

Appendix X: Applicable Standards for EMP

Table 1: Applicable Noise Levels Standards

Sl. No.	Category of areas	The Noise Pollution (Control) Rules 2006 (dBA)		IFC Standard, 2007 (One Hour LA _{eq} dBA) ^a		Applicable to the Project per ADB Safeguard Policy Statement (dBA) ^b	
		Day	Night	Day (07:00-22:00)	Night (22:00-07:00)	Day	Night
1	Silent zone ^c	50	40	-	-	50	40
2	Residential zone	55	45	55	45	55	45
3	Mixed zone (mainly residential area, simultaneously used for commercial and industrial purposes)	60	50	-	-	60	50
4	Commercial zone	70	60	70	70	70	60
5	Industrial zone	75	70	70	70	70	70
6	Occupational Health and Safety (above these limits PPE to be worn)	TBC		85dB(A) (L _{aeq} 8 hours) Peak sound pressure 140 dB(C) L _{Amax} 110 dB(A)		85dB(A) (L _{aeq} 8 hours) Peak sound pressure 140 dB(C) Average maximum 110 dB(A)	

Source: Bangladesh Noise Pollution Control Rules 2006, Guidelines for Community Noise, World Health Organization (WHO), 1999 and IFC World Bank Group. 2007. Environmental, Health and Safety General Guidelines. Washington, D.C.

a/ Except for occupational health and safety levels guidelines values are for noise levels measured out of doors. Noise monitoring should be carried out using a Type 1 or 2 sound level meter meeting all appropriate IEC standards.

b/ If less stringent levels or measures are appropriate in view of specific project circumstances, executing agency will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS within the disclosed IEE report.

c/ Area up to a radius of 100 meters around hospitals or educational institutions or special institutions/establishments identified/to be identified by the Government is designated as Silent Zones where use of horns of vehicles or other audio signals, and loudspeakers are prohibited.

Table 2: Applicable Ambient Air Quality Standards

Parameter	Bangladesh Ambient Air Quality Standard ($\mu\text{g}/\text{m}^3$) ^a	WHO Air Quality Guidelines ($\mu\text{g}/\text{m}^3$)		Applicable to the Project per ADB Safeguard Policy Statement ^d ($\mu\text{g}/\text{m}^3$)
		Global Update ^b 2005	Global Update ^c 2021	
PM ₁₀	50 (1-year) 150 (24-h)	20 (1-year) 50 (24-h)	15 (1-year) 45 (24-h)	45 (24-h)
PM _{2.5}	35 (1-year) 65 (24-h)	10 (1-year) 25 (24-h)	5 (1-year) 15 (24-h)	15 (24-h)
SO ₂	250 (1-h) 80 (24-h)	20 (24-h) 500 (10-min)	40 (24-h)	40 (24-h) 500 (10-min)
NO ₂	40 (Annual) 80 (24-h)100 (1-year)	40 (1-year) 200 (1-h)	10 (1-year) 25 (24-h)	25 (24-h) 200 (1-h)
CO	5,000 (8-h) 20,000 (1-h)	-	4,000 (24-h)	4,000 (24-h) 10,000 (8-h) 40,000 (1-h)
Lead	0.25 (1-year) 0.50 (24-h)	-	-	0.5 (1-year)
Ozone (O ₃)	180 (1-h) 100 (8-h)	100 (8-h)	100 (8-h) 60 (peak season, average 6 months)	100 (8-h)
Ammonia (NH ₃)	100 (Annual) 400 (24-h)	-	-	400 (24-h)

ADB = Asian Development Bank, CO = carbon monoxide, h = hour, $\mu\text{g}/\text{m}^3$ = microgram per cubic meter, min = minute, NO₂ = nitrogen dioxide, PM_{2.5} = particulate matter 2.5 microns, PM₁₀ = particulate matter 10 microns, SO₂ = sulfur dioxide, TSP = total suspended particle, WHO = World Health Organization. a/ SRO NO. 255-LAW/2022(Bangladesh Air Pollution Control Rules, 2022)). <https://mccibd.org/wp-content/uploads/2022/07/Air-Pollution-Control-Rules-2022.pdf>

b/ IFC World Bank Group. 2007. *Environmental, Health and Safety General Guidelines*. Washington, D.C.

c/ WHO. 2021. *WHO global air quality guidelines: particulate matter (PM_{2.5} and PM₁₀), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide*. Geneva. 24-h standards are 99%iles.

d/If less stringent levels or measures are appropriate in view of specific project circumstances, executing agency will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS within the disclosed IEE.

Table 3: Applicable Effluent Discharge Standards by Receiving Environment

Sl. No.	Parameters	Unit	Discharge To ^a			IFC Standard 2007, Treated Sanitary Sewage Discharge to Inland Surface Water
			Inland Surface Water	Public Sewerage system connected to treatment at second stage	Irrigated Land	
1	Ammoniacal nitrogen (as elementary N)	mg/l	50	75	75	-
2	Ammonia (as free ammonia)	mg/l	5	5	15	-
3	Arsenic (as As)	mg/l	0.2	0.05	0.2	-
4	BOD ₅ at 20°C	mg/l	50	250	100	30
5	Boron	mg/l	2	2	2	-
6	Cadmium (as Cd)	mg/l	0.5	0.05	0.05	-
7	Chloride	mg/l	600	600	600	-
8	Chromium (as total Cr)	mg/l	0.5	1.0	1.0	-
9	COD	mg/l	200	400	400	125
10	Chromium (as hexavalent Cr)	mg/l	0.1	1.0	1.0	-
11	Copper (as Cu)	mg/l	0.5	3.0	3.0	-
12	Dissolved oxygen (DO)	mg/l	4.5-8	4.5-8	4.5-8	-
13	Electro-conductivity (EC)	micromho/cm	1200	1200	1200	-
14	Total dissolved solids	mg/l	2100	2100	2100	-
15	Fluoride (as F)	mg/l	2	15	10	-
16	Sulfide (as S)	mg/l	1	2	2	-
17	Iron (as Fe)	mg/l	2	2	2	-
18	Total Kjeldahl nitrogen (as N)	mg/l	100	100	100	10 (Total Nitrogen)
19	Lead (as Pb)	mg/l	0.1	1	0.1	-
20	Manganese (as Mn)	mg/l	5	5	5	-
21	Mercury (as Hg)	mg/l	0.01	0.01	0.01	-
22	Nickel (as Ni)	mg/l	1.0	2.0	1.0	-
23	Nitrate (as elementary N)	mg/l	10.0	Not yet set	10	-
24	Oil and grease	mg/l	10	20	10	10

Sl. No.	Parameters	Unit	Discharge To ^a			IFC Standard 2007, Treated Sanitary Sewage Discharge to Inland Surface Water
			Inland Surface Water	Public Sewerage system connected to treatment at second stage	Irrigated Land	
25	Phenolic compounds (as C ₆ H ₅ OH)	mg/l	1.0	5	1.0	-
26	Dissolved phosphorus (as P)	mg/l	8	8	15	2 (Total Phosphorous)
27	Radioactive substance	(to be specified by Bangladesh Atomic Energy Commission)				-
28	pH	----	6-9	6-9	6-9	6-9
29	Selenium (as Se)	mg/l	0.05	0.05	0.05	-
30	Zinc (as Zn)	mg/l	5	10	10	-
31	Temperature	°C (summer)	40	40	40	-
		°C (winter)	45	45	45	
32	Suspended solids (SS)	mg/l	150	500	200	50 (TSS)
33	Cyanide (as Cn)	mg/l	0.1	2.0	0.2	-
	Total Coliform	MPN/100ml	-	-	-	400

^a Schedule 10 Standards for Waste from Industrial Units or Projects Waste [See Rule 13]

Notes:

1. These standards shall be applicable to all industries or projects other than those specified under the heading “Standards for sector wise industrial effluent or emission.”
2. Compliance with these standards shall be ensured from the moment an industrial unit starts trial production, and in other cases, from the moment a project starts operation.
3. These standards shall be inviolable even in case of any sample collected instantly at any point of time. These standards may be enforced in a more stringent manner if considered necessary in view of the environmental conditions of a particular situation.
4. Inland Surface Water means drains/ponds/tanks/water bodies/ ditches, canals, rivers, springs and estuaries.
5. Public sewerage system means treatment facilities of the first and second stage and also the combined and complete treatment facilities.
6. Irrigable land means such land area which is sufficiently irrigated by wastewater taking into consideration the quantity and quality of such water for cultivation of selected crops on that land.
7. Inland Surface Water Standards shall apply to any discharge to a public sewerage system or to land if the discharge does not meet the requirements of the definitions in notes 5 and 6 above.

^b IFC World Bank Group. 2007. Environmental, Health and Safety General Guidelines. Washington, D.C.

MPM=maximum probable number

Table 4: Applicable Drinking Water Quality Standards (Groundwater Quality)

SI	Parameter	Unit Standard	Bangladesh Standard (ECR 2023)	WHO Guidelines 2017
1	Aluminum	mg/l	0.2	0.2
2	Ammonia (NH ₃)	mg/l	1.5	-
3	Arsenic	mg/l	0.05	0.01
4	Barium	mg/l	0.7	1.3
5	Benzene	mg/l	0.01	0.01
6	Boron	mg/l	1	2.4
7	Cadmium	mg/l	0.003	0.003
8	Calcium	mg/l	75	-
9	Chloride	mg/l	250*	-
10	Carbon Tetrachloride	mg/l	0.005	0.004
11	1.1 Dichloroethylene	mg/l	0.03	
12	1.2 Dichloroethylene	mg/l	0.03	0.03
13	Tetrachloroethylene	mg/l	0.04	0.04
14	Trichloroethylene	mg/l	0.02	0.02
15	Pentachlorophenol	mg/l	0.009	0.009
16	2.4.6 Trichlorophenol	mg/l	0.02	0.2
17	Chlorine (Residual)	mg/l	0.2	0.2
18	Chloroform	mg/l	0.09	0.3
19	Chromium (total)	mg/l	0.05	0.05
20	Coliform (fecal)	cfu/100 ml	0	-
21	Coliform (total)	cfu/100 ml	0	-
22	Color	Huyghens Unit	15	-
23	Copper	mg/l	1.5	2
24	Cyanide	mg/l	0.05	-
25	Fluoride	mg/l	1.0	1.5
26	Hardness (as CaCO ₃)	mg/l	500	-
27	Iron (Fe)	mg/l	0.3-1.0	-
28	Nitrogen (Total Kjeldahl Nitrogen)	mg/l	1	-
29	Lead	mg/l	0.01	0.01
30	Magnesium	mg/l	30-35	-
31	Manganese	mg/l	0.4	0.4
32	Mercury	mg/l	0.001	0.006
33	Nickel	mg/l	0.05	0.07
34	Nitrate	mg/l	45	50
35	Nitrite	mg/l	1	3

SI	Parameter	Unit Standard	Bangladesh Standard (ECR 2023)	WHO Guidelines 2017
36	Odor		Odorless	-
37	Oil & Grease	mg/l	0.01	-
38	pH		6.5-8.5	-
39	Phenolic Compounds	mg/l	0.002	-
40	Potassium	mg/l	12	-
41	Radioactive Materials (gross alpha activity)	bq/l	0.1	-
42	Radioactive Materials (gross beta activity)	bq/l	1.0	-
43	Selenium	mg/l	0.01	0.04
44	Silver	mg/l	0.02	-
45	Sodium	mg/l	200	50
46	Suspended particulate matters	mg/l	10	-
47	Sulfide as H ₂ S	mg/l	0.05	-
48	Sulfate	mg/l	250	-
49	Total dissolved solids	mg/l	1000	1000
50	Temperature	°C	20-30	-
51	Tin	mg/l	2	-
52	Turbidity	NTU	5	-
53	Zinc	mg/l	5	-
54	Aldrin/Dieldrin	Microgram/l	0.003	
55	Anionic Detergents	mg/l	0.2	

Table 5: Applicable Inland Surface Water Quality Standards

Best Practice Based classification	pH	DO mg/l	BOD mg/l	NO ₃ -N mg/l	NH ₄ -N mg/l	PO ₄ -P mg/l	Total Cr mg/l	Pb mg/l	Hg mg/l	Total Coliform cfu/100mg	TDS mg/l	COD mg/l
a. Source of drinking water for supply only after disinfecting:	6.5-8.5	≥6	≤2	7.0	0.1	0.1	0.02	0.03	0.001	≤100	1000	10
b. Water usable for recreational activity	6.5-8.5	≥5	≤3	7.0	0.3	0.5	0.2	0.05	0.001	≤50	1000	10
c. Source of drinking water for supply after conventional treatment	6-9	≥5	≤3	7.0	0.3	0.5	0.02	0.03	0.001	≤5000	1000	25
d. Water usable by fisheries	6-9	≥5	≤6	7.0	0.3	0.5	0.05	0.1	0.004	≤5000	1000	50
e. Water usable by various process and cooling industries	6.5-8.5	≥1	12	-	2.7	-	0.1	0.1	0.05	-	1000	100
f. Water usable for irrigation	6.5-8.5	-	≤12	5.0	1.5	2.0	0.1	0.1	0.002	≤50000	1000	100

Source: ECR,23

Table 6: Reference Levels for Occupational Exposure to Time-Varying Electric and Magnetic Fields

Frequency range	E-Field Strength (V/m)	H-Field Strength (A/m)	B-Field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
up to 1 Hz	—	1.63×10^5	2×10^5	—
1–8 Hz	20,000	$1.63 \times 10^5/f^2$	$2 \times 10^5/f^2$	—
8–25 Hz	20,000	$2 \times 10^4/f$	$2.5 \times 10^4/f$	—
0.025–0.82 kHz	$500/f$	$20/f$	$25/f$	—
0.82–65 kHz	610	24.4	30.7	—
0.065–1 MHz	610	$1.6/f$	$2.0/f$	—
1–10 MHz	$610/f$	$1.6/f$	$2.0/f$	—
10–400 MHz	61	0.16	0.2	10
400–2,000 MHz	$3f^{1/2}$	$0.008f^{1/2}$	$0.01f^{1/2}$	$f/40$
2–300 GHz	137	0.36	0.45	50

Table 7: Reference Levels for General Public Exposure to Time-Varying Electric and Magnetic Fields

Frequency range	E-Field Strength (V/m)	H-Field Strength (A/m)	B-Field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
up to 1 Hz	—	3.2×10^4	4×10^4	—
1–8 Hz	10,000	$3.2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8–25 Hz	10,000	$4,000/f$	$5,000/f$	—
0.025–0.8 kHz	$250/f$	$4/f$	$5/f$	—
0.8–3 kHz	$250/f$	5	6.25	—
3–150 kHz	87	5	6.25	—
0.15–1 MHz	87	$0.73/f$	$0.92/f$	—
1–10 MHz	$87/f^{1/2}$	$0.73/f$	$0.92/f$	—
10–400 MHz	28	0.073	0.092	2
400–2,000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$0.0046f^{1/2}$	$f/200$
2–300 GHz	61	0.16	0.2	10

Source: ICNIRP (International Commission on Non-Ionizing Radiation Protection) Guidelines 1998. Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)

Note:

- (i) f as indicated in the frequency range column.
- (ii) Provided that basic restrictions are met and adverse indirect effects can be excluded, field strength values can be exceeded.
- (iii) for frequencies between 100 kHz and 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any 6-min period.
- (iv) for frequencies exceeding 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any $68/f^{1.05}$ -min period (f in GHz).
- (v) No E-field value is provided for frequencies <1 Hz, which are effectively static electric fields. Electric shock from low impedance sources is prevented by established electrical safety procedures for such equipment.

Table 8: Minimum Limits for Workplace Illumination Intensity (IFC 2027)

Location / Activity	Light Intensity
Emergency light	10 lux
Outdoor non-working areas	20 lux
Simple orientation and temporary visits (Machine storage, garage, warehouse)	50 lux
Workspace with occasional visual tasks only (Corridors, stairways, lobby, elevator, auditorium, etc.)	100 lux
Medium precision work (Simple assembly, rough machine works, welding, packing, etc.)	200 lux
Precision work (Reading, moderately difficult assembly, sorting, checking, medium bench and machine works, etc.), offices.	500 lux
High precision work (Difficult assembly, sewing, color inspection, fine sorting etc.)	1,000 – 3,000 lux

Table 9: Guideline Values for Vibration Velocity to be Used When Evaluating Risks to Structures

Group	Type of structure	Guideline Values for Velocity (mm/s)				
		Short-term			Long-term	
		At foundation			Uppermost Floor	Uppermost Floor
		Less than 10 Hz	10 Hz to 50 Hz	50 to 100 Hz	All frequencies	All frequencies
1	Buildings used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	10
2	Residential dwellings and buildings of similar design and/or use	5 (105 dB)	5 to 15	15 to 20	15	5 (105 dB)
3	Structures that because of their particular sensitivity to vibration, do not correspond to those listed in Lines 1 or 2 and have intrinsic value (e.g. buildings that are under a preservation order)	3 (100.5 dB)	2 to 8	8 to 10	8	2.5 (99.0 dB)

Source: DIN 4150-3, Structural Vibration, Part 3: Effect of vibration on structures

Table 10: Transmission Voltage (kV) Width of Right of Way (in Meters)

Amount of Right of way (ROW)

Serial No	Transmission Voltage (kV)	Width of Right of way (on each side from the outer conductor) (Meter)	Minimum safe distance from conductive overhead wires (BS 7354) (Meter)
(1)	(2)	(3)	(4)
1.	11	2.50	2.50
2.	33	3.50	2.80
3.	132	14.00	3.80
4.	230	20.00	4.60
5.	400	23.00	6.40
6.	765	43.00	10.3

Source Bangladesh Electricity Rules 2020