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

Contract Package 1

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

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	At construction camp site
	Construction sites including construction roads	Visual observation of dust	No major adverse impacts		Daily	Site works Every day, especially in dry season
	Storage facilities for dust generating materials including plants		No major adverse impacts			
	Air-1 (Along NR5) *187+500 Data: 6th – 7th July 2022 Air-2 (Residential area near Air-1) *187+500 Data: 6th – 7th July 2022	**PM_{10}**	Air-1 = 0.032 mg/m³ Air-2 = 0.027 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	The monitoring of air quality is conducted by MoE. The monitoring points (Air-1 and Air-2) are out of the project area. Thus, the values are not impacted by the project.
		$PM_{2.5}$	Air-1 = 0.010 mg/m³ Air-2 = 0.008 mg/m³	0.025 mg/m³ (MoE, average 24h)		
		SO_2	Air-1 = 0.021 mg/m³ Air-2 = 0.013 mg/m³	0.30 mg/m³ (MoE, average 24h)		
		NO_2	Air-1 = 0.017 mg/m³ Air-2 = 0.005 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-1 (Pursat River/upstream) *185+000 WQ-8 (Pursat River/downstream) *185+350	**pH**	The Water Quality Survey will be conducted in October 2022 (No survey plan between July-September 2022)	6.5-8.5 (MoE)	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	
		TSS		25-100 mg/L (MoE)		
		BOD		1-10 mg/L (MoE)		
		COD		1-8 mg/L (MoE)		
		Total Coliform		<5,000 MPN/100ml (MoE)		
Noise	NV-1 (Along NR5) *187+500	Noise Level	The Noise and Vibration Survey will be conducted in October 2022	- 60 dB(A) (06:00-18:00) - 50dB(A) (18;00-22:00)	1) 1 time in dry season and 1 time in rainy season	

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Contract Package 1

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

Item	Location *nearest KMP	Parameter/Means of Monitoring		Result (Average/ Max /Total…)	Standards (Local/Inter Standard)	Frequency	Remarks
				(No survey plan between July-September 2022)	- 45dB(A) (22:00-06:00) (MoE)	2) Daily check/weekly mobile device check when suspected situation is caused and/or residents complain	
Vibration		Vibration Level			- 65 dB (5:00-17:00) - 60 dB (17:00-05:00) (MoE)		
Waste Generation	Waste storage at construction site	Construction waste	Discharged amount	20 kg/month		Daily	
			Recycled amount	5 kg/month			
			The way of recycle	Sell to village buyers			
			Treated amount				Some liquid waste is treated by septic tanks
			Local of final disposal	Pursat Landfill			
		General waste	Discharged amount	100 kg/month			
			Recycled amount	23 kg/month			
			The way of recycle	Sell to villager buyers			
			Treated amount				Some liquid waste is treated by septic tanks
			Local of final disposal	Pursat landfill			
Subsidence	Subsidence prone locations along the road project	Visual inspection and interview with local people		No impact at construction site		1 time/week to 1 time/month depending on situations	Minor affects to prone locations along the road project
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow		No impacts at construction site		Daily	
Ecosystem	EC-1 (Pursat River) *185+350	Interviews of local people and visual observation of animals, reptiles, and amphibious		The ecosystem survey will be conducted in October 2022 (No survey plan between July-September 2022)		1 time in dry season and 1 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)

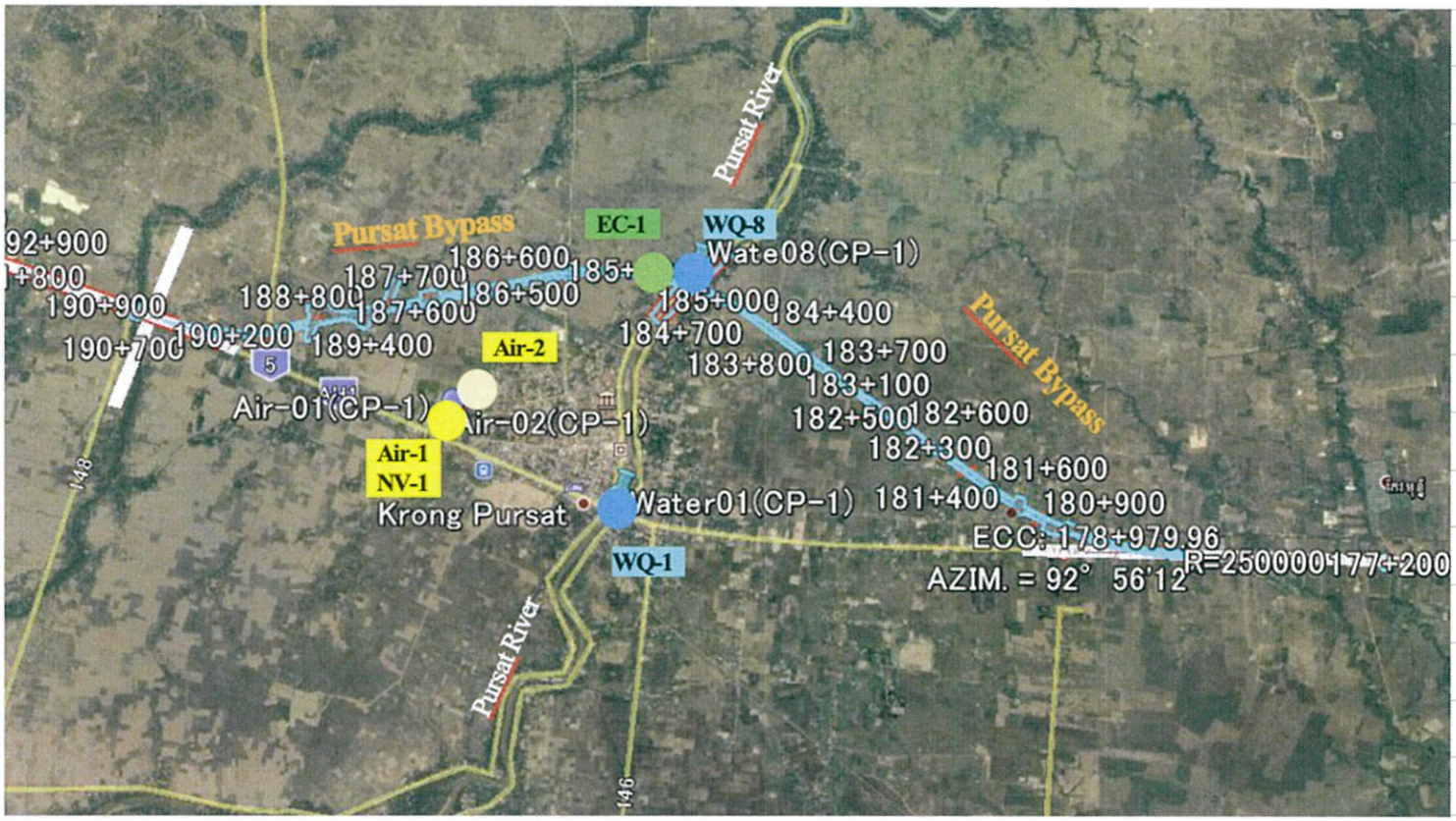
Contract Package 1

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

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

Year	2019	2020				2021				2022			
		Jan	Apr	July	Oct	Jan	Apr	July	Oct	Jan	Apr	July	Oct
	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air Quality	×	×	●	●	●	●	●	●	●	●		●	
	Not conducted	Not conducted	9-10th	23-24th	23-24th	12-13th	4-5th	6-7th	3-4th	16-17th	11-12th	6-7th	
2. Water Quality	×		●		●		●		●		●		
	Not conducted		10th		27th		5th		3rd		11th		
3. Noise	×		●		●		●		●		●		
	Not conducted		9-10th		23-24th		4-5th		3-4th		11-12th		
4. Vibration	×		●		●		●		●		●		
	Not conducted		9-10th		23-24th		4-5th		3-4th		11-12th		
8. Ecosystem			●		●		●		●		●		
			4th of May		28th		25th		17th		11th		

Figure 1: Seasonal Monitoring Points for CP1 (KMP 171+200 – 191+000)



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

Contract Package 2

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

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	No major adverse impacts		Daily	
	Storage facilities for dust generating materials including plants		No major adverse impacts			
	Air-9 (Additional Point) *209+840 Date: 5th – 6th July 2022	**PM_{10}**	Air-9 = 0.012 mg/m³	0.05 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 of air quality is conducted by MoE.
		$PM_{2.5}$	Air-9 = 0.008 mg/m³	0.025 mg/m³ (MoE, average 24h)		
		SO_2	Air-9 = 0.054 mg/m³	0.30 mg/m³ (MoE, average 24h)		
		NO_2	Air-9 = 0.047 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-2 (Tapaong river) *216+080 WQ-3 (Svay Doun Keo river) *219+940	**pH**	The Water Quality Survey will be conducted in October 2022 (No survey plan between July-September 2022)	6.5-8.5 (MoE)		
		TSS		25-100 mg/L (MoE)		
		BOD		1-10 mg/L (MoE)		
		COD		1-8 mg/L (MoE)		
		Total Coliform		<5,000 MPN/100ml (MoE)		

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

Contract Package 2

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

Item	Location *nearest KMP	Parameter/Means of Monitoring		Result (Average/ Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks
Noise	NV-6 (Additional point) *209+840	Noise Level		The Noise and Vibration Survey will be conducted in October 2022 (No survey plan between July-September 2022)	- 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	
Vibration		Vibration Level			- 65 dB (5:00-17:00) - 60 dB (17:00-05:00) (MoE)		
Waste Generation	Waste storage at construction site	Construction waste	Discharged amount	30 kg/month		Daily	
			Recycled amount	30 kg/month			
			The way of recycle	Sell to village buyers			
			Treated amount				Some liquid waste is treated by septic tanks
			Local of final disposal	Pursat landfill			
		General waste	Discharged amount	700 kg/month			
			Recycled amount	30 kg/month			
			The way of recycle	Sell to village buyers			
			Treated amount				Some liquid waste is treated by septic tanks
			Local of final disposal	Pursat landfill			
Subsidence	Subsidence prone locations along the project road	Visual inspection and interview with local people		No impact at construction site		1 time/week to 1 time/month depending on situations	Minor affects to prone locations along the road project
Hydrology	River, stream, and reservoir where construction works are executed	Visual inspection on volume and speed of water flow		No impacts at construction site		Daily	

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

Contract Package 2

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

Item	Location *nearest KMP	Parameter/Means of Monitoring	Result (Average/ Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks
Ecosystem	EC-2 (Svay Art river) *191+220 EC-3 (Beung Kna river) *208+900	Interviews of local people and visual observation of animals, reptiles, and amphibious	The ecosystem survey will be conducted in October 2022 (No survey plan between July-September 2022)		1 time in dry season and 1 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)

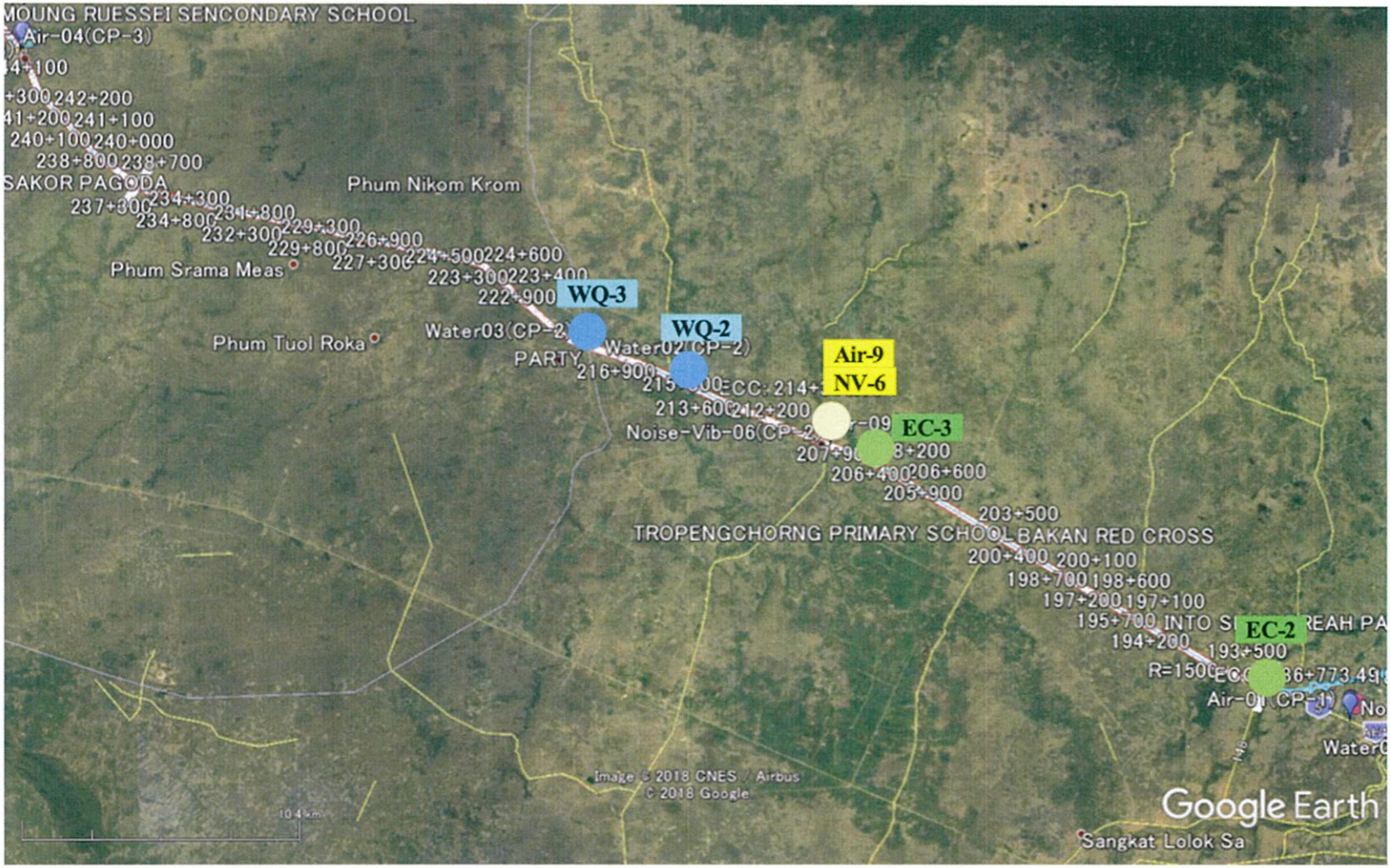
Contract Package 2

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

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

Year	2019	2020				2021				2022			
	Aug	Jan	Apr	July	Oct	Jan	Apr	July	Oct	Jan	Apr	July	Oct
	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air Quality	●	●	●	●	●	●	●	●	●	●	●	●	
	26-27th	15-16th	9-10th	10-11th	24-25th	11-12th	3rd-4th	5-6th	4-5th	19-20th	2-3rd	5-6th	
2. Water Quality	●		●		●		●		●		●		
	28th		No Water		24th		No water		4th		4th		
3. Noise	●		●		●		●		●		●		
	26-27th		9-10th		24-25th		3rd-4th		4-5th		2-3rd		
4. Vibration	●		●		●		●		●		●		
	26-27th		9-10th		24-25th		3rd-4th		4-5th		2-3rd		
8. Ecosystem			●		●		●		●		●		
			3rd-4th		24th		24th		16th		10th		

Figure 1: Seasonal Monitoring Points for CP2 (KMP 191+000 – 238+000)



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

Contract Package 3

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

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		No major adverse impacts			
	Air-3 (Along NR5) *244+760 Date: 5th – 6th July 2022 Air-4 (Residential area near Air-3) *244+760 Date: 6th – 7th July 2022 Air-5 (Along NR5) *282+180 Date: 7th – 8th July 2022 Air-6 (Residential area near Air-5) *282+180 Date: 8th – 9th July 2022	**PM_{10}**	Air-3 = 0.040 mg/m³ Air-4 = 0.008 mg/m³ Air-5 = 0.022 mg/m³ Air-6 = 0.016 mg/m³	0.05 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 of air quality is conducted by MoE. The monitoring of air quality is conducted by MoE.
		$PM_{2.5}$	Air-3 = 0.011 mg/m³ Air-4 = 0.005 mg/m³ Air-5 = 0.013 mg/m³ Air-6 = 0.011 mg/m³	0.025 mg/m³ (MoE, average 24h)		
		SO_2	Air-3 = 0.108 mg/m³ Air-4 = 0.054 mg/m³ Air-5 = 0.075 mg/m³ Air-6 = 0.081 mg/m³	0.30 mg/m³ (MoE, average 24h)		
		NO_2	Air-3 = 0.039 mg/m³ Air-4 = 0.036 mg/m³ Air-5 = 0.052 mg/m³ Air-6 = 0.032 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-4 (Maung river) *244+600 WQ-5 (Chak river) *255+760 WQ-6 (Sangke river)	**pH**	The Water Quality Survey will be conducted in October 2022 (No survey plan between July-September 2022)	6.5-8.5 (MoE)		
		TSS		25-100 mg/L (MoE)		
		BOD		1-10 mg/L (MoE)		
		COD		1-8 mg/L (MoE)		
		Total Coliform		<5,000 MPN/100ml (MoE)		

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

Contract Package 3

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

Item	Location *nearest KMP	Parameter/Means of Monitoring		Result (Average/ Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks
	* Battambang City (Out of Project area)						
Noise	NV-2 (Along NR5/Air-3) *244+760	Noise Level		The Noise and Vibration Survey will be conducted in October 2022 (No survey plan between July-September 2022)	- 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	
Vibration	NV-3 (Along NR5/Air-5) *282+180	Vibration Level			- 65 dB (5:00-17:00) - 60 dB (17:00-05:00) (MoE)		
Waste Generation	Waste storage at construction site	Construction waste	Discharged amount	170 kg/month		Daily	
			Recycled amount	70 kg/month			
			The way of recycle	Sell to villager buyers			
			Treated amount				Some liquid waste is treated by septic tanks
			Local of final disposal	Battambang landfill			
		General waste	Discharged amount	790 kg/month			
			Recycled amount	270 kg/month			
			The way of recycle	Sell to villager buyers			
			Treated amount				Some liquid waste is treated by septic tanks
			Local of final disposal	Battambang landfill			
Subsidence	Subsidence prone locations along the project road	Visual inspection and interview to the local people		No impact at construction site		1 time/week to 1 time/month depending on situations	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		Daily	

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

Contract Package 3

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

Item	Location *nearest KMP	Parameter/Means of Monitoring	Result (Average/ Max /Total...)	Standards (Local/Inter Standard)	Frequency	Remarks
Ecosystem	EC-4 (Maung river/WQ-4) *244+600 EC-5 (Chak river/WQ-5) *255+760	Interviews of local people and visual observation of animals, reptiles, and amphibious	The ecosystem survey will be conducted in October 2022 (No survey plan between July-September 2022)		1 time in dry season and 1 time in rainy season	

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

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

Contract Package 3

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (Middle Section / Thlea Ma'am- Battambang Section)

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

Year	2019	2020				2021				2022			
	Aug	Jan	Apr	July	Oct	Jan	Apr	July	Oct	Jan	Apr	July	Oct
	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air Quality	×	●	●	●	●	●	●	●	●	●	●	●	
	Not conducted	26-28th of May	27-30th	8-10th	24-27th	15-19th	9-13th	6-10th	8-11th	17-20th	8-12th	5-8th	
2. Water Quality	×		●		●		●		●		●		
	Not conducted		30th		26th		12th		11th		10th		
3. Noise	×		●		●		●		●		●		
	Not conducted		27-29th		24-26th		10-13th		8-11th		8-12th		
4. Vibration	×		●		●		●		●		●		
	Not conducted		24-26th		24-26th		10-13th		8-11th		8-12th		
8. Ecosystem	×		●		●		●		●		●		
	Not conducted		25th		25th		22nd		15-16th		9th		

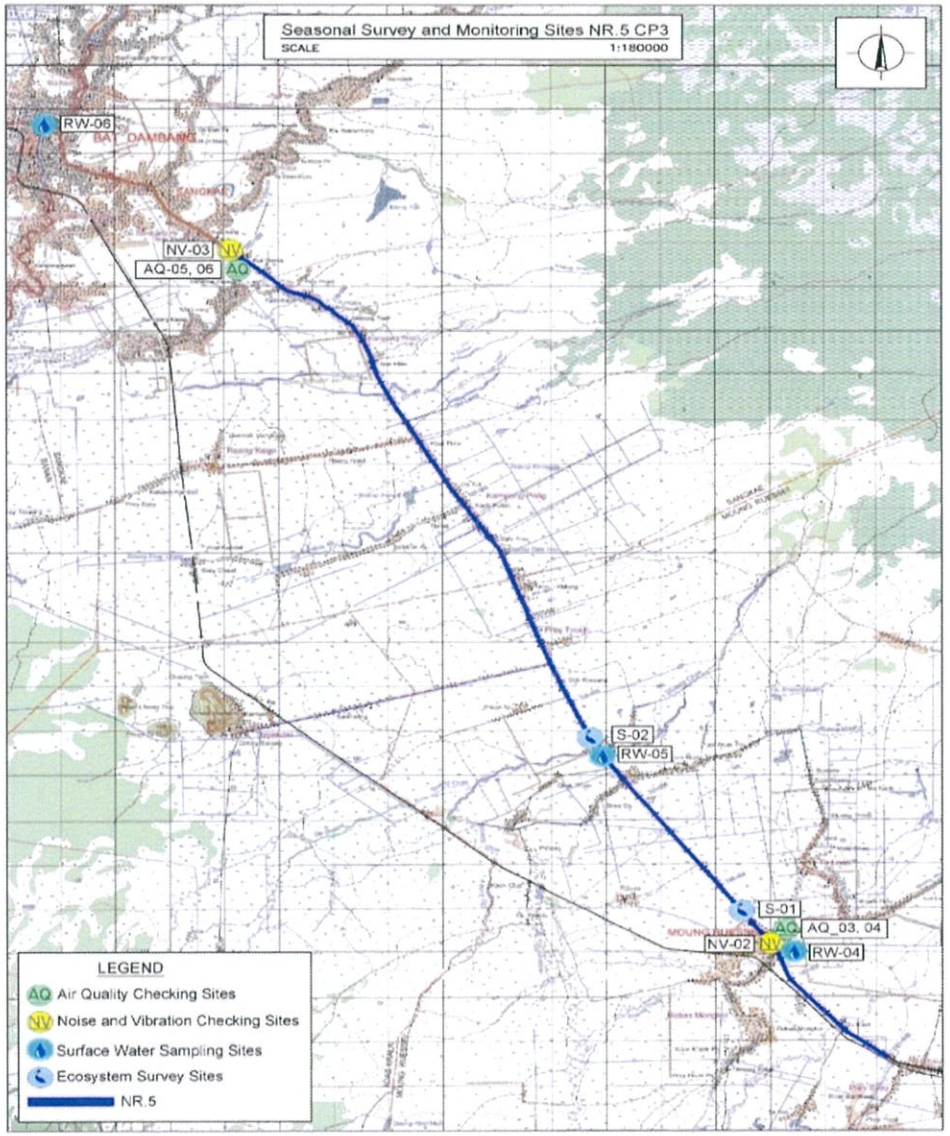



Figure 1: Seasonal Monitoring Points for CP3 (Sta. 238+000 – 282+101)