covenants, and submit the approved 6-monthly report to ADB and seek permission to disclose the same in the investment program website
  - (xv) prepare monitoring report on post-construction activities by the contractors as specified in the EMP
70. The contractor will be required to:
- (i) prepare site-specific environmental management plan based on the EMP;
  - (ii) comply with all applicable legislation, and be conversant with the requirements of the EMP;
  - (iii) Carry out monitoring work- base line and during construction data generation from working sites
  - (iv) brief his staff, employees, and laborers about the requirements of the EMP;
  - (v) ensure any sub-contractors/suppliers who are utilized within the context of the contract comply with the environmental requirements of the EMP. The contractor will be held responsible for non-compliance on their behalf;
  - (vi) supply method statements for all activities requiring special attention as specified and/or requested by the DSC environment specialist for the duration of the contract;
  - (vii) provide environmental awareness training to staff, employees, and laborers;
  - (viii) bear the costs of any damages/compensation resulting from non-adherence to the EMP or written site instructions;
  - (ix) conduct all activities in a manner that minimizes disturbance to directly affected residents and the public in general, as well as foreseeable impacts on the environment; and
  - (x) ensure that the PMU environmental Specialist are informed in a timely manner of any foreseeable activities that will require input from the DSC environment specialist.
71. Costs requirement for ensuring environmental safeguards cover the following activities:
- (i) conducting IEE or EIA studies, including limited field and laboratory monitoring, preparing and submitting reports, and public consultation and disclosure;
  - (ii) application for consent to establish and operate where required (currently STP and WTP);
  - (iii) implementation of environmental management plans (EMP), including long-term surveys, monitoring, data generation, etc.;
  - (iv) redressal of grievances/complaints; and
  - (v) capacity building.
72. For budgeting purposes, it is assumed that subprojects of future tranches (on the basis of the environmental subproject selection guidelines) which involve the provision of new or refurbished infrastructure will be classified as category B (requiring IEE).
73. Generally, an IEE relies on the collection of existing data in order to describe environmental conditions in the subproject area, and it is not expected that new surveys would be conducted unless there are critical gaps in data. The work thus involves the collection and analysis of data on the existing environment and the proposed project, assessment and mitigation of impacts, preparation of the environmental management plan (EMP) and budget, public consultation, and preparation of the IEE report. An average IEE for this type of subproject

requires 1.5 months of effort by one expert and one support staff (specializing in the natural environment and social issues). Other expenses are the cost of public consultation meetings and the cost of document disclosure.

74. Tentative cost estimates for implementation of identified monitoring and reporting plans are summarized in **Table 6**. Internal monitoring costs during construction, not involving engagement of specialized monitoring agencies for actual field-cum-laboratory sampling and analysis, will be borne by DSC and contractors as part of their contracts and by KMC during the operational phase. Costs for implementing all mitigation measures during the construction phase will be included in the tender and contract document of contractors and will be borne by the contractors.

**Table 6: Staffing and Cost of EARF Implementation**

Item	Quantity	Unit Cost (INR)	Total Cost (INR)	Subtotal (INR)
1. KEIP - project management unit				
Environmental Specialist of SMU	Included in the PMU budget – to be extended for Tranche 2			
2. Design and supervision consultant (DSC)				
Environment specialist	Included in project cost of consultant– to be extended for Tranche 2			
3. Other expenses				
Consent to establish by PMU if any		50,000		
Consent to operate by PMU if any		50,000		
Monitoring expenses during implementation	As per requirement- Tranche 2 by construction contractor – air, noise, water	For 30 months	47,64,000.00	47,64,000.00
Public consultations	Tranche 2	50,000.00 yearly	1,50,000.00	1,50,000.00
4. Grievance redress mechanism	Tranches 1, 2, and 3	Part of management cost		
5. Capacity building	Tranches 1, 2, and 3	Part of management cost		
<b>TOTAL</b>				<b>49,14,000.00</b>

KMC – Kolkata Municipal Corporation, INR-Indian Rupees, PMC-project management consultant, PMU-project management unit

## VII. MONITORING AND REPORTING

75. Monitoring and reporting of the investment program will follow a structured approach as used in the KEIP that has been found to be adequate. Prior to commencement of any construction work, the contractors will submit a compliance report to the DSC, ensuring that all identified pre-construction environmental impact mitigation measures as detailed in the subproject IEEs have been undertaken. DSC will review the report, and thereafter PMU will allow commencement of construction works.

76. The DSC will organize an induction course for the training of contractors, preparing them for EMP implementation, including environmental monitoring requirements related to identified mitigation measures and taking immediate action to remedy unexpected adverse impacts or ineffective mitigation measures found in the course of implementation.

77. During the construction phase, results from internal monitoring by the contractors will be reflected in their weekly EMP implementation reports to the site level construction supervisors of the DSC. These weekly reports will be retained in the DSC office for reference. The environmental specialist of the DSC will carry out periodic site visits and report to the team leader, DSC on the adequacy of mitigation and safety measures at work site levels. The team leader, DSC will form flying squads to conduct occasional unannounced site inspections for feedback to the environmental specialist of the DSC.

78. A monthly report will be prepared by the DSC Construction Manager summarizing compliance with monitoring requirements, details on any noncompliance, remedial actions taken, and additional environmental mitigation measures if necessary. The format of the monthly report is given in **Appendix 16**.

79. Measurements on environmental monitoring employing external agencies will be organized by the contractor as per advice of DSC. Based on monthly reports and measurements, the DSC will draft a 6-monthly EMP implementation report. Such reports will include (i) construction activities over the last 6 months; (ii) reporting on EMP implementation; (iii) environmental conditions; (iv) measurement or sampling undertaken and monitoring results (based on the monitoring plan); (v) findings on the compliance status; (vi) summary of any non-compliance and remedial actions taken; and (vii) recommendations for improvement and revision of the mitigation measures and/ or the EMP, if any. The environmental Specialist of the PMU will review the draft EMP implementation report which, upon approval by the project director, will be submitted to ADB. Once concurrence from the ADB is received, the 6-monthly EMP implementation report will be uploaded in the investment program website. Based on review of environmental monitoring results, future modifications in the EMP could be undertaken with the concurrence of ADB. These will be generally undertaken, if required, upon review of the 6-monthly EMP progress reports submitted by the PMU to ADB following agreed procedures and mechanisms.

80. For subprojects likely to have anticipated adverse environmental impacts during operation, monitoring may continue at the minimum on an annual basis during the operation phase.

81. For subprojects likely to have significant adverse environmental impacts, the KMC will retain qualified and experienced external experts to verify its monitoring information. The KMC external auditor will document significant monitoring results, identify the necessary corrective actions, and reflect them in a corrective action plan. The KMC, for each quarter, will study the compliance with the action plan developed in the previous quarter. Compliance with loan covenants will be screened by the KMC.

82. ADB will review project performance against the KMC's commitments as agreed in the legal documents. The extent of ADB's monitoring and supervision activities will be commensurate with the investment program's risks and impacts. Monitoring and supervising of social and environmental safeguards will be integrated into the project performance management system. The investment program budget will reflect the costs of monitoring and reporting requirements.

### VIII. REVIEW OF ENVIRONMENTAL ASSESSMENT REPORTS

83. On completion, EIAs/IEEs will be reviewed initially by PMU. In case an environmental clearance is required, the EIAs/IEEs are to be forwarded to the MoEFCC/SEIAA for approval.

84. KMC will forward the EIAs/IEEs to ADB for review.

85. For subproject processing, the steps to be followed are shown in **Table 7**. Implementation of the subproject will be governed by the national and State of West Bengal environmental acts, rules, regulations, and standards. These regulations impose restrictions on activities to minimize and mitigate likely impacts on the environment. It is the responsibility of the project executing and implementing agencies to ensure subprojects are consistent with the legal framework, whether national, state, or municipal/local. Compliance is required in all stages of the subproject including design, construction, and operation and maintenance. Stricter requirement applies in case the result of ADB's classification is different from that of the government's EIA Notification, 2006.

**Table 7: Environmental Procedures for Subproject Processing**

Project Stage	ADB Procedure	Government of India Procedure
Subproject identification	REA checklist	Categorization (A or B) according to schedule and general/specific conditions in the government's EIA Notification, 2006
	Categorization (A/B/C): PMU to review the REA checklists and reconfirm the categorization	Application for prior environmental clearance (EC) is required after the identification of the prospective site, or before commencing any construction or land preparation. Category A requires environmental clearance from MOEF. Category B requires environmental clearance from SEIAA. In the absence of SEIAA or SEAC, category B will be treated as category A and will be cleared from MoEFCC
	Meets subproject selection criteria	Screening (for category B) subject to SEAC Categorized as B1 (requires full EIA) or B2 (does not require full EIA)
	Stricter requirement applies in case the result of ADB's classification is different from that of the government's EIA Notification, 2006.	
Detailed design	EIA/IEE	Scoping and TOR for EIA (A or B1) with scrutiny by EAC TOR (or rejection of environmental clearance) finalized by EAC or SEAC within 60 days Approved TOR posted on MOEFCC or concerned SEIAA website Preparation of draft EIA as per TOR
	For subprojects involving facilities and/or business activities that already exist or are under construction, the borrower/client will undertake an environment and/or social compliance audit, including on-site assessment, to identify past or present concerns related	

	<p>to impacts on the environment, involuntary resettlement, and indigenous peoples. The objective of the compliance audit is to determine whether actions were in accordance with ADB's safeguard principles and requirements for borrowers/clients and to identify and plan appropriate measures to address outstanding compliance issues. Where noncompliance is identified, a corrective action plan agreed on by ADB and the borrower/client will be prepared. The plan will define necessary remedial actions, the budget for such actions, and the time frame for resolution of non-compliance. The audit report (including corrective action plan, if any) will be made available to the public in accordance with the information disclosure requirements of the Safeguard Requirements 1–3. For environment category A projects involving facilities and/or business activities that already exist or are under construction, the borrower/client will submit the audit report to ADB to disclose on ADB's website at least 120 days prior to ADB Board approval. If a project involves an upgrade or expansion of existing facilities that has potential impacts on the environment, involuntary resettlement, and/or indigenous peoples, the requirements for environmental and social impact assessments and planning specified in Safeguard Requirements 1-3 will apply in addition to compliance audit.</p>	
	<p>Public consultation to be carried out in a manner commensurate with the impacts of affected communities The consultation process and its results are to be documented and reflected in the environmental assessment report.</p>	<p>Public consultation for category A and B1 projects and consists of two components: (i) public hearing conducted by WBPCB within 45 days of a request from the applicant, and (ii) obtaining written responses. Draft EIA publicized widely before hearing. Notice of public hearing within 7 days of date, 30 days for public responses. Incorporate concerns expressed into the draft EIA and EMP.</p>
	<p>Disclosure: For category A: Disclosure on ADB's website of a draft full EIA (including the draft EMP) at least 120 days prior to the ADB Board consideration, and/or EARF before project appraisal where applicable; the final EIA; updated EIAs and corrective action plans; and environmental monitoring reports For category B: Disclosure on ADB's</p>	

	<p>website of the final IEE; updated IEEs and corrective action plans; and environmental monitoring reports</p> <p>In addition, for all categories, environmental information must be in an accessible place and in a form or language understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used.</p>	
	Mitigation measures specified in IEE/EIA study incorporated in project design	
	Identify and incorporate environmental mitigation and monitoring measures (including the EMP) into bid/contract documents.	
Appraisal	EMP and other environmental covenants are incorporated into the facility framework agreement, loan/project agreement, and facility administration memorandum (FAM)	Appraisal of application completed by EAC or SEAC within 60 days of receipt of final EIA report
Approval	<p>KMC to design and implement all subproject facilities in accordance with the EARF and environmental assessments agreed upon, and in compliance with the government's environmental laws and regulations and ADB SPS</p> <p>ADB to review and clear EIA/IEE prior to approval and issuance of tender documents during detailed design stage</p> <p>Complete EIA/IEE disclosed to public</p>	<p>Environmental clearance decision within 60 days of the receipt of recommendations of the EAC or SEAC, or within 120 days of the receipt of the final EIA</p> <p>Where EIA is not required, within 120 days of the receipt of complete application and requisite documents</p>
Contract award	<p>Obtain necessary environmental clearances, consents, and NOCs prior to contract award.</p> <p>Implementation of EMP including monitoring plans based on EIA/IEE findings to be incorporated into bidding documents and civil award contracts</p>	Necessary environmental clearance obtained prior to commencing any construction or land preparation NOCs, CTE and CTO from WBPCB, and forest clearances (if any) from DFO
Implementation	<p>Periodic monitoring reports</p> <p>Periodic (6-monthly) monitoring report from PMU</p> <p>Submission of annual monitoring report to ADB</p>	Project to submit half-yearly compliance monitoring reports by 31 July and 31 January All compliance reports are public documents and displayed on website of concerned regulatory authority.

### Appendix 1: List of Identified Subprojects and Their Components Under Tranche 2

Sub project	Package Number	General Description
<b>Sewerage and Drainage</b>		
1	TR-2 / SD 09	Sewerage & Drainage Work and Construction of 1 Pumping Station in Ward No.114 (Part) in Borough - XI
	TR-2 / SD 10	Sewerage & Drainage Network in Rania Box Catchment (Part of Ward Nos.111, 112 & 113) in Borough - XI
	TR-2 / SD 11	Sewerage & Drainage Network in Vivekananda Road Catchment (Part of Ward Nos.113 & 114) and Construction of 1 Pumping Station in Borough - XI
2	TR-2 / SD 12	Laying of Trunk Sewer along James Long Sarani by Micro-Tunneling Method
	TR-2 / SD 13	Development of Sewerage & Drainage Network within James Long Sarani and Mahatma Gandhi Road Catchment in Borough - XVI (Ward Nos.123 & 124)
	TR-2 / SD 22	S & D Mains and Pumping Stations in Churial Extension Catchment in Borough - XIII & XVI (Part of Ward Nos.122, 123 & 124) - 1
3	TR-2 / SD 14	Laying of Lateral Sewers in part of Borough - XIV (Ward Nos. 128 TO 132)
4	TR-2 / SD 19	S & D Mains and 2 Pumping Stations (Augmentation of Keorapukur MPS) in Tolly's Nullah / Keorapukur Sub-Basin in Borough - XIII (Ward No.115 & Part of Ward No.122)
5	TR-2 / SD 23	Construction of New Pumping Station at Lalababu Nikashi / Bagjola Canal
<b>Water Supply</b>		
1		Demarcation DMAs and allied works including hydraulic modeling. No significant construction activity
2	TR-2 / WS 15	Construction of 2 UGR cum PS at Prantik PH-III and KMC Land on Julpia Road; 6 Elevated Service Reservoirs (ESRs) at Prantik PH-III, N-E of SSE STP, N-W of SSE STP, KMC Land on Julpia Road, WBSETCL, 22 Bigha
	TR-2 / WS 16	Laying of Transmission Main from Daspara near existing PS to UGRs at Prantik PH-III and KMC Land on Julpia Road; and Transmission Main from UGRs to 8 ESRs (6 Proposed + 2 Existing)
	TR-2 / WS 17	Laying of Distribution System and House Connection within the Command Area of 8 ESRs (6 Proposed + 2 Existing)
	TR-2 / WS 18	Construction of Elevated Service Reservoir at Ramkantapur, Malpara, Charaktala; Transmission Main from UGR at KMC Land on Julpia Road to 3 ESRs; Distribution System and House Connection within Command Area of 3 ESRs.
	TR-2 / WS 24	Dedicated Water Supply Transmission Main from Junction of James Long Sarani to Daspara near existing Pumping Station along James Long Sarani
3	TR-2 / WS 25	Water Loss Management under Jay Hind WTP Area (Eastern Kolkata) including rehabilitation, expansion of 100 km Distribution network and connection to around 20000 House holds

**Appendix 2: Consent to Establish and Consent to Operate**

Complete form can be downloaded from <http://www.wbpcb.gov.in/html/download.shtml> and the application is to be filed online.

### Appendix 3: Indian Environmental Standards

#### I. Air Emission

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

##### Ambient Air Quality Standards

Pollutant	Time Weighted Average	Industrial, Residential, Rural and Other Areas	Sensitive Area (Notified by Central Government)	Method of Measurement
Sulfur dioxide (SO <sub>2</sub> ), µg/m <sup>3</sup>	Annual* 24 hours**	50 80	20 80	Improved West & Gaeke method Ultraviolet fluorescence
Nitrogen oxide (NO <sub>2</sub> ), µg/m <sup>3</sup>	Annual* 24 hours**	40 80	30 80	Jacobs & Hochheiser modified (NaOH – NaAsO <sub>2</sub> ) method <input type="checkbox"/> Gas chemiluminescence
Particulate matter (PM <sub>10</sub> ) (Size <10 µm) µg/m <sup>3</sup>	Annual* 24 hours**	60 100	60 100	Gravimetric TOEM <input type="checkbox"/> Beta Attenuation
Particulate matter (PM <sub>2.5</sub> ) (Size <2.5 µm) µg/m <sup>3</sup>	Annual* 24 hours**	40 60	40 60	<input type="checkbox"/> Gravimetric <input type="checkbox"/> TOEM <input type="checkbox"/> Beta Attenuation
Ozone (O <sub>3</sub> ) µg/m <sup>3</sup>	8 hours** 1 hour**	100 180	100 180	<input type="checkbox"/> UV photometric <input type="checkbox"/> Chemiluminescence <input type="checkbox"/> Chemical method
Lead (Pb) µg/m <sup>3</sup>	Annual* 24 hours**	0.5 1.0	0.5 1.0	<input type="checkbox"/> AAS method after sampling using EPM 2000 or equivalent filter paper
Carbon monoxide (CO), mg/m <sup>3</sup>	8 hours** 1 hour**	2.0 4.0	2.0 4.0	<input type="checkbox"/> Non dispersive infrared spectroscopy
Ammonia (NH <sub>3</sub> ),	Annual* 24 hours**	100 400	100 400	<input type="checkbox"/> Chemiluminescence <input type="checkbox"/> Indophenol blue method
Benzene (C <sub>6</sub> H <sub>6</sub> ) µg/m <sup>3</sup>	Annual*	5	5	Gas chromatography continuous analyzer Adsorption and desorption followed by GC analysis
Benzo(o)pyrene (BaP) particulate phase only ng/m <sup>3</sup>	Annual*	1	1	Solvent extraction followed by GC/HPLC analysis
Arsenic (As), ng/m <sup>3</sup>	Annual*	6	6	<input type="checkbox"/> <input type="checkbox"/> AAS/ICP method after sampling using EPM 2000 or equivalent filter paper
Nickel (Ni) ng/m <sup>3</sup>	Annual*	20	20	<input type="checkbox"/> <input type="checkbox"/> AAS/ICP method after sampling using EPM 2000 or equivalent filter paper

Source: Central Pollution Control Board, New Delhi, Notification dated 18 November 2009

Notes:

\* Indicates Annual Arithmetic Mean of Minimum 104 measurement in a year measured twice a week, 24-hourly at uniform intervals

\*\* 24 hourly/8 hourly/hourly values should be met 98% of the time in a year. However, 2% of the time, it may exceed, but not on 2 consecutive days

## B. Emission standards for diesel generator sets

CPCB emission regulations, Part IV, COINDS/26/1986-87

Para 95. Emission limits for new diesel engines (up to 800 W) for gen set application

The emission limits for new diesel engines up to 800 KW, for gen set applications shall be as follows:

Capacity of Diesel Engine	Date of Implementation	Emission Limits (g/kw-hr)				Smoke Limit (light absorption coefficient, m-1) (at full load)	Test Cycle	
		NO <sub>x</sub>	HC	CO	PM		Torque %	Weighting factors
1	2	3				4	5	
Up to 19 KW	1.7.2005	9.2	1.3	3.5	0.3	0.7	100 75	0.05 0.25
> 19 KW up to 176 KW	1.1.2004	9.2	1.3	5.0	0.5	0.7	50	0.30
	1.7.2004	9.2	1.3	3.5	0.3	0.7	25	0.30
> 176 KW up to 800 KW	1.11.2004	9.2	1.3	3.5	0.3	0.7	10	0.10

## II. Effluent

### A. Schedule VI of Environment (Protection) Rules, 1986

#### General Standards for Discharge of Environmental Pollutants: Effluents

Sl no	Parameter	Standards			
		Inland Surface Water	Public Sewers	Land of Irrigation	Marine/Coastal Areas
		(a)	(b)	(c)	(d)
1.	Color and odor	Remove as far as practicable			
2.	Suspended solids, mg/l max.	100	600	200	(a) For process waste water 100 (b) For cooling water effluent 10% above total suspended matter of influent
3.	Particle size of suspended solids	Shall pass 850 micron IS sieve			(a) Floatable solids, max. 3 mm (b) Settable solids (max 850 micron)
4.	pH value	5.5-9.0	5.5-9.0	5.5-9.0	5.5-9.0
5.	Temperature	Shall not exceed 50°C above the receiving water temperature			Shall not exceed 50°C above the receiving water temperature

Sl no	Parameter	Standards			
6.	Oil and grease, mg/l max	10	20	10	20
7.	Total residual chlorine, mg/l max	1.0			1.0
8.	Ammoniacal nitrogen (as N.) mg/l max	50	50		50
9.	Total Kjeldahl nitrogen (as NH <sub>3</sub> ) mg/l. max	100			100
10.	Free ammonia (as NH <sub>3</sub> ), mg/l max	5.0			5.0
11.	Biochemical oxygen demand (3 days at 27°C), mg/l max	30	350	100	100
12.	Chemical oxygen demand, mg/l max	250			250
13.	Arsenic (as As) mg/l max	0.2	0.2	0.2	0.2
14.	Mercury (as Hg), mg/l max	0.1	0.1	0.1	0.1
15.	Lead (as Pb) mg/l max	0.1	1.0		2.0
16.	Cadmium (as Cd) mg/l max	2.0	1.0		2.0
17.	Hexavalent chromium (as Cr +6) mg/l, max	0.1	2.0		1.0
18.	Total chromium (as Cr) mg/l max	2.0	2.0		2.0
19.	Copper (as Cu) mg/l max	3.0	3.0		3.0
20.	Zinc (as Zn) mg/l max	5.0	15		15
21.	Selenium (as Se) mg/l max	0.05	0.05		0.05
22.	Nickel (as Ni) mg/l max	3.0	3.0		5.0
23.	Cyanide (as CN) mg/l max	0.2	2.0	0.2	0.2
24.	Fluoride (as F) mg/l max	2.0	15		15
25.	Dissolved phosphates (as P) mg/l max	5.0			
26.	Sulfide (as S) mg/l max	2.0			5.0
27.	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l max	1.0	5.0		5.0
28.	Radioactive materials: (a) Alfa emitters microcurie/ml max (b)Beta emitters microcurie/ml max	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>	10 <sup>-8</sup> 10 <sup>-7</sup>	10 <sup>-7</sup> 10 <sup>-6</sup>
29.	Bio-assay test	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent	90% survival of fish after 96 hours in 100% effluent
30.	Manganese (as Mn)	2 mg/l	2 mg/l		2 mg/l
31.	Iron (as Fe)	3 mg/l	3 mg/l		3 mg/l
32.	Vanadium (as V)	0.2 mg/l	0.2 mg/l		0.2 mg/l
33.	Nitrate nitrogen	10 mg/l			20 mg/l

These standards shall be applicable for industries, operations, or processes other than those industries, operations, or processes for which standards have been specified in schedule of the Environment Protection Rules, 1989.

**B. Drinking water standard at consumer end is under revision, and the draft version is given in the following table:**

**Indian Standards for Drinking Water - Specification (BIS 10500: 1991) Revised Draft 2009**

Sl. No	Substance or Characteristic	Requirement (Acceptable Limit)	Undesirable Effect Outside the Acceptable Limit	Permissible Limit in the Absence of Alternate Source	Method of Test (Ref to IS)	Remarks
<b>1. Organoleptic and physical parameters</b>						
i)	Color, Hazen units, max	5	Above 5, consumer acceptance decreases	15	3025 (Part 5)	
ii).	Odor	Agreeable	-	Agreeable	3025 (Part 5)	a) Test cold when heated b) Test at several dilutions
iii)	Taste	Agreeable	-	Agreeable	3025 (Part 7 and 8)	Test to be conducted only after safety has been established
iv)	Turbidity, NTU, max	1	Above 5, consumer acceptance decreases	5	3025 (Part 10)	-
v)	Dissolved solids, mg/l max	500	Beyond this palatability decreases and may cause gastrointestinal irritation	2000	3025 (Part 16)	-
vi)	pH Value	6.5–8.5	Beyond this range, the water will affect the mucous membrane and/or water supply system	No relaxation	3025 (Part 11)	-
vii)	Total hardness (as CaCO <sub>3</sub> ), mg/l max	200	Encrustation in water supply structure and adverse effects on domestic use	600	3025 (Part 21)	
<p>Note 1: It is recommended that the acceptable limit be implemented. Values in excess of those mentioned under "Acceptable" render the water not acceptable, but still may be tolerated in the absence of an alternative source, but only up to the permissible limits in the absence of alternate source in col (5), above which the sources will have to be rejected.</p>						
<b>General parameters concerning substances undesirable in excessive amounts</b>						
i)	Iron (as Fe) mg/l max	0.3	Beyond this limit, taste/appearance are affected, has adverse effect on domestic uses and water supply	No relaxation	3025 (Part 53)	Total concentration of manganese (as Mn) and iron (as Fe)

Sl. No	Substance or Characteristic	Requirement (Acceptable Limit)	Undesirable Effect Outside the Acceptable Limit	Permissible Limit in the Absence of Alternate Source	Method of Test (Ref to IS)	Remarks
			structures, and promotes iron bacteria			shall not exceed 0.3 mg/l
ii)	Aluminum (as Al), mg/l max	0.1	Beyond this limit taste/ appearance are affected, has adverse effect on domestic uses and water supply structures	0.3	IS 3025 (Part 59)	-
iii)	Copper (as Cu), mg/l max	0.05	Astringent taste, discoloration and corrosion of pipes, fittings and utensils will be caused beyond this	1.5	IS 3025 (Part 42)	-
iv)	Manganese (as Mn), mg/l max	0.1	Beyond this limit, taste/appearance are affected, has adverse effect on domestic uses and water supply structures	0.3	IS 3025 (Part 59)	Total concentration of manganese (as Mn) and iron (as Fe) shall not exceed 0.3 mg/l
v)	Zinc (as Zn), mg/l max	5	Beyond this limit it can cause astringent taste and an opalescence in water	15	IS 3025 (Part 49)	-
vi)	Magnesium (as Mg), mg/l max	30	Encrustation in water supply structure and adverse effects on domestic use	No relaxation	IS 3025 (Part 46)	-
vii)	Barium (as Ba), mg/l max	0.7	May lead to cardiovascular problem	No relaxation	Annex F of IS 13428*/ S 15302	-
viii)	Calcium (as Ca) mg/l max	75	Encrustation in water supply structure and adverse effects on domestic use	200	3025 (Part 40)	-
ix)	Silver (as Ag), mg/l max	0.1	-	No relaxation	Annex J of IS 13428	-
x)	Selenium (as Se), mg/l max	0.01	Beyond this the water becomes toxic	No relaxation	3025 (Part 56) or IS 15303*	-
xi)	Molybdenum (as Mo), mg/l	0.07	Beyond this, it may cause	No relaxation	3025 (Part 2; 2002)/	-

Sl. No	Substance or Characteristic	Requirement (Acceptable Limit)	Undesirable Effect Outside the Acceptable Limit	Permissible Limit in the Absence of Alternate Source	Method of Test (Ref to IS)	Remarks
	max		osteoporosis/bone disorders		ISO 11885: 1996	
xii)	Boron (as B), mg/l max	0.5	-	1.0	3025 (Part 57)	-
xiii)	Nitrate (as NO <sub>3</sub> ) mg/l max	45	Beyond this, methemoglobinemia takes place/may be indicative of pollution	No relaxation	3025 (Part 34)	
xiv)	Sulfate (as SO <sub>4</sub> ) mg/l max	200	Beyond this, causes gastrointestinal irritation when magnesium or sodium is present	400	3025 (Part 24)	May be extended to 400, provided that Mg does not exceed 30
xv)	Sulfide (as H <sub>2</sub> S), mg/l max	Below detectable limit	Beyond this it may cause objectionable taste and odor	No relaxation	3025 (Part 29)	-
xvi)	Fluoride (as F) mg/l max	1.0	Fluoride may be kept as low as possible. High fluoride may cause fluorosis	1.5	3025 (Part 60)	-
xvii)	Chlorides (as Cl) mg/l max	250	Beyond this, taste corrosion and palatability are affected	1000	3025 (Part 32)	-
xviii)	Ammonia (as total ammonia – N), mg/l max	0.5	Toxicological effect about 200 mg per kg of body weight	No relaxation	3025 (Part 34)	-
xix)	Chloramines (as Cl <sub>2</sub> ), mg/l max	0.2	Eyes, nose irritation, anemia, stomach discomfort	No relaxation	3025 (Part 26) or APHA 4500-CIG	-
xx)	Residual, free chlorine, mg/l min	0.2	-	-	3025 (Part 26)	To be applicable only when water is chlorinated. Tested at consumer end. When protection against viral infection is required, it should be minimum 0.5 mg/l.
xxi)	Total alkalinity	200	Beyond this limit,	600	3025 (Part	-

Sl. No	Substance or Characteristic	Requirement (Acceptable Limit)	Undesirable Effect Outside the Acceptable Limit	Permissible Limit in the Absence of Alternate Source	Method of Test (Ref to IS)	Remarks
	in calcium carbonate, mg/l max		taste becomes unpleasant		23)	
xxii)	Phenolic compounds (as C <sub>6</sub> H <sub>5</sub> OH) mg/l max	0.001	Beyond this may cause objectionable taste and odor	0.002	3025 (Part 43)	-
xxiii)	Mineral oil mg/l max	Below detectable limit	Beyond this limit, undesirable taste and odor after chlorination takes place	No relaxation	3025 (Part 39) Infrared partition method	-
xxiv)	Anionic detergents (as MBAS) mg/l max	0.2	Beyond this limit it can cause a light froth in water	1.0	Annex K to IS 13428-	-
<p>Note 2: in case of dispute, the method by “*” shall be referee method.</p> <p>Note 3: It is recommended that the acceptable limit be implemented. Values in excess of those mentioned under “Acceptable” render the water not acceptable, but still may be tolerated in the absence of an alternative source, but only up to permissible limits in the absence of alternate source in col (5), above which the sources will have to be rejected.</p>						
<b>Parameters concerning toxic substances</b>						
i)	Total chromium (as Cr <sub>6+</sub> ), mg/l max	0.05	May be carcinogenic above this limit	No relaxation	3025 (part 52)	-
ii)	Total arsenic (as As) mg/l max	0.01	Beyond this, the water becomes toxic	0.05	3025 (part 37)	
iii)	Mercury (as Hg) mg/l max	0.001	Beyond this the water becomes toxic	No relaxation	3025 (part 48) /Mercury analyzer	-
iv)	Cadmium (as Cd) mg/lit max	0.003	Beyond this, the water becomes toxic	No relaxation	3025 (part 41)	
v)	Lead (as Pb) mg/l max	0.01	Beyond this, the water becomes toxic	No relaxation	3025 (part 47)	
vi)	Nickel (as Ni), mg/l max	0.02	Beyond this, the water becomes toxic	No relaxation	3025 (part 54)	
vii)	Cyanide (CN), mg/l max	0.05	Beyond this, the water becomes toxic	No relaxation	3025 (part 27)	
viii)	Polynuclear aromatic hydrocarbons (as PAH), mg/l max	0.0001	May be carcinogenic	No relaxation	APHA 6440	-
ix)	Polychlorinated	0.0005	May be	No	ASTM	-

Sl. No	Substance or Characteristic	Requirement (Acceptable Limit)	Undesirable Effect Outside the Acceptable Limit	Permissible Limit in the Absence of Alternate Source	Method of Test (Ref to IS)	Remarks
	biphenyls, mg/l max		carcinogenic	relaxation	5175/APHA 6630	
Bacteriological quality of drinking water						
Organisms		Guidelines				
<i>E. coli</i> or thermotolerant coliform bacteria		Must not be detectable in any 100 ml sample				
Total coliform bacteria		Must not be detectable in any 100 ml sample				

### C. EFFLUENT DISCHARGED STANDARDS FOR SEWAGE TREATMENT PLANT (notified by CPCB, 2015)

Sl. No.	Parameter	Parameters Limit (Standards for New STPs Design after notification date) *
1.	pH	6.5-9.0
2.	BOD (mg/l)	Not more than 10
3.	COD (mg/l)	Not more than 50
4.	TSS (mg/l)	Not more than 20
5.	NH <sub>4</sub> -N (mg/l)	Not more than 5
6.	N-total (mg/l)	Not more than 10
7.	Fecal Coliform (MPN/100ml)	Less than 100

No te:

(i) These standards will be applicable for discharge in water resources as well as for land disposal. The standards for Fecal Coliform may not be applied for use of treated sewage in industrial purposes.

(iii) Abbreviation: BOD=Bio-chemical Oxygen Demand, COD=Chemical Oxygen Demand, TSS=Total Suspended Solids, NH<sub>4</sub>-N = Total Ammonical Nitrite, N-Total=Nitrite

### III. Noise

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

Rule 3. Ambient air quality standards with respect to noise for different areas/zones

(1) The ambient air quality standards with respect to noise for different areas/zones shall be such as specified below.

(2) The state government shall categorize the areas into industrial, commercial, residential, or silence areas/zones for the purpose of implementation of noise standards for different areas.

(5) An area comprising not less than 100 m around hospitals, educational institutions, and courts may be declared as silence area/zone for the purpose of these rules.

Area Code	Category of Area	Limit in dB(A) Leq	
		Daytime	Nighttime
A.	Industrial area	75	70
B.	Commercial area	65	55
C.	Residential area	55	45
D.	Silence zone	50	40

**Notes:**

1. Daytime is reckoned in between 6 a.m. and 10 p.m.
2. Nighttime is reckoned in between 10 p.m. and 6 a.m.
3. Silence zone is an area comprising not less than 100 m around hospitals, educational institutions, courts, religious places, or any other area declared as such by the competent authority.
4. Mixed categories of areas may be declared as one of the four aforementioned categories by the competent authority.

\* dB(A) Leq denotes the time-weighted average of the level of sound in decibels on scale A, which is relatable to human hearing.

A "decibel" is a unit in which noise is measured.

"A", in dB(A) Leq, denotes the frequency weighting in the measurement of noise and corresponds to frequency response characteristics of the human ear.

Leq is an energy mean of the noise level over a specified period.

Rule 5. Restrictions on the use of loudspeakers/public address systems and sound-producing instruments

Rule 5A. Restrictions on the use of sound-emitting construction equipment

(3) Sound emitting-construction equipment shall not be used or operated during nighttime in residential areas and silence zones.

C) Noise limit for generator sets run with diesel

Noise limit for generator sets run with diesel notified by Environment (Protection) second Amendment Rules vide GSR 371(E), dated 17 May 2002 at serial no. 94 and its amendments vide GSR No 520(E) dated 1 July 2003; GSR 448(E), dated 12 July 2004; GSR 315(E) dated 16 May 2005; GSR 464(E) dated 7 August 2006; GSR 566(E) dated 29 August 2007 and GSR 752(E) dated 24 October 2008; G.S.R. 215 (E), dated 15 March, 2011 under the Environment (Protection) Act, 1986) is as follows:

Para 50. Noise limit for diesel generator sets (up to 1000 KVA) manufactured on or after 1 January 2005

The maximum permissible sound pressure level for new diesel generator (DG) sets with rated capacity up to 1000 KVA, manufactured on or after 1 January 2005, shall be 75 dB(A) at 1 m from the enclosure surface. The diesel generator sets should be provided with integral acoustic enclosure at the manufacturing stage itself.

## Appendix 4: Occupational Noise Exposure

### National Institute of Occupational Safety and Health Criteria for a Recommended Standard: Occupational Noise Exposure NIOSH Publication no. 98-126

Combination of noise exposure levels and duration that no worker exposure shall equal or exceed

Exposure Level (dBA)	Duration		
	Hours	Minutes	Seconds
80	25	24	-
81	20	10	-
82	16	-	-
83	12	42	-
84	10	5	-
85	8	-	-
86	6	21	-
87	5	2	-
88	4	-	-
89	3	10	-
90	2	31	-
91	2	-	-
92	1	35	-
93	1	16	-
94	1	-	-
95	-	47	37
96	-	37	48
97	-	30	-
98	-	23	49
99	-	18	59
100	-	15	-
103	-	7	30
105	-	4	43
110	-	1	29

**Appendix 5: Hazardous Wastes (Management Handling and Transboundary Movement)  
Rules, 2008 S.O. 2265 (E) dated 24 September 2008**

Rule 3. Hazardous waste means waste which, by reason of any of its physical, chemical, reactive, toxic, inflammable, explosive, or corrosive characteristics, causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances, and shall include wastes having constituents specified in Schedule II if their concentration is equal to or more than the limit indicated in the said schedule.

5. Grant of authorization for handling hazardous wastes

(a) Every person who is engaged in generation, processing, treatment, packaging, storage, transportation, use, collection, destruction, conversion offering for sale, transfer or the like of the hazardous waste shall require to obtain an authorization from the WBPCB.

(b) The hazardous waste shall be collected, treated, recycled, re-processed, stored, or disposed of only in only in such facilities as may be authorized by the WBPCB for the purpose.

## Schedule 2

## List of Waste Constituents with Concentration Limits\*

Class A

Concentration limit: □ 50 mg/kg

- A1 Antimony and antimony compounds
- A2 Arsenic and arsenic compounds
- A3 Beryllium and beryllium compounds
- A4 Cadmium and cadmium compounds
- A5 Chromium (VI) compounds
- A6 Mercury and mercury compounds
- A7 Selenium and selenium compounds
- A8 Tellurium and tellurium compounds
- A9 Thallium and thallium compounds
- A10 Inorganic cyanide compounds
- A11 Metal carbonyls
- A12 Napthalene
- A13 Anthracene
- A14 Phenanthrene
- A15 Chrysene, benzo (a) anthracene, fluoranthene, benzo (a) pyrene, benzo (K) fluoranthene, indeno (1, 2, 3-cd) pyrene and benzo (ghi) perylene
- A16 halogenated compounds of aromatic rings, e.g. polychlorinated biphenyls, polychloroterphenyls and their derivatives
- A17 Halogenated aromatic compounds
- A18 Benzene
- A19 Organo-chlorine pesticides
- A20 Organo-tin Compounds

Class B

Concentration limit: □ 5,000 mg/kg

- B1 Chromium (III) compounds
- B2 Cobalt compounds
- B3 Copper compounds
- B4 Lead and lead compounds
- B5 Molybdenum compounds
- B6 Nickel compounds
- B7 Inorganic Tin compounds
- B8 Vanadium compounds
- B9 Tungsten compounds
- B10 Silver compounds
- B11 Halogenated aliphatic compounds
- B12 Organo phosphorus compounds

- B13 Organic peroxides
- B14 Organic nitro-and nitroso-compounds
- B15 Organic azo-and azoxy compounds
- B16 Nitriles
- B17 Amines
- B18 (Iso-and thio-) cyanates
- B19 Phenol and phenolic compounds
- B20 Mercaptans
- B21 Asbestos
- B22 Halogen-silanes
- B23 Hydrazine (s)
- B24 Fluorine
- B25 Chlorine
- B26 Bromine
- B27 White and red phosphorus
- B28 Ferro-silicate and alloys
- B29 Manganese-silicate
- B30 Halogen-containing compounds which produce acidic vapours on contact with humid air or water, e.g. silicon tetrachloride, aluminium chloride, titanium tetrachloride

**Class C**

Concentration limit: □ 20, 000 mg/kg

- C1 Ammonia and ammonium compounds
- C2 Inorganic peroxides
- C3 Barium compounds except barium sulphate
- C4 Fluorine compounds
- C5 Phosphate compounds except phosphates of aluminium, calcium and iron
- C6 Bromates, (hypo-bromites)
- C7 Chlorates, (hypo-chlorites)
- C8 Aromatic compounds other than those listed under A12 to A18
- C9 Organic silicone compounds
- C10 Organic sulphur compounds
- C11 Iodates
- C12 Nitrates, nitrites
- C13 Sulphides
- C14 Zinc compounds
- C15 Salts of per-acids
- C16 Acid amides
- C17 Acid anhydrides

**Class D**

Concentration limit: □ 50, 000 mg/kg

- D1 Total Sulphur
- D2 Inorganic acids

- D3 Metal hydrogen sulphates
- D4 Oxides and hydroxides except those of hydrogen, carbon, silicon, iron, aluminum, titanium, manganese, magnesium, calcium
- D5 Total hydrocarbons other than those listed under A12 to A18
- D6 Organic oxygen compounds
- D7 Organic nitrogen compounds expressed as nitrogen
- D8 Nitrides
- D9 Hydrides

#### Class E

Regardless of concentration limit, Classified as hazardous wastes if the waste exhibits any of the following Characteristics.

- E1 **Flammable**  
Flammable wastes with flash point 65.6°C or below.
- E2 **Explosive**  
Wastes which may explode under the effect of flame, heat or photochemical conditions. Any other waste of explosive materials included in the Indian Explosive Act.
- E3 **Corrosive**  
Wastes which may be corrosive, by chemical action, will cause severe damage when in contact with living tissue.
- E4 **Toxic**  
Wastes containing or contaminated with established toxic and or eco- toxic constituents.
- E5 **Carcinogenicity, Mutagenicity and Endocrine disruptivity**  
Wastes contaminated or containing established carcinogens, mutagens and endocrine disruptors.

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\*Waste constituents and their concentration limits given in this list are based on erstwhile BAGA (the Netherlands Environment Protection Agency) List of Hazardous Substances. In order to decide whether specific wastes listed above is hazardous or not, following points be taken into consideration:

- (i) If a component of the waste appears in one of the five risk classes listed above (A,B,C,D or E) and the concentration of the component is equal to or more than the limit for the relevant risks class, the material is then classified as hazardous waste.
- (ii) If a chemical compound containing a hazardous constituent is present in the waste, the concentration limit does not apply to the compound, but only to the hazardous constituent itself.
- (iii) If multiple hazardous constituents from the same class are present in the waste, the concentrations are added together.
- (iv) If multiple hazardous constituents from different classes are present in the waste, the lowest concentration limit corresponding to the constituent(s) applies.
- (v) For determining the concentration of the hazardous constituents in the waste "Toxicity Characteristics Leaching Procedure (TCLP) as per ASTM-D5233-92 should be adopted.

**Appendix 6: Forest (Conservation) Act, 1980 and Forest Conservation Rules, 2003 as amended**

As per Rule 6 of the Forest (Conservation) Rules, 2003, every user agency who wants to use any forest land for non-forest purposes shall make its proposal in the appropriate form appended to these rules, i.e., form A for proposals seeking first time approval under the act and form B for proposals seeking renewal of leases where approval of the central government under the act had already been obtained earlier. The proposal shall be submitted to the concerned nodal officer authorized in this behalf by the state government, along with requisite information and documents, complete in all respects, well in advance of taking up any non-forest activity on the forest land.

### **Appendix 7: Wetlands (Conservation and Management) Rules, 2010**

#### Rule 3. Protected wetlands

The following wetlands shall be regulated under these rules, namely, wetlands categorized as Ramsar Wetlands of International importance under the Ramsar Convention.

#### Rule 4. Restrictions on activities within wetlands

Sub-rule (1). The following activities within the wetlands shall be prohibited, namely:

- (i) reclamation of wetlands;
- (ii) setting up of new industries and expansion of existing industries;
- (iii) manufacture, handling, storage, or disposal of hazardous substances as per laid down in the rules;
- (iv) solid waste dumping;
- (v) discharge of untreated wastes and effluents from industries, cities, or towns and other human settlements;
- (vi) any construction of a permanent nature except for boat jetties within 50 m from the mean high flood level observed in the past 10 years; and
- (vii) any other activity likely to have an adverse impact on the ecosystem of the wetland.

Sub-rule (2). The following activities shall not be undertaken without the prior approval of the state government within the wetlands, namely:

- (i) withdrawal of water or impoundment, diversion, or interruption of water sources within the local catchment area of the wetland ecosystem;
- (ii) harvesting of living or non-living resources;
- (iii) grazing to the level that the basic nature and character of the biotic community is not adversely affected;
- (iv) treated effluent discharges from industries, cities, towns, human settlements, and agricultural fields falling within the limits laid down by the Central Pollution Control Board or State Pollution Control Committee, as the case may be;
- (v) plying of motorized boats, if it is not detrimental to the nature and character of the biotic community;
- (vi) dredging, only if the wetland is impacted by siltation;
- (vii) construction of boat jetties;
- (viii) activities within the zone of influence, as per definition of wetlands, that may directly affect the ecological character of the wetland;
- (ix) facilities required for temporary use, such as pontoon bridge, that do not affect the ecological character of the wetland;
- (x) aquaculture, agriculture, and horticulture activities within the wetlands; and
- (xi) repair of existing buildings or infrastructures, including reconstruction activities.

Sub-rule (3). However, central government may permit any of the prohibited activities on the recommendation of Central Wetlands Regulatory Authority.

Sub-rule (5). No wetland shall be converted to non-wetland use unless central government is satisfied that it is expedient in the public interest.

Relevant links:

- (i) East Kolkata Wetlands Management Authority - <http://www.ekwma.com/>
- (ii) EKW (Conservation & Management) Act, 2006

<http://www.ekwma.com/index.php?view=pdflist&MenuID=30>

(iii) EKW Act (Amendment), 2008

[http://www.ekwma.com/index.php?view=pdfs&pdfname=EKW\\_CandM\\_Amendment\\_%20Act\\_2008&MenuID=60](http://www.ekwma.com/index.php?view=pdfs&pdfname=EKW_CandM_Amendment_%20Act_2008&MenuID=60)

(iv) EKW (Conservation & Management) Rules, 2006

<http://www.ekwma.com/index.php?view=ekwrules&MenuID=31>

(v) EKW Rules (Amendment), 2011

[http://www.ekwma.com/index.php?view=pdfs&pdfname=EKW\\_CandM\\_Amendment\\_Act\\_2011&MenuID=61](http://www.ekwma.com/index.php?view=pdfs&pdfname=EKW_CandM_Amendment_Act_2011&MenuID=61)

(iv) EKW Management Plan -

<http://www.ekwma.com/index.php?view=ekwmamanagementplan&MenuID=32>

**Appendix 8: Ancient Monuments and Archaeological Sites and Remains  
(Amendment and Validation) Act, 2010**

The Ancient Monuments and Archaeological Sites and Remains (Amendment and Validation) Act, 2010, hereinafter referred to as the Amendment Act, has been enacted to amend the Ancient Monuments and Archaeological Sites and Remains Act, 1958 and to make provision for validation of certain actions taken by the central government under the said act. The act came into force (except sections 3, 5, 7, and 8–11) on 23 January 2010.

The limits of the prohibited area and regulated area around the monuments, archaeological sites, and remains declared by the central government as protected have been specified in the principal act as 100 m and 200 m, respectively. The limits so fixed may be further extended on the basis of gradation and classification of the monuments, archaeological sites, and remains to be done by the National Monument Authority, which is to be constituted by the central government by virtue of the amendment in the principal act.

Henceforth, no permission for construction of any public projects or any other nature shall be granted in the prohibited areas of the protected monument and protected area. However, permission for repair and renovation could be granted by the competent authority, to be specified by the central government, on the recommendation of the National Monument Authority, subject to the condition that the building or structure is pre-1992, or permission for construction or reconstruction of such building or structure had been granted by the Archaeological Survey of India.

With respect to regulated area, the Competent Authority may grant permission for construction, reconstruction, repair, and renovation on the basis of recommendation of the National Monument Authority duly taking note of heritage bylaws, which shall be prepared with respect to each protected monument and protected area.

**Appendix 9: West Bengal Trees (Protection and Conservation in Non-Forest areas) Rules, 2007** under West Bengal Trees (Protection and Conservation in Non-Forest Areas) Act, 2006

Permission to fell trees. 4. (1) Permission for felling or otherwise disposing of any tree shall be granted for the following purposes:

- a) if it causes serious inconvenience to the local residents, or poses threat to human life or a building or property, or disrupts public services (transportation system);
- b) if it attains natural death due to any disease, or natural calamities like storm or lightning;
- c) if a tree was raised with the purpose of social forestry or farm forestry and has since attained maturity for harvesting;
- d) if the tree is sought to be removed for facilitating reforestation of the land for the purpose of social forestry or farm forestry;
- e) if the owner intends to carry out the felling of trees to meet expenses for family obligations, such as medical treatment, marriage, education, or to meet requirement of timber for construction or repair of his own house;
- f) if it becomes absolutely necessary to fell the trees for the disposing of land or settling of the land dispute; and
- g) if in a tea garden, proviso to sub-section (3) of section 6 shall be complied with.

2 (a) A person other than a developer, seeking permission for felling or otherwise disposing of any tree, shall submit an application to the competent authority in form I (A), provided, however, that a developer shall submit application to the competent authority in the form I (B).

Procedure for obtaining permission to fell tree. 5. (1) For the purpose of obtaining permission to fell or otherwise dispose of any tree, the applicant shall pay the following fee to the competent authority at the time of submitting application:

Developer: Rs. 1,000.00

A person other than a developer: Rs. 25.00 (in rural areas) and Rs 100.00 (other than rural areas)

Obligation to plant trees 6. (1) Every person who, after obtaining permission by the competent authority, fells any tree, shall undertake plantation of two trees in place of every tree felled, in the same plot of land, and will tend to such plantation for trees.

Compulsory plantation of trees. 7. A developer shall undertake plantation of trees over at least 20% of the total area in the same plot or plots of land as subject to such development, in accordance with a plantation plan approved by the competent authority, and provided that the total number of trees to be planted shall be at least five times the number of trees to be felled. The species to be planted, spacing, planting pattern, and time schedule for plantation and maintenance shall be specified in the plan.

Competent authority

Divisional Forest Officer – Kolkata Municipal Corporation area

Form I-(A) and Form I-(B) can be downloaded from (<http://www.westbengalforest.gov.in>)

**Appendix 10: Direction No. EN/3170/T-IV-7 /001/2009 dated 10 December 10 2009 of  
Department of Environment, Government of West Bengal**

All municipalities, local authorities, and all other concerned government departments within the State of West Bengal are to implement the following norms to be followed by the developers, contractors, or any other infrastructure developers.

Preventive measures:

- a) wrap construction area/buildings with geotextile fabric, install 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 leveling 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, stabilize stockpiles upon completion of activity with water, and maintain a dust palliative for 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 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) dispose of debris in consultation with the local authorities following proper environmental management practice; and
- m) during construction work, including cutting of marble, ensure that ambient noise level should not exceed more than 65 dB(A).

Practices to be discarded:

- a) Don't dispose of debris indiscriminately.
- b) Don't allow the vehicles to run at high speed within the work site.
- c) Don't cut materials without proper dust control/noise control facility.
- d) Don't keep materials without effective cover.
- e) Don't allow access in the work area except to workers to limit soil disturbance and prevent access by fencing, ditches, vegetation, berms, or other suitable barrier.
- f) Don't leave the soil, sand, and cement stack uncovered.
- g) Don't keep materials or debris on the roads or pavements.
- h) Burning of old tires in hot mix plant as a fuel during construction and repair of the roads for melting coal tar should be prohibited.

## Appendix 11: The West Bengal Inland Fisheries Act, 1984

### Chapter IIIA Bar to conversion of water area etc. for other use

Rule 17A. Bar to conversion of water area, etc. for other use. — (1) No person shall—

(a) put any water area, including embankment, measuring 5 cottahs or 0.0335 ha or more, which is capable of being used as fishery, or any naturally or artificially depressed land holding measuring 5 cottahs or 0.035 ha or more, which retains water for a minimum period of 6 months in a year, to such use, other than fishery, as may result in abolition of fishery, or

(b) fill up any water area, including embankment or naturally or artificially depressed land holding as aforesaid, with a view to converting it into solid land for the purpose of construction of any building thereon or for any other purpose, or

(c) divide any water area, including embankment or naturally or artificially depressed land holding as aforesaid, into parts so as to make any such part measure less than 5 cottahs or 0.0335 ha for any purpose other than pisciculture, or transfer any part of any such water area, including embankment or naturally or artificially depressed land holding as so divided, to any other person.

(9) No water area including embankment or naturally or artificially depressed land holding, referred to in clause (a) of sub-section (1), shall be

(a) put to any use other than for fishery, or

(b) filled up with a view to converting it into solid land, for the purpose of implementation of any development scheme by any department of the central government or the state government or any public undertaking under the administrative control of the central government or the state government or any statutory body or local authority or any organization in the public sector or any organization or individual in the private sector, except with the prior approval of the state government in the Department of Fisheries.

## Appendix 12: ADB Rapid Environmental Checklists

### A. Water Supply

Screening questions	Yes	No	Remarks
a. Project siting Is the project area			
▪ Densely populated?			
▪ Heavy with development activities?			
▪ Adjacent to or within any environmentally sensitive areas?			
• Cultural heritage site			
• Protected area			
• Wetland			
• Mangrove			
• Estuarine			
• Buffer zone of protected area			
• Special area for protecting biodiversity			
• Bay			
b. Potential environmental impacts will the project cause...			
▪ Pollution of raw water supply from upstream wastewater discharge from communities, industries, agriculture, and soil erosion runoff?			
▪ Impairment of historical/cultural monuments/areas and loss/damage to these sites?			
▪ Hazard of land subsidence caused by excessive ground water pumping?			
▪ Social conflicts arising from displacement of communities?			
▪ Conflicts in abstraction of raw water for water supply with other beneficial water uses for surface and ground waters?			

Screening questions	Yes	No	Remarks
▪ Unsatisfactory raw water supply (e.g. excessive pathogens or mineral constituents)?			
▪ Delivery of unsafe water to distribution system?			
▪ Inadequate protection of intake works or wells, leading to pollution of water supply?			
▪ Over pumping of ground water, leading to salinization and ground subsidence?			
▪ Excessive algal growth in storage reservoir?			
▪ Increase in production of sewage beyond capabilities of community facilities?			
▪ Inadequate disposal of sludge from water treatment plants?			
▪ Inadequate buffer zone around pumping and treatment plants to alleviate noise and other possible nuisances and protect facilities?			
▪ Impairments associated with transmission lines and access roads?			
▪ Health hazards arising from inadequate design of facilities for receiving, storing, and handling of chlorine and other hazardous chemicals.			
▪ Health and safety hazards to workers from the management of chlorine used for disinfection and other contaminants?			
▪ Dislocation or involuntary resettlement of people			
▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			
▪ Noise and dust from construction activities?			
▪ Increased road traffic due to interference of construction activities?			
▪ Continuing soil erosion/silt runoff from construction operations?			

Screening questions	Yes	No	Remarks
<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>			
<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>			
<ul style="list-style-type: none"> <li>▪ Accidental leakage of chlorine gas?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ Excessive abstraction of water affecting downstream water users?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ Competing uses of water?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ Increased sewage flow due to increased water supply</li> </ul>			
<ul style="list-style-type: none"> <li>▪ Increased volume of sillage (wastewater from cooking and washing) and sludge from wastewater treatment plant</li> </ul>			
<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>			
<ul style="list-style-type: none"> <li>▪ Social conflicts if workers from other regions or countries are hired?</li> </ul>			
<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>			

Screening questions	Yes	No	Remarks
<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>			

### A Checklist for Preliminary Climate Risk Screening

Country/Project Title:

Sector:

Subsector:

Division/Department:

Screening Questions		Score	Remarks <sup>18</sup>
<b>Location and Design of project</b>	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?		
	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)?		
<b>Materials and Maintenance</b>	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)?		
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?		
<b>Performance of project outputs</b>	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?		

<sup>18</sup> If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

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):**

**B. Sewage Treatment**

Screening Questions	Yes	No	Remarks
<b>A. PROJECT SITING</b> IS THE PROJECT AREA...			
▪ Densely populated?			
▪ Heavy with development activities?			
▪ Adjacent to or within any environmentally sensitive areas?			
▪ Cultural heritage site			
▪ Protected area			
▪ Wetland			
▪ Mangrove			
▪ Estuarine			
▪ Buffer zone of protected area			
▪ Special area for protecting biodiversity			
▪ Bay			
<b>B. POTENTIAL ENVIRONMENTAL IMPACTS</b> WILL THE PROJECT CAUSE...			
▪ impairment of historical/cultural monuments/areas and loss/damage to these sites?			
▪ interference with other utilities and blocking of access to buildings; nuisance to neighboring areas due to noise, smell, and influx of insects, rodents, etc.?			
▪ dislocation or involuntary resettlement of people?			
▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?			
▪ impairment of downstream water quality due to inadequate sewage treatment or release of untreated sewage?			
▪ overflows and flooding of neighboring properties with raw sewage?			

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>▪ environmental pollution due to inadequate sludge disposal or industrial waste discharges illegally disposed in sewers?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ noise and vibration due to blasting and other civil works?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ risks and vulnerabilities related to occupational health and safety due to physical, chemical, and biological hazards during project construction and operation?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ discharge of hazardous materials into sewers, resulting in damage to sewer system and danger to workers?</li> </ul>			
<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>			
<ul style="list-style-type: none"> <li>▪ road blocking and temporary flooding due to land excavation during the rainy season?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ noise and dust from construction activities?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ traffic disturbances due to construction material transport and wastes?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ temporary silt runoff due to construction?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ hazards to public health due to overflow flooding, and groundwater pollution due to failure of sewerage system?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ deterioration of water quality due to inadequate sludge disposal or direct discharge of untreated sewage water?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ contamination of surface and ground waters due to sludge disposal on land?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ health and safety hazards to workers from toxic gases and hazardous materials which maybe contained in confined areas, sewage flow and exposure to pathogens in untreated sewage and unstabilized sludge?</li> </ul>			
<ul style="list-style-type: none"> <li>▪ large population increase during project construction and operation that causes increased burden on social infrastructure (such as sanitation system)?</li> </ul>			

Screening Questions	Yes	No	Remarks
▪ social conflicts between construction workers from other areas and community workers?			
▪ risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?			
▪ 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?			

### A Checklist for Preliminary Climate Risk Screening

**Country/Project Title:**

**Sector :**

**Subsector:**

**Division/Department:**

Screening Questions		Score	Remarks <sup>19</sup>
<b>Location and Design of project</b>	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?		
	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)?		
<b>Materials and Maintenance</b>	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)?		
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?		

<sup>19</sup> If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Screening Questions		Score	Remarks <sup>19</sup>
<b>Performance of project outputs</b>	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?		

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):**

**Other Comments:** \_\_\_\_\_

**Prepared by:**

## Appendix 13: Content and Format of Environmental Assessment Documents

### (Annex to Appendix 1 of ADB SPS, 2009)

1. **Executive summary** - This section describes concisely the critical facts, significant findings, and recommended actions.
2. **Policy, legal, and administrative framework** - This section discusses the national and local legal and institutional framework within which the environmental assessment is carried out. It also identifies project-relevant international environmental agreements to which the country is a party.
3. **Description of the project** - This section describes the proposed project; its major components; and its geographic, ecological, social, and temporal context, including any associated facility required by and for the project (for example, access roads, power plants, water supply, quarries and borrow pits, and spoil disposal). It normally includes drawings and maps showing the project's layout and components, the project site, and the project's area of influence.
4. **Description of the environment (baseline data)** - This section describes relevant physical, biological, and socioeconomic conditions within the study area. It also looks at current and proposed development activities within the project's area of influence, including those not directly connected to the project. It indicates the accuracy, reliability, and sources of the data.
5. **Anticipated environmental impacts and mitigation measures** - This section (i) predicts and assesses the project's likely positive and negative direct and indirect impacts to physical, biological, socioeconomic (including occupational health and safety, community health and safety, vulnerable groups and gender issues, and impacts on livelihoods through environmental media—Annex 2 of ADB Safeguard Policy, para. 6), and physical cultural resources in the project's area of influence, in quantitative terms to the extent possible; (ii) identifies mitigation measures and any residual negative impacts that cannot be mitigated; (iii) explores opportunities for enhancement; (iv) identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions and specifies topics that do not require further attention; and (v) examines global, transboundary, and cumulative impacts as appropriate.
6. **Analysis of alternatives** - This section examines (i) alternatives to the proposed project site, technology, design, and operation—including the no-project alternative—in terms of their potential environmental impacts; (ii) the feasibility of mitigating these impacts; (iii) their capital and recurrent costs; (iv) their suitability under local conditions; and (v) their institutional, training, and monitoring requirements. It also states the basis for selecting the particular project design proposed, and justifies recommended emission levels and approaches to pollution prevention and abatement.
7. **Information disclosure, consultation, and participation** - This section:
  - (i) describes the process undertaken during project design and preparation for engaging stakeholders, including information disclosure and consultation with affected people and other stakeholders;
  - (ii) summarizes comments and concerns received from affected people and other stakeholders, and how these comments have been addressed in project design

- and mitigation measures, with special attention paid to the needs and concerns of vulnerable groups, including women, the poor, and indigenous peoples; and
- (iii) describes the planned information disclosure measures (including the type of information to be disseminated and the method of dissemination) and the process for carrying out consultation with affected people and facilitating their participation during project implementation.

8. **Grievance redress mechanism** - This section describes the grievance redress framework (both informal and formal channels), setting out the time frame and mechanisms for resolving complaints about environmental performance.

9. **Environmental management plan** - This section deals with the set of mitigation and management measures to be taken during project implementation to avoid, reduce, mitigate, or compensate for adverse environmental impacts (in that order of priority). It may include multiple management plans and actions. It includes the following key components (with the level of detail commensurate with the project's impacts and risks):

- (i) **Mitigation** (a) identifies and summarizes anticipated significant adverse environmental impacts and risks; (b) describes each mitigation measure with technical details, including the type of impact to which it relates and the conditions under which it is required (for instance, continuously or in the event of contingencies), together with designs, equipment descriptions, and operating procedures, as appropriate; and (c) provides links to any other mitigation plans (for example, for involuntary resettlement, indigenous peoples, or emergency response) required for the project.
- (ii) **Monitoring** (a) describes monitoring measures with technical details, including parameters to be measured, methods to be used, sampling locations, frequency of measurements, detection limits, and definition of thresholds that will signal the need for corrective actions; and (b) describes monitoring and reporting procedures to ensure early detection of conditions that necessitate particular mitigation measures and document the progress and results of mitigation.
- (iii) **Implementation arrangements** (a) specifies the implementation schedule showing phasing and coordination with overall project implementation; (b) describes institutional or organizational arrangements, namely, who is responsible for carrying out the mitigation and monitoring measures, which may include one or more of the following additional topics to strengthen environmental management capability: technical assistance programs, training programs, procurement of equipment and supplies related to environmental management and monitoring, and organizational changes; and (c) estimates capital and recurrent costs and describes sources of funds for implementing the environmental management plan.
- (iv) **Performance indicators** describes the desired outcomes as measurable events to the extent possible, such as performance indicators, targets, or acceptance criteria that can be tracked over defined time periods.

10. **Conclusion and recommendation** - This section provides the conclusions drawn from the assessment and provides recommendations.

### Appendix 14: Generic EMP Matrixes

#### A. Water Supply

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
<b>Site establishment and preliminary activities</b>				
1.	Legislation, permits, and agreements	In all instances, KMC, service providers, contractors, and consultants must remain in compliance with relevant local and national legislation.	PMU and DSC	Prior to moving onto site and during construction
		DSC to obtain statutory clearances and permits from government agencies and other entities	PMU	Prior to start of civil works
		Contractor to submit proof of compliance to Air Act (in relation to hot mixing, stone crushers, diesel generators)	DSC environment specialist	Prior to moving onto site and during construction
		A copy of the EMP must be kept on-site during the construction period	PMU environment specialist specialist and DSC environment specialist	At all times
2.	Access to site	Access to site will be via existing roads. The contractor will need to ascertain the existing condition of the roads, repair them, and ensure that damage shall not occur due to construction.	DSC Environment Specialist	Prior to moving onto site and during construction
		The Local Traffic Department shall be involved in the planning stages of the road closure and detour and be available on-site in the monitoring of traffic in the early stages of the operations during road closure.	DSC environment specialist	Prior to moving onto site
		The Local Traffic Department must be informed at least a week in advance if the traffic in the area will be affected.	DSC environment specialist	Prior to moving onto site
		The location of all affected services and servitudes must be identified and confirmed.	DSC environment specialist	Prior to moving onto site
		All roads for construction access must be planned and approved ahead of construction activities. They shall not be created on an ad hoc basis.	PMU environment specialist and DSC environment specialist	Prior to moving onto site and during construction
		No trees/shrubs/groundcover may be removed or vegetation stripped without prior permission.	PMU environment specialist and DSC environment specialist	Before and during construction
		Contractors shall construct formal drainage on all temporary haulage roads in the form of side drains and miter drains to prevent erosion and point source discharge of run-off.	DSC environment specialist	Prior to moving onto site

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
3.	Setting up of construction camp <sup>1</sup>	Choice of site for the contractor's camp requires the DSC environment specialist's permission and must take into account location of local residents, businesses, and existing land uses, including flood zones and slip/unstable zones. A site plan must be submitted to the DSC environment specialist for approval.	DSC Environment specialist and PMU environment specialist	During surveys and preliminary investigations and prior to moving onto the site
		The construction camp may not be situated on a floodplain or on slopes greater than 1:3.	PMU environment specialist and DSC environment specialist	During surveys and preliminary investigations and prior to moving onto the site
		If the contractor chooses to locate the campsite on private land, he must get prior permission from both the DSC environment specialist and the landowner.	PMU environment specialist and DSC environment specialist	During site establishment and ongoing; weekly inspections
		In most cases, on-site accommodation will not be required. The construction camp can thus be comprised of: <ul style="list-style-type: none"> <li>• site office</li> <li>• toilet facilities</li> <li>• designated first aid area</li> <li>• eating areas</li> <li>• staff lockers and showers (where water and waterborne sewers are available)</li> <li>• storage areas</li> <li>• batching plant (if required)</li> <li>• refueling areas (if required)</li> <li>• maintenance areas (if required)</li> <li>• crushers (if required)</li> </ul>	DSC environment specialist	During set-up
		Cut and fill must be avoided where possible during the set-up of the construction camp.	DSC environment specialist	During site set-up
		The contractor shall make adequate provision for temporary toilets for the use of their employees during the construction phase. Such facilities, which shall comply with local authority regulations, shall be maintained in a clean and hygienic condition. Their use shall be strictly enforced.	DSC environment specialist	During site establishment and ongoing; weekly inspections
		Under no circumstances may open areas or the surrounding bush be used as a toilet facility.	DSC environment specialist	Ongoing
		Bins and/or skips shall be provided at convenient intervals for disposal	DSC environment specialist	During site set-up and ongoing

<sup>1</sup> Careful planning of the construction camp can ensure that time and costs associated with environmental management and rehabilitation are reduced.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		of waste within the construction camp.		
		Bins shall have liner bags for efficient control and safe disposal of waste.	DSC environment specialist	Ongoing
		Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged.	DSC environment specialist	During site set-up and ongoing
4.	Establishing equipment lay-down and storage area <sup>2</sup>	Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to adjacent land uses, general on-site topography, and water erosion potential of the soil. Impervious surfaces must be provided where necessary.	PMU environment specialist and DSC environment specialist	During site set-up
		Storage areas shall be secure so as to minimize the risk of crime. They shall also be safe from access by children, animals, etc.	DSC environment specialist	During site set-up
		It is very important that the proximity of residents, businesses, schools, etc. is taken into account when deciding on storage areas for hazardous substances or materials. Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area.	PMU environment specialist and DSC environment specialist	During site set-up
		Equipment lay-down and storage areas must be designated, demarcated, and fenced if necessary.	DSC environment specialist	During site set-up
		Fire prevention facilities must be present at all storage facilities.	DSC environment specialist	During site set-up
		Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage areas. These pollution prevention measures for storage shall include a bund wall high enough to contain at least 110% of any stored volume. The contractor shall submit a method statement for approval.	DSC environment specialist	During site set-up and ongoing
		These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm	DSC environment specialist	During site set-up and ongoing

<sup>2</sup> Storage areas can be hazardous and unsightly and can cause environmental pollution if not designed and managed carefully.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		water from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.		
		Fuel tanks must meet relevant specifications and be elevated so that leaks may be easily detected.	DSC environment specialist	During site set-up and monitored
		Material safety data sheets (MSDSs) shall be readily available on-site for all chemicals and hazardous substances to be used. Where possible, the available, MSDSs shall additionally include information on ecological impacts and measures to minimize negative environmental impacts during accidental releases or escapes.	DSC environment specialist and contractor	Ongoing
		Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. The contractor must ensure that his staff are made aware of the health risks associated with any hazardous substances used, have been provided with the appropriate protective clothing/equipment in case of spillages or accidents, and have received the necessary training.	DSC environment specialist and contractor	Ongoing
		Contractors shall submit a method statement and plans for the storage of hazardous materials and emergency procedures.	DSC environment specialist	Prior to establishment of storage area
5.	Materials management – sourcing <sup>3</sup>	Contractors shall prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, etc.), and submit these to the DSC environment specialist for approval prior to commencement of any work.	PMU environment specialist and DSC environment specialist	Upon award of contract
		Where possible, a signed document from the supplier of natural materials shall be obtained, confirming that they have been obtained in a sustainable manner and in compliance with relevant legislation.	PMU environment specialist and DSC environment specialist	Upon receipt of natural materials
		Where materials are borrowed (mined), proof must be provided of authorization to utilize these materials from the	DSC environment specialist	Upon receipt of borrowed (mined) materials

<sup>3</sup> Materials must be sourced in a legal and sustainable way to prevent offsite environmental degradation.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		landowner/material rights owner and the Department of Mines, Government of West Bengal.		
6.	Education of site staff on general and environmental conduct <sup>4</sup>	Ensure that all site personnel have a basic level of environmental awareness training.	PMU environment specialist, DSC environment specialist, and contractor	During staff induction and ongoing
		Staff operating equipment (such as excavators, loaders, etc.) shall be adequately trained and sensitized to any potential hazards associated with their task.	DSC environment specialist and contractor	During staff induction, followed by ongoing monitoring
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the contractor and certified competent by DSC.	DSC environment specialist and contractor	During staff induction, followed by ongoing monitoring
		All employees must undergo safety training and wear the necessary protective clothing	DSC Environment Specialist and Contractor	During staff induction, followed by ongoing monitoring
		A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: <ul style="list-style-type: none"> <li>• no alcohol/drugs on-site;</li> <li>• prevent excessive noise;</li> <li>• construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden);</li> <li>• no fires to be permitted on-site;</li> <li>• trespassing on private/commercial properties adjoining the site is forbidden;</li> <li>• other than pre-approved security staff, no workers shall be permitted to live on the construction site; and</li> <li>• no worker may be forced to do work that is potentially dangerous or for which he/she is not trained.</li> </ul>	DSC environment specialist and contractor	During staff induction, followed by ongoing monitoring
6.	Social impacts <sup>5</sup>	Open liaison channels shall be established between the site owner, the developer, operator, the contractors, and interested and affected people, such that any	PMU environment specialist and DSC environment specialist	Prior to moving onto site and ongoing

<sup>4</sup> These points need to be made clear to all staff on-site before the subproject begins.

<sup>5</sup> It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		queries, complaints, or suggestions can be dealt with quickly and by the appropriate persons.		
		A communications strategy is of vital importance to accommodating traffic during road closure. The road closure, together with the proposed detour, needs to be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.	PMU environment specialist	Prior to moving onto site and ongoing
		Advance road signage must indicate the road detour and alternative routes. Provide sign boards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints.	PMU environment specialist	Prior to moving onto site and ongoing
		Storage facilities, elevated tanks, and other temporary structures on-site shall be located such that they have as little visual impact on local residents as possible.	DSC environment specialist and PMU environment specialist	During surveys and preliminary investigations and site set-up
		In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.	DSC environment specialist and PMU environment specialist	During surveys and preliminary investigations and site set-up
		Special attention shall be given to the screening of highly reflective materials on-site.	PMU environment specialist	During site set-up
7.	Noise impacts	Construction vehicles are to be fitted with standard silencers prior to the beginning of construction.		
		Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers, etc.) will be used as per operating instructions and maintained properly during site operations.		
8.	Dust/air pollution <sup>6</sup>	Vehicles travelling along the access roads must adhere to speed limits to avoid creating excessive dust.	PMU environment specialist	Ongoing
		Camp construction/haulage road construction areas that have been stripped of vegetation must be dampened periodically to avoid excessive dust.	PMU environment specialist	Ongoing, more frequently during dry and windy conditions
		The contractor must make alternative arrangements (other	DSC environment specialist	Ongoing

<sup>6</sup> Establishment of the campsite and related temporary works can reduce air quality.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		than fires) for cooking and/or heating requirements. LPG gas cookers may be used, provided that all safety regulations are followed.		
9.	Soil erosion	The time that stripped areas are left open to exposure shall be minimized wherever possible. Care shall be taken to ensure that lead times are not excessive.	DSC environment specialist and PMU environment specialist	Throughout the duration of the subproject
		Wind screening and storm water control shall be undertaken to prevent soil loss from the site.	DSC environment specialist and PMU environment specialist	During site set-up
		Procedures that are in place to conserve topsoil during the construction phase of the subproject are to be applied to the set-up phase. i.e. topsoil is to be conserved while providing access to the site and setting up the camp.	DSC environment specialist and PMU environment specialist	Ongoing monitoring during site set-up
10.	Storm water <sup>7</sup>	To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated, and the drainage system assessed accordingly. A drainage plan must be submitted to the DSC environment specialist for approval, and must include the location and design criteria of any temporary stream crossings (siting and return period, etc.).	DSC environment specialist	During surveys and preliminary investigations
		During site establishment, storm water culverts and drains are to be located and covered with metal grids to prevent blockages if deemed necessary by the DSC environment specialist. (e.g. due to demolition work).	DSC environment specialist	During site setup
		Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.	PMU environment specialist	During site set-up
11.	Water quality <sup>8</sup> .	Storage areas that contain hazardous substances must be bunded with an approved impermeable liner.	DSC environment specialist	During site set-up
		Spills in bunded areas must be cleaned up, removed, and disposed of safely from the bunded area as soon after detection as possible to minimize pollution risk and reduced bunding capacity.	DSC environment specialist and PMU environment specialist	During site set-up

<sup>7</sup> Serious financial and environmental impacts can be caused by unmanaged storm water.

<sup>8</sup> Incorrect disposal of substances and materials and polluted run-off can have serious negative effects on groundwater quality

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		A designated, bunded area is to be set aside for vehicle washing and maintenance. Materials caught in this bunded area must be disposed off at a suitable waste site or as directed by the DSC environment specialist.	DSC environment specialist and PMU environment specialist	During site set-up
		Provision shall be made during set-up for all polluted runoff to be treated to the DSC environment specialist's approval before being discharged into the storm water system. (This will be required for the duration of the project.)	DSC environment specialist and PMU environment specialist	During site set-up and to be monitored weekly
12.	Conservation of the natural environment <sup>9</sup>	No vegetation may be cleared without prior permission from the DSC environment specialist.	DSC environment specialist and PMU environment specialist	During site set-up and ongoing
		Trees that are not to be cleared shall be marked beforehand with danger tape. The PMU environment specialist must be given a chance to mark vegetation that is to be conserved before the contractor begins clearing the site.	DSC environment specialist and PMU environment specialist	During site set-up
		Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported material.)	PMU environment specialist	Ongoing in campsite, haulage areas
13.	Set-up of waste management procedure	The excavation and use of rubbish pits on site is forbidden.	PMU environment specialist	Ongoing
		Burning of waste is forbidden.	PMU environment specialist	Ongoing
14.	Cultural environment	Prior to the commencement of construction, all staff need to know what possible archaeological or historical objects of value may look like, and notify the DSC environment specialist/contractor should such an item be uncovered.	PMU environment specialist	During site set-up and ongoing
15.	Security and safety	Lighting on-site is to be set up to provide maximum security and enable easier policing of the site, without creating a visual nuisance to local residents or businesses.	DSC environment specialist	During site set-up
		Material stockpiles or stacks, such as pipes, must be stable and well secured to avoid collapse and possible injury to site workers/local residents.	PMU environment specialist	Ongoing
		Flammable materials shall be stored as far as possible from	PMU environment specialist	Ongoing

<sup>9</sup> Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on and surrounding the site.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		adjacent residents/businesses.		
		All interested and affected persons shall be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples are: <ul style="list-style-type: none"> <li>• stringing of power lines</li> <li>• excavation for the micro-tunnel equipment</li> <li>• earthworks/earthmoving machinery beside houses, infrastructure, and sensitive receptors</li> <li>• risk to residences/sensitive receptors along haulage roads/access routes</li> </ul>	PMU environment specialist and DSC environment specialist	24 hours prior to activity in question
<b>Management of construction and workforce activities</b>				
1.	Access to site	Contractor shall ensure that all side and miter drains and scour check walls on access and haul roads are functioning properly and are well maintained.	DSC environment specialist	Weekly and after heavy rains
		Contractor shall ensure that access roads are maintained in good condition by attending to potholes, corrugation, and storm water damage as soon as these develop.	DSC environment specialist	Weekly inspection
		If necessary, contractor to employ a staff member to clean surface roads adjacent to construction sites where materials have been spilled.	DSC environment specialist	When necessary
		Contractor to avoid unnecessary compaction of soils by heavy vehicles	DSC environment specialist	Ongoing monitoring
		Contractor to restrict construction vehicles to demarcated access, haulage routes, and turning areas.	DSC environment specialist	Ongoing monitoring
2.	Maintenance of construction camp	Contractor to monitor and manage drainage of the campsite to avoid standing water and soil erosion	DSC environment specialist	Ongoing monitoring
		Contractor to ensure runoff from the campsite must not discharge into neighbors' properties	DSC environment specialist	Ongoing monitoring
		Contractor will maintain toilets in a clean state, and these shall be moved to ensure that they adequately service the work areas.	DSC environment specialist	Weekly inspection
		Contractor to ensure that open areas or the surrounding bush are not being used as a toilet facility	DSC environment specialist	Weekly inspection
		Contractor to ensure all litter is collected from the work and camp areas daily	DSC environment specialist	Ongoing monitoring
		Contractor to empty bins and/or skips regularly, dispose of wastes at the pre-approved sites, and	DSC environment specialist	Weekly inspection

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		keep all disposal waybills for review		
		Contractor to ensure eating areas are regularly serviced and cleaned to the highest possible standards of hygiene and cleanliness	DSC environment specialist	Ongoing monitoring
		Contractor to ensure that his camp and working areas are kept clean and tidy at all times	DSC environment specialist	Weekly monitoring
3.	Staff conduct	Contractor will monitor performance of construction workers, and ensure points relayed during their induction have been properly understood and are being followed. If necessary, the DSC environment specialist and/or a translator shall be called to the site to further explain aspects of environmental or social behavior that are unclear.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure rules explained in the worker conduct section <sup>10</sup> must be followed at all times	DSC environment specialist	Ongoing monitoring
4.	Dust and air pollution <sup>11</sup>	Contractor to ensure vehicles travelling to and from the construction site adhere to speed limits so as to avoid producing excessive dust	DSC environment specialist	Ongoing monitoring
		A speed limit of 30 kph must be adhered to on all dirt roads.	DSC environment specialist	Ongoing monitoring
		Contractor to dampen access and other cleared surfaces whenever possible, and especially in dry and windy conditions to avoid excessive dust.	DSC environment specialist	Ongoing monitoring
		Contractor to utilize screening using wooden supports and shade cloth where dust is unavoidable in residential, commercial, and sensitive receptor areas	DSC environment specialist	As directed by the DSC environment specialist
		Contractor to keep vehicles and machinery in good working order and meet manufacturers' specifications for safety, fuel consumption, etc.	DSC environment specialist	Ongoing monitoring
		Contractor to check and repair equipment as soon as possible if	DSC environment specialist	As directed by the DSC environment

<sup>10</sup> (i) no alcohol/drugs on-site; (ii) prevent excessive noise; (iii) construction staff to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden); (iv) no fires to be permitted on-site; (v) trespassing on private/commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; (vii) no worker may be forced to do work that is potentially dangerous or for which he/she is not trained.

<sup>11</sup> Main causes of air pollution during construction are dust from vehicle movements and stockpiles, vehicle emissions, and fires.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		excessive emissions are observed		specialist
		No fires are allowed on-site except for the burning of firebreaks.	DSC environment specialist	Ongoing monitoring
5.	Soil erosion	Once an area has been cleared of vegetation, the top layer of soil (nominally 150 mm) shall be removed, and contractor will stockpile this in the designated area.	DSC environment specialist	Ongoing monitoring
		Contractor to commence topsoiling and revegetation immediately after completion of an activity and at an agreed distance behind any particular work front	DSC environment specialist	As each activity is completed
		Contractor to ensure storm water control and wind screening to prevent soil loss from the site	DSC environment specialist	Ongoing monitoring
		Contractor to dispose of unusable soils and spoils in pre-approved disposal sites <sup>12</sup>	DSC environment specialist	Ongoing monitoring
		Contractor to protect all embankments, unless otherwise directed by the DSC environment specialist, with a cut-off drain to prevent water from cascading down the face of the embankment and causing erosion.	DSC environment specialist	Immediately after the creation of the embankment/stripping of vegetation
6.	Storm water	Contractor shall not in any way modify nor damage the banks or bed of streams, rivers, wetlands, other open water bodies, and drainage lines adjacent to or within the designated area, unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies shall be kept to a minimum in terms of (i) removal of riparian vegetation, and (ii) opening up of the stream channel.	PMU environment specialist and DSC environment specialist	Ongoing monitoring
		Contractor to dispose of earth, stones, and rubble and prevent obstruction of natural water pathway, i.e., these materials must not be placed in storm water channels, drainage lines, or rivers	DSC environment specialist	Monitoring throughout the duration of the subproject
		Contractor to check periodically sites' drainage system to ensure that the water flow is unobstructed	DSC environment specialist	Monthly inspection
		Contractor to control un-channeled flows. Where large areas of soil are left exposed, rows of straw hay or bundles of cut vegetation shall	DSC environment specialist	As surfaces become exposed

<sup>12</sup> Estimated total volume of unused excavated material to be disposed of is about 4,800 m<sup>3</sup> for Palta water works and 157,000 m<sup>3</sup> (inclusive of 1,500 m<sup>3</sup> of road crust) for Garden Reach water works.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		be dug into the soil in contours to slow surface wash and capture eroded soil.		
		Contractor to slow down flows where surface runoff is concentrated (e.g. along exposed roadways/tracks by contouring with hay bales or bundled vegetation generated during site clearance operation). If the area must be used for construction vehicles, berms may be used instead. The berms must be at least 30 cm high and well compacted. The berms shall channel concentrated flow into detention ponds or areas protected with hay bales for flow reduction and sediment capture.	DSC environment specialist	Ongoing monitoring
7.	Water quality <sup>13</sup>	Contractor to ensure mixing/decanting of all chemicals and hazardous substances takes place either on a tray or on an impermeable surface, and waste is disposed of at pre-approved disposal sites	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor to ensure every effort is made that any chemicals or hazardous substances do not contaminate the soil, Hooghly River, or groundwater on site	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor to ensure runoff from vehicle or plant washing does not enter Hooghly River or the groundwater and ensure wash water passes through an oil-grease trap prior to discharge	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor shall prohibit site staff from using any stream, river, other open water body, or natural water source adjacent to or within the designated site for bathing, washing of clothing, or any construction or related activities. Municipal water (or another source approved by the DSC environment specialist) shall instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc.	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor shall refer to emergency contact numbers of WBPCB in order to deal with spillages and contamination of	PMU environment specialist and DSC environment specialist	As necessary

<sup>13</sup> Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment are also detrimental to water quality. Mismanagement of polluted runoff from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to water quality.

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>
		aquatic environments		
8.	Conservation of natural environment	Contractor is to check that vegetation clearing and tree-felling have prior permission as the work front progresses.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure only trees that have been marked beforehand are to be removed	DSC environment specialist	Ongoing monitoring
		Contractor to prohibit site staff from gathering firewood, fruits, plants, crops or any other natural material on-site or in areas adjacent to the sites.	DSC environment specialist	Ongoing monitoring
		Contractor to prohibit site staff from hunting birds and animals on-site or in areas adjacent to the sites	DSC environment specialist	Ongoing monitoring
		Contractor will immediately re-vegetate stripped areas and remove alien species by weeding. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure, where possible, that cleared indigenous vegetation is kept in a nursery for use at a later stage (such as site rehabilitation).	DSC environment specialist	As the work front progresses
9.	Materials management	Contractor to ensure stockpiles do not obstruct natural water pathways	DSC environment specialist	As necessary
		Contractor to ensure stockpiles do not exceed 2 m in height unless otherwise permitted by the DSC environment specialist	DSC environment specialist	As necessary
		Contractor to cover stockpiles exposed to windy conditions or heavy rain with vegetation, cloth, or tarps	DSC environment specialist	As necessary
		Contractor to ensure stockpiles are kept clear of weeds and alien vegetation growth by regular weeding	DSC environment specialist	Monthly monitoring
		Contractor to ensure all concrete mixing takes place on a designated, impermeable surface.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure vehicles transporting concrete to the site are not washed on-site	Contractor	Ongoing monitoring
		Contractor to prohibit mixing of lime and other powders during excessively windy conditions	DSC environment specialist	As necessary
		Contractor to store all substances required for vehicle maintenance and repair in sealed containers until they can be disposed of/removed from the site	DSC environment specialist	Ongoing monitoring
		Contractor to ensure hazardous substances/materials are	DSC environment specialist	Ongoing monitoring

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		transported in sealed containers or bags		
		Contractor to prohibit spraying of herbicides/pesticides during windy conditions	DSC environment specialist	As necessary
10.	Waste management	Contractor to place refuse in designated skips/bins and rubble in demarcated areas, remove them from the site, and transport to pre-approved disposal sites. Waybills proving disposal at each site shall be provided for the DSC environment specialist's inspection.	DSC environment specialist	Checked at each site meeting
		Contractor to prohibit littering on-site and clear the site of litter at the end of each working day	DSC environment specialist	Ongoing monitoring
		Contractor to encourage recycling by providing separate receptacles for different types of waste and making sure that staffs are aware of their uses.	DSC environment specialist	Ongoing monitoring
		Contractor to clean toilets regularly and avoid contamination of soils, water, pollution, and nuisance to adjoining areas	DSC environment specialist	Weekly monitoring
11.	Social impacts <sup>14</sup>	Contractor to restrict activities and movement of staff to designated construction areas	DSC environment specialist	Ongoing
		Contractor to assist in locating DSC environment specialist and/or PMU environment specialist in the event a construction staff is approached by members of the public or other stakeholders	DSC environment specialist	Ongoing monitoring
		Contractor to ensure conduct of construction staff, when dealing with the public or other stakeholders, shall be in a manner that is polite and courteous at all times. Failure to adhere to this requirement may result in the removal of staff from the site.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure disruption of access for local residents is minimized and approved by the DSC environment specialist.	DSC environment specialist	Ongoing monitoring
		Contractor to provide walkways and metal sheets where required to maintain access across for people and vehicles.	DSC environment specialist	Ongoing monitoring
		Contractor to increase workforce in front of critical areas such as institutions, places of worship, business establishments,	DSC environment specialist	Ongoing monitoring

<sup>14</sup> Regular communication between the contractor and the interested and affected parties is important for the duration of the contract.

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>
		hospitals, and schools		
		Contractor to consult businesses and institutions regarding operating hours, and factor this in work schedules	DSC environment specialist	At least 1 week prior to the activity taking place
		Contractor to inform affected persons in writing of disruptive activities at least 24 hours beforehand. This can be done by way of leaflets giving DSC environment specialist and contractor's details or other method approved by the DSC environment specialist.	DSC environment specialist	At least 24 hours prior to the activity taking place
		Contractor to provide sign boards for pedestrians to inform them of the nature and duration of construction works and contact numbers for concerns/complaints	DSC environment specialist	At least 1 week prior to the activity taking place
		Contractors to ensure lighting at the construction site is pointed downwards and away from oncoming traffic and nearby houses	DSC environment specialist	Ongoing monitoring
		Contractor to ensure machinery and vehicles are in good working order to minimize noise nuisance	DSC environment specialist	Ongoing monitoring
		Contractor to restrict noisy activities to the daytime	DSC environment specialist	Ongoing monitoring
		A complaints register (refer to the grievance redress mechanism) shall be available at the site office. This shall be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the contractor. This register is to be tabled during monthly site meetings.	DSC environment specialist	Monthly monitoring
		Interested and affected people need to be made aware of the existence of the complaints book and the methods of communication available to them.	PMU environment specialist and DSC environment specialist	Ongoing monitoring
		Contractor to initially handle and document queries and complaints; submit these for inclusion in complaints register; bring issues to DSC environment specialist's attention immediately; and take remedial action as per DSC environment specialist's instruction	PMU environment specialist and DSC environment specialist	As necessary
		Contractor to assign staff for formal consultation with interested and affected people in order to explain and answer questions on the construction process	DSC environment specialist	Ongoing monitoring
12.	Cultural environment	Contractor will note possible items of historical or archaeological value, including old stone	DSC environment specialist	As required

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		foundations, tools, clayware, jewelry, remains, fossils, etc. If something of this nature is uncovered, contractor is to stop work immediately and notify the DSC environment specialist, who in turn will inform the PMU and coordinate with ASI or State Department of Archaeology.		
<b>Post-construction activities (defects liability period)</b>				
1.	Construction camp	All structures comprising the construction camp are to be removed from site.	DSC environment specialist	Subproject completion
		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.	DSC environment specialist	Subproject completion
		All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document.	DSC environment specialist	Subproject completion
		The contractor must arrange the cancellation of all temporary services.	DSC environment specialist	Subproject completion
2.	Vegetation	All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation.	DSC environment specialist	Subproject completion
		Open areas are to be replanted as per the revegetation specification.	DSC environment specialist	Subproject completion
		All vegetation that has been cleared during construction is to be removed from site or used as much as per the revegetation specification (except for seeding alien vegetation).	DSC environment specialist	Subproject completion
		The contractor is to water and maintain all planted vegetation until the end of the defects liability period, and is to submit a method statement regarding this to the DSC environment specialist.	DSC environment specialist	Subproject completion
3.	Land rehabilitation	All surfaces hardened due to construction activities are to be ripped, and imported materials thereon removed.	Contractor	Subproject completion
		All rubble is to be removed from the site and brought to an approved disposal site. Burying of rubble on-site is prohibited.	Contractor	Subproject completion
		The site is to be cleared of all litter.	Contractor	Subproject completion
		Surfaces are to be checked for waste products from activities such as concreting or asphaltting, and	Contractor	Subproject completion

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>
		cleared in a manner approved by the DSC environment specialist.		
		All embankments are to be trimmed, shaped, and replanted to the satisfaction of the DSC environment specialist.	DSC environment specialist and contractor	Subproject completion
		Borrow pits are to be closed and rehabilitated in accordance with the pre-approved management plan for each borrow pit. The Contractor shall liaise with the DSC environment specialist regarding these requirements.	DSC environment specialist	Subproject completion
		The contractor is to check that all watercourses are free from building rubble, spoil materials, and waste materials.	Contractor	Subproject completion
4.	Materials and infrastructure	Fences, barriers, and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the DSC environment specialist.	DSC environment specialist	Subproject completion
		All residual stockpiles must be removed to spoil or spread on-site as directed by the DSC environment specialist.	DSC environment specialist	Subproject completion
		All leftover building materials must be returned to the depot or removed from the site.	Contractor	Subproject completion
		The contractor must repair any damage that the construction works has caused to neighboring properties.	Contractors	As directed by the DSC environment specialist
	General	A meeting is to be held on-site between the DSC environment specialist, PMU environment specialist, and the contractor to approve all remediation activities and to ensure that the site has been restored to a condition approved by the DSC environment specialist.	DSC environment specialist and PMU environment specialist	Upon completion of the construction and maintenance phases
		Temporary roads must be closed and access across these blocked.	DSC environment specialist and PMU environment specialist	Upon completion of construction
		Access or haulage roads that were built across watercourses must be rehabilitated by removing temporary bridges and any other materials placed in or near to watercourses. Revegetation of banks or streambeds is necessary and must be approved by the DSC environment specialist.	DSC environment specialist and contractor	Upon completion of construction
		All areas where temporary services were installed are to be	DSC environment specialist and	Upon completion of construction

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		rehabilitated to the satisfaction of the DSC environment specialist.	contractor	
<b>Operations and maintenance</b>				
1.	Pollution monitoring	Monitor the environmental quality in terms of WTPs discharge, sludge, ambient air, and noise levels	KMC	As specified in the CTO to be issued by WBPCB
2.	Leak detection and repairs	Conduct pipe repairs the soonest time possible to avoid disruption of service and disturbance to users/sensitive receptors	KMC	As necessary
3.	Sludge reuse and disposal	Implement sludge management plan	KMC	As necessary
4.	Trees and landscaping maintenance	Young trees require sufficient water until their roots are able to tap available groundwater. Make every effort to water existing trees during periods of drought. When pruning, cut as close as possible to the branch collar. Do not injure or remove the collar.	KMC	

## B. Sewerage and Drainage

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
<b>Site establishment and preliminary activities</b>				
1.	Legislation, permits, and agreements	In all instances, KMC, service providers, contractors, and consultants must remain in compliance with relevant local and national legislation.	PMU and DSC	Prior to moving onto site and during construction
		DSC will obtain statutory clearances and permits from government agencies and other entities.	PMU	Prior to start of civil works
		Contractor to submit proof of compliance to Air Act (in relation to hot mixing, stone crushers, diesel generators)	DSC environment specialist	Prior to moving onto site and during construction
		A copy of the EMP must be kept on-site during the construction period.	PMU environment specialist and DSC environment specialist	At all times
2.	Access to site	Access to site will be via existing roads. The contractor will need to ascertain the existing condition of the roads and repair them, and ensure that damage shall not occur due to construction.	DSC environment specialist	Prior to moving onto site and during construction
		The Local Traffic Department shall be involved in the planning stages of the road closure and detour and be available on-site in the monitoring of traffic in the early stages of the operations during road closure.	DSC environment specialist	Prior to moving onto site
		The Local Traffic Department must be informed at least a week in advance if the traffic in the area will be affected.	DSC environment specialist	Prior to moving onto site
		The location of all affected services and servitudes must be identified and confirmed.	DSC environment specialist	Prior to moving onto site

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		All roads for construction access must be planned and approved ahead of construction activities. They shall not be created on an ad hoc basis.	PMU environment specialist and DSC environment specialist	Prior to moving onto site and during construction
		No trees, shrubs, or groundcover may be removed or vegetation stripped without prior permission.	PMU environment specialist and DSC environment specialist	Before and during construction
		Contractors shall construct formal drainage on all temporary haulage roads in the form of side drains and miter drains to prevent erosion and point source discharge of runoff.	DSC environment specialist	Prior to moving onto site
3.	Setting up of construction camp <sup>15</sup>	Choice of site for the contractor's camp requires the DSC environment specialist's permission, and must take into account location of local residents, businesses, and existing land uses, including flood zones and slip/ unstable zones. A site plan must be submitted to the DSC environment specialist for approval.	DSC environment specialist and PMU environment specialist	During surveys and preliminary investigations and prior to moving onto the site
		The construction camp may not be situated on a floodplain or on slopes greater than 1:3.	PMU environment specialist and DSC environment specialist	During surveys and preliminary investigations and prior to moving onto the site
		If the contractor chooses to locate the campsite on private land, he must get prior permission from both the DSC environment specialist and the landowner.	PMU environment specialist and DSC environment specialist	During site establishment and ongoing; weekly inspections
		In most cases, on-site accommodation will not be required. The construction camp can thus be comprised of: <ul style="list-style-type: none"> <li>• site office</li> <li>• toilet facilities</li> <li>• designated first aid area</li> <li>• eating areas</li> <li>• staff lockers and showers (where water and waterborne sewers are available)</li> <li>• storage areas</li> <li>• batching plant (if required)</li> <li>• refueling areas (if required)</li> <li>• maintenance areas (if required)</li> <li>• crushers (if required)</li> </ul>	DSC environment specialist	During set-up
		Cut and fill must be avoided where possible during the set-up of the construction camp.	DSC environment specialist	During site set-up
		The contractor shall make adequate provision for temporary toilets for the use of their employees during the construction phase. Such facilities, which shall comply with local authority	DSC environment specialist	During site establishment and ongoing; weekly inspections

<sup>15</sup> Careful planning of the construction camp can ensure that time and costs associated with environmental management and rehabilitation are reduced.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		regulations, shall be maintained in a clean and hygienic condition. Their use shall be strictly enforced.		
		Under no circumstances may open areas or the surrounding bush be used as a toilet facility.	DSC environment specialist	Ongoing
		Bins and/or skips shall be provided at convenient intervals for disposal of waste within the construction camp.	DSC environment specialist	During site set-up and ongoing
		Bins shall have liner bags for efficient control and safe disposal of waste	DSC environment specialist	Ongoing
		Recycling and the provision of separate waste receptacles for different types of waste shall be encouraged.	DSC environment specialist	During site set-up and ongoing
4.	Establishing equipment lay-down and storage area <sup>16</sup>	Choice of location for equipment lay-down and storage areas must take into account prevailing winds, distances to adjacent land uses, general on-site topography, and water erosion potential of the soil. Impervious surfaces must be provided where necessary.	PMU environment specialist and DSC environment specialist	During site set-up
		Storage areas shall be secure so as to minimize the risk of crime. They shall also be safe from access by children, animals, etc.	DSC environment specialist	During site set-up
		It is very important that the proximity of residents, businesses, schools, etc. is taken into account when deciding on storage areas for hazardous substances or materials. Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area.	PMU environment specialist and DSC environment specialist	During site set-up
		Equipment lay-down and storage areas must be designated, demarcated, and fenced if necessary.	DSC environment specialist	During site set-up
		Fire prevention facilities must be present at all storage facilities.	DSC environment specialist	During site set-up
		Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the temporary storage areas. These pollution prevention measures for storage shall include a bund wall high enough to contain at least 110% of any stored volume. The contractor shall submit a method statement for approval.	DSC environment specialist	During site set-up and ongoing
		These storage facilities (including any tanks) must be on an impermeable surface that is protected from the ingress of storm water from surrounding areas in order to ensure that accidental	DSC environment specialist	During site set-up and ongoing

<sup>16</sup> Storage areas can be hazardous and unsightly and can cause environmental pollution if not designed and managed carefully.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		spillage does not pollute local soil or water resources.		
		Fuel tanks must meet relevant specifications and be elevated so that leaks may be easily detected.	DSC environment specialist	During site set-up and monitored
		Material safety data sheets (MSDSs) shall be readily available on-site for all chemicals and hazardous substances to be used. Where possible, the MSDSs shall additionally include information on ecological impacts and measures to minimize negative environmental impacts during accidental releases or escapes.	DSC environment specialist and contractor	Ongoing
		Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures. The contractor must ensure that the staff is made aware of the health risks associated with any hazardous substances used, have been provided with the appropriate protective clothing/equipment in case of spillages or accidents, and have received the necessary training.	DSC environment specialist and contractor	Ongoing
		Contractors shall submit a method statement and plans for the storage of hazardous materials and emergency procedures.	DSC environment specialist	Prior to establishment of storage area
5.	Materials management – sourcing <sup>17</sup>	Contractors shall prepare a source statement indicating the sources of all materials (including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, etc.), and submit these to the DSC environment specialist for approval prior to commencement of any work.	PMU environment specialist and DSC environment specialist	Upon award of contract
		Where possible, a signed document from the supplier of natural materials shall be obtained confirming that they have been obtained in a sustainable manner and in compliance with relevant legislation.	PMU environment specialist and DSC environment specialist	Upon receipt of natural materials
		Where materials are borrowed (mined), proof must be provided of authorization to utilize these materials from the landowner/material rights owner and the Department of Minerals.	DSC environment specialist	Upon receipt of borrowed (mined) materials
6.	Education of site staff on general and environmental conduct <sup>18</sup>	Ensure that all site personnel have a basic level of environmental awareness training.	PMU environment specialist, DSC environment specialist, and contractor	During staff induction and ongoing
		Staff operating equipment (such as excavators, loaders, etc.) shall be	DSC environment specialist and	During staff induction, followed by ongoing

<sup>17</sup> Materials must be sourced in a legal and sustainable way to prevent offsite environmental degradation.

<sup>18</sup> These points need to be made clear to all staff on-site before the subproject begins.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		adequately trained and sensitized to any potential hazards associated with their task.	contractor	monitoring
		No operator shall be permitted to operate critical items of mechanical equipment without having been trained by the contractor and certified competent by DSC.	DSC environment specialist and contractor	During staff induction, followed by ongoing monitoring
		All employees must undergo safety training and wear the necessary protective clothing	DSC environment specialist and contractor	During staff induction, followed by ongoing monitoring
		A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules: <ul style="list-style-type: none"> <li>• no alcohol/drugs on-site;</li> <li>• prevent excessive noise;</li> <li>• construction staff are to make use of the facilities provided for them, as opposed to adhoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden);</li> <li>• no fires to be permitted on-site;</li> <li>• trespassing on private/ commercial properties adjoining the site is forbidden;</li> <li>• other than pre-approved security staff, no workers shall be permitted to live on the construction site; and</li> <li>• no worker may be forced to do work that is potentially dangerous or for which he/she is not trained.</li> </ul>	DSC environment specialist and contractor	During staff induction, followed by ongoing monitoring
6.	Social impacts <sup>19</sup>	Open liaison channels shall be established between the site owner, the developer, operator, the contractors, and interested and affected people such that any queries, complaints, or suggestions can be dealt with quickly and by the appropriate persons.	PMU environment specialist and DSC environment specialist	Prior to moving onto site and ongoing
		A communications strategy is of vital importance to accommodating traffic during road closure. The road closure, together with the proposed detour, needs to be communicated via advertising, pamphlets, radio broadcasts, road signage, etc.	PMU environment specialist	Prior to moving onto site and ongoing
		Advance road signage must indicate the road detour and alternative routes. Provide sign boards for pedestrians to inform them of nature and duration of construction works and contact numbers for concerns/complaints.	PMU environment specialist	Prior to moving onto site and ongoing
		Storage facilities, elevated tanks, and	DSC environment	During surveys and

<sup>19</sup> It is important to take notice of the needs and wishes of those living or working adjacent to the site. Failure to do so can cause disruption to work.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		other temporary structures on-site shall be located, such that they have as little visual impact on local residents as possible.	specialist and PMU environment specialist	preliminary investigations and site set-up
		In areas where the visual environment is particularly important or privacy concerns for surrounding buildings exist, the site may require screening. This could be in the form of shade cloth, temporary walls, or other suitable materials prior to the beginning of construction.	DSC environment specialist and PMU environment specialist	During surveys and preliminary investigations and site set-up
		Special attention shall be given to the screening of highly reflective materials on-site.	PMU environment specialist	During site set-up
7.	Noise impacts	Construction vehicles are to be fitted with standard silencers prior to the beginning of construction.		
		Equipment that is fitted with noise reduction facilities (e.g. side flaps, silencers, etc.) will be used as per operating instructions and maintained properly during site operations.		
8.	Dust/air pollution <sup>20</sup>	Vehicles travelling along the access roads must adhere to speed limits to avoid creating excessive dust.	PMU environment specialist	Ongoing
		Camp construction/haulage road construction areas that have been stripped of vegetation must be dampened periodically to avoid excessive dust.	PMU environment specialist	Ongoing; more frequently during dry and windy conditions
		The contractor must make alternative arrangements (other than fires) for cooking and/or heating requirements. LPG gas cookers may be used, provided that all safety regulations are followed.	DSC environment specialist	Ongoing
9.	Soil erosion	The time that stripped areas are left open to exposure shall be minimized wherever possible. Care shall be taken to ensure that lead times are not excessive.	DSC environment specialist and PMU environment specialist	Throughout the duration of the subproject
		Wind screening and storm water control shall be undertaken to prevent soil loss from the site.	DSC environment specialist and PMU environment specialist	During site set-up
		Procedures that are in place to conserve topsoil during the construction phase of the subproject are to be applied to the set-up phase, i.e., topsoil is to be conserved while providing access to the site and setting up the camp.	DSC environment specialist and PMU environment specialist	Ongoing monitoring. during site set-up
10.	Storm water <sup>21</sup>	To prevent storm water damage, the increase in storm water runoff resulting	DSC environment specialist	During surveys and preliminary

<sup>20</sup> Establishment of the campsite and related temporary works can reduce air quality.

<sup>21</sup> Serious financial and environmental impacts can be caused by unmanaged storm water.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		from construction activities must be estimated, and the drainage system assessed accordingly. A drainage plan must be submitted to the DSC environment specialist for approval and must include the location and design criteria of any temporary stream crossings (siting and return period, etc.).		Investigations
		During site establishment, storm water culverts and drains are to be located and covered with metal grids to prevent blockages if deemed necessary by the DSC environment specialist (e.g. due to demolition work).	DSC environment specialist	During site setup
		Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.	PMU environment specialist	During site set-up
11.	Water quality <sup>22</sup>	Storage areas that contain hazardous substances must be bunded with an approved impermeable liner.	DSC environment specialist	During site set-up
		Spills in bunded areas must be cleaned up, removed, and disposed of safely from the bunded area as soon after detection as possible to minimize pollution risk and reduced bunding capacity.	DSC environment specialist and PMU environment specialist	During site set-up
		A designated bunded area is to be set aside for vehicle washing and maintenance. Materials caught in this bunded area must be disposed of at a suitable waste site or as directed by the DSC environment specialist	DSC environment specialist and PMU environment specialist	During site set-up
		Provision shall be made during set-up for all polluted runoff to be treated to the DSC environment specialist's approval before being discharged into the storm water system. (This will be required for the duration of the project.)	DSC environment specialist and PMU environment specialist	During site set-up and to be monitored weekly
12.	Conservation of the natural environment <sup>23</sup>	No vegetation may be cleared without prior permission from the DSC environment specialist	DSC environment specialist and PMU environment specialist	During site set-up and ongoing
		Trees that are not to be cleared shall be marked beforehand with danger tape. The PMU environment specialist must be given a chance to mark vegetation that is to be conserved before the contractor begins clearing the site.	DSC environment specialist and PMU environment specialist	During site set-up
		Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported	PMU environment specialist	Ongoing in campsite, haulage areas

<sup>22</sup> Incorrect disposal of substances and materials and polluted runoff can have serious negative effects on groundwater quality.

<sup>23</sup> Alien plant encroachment is particularly damaging to natural habitats and is often associated with disturbance to the soil during construction activities. Care must be taken to conserve existing plant and animal life on and surrounding the site.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		material.)		
13.	Set-up of waste management procedure	The excavation and use of rubbish pits on-site is forbidden.	PMU environment specialist	Ongoing
		Burning of waste is forbidden.	PMU environment specialist	Ongoing
14.	Cultural environment	Prior to the commencement of construction, all staff need to know what possible archaeological or historical objects of value may look like, and to notify the DSC environment specialist/contractor should such an item be uncovered.	PMU environment specialist	During site set-up and ongoing
15.	Security and safety	Lighting on-site is to be set up to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.	DSC environment specialist	During site set-up
		Material stockpiles or stacks, such as, pipes, must be stable and well secured to avoid collapse and possible injury to site workers/local residents.	PMU environment specialist	Ongoing
		Flammable materials shall be stored as far as possible from adjacent residents/businesses.	PMU environment specialist	Ongoing
		All interested and affected persons shall be notified in advance of any known potential risks associated with the construction site and the activities on it. Examples are: <ul style="list-style-type: none"> <li>• stringing of power lines</li> <li>• excavation for the micro-tunnel equipment</li> <li>• earthworks/earthmoving machinery beside houses, infrastructure, or sensitive receptors</li> <li>• risk to residences/sensitive receptors along haulage roads/ access routes</li> </ul>	PMU environment specialist and DSC environment	24 hours prior to activity in question
<b>Management of construction and work force activities</b>				
1.	Access to site	Contractor shall ensure that all side and miter drains and scour check walls on access and haul roads are functioning properly and are well maintained.	DSC environment specialist	Weekly and after heavy rains
		Contractor shall ensure that access roads are maintained in good condition by attending to potholes, corrugations, and storm water damage as soon as these develop.	DSC environment specialist	Weekly inspection
		If necessary, contractor will employ a staff member to clean surface roads adjacent to construction sites where materials have been spilled.	DSC environment specialist	When necessary
		Contractor to avoid unnecessary compaction of soils by heavy vehicles	DSC environment specialist	Ongoing monitoring
		Contractor to restrict construction vehicles to demarcated access, haulage routes, and turning areas	DSC environment specialist	Ongoing monitoring
2.	Maintenance of	Contractor to monitor and manage	DSC environment	Ongoing monitoring

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
	construction camp	drainage of the campsite to avoid standing water and soil erosion	specialist	
		Contractor to ensure runoff from the campsite must not discharge into neighbors' properties	DSC environment specialist	Ongoing monitoring
		Contractor to maintain toilets in a clean state, and these shall be moved to ensure that they adequately service the work areas.	DSC environment specialist	Weekly inspection
		Contractor to ensure that open areas or the surrounding bush are not being used as a toilet facility.	DSC environment specialist	Weekly inspection
		Contractor to ensure all litter is collected from the work and camp areas daily	DSC environment specialist	Ongoing monitoring
		Contractor to empty bins and/or skips regularly, dispose of wastes at the pre-approved sites, and keep all disposal waybills for review.	DSC environment specialist	Weekly inspection
		Contractor to ensure eating areas are regularly serviced and cleaned to the highest possible standards of hygiene and cleanliness	DSC environment specialist	Ongoing monitoring
		Contractor to ensure that his camp and working areas are kept clean and tidy at all times	DSC environment specialist	Weekly monitoring
3.	Staff conduct	Contractor will monitor performance of construction workers and ensure points relayed during their induction have been properly understood and are being followed. If necessary, the DSC environment specialist and/or a translator shall be called to the site to further explain aspects of environmental or social behavior that are unclear.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure rules that are explained in the worker conduct section <sup>24</sup> must be followed at all times.	DSC environment specialist	Ongoing monitoring
4.	Dust and air pollution <sup>25</sup>	Contractor to ensure vehicles travelling to and from the construction site adhere to speed limits so as to avoid producing excessive dust.	DSC environment specialist	Ongoing monitoring
		A speed limit of 30 kph must be adhered to on all dirt roads.	DSC environment specialist	Ongoing monitoring
		Contractor to dampen access and other cleared surfaces whenever possible and especially in dry and windy conditions to avoid excessive dust	DSC environment specialist	Ongoing monitoring
		Contractor to utilize screening using wooden supports and shade cloth	DSC environment specialist	As directed by the DSC environment

<sup>24</sup> (i) no alcohol/drugs present on-site; (ii) prevent excessive noise; (iii) construction staff are to make use of the facilities provided for them, as opposed to ad hoc alternatives (e.g. fires for cooking, the use of surrounding bush as a toilet facility are forbidden); (iv) no fires to be permitted on-site; (v) trespassing on private/ commercial properties adjoining the site is forbidden; (vi) other than pre-approved security staff, no workers shall be permitted to live on the construction site; (vii) no worker may be forced to do work that is potentially dangerous or for which he/she is not trained.

<sup>25</sup> Main causes of air pollution during construction are dust from vehicle movements and stockpiles, vehicle emissions, and fires.

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>
		where dust is unavoidable in residential, commercial, and sensitive receptors areas.		specialist
		Contractor to keep vehicles and machinery in good working order and meet manufacturers specifications for safety, fuel consumption, etc.	DSC environment specialist	Ongoing monitoring
		Contractor to check and repair equipment as soon as possible if excessive emissions are observed.	DSC environment specialist	As directed by the DSC environment specialist
		No fires are allowed on-site except for the burning of firebreaks.	DSC environment specialist	Ongoing monitoring
5.	Soil erosion	Once an area has been cleared of vegetation, the top layer of soil (nominally 150 mm) shall be removed and contractor will stockpile this in the designated area.	DSC environment specialist	Ongoing monitoring
		Contractor to commence topsoiling and revegetation immediately after completion of an activity, and at an agreed distance behind any particular work front	DSC environment specialist	As each activity is completed
		Contractor to ensure storm water control and wind screening to prevent soil loss from the site	DSC environment specialist	Ongoing monitoring
		Contractor to dispose of unusable soils and spoils in pre-approved disposal sites	DSC environment specialist	Ongoing monitoring
		Contractor to protect all embankments, unless otherwise directed by the DSC environment specialist, by a cut-off drain to prevent water from cascading down the face of the embankment and causing erosion	DSC environment specialist	Immediately after the creation of the embankment/stripping of vegetation
6.	Storm water	Contractor shall not in any way modify nor damage the banks or bed of streams, rivers, wetlands, other open water bodies and drainage lines adjacent to or within the designated area, unless required as part of the construction project specification. Where such disturbance is unavoidable, modification of water bodies shall be kept to a minimum in terms of (i) removal of riparian vegetation, and (ii) opening up of the stream channel.	PMU environment specialist and DSC environment specialist	Ongoing monitoring
		Contractor to dispose of earth, stones, and rubble and prevent obstruction of natural water pathway, i.e., these materials must not be placed in storm water channels, drainage lines, or rivers	DSC environment specialist	Monitoring throughout the duration of the subproject
		Contractor to check periodically sites' drainage system to ensure that the water flow is unobstructed	DSC environment specialist	Monthly inspection
		Contractor will control unchanneled flows. Where large areas of soil are left exposed, rows of straw/hay or bundles of cut vegetation shall be dug into the soil in contours to slow surface wash	DSC environment specialist	As surfaces become exposed

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		and capture eroded soil.		
		Contractor will slow down flows where surface runoff is concentrated (e.g. along exposed roadways/tracks by contouring with hay bales or bundled vegetation generated during site clearance operation). If the area must be used for construction vehicles, berms may be used instead. The berms must be at least 30 cm high and well compacted. The berms shall channel concentrated flow into detention ponds or areas protected with hay bales for flow reduction and sediment capture.	DSC environment specialist	Ongoing monitoring
7.	Water quality <sup>26</sup>	Contractor will ensure mixing/decanting of all chemicals and hazardous substances takes place either on a tray or on an impermeable surface, and waste from these will be disposed of at pre-approved disposal sites.	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor to ensure every effort is made that any chemicals or hazardous substances do not contaminate the soil, Hooghly River, or groundwater on site	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor to ensure runoff from vehicle or plant washing does not enter Hooghly River or the groundwater, and ensure wash water passes through an oil-grease trap prior to discharge	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor to prohibit site staff from using any stream, river, other open water body, or natural water source adjacent to or within the designated site for bathing, washing of clothing, or any construction or related activities. Municipal water (or another source approved by the DSC environment specialist) shall instead be used for all activities such as washing of equipment or disposal of any type of waste, dust suppression, concrete mixing, compacting, etc.	DSC environment specialist	Regular monitoring (refer to the environmental monitoring program)
		Contractor shall refer to emergency contact numbers of WBPCB in order to deal with spillages and contamination of aquatic environments.	PMU environment specialist and DSC environment specialist	As necessary
8.	Conservation of natural environment	Contractor is to check that vegetation clearing and tree-felling have prior permission as the work front progresses.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure only trees that have been marked beforehand are to be removed	DSC environment specialist	Ongoing monitoring
		Contractor to prohibit site staff from	DSC environment	Ongoing monitoring

Water quality is affected by the incorrect handling of substances and materials. Soil erosion and sediment are also detrimental to water quality. Mismanagement of polluted runoff from vehicle and plant washing and wind dispersal of dry materials into rivers and watercourses are detrimental to water quality.

	<b>Activity</b>	<b>Management/Mitigation</b>	<b>Responsible for Monitoring</b>	<b>Frequency</b>
		gathering firewood, fruits, plants, crops or any other natural material on-site or in areas adjacent to the sites	specialist	
		Contractor to prohibit site staff from hunting birds and animals on-site or in areas adjacent to the sites	DSC environment specialist	Ongoing monitoring
		Contractor to immediately revegetate stripped areas and remove alien species by weeding. This significantly reduces the amount of time and money that must be spent on alien plant management during rehabilitation.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure, where possible, that cleared indigenous vegetation is kept in a nursery for use at a later stage (such as site rehabilitation)	DSC environment specialist	As the work front progresses
9.	Materials management	Contractor to ensure stockpiles do not obstruct natural water pathways.	DSC environment specialist	As necessary
		Contractor to ensure stockpiles do not exceed 2 m in height unless otherwise permitted by the DSC environment specialist	DSC environment specialist	As necessary
		Contractor to cover stockpiles exposed to windy conditions or heavy rain with vegetation, cloth, or tarps	DSC environment specialist	As necessary
		Contractor to ensure stockpiles are kept clear of weeds and alien vegetation growth by regular weeding	DSC environment specialist	Monthly monitoring
		Contractor to ensure all concrete mixing takes place on a designated, impermeable surface	DSC environment specialist	Ongoing monitoring
		Contractor to ensure vehicles transporting concrete to the site are not washed on-site	Contractor	Ongoing monitoring
		Contractor to prohibit mixing of lime and other powders during excessively windy conditions	DSC environment specialist	As necessary
		Contractor to store all substances required for vehicle maintenance and repair in sealed containers until they can be disposed of or removed from the sites	DSC environment specialist	Ongoing monitoring
		Contractor to ensure hazardous substances/materials are transported in sealed containers or bags	DSC environment specialist	Ongoing monitoring
		Contractor to prohibit spraying of herbicides/pesticides during windy conditions	DSC environment specialist	As necessary
10.	Waste management	Contractor to place refuse in designated skips/bins and rubble in demarcated areas, remove them from the site, and transport them to pre-approved disposal sites. Waybills proving disposal at each site shall be provided for the DSC environment specialist's inspection.	DSC environment specialist	Checked at each site meeting
		Contractor to prohibit littering on-site and clear the site of litter at the end of each working day.	DSC environment specialist	Ongoing monitoring
		Contractor to encourage recycling by	DSC environment	Ongoing monitoring

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		providing separate receptacles for different types of waste and make sure that staff are aware of their uses.	specialist	
		Contractor to clean toilets regularly and avoid contamination of soils, water, pollution, and nuisance to adjoining areas	DSC environment specialist	Weekly monitoring
11.	Social impacts <sup>27</sup>	Contractor to restrict activities and movement of staff to designated construction areas	DSC environment specialist	Ongoing
		Contractor to assist in locating DSC environment specialist and/or PMU environment specialist in the event a construction staff is approached by members of the public or other stakeholders	DSC environment specialist	Ongoing monitoring
		Contractor to ensure conduct of construction staff, when dealing with the public or other stakeholders, shall be in a manner that is polite and courteous at all times. Failure to adhere to this requirement may result in the removal of staff from the site.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure disruption of access for local residents is minimized and approved by the DSC environment specialist	DSC environment specialist	Ongoing monitoring
		Contractor to provide walkways and metal sheets where required to maintain access across for people and vehicles	DSC environment specialist	Ongoing monitoring
		Contractor to increase workforce in front of critical areas such as institutions, places of worship, business establishments, hospitals, and schools	DSC environment specialist	Ongoing monitoring
		Contractor to consult businesses and institutions regarding operating hours, and factor this in work schedules	DSC environment specialist	At least 1 week prior to the activity taking place
		Contractor to inform affected persons in writing of disruptive activities at least 24 hours beforehand. This can be done by way of leaflets giving DSC environment specialist and contractor's details or other method approved by the DSC environment specialist.	DSC environment specialist	At least 24 hours prior to the activity taking place
		Contractor to provide sign boards for pedestrians to inform them of the nature and duration of construction works and contact numbers for concerns/complaints	DSC environment specialist	At least 1 week prior to the activity taking place
		Contractors to ensure lighting at the construction site is pointed downwards and away from oncoming traffic and nearby houses.	DSC environment specialist	Ongoing monitoring
		Contractor to ensure machinery and vehicles are in good working order to	DSC environment specialist	Ongoing monitoring

<sup>27</sup> Regular communication between the contractor and the interested and affected parties is important for the duration of the contract.

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		minimize noise nuisance		
		Contractor to restrict noisy activities to the daytime	DSC environment specialist	Ongoing monitoring
		A complaints register (refer to the grievance redress mechanism) shall be available at the site office. This shall be in carbon copy format, with numbered pages. Any missing pages must be accounted for by the contractor. This register is to be tabled during monthly site meetings.	DSC environment specialist	Monthly monitoring
		Interested and affected people need to be made aware of the existence of the complaints book and the methods of communication available to them.	PMU environment specialist and DSC environment specialist	Ongoing monitoring
		Contractor to initially handle and document queries and complaints; submit these for inclusion in the complaints register; bring issues to DSC environment specialist's attention immediately; and take remedial action as per DSC environment specialist's instruction	PMU environment specialist and DSC environment specialist	As necessary
		Contractor to assign staff for formal consultation with the interested and affected people in order to explain and answer questions on the construction process	DSC environment specialist	Ongoing monitoring
12.	Cultural environment	Contractor to note possible items of historical or archaeological value, including old stone foundations, tools, clayware, jewelry, remains, fossils, etc. If something of this nature is uncovered, contractor is to stop work immediately and notify the DSC environment specialist, who in turn will inform the PMU and coordinate with ASI or State Department of Archaeology.	DSC environment specialist	As required
<b>Post-construction activities (defects liability period)</b>				
1.	Construction camp	All structures comprising the construction camp are to be removed from site.	DSC environment specialist	Subproject completion
		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.	DSC environment specialist	Subproject completion
		All hardened surfaces within the construction camp area shall be ripped, all imported materials removed, and the area topsoiled and regrassed using the guidelines set out in the revegetation specification that forms part of this document.	DSC environment specialist	Subproject completion
		The contractor must arrange the cancellation of all temporary services.	DSC environment specialist	Subproject completion
2.	Vegetation	All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation.	DSC environment specialist	Subproject completion

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		Open areas are to be replanted as per the revegetation specification.	DSC environment specialist	Subproject completion
		All vegetation that has been cleared during construction is to be removed from site or used as much as per the revegetation specification (except for seeding alien vegetation).	DSC environment specialist	Subproject completion
		The contractor is to water and maintain all planted vegetation until the end of the defects liability period, and is to submit a method statement regarding this to the DSC environment specialist.	DSC environment specialist	Subproject completion
3.	Land rehabilitation	All surfaces hardened due to construction activities are to be ripped, and imported materials thereon removed.	Contractor	Subproject completion
		All rubble is to be removed from the site and disposed of at an approved site. Burying of rubble on-site is prohibited.	Contractor	Subproject completion
		The site is to be cleared of all litter.	Contractor	Subproject completion
		Surfaces are to be checked for waste products from activities such as concreting or asphaltting, and cleared in a manner approved by the DSC environment specialist.	Contractor	Subproject completion
		All embankments are to be trimmed, shaped, and replanted to the satisfaction of the DSC environment specialist.	DSC environment specialist and contractor	Subproject completion
		Borrow pits are to be closed and rehabilitated in accordance with the pre-approved management plan for each borrow pit. The contractor shall liaise with the DSC environment specialist regarding these requirements.	DSC environment specialist	Subproject completion
		The contractor is to check that all watercourses are free from building rubble, spoil materials, and waste materials.	Contractor	Subproject completion
4.	Materials and infrastructure	Fences, barriers, and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the DSC environment specialist.	DSC environment specialist	Subproject completion
		All residual stockpiles must be removed to spoil or spread on-site as directed by the DSC environment specialist.	DSC environment specialist	Subproject completion
		All leftover building materials must be returned to the depot or removed from the site.	Contractor	Subproject completion
		The contractor must repair any damage that the construction work has caused to neighboring properties.	Contractors	As directed by the DSC environment specialist
	General	A meeting is to be held on-site between the DSC environment specialist, PMU environment specialist, and the contractor to approve all remediation activities and to ensure that the site has been restored to a condition approved	DSC environment specialist and PMU environment specialist	Upon completion of the construction and maintenance phases

	Activity	Management/Mitigation	Responsible for Monitoring	Frequency
		by the DSC environment specialist.		
		Temporary roads must be closed and access across these blocked.	DSC environment specialist and PMU environment specialist	Upon completion of construction
		Access or haulage roads that were built across watercourses must be rehabilitated by removing temporary bridges and any other materials placed in or near to watercourses. Revegetation of banks or streambeds is necessary, and these must be approved by the DSC environment specialist.	DSC environment specialist and contractor	Upon completion of construction
		All areas where temporary services were installed are to be rehabilitated to the satisfaction of the DSC environment specialist.	DSC environment specialist and contractor	On completion of construction
<b>Operations and maintenance</b>				
1.	Pollution monitoring	Monitor the environmental quality in terms of pumps' discharge, sludge, ambient air, and noise levels.	KMC	As specified in the CTO to be issued by WBPCB
2.	Leak detection and repairs	Conduct pipe repairs at the soonest time possible to avoid disruption of service and disturbance to users/sensitive receptors.	KMC	As necessary
3.	Sludge disposal	Analyze for hazardous elements and accomplish safe disposal at pre-approved sites.	KMC	As necessary
4.	Trees and landscaping maintenance	Young trees require sufficient water until their roots are able to tap available groundwater. Make every effort to water existing trees during periods of drought. When pruning, cut as close as possible to the branch collar. Do not injure or remove the collar.	KMC	

### Appendix 15: Sample Grievance Registration Form

(To be available also in Bengali, Hindi, and Urdu)

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

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

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

#### FOR OFFICIAL USE ONLY

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

**Appendix 16: Environmental Monitoring Format- Monthly**

Month:                      Year:

**A. Work Details**

**Work Details and Risks**

Locations	Subprojects Components (Package No.)	Name of the Contractor	Listing of Works Under the Package	Starting Date (Land Clearance) and Scheduled Date of Completion	What Type of Works Continued at Present	Progress %	Expected Changes from Approved Scope	Fulfillment of Objectives- Type of Remedial Measures Needed	Key Assumptions and Risks that Affect Attainment of the Objectives

**B. Implementation of Environmental Management Plan**

**Status of Environment, Forests, and Other Clearances**

City/Town	Work (Package No.)	Applicable Legislation/ Type of Clearance	Clearance Given by and Date	Subject/Issue	Remarks/Action Needed

**Compliance with Environmental Management Plan**

Description of Impact	Mitigation Measures	Proposed Implementation Status	Detail/ Remarks on implementation	Monitoring Methods and Frequency	Monitoring Conducted By	Monitoring Remarks (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfaction/ Poor/Very Poor)	Remarks and Actions Taken to Improve Implementation
Pre-construction							
Construction							
Operation (Defect Liability Period)							

Dated

Signature  
Name  
Designation