

Environmental Monitoring Form for Construction Stage 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	No major adverse impacts		Every day	site works	
	Storage facilities for dust generation					Every day, especially in dry season	
	AGS-1 (July 21 st , 2020)		AQS1 = 0.073mg/m ³	0.05 mg/m ³ (WHO, average 24h)	2 times in dry season	We will use mobile device to check for daily and weekly monitoring.	Contractor will provide more watering regularly, especially during the day time.
	KP: 39+200		AQS1 = 0.038mg/m ³	0.025 mg/m ³ (WHO, average 24h)	2 times in wet season	The value of NO2, SO2, were not exceeded the Cambodian standard, but for PM2.5 and PM10 are seem to be a little exceeded Cambodian standard, because there are (at Odongk District Hospital) is nearby the urban area as well as Market area and the traffic is also congested. Therefore, it means that the air quality within those section was started polluted particle matter due to the human activities, so the contractor has to pay more attention above matter by providing more watering in regularly, especially during the day time.	The contractor will prepare and strictly implement plan around construction sites.
	Okdong District Hospital, Kompong Speu Province.		AQS1 = 0.032mg/m ³	0.30 mg/m ³ (WHO average 24h)			The drivers of construction vehicles will comply with speed limits to minimize road dust.

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Item	Location	Parameter/Mean of Monitoring	Result (Average/Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure		
Water Quality	<p>WS-1 (06th of April 2020) KP: 32+000 at LHS, Pond, 200m from ROW (water sampling point will be replaced due to far from the road)</p> <p>WS-2 (06th of April 2020) KP: 32+300 at RHS, in Tonle Sap river, in front of Prek Prang Pagoda</p> <p>WS-3 (06th of April 2020) KP: 36+900 at RHS, downstream, border of Kandal and Kompong Chhnang</p> <p>WS-4 (06th of April 2020) KP: 40+900 at RHS, downstream near factory</p>	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector			
		pH	WS-1=7.68 WS-2=7.38 WS-3=7.52 WS-4=7.91	6.5-8.5 (MoE)	1 time in dry season	We will use mobile device to check for daily and weekly monitoring.	Contractor will try to reduce any possible impacts from the construction sites such as improve the management of solid waste, oil waste, application of slope protection to reduce run off of the dirt with the rain water, etc.		
		TSS	WS-1=152 WS-2=37 WS-3=42 WS-4=320	25-100 mg/l (MoE)	1 time in wet season	Seasonal monitoring shall be done at the same point on EIA.			
		BOD	WS-1=2.40 WS-2=3.88 WS-3=5.26 WS-4=3.60	1-10 mg/l (MoE)		Comparing this result with the Cambodian Standard, there are showing that the value of pH and BOD are below the standard, however, the value of COD for WS2 and WS3 are exceeded the standard, and value of TSS is higher the standard for WS1 and WS4. The value of Total-coliiform are very higher than standard for WS1 and WS2.			
		COD	WS-1=7.44 WS-2=10.19 WS-3=12.23 WS-4=9.80	1-8 mg/l (MoE)					
		Total Coliform	WS-1= 1.1 x 10 ⁵ WS-2= 4.3 x 10 ³ WS-3= 1.1x10 ⁴ WS-4= 4.3x10 ³	<5,000 (Japanese Standard)					
		Noise	ANV-1 (April 11 st , 2020) KP: 39+200 Odong District, Kompong Speu Province (Odong district hospital)	Noise Level (MoE Laboratory)	ANV-1= -62dB (6:00-18:00) -59dB (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. 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.	Continue to do the NR5 maintenance and put on the traffic sign on the NR5 to lower the driving speed to reduce the noise during at night. Contractor select quiet equipment and working method as much as possible.
				Vibration Level (MoE Laboratory)	ANV-1 -21Hz (7:00-20:00) -20Hz (20:00-7:00)	- 65Hz (7:00-20:00) - 60Hz (20:00-7:00) (MoE)			
				Vibration					

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Waste Generation	Waste storage at construction site	Slurry and other construction waste	The result was shown in table of waste data	No standards	Every day	Septic tank	
		General waste					The result was shown in table of waste data
Subsidence	Subsidence prone locations along the project road	Discharged amount Recycled amount The way of recycle Treated amount Local of final disposal	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.	
		Visual inspection and interview to the local people					
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.	Contractor shall use methods to mitigate the impacts of Ecosystem and educate the Engineers and
Ecosystem	EC-1 KP 35 and KP 37+200 (April, 2020) Odong bypass as requested by JICA and Client	Visual observation of animals, reptiles, and amphibious	Mammal = 2 Amphibian =5 Reptile = 4 Birds = 21 Fishes = 20 Flora = 2 Insect = 4	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river. Based on above team inspection and interviewing with local	

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												workers not to catch wild flora and fauna species around construction sites.
												villager as well as farmers, 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.

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

Note:

WHO: World Health Organization,
MoE: Ministry of Environment,
NO₂: Nitrogen Dioxide,

SO₂: Sulfur Dioxide,
PM: Particulate Matters,
BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand
TSS: Total Suspended Solid

2. Seasonal Monitoring Points and Areas

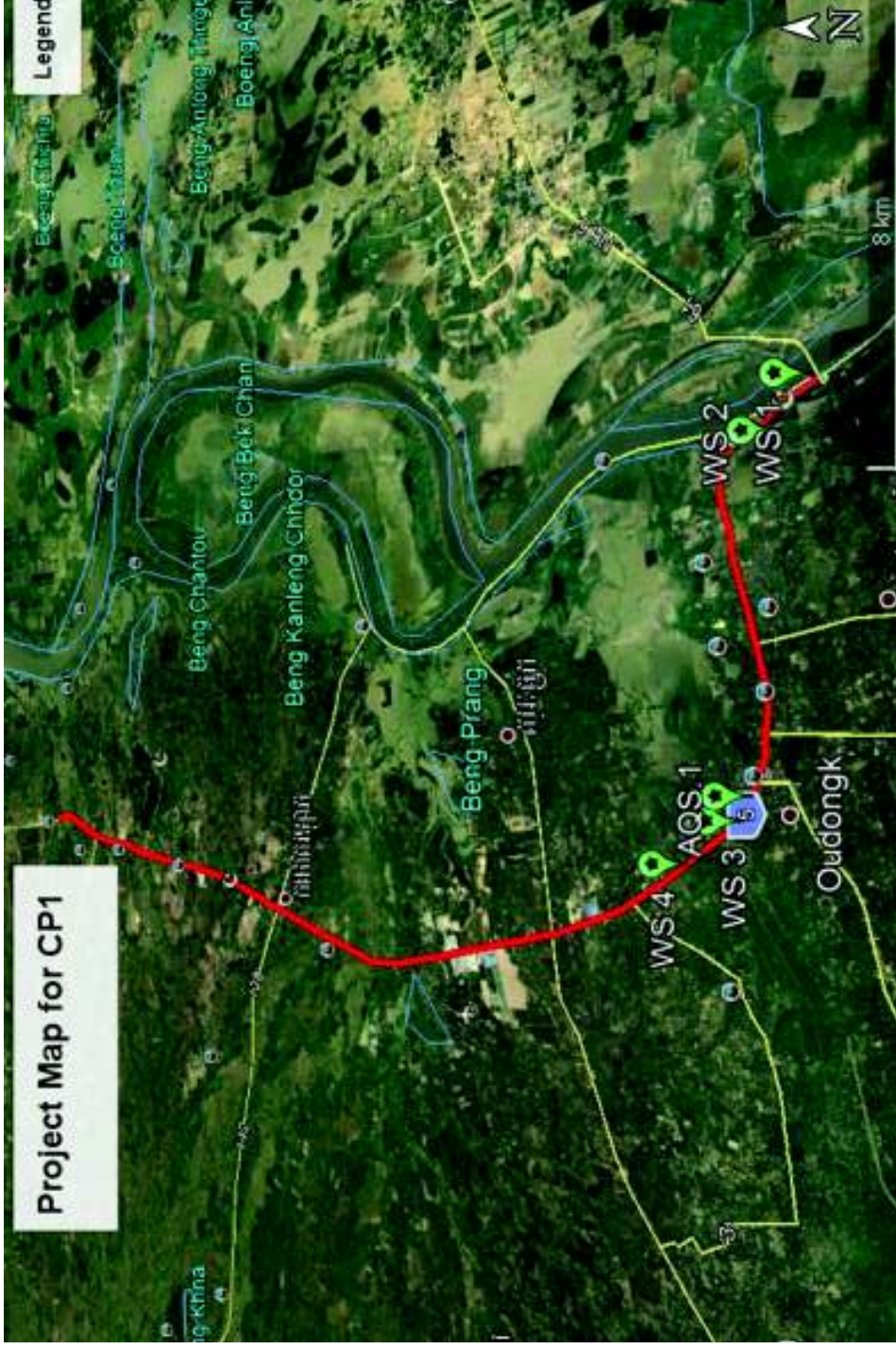
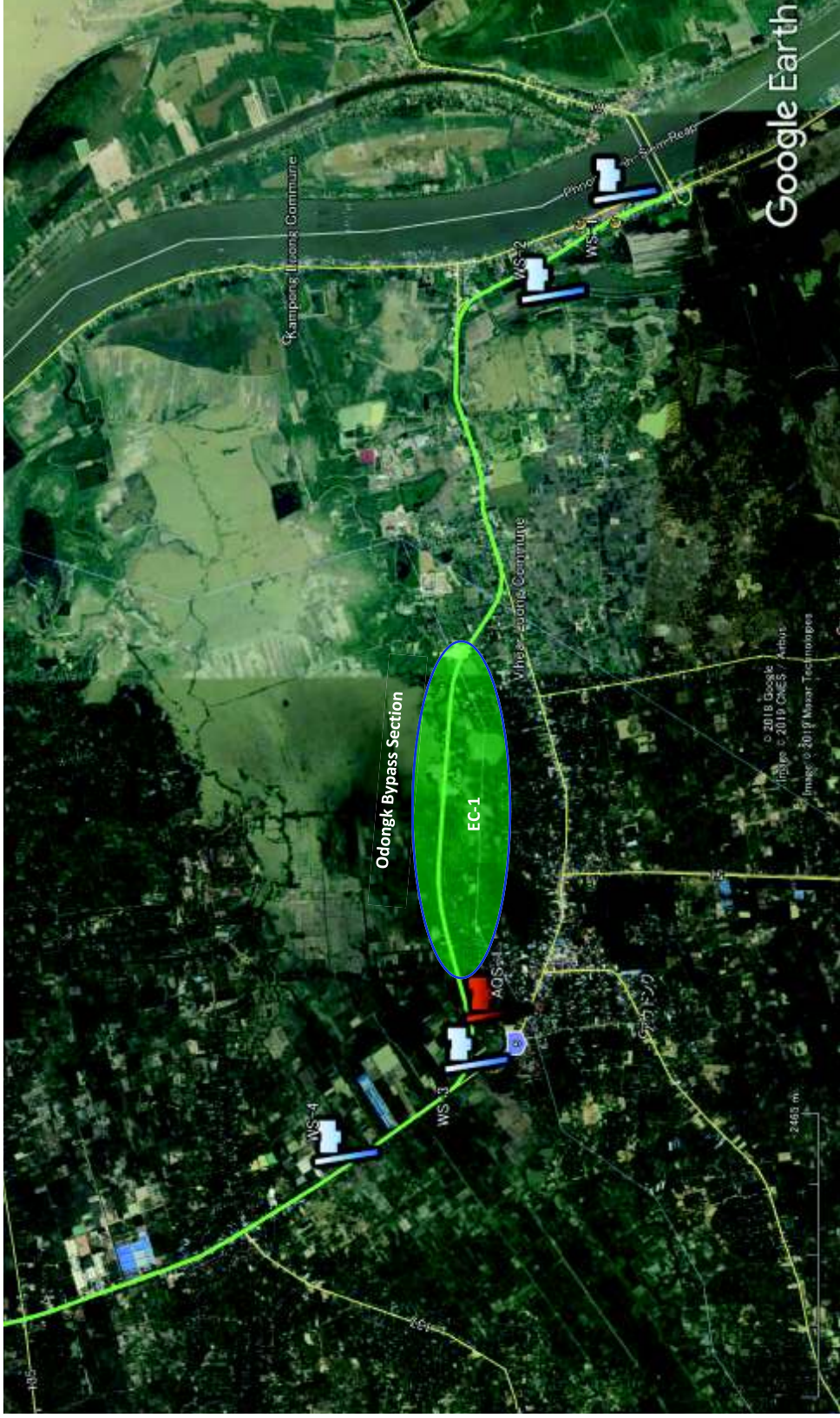


Figure-1: Designed Monitoring Points for Package 1 Section (Sta 31+370 - Sta 73+000)

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



NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (PREK KDAM-THLEA MA'AM SECTION)
 JICA Loan No. CP-P19
 Contract Package 1

12	Construction Site	PK62+733 LHS (RCBC)	12kg	0	Sold to scavenger	Dispose to dump site	100kg	90kg	0.037m ³	Backfill/Sold to scavenger	Dispose to disposal areas
13	Construction Site	PK36+100 to 220RHS/ LHS (G.Riprap)	16kg	0	Sold to scavenger	Dispose to dump site	25kg	25kg	0.010m ³	Backfill/Sold to scavenger	Dispose to disposal areas
14	Construction Site	PK37+380 to 480RHS/ LHS (G.Riprap)	14kg	0	Sold to scavenger	Dispose to dump site	32kg	20kg	0.010m ³	Backfill/Sold to scavenger	Dispose to disposal areas
15	Construction Site	PK66+124 LHS (RCPC)	12kg	0	Sold to scavenger	Dispose to dump site	120kg	120kg	0.052m ³	Backfill/Sold to scavenger	Dispose to disposal areas
16	Construction Site	PK52+952 RHS (RCPC)	17kg	0	Sold to scavenger	Dispose to dump site	135kg	80kg	0.035m ³	Backfill/Sold to scavenger	Dispose to disposal areas
Total General Waste			357kg	0	Total Construction Waste	873kg	786kg	0.203m³			

5. Fauna and flora survey at EC-01

Category-1	Category-2	Family	Local Name	English name	Scientific name	IUCN Status
a) Mammal	None	None	Kambrok por Sam pouch Vor	Northern Treeshrew Variable squirrel	Callosciurus Erythraeus Viverricula indica	N/A LC
b) Amphibian	None	None	Kingkuok Hing Kangkeb Kanhkebkob	Common Asian Toad Common Asian Bullfrog Paddy Frog Regulose Bullfrog	Bufo Melanostrictus Kaloula Pulchra Fejervarya limnocharis Hoblobatrachus Rugulosus	N/A LC N/A N/A

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (PREK KDAM-THLEA MA'AM SECTION)

JICA Loan No. CP-P19

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Category-1	Category -2	Family	Local Name	English name	Scientific name	IUCN Status
			Kanhchanhehek	Common tree frog	Polypedates leucomystax	LC
c) Reptile	None	None				
			Pous Vek Dom Bouk	Indochinese Spitting Cobra	Naja Siamensis	VU
			Pous Vek Krobei	Monocled Cobra	Naja Kaouthia	LC
			Pous thlan touch	Burmese Python	Pythoon Molurus Bivittatus	N/A
			Pous thlan thorn	Reticulate python	Pythoon Reticulatus	N/A
d) Birds	None	None				
			Popustoeak	Little Grebe	Tachybaptus Ruficollis	LC
			Populchampusthum	Thick-Billed Green pigeon	Treron Curvirostra	LC
			Populchoeung	Yellow-Footed Green Pigeon	Treron Phoenicoptera	N/A
			Choathkrem	Common kingfisher	Alcedo affinis	LC
			Porloutok thngaskhmao	Blue-Eared Barbet	Megalaima Australis	LC
			Porloutok Kbal	Lineated Barbet	Megalaima Lineata	LC
			Porloutok Ambuk	Coppersmith Barbet	Megalaima Haemacephala	LC
			Chek tum	Black-Naped Oriole	Oriolus chinensis	LC
			Sek Sourm	Alexandrine Parakeet	Psittacula Eupatria	LC
			Sek sork	Red-Breasted Parakeet	Loriculus vemalis	N/A
			Kvaek	Black-Crowned Night Heron	Nycticorax Nycticorax	LC
			Ngeav kork	Stork-Billed kingfisher	Halcyon Capensis	N/A
			Antep toing	Greater Racket- Tailed Drongo	Dicrurus Paradiseus	LC
			Kok kroung	Intermediate Egret	Egretta Intermedia	N/A
			Kok Kmao Thleurm			
			Andeurk	Black Bittern	Bupetor Flavicollis	N/A
			La out thom	Greater Coucal	Centropus sinensis	LC
			Preab Srok	Rock Pigeon	Columba Livia	LC
			Pror Voek	Lesser Whistling Duck	Dedrocygna Javanica	N/A
			Tror Ses Knong			
			Plerng Toch	Common Flamedback	Dinopium Javanense	LC
			Tavao	Common koel	Eudynamys Scolopacea	N/A
			Teav Kiev	Indian Roller	Coracias Benghalensis	LC
				Yellow Breasted Bunting	Emberiza Aureola	N/A
				Green Bushlark	Mirafra Marionae	N/A
				Yellow Bushlark	Mirafra Marionae	N/A

NATIONAL ROAD NO.5 IMPROVEMENT PROJECT (PREK K DAM-THLEA MA'AM SECTION)
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Category-1	Category -2	Family	Local Name	English name	Scientific name	IUCN Status
e) Fishes	None	None	Trey andaeng roeng	Walking catfish	Clarias batrachus	LC
			Trey andaengtun	Black skin catfish	Clarias mellaerma	N/A
			Trey Bra kae		Pangasius conchophilus	LC
			Trey Bra kehao		Pangasius bocourti	LC
			Trey Bra thom	Sutchi catfish	Pangasianodon hypophthalmus	N/A
			Trey chhkaok		Cylocheilichthys Enoplos	N/A
			Trey chipin	Goldfin tinfoil barb	Hypsibarbus Malcolmi	N/A
			Trey ka Ek	Black sharkminnow	Labeo Chreysophekadion	L/C
			Trey kaes		Microbenacheveyi	N/A
			Trey kanhchrouk	Skunk botia	Yasuhikotakia morleti	LC
			Trey khchoeung	Frecklefin Eel	Trey Chonluanh Moan	N/A
			Trey khman	Hampala barb	Hampala Macrolepida	LC
			Trey kray	Clown Featherbaak	Chitala Ornata	LC
			Trey Krus	Dusky face carp	Osteochilus lini	LC
			Trey Sanday/Trey Ros	Snakehead Murrel	Chana Striata	LC
			Trey Proma	Boeseman Croader	Boesemania	NT
			Trey slat	Bronze Featherback	Notopterus Notopterus	LC
			Trey Stuok		Wallagoleerii	N/A
			Trey ta oun		Ompok hypophthalmus	N/A
			Trey chhlaing	Asian Redtail Catfish	Hemibagrus nemurus	N/A
f) Insect	None	None				
				Scarlet lily beetle	Lilioceris	N/A
			Kantum Ruy	Dragon Fly	Anisoptera	N/A
				Butterfly	Rhopalocera	N/A
			Sramaoch	Ant		N/A
g) Flora	None	None				
				Alstonia	Alstonia Scholaris	N/A
				Sleeping grass	Mimosa Pudica	N/A

Environmental Monitoring Form for Construction Stage 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 campsites		
	Storage facilities for dust generation	Visual observation of dust	No major adverse impacts		Every day	site works		
	AQS-2 (July 22 nd , 2020) KP: 89+250 At RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kompong Chhnang, Kompong Chhnang Province.	PM10		AQS-2=0.069 AQS-3=0.062	0.05 mg/m ³ (WHO, average 24h)	2 times in dry season	Monitoring on air quality at two sites at PK89+250 and PK97+300 along the National Road 5 found that the amount of fine particulate matter, both PM10 and PM2.5, were exceeding the standard of ambient air quality of the government of Cambodia as well as the IFC standard. The monitoring results showed a trend of increasing amount of pollutant comparing to the monitoring results in last rainy season in 2019, but a similar value to the dry seasons in 2019. The main cause of this large amount of particulate matters in the ambient air might be due to the dust emission from traffic on the National Road 5, and very small contribution from the construction activities.	Contractor will continue and enhance the fugitive dust emission control along its construction sites.
		PM2.5		AQS-2= 0.033 AQS-3=0.028	0.025 mg/m ³ (WHO, average 24h)	2 times in wet season		
		SO₂		AQS-2=0.050 AQS-3=0.030	0.30 mg/m ³ (WHO average 24h)			
		NO₂		AQS-2= 0.038 AQS-3= 0.028	0.10 mg/m ³ (WHO average 24h)			
AQS-3 (July 22 nd , 2020) KP: 97+300 At LHS, rice field area more than 100m from ROW, in Trapaeng Por Village, Pong Ru commune, Rolea B'ear district, Kompong Chhnang province.							Contractor will spray water on the access road to construction site and apply the Calcium chloride on the detour road. The contractor will prepare and strictly implement plan around construction sites. The drivers of construction vehicles will comply with speed limits to minimize road dust.	

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Water Quality	<p>WS-5 (01st of April 2020) KP: 82+500 at RHS, Chrey Bak river downstream, near Phnom Chompus Pagoda Andoung Svay commune, Rolea Bier district, Kompong chhnang province.</p> <p>WS-6 (01st of April 2020) KP: 91+700 at LHS of bypass, Strah Por lake, Thmar Keo village, Svay Chrum commune, Rolea Bier district, Kompong Chhnang province.</p> <p>WS-7 (01st of April 2020) KP: 106+350 at RHS, downstream Strah Angkam lake, Thmar Keo village, Svay Chrum commune, Rolea Bier district, Kompong chhnang province.</p> <p>WS-8 (01st of April 2020) KP: 117+118 at RHS, downstream Boribo river, Phsar village, Phsar commune, Boribo district, Kompong Chhnang province.</p>	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector	<p>Contractor will try to reduce any possible impacts from the construction sites such as improve the management of solid waste, oil waste, application of slope protection to reduce run off of the dirt with the rain water, etc.</p>
		pH	WS-5=7.01 WS-6=8.44 WS-7=6.81 WS-8=7.29	6.5-8.5 (MoE)	1 time in dry season 1 time in wet season	<p>The analysis results by the Laboratory of the Ministry of Environment showed that WS-06 had amount of suspended solid (SS) and chemical oxygen demand (COD) exceed the standard value of the public water of the Kingdom of Cambodia. These might be because of the activities of the cattle that came to the lake for drinking, and urinating and defecating at the lake. The result also showed that WS-07 had more amount of chemical oxygen demand (COD) exceed the standard of public water quality. This should be owing to the reduction of amount of water in this dry season, and the increasing of the amount of inorganic substances in the lake by construction activities.</p>	
		TSS	WS-5=70 WS-6=288 WS-7=18 WS-8=28	25-100 mg/l (MoE)			
		BOD	WS-5=2.00 WS-6=5.40 WS-7=2.00 WS-8=2.60	1-10 mg/l (MoE)			
		COD	WS-5=3.78 WS-6=9.21 WS-7=5.92 WS-8=4.11	1-8 mg/l (MoE)			
		Total Coliform	WS-5=920 WS-6=1,500 WS-7=1,500 WS-8=2,300	<5,000 (Japanese Standard)			

Environmental Monitoring Form for Construction Stage Contract Package 2

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Noise	ANV-2 (08 th of April, 2020) PK 89+250 at RHS in Department of Social Veteran and Youth Rehabilitation of Krong Kampong Chhnang, Kampong Chhnang province	Noise Level (MoE Laboratory)	ANV-2 - 60dB (06:00-18:00) - 67dB (18:00-22:00) - 60dB (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 levels 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 were owing to traffic activities on the NR5 which is the main road connected between the crowded cities of Poipet & Battambang to Phnom Penh city.	Continue to do the NR5 maintenance and put on the traffic sign on the NR5 to lower the driving speed to reduce the noise during at night. Contractor select quiet equipment and working method as much as possible.
	ANV-3 (08 th of April, 2020) PK 97+300 at LHS, residential area in Trapeang Por village, Pong Ro commune, Rolea B'ier district, Kampong Chhnang province		ANV-3 - 68dB (06:00-18:00) - 59dB (18:00-22:00) - 55dB (22:00-06:00)				
Vibration		Vibration Level (MoE Laboratory)	ANV-2 - 17Hz (07:00-20:00) - 16Hz (20:00-07:00) ANV-3 - 23Hz (07:00-20:00) - 16Hz (20:00-07:00)	- 65Hz (07:00-20:00) - 60Hz (20:00-07:00)		The vibration level found during the measurement at site along NR5 were generally within the standard of the Japanese government for the construction activities. This means that daily traffic activities and construction activities of the project might not have result in any concern over the vibration.	

Environmental Monitoring Form for Construction Stage Contract Package 2

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Waste Generation	Waste storage at construction site and campsites	Slurry and other construction waste	The attached result table will be shown	No standards	Every day	Septic tank	
		General waste					The attached result table will be shown
		Discharged amount					
		Recycled amount					
		The way of recycle					
		Treated amount					
		Local of final disposal					
		Discharged amount					
		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.	Contractor shall use methods to mitigate the impacts of Ecosystem and educate the Engineers and workers not to catch wild flora and fauna species around
Ecosystem	EC-02, EC-03, EC-04, EC-05 and EC-06 (08 TH of April, 2020)	Visual observation of animals, reptiles, and amphibious	Mammal = 6 Amphibian =5 Reptile = 13 Birds = 35 Fishes = 52 Insect = 5 Flora = 39	No standards	One time in dry season and one time in rainy season	Visual survey shall be done near permanent river Most of the mammal, amphibian, reptile and bird are generally present in the area both rainy season and dry season. The survey found that 2 species of	

Environmental Monitoring Form for Construction Stage Contract Package 2

Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
						reptile namely Pous Vek Dom Bok (Naja Siamensis), and An Deurk (Malayemys subtrijuga) are classified as Vulnerable Species in IUCN Red List, and other 61 Species are not yet listed in the IUCN Red List.	construction sites.

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

Note:

WHO: World Health Organization,
MoE: Ministry of Environment,

SO₂: Sulfur Dioxide,
PM: Particulate Matters,
BOD: Biochemical Oxygen Demand

COD: Chemical Oxygen Demand
TSS: Total Suspended Solid

NO₂: Nitrogen Dioxide,

2. Seasonal Monitoring Points and Areas

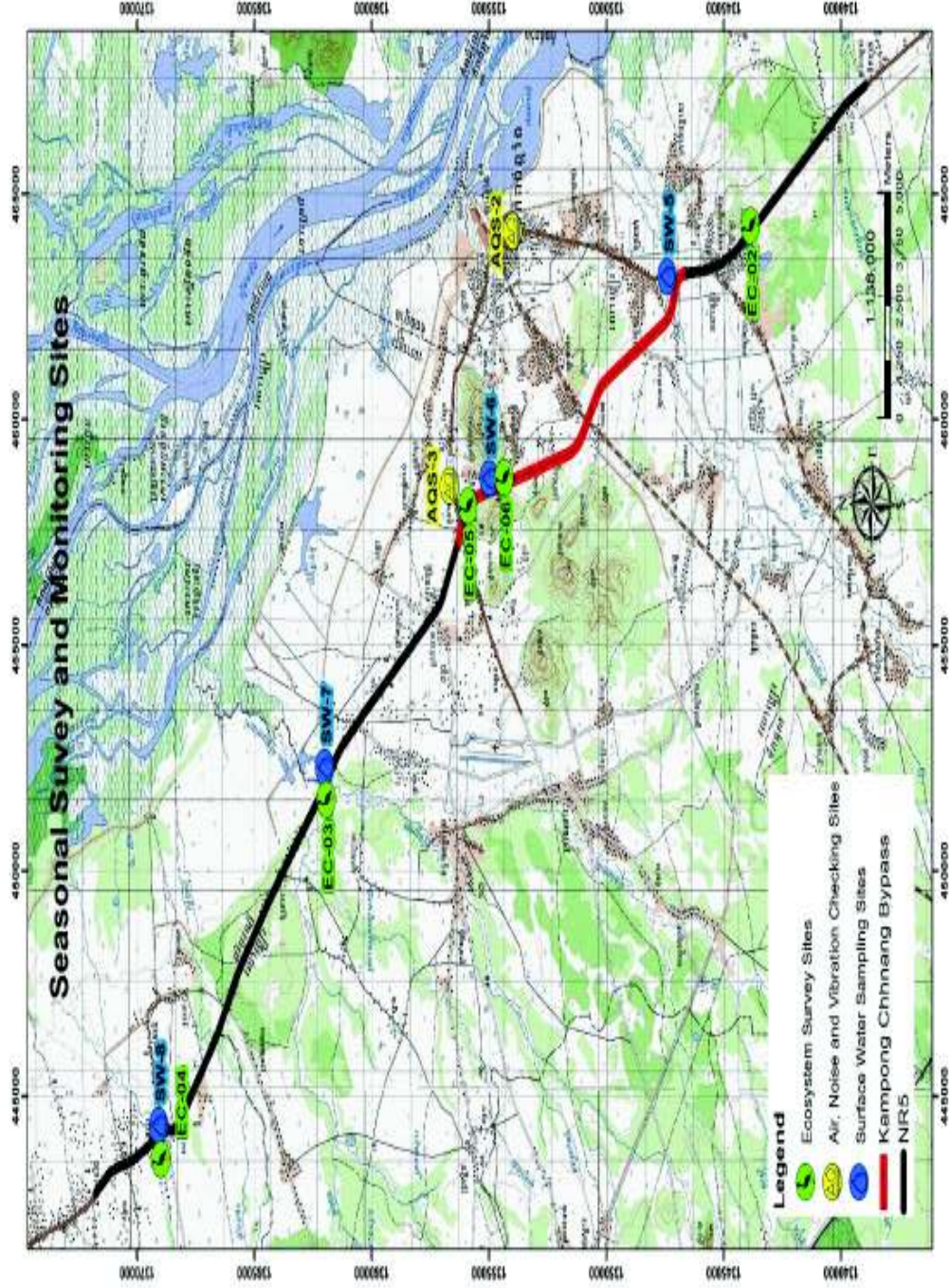


Figure 2.1: Designed Monitoring Points for Package 2 Section (Sta 73+000 - Sta 120+000)

3. The Solid Waste Generation in September, 2020

Location	General Waste				Construction Waste			
	GA (Kg/m)	RA (Kg/m)	MR	DS	GA (Kg/m)	RA (Kg/m)	MR	DS
CP2 Office	210	20	Sold to scavenger	Dumpsite	-	-	-	-
SMCC Accommodation	100	15	Sold to scavenger	Dumpsite	-	-	-	-
MOTORPOOL	500	25	Sold to scavenger	Dumpsite	75 (scrap)	75	Sold to scavenger	-
LOT1	120	7	Sold to scavenger	Dumpsite	-	-	-	-
LOT2	110	5	Sold to scavenger	Dumpsite	-	-	-	-
SMCC Fabrication Yard A	500	25	Sold to scavenger	Dumpsite	120 (scrap)	120	Sold to scavenger	-
SMCC Fabrication Yard B	350	20	Sold to scavenger	Dumpsite	-	-	-	-
SMCC Fabrication Yard C	250	15	-	Dumpsite	-	-	-	-
Contractor's Yard	150	8	Sold to scavenger	Dumpsite	-	-	-	-
All Box Culvert	200	5	Sold to scavenger	Dumpsite	-	-	-	-
TOTAL	2,490	145			175	175		

Note: GA = Generated amount ; RA = Recycling amount ; MR = Mean of Recycling, DS = Disposal Site ;
 Kg/m = Kilogram per month ; Dumpsite is at Traok Keut village, Sre Thmey commune, Rolea B'ier district, Kampong Chhnang province.

Environmental Monitoring Form for Construction Stage Contract Package 3

Item	Location	Parameter/Mean 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	No major adverse impacts		Every day	site works		
	Storage facilities for dust generation					Every day, especially in dry season		
	AGS-4 (03 rd of July, 2020) PK-135+600 Kbal Damrei village, Ansa Chambork commune, Krakor district, Pursat province	PM10	AQS4 = 0.019mg/m³ AQS5 = 0.014mg/m ³	0.05 mg/m ³ (WHO, average 24h)	2 times in dry season	The results showed that the ambient air quality in sampling site AQS-4 and AQS-5 along the national road no.5 withing package 3 is in acceptable condition.	The contractor will prepare and strictly implement plan around construction sites.	
	AGS-5 (04 th of July, 2020) PK-170+340 Kcandol Sar Village, Beung Kantout commune, Krakor district, Pursat province	PM2.5	AQS4 = 0.013mg/m³ AQS5 = 0.010mg/m ³	0.025 mg/m ³ (WHO, average 24h)	2 times in wet season	The result is under standard of the Ministry of Environment and Environmental, Health, and Safety General Guidelines (IFC).	The drivers of construction vehicles will comply with speed limits to minimize road dust.	
		SO₂	AQS4 = 0.011mg/m ³ AQS5 = 0.013mg/m ³					
		NO₂	AQS4 = 0.020mg/m ³ AQS5 = 0.015mg/m ³	0.10 mg/m ³ (WHO average 24h)			Contractor will spray water on the access road to construction site.	
Item	Location	Parameter/Mean of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure	
Water Quality	WS-9 (17 th of April, 2020) PK-170+700 Ou Chankok river, Tnot Chum commune, Krakor district, Pursat province	Visual observation/inspection	No major adverse impacts	No standards	Every day	Contractor and inspector		
		pH	7.02	6.5-8.5 (MoE)	1 time in dry season	The water quality in this main river (Thlea Ma'am) is under the water quality standard as stipulated in the Sub-decree on Water Pollution Control (1990) of Ministry of	Contractor will try to reduce any possible impacts from the construction sites such as improve the	
		TSS	117	25-100 mg/l (MoE)				
		BOD	6.85	1-10 mg/l (MoE)				
		COD	10.31	1-8 mg/l (MoE)				
	Total Coliform	240000	<5,000 (Japanese Standard)					

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Item	Location	Parameter/Means of Monitoring	Result (Average/ Max /Total..)	Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
Vibration		Vibration Level (MoE Laboratory)	ANV-4, 61 dB (06:00-18:00) 57 dB (18:00-22:00) 56 dB (22:00-06:00) AQS-5 70 dB (06:00-18:00) 64 dB (18:00-22:00) 61 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	Environment, except TSS and Total Coliform parameter are 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 found that even there is no many construction activities at the monitoring site during the monitoring date, the monitoring sites are already disturbed by the transportation activities on NR5, which is an important route connecting Phnom Penh capital city to Battambang and Poipet, an international border gate to Thailand.	management of solid waste, oil waste, application of slope protection to reduce run off of the dirt with the rain water, etc. Continue to do the NR5 maintenance and put on the traffic sign on the NR5 to lower the driving speed to reduce the noise during at night. Contractor select quiet equipment and working method as much as possible.
						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 during the point of time of the construction stage.	

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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	Recycled amount	The result table will be shown below.			
			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.
Item	Location	Parameter/Mean of Monitoring	Result (Average/ Max /Total..)		Standards (Local/Inter Standard)	Frequency	Remarks	Mitigation Measure
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 (15 th of April, 2020)	Visual observation of animals, reptiles, and amphibious	Mammal = 2 Amphibian = 5 Reptile = 8 Birds = 12 Flora = 61 Insect = 3 Fish = 29		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	Contractor shall use methods to mitigate the impacts of Ecosystem and educate the Engineers and workers not to

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

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

photos of observation fauna resource by the environmentalist.

catch wild flora and fauna species around construction sites.

1. Schedule of Seasonal Monitoring

The seasonal periodical monitoring for air quality was conducted on 03rd and 04th July, 2020, noise and vibration were done on 17th - 18th April 2019, water quality was conducted on 17th of April, 2020 and ecosystem survey was implemented on 15th of April, 2020.

Table 1.1 Schedule of Seasonal Monitoring

Year	2018				2019				2020				2021				2022			
	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Oct	Jan	Apr	Jul	Oct	Jan	Apr	Jul	Oct		
Item	Dry	Dry	Dry	Dry	Dry	Dry	Rainy	Rainy	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

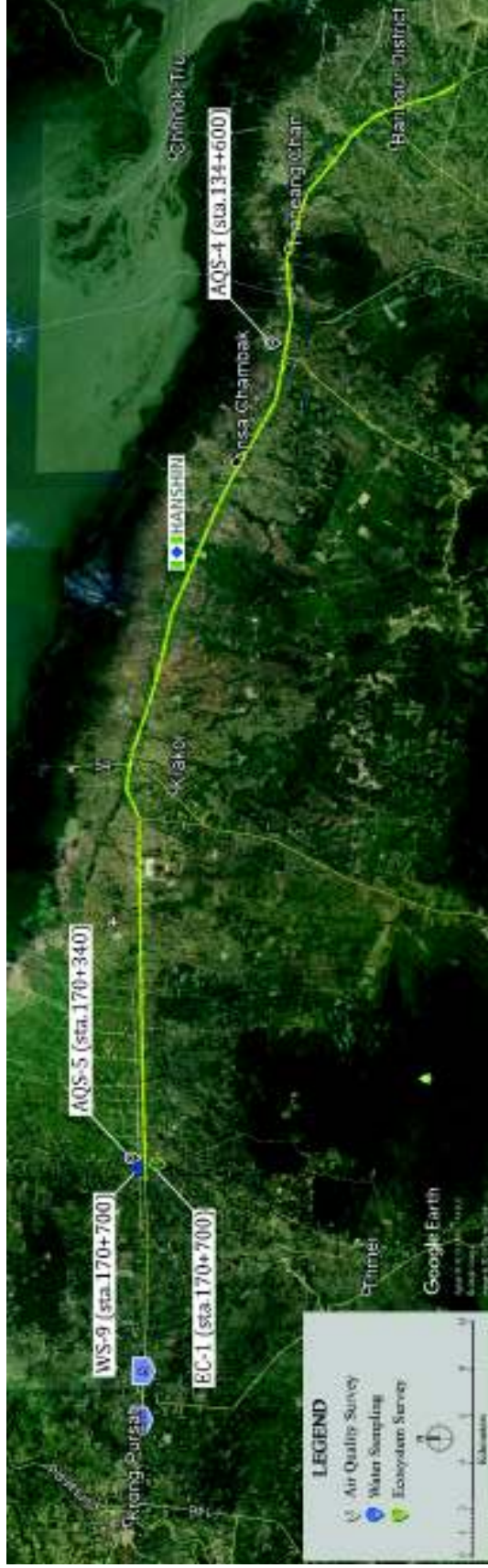


Figure-2: Designed Monitoring Points for Package 3 Section (Sta 120+000 - Sta 171+200)

3. The Solid waste Generation in September, 2020

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)	80.5 kg	23.2 kg	provide to cleaner	dumpsite	11.3 kg of scarp waste	6.5	provide to scavenger	dumpsite
DP office (sta.144)	56.3 kg	36.4 kg	provide to cleaner	dumpsite	0.5 m ³ of concrete waste	0.5 m ³	backfill at courtyard	
					10.7 kg of scarp waste	8.5	provide to scavenger	dumpsite
VHCM office (sta.145)	40.1 kg	9.8 kg	provide to cleaner	dumpsite	0.5 m ³ of concrete waste	0.5 m ³	backfill at courtyard	
					6.5 kg of scarp waste	3.1 kg	provide to scavenger	dumpsite
LSC office (sta.132)	25.0 kg	5.5 kg	provide to cleaner	dumpsite				
					4.5 kg of scarp waste	1.6 kg	provide to scavenger	dumpsite
SORIN (sta.166)	20.4 kg	10.6 kg	provide to cleaner	dumpsite				
					4.8 kg of scarp waste	2.3 kg	provide to scavenger	dumpsite
Bridge 33 (sta.150+220)	0.3 kg			dumpsite	0.1 m ³ of concrete waste	0.1 m ³	backfill at courtyard	
Bridge 28 (sta.135+978)	0.3 kg			dumpsite	0.6 m ³ of concrete waste	0.6 m ³	backfill at courtyard	
Box culvert 37 (sta.170+071)	0.2 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Box culvert 30 (sta.161+081)	0.2 kg			dumpsite	0.5 m ³ of concrete waste	0.5 m ³	backfill at courtyard	
Box culvert 28 (sta.157+777)	0.2 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Box culvert 27 (sta.157+442)	0.2 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Box culvert 16 (sta.140+615)	0.2 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Box culvert 14 (sta.139+117)	0.2 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Box culvert 12 (sta.137+701)	0.2 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Pipe culvert 30 (sta.161+230)	0.1 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Pipe culvert 29 (sta.159+612)	0.1 kg			dumpsite	0.1 m ³ of concrete waste	0.1 m ³	backfill at courtyard	
Pipe culvert 24 (sta.151+921)	0.1 kg			dumpsite	0.1 m ³ of concrete waste	0.1 m ³	backfill at courtyard	
Pipe culvert 14 (sta.137+445)	0.1 kg			dumpsite	0.1 m ³ of concrete waste	0.1 m ³	backfill at courtyard	
Pipe culvert 12 (sta.133+060)	0.1 kg			dumpsite	0.1 m ³ of concrete waste	0.1 m ³	backfill at courtyard	
Pipe culvert 11 (sta.132+480)	0.1 kg			dumpsite	0.2 m ³ of concrete waste	0.2 m ³	backfill at courtyard	
Total	254.9 kg	85.5 kg			37.8 kg + 4.2 m³	22 kg + 4.2 m³		