Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

NR5-South Section : Contract Package 1

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
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 (July 04th, 2022) KP: 39+200 Okdong District Hospital, Kompong Speu Province.	**PM_{10}**	AQS1 = 0.039mg/m^3	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	We use mobile device to check for daily and weekly monitoring. The result of the seasonal measurement is indicated that the value of NO_2, SO_2, $PM_{2.5}$, and PM_{10} were below the Cambodian Standard as well as IFC Standard. Therefore, it means that the air quality within those section was not polluted with particle matter due to the human activities were reduced, even though, the contractor has to pay more attention above matter by providing more watering in regularly, especially during the day time.	Contractor will provide more watering regularly, especially during the day time. Surface Treatment (Prime coat and/or Calcium Chloride) The drivers of construction vehicles will comply with speed limits to minimize road dust and keeping driving speed of construction machines less than 60km/h The contractor will prepare and strictly implement plan around construction sites.
		$PM_{2.5}$	AQS1 = 0.016mg/m^3	0.025 mg/m^3 (WHO, average 24h)			
		SO_2	AQS1 = 0.015mg/m^3	0.30 mg/m^3 (WHO average 24h)			
		NO_2	AQS1 = 0.015mg/m^3	0.10 mg/m^3 (WHO average 24h)			
Water Quality	WS-1 KP:32+000 at LHS, Pond, 200m from ROW (water sampling point will be replaced due to far from the road WS-2 KP: 32+300 at RHS, in Tonle Sap river, in front of Prek Prang Pagoda	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector	
		pH	**The water quality was not conducted from July-September, 2022**	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season		
		TSS		25-100 mg/l (MoE)			
		BOD		1-10 mg/l (MoE)			
		COD		1-8 mg/l (MoE)			
		Total Coliform		<5,000 (Japanese Standard)			

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

NR5-South Section : Contract Package 1

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
	WS-3 KP: 36+900 at RHS, downstream, border of Kandal and Kompong Chhnang WS-4 KP: 40+900 at RHS, downstream near factory							
Noise	ANV-1 KP:39+200 Odong District, Kompong Speu Province (Odong district hospital)	Noise Level (MoE Laboratory)		**The Noise and Vibration Survey were not conducted from July-September, 2022**	- 60 dB(A) (06:00-18:00) - 50dB(A) (18;00-22:00) - 45dB(A) (22:00-06:00) (MoE, residential area)	1 time in dry season 1 time in wet season		
Vibration		Vibration Level (MoE Laboratory)			- 65 dB (7:00-20:00) - 60 dB (20:00-7:00) (MoE)			
Waste Generation	Waste storage at construction site	Slurry and other construction waste	Discharged amount	2000kg/month+0.833m^3	No standards	Every day	Septic tank	
			Recycled amount	2000kg /month+0.833m^3				
			The way of recycle	Backfill/Sold to scavenger				
			Treated amount					
			Local of final disposal	Disposal area				
		General waste	Discharged amount	158kg/month				
			Recycled amount	0kg/month				
			The way of recycle	Sold to scavenger				
			Treated amount					
			Local of final disposal	Disposal area			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	Minor affects to prone locations along the project road.	

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

NR5-South Section : Contract Package 1

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
					(depending on situation)		
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 canels are crossing NR-5, sometime, was raining.	
Ecosystem	EC-1 KP 35 and KP 37+200 Odong bypass as requested by JICA and Client	Interview the local people and Visual observation of animals, reptiles, and amphibious	**The Ecosystem Survey was not conducted from July-September, 2022.**	No standards	One time in dry season and one time in rainy season		

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

Note:

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

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

NR5-South Section : Contract Package 1

Table 1: Schedule of Seasonal Monitoring (☐ target monitoring during July-September, 2022)

Year	2018	2019				2020				2021				2022			
	Nov	Jan	April	July	Oct	Jan	April	July	Oct	Jan	April	July	Oct	Jan	April	July	Oct
Item	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air Quality	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	21st	18th	18th	12th	5th	4th of Feb	11th	21st	21st	9th	6th	9th	01st	14th	13th	4th	
2. Water Quality	●		●		●		●		●		●		●		●		
	23rd		8th		5th		6th		21st		29th		20th		21st		
3. Noise	●		●		●		●		●		●		●		●		
	22nd		8th		5th		11th		21st		6th		01st		13th		
4. Vibration	●		●		●		●		●		●		●		●		
	23rd		8th		5th		11th		21st		6th		01st		13th		
8. Ecosystem		●	●		●		●		●		●		●		●		
		29th	8th		9th				25th		25th		25th		25th		

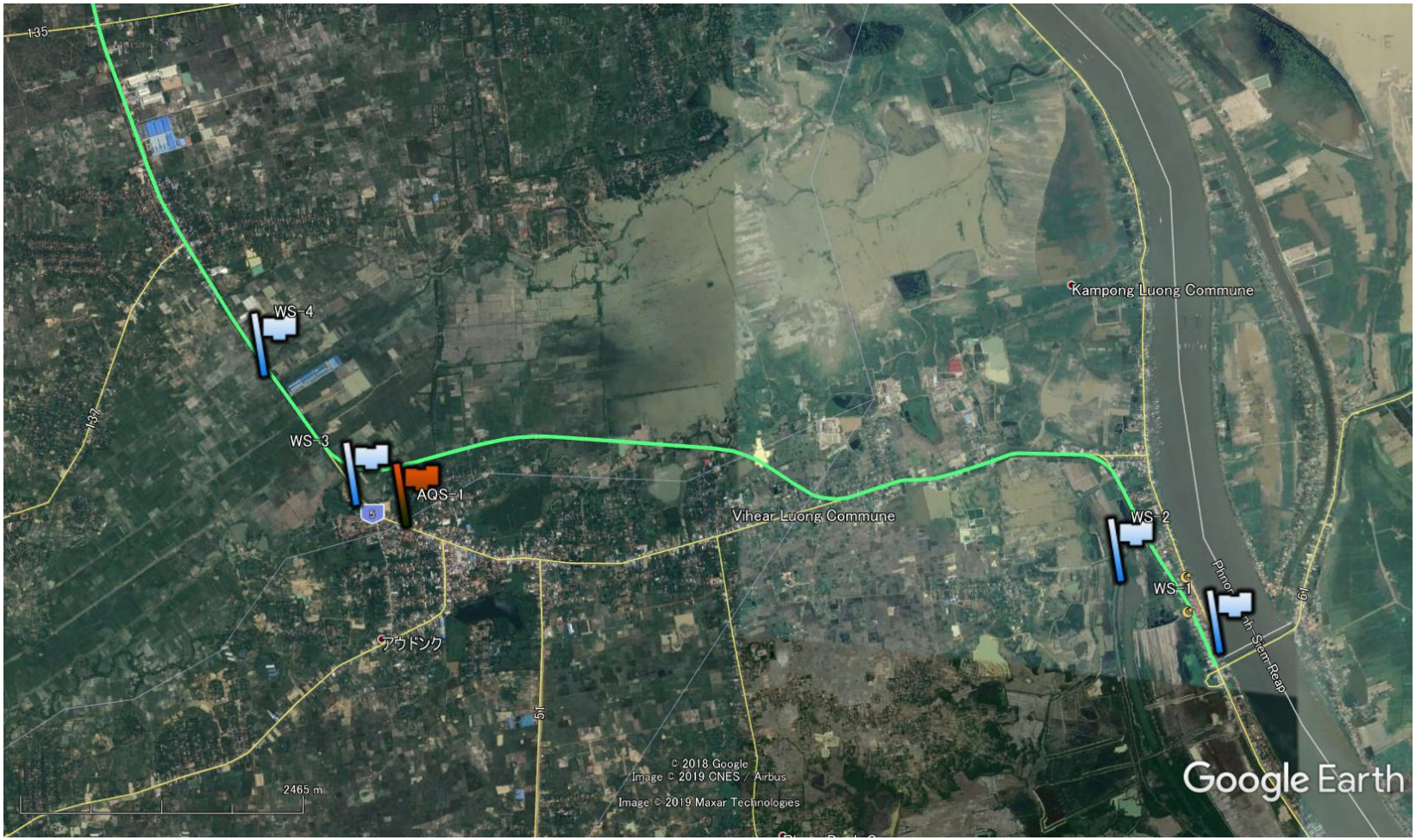

Figure 1: Seasonal Monitoring Points for CP1 (Sta 31+370 – 73+000)

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 2

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Air Quality	Construction site	Visual inspection of mechanical condition and exhaust gas	No major adverse impacts	No standards	Every day before working	At construction campsites	
	Storage facilities for dust generation	Visual observation of dust	No major adverse impacts		Every day	site works	
						Every day, especially in dry season	
	AQS-2 (July 05th, 2022) KP: 89+250 At RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kompong Chhnang, Kompong Chhnang Province. AQS-3 (July 05th, 2022) 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=0.033 AQS-3=0.028	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	We use mobile device for daily and weekly monitoring. The finding showed a better quality of air within the monitoring site compared to previous study in April 2022, except NO_2 at AQS3 which was slightly increasing. These higher amount of NO_2 might be owing to growing of traffic activities along NR5 after new NR5 has been temporarily opened for traffic, and COVID-19 situation in Cambodia has been much better.	Contractor will provide more watering regularly, especially during the day time. Surface Treatment (Prime coat and/or Calcium Chloride) was applied. The drivers of construction vehicles will comply with speed limits to minimize road dust and keeping driving speed of construction machines less than 60km/h The contractor will prepare and strictly implement plan around construction sites.
		PM2.5	AQS-2= 0.015 AQS-3=0.010	0.025 mg/m^3 (WHO, average 24h)			
		SO_2	AQS-2=0.014 AQS-3=0.015	0.30 mg/m^3 (WHO average 24h)			
		NO_2	AQS-2= 0.010 AQS-3= 0.016	0.10 mg/m^3 (WHO average 24h)			
Water Quality	WS-5 KP:82+500 at RHS, Chrey Bak river downstream, near Phnom Chompus Pagoda Andoung Svay commune, Rolea Bíer district, Kompong chhnang province.	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector	
		pH	**The Water Quality was not conducted from July-September, 2022**	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season		
		TSS		25-100 mg/l (MoE)			
		BOD		1-10 mg/l (MoE)			
		COD		1-8 mg/l (MoE)			
		Total Coliform		<5,000 (Japanese Standard)			

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 2

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
	WS-6 KP: 91+700 at LHS of bypass, Srah Por lake, Thmar Keo village, Svay Chrum commune, Rolea B'ier district, Kompong Chhnang province. WS-7 KP: 106+350 at RHS, downstream Srah Angkam lake, Thmar Keo village, Svay Chrum commune, Rolea B'ier district, Kompong chhnang province. WS-8 KP: 117+118 at RHS, downstream Boribo river, Phsar village, Phsar commune, Boribo district, Kompong Chhnang province.						
Noise	ANV-2 PK 89+250 at RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kampong Chhnang, Kampong Chhnang province ANV-3 PK 97+300 at LHS, residential area in Trapeang Por village, Pong Ro commune, Rolea B'ier	**Noise Level (MoE Laboratory)**	**The Noise and Vibration were not conducted from July-September, 2022**	- 60 dB(A) (06:00-18:00) - 50dB(A) (18;00-22:00) - 45dB(A) (22:00-06:00) (MoE, residential area)	1 time in dry season 1 time in wet season		

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 2

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Vibration	district, Kampong Chhnang province	Vibration Level (MoE Laboratory)			- 65dB (07:00-20:00) - 60dB (20:00-07:00)			
Waste Generation	Waste storage at construction site and campsites in September, 2021	Slurry and other constructi on waste	Discharged amount	250kg/month	No standards	Every day	Septic tank	
			Recycled amount	250kg/month				
			The way of recycle	Stored in the yard				
			Treated amount					
			Local of final disposal	Local Dumpsite				
		General waste	Discharged amount	690kg/month				
			Recycled amount	45kg/month				
			The way of recycle	Sold to scavenger				
			Treated amount					
			Local of final disposal	Local dumpsite			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-02, EC-03, EC-04, EC-05 and EC-06	Interview the local people and visual observation of animals, reptiles and amphibious.		**The ecosystem survey was not conducted from July-September, 2022**	No standards	One time in dry season and one time in rainy season		

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

Note:

WHO: World Health Organization, SO_2: Sulfur Dioxide, COD: Chemical Oxygen Demand VU: Vulnerable,
MoE: Ministry of Environment, PM: Particulate Matters, TSS: Total Suspended Solid EN: Endangered,
NO_2: Nitrogen Dioxide, BOD: Biochemical Oxygen Demand, LC: Least Concern, NT : Near Threatened

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 2

Table 1: Schedule of Seasonal Monitoring (☐ target monitoring during July-September, 2022)

Year	2018	2019				2020				2021				2022			
	Nov	Jan	Apr	Jul	Oct	Feb	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct
Item	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air Quality	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	21st	28th	7th	10th	4th	8th	8th	22nd	22nd	8th	5th	7th	2nd	15th	12th	5th	
2. Water Quality	●		●		●		●		●		●		●		●		●
	31st		5th		10th		1st		8th		29th		12th		6th		
3. Noise	●		●		●		●		●		●		●		●		●
	22nd		7th		4th		8th		22nd		5th		2nd		12th		
4. Vibration	●		●		●		●		●		●		●		●		●
	22nd		7th		4th		8th		22nd		5th		2nd		12th		
8. Ecosystem		●	●		●		●		●		●		●		●		●
		26th	23rd		16th		8th		23rd		1st		22nd		21th		

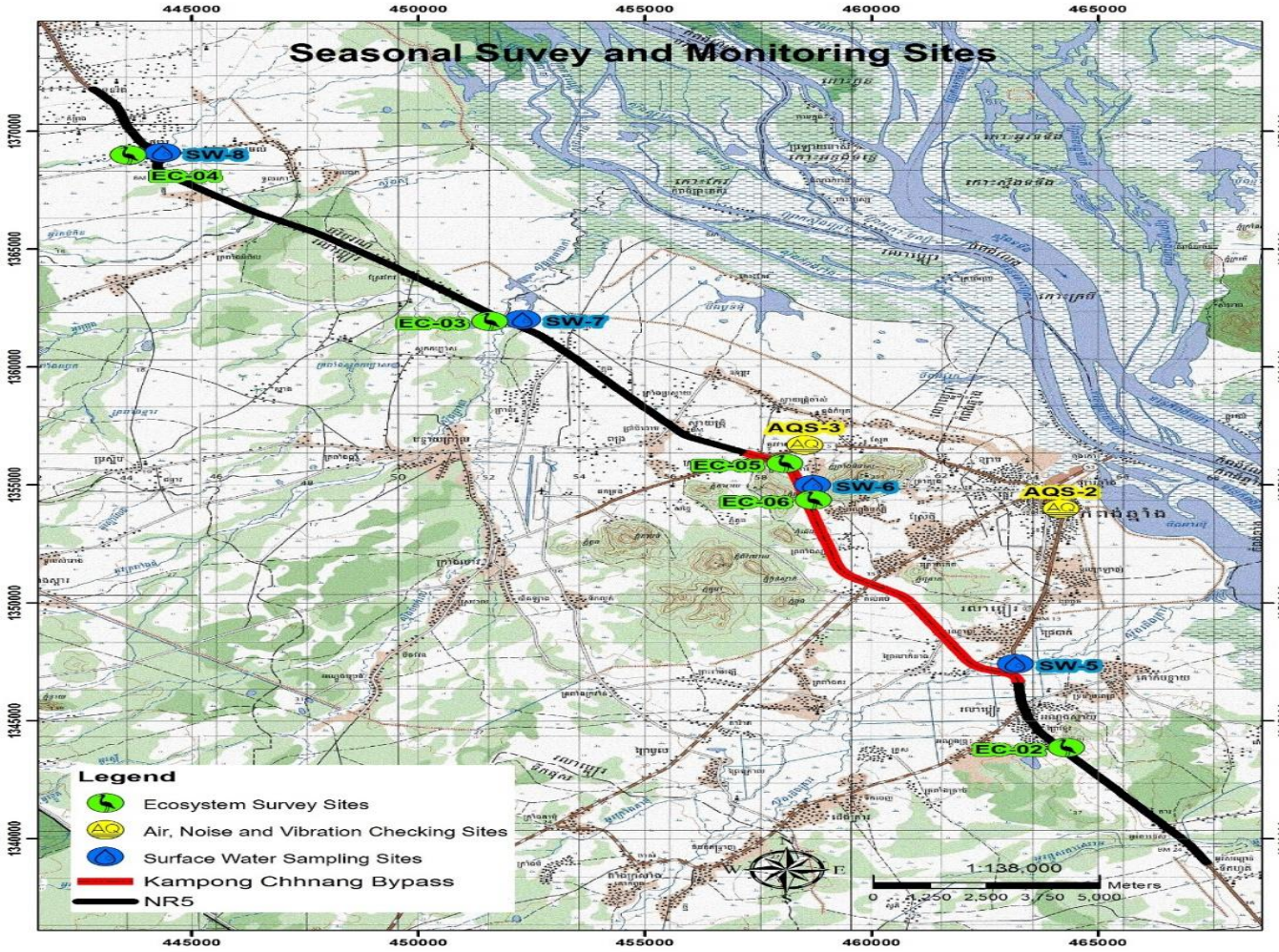

Figure 1: Seasonal Monitoring Points for CP2 (Sta 73+000 – Sta 120+000)

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 3

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
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 (July 28th, 2022) PK-135+600 Kbal Damrei village, Ansa Chambork commune, Krakor district, Pursat province AQS-5 (July 28th, 2022) PK-170+340 Kcandol Sar Village, Beung Kantout commune, Krakor district, Pursat province	**PM10**	AQS-4 = 0.012mg/m^3 AQS-5 = 0.017mg/m^3	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	We use mobile device for daily and weekly monitoring. The ambient air quality in both sampling sites AQS-4 and AQS-5 along the national road No.5 within Package 3 is in acceptable condition. The result are under standard of the Ministry of Enviornment and guideline value of Environment, Health and Safety General Guideline(IFC).	With regard to reduction of dust, the Consultant strongly request to the Contractor to provide more watering regularly, especially during the day time or using "Surface Treatment" (Prime coat) . Additionally, based on the Consultant's instructions, the drivers of construction vehicles will comply with speed limits to minimize road dust and keeping driving speed of construction machines less than 60km/h
		PM2.5	AQS-4 = 0.008mg/m^3 AQS-5 = 0.010mg/m^3	0.025 mg/m^3 (WHO, average 24h)			
		SO_2	AQS-4 = 0.063mg/m^3 AQS-5 = 0.112mg/m^3	0.30 mg/m^3 (WHO average 24h)			
		NO_2	AQS-4 = 0.030mg/m^3 AQS-5 = 0.050mg/m^3	0.10 mg/m^3 (WHO average 24h)			
Water Quality	WS-9 PK-170+700 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	**The Water Quality was not conducted from July-September, 2022**.	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season		
		TSS		25-100 mg/l (MoE)			
		BOD		1-10 mg/l (MoE)			
		COD		1-8 mg/l (MoE)			
		Total Coliform		<5,000 (Japanese Standard)			
Noise	ANV-4 PK-134+600, Kbal Damrei village, Ansar Chambork commune, Krakor district, Pursat province.	Noise Level (MoE Laboratory)	**The Noise and Vibration were not conducted from July-September, 2022**	- 60 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		

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 3

Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Vibration	ANV-5 PK-170+340, Kandol Sar village, Beung Kantuot commune, Krakor district, Pursat province.	Vibration Level (MoE Laboratory)			- 65 dB (06:00-18:00) - 60 dB (18:00-06:00) (MoE)			
Waste Generation	Waste storage at construction site and campsites in September, 2021	Slurry and other construction waste	Discharged amount	0.1m^3/month	No standards	Every day	Septic tank	
			Recycled amount	0.1m^3/month				
			The way of recycle	Backfill at courtyard				
			Treated amount					
			Local of final disposal	Dumpsite				
		General waste	Discharged amount	45kg/month				
			Recycled amount	2.2kg/month				
			The way of recycle	Provide to scavenger				
			Treated amount					
			Local of final disposal	Local dumpsite				
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	Interview the local people and Visual observation of animals, reptiles, and amphibious		**The Ecosystem was not surveyed from July-September, 2022**	No standards	One time in dry season and one time in rainy season		

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 3

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

Note:

WHO:	World Health Organization,	SO_2:	Sulfur Dioxide,	COD:	Chemical Oxygen Demand
MoE:	Ministry of Environment,	PM:	Particulate Matters,	TSS:	Total Suspended Solid
NO_2:	Nitrogen Dioxide,	BOD:	Biochemical Oxygen Demand,	LC:	Least Concern
VU:	Vulnerable,	EN:	Endangered,	NT :	Near Threatened

Environmental Monitoring Form for Construction Stage (the 3rd Quarterly / July-September, 2022)

South Section : Contract Package 3

Table 1: Schedule of Seasonal Monitoring (☐ target monitoring during July-September, 2022)

Year	2018	2019				2020				2021				2022			
	Nov	Feb	Apr	July	Oct	Jan	April	July	Oct	Jan	April	July	Oct	Jan	April	July	Oct
Item	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
	27th Dec	21st	11th May	22nd	23rd	16th	18th	4th	14th Nov	10th	10th	8th	12th	20th	01st	28th	
2. Water	●		●		●		●		●		●		●		●		
	27th Dec		11th May		10th		17th		13th Nov		8th		12th		01st		
3. Noise	●		●		●		●		●		●		●		●		
	27th Dec		11th May		23rd		18th		14th Nov		10th		12th		01st		
4. Vibration	●		●		●		●		●		●		●		●		
	27th Dec		11th May		23rd		18th		14th Nov		10th		12th		01st		
8. Ecosystem		●	●		●		●		●		●		●		●		
		22nd	24th		22nd		15th		13th Nov		8th		12th		01st		

Figure 1: Seasonal Monitoring Points for CP3 (Sta 120+000 – 171+200)