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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 (October 5th, 2020) KP: 39+200 Okdong District Hospital, Kompong Speu Province.	**PM10**	AQS1 = 0.089mg/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. 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 and Okdong district hospital is nearby the urban as well as market area and the traffic is also congested. It means that the air quality within those sections were started polluting due to the construction activities and human activities, so the contractor has to pay more attention above matter by providing more watering in regularly, especially during the day time.
		PM2.5	AQS1 = 0.047mg/m^3	0.025 mg/m^3 (WHO, average 24h)		
		SO_2	AQS1 = 0.019mg/m^3	0.30 mg/m^3 (WHO average 24h)		
		NO_2	AQS1 = 0.023mg/m^3	0.10 mg/m^3 (WHO average 24h)		

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Water Quality	WS-1 (07th of October 2019) KP:32+000 at LHS, Pond, 200m from ROW (water sampling point will be replaced due to far from the road WS-2 (07th of October 2019) KP: 32+300 at RHS, in Tonle Sap river, in front of Prek Prang Pagoda WS-3 (07th of October 2019) KP: 36+900 at RHS, downstream, border of Kandal and Kompong Chhnang WS-4 (07th of October 2019) KP: 40+900 at RHS, downstream near factory	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector
		pH	WS-1=7.19 WS-2=6.94 WS-3=7.35 WS-4=7.29	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. The result of water quality analysis is indicated for all sites (within this month is rainy season. Comparing the result with the Cambodian Standard, there are showing date the value of TSS, BOD, COD are still below the standard, but it seem to be exceeded for Total Coliform (WS-2 and WS-3)
		TSS	WS-1=29 WS-2=28 WS-3=22 WS-4=32	25-100 mg/l (MoE)		
		BOD	WS-1=1.00 WS-2=3.20 WS-3=2.00 WS-4=2.20	1-10 mg/l (MoE)		
		COD	WS-1=3.92 WS-2=11.36 WS-3=6.27 WS-4=5.88	1-8 mg/l (MoE)		
		Total Coliform	WS-1= 4.3×10^3 WS-2= 1.5×10^4 WS-3= 1.5×10^4 WS-4= 4.3×10^3	<5,000 (Japanese Standard)		
Noise	ANV-1 (April 08th, 2019) KP:39+200 Odong District, Kompong Speu Province (Odong district hospital)	Noise Level (MoE Laboratory)	ANV-1= -63dB (6:00-18:00) -60dB (18:00-22:00) -59dB (22:00-06:00)	- 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	Visual check and maintain the construction equipment.
Vibration		Vibration Level (MoE Laboratory)	ANV-1 -38Hz (7:00-20:00) -37Hz (20:00-7-00)	- 65Hz (7:00-20:00) - 60Hz (20:00-7:00) (MoE)		The value of noise was a little exceeded the Cambodian Standard and IFC Standard, because this area is nearby the urban area as well as market and the traffic also is congested.

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Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Waste Generation	Waste storage at construction site	Slurry and other construction waste	Discharged amount	The result was shown in table of waste data	No standards	Every day	Septic tank
			Recycled amount				
			The way of recycle				
			Treated amount				
			Local of final disposal				
		General waste	Discharged amount	The result was shown in table of waste data			
			Recycled amount				
			The way of recycle				
			Treated amount				
			Local of final disposal				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 canels are crossing NR-5, sometime, was raining.
Ecosystem	EC-1 KP 35 and KP 37+200 (26th of September 2019 to 09th October, 2019) Odong bypass as requested by JICA and Client	Visual observation of animals, reptiles, and amphibious		Mammal = 4 Amphibian =5 Reptile = 6 Birds = 26 Fishes = 23 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. Based on above inspection team and interviewing with local villager as well as famers, there are existing some species are vulnerable some least concern which mentioned within IUCN list, and some other species are non within the IUCN list. The interviewing show that the vulnerable species within this section have seen very rarely such as Naja Siamensis, Amyda

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						Cartilaginea and Malayemys subtrijuga.

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

1. Schedule of Seasonal Monitoring

The seasonal periodical monitoring for air quality was done on 05th of October 2019, noise and vibration were done on 05th of October 2019, water quality sampling was conducted on 07th of October 2019 and ecosystem survey was completed on 8th of April 2019.

Table 1.1 Monitoring Items and Frequency

Year	2018	2019				2020				2021				2022			
	29th Nov	Jan	Apr	Jul	Oct	Jan	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	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2. Water Quality	●		●		●		●		●		●		●		●		●
3. Noise	●		●		●		●		●		●		●		●		●
4. Vibration	●		●		●		●		●		●		●		●		●
8. Ecosystem		●	●		●		●		●		●		●		●		●

2. Seasonal Monitoring Points and Areas

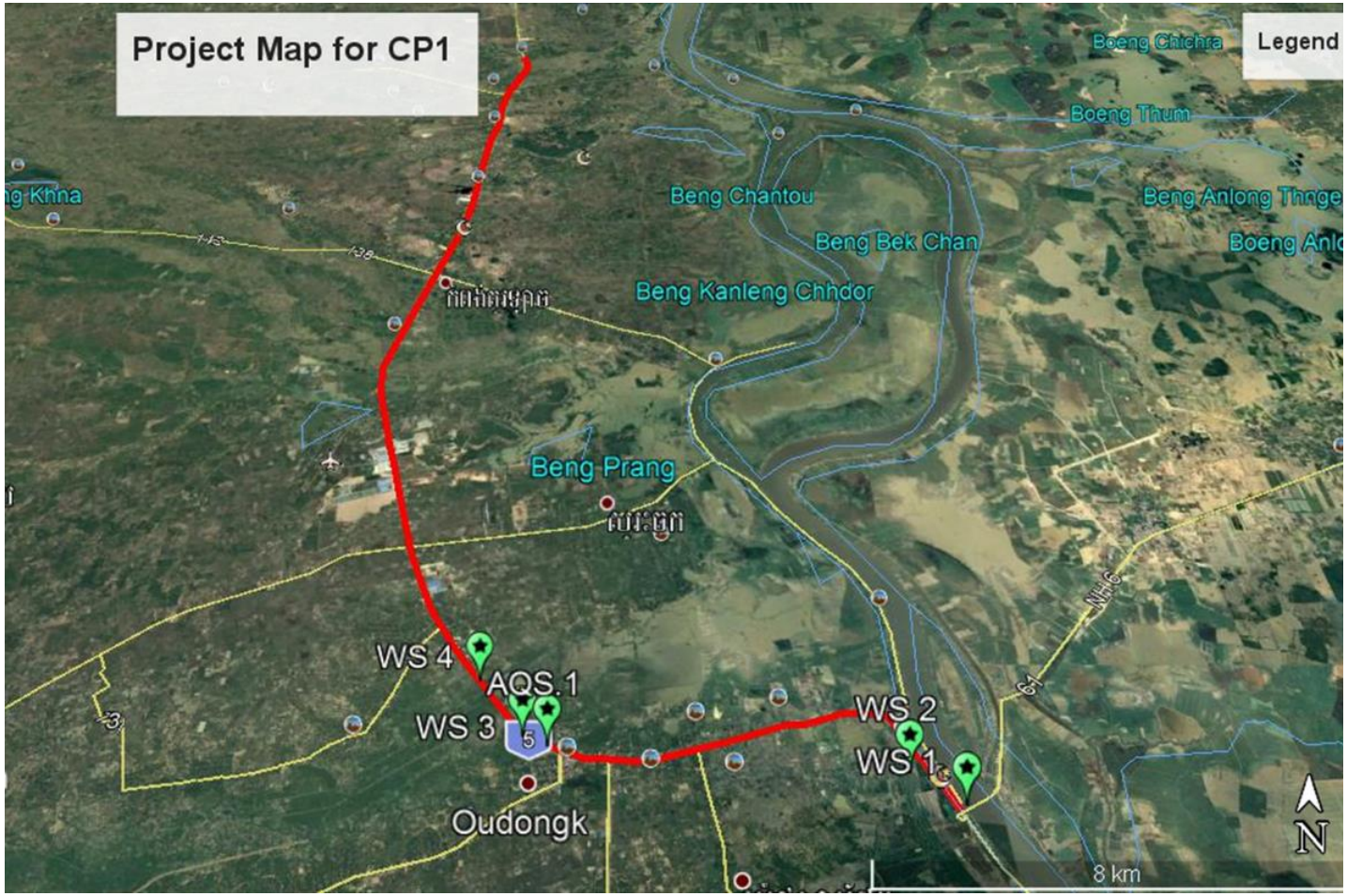

Figure-1: Designed Monitoring Points for Package 1 Section (Sta 31+370 - Sta 73+000)

3. Ecosystem Map and Area for CP1 (Odong Bypass)

1. The Solid Waste Generation in December, 2019

Location	General waste				Construction waste			
	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal
CP1 office (PK35)	80kg	5kg	Provide to cleaner	Dumpsite	-	-	-	-
PSC deck yard (PK78 RHS)	30kg	10kg	Sold to scavenger	-	100kg	50kg	Sold to scavenger and Store at Fab yard	-
Feb yard (PK78)	100kg	15kg	Sold to scavenger	Dumpsite	200kg	50kg	Sold to scavenger and store at CJCG	-
KV yard (37+570)	50kg	5kg	Sold to scavenger	Dumpsite	50kg	50kg	Sold to scavenger	-
New site Office (PK 49+900) RHS	50kg	5kg	Sold to scavenger	Dumpsite	100kg	20kg	Sold to scavenger	Dumpsite
Accommodation (PK51) RHS	100kg	10kg	Sold to scavenger	Dumpsite	100kg	50kg	Sold to scavenger	-
EWT Office (PK51) RHS	50kg	-	-	Dumpsite	-	-	-	-
CT yard (PK65)	50kg	-	-	Dumpsite	100kg	-	-	Dumpsite
Bridge 11	40kg	-	-	Dumpsite	$0.50m^3$	$0.50m^3$	Detour road	Disposal area
Bridge 12	10kg	-	-	Dumpsite	$1m^3$	$0.50m^3$	Detour road	Disposal area
Bridge 13	50kg	-	-	Dumpsite	$2m^3$	$0.50m^3$	Detour road	Disposal area

Location	General waste				Construction waste			
	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal
Bridge 14	10kg	-		Dumpsite	1m3	-	-	Disposal area
Total	**620kg**	**55kg**	**-**	**-**	**650kg + 4.5m3**	**220kg + 1.5m3**	-	-

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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 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 (October 04th, 2019) KP: 89+250 At RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kompong Chhnang, Kompong Chhnang Province. AQS-3 (October 3rd, 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=0.059 AQS-3=0.078	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. Both PM10 and PM2.5 were exceed the standard of ambient air quality of the government of Cambodia as well as the IFC standard. This finding was not so much different from previous study in the January and April 2019. The main cause of this large amount of particulate matters in the ambient air might be the dust emission from busy traffic on the NR5. The presence of the construction activities for the improvement of the NR5 might contribute very little to this. SMCC has always implement the dust control measures such as water spraying on the access road to construction sites, setting the limitation of the driving speed of vehicles and loading trucks, and covering the loading truck to prevent the dust emission.
		PM2.5	AQS-2= 0.019 AQS-3=0.038	0.025 mg/m^3 (WHO, average 24h)		
		SO_2	AQS-2=0.015 AQS-3=0.012	0.30 mg/m^3 (WHO average 24h)		
		NO_2	AQS-2= 0.020 AQS-3=0.017	0.10 mg/m^3 (WHO average 24h)		

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Water Quality	WS-5 (10th of October 2019) KP:82+500 at RHS, Chrey Bak river downstream, near Phnom Chompus Pagoda Andoung Svay commune, Rolea Bíer district, Kompong chhnang province. WS-6 (10th of October 2019) 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 (10th of October 2019) KP: 106+350 at RHS, downstream Srah Angkam lake, Thmar Keo village, Svay Chrum commune, Rolea B'ier district, Kompong chhnang province. WS-8 (10th of October 2019) KP: 117+118 at RHS, downstream Boribo river, Phsar village, Phsar commune, Boribo district, Kompong Chhnang province.	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector
		pH	WS-5=7.12 WS-6=8.23 WS-7=6.14 WS-8=6.50	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. Two samples of SW-06 and SW-07 had amount of Total Coliform exceed the Standard of Public Water Quality of the Government of Cambodia. The reasons behind this status are mostly related to run-off of the organic waste from surrounding area caused by the activities of local people living around the water bodies such as using water for bathing their cattle, application of fertilizer on the paddy field, or the natural phenomenon of decomposition of aquatic plants in these water bodies. SW-07 also found to have more amount of inorganic and organic substances which caused the COD exceed the standard of Public Water Quality of the Government of Cambodia. From our inspection, the NR5 construction activities have not contributed to this pollution of water quality because there were no construction activities at these water bodies, and there was no much run-off from construction area to these water bodies in this rainy season.
		TSS	WS-5=65.00 WS-6=36.00 WS-7=31.00 WS-8=14.00	25-100 mg/l (MoE)		
		BOD	WS-5=1.00 WS-6=1.60 WS-7=1.80 WS-8=1.30	1-10 mg/l (MoE)		
		COD	WS-5=3.5 WS-6=4.92 **WS-7=5.88** WS-8=3.18	1-8 mg/l (MoE)		
		Total Coliform	WS-5=2,800 **WS-6=46,000** **WS-7=6,400** WS-8=2,800	<5,000 (Japanese Standard)		

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Noise	ANV-2 (04th of October, 2019) PK 89+250 at RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kampong Chhnang, Kampong Chhnang province ANV-3 (03rd of October, 2019) PK 97+300 at LHS, residential area in Trapeang Por village, Pong Ro commune, Rolea B'ier district, Kampong Chhnang province	Noise Level (MoE Laboratory)	ANV-2 - **63dB (06:00-18:00)** **- 61dB (18:00-22:00)** **- 62dB (22:00-06:00**) ANV-3 - 58dB (06:00-18:00) **- 58dB (18:00-22:00)** **- 57dB (22:00-06:00)**	- 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	Visual check and maintain the construction equipment The noise level were found slightly over the allowable standard for the residential area stipulated in the Sub-Decree on Air Pollution Control and Noise Disturbance (2000) of the government of Cambodia. These are results of busy traffic activities on the NR5 which is the main road connected between the crowded cities of Poipet & Battambang to Phnom Penh city, the capital city of Cambodia. The presence of construction activities which consist of transportation of loading trucks from borrow pits to road construction sites, and road clearing and grubbing might have contributed very little. This is because of the very few activities of the project has taken place nearby the measurement sites.
Vibration		Vibration Level (MoE Laboratory)	ANV-2 - 44Hz (07:00-20:00) - 43Hz (20:00-07:00) ANV-3 - 27Hz (07:00-20:00) - 27Hz (20:00-07:00)	- 65Hz (07:00-20:00) - 60Hz (20:00-07:00)		The vibration levels were generally within the standards for the construction activities. This means that daily traffic activity and construction activities of the project have not resulted in any concern over the vibration yet.

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Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Waste Generation	Waste storage at construction site and campsites	Slurry and other construction waste	Discharged amount	The attached result table will be shown	No standards	Every day	Septic tank
			Recycled amount				
			The way of recycle				
			Treated amount				
			Local of final disposal				
		General waste	Discharged amount	The attached result table will be shown			
			Recycled amount				
			The way of recycle				
			Treated amount				
			Local of final disposal				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	(16th of October 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 = 4 Amphibian =5 Reptile = 12 Birds = 34 Fishes = 51	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river This survey was conducted by interviewing with local fisherman and local people about the presence of fauna resource listed in the table of checklist and taking photos of observing fauna resources by the environmentalist.

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
						Most of the mammal, amphibian, reptile and bird are generally present in the area in both rainy and dry season. Following these results, we find there is no much change from the previous survey in dry season in April 2019. Therefore, we could draw a prompt conclusion that there is no major negative effects on fauna owing to the construction activities.

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

1. Schedule of Seasonal Monitoring

The seasonal periodical monitoring for air quality was done on 03rd and 04th of October 2019, noise and vibration were done on 03rd and 04th of October 2019, water quality was conducted on 10th of October 2019 and ecosystem survey was implemented on 16th of October, 2019.

Table 1.1 Schedule of Seasonal Monitoring

Year	2018	2019				2020				2021				2022			
	29th Nov	Jan	Apr	Jul	Oct	Jan	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	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2. Water Quality	●		●		●		●		●		●		●		●		●
3. Noise	●		●		●		●		●		●		●		●		●
4. Vibration	●		●		●		●		●		●		●		●		●
8. Ecosystem		●	●		●		●		●		●		●		●		●

2. Seasonal Monitoring Points and Areas

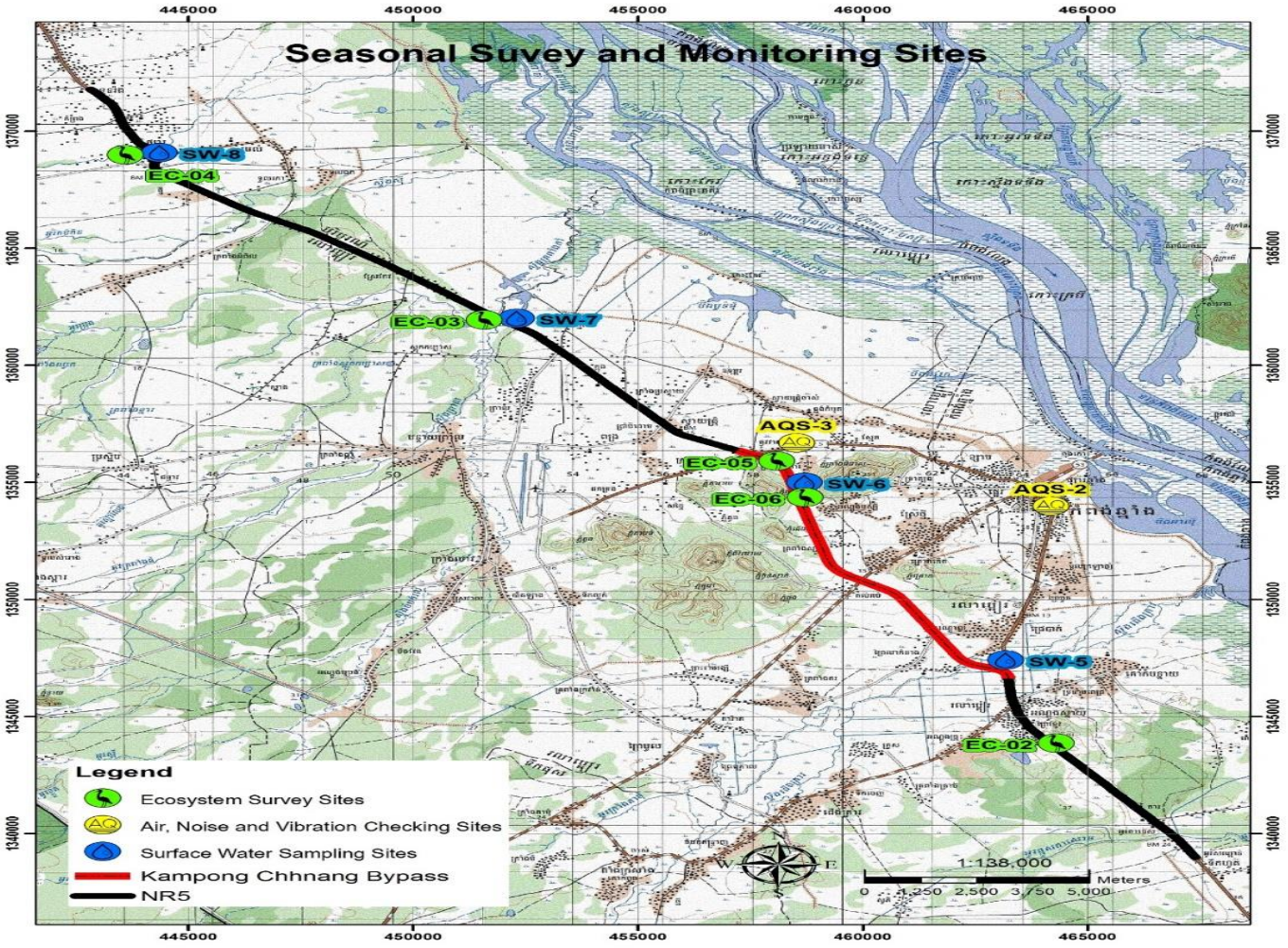

Figure 2.1: Designed Monitoring Points for Package 2 Section (Sta 73+000 - Sta 120+000)

3. The Solid Waste Generation in December, 2019

Location	General waste				Construction waste			
	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal
CP2 office	250	10	Sold to scavenger	Dumpsite	-	-	-	-
SMCC Accommodation	240	9	Sold to scavenger	Dumpsite	-	-	-	- -
MOTORPOOL	610	15	-	Dumpsite	30 (Scrap waste)	30	Sold to scavenger	-
LOT1	120	-	-	Dumpsite	-	-	-	Dumpsite
LAT2	100	5	-	Dumpsite	-	-	-	Dumpsite
CLE Accommodation	240	-	Sold to scavenger	Dumpsite	-	-	-	-
CLE Yard	370	-	-	Dumpsite	5 (Scrap waste)	-	Store in CLE Yard	-
KCNC	120	13	Sold to scavenger	Dumpsite	35 (Scrap waste)	-	-	-
SEC Fabrication Yard	65	-	-	Dumpsite	-	-	-	-

Location	General waste				Construction waste			
	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal	General Amount Kg/month	Recycle Amount (kg/month)	Mean of Recycle	Disposal
All Box Culvert	240	-	-	Dumpsite	-	-	-	-
Dumped at disposal area PK105	-	-	-	-	25m^3 (demolition waste)			Dumped at disposal area PK105
TOTAL	2,895	80				40		

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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 (17th of January, 2019) PK-135+600 Kbal Damrei village, Ansa Chambork commune, Krakor district, Pursat province AQS-5 (15th of January, 2019) PK-170+340 Kcandol Sar Village, Beung Kantout commune, Krakor district, Pursat province	**PM10**	AQS4 = 0.139mg/m^3 AQS5 = 0.099mg/m^3	0.05 mg/m^3 (WHO, average 24h)	2 times in dry season 2 times in wet season	The results showed that the ambient air quality in both sampling sites AQS-4 and AQS-5 along the NR.5 within package 3 is in acceptable condition. Among four parameters there are two parameters including NO2 and SO2, have their values under the standard of the Ministry of Environment (MOE) as well as the Environmental Health and General Guideline of IFC. However, another two parameters, PM10 and PM2.5, are highly above the standard value of MOE and guideline value of IFC. This is might be because transportation and activity at KM134+600. Anyway, both particulate matters at KM170+340 are highly above the standard even though no activity. However, there lower than last seasonal result little bit. Through this result, we could draw a conclusion that air quality at the monitoring sites is already polluted by the particulate matter even there is no many activities of the road construction. .
		PM2.5	AQS4 = 0.092mg/m^3 AQS5 = 0.060mg/m^3	0.025 mg/m^3 (WHO, average 24h)		
		SO_2	AQS4 = 0.028mg/m^3 AQS5 = 0.022mg/m^3	0.30 mg/m^3 (WHO average 24h)		
		NO_2	AQS4 = 0.030mg/m^3 AQS5 = 0.034mg/m^3	0.10 mg/m^3 (WHO average 24h)		

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Water Quality	WS-9 (23th of October, 2019) 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	7.49	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season	The water quality in this main rivers (Thlea Ma'am) is under the water quality standard as stipulated in the Sub-decree on Water Pollution Control (1999) of Ministry of Environment (MOE), except TSS parameter is higher than MOE standard and Japanese standard, caused by agriculture and business activity at upstream of river since 2000 according to interview local people and survey. We noticed the river water has not been polluted by construction activities.
		TSS	110	25-100 mg/l (MoE)		
		BOD	2.25	1-10 mg/l (MoE)		
		COD	5.16	1-8 mg/l (MoE)		
		Total Coliform	2100	<5,000 (Japanese Standard)		
Noise	ANV-4 (23rd - 24th of October, 2019) PK-135+600, Kbal Damrei village, Ansar Chambork commune, Krakor district, Pursat province. ANV-5 (23rd - 24th of October, 2019) PK-170+340, Kandol Sar village, Beung Kantuot commune, Krakor district, Pursat province.	Noise Level (MoE Laboratory)	ANV-4, 61 dB (06:00-18:00) 58 dB (18:00-22:00) 58 dB (22:00-06:00) AQS-5 64 dB (06:00-18:00) 63 dB (18:00-22:00) 62 dB (22:00-06:00)	- 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	The noise level at sampling sites AQS-4 and AQS-5 are lower than standard value of MOE as well as the guideline value of IFC and Japanese standard, except at night time, the noise level slightly above the allowable standard value of MOE as well as the guideline value of IFC for residential, institutional, educational area. We find that even there are no many construction activities at the monitoring site during the monitoring date, the monitoring sites are already disturbed by the transportation activities on NR.5.

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Item	Location	Parameter/Means of Monitoring		Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks
Vibration		Vibration Level (MoE Laboratory)		AQS-4 42 Hz (7:00-20:00) 41 Hz (20:00-07:00) AQS-5 37 Hz (7:00-20:00) 37 Hz (20:00-07:00)	- 65Hz (06:00-18:00) - 60Hz (18:00-06:00) (MoE)		The results of vibration level measurement in 24 hours at both sampling sites, AQS-4 and AQS-5, within the package 3 area showed a good condition. Vibration levels are under the allowable maximum standard level of MOE, guideline value of IFC, and Japanese Standard. This is because of no major construction activities have been done during the point of time of the construction stage.
Waste Generation	Waste storage at construction site and campsites	Slurry and other construction waste	Discharged amount	The result table will be shown below.	No standards	Every day	Septic tank
			Recycled amount				
			The way of recycle				
			Treated amount				
			Local of final disposal				
		General waste	Discharged amount	The result table will be shown below.			
			Recycled amount				
			The way of recycle				
			Treated amount				
			Local of final disposal				
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 (22nd of October, 2019)	Visual observation of animals, reptiles, and amphibious		Mammal = 4 Amphibian = 5 Reptile = 8 Birds = 13 Flora = 29 Insect = 3 Flora = 61	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river This survey was conducted by interviewing with local fisherman and local people about the presence of fauna resource listed in the table of checklist and taking photos of observation fauna resource by the environmentalist.

Environmental Monitoring Form for Construction Stage
Contract Package 3

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

1. Schedule of Seasonal Monitoring

The seasonal periodical monitoring for air quality was done on 15th and 17th January, 2020, noise and vibration were done on 23rd - 24th October 2019, water quality was conducted on 23rd of October 2019 and ecosystem survey was implemented on 22nd of October 2019.

Table 1.1 Schedule of Seasonal Monitoring

Year	2018	2019					2020				2021				2022			
	28th Dec	21st Feb	24th Apr	11th May	22nd Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct
Item	Dry	Dry	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy	Dry	Dry	Rainy	Rainy
1. Air Quality	●	●		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
2. Water Quality	●			●		●		●		●		●		●		●		●
3. Noise	●			●		●		●		●		●		●		●		●
4. Vibration	●			●		●		●		●		●		●		●		●
8. Ecosystem		●	●			●		●		●		●		●		●		●

2. Seasonal Monitoring Points/Areas and Ecosystem survey

Figure-2: Designed Monitoring Points for Package 3 Section (Sta 120+000 - Sta 171+200)

3. The Solid Waste Generation in January, 2020

Table: Solid Waste Data (kg/month)

Location	General waste				Construction waste			
	General amount	Recycle amount	Mean of recycle	Disposal	General amount	Recycle amount	Mean of recycle	Disposal
HS office (sta.145)	40.3 kg	12.5 kg	provide to cleaner	dumpsite				
DP office (sta.144)	105.6 kg	28.7 kg	provide to cleaner	dumpsite	0.5 m3 of concrete waste	0.5 m3	backfill at courtyard	
					12.5 kg of scarp waste	5.2 kg	sold to scavenger	dumpsite
VHCM office (sta.145)	28.8 kg	5.4 kg	provide to cleaner	dumpsite	0.5 m3 of concrete waste	0.5 m3	backfill at courtyard	
					15.4 kg of scarp waste	5.5 kg	sold to scavenger	dumpsite
Bridge 31 (sta.147+112)	0.5 kg			dumpsite	0.1 m3 of concrete waste	0.1 m3	backfill at courtyard	
Bridge 29 (sta.140+917)	0.5 kg			dumpsite	0.5 m3 of concrete waste	0.5 m3	backfill at courtyard	
Box culvert 13 (sta.138+243)	0.5 kg			dumpsite	0.2 m3 of concrete waste	0.2 m3	backfill at courtyard	
Box culvert 14 (sta.139+117)	0.5 kg			dumpsite	0.3 m3 of concrete waste	0.3 m3	backfill at courtyard	
Box culvert 21 (sta.139+117)	0.5 kg			dumpsite	0.3 m3 of concrete waste	0.3 m3	backfill at courtyard	
Box culvert 31 (sta.161+697)	0.5 kg			dumpsite	0.5 m3 of concrete waste	0.5 m3	backfill at courtyard	
Pipe culvert 11 (sta.132+480)	0.5 kg			dumpsite	0.1 m3 of concrete waste	0.1 m3	backfill at courtyard	
Pipe culvert 12 (sta.133+060)	0.5 kg			dumpsite	0.1 m3 of concrete waste	0.1 m3	backfill at courtyard	
Pipe culvert 15 (sta.138+556)	0.5 kg			dumpsite	0.2 m3 of concrete waste	0.2 m3	backfill at courtyard	
Pipe culvert 16 (sta.139+797)	0.5 kg			dumpsite	0.2 m3 of concrete waste	0.2 m3	backfill at courtyard	
Pipe culvert 31 (sta.162+632)	0.5 kg			dumpsite	0.3 m3 of concrete waste	0.3 m3	backfill at courtyard	
Total	**180.2 kg**	**46.6 kg**			**27.9 kg + 3.8 m3**	**10.7 kg + 3.8 m3**		