Attachment 4

Environmental Monitoring Form for Construction Stage
Contract Package 1

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
Air Quality	Construction site	Visual inspection of mechanical condition and exhaust gas	No major adverse impacts	No standards	Every day before working	At construction camp site
	Construction site	Visual observation of dust			Every day	site works
	Storage facilities for dust generation		No major adverse impacts			Every day, especially in dry season
	AQS-1 (Jan 30th, 2019) KP: 39+200 Okdong District Hospital, Kompong Speu Province.	**PM10**	AQS1 = 0.197mg/m^3	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	We will use mobile device to check for daily and weekly monitoring. Seasonal monitoring shall be done at the same point on EIA Both PM10 and PM2.5 are exceed the standard. This much amount of particulate matters might be owing to the emission of dust from the transportation activities along the NR5 rather than as result of the construction activities of the SMCC. Therefore, the air quality within above section is still good quality, no any impact to the environment as well as to the public health.
		PM2.5	AQS1 = 0.083mg/m^3	0.025 mg/m^3 (WHO, average 24h)		
		SO_2	AQS1 = 0.021mg/m^3	0.30 mg/m^3 (WHO average 24h)		
		NO_2	AQS1 = 0.019mg/m^3	0.10 mg/m^3 (WHO average 24h)		
Water Quality	WS-1 (31st of Oct 2018) KP:32+000 at LHS, Pond, 200m from ROW (water sampling point will be replaced due to far from the road WS-2 (31st of Oct 2018)	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector
		pH	WS-1=7.32 WS-2=6.87 WS-3=7.67 WS-4=7.69	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season	We will use mobile device to check for daily and weekly monitoring. Seasonal monitoring shall be done at the same point on EIA
		TSS	WS-1=37.00 WS-2=13.00 WS-3=52.00	25-100 mg/l (MoE)		

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
	KP: 32+300 at RHS, in Tonle Sap river, in front of Prek Prang Pagoda WS-3 (31st of Oct 2018) KP: 36+900 at RHS, downstream, border of Kandal and Kompong Chhnang WS-4 (31st of Oct 2018) KP: 40+900 at RHS, downstream near factory			WS-4=49.00			
		BOD		WS-1=1.30 WS-2=1.60 WS-3=1.40 WS-4=1.50	1-10 mg/l (MoE)		
		COD		WS-1=4.12 WS-2=7.44 WS-3=4.31 WS-4=4.70	1-8 mg/l (MoE)		
		Total Coliform		WS-1=1.5×10^3 WS-2=9.2×10^2 WS-3=1.4×10^3 WS-4=2.1×10^3	<5,000 (Japanese Standard)		
Noise	Boundary of land plot nearest to the construction site	Noise Level (Visual inspection)		No construction at survey point of seasonal, so no serious impacts of noise operation and vibration	- 50 dB (06:00-18:00) - 50dB (18;00-22:00) - 45dB (22:00-06:00) (MoE, residential area)	1 time in dry season 1 time in wet season	Visual check and maintain the construction equipment
Vibration		Vibration Level (Visual inspection)		The engineer and contractor will use mobile device for daily/weekly check depend on situation at construction site	- 65Hz (5:00-17:00) - 60Hz (17:00-05:00) (MoE)		Visual regularly check and maintain the construction equipment
Waste Generation	Waste storage at construction site	Slurry and other construction waste	Discharged amount	The engineer will request the contractor to describe expected volume and the content of waste	No standards	Every day	Septic tank
			Recycled amount				
			The way of recycle	No recycle			
			Treated amount	No treat			
			Local of final disposal	Local land was agreed with local resident			
		General waste	Discharged amount	The engineer will request the contractor to			
			Recycled amount				

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
				describe expected volume and the content of waste			
			The way of recycle	No recycle			
			Treated amount	No treat			
			Local of final disposal	Land-fill of waste collector			Land-fill of provincial authority
Subsidence	Subsidence prone locations along the project road	Visual inspection and interview to the local people		No impact at construction site	No standards	1 time/week to 1 time/month (depending on situation)	Minor affects to prone locations along the project road.
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow		No impacts at construction site		Every day	In The main rivers and canals are crossing NR-5, sometime, was raining.
Ecosystem	EC-1 KP 35 and KP 37+200 (29th of Jan 2019)	Visual observation of animals, reptiles, and amphibious		Mammal = None Amphibian =None Reptile = None Birds = None Flora = None Insect=None	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river

Remarks: Past trend and current statute including remedial measures, if necessary.

Note:
WHO: World Health Organization,
MoE: Ministry of Environment
NO_2: Nitrogen Dioxide
SO_2: Sulfur Dioxide
PM: Particulate Matters
BOD: Biochemical Oxygen Demand
COD: Chemical Oxygen Demand
TSS: Total Suspended Solid

Attachment 4

Environmental Monitoring Form for Construction Stage
Contract Package 2

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
Air Quality	Construction site	Visual inspection of mechanical condition and exhaust gas	No major adverse impacts	No standards	Every day before working	At construction camp site
	Construction site	Visual observation of dust			Every day	site works
	Storage facilities for dust generation		No major adverse impacts			Every day, especially in dry season
	AQS-2 (Jan 29th, 2019) KP: 89+250 At RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kompong Chhnang, Kompong Chhnang Province. AQS-3 (Jan 28th, 2019) KP: 97+300 At LHS, rice field area more than 100m from ROW, in Trapaeng Por Village, Pong Ru commune, Rolea B'ear district, Komponng Chhnang province.	**PM10**	AQS-2=0.162 AQS-3=0.118	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	We will use mobile device to check for daily and weekly monitoring. Seasonal monitoring shall be done at the same point on EIA Both PM10 and PM2.5 are exceed the standard. This much amount of particulate matters might be owing to the emission of dust from the transportation activities along the NR5 rather than as result of the construction activities of the SMCC
		PM2.5	AQS-2= 0.070 AQS-3=0.060	0.025 mg/m^3 (WHO, average 24h)		
		SO_2	AQS-2=0.015 AQS-3=0.017	0.30 mg/m^3 (WHO average 24h)		
		NO_2	AQS-2= 0.018 AQS-3=0.022	0.10 mg/m^3 (WHO average 24h)		
Water Quality	WS-5 (31st of Oct 2018) KP:82+500 at RHS, downstream, near Phnom Chompus Pagoda. WS-6 (31st of Oct 2018) KP: 91+700 at LHS of bypass, Pond in Trapaeng Pond dam WS-7 (31st of Oct 2018) KP: 106+300 at RHS, downstream	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector
		pH	WS-7=6.45	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season	We will use mobile device to check for daily and weekly monitoring. Seasonal monitoring shall be done at the same point on EIA
		TSS	WS-5=26.00 WS-6=19.00 WS-7=35.00 WS-8=41.00	25-100 mg/l (MoE)		
		BOD	WS-5=1.10 WS-6=1.50 WS-7=1.00 WS-8=1.40	1-10 mg/l (MoE)		

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
	WS-8 (31st of Oct 2018) KP: 117+118 at RHS, downstream Boribo Stream.	**COD**		WS-5=3.13 WS-6=4.50 WS-7=2.56 WS-8=3.80	1-8 mg/l (MoE)		
		Total Coliform		WS-5=6.4×10^2 WS-6=4.6×10^2 WS-7=9.3×10^2 WS-8=2.1×10^3	<5,000 (Japanese Standard)		
Noise	Boundary of land plot nearest to the construction site	Noise Level (Visual inspection)		No construction at survey point of seasonal, so no serious impacts of noise operation and vibration	- 50 dB (06:00-18:00) - 50dB (18;00-22:00) - 45dB (22:00-06:00) (MoE, residential area)	1 time in dry season 1 time in wet season	Visual check and maintain the construction equipment
Vibration		Vibration Level (Visual inspection)		The engineer and contractor will use mobile device for daily/weekly check depend on situation at construction site	- 65Hz (5:00-17:00) - 60Hz (17:00-05:00) (MoE)		Visual regularly check and maintain the construction equipment
Waste Generation	Waste storage at construction site	Slurry and other construction waste	Discharged amount	The engineer will request the contractor to describe expected volume and the content of waste	No standards	Every day	Septic tank
			Recycled amount				
			The way of recycle	No recycle			
			Treated amount	No treat			
			Local of final disposal	Local land was agreed with local resident			
		General waste	Discharged amount	The engineer will request the contractor to describe expected volume and the content of waste			
			Recycled amount				
			The way of recycle	No recycle			
			Treated amount	No treat			

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
			Local of final disposal	Land-fill of waste collector			Land-fill of provincial authority
Subsidence	Subsidence prone locations along the project road	Visual inspection and interview to the local people		No impact at construction site	No standards	1 time/week to 1 time/month (depending on situation)	Minor affects to prone locations along the project road.
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow		No impacts at construction site		Every day	In The main rivers and canals are crossing NR-5, sometime, was raining.
Ecosystem	(26th of Jan 2019) EC-02 KP 78+800 At Kiri Vong Kut Pagoda EC-03 KP 106+000 near Srah Angkam Bridge EC-04 KP 117+000 Boribo river along NR5 EC-05&EC-06 KP 91+700 At Trapaeng Por Lake	Visual observation of animals, reptiles, and amphibious		Mammal = 5 Amphibian =5 Reptile = 9 Birds = 23 Fishes = 71	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river

Remarks: Past trend and current statute including remedial measures, if necessary.

Note:
WHO: World Health Organization,
MoE: Ministry of Environment
NO_2: Nitrogen Dioxide
SO_2: Sulfur Dioxide
PM: Particulate Matters
BOD: Biochemical Oxygen Demand
COD: Chemical Oxygen Demand
TSS: Total Suspended Solid

Attachment 4

Environmental Monitoring Form for Construction Stage
Contract Package 3

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
Air Quality	Construction site	Visual inspection of mechanical condition and exhaust gas	No major adverse impacts	No standards	Every day before working	At construction camp site
	Construction site	Visual observation of dust			Every day	site works
	Storage facilities for dust generation		No major adverse impacts			Every day, especially in dry season
	AQS-4 (21th of January, 2019) PK-135 Kbal Damrei village, Ansa Chambork commune, Krakor district, Pursat province AQS-5 (22th of January, 2019) PK-170 Kcandol Sar Village, Beung Kantout commune, Krakor district, Pursat province	**PM10**	AQS4 = 0.008mg/m^3 AQS5 = 0.010mg/m^3	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	We will use mobile device to check for daily and weekly monitoring. Seasonal monitoring shall be done at the same point on EIA The results showed that the ambient air quality in both sampling sites, AQS-4 and AQS-5 along NR.5 within package 3 is in acceptable condition.
		PM2.5	AQS4 = 0.005mg/m^3 AQS5 = 0.007mg/m^3	0.025 mg/m^3 (WHO, average 24h)		
		SO_2	AQS4 = 0.227mg/m^3 AQS5 = 0.040mg/m^3	0.30 mg/m^3 (WHO average 24h)		
		NO_2	AQS4 = 0.099mg/m^3 AQS5 = 0.113mg/m^3	0.10 mg/m^3 (WHO average 24h)		
Water Quality	WS-9 (17th of Dec 2018) PK-170, Ou Chankok river, Tnot Chum commune, Krokor district, Pursat province	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector
		pH	7.48	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season	We will use mobile device to check for daily and weekly monitoring. Seasonal monitoring shall be done at the same point on EIA
		TSS	29	25-100 mg/l (MoE)		
		BOD	1.8	1-10 mg/l (MoE)		
		COD	3.92	1-8 mg/l (MoE)		
		Total Coliform	750	<5,000 (Japanese Standard)		
Noise	AQS-4 (28th of December, 2018) PK-135, Kbal Damrei village, Ansar Chambork commune, Krakor district, Pursat province.	Noise Level (Visual inspection)	AQS-4, 63 dB (06:00-18:00) 62 dB (18:00-22:00) 59 dB (22:00-06:00) AQS-4 58 dB (06:00-18:00) 55 dB (18:00-22:00) 55 dB (22:00-06:00)	- 50 dB (06:00-18:00) - 50dB (18;00-22:00) - 45dB (22:00-06:00) (MoE, residential area)	1 time in dry season 1 time in wet season	Visual check and maintain the construction equipment

Attachment 4

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total)	Standards (Local/Inter Standard)	Frequency	Remarks
Vibration	AQS-5 (27th of December, 2018) PK-170, Kandol Sar village, Beung Kantuot commune, Krakor district, Pursat province.	Vibration Level (Visual inspection)		AQS-4 44 Hz (5:00-17:00) 43 Hz (17:00-05:00) AQS-5 25 Hz (5:00-17:00) 24 Hz (17:00-05:00)	- 65Hz (5:00-17:00) - 60Hz (17:00-05:00) (MoE)		Visual regularly check and maintain the construction equipment
Waste Generation	Waste storage at construction site DP : Sta.144 LHS HSB : Sta.164 LHS	Slurry and other construction waste	Discharged amount	9kg/day	No standards	Every day	Septic tank
			Recycled amount	2kg/day			
			The way of recycle	No recycle			
			Treated amount	No treat			
			Local of final disposal	No have			
		General waste	Discharged amount				
			Recycled amount	0.12m3/day			
			The way of recycle	Hand over to Retailers			
			Treated amount	4.2m3/day			
			Local of final disposal	Burn Out			
Subsidence	Subsidence prone locations along the project road	Visual inspection and interview to the local people		No impact at construction site	No standards	1 time/week to 1 time/month (depending on situation)	Minor affects to prone locations along the project road.
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow		No impacts at construction site		Every day	In The main rivers and canals are crossing NR-5, sometime, was raining.
Ecosystem	EC-1 KP 170+700 (22th of Feb 2019)	Visual observation of animals, reptiles, and amphibious		Mammal = 4 Amphibian = 4 Reptile = 8 Birds = 5 Flora = 60	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river

Remarks: Past trend and current statute including remedial measures, if necessary.

Note:
WHO: World Health Organization,
MoE: Ministry of Environment
NO_2: Nitrogen Dioxide
SO_2: Sulfur Dioxide
PM: Particulate Matters
BOD: Biochemical Oxygen Demand
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