

ATTACHMENT – A3

ENVIRONMENTAL MONITORING (Construction Stage)

- **Contract Package – 4**
- **Contract Package – 5**

Environmental Monitoring for Construction Stage
 (2nd Quarter; April ~ June 2024)

Item	Location *nearest KMP	Parameter/Means of Monitoring	Result (Average/ Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks	
Air Quality	Contractor offices and parking of machineries	Visual inspection of mechanical conditions and exhaust gases	No major adverse impacts	X	Daily before working		
		Visual observation of dust			Daily		
	Construction sites including construction roads Storage facilities for dust generating materials including plants	PM10	Air-7 = 0.018 mg/m ³ Air-8 = 0.013 mg/m ³	0.1 mg/m ³ (MoE, average 24h)	1) 2 times in dry season and 2 times in rainy season	The monitoring is conducted by Ministry of Environment (MoE). All parameters are below the MoE's standard.	
		PM2.5	Air-7 = 0.012 mg/m ³ Air-8 = 0.009 mg/m ³	0.025 mg/m ³ (MoE, average 24h)	Dust (PM2.5 and PM10) daily check visual		
SO ₂	Air-7 = 0.128 mg/m ³ Air-8 = 0.069 mg/m ³	0.30 mg/m ³ (MoE, average 24h)	check/weekly mobile device				
NO ₂	Air-7 = 0.054 mg/m ³ Air-8 = 0.054 mg/m ³	0.10 mg/m ³ (MoE, average 24h)	check if suspected situation is caused and/or local residents complain				
Water Quality	Construction areas including borrow pits and quarry (River, steam, reservoir and other public water body where construction works are executed)	Visual observation	No major adverse impacts	X	1/ 1 time in dry season and 1 time in rainy season	The monitoring is conducted by Ministry of Environment (MoE). All parameters are below the MoE's standard.	
		pH	7.67		6.5-8.5 (MoE)		2) Daily visual check/weekly mobile device
		TSS	18.00		25-100 mg/L (MoE)		check when suspected situation is caused and/or local residents complain
		BOD	2.60		1-10 mg/L (MoE)		
		COD	3.13		1-8 mg/L (MoE)		
Total Coliform	3.6 x 10 ³	<5,000 MPN/100ml (MoE)					
Noise	NV-07 *105+240 Date: 26th April 2024	Noise Level	NV-7 06:00-18:00= 54 dB(A) 18:00-22:00= 51 dB(A)	- 60 dB(A) (06:00-18:00) - 50dB(A) (18:00-22:00) - 45dB(A) (22:00-06:00)	1) 1 time in dry season and 1 time in rainy season	NV-7 slightly exceed the MoE standard at 18:00-22:00 and 22:00-6:00	

Environmental Monitoring for Construction Stage
 (2nd Quarter; April ~ June 2024)

Item	Location *nearest KMP	Parameter/Means of Monitoring	Result (Average/ Max./Total...)	Standards (Local/Inter Standard)	Frequency	Remarks
	NV-08 *105+240 (1400 m away from Air-07) Date: 27th April 2024		22:00-06:00= 47 dB(A) NV-8 06:00-18:00= 52 dB(A) 18:00-22:00= 49 dB(A) 22:00-06:00= 47 dB(A)	(MoE)	2) Daily check/weekly mobile device check when suspected situation is caused and/or residents complain	Nv-8 slightly exceed the MoE standard at 22:00-06:00
Vibration		Vibration Level	NV-7 06:00-18:00 = 27 dB 18:00-06:00 = 23 dB NV-8 06:00-18:00 = 21 dB 18:00-06:00 = 21 dB	- 65 dB (06:00-18:00) - 60 dB (18:00-06:00) (MoE)		All locations are below the MoE's standard.
Waste Generation	Base camp, subcontractor camp	Construction waste	Discharged amount	X	Daily	
			Recycled amount			
		The way of recycling	Sell to villager buyers			
		Treated amount	155 kg/month			
General waste		Local of final disposal	KOUNGVA landfill			
		Discharged amount	365 kg/month			
		Recycled amount	270 kg/month			
		The way of recycling	Sell to villager buyers			
		Treated amount				

**Environmental Monitoring for Construction Stage
 (2nd Quarter; April ~ June 2024)**

Item	Location *nearest KMP	Parameter/Means of Monitoring	Result (Average/ Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks																
		Local of final disposal	KOUNGVA landfill																			
Subsidence	Subsidence prone locations along the project road	Visual inspection and interview to the local people	No major adverse impacts		1 time/week to 1 time/month depending on situations																	
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow	No major adverse impacts		Daily																	
Ecosystem	EC-06 (Sri Sophorn River) Date: 20th April 2024	Interviews of local people and visual observation of animals, reptiles, and amphibious	<table border="1"> <thead> <tr> <th>Category</th> <th>Recorded Species</th> </tr> </thead> <tbody> <tr> <td>Mammal</td> <td>3</td> </tr> <tr> <td>Amphibian</td> <td>4</td> </tr> <tr> <td>Reptile</td> <td>6</td> </tr> <tr> <td>Birds</td> <td>12</td> </tr> <tr> <td>Fishes</td> <td>21</td> </tr> <tr> <td>Insect</td> <td>3</td> </tr> <tr> <td>Flora</td> <td>16</td> </tr> </tbody> </table>	Category	Recorded Species	Mammal	3	Amphibian	4	Reptile	6	Birds	12	Fishes	21	Insect	3	Flora	16		1 time in dry season and 1 time in rainy season	Most of the species are in least concern of IUCN Red list.
Category	Recorded Species																					
Mammal	3																					
Amphibian	4																					
Reptile	6																					
Birds	12																					
Fishes	21																					
Insect	3																					
Flora	16																					

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

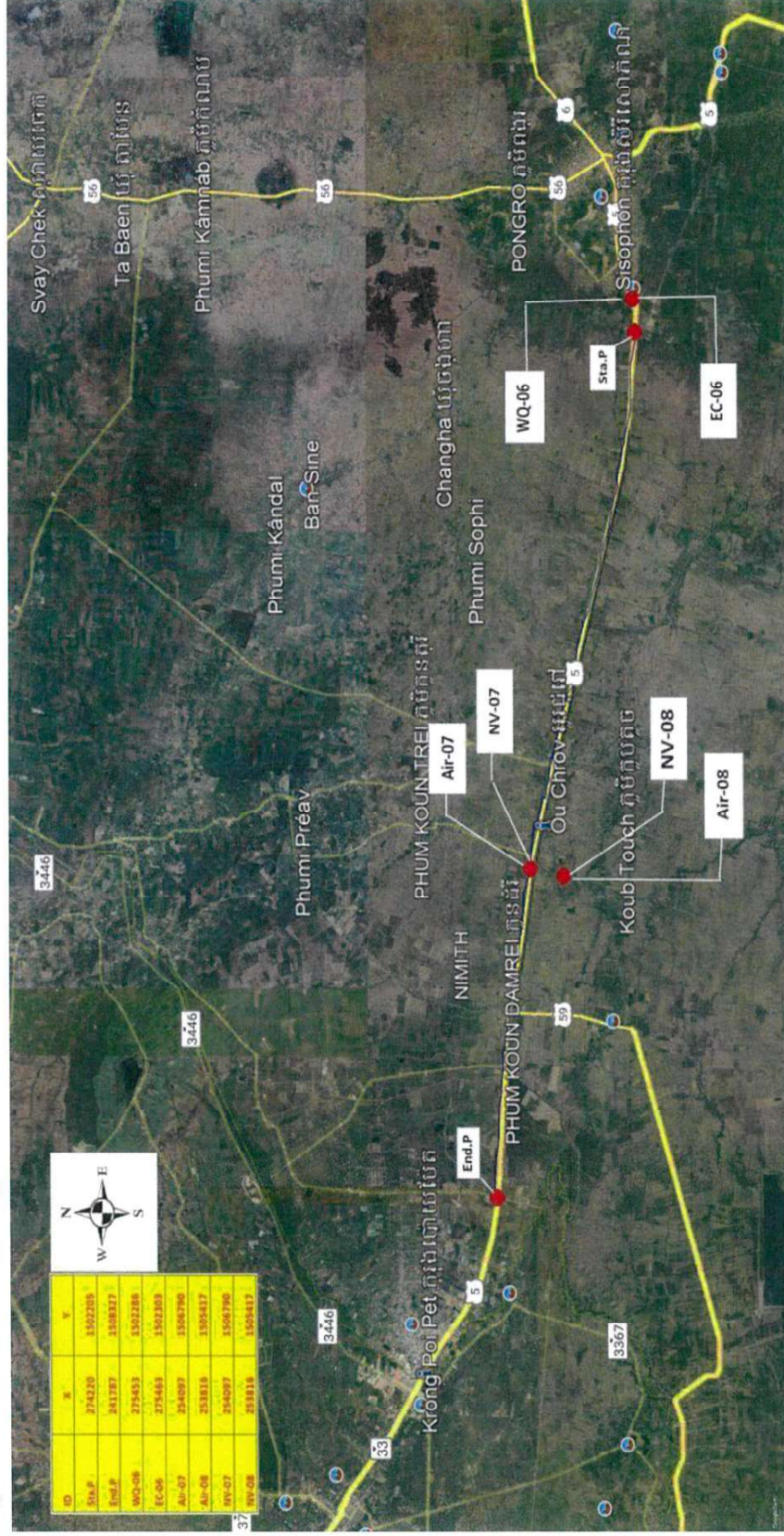
Note:
 WHO: World Health Organization, SO₂: Sulfur Dioxide, COD: Chemical Oxygen Demand
 MoE: Ministry of Environment, PM: Particulate Matters, TSS: Total Suspended Solid
 NO₂: Nitrogen Dioxide, BOD: Biochemical Oxygen Demand,

Environmental Monitoring for Construction Stage
 (2nd Quarter; April ~ June 2024)

Year	2022				2023				2024				2025	
	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan
Item	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry
1. Air Quality	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Survey Date	Not Conducted	23 th -24 th of March 2023	Not Conducted	Not Conducted	Not Conducted	20 th -21 th of October 2023	24 th -25 th of January 2024	26 th -27 th of April 2024	26 th -27 th of April 2024	27 th of April 2024	26 th -27 th of April 2024	26 th -27 th of April 2024	20 th -21 st of April 2024	
2. Water Quality	●		●		●									
Survey Date	Not Conducted		Not Conducted		21 th of October 2023									
3. Noise	●		●		●									
Survey Date	Not Conducted		Not Conducted		20 th -21 th of October 2023									
4. Vibration	●		●		●									
Survey Date	Not Conducted		Not Conducted		20 th -21 th of October 2023									
8. Ecosystem	●		●		●									
Survey Date	Not Conducted		Not Conducted		19 th -20 th of October 2023									

Environmental Monitoring for Construction Stage
 (2nd Quarter; April ~ June 2024)

Figure 1: Seasonal Monitoring Points for CP4



Environmental Monitoring Form for Construction Stage
 (2nd Quarter; April ~ June 2024)

Item	Location *nearest KMP	Parameter/Mean of Monitoring	Result (Average/Max./Total...)	Standards (Local/Inter-Standard)	Frequency	Remarks
Air Quality	Contractor offices and parking of machineries	Visual inspection of mechanical conditions and exhaust gases	No major adverse impacts	X	Daily before working	
		Visual observation of dust			Daily	
	Construction sites including construction roads Storage facilities for dust generating materials including plants	PM ₁₀	Air-WBS 01&02 = 0.028 mg/m ³ Air-WBS 04 = 0.023 mg/m ³	0.05 mg/m ³ (MoE, average 24h)	1) 2 times in dry season and 2 times in rainy season 2) Dust (PM _{2.5} and PM ₁₀)	There is no any activity at WBS03 during October to December 2024. The monitoring of air quality is conducted by Ministry of Environment (MoE).
		PM _{2.5}	Air-WBS 01&02 = 0.020 mg/m ³ Air-WBS 04 = 0.013 mg/m ³	0.025 mg/m ³ (MoE, average 24h)	daily check visual check/weekly mobile device check if suspected situation is caused and/or local residents complain	
		SO ₂	Air-WBS 01&02 = 0.078 mg/m ³ Air-WBS 04 = 0.043 mg/m ³	0.30 mg/m ³ (MoE, average 24h)		
NO ₂	Air-WBS 01&02 = 0.054 mg/m ³ Air-WBS 04 = 0.048 mg/m ³	0.10 mg/m ³ (MoE, average 24h)				
Construction areas including borrow pits and quarry (River, steam, reservoir and other public water body where construction works are executed)		Visual observation	No major adverse impacts	X	1/1 time in dry season and 1 time in rainy season 2) Daily visual check/weekly mobile device check when suspected situation is caused and/or local residents complain	
Water Quality	W- 01&02 *105+700 Data: 20 th April 2024	pH	8.75	6.5-8.5 (MoE)		There is no any activity at WBS03 during October to December 2024.
		TSS	81.00 mg/L	25-100 mg/L (MoE)		
		BOD	1.20 mg/L	1-10 mg/L (MoE)		
		COD	2.35 mg/L	< 8 mg/L (MoE)		

**Environmental Monitoring Form for Construction Stage
 (2nd Quarter; April ~ June 2024)**

Item	Location *nearest KMP	Parameter/Mean of Monitoring	Result (Average/Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks	
	W- 04 *273+500 Data: 20th April 2024	Total Coliform	210 MPN/100ml	<5,000 MPN/100ml (MoE)	2) Daily visual check/weekly mobile device check when suspected situation is caused and/or local residents complain	The monitoring is conducted by Ministry of Environment (MoE).	
Noise	NV-WBS 01&02 *105+525 Data: 20th April 2024	Noise Level	NV-WBS 01&02 06:00-18:00= 55.69 dB(A) 18:00-22:00= 59 dB(A) 22:00-06:00= 51.96 dB(A)	- 60 dB(A) (06:00-18:00) - 50dB(A) (18:00-22:00) - 45dB(A) (22:00-06:00) (MoE)	1) 1 time in dry season and 1 time in rainy season 2) Daily check/weekly mobile device check when suspected situation is caused and/or residents complain	The monitoring is conducted by Ministry of Environment (MoE).	
	NV-WBS 03 *207+460 Data:		06:00-18:00= 61.74 dB(A) 18:00-22:00= 62.5 dB(A) 22:00-06:00= 59.175 dB(A)				
Vibration	NV-WBS 04 *272+289 Data: 20th April 2024	Vibration Level	NV-WBS 01&02 06:00-18:00 = 39 dB 18:00-06:00 = 29.53 dB	- 65 dB (06:00-18:00) - 60 dB (18:00-06:00) (MoE)			
	NV-WBS 04 06:00-18:00 = 37 dB 18:00-06:00 = 35.25 dB						
Waste Generation	Waste storage at construction site	Construction waste	Discharged amount	X	Daily		
			Recycled amount				
		The way of recycling	Treated amount				
			Local of final disposal				
		General waste	Discharged amount				10 kg/month
							80 kg/month

**Environmental Monitoring Form for Construction Stage
 (2nd Quarter; April ~ June 2024)**

Item	Location *nearest KMP	Parameter/Mean of Monitoring		Result (Average/Max/Total...)	Standards (Local/Inter Standard)	Frequency	Remarks
		Recycled amount		20 kg/month			
		The way of recycling		Sell to villager buyers			
		Treated amount					
		Local of final disposal		Battambang Landfill			
Subsidence	Subsidence prone locations along the road project	Visual inspection and interview with local people		No major adverse impacts		1 time/week to 1 time/month depending on situations	
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow		No major adverse impacts		Daily	

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

Note:

WHO: World Health Organization, SO₂: Sulfur Dioxide, COD: Chemical Oxygen Demand
 MoE: Ministry of Environment, PM: Particulate Matters, TSS: Total Suspended Solid
 NO₂: Nitrogen Dioxide, BOD: Biochemical Oxygen Demand, LC: Least Concern
 NT: Near Threatened

Environmental Monitoring Form for Construction Stage
 (2nd Quarter, April ~ June 2024)

Table 1: Schedule of Seasonal Monitoring (☐ target monitoring during April ~ June, 2024)

Year	2023		2024				2025		
	July	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul
Item	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy
1. Air Quality									
Survey Date	25.Aug	30.Oct	19th.Feb	20.Ap	•	•	•	•	•
2. Water Quality									
Survey Date		30.Oct		20.Ap				•	
3. Noise Quality									
Survey Date		30.Oct		20.Ap				•	
4. Vibration Quality									
Survey Date		30.Oct		20.Ap				•	

Environmental Monitoring Form for Construction Stage (2nd Quarter; April ~ June 2024)

Figure 1: Seasonal Monitoring Points for CP5

