ATTACHMENT – A3

ENVIRONMENTAL MONITORING
(Construction Stage)

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

The Royal Government of Cambodia
Ministry of Public Works and Transport
National Road No. 5 Improvement Project
Thlea Ma'am – Battambang - & Sri Sophorn – Poipet Sections
119+880

Contract Package 4
CC1-CIENCO6 Joint Venture
Sri Sophorn Poipet Section
Sta. 84+740 to Sta.

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		Daily before working	
	Construction sites including construction roads	Visual observation of dust			Daily	
	Storage facilities for dust generating materials including plants					
	Air-07 (Along NR5) *105+240 Date: 26th April 2024 Air-08 *105+240 (1400 m away from Air-07) Date: 27th April 2024	**PM_{10}**	Air-7 = 0.018 mg/m³ Air-8 = 0.013 mg/m³	0.1 mg/m³ (MoE, average 24h)	1) 2 times in dry season and 2 times in rainy season 2) Dust (PM2.5 and PM10) daily check visual check/weekly mobile device check if suspected situation is caused and/or local residents complain	The monitoring is conducted by Ministry of Environment (MoE). All parameters are below the MoE's standard.
		$PM_{2.5}$	Air-7 = 0.012 mg/m³ Air-8 = 0.009 mg/m³	0.025 mg/m³ (MoE, average 24h)		
		SO_2	Air-7 = 0.128 mg/m³ Air-8 = 0.069 mg/m³	0.30 mg/m³ (MoE, average 24h)		
		NO_2	Air-7 = 0.054 mg/m³ Air-8 = 0.054 mg/m³	0.10 mg/m³ (MoE, average 24h)		
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		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	
	WQ-06 (Sri Sophorn River) Date: 27th April 2024	**pH**	7.67	6.5-8.5 (MoE)		The monitoring is conducted by Ministry of Environment (MoE). All parameters are below the MoE's standard.
		TSS	18.00	25-100 mg/L (MoE)		
		BOD	2.60	1-10 mg/L (MoE)		
		COD	3.13	1-8 mg/L (MoE)		
		Total Coliform	3.6×10^3	<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	180 kg/month		Daily	
			Recycled amount	155 kg/month			
			The way of recycling	Sell to villager buyers			
			Treated amount				
			Local of final disposal	KOUNGVA landfill			
		General waste	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	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.

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

The Royal Government of Cambodia
Ministry of Public Works and Transport
National Road No. 5 Improvement Project
Thlea Ma'am – Battambang - & Sri Sophorn – Poipet Sections
119+880

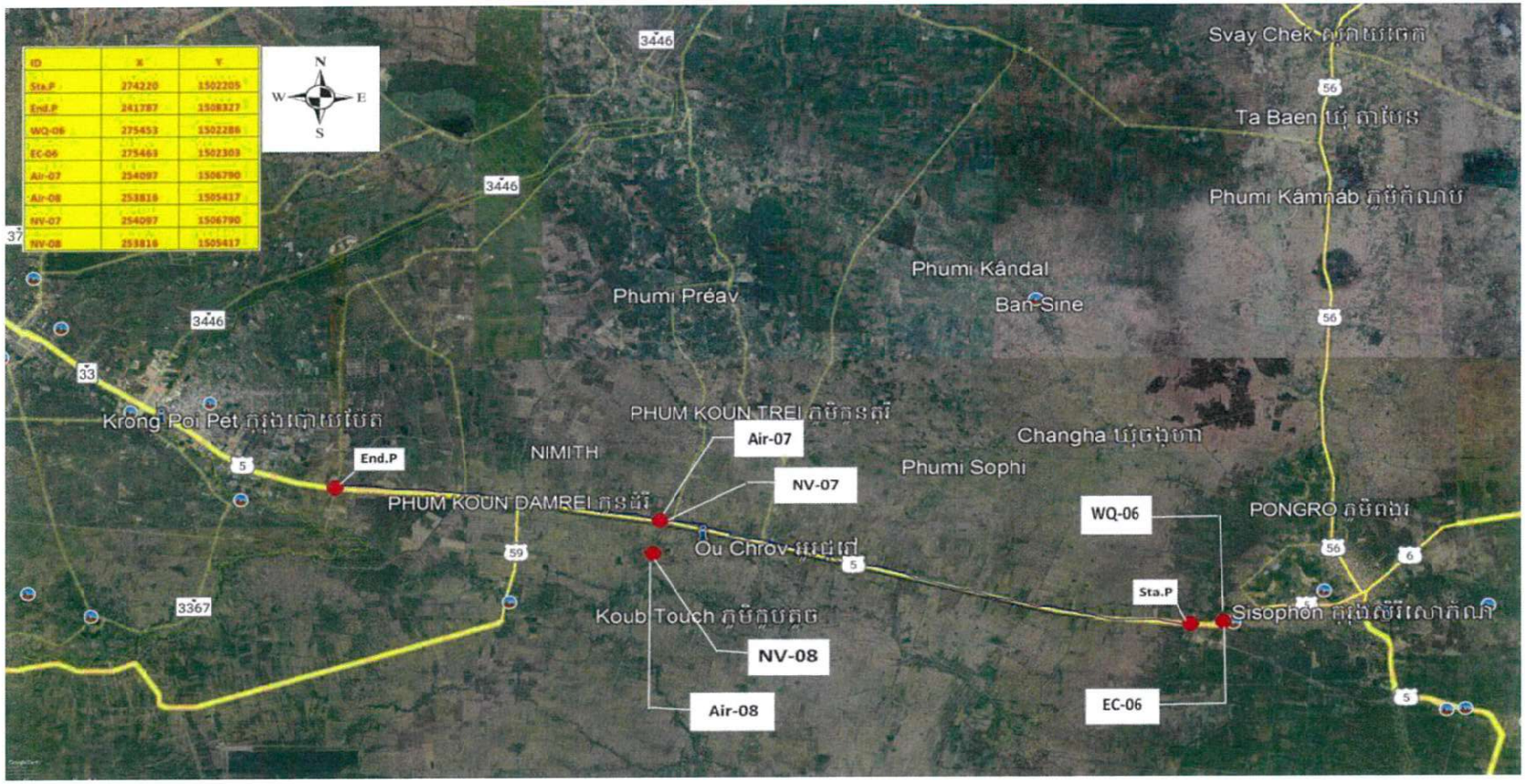
Contract Package 4
CC1-CIENCO6 Joint Venture
Sri Sophorn Poipet Section
Sta. 84+740 to Sta.

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
Item	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry
1. Air Quality	●	●	●	●	●	●	●	●	●	●
Survey Date	Not Conducted	23th–24th of March 2023	Not Conducted	Not Conducted	20th–21th of October 2023	24th–25th of January 2024	26th–27th of April 2024			
2. Water Quality	●		●		●		●		●	
Survey Date	Not Conducted		Not Conducted		21th of October 2023		27th of April 2024			
3. Noise	●		●		●		●		●	
Survey Date	Not Conducted		Not Conducted		20th–21th of October 2023		26th–27th of April 2024			
4. Vibration	●		●		●		●		●	
Survey Date	Not Conducted		Not Conducted		20th–21th of October 2023		26th–27th of April 2024			
8. Ecosystem	●		●		●		●		●	
Survey Date	Not Conducted		Not Conducted		19th–20th of October 2023		2oth–21st of April 2024			

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/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		Daily before working	
	Construction sites including construction roads	Visual observation of dust			Daily	
	Storage facilities for dust generating materials including plants					
	Air-WBS 01&02 *105+525 Data: 20th April 2024 Air-WBS 03 *207+460 Data: Air-WBS 04 *272+289 Data: 20th April 2024	PM_{10}	Air-WBS 01&02 = 0.028 mg/m³ Air-WBS 04 = 0.023 mg/m³	0.05 mg/m³ (MoE, average 24h)	1) 2 times in dry season and 2 times in rainy season 2) Dust ($PM_{2.5}$ and PM_{10}) daily check visual check/weekly mobile device check if suspected situation is caused and/or local residents complain	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/m³ Air-WBS 04 = 0.013 mg/m³	0.025 mg/m³ (MoE, average 24h)		
		SO_2	Air-WBS 01&02 = 0.078 mg/m³ Air-WBS 04 = 0.043 mg/m³	0.30 mg/m³ (MoE, average 24h)		
		NO_2	Air-WBS 01&02 = 0.054 mg/m³ Air-WBS 04 = 0.048 mg/m³	0.10 mg/m³ (MoE, average 24h)		
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		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	
	W- 01&02 *105+700 Data: 20th April 2024	pH	8.75	6.5-8.5 (MoE)	1) 1 time in dry season and 1 time in rainy season	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/Means 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 NV-WBS 03 *207+460 Data: NV-WBS 04 *272+289 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) **NV-WBS 04** 06:00-18:00= 61.74 dB(A) 18:00-22:00= 62.5 dB(A) 22:00-06:00= 59.175 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).
Vibration		Vibration Level		**NV-WBS 01&02** 06:00-18:00 = 39 dB 18:00-06:00 = 29.53 dB **NV-WBS 04** 06:00-18:00 = 37 dB 18:00-06:00 = 35.25 dB	- 65 dB (06:00-18:00) - 60 dB (18:00-06:00) (MoE)		
Waste Generation	Waste storage at construction site	Construction waste	Discharged amount	10 kg/month		Daily	
			Recycled amount	-			
			The way of recycling	-			
			Treated amount	-			
			Local of final disposal	-			
		General waste	Discharged amount	80 kg/month			

Environmental Monitoring Form 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
			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,	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
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)

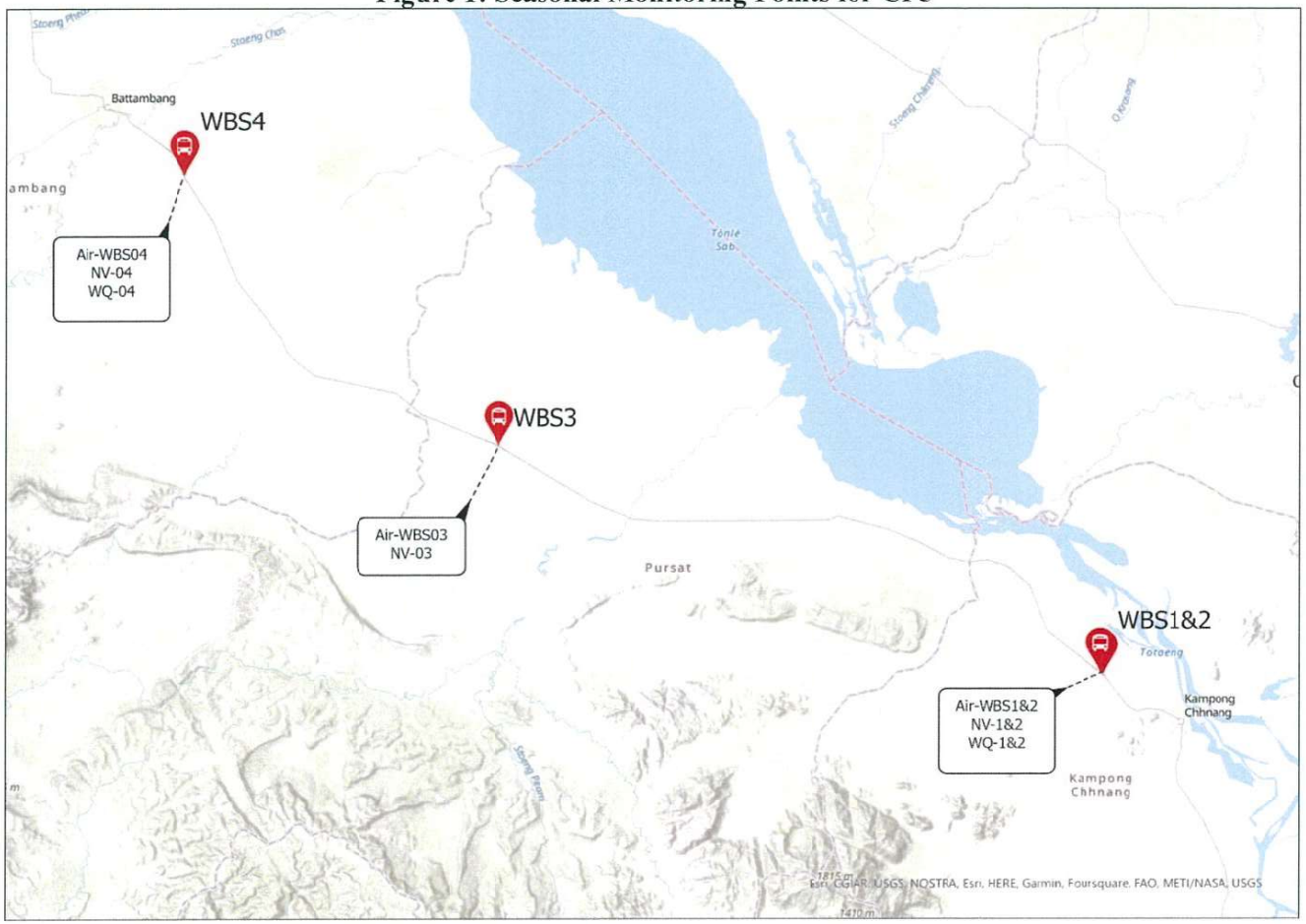



Figure 1: Seasonal Monitoring Points for CP5