

Environmental Management Plan

Impact Item	Mitigation Measure	Implementing Body	Responsible Organization	Cost
<b>Preparation and Construction Phase</b>				
Air Pollution	<ul style="list-style-type: none"> <li>Use of construction equipment with exhaust gas emission control</li> <li>Careful operation and self-regulation of speed of construction machineries and vehicles</li> <li>Watering to prevent dust</li> </ul>	Contractor	PIU/WASA-F	Costs not required due to measures taken in construction plan and construction methods
Water Pollution	<ul style="list-style-type: none"> <li>Control of soil flow out to RBC from the working area of Intake facility</li> <li>Preventive maintenance of construction machineries and vehicles</li> <li>Wastewater control at accommodation for workers</li> </ul>	Contractor	PIU/WASA-F	Costs not required due to measures taken in construction plan and construction methods
Solid Waste	<ul style="list-style-type: none"> <li>Proper waste handling at waste disposal site and treatment plant</li> <li>Guidance to workers on construction site regarding</li> </ul>	Contractor	PIU/WASA-F	Costs not required due to measures taken in construction plan and construction methods
Soil Contamination	<ul style="list-style-type: none"> <li>Safe handling of fuel and oil storage and disposal</li> <li>Prevention of oil leaks through proper inspection and maintenance of construction machineries</li> </ul>	Contractor	PIU/WASA-F	Costs not required due to measures taken in construction plan and construction methods
Noise and Vibration	<ul style="list-style-type: none"> <li>Active use of low-noise and low-vibrational construction machineries</li> <li>Careful operation and self-regulation of speed of construction machineries and vehicles</li> </ul>	Contractor	PIU/WASA-F	Costs not required due to measures taken in construction plan and construction methods
Hydrological Situation	<ul style="list-style-type: none"> <li>Banking design having minimal impact on hydrology</li> <li>Proper use of construction methods and materials</li> </ul>	Contractor	PIU/WASA-F	Costs not required due to measures taken in construction plan and construction methods
Local Economy (Livelihood, Employment, etc.)	<ul style="list-style-type: none"> <li>Effective traffic regulation to reduce impact on local economy</li> <li>Use of construction signs and other means to ensure traffic safety</li> </ul>	Contractor	PIU/WASA-F	Included in construction cost
Water Use and Water Rights	<ul style="list-style-type: none"> <li>Water intake restrictions during drought</li> <li>Regular community meetings on water use</li> </ul>	WASA-F	PIU/WASA-F	Costs not required since WASA-F is responsible
Existing Social Infrastructures & Services	<ul style="list-style-type: none"> <li>Regular access to existing infrastructures</li> <li>Advance notification during construction period</li> </ul>	Contractor	PIU/WASA-F	Included in construction cost
Landscap.	<ul style="list-style-type: none"> <li>Provision of fencing to blind off temporary storage of excavated materials and pipes</li> </ul>	Contractor	PIU/WASA-F	Included in construction cost
Infectious Diseases such as HIV/AIDS	<ul style="list-style-type: none"> <li>Awareness raising and guidance to workers on infection prevention</li> </ul>	Contractor	PIU/WASA-F	Costs not required since contractor is responsible
Working Conditions	<ul style="list-style-type: none"> <li>Inspection and execution of occupational safety and health guidelines</li> <li>Execution of regular safety meetings for workers</li> <li>Installation of safety signs</li> <li>Use of clothing to prevent dust and noise when transporting soil</li> </ul>	Contractor	PIU/WASA-F	Costs not required since contractor is responsible
Accidents (Traffic accidents, etc.)	<ul style="list-style-type: none"> <li>Careful operation and self-regulation of speed of construction vehicles (30km/hr or less)</li> <li>Notification of construction details to traffic regulations</li> <li>Assignment of traffic control staff and warning signs</li> <li>Clear management guidance for workers</li> </ul>	Contractor	PIU/WASA-F	Costs not required since contractor is responsible

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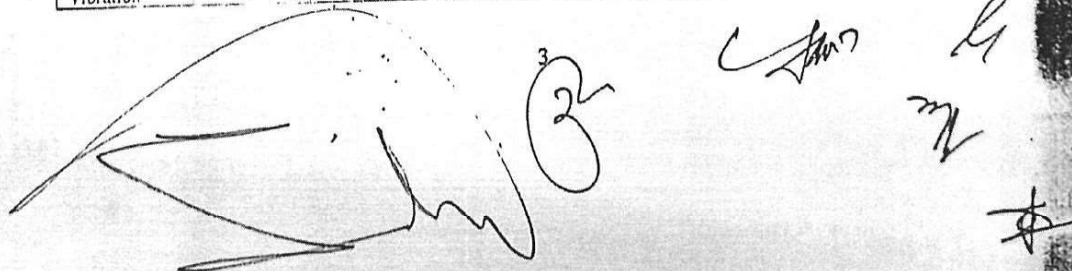
Impact Item	Mitigation Measure	Implementing Body	Responsible Organization	Cost
Operation Phase				
Solid Waste	<ul style="list-style-type: none"> <li>Proper removal and disposal of sludge generated from the water treatment plant</li> </ul>	WASA-F	PIU/WASA-F	Included in the Q&M costs of WASA-F
Noise and Vibration	<ul style="list-style-type: none"> <li>Active use of low-noise and low-vibrational construction machineries</li> </ul>	WASA-F	PIU/WASA-F	Included in the Q&M costs of WASA-F
The Poor	<ul style="list-style-type: none"> <li>Introduction of a fee structure which considers income</li> </ul>	WASA-F	PIU/WASA-F	Included in the Q&M costs of WASA-F
Water Use and Water Rights	<ul style="list-style-type: none"> <li>Coordination with Irrigation Department on water use balance between drinking water and irrigation water</li> </ul>	WASA-F	PIU/WASA-F	Included in the Q&M costs of WASA-F

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### Environmental Monitoring Plan

Impact Item	Monitoring Parameter	Measurement Method	Frequency	Monitoring Organization	Cost
<b>Preparation and Construction Phase</b>					
Air Pollution	<ul style="list-style-type: none"> <li>Presence of dust during construction</li> <li>Air quality measurement CO &lt;5, SO<sub>2</sub> &lt;120, NO<sub>x</sub> &lt;80, PM<sub>10</sub> &lt;150 (µg/m<sup>3</sup>)</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> <li>Air quality measurement</li> </ul>	Four times in a year	Contractor	Included in construction cost
Water Pollution	<ul style="list-style-type: none"> <li>Effluent water quality analyses COD &lt;150, SS &lt;200 (mg/L)</li> <li>Drinking water quality standard (31 parameters)</li> </ul>	<ul style="list-style-type: none"> <li>Water quality analysis</li> </ul>	Twice in a year	Contractor	Included in construction cost
Solid Waste	<ul style="list-style-type: none"> <li>Proper waste handling at waste disposal site and treatment plant</li> <li>Guidance to workers on construction site cleaning</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> </ul>	Monthly	Contractor	Not required due to confirmation by site inspection only
Soil Contamination	<ul style="list-style-type: none"> <li>Confirmation on soil inflow of fuel, oil, grease, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> </ul>	Monthly	Contractor	Not required due to confirmation by site inspection only
Noise and Vibration	<ul style="list-style-type: none"> <li>Noise level (Industrial area during daytime &lt;75dB)</li> </ul>	<ul style="list-style-type: none"> <li>Sound level meter</li> </ul>	Twice in a year	Contractor	Included in construction cost
Hydrological Situation	<ul style="list-style-type: none"> <li>Water level near intake point</li> </ul>	<ul style="list-style-type: none"> <li>Water level measurement</li> </ul>	Weekly	Contractor	Not required due to confirmation by site inspection only
Local Economy (Livelihood, Employment, etc.)	<ul style="list-style-type: none"> <li>Confirmation on regulation to ensure no impact on local economy</li> </ul>	<ul style="list-style-type: none"> <li>Inquiries to relevant persons</li> </ul>	Weekly	Contractor	Not required due to confirmation by site inspection only
Water Use and Water Rights	<ul style="list-style-type: none"> <li>Fluctuations in water quantity and quality in canal due to the construction of water intake facilities</li> </ul>	<ul style="list-style-type: none"> <li>Inquiries to relevant persons</li> <li>Physical observation</li> </ul>	Weekly	WASA-F	Not required due to inquiries done by WASA-F staff only
Existing Social Infrastructures & Services	<ul style="list-style-type: none"> <li>Existence of traffic obstruction or reduced access to existing infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Inquiries to relevant persons</li> <li>Physical observation</li> </ul>	Weekly	Contractor	Not required due to confirmation by site inspection only
Landscape	<ul style="list-style-type: none"> <li>Changes in landscape around construction site</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> </ul>	Monthly	Contractor	Not required due to confirmation by site inspection only
Infectious Diseases such as HIV/AIDS	<ul style="list-style-type: none"> <li>Prevalence of infectious diseases</li> <li>Implementation of guidance on the prevention of infectious diseases</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> </ul>	Monthly	Contractor	Not required due to internal training
Working Conditions	<ul style="list-style-type: none"> <li>Working conditions of employees and regular safety meetings</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> <li>Reports on workshops and meetings</li> </ul>	Weekly	Contractor	Not required due to internal training
Accidents (Traffic accidents, etc.)	<ul style="list-style-type: none"> <li>Occurrence of accidents</li> </ul>	<ul style="list-style-type: none"> <li>Inquiries to relevant persons</li> <li>Physical observation</li> </ul>	Weekly	Contractor	Not required due to confirmation by site inspection only
Operation Phase					
Solid Waste	<ul style="list-style-type: none"> <li>Removal of people removal and disposal of generated sludge</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> </ul>	Monthly	WASA-F	Not required due to confirmation by site inspection only
Noise and Vibration	<ul style="list-style-type: none"> <li>Noise level (Industrial area during daytime &lt;75dB)</li> </ul>	<ul style="list-style-type: none"> <li>Portable sound level meter</li> </ul>	Every 6 months	WASA-F	Not required due to confirmation by staff



Impact Item	Monitoring Parameter	Measurement Method	Frequency	Monitoring Organization	Cost
The Poor	Impact from water tariff system to household economy	<ul style="list-style-type: none"> <li>Inquiries to relevant person</li> </ul>	Every 6 months	WASA-F	Not required due to confirmation by staff
Water Use and Water Rights	Changes in amounts of irrigated water to downstream of the canal lands especially during drought periods	<ul style="list-style-type: none"> <li>Physical observation</li> <li>Inquiries to Irrigation Dept.</li> </ul>	Quarterly	WASA-F	Not required due to confirmation by site inspection only

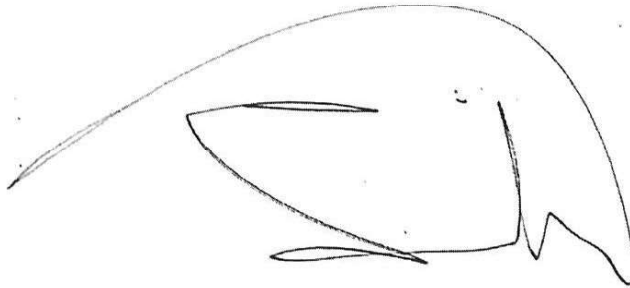
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Environmental and Social Monitoring Form

(1) Pollution Control Measures

1) Air Pollution: During Construction

a) Observation

Monitoring Item	Remarks
Dust generated at construction site	Construction site, Four times/year, Physical observation (existence of dust)

b) Measurement (Environmental Standard)

Item (Unit)	Measured Value (m)	Measured Value (Maximum)	Local Standard	Japanese Standard	Remarks (Measurement point, frequency, method)
CO (µg/m <sup>3</sup> )			<5	<10	Air quality measurement around construction site, Four times/year, Air quality measurement
SO <sub>2</sub> (µg/m <sup>3</sup> )			<120	<105	
NOx (µg/m <sup>3</sup> )			<80	—	
PM <sub>10</sub> (µg/m <sup>3</sup> )			<150	<100	

2) Water Pollution (Effluent/Drinking Water Quality Standard): During Construction

Item (Unit)	Measured Value (m)	Measured Value (Maximum)	Local Standard	Japanese Standard	Remarks (Measurement point, frequency, method)
COD (mg/L)			<150	<160	Effluent quality measurement around construction site, Twice/year, Water quality analysis
SS (mg/L)			<200	<200	
pH			6.5-8.5	5.8-8.6	Drinking water quality downstream of construction site at intake facility, Twice/year, Water quality analysis
Odour			NO	NO	
Taste			NO	NO	
Colour (PCU)			≤15 TCU	≤5 CU	
Turbidity (NTU)			<5	≤2	
Total (mg/L)			<500	≤300	
TDS (mg/L)			<1000	≤500	
Cl (mg/L)			<250	≤200	
CN (mg/L)			≤0.05	≤0.01	
F (mg/L)			≤1.5	≤0.8	
NO <sub>2</sub> (mg/L)			≤3	≤0.04 (as N)	
NO <sub>3</sub> (mg/L)			≤50	≤10 (NO <sub>2</sub> -N + NO <sub>3</sub> -N)	
Phenol (mg/L)			—	≤0.005	
Residual (mg/L)			0.2-0.5	—	
Al (mg/L)			≤0.2	≤0.2	
Pesticide			—	—	
Cd (mg/L)			0.01	≤0.003	
Cu (mg/L)			2	≤1.0	

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Item (mg/L)	Measured Value (Mean)	Measured Value (Maximum)	Local Standard	Japanese Standard	Remarks (Measurement point, frequency, method)
Cr (mg/L)			≤ 0.05	≤ 0.02 (Cr <sup>6+</sup> )	
Hg (mg/L)			≤ 0.001	≤ 0.0005	
Sb (mg/L)			≤ 0.005	—	
Ni (mg/L)			≤ 0.02	—	
Zn (mg/L)			5.0	≤ 1.0	
As (mg/L)			≤ 0.05	≤ 0.01	
Ba (mg/L)			0.7	—	
Mn (mg/L)			≤ 0.5	≤ 0.05	
B (mg/L)			0.3	≤ 1.0	
Pb (mg/L)			≤ 0.05	≤ 0.01	
Se (mg/L)			0.01	≤ 0.01	
Total Coliform			0/100ml	≤ 100/1ml (Common bacteria)	
Faecal Coliform			0/100ml	Not to be detected (E. Coll)	

3) Solid waste

a) During construction

Item	Remarks
<ul style="list-style-type: none"> <li>Proper disposal of solid waste at disposal site</li> <li>Clean up of construction site by workers</li> </ul>	Construction site and disposal site, Once/month, Physical observation (proper disposal, cleaning situation)

b) During operation

Item	Remarks
Proper removal and disposal of generated sludge	Water treatment plant, Once/month, Physical observation (status of sludge removal and disposal)

4) Solid waste during Construction

Item	Remarks
Proper storage of fuel (oil, etc.), soil etc.	Construction site, Once/month, Physical observation (status of fuel and oil storage and disposal.)

5) Noise measurement during Construction/During Operation

Item (dB)	Measured Value (Maximum)	Local Standard	Japanese Standard	Remarks (Measurement point, frequency, method)
Noise level		<75	<85	During construction: Daytime industrial area surrounding construction site, Twice/year, Sound level meter During operation: Daytime industrial area surrounding water treatment plant. Every 6 months, Sound level meter

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