

Appendix F Environmental Monitoring Program

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
Site Preparation and Construction Phase						
General	Inspection of mitigation compliance	General compliance with mitigation measures presented in the ESMP and as specified in EPC Contractor Manual	Project activity areas ¹⁵ and construction workers camp	Visual inspection of all active work areas	Daily	HSE Team of EPC Contractor
Soil	Contamination of soil	pH, salinity, NH ₄ ⁺ , total P, heavy metals, oil & grease	Construction site or laydown area or spill area	Standard analytical methods	In the event of any leakage or spillage of hazardous substances, oil, or toxic chemicals	3 rd Party Environmental Consultant/agency
Sediment	Contamination of sediment	pH, Sediment Oxygen Demand (SOD), Total organic carbon (TOC), loss of ignition (LOI) and Total Petroleum Hydrocarbon (TPH)	Near Temporary Jetty and near water intake and outfall structures, Sediment from Dehular Khal about 50 – 100 m downstream of project site	Standard analytical methods	Once prior to start of construction activity Quarterly during construction	3 rd Party Environmental Consultant/agency
Water	Contamination of surface water	Turbidity, pH, DO, Total dissolved solids, oil & grease, total coliform, heavy metals	Near Temporary Jetty and near water intake and outfall structures	Standard analytical methods	Monthly	3 rd Party Environmental Consultant/agency
	Ground water quality	Drinking water quality parameters as per Schedule 3 of ECR 1997	Groundwater wells to be used for drinking water supply during this phase	Standard analytical methods	Once every fortnight	3 rd Party Environmental Consultant/agency
Ambient Air Quality	Dust generation	SPM and PM ₁₀	Identified ASRs within 200 m from the construction site (3 locations)	24-hour	Bi-monthly	3 rd Party Environmental Consultant/agency
	Vehicle exhaust	PM _{2.5} , NO ₂ , SO ₂ , CO	Identified ASRs within 100 m from the activity areas (2	24-hourly monitoring of PM _{2.5} and SO ₂ and 1-	Bi-monthly	3 rd Party Environmental Consultant/agency

(1) ¹⁵ Activity areas are defined as Project site, access road, oil handling jetty, waterway and gas pipeline RoW.

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			locations)	hourly monitoring of NO2 and CO		
Noise	Increase in ambient noise levels	Noise levels in Leq, Leq day, Leq night and hourly Leq	Identified NSRs within 200 m from the activity area/s (5 locations)	24-hour	Bi-monthly	3 rd Party Environmental Consultant/ In-house monitoring
Occupational Health and Safety	Accidents or incidents due to construction activities, workers' health	Near-misses, incidents, occupational diseases, dangerous occurrences	Project activity areas and construction workers camp	As defined in construction phase Health & Safety Plan to be prepared by EPC contractor	As defined in H&S Plan	HSE Team of EPC Contractor
Community Health and Safety	Community disturbance and potential safety hazard due to road traffic	Accidents, incidents and complaints	Access Road connecting site	Incidents, accidents and community complaints	Based on occurrence	HSE and/or Community Liaison Officer of EPC Contractor
	Public concerns	Complaints from community	Neighbouring communities around the Project activity areas	As per the grievance redress mechanism	Continuous	NBBL
Terrestrial Ecology	Impact on species of conservational importance	Tree cutting	RoW of gas pipeline	Identification and Enumeration by ecologist	One time prior to start of work	NBBL with help of experts
	Impact on habitat of avifauna	Habitats and Disturbance to avifauna	Project activity areas	Visual Inspection	Once during winter season	NBBL
Aquatic Ecology	Impact on habitat of aquatic and riverine fauna due to spillage	Habitats and Disturbance to aquatic fauna	Near temporary jetty, transportation route, and intake structure	Identification by experts and visual inspections	Prior to start of work and Continuous visual inspection	NBBL
	Impact on reptiles due to trawlers and barges	Habitats and Disturbance to aquatic fauna	temporary jetty, transportation route	Visual monitoring	Continuous during unloading operations at temporary jetty area and transportation route	NBBL
	Impact on Ghariyal and Gangetic Dolphins	Disturbance to concerned species	In and around the construction site	Visual count/ frequency of spotting	Daily basis (continuous)	EPC contractor/ NBBL
Operation Phase						
General	Inspection of mitigation compliance	General compliance with mitigation measures presented in the ESMP and	Project activity areas	Visual inspection of all active work areas	Daily	Plant HSE Team

Project Stage/ Affected Component	Potential Impact	Parameters to be Monitored	Location	Measurements	Frequency	Responsibility
		operational manual				
Soil	Soil contamination	pH, salinity, NH ₄ ⁺ , total P, heavy metals, oil & grease	In waste storage area, as applicable	Standard analytical methods	In case of Accidental spillage	3 rd Party Environmental Consultant/agency
Sediment	Contamination of sediment	pH, Sediment Oxygen Demand (SOD), Total organic carbon (TOC), loss of ignition (LOI) and Total Petroleum Hydrocarbon (TPH)	Near Jetty and near water intake and outfall structures, sediment in Dehular Khal about 50 – 100 m downstream of project site	Standard analytical methods	Six monthly	3 rd Party Environmental Consultant/agency
Water	Ground water quality	Drinking water quality parameters as per Schedule 3 of ECR 1997	Borewell water to be used for domestic purposes	Standard analytical methods	Monthly	Inhouse laboratory
					Quarterly	3 rd Party Environmental Consultant/agency
	Wastewater	Temperature, chlorine, pH, BOD5, COD, oil & grease, heavy metals, total faecal coliform	Outlet of discharge channel	Standard methods	Daily	Inhouse laboratory
					Quarterly	3 rd Party Environmental Consultant/agency
	Surface water quality	Temperature, conductivity, pH, DO, TDS	6 stations (at 0 m, 50 m and 100 m from the point of discharge of effluent on upstream and downstream)	Potable water quality analyser	Daily	Inhouse laboratory
Quarterly					3 rd Party Environmental Consultant/agency	
Cooling water	Temperature	Intake pipeline inlet and discharge pipeline outlet	Thermistor	Continuous	Inhouse laboratory	
Air Emissions	Stack emissions	NOx, CO, PM _{2.5} and O ₂	Main stack and by-pass stack	CEM	Continuous	NBBL
	Emission concentrations	CEM validation for NOx, CO and PM _{2.5}	Main stack and by-pass stack	Standard methods	Annual	3 rd Party Environmental Consultant/agency
	Ambient air quality	NOx, CO, PM ₁₀ , PM _{2.5} , SO ₂	5 locations within 2 km from the Project boundary (same as baseline monitoring locations)	Standard methods	Half yearly	3 rd Party Environmental Consultant/agency
Noise	Noise generation by Plant equipment	Sound Pressure Level	1 m from the noise generating equipment (For all	Noise monitor	Monthly	In-house laboratory

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			the noise sources greater than 70 dB(A) noise level)		Half yearly	3 rd Party Environmental Consultant/agency
	Ambient noise	Ambient noise levels	At Project boundary and at nearest noise sensitive receptors in all direction from the Plant	Noise monitor with data logger (24-hour observations with hourly noise levels)	Half yearly	3 rd Party Environmental Consultant/agency
EMF	EMF	EMF standards	Transmission line		Annual	NBBL
GHG Emissions	Climate change	GHG production	Plant control room	Natural gas consumption	Annual	NBBL
Aquatic Ecology	Impact on Fishes and riverine flora and fauna	Fish count, phytoplankton's, zooplanktons numbers	Upstream , downstream of discharge point in Dehular Khal	Abundance of aquatic flora and fauna	Once post 1 year of commissioning of the plant through experts	NBBL by engaging Aquatic Ecology Expert/ Agency
	Aquatic ecology	Visible fish kills	Water intake and outlet and downstream of Dehular Khal	Visual inspection and consultation with fishermen	Monthly	Plant HSE Team
	Aquatic Ecology	Phytoplankton, zooplankton and benthos	Upstream , downstream of Dehular Khal	Abundance and species composition	Half yearly	NBBL by engaging Aquatic Ecology Expert/ Agency
	Impact on Ghariyal and Gangetic Dolphins	Disturbance to concerned species	In and around the plant	Visual count/ frequency of spotting	Daily basis (continuous)	NBBL
Community Health and Safety	Community disturbance and potential safety hazard due to road/ waterway traffic	Accidents, incidents and complaints	Access Road, Dehular Khal	Incidents, accidents and community complaints	Based on occurrence	HSE and/or Community Liaison Officer of NBBL
	Discharge of effluent and cooling water	Accidents, incidents and complaints	Adjoining Channel	Incidents, accidents and community complaints	Based on occurrence	HSE and/or Community Liaison Officer of NBBL
	Public concerns	Complaints from community	Neighbouring communities around the Project activity areas	As per the grievance redress mechanism	Continuous	Community Liaison Officer of NBBL and Station Manager
CSR Activities	Community Development	Activities/ Programmes and No. of beneficiaries	Vulnerable Groups around the Project activity areas	No. of beneficiaries and outcome of the activities	Periodic and need based	Admin/ HR Manager and Station Manager