APPENDIX C SURFACE WATER FIELD LOGS, CALIBRATION SHEETS, AND SAMPLING RAW DATA

Sampling points	Points_Name		SW01	SW02	SW03	SW04	SW05	SW06	National Environmental Standards No.81/MONRE 2017
	Date		12/8/2021	12/8/2021	12/8/2021	12/8/2021	12/8/2021	12/8/2021	
	Time		17:40	17:05	14:45	15:30	14:00	15:50	
	Village		Daktiem	Daktiem	Dakrun	Dakrun	Dakbong	Dakbong	
	Observations	Unit							
1	Oder		Non	Non	Non	Non	Non	Non	
2	Color		Clear	Clear	Clear	Clear	Clear	Clear	
3	Turbidity		light	light	light	light	light	light	
	On Site Parameters								
1	Temperture	°c	22.4	22.3	22	21.4	26.4	26.4	-
2	pH		7.9	7.9	7.3	7.4	7.4	6.3	6 - 8
3	DO	mg/L	9.7	8.3	9.1	9.4	9	10.8	6.0
4	Conductivity	ms/cm	7	7.4	27.7	41	25	26.4	≤ 1000
5	Salinity	ppt	0	0	0.01	0.02	0.01	0.01	-
6	TDS	ppm	3.5	3.7	13.9	20.7	13.6	13.2	-
	Laboratory Analysis								
8	Ammonia	mg/L	ND	ND	ND	ND	ND	ND	-
9	BOD	mg/L	<1.00	ND	<1.00	ND	<1.00	ND	-
10	COD	mg/L	5.53	ND	21.5	12.9	11.7	ND	5 - 7
11	Chloride	mg/L	ND	ND	ND	ND	ND	ND	-
12	Hardness	mg/L	<10.0	<10.0	10.9	17.6	11.4	10.9	-
13	Fe (Iron)	mg/L	0.3	0.13	0.33	0.15	ND	0.44	-
14	Alkalinity	mg/L	<10.0	<10.0	16.8	24	16.8	14.4	-
15	Nitrate	mg/L	ND	ND	ND	ND	ND	1.5	-
16	Nitrite	mg/L	ND	ND	ND	ND	ND	ND	-
17	Oil & Grease	mg/L	ND	ND	ND	ND	ND	ND	-
18	Sulfate	mg/L	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	-
19	TSS	mg/L	<2.50	3.70	7.2	6.2	6.1	7.1	≤ 25
20	Ortho Phosphate	mg/L	ND	ND	ND	ND	ND	ND	-
21	Coliform Bacteria	MPN/100mL	2,200	2,100	11,000	3,900	4,900	2,100	5,000
22	Phosphorus	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15	-
23	Total Nitrogen	mg/L	<5	<5	<5	<5	<5	<5	-
24	ORP	mV	-63.7	-40.8	0.4	26.1	24.7	27.6	-
25	Aluminium	mg/L	0.19	0.21	0.15	0.17	0.22	0.26	-
26	Arsenic	mg/L	ND	ND	ND	ND	ND	ND	0.01
27	Cadmium	mg/L	ND	ND	ND	ND	ND	ND	0.003
28	Calcium	mg/L	<1.00	<1.00	1.90	4.02	2.31	2.16	-
29	Mercury	mg/L	ND	ND	ND	ND	ND	ND	0.001
30	Copper	mg/L	ND	ND	ND	ND	ND	ND	1.5
31	Lead	mg/L	ND	ND	ND	ND	ND	ND	0.01
32	Magnesium	mg/L	<1.00	<1.00	1.76	1.95	1.47	1.41	-
33	Sodium	mg/L	1.26	1.12	1.65	1.49	1.4	1.22	-
34	Potassium	mg/L	1.15	<1.00	<1.00	2.41	<1.00	1.03	-
35	Zine	mg/L	ND	<0.03	ND	ND	ND	ND	1
36	Manganese	mg/L	<0.03	0.2	0.1	0.03	<0.03	<0.03	1
37	Nickel	mg/L	ND	ND	ND	ND	ND	ND	0.1
	Pesticides Organochlorine Group								
38	Aldrin	µg/L	ND	ND	ND	ND	ND	ND	0.1
39	a-BHC	µg/L	ND	ND	ND	ND	ND	ND	0.02
40	a-Endosulfan	µg/L	ND	ND	ND	ND	ND	ND	-
41	ß-BHC	µg/L	ND	ND	ND	ND	ND	ND	-
42	Dicofol	µg/L	ND	ND	ND	ND	ND	ND	-
43	ß-Endosulfan	µg/L	ND	ND	ND	ND	ND	ND	-
44	Dieldrin	µg/L	ND	ND	ND	ND	ND	ND	0.1
45	cis-Chlordane	µg/L	ND	ND	ND	ND	ND	ND	-
46	Endosulfan Sulfate	µg/L	ND	ND	ND	ND	ND	ND	-
47	Endrin	µg/L	ND	ND	ND	ND	ND	ND	Must Not Have
48	Y-BHC	µg/L	ND	ND	ND	ND	ND	ND	-
49	HCB	µg/L	ND	ND	ND	ND	ND	ND	-
50	Heptachlor	µg/L	ND	ND	ND	ND	ND	ND	0.2
51	Heptachlor-exo-epoxide	µg/L	ND	ND	ND	ND	ND	ND	0.2

Sampling points	Points_Name		SW01	SW02	SW03	SW04	SW05	SW06	National Environmental Standards No.81/MONRE 2017
	Date		12/8/2021	12/8/2021	12/8/2021	12/8/2021	12/8/2021	12/8/2021	
	Time		17:40	17:05	14:45	15:30	14:00	15:50	
	Village		Daktiem	Daktiem	Dakrun	Dakrun	Dakbong	Dakbong	
52	Methoxychlor	µg/L	ND	ND	ND	ND	ND	ND	-
53	o,p'-DDT	µg/L	ND	ND	ND	ND	ND	ND	-
54	o,p'-DDE	µg/L	ND	ND	ND	ND	ND	ND	-
55	o,p'-DDD	µg/L	ND	ND	ND	ND	ND	ND	-
56	p,p'-DDD	µg/L	ND	ND	ND	ND	ND	ND	-
57	p,p'-DDE	µg/L	ND	ND	ND	ND	ND	ND	-
58	p,p'-DDT	µg/L	ND	ND	ND	ND	ND	ND	-
59	Total DDT	µg/L	ND	ND	ND	ND	ND	ND	1
60	trans-Chlordane	µg/L	ND	ND	ND	ND	ND	ND	-
61	Anilofos	µg/L	ND	ND	ND	ND	ND	ND	-
62	Azinphos-ethyl	µg/L	ND	ND	ND	ND	ND	ND	-
63	Azinphos-methyl	µg/L	ND	ND	ND	ND	ND	ND	-
64	Chlorfenvinphos	µg/L	ND	ND	ND	ND	ND	ND	-
65	Diazinon	µg/L	ND	ND	ND	ND	ND	ND	-
66	Dichlorvos	µg/L	ND	ND	ND	ND	ND	ND	-
67	Dicrotophos	µg/L	ND	ND	ND	ND	ND	ND	-
68	Dimethoate	µg/L	ND	ND	ND	ND	ND	ND	-
69	EPN	µg/L	ND	ND	ND	ND	ND	ND	-
70	Ethion	µg/L	ND	ND	ND	ND	ND	ND	-
71	Ethoprophos	µg/L	ND	ND	ND	ND	ND	ND	-
72	Etrimfos	µg/L	ND	ND	ND	ND	ND	ND	-
73	Fenitrothion	µg/L	ND	ND	ND	ND	ND	ND	-
74	Fenthion	µg/L	ND	ND	ND	ND	ND	ND	-
	Organophosphate Group								
75	Malathion	µg/L	ND	ND	ND	ND	ND	ND	-
76	Methamidophos	µg/L	ND	ND	ND	ND	ND	ND	-
77	Methidathion	µg/L	ND	ND	ND	ND	ND	ND	-
78	Mevinphos	µg/L	ND	ND	ND	ND	ND	ND	-
79	Monocrotophos	µg/L	ND	ND	ND	ND	ND	ND	-
80	Omethoate	µg/L	ND	ND	ND	ND	ND	ND	-
81	Parathion-methyl	µg/L	ND	ND	ND	ND	ND	ND	-
82	Phosalone	µg/L	ND	ND	ND	ND	ND	ND	-
83	Phosphamidon	µg/L	ND	ND	ND	ND	ND	ND	-
84	Pirimiphos-ethyl	µg/L	ND	ND	ND	ND	ND	ND	-
85	Pirimiphos-methyl	µg/L	ND	ND	ND	ND	ND	ND	-
86	Profenofos	µg/L	ND	ND	ND	ND	ND	ND	-
87	Prothiofos	µg/L	ND	ND	ND	ND	ND	ND	-
88	Terbufos	µg/L	ND	ND	ND	ND	ND	ND	-
89	Triazophos	µg/L	ND	ND	ND	ND	ND	ND	-

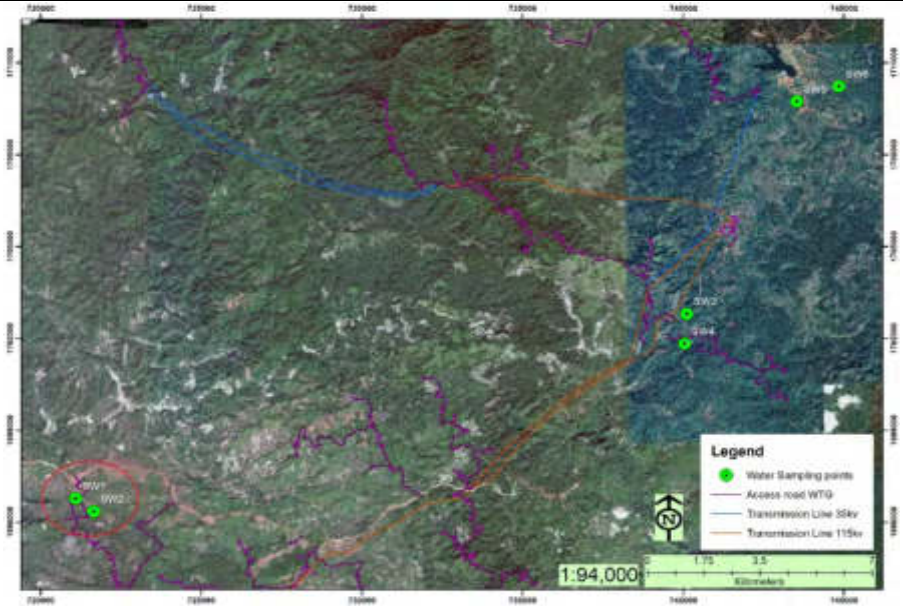
Red mark: The result of water were over standard.

Field Record

1	Water Sampling Point	**SW01**				On Site Parameters	Result
2	Date	12/8/2021				pH	7.9
3	Time	17:40				DO	9.7
4	Location	Village	District		Province	Conductivity	7
		Daktiem	Dakcheung		Sekong	Salinity	0
5	Coordinate	N	721096			TDS	3.5
		E	1696768			Air temperature	25
6	Observations	Oder	Color	Turbidity		Water temperature	22.4
		Non	Clear	light			
8	Environment Condition in the Sampling Point	It is a medium stream with water low all year round because the upper part of the stream is civered by a forest. The sampling point is below a water fall which has been created due to an exlosion of rock for for constrcution. The enclosed area consists of fine rock and cliff with the water is clear and no smell.					

Photo Sampling Survey

Water Survey Location Map



Name of Sampling Equipment	
PONPE 510PD pH/COND./SALT/DO METER	
Recorded By	
Name: KeoOudone	
Signature: Date: 12/08/2021	

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION BUREAU
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-015
Sampling Source	:	Surface Water	Sample No.	:	W6408164
Sample Name	:	SW01	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:40
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Ammonia	mg/L	SM 2017:4500-NH_3 F: Phenate	ND	-	-	-
Biochemical Oxygen Demand	mg/L	SM 2017:5210 B: 5-Day BOD test, Azide Modification	< 1.00	-	0.20	1.00
Chemical Oxygen Demand**	mg/L	SM 2017:5220 C: Closed Reflux, Titrimetric	5.53	5-7	1.00	4.00
Chloride**	mg/L as Cl^-	In-house method: SOP-LAB-013 based on SM 2017:4500-Cl^- B	ND	-	1.00	3.00
Hardness**	mg/L as $CaCO_3$	In-house method: SOP-LAB-013 based on SM 2017:2340 C	< 10.0	-	3.00	10.0
Iron	mg/L	SM 2017:3500-Fe B: Phenanthroline	0.30	-	0.01	0.10
Alkalinity	mg/L	SM 2017:2320 B: Titration	< 10.0	-	3.00	10.0
Nitrate	mg/L as NO_3^-	SM 2017:4500-NO_3^- E: Cadmium Reduction	ND	-	0.09	0.22
Nitrite	mg/L as NO_2^-	SM 2017:4500-NO_2^- E: Colorimetric	ND	-	0.02	0.07
Oil and Grease	mg/L	SM 2017:5520 B: Partition-Gravimetric	ND	-	0.70	2.00
Sulfate	mg/L as SO_4^{2-}	SM 2017:4500-SO_4^{2-} E: Turbidimetric	< 5.00	-	1.50	5.00
Total Suspended Solids	mg/L	SM 2017:2540 D: Dried at 103-105°C	< 2.50	≤ 25	1.00	2.50
Ortho Phosphate ###	mg/L	Based on APHA (2017)	ND	-	-	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
**Out of Accreditation Scope
Parameter tested by ALS Laboratory Group(Thailand) Co.,Ltd

Approved By:
(Top Management)
14/09/2021

ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
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Vientiane Capital, Lao PDR.
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LABORATORY ACCREDITATION
TESTING
No.0162

TEST REPORT

Request No. : W6408022
Report No. : 6409-015

Customer : 600 MW Monsoon Wind farm Project
Address : Dakcheung District, Sekong Province and Samxay District, Attapeu Province
Sampling Source : Surface Water
Sample Name : SW01
Sampling By : Customer
Sampling Method : Grab Sample
Tested Date : 16/08/2021-14/09/2021

Sample No. : W640080164
Sampling Date : 12/08/2021
Sampling Time : 17:40
Received Date : 16/08/2021
Reported Date : 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Coliform Bacteria #	MPN/100mL	SM 2017:9221 B: MPN Test	2,200	5,000	-	1.8
Phosphorus #	mg/L as P	SM 2017:4500-P: Ascorbic Acid	< 0.15	-	0.01	0.15
Total Nitrogen #	mg/L as N	SM 2017:4500-N: Calculation	<5	-	-	-
ORP #	mV	ORP Meter	-63.7	-	-	-
Aluminium #	mg/L	SM 2017:3500 By ICP-OES	0.19	-	0.01	0.10
Arsenic #	mg/L	SM 2017:3500: Continuous Hydride Generation/Atomic Absorption Spectrometric	ND	0.01	0.0005	0.0020
Cadmium #	mg/L	SM 2017:3500 by ICP-OES	ND	0.003	0.002	0.003
Calcium #	mg/L	SM 2017:3500 by ICP-OES	< 1.00	-	0.50	1.00
Mercury #	mg/L	SM 2017:3500 By Cold-Vapor, Atomic Absorption Spectrometric	ND	0.001	0.0005	0.0020
Copper #	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	1.5	0.01	0.02
Lead #	mg/L	SM 2017:3500 by ICP-OES	ND	0.01	0.005	0.010
Magnesium #	mg/L	SM 2017:3500 By ICP-OES	< 1.00	-	0.50	1.00
Sodium #	mg/L	SM 2017:3500 By ICP-OES	1.26	-	1.00	1.00
Potassium #	mg/L	SM 2017:3500 by ICP-OES	1.15	-	0.02	0.05
Zinc #	mg/L	SM 2017:3500 by ICP-OES	ND	1.0	0.01	0.02

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Approved by .....
(Top Management)
14/09/2021

Phanthamit Analytical Lab Co., Ltd.

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
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Tel: +856-21-263962 E-mail: info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	: W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	: 6409-015
Sampling Source	:	Surface Water	Sample No.	: W64089164
Sample Name	:	SW01	Sampling Date	: 12/08/2021
Sampling By	:	Customer	Sampling Time	: 17:40
Sampling Method	:	Grab Sample	Received Date	: 16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	: 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Manganese #	mg/L	SM 2017:3500 by ICP-OES	< 0.03	1.0	0.01	0.03
Nickel #	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	0.1	0.02	0.10
Pesticides ##						
Organochlorine Group						
Aldrin	µg/L	In-house method TM-CH-090 based on	ND	0.1	0.012	0.05
α-BHC	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.02	0.012	0.05
α-Endosulfan	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.012	0.05
β-BHC	µg/L		ND	-	0.012	0.05
Dieofol	µg/L		ND	-	0.012	0.05
β-Endosulfan	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	0.1	0.012	0.05
cis-Chlordane	µg/L		ND	-	0.012	0.05
Endosulfan Sulfate	µg/L		ND	-	0.012	0.05
Endrin	µg/L		ND	Must Not Have	0.012	0.05
γ-BHC	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
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Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co., Ltd

Approved by .....
(Top Management)
14/09/2021

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LABORATORY ACCREDITATION
ILAC-MRA
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-015
Sampling Source	:	Surface Water	Sample No.	:	W64080164
Sample Name	:	SW01	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:40
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides ##						
Organochlorine Group						
HCB	µg/L	In-house method TM-CH-090 based on	ND	-	0.012	0.05
Heptachlor	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.2	0.012	0.05
Heptachlor-exo-epoxide	µg/L	EPA method 508 (1995) Revision 3.1	ND	0.2	0.012	0.05
Methoxychlor	µg/L		ND	-	0.012	0.05
o,p'-DDT	µg/L		ND	-	0.012	0.05
o,p'-DDE	µg/L		ND	-	0.012	0.05
o,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDE	µg/L		ND	-	0.012	0.05
p,p'-DDT	µg/L		ND	-	0.012	0.05
Total DDT	µg/L		ND	1.0	0.012	0.05
trans-Chlordane	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
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2. LOD = Limit Of Detection
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3. LOQ = Limit Of Quantification
Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd.
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd.

Approved By
(Top Management)
14/09/2021

Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-015
Sampling Source	:	Surface Water	Sample No.	:	W64080164
Sample Name	:	SW01	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:40
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides ##						
Organophosphate Group						
Anilofos	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Azinphos-ethyl	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Azinphos-methyl	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Chlorfenvinphos	µg/L		ND	-	0.031	-
Chlorpyrifos	µg/L		ND	-	0.031	-
Diazinon	µg/L		ND	-	0.031	-
Dichlorvos	µg/L		ND	-	0.031	-
Dicrotophos	µg/L		ND	-	0.031	-
Dimethoate	µg/L		ND	-	0.031	-
EPN	µg/L		ND	-	0.031	-
Ethion	µg/L		ND	-	0.031	-
Ethoprophos	µg/L		ND	-	0.031	-
Etrimfos	µg/L		ND	-	0.031	-
Fenitrothion	µg/L		ND	-	0.031	-
Fenthion	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water

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2. LOD = Limit Of Detection
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3. LOQ = Limit Of Quantification
Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

TEST REPORT

TESTING
No.0162

Customer	: 600 MW Monsoon Wind farm Project	Request No.	: W6408022
Address	: Dakcheung District, Sekong Province and Samxay District, Attapeu Province	Report No.	: 6409-015
Sampling Source	: Surface Water	Sample No.	: W64080161
Sample Name	: SW01	Sampling Date	: 12/08/2021
Sampling By	: Customer	Sampling Time	: 17:40
Sampling Method	: Grab Sample	Received Date	: 16/08/2021
Tested Date	: 16/08/2021-14/09/2021	Reported Date	: 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides ##						
Organophosphate Group						
Malathion	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Methamidophos	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Methidathion	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Mevinphos	µg/L		ND	-	0.031	-
Monocrotophos	µg/L		ND	-	0.031	-
Omethoate	µg/L		ND	-	0.031	-
Parathion-methyl	µg/L		ND	-	0.031	-
Phosalone	µg/L		ND	-	0.031	-
Phosphamidon	µg/L		ND	-	0.031	-
Pirimiphos-ethyl	µg/L		ND	-	0.031	-
Pirimiphos-methyl	µg/L		ND	-	0.031	-
Profenofos	µg/L		ND	-	0.031	-
Prothiofos	µg/L		ND	-	0.031	-
Terbufos	µg/L		ND	-	0.031	-
Triazophos	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No.81, Date 07/02/2017 Standard for Surface Water
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Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

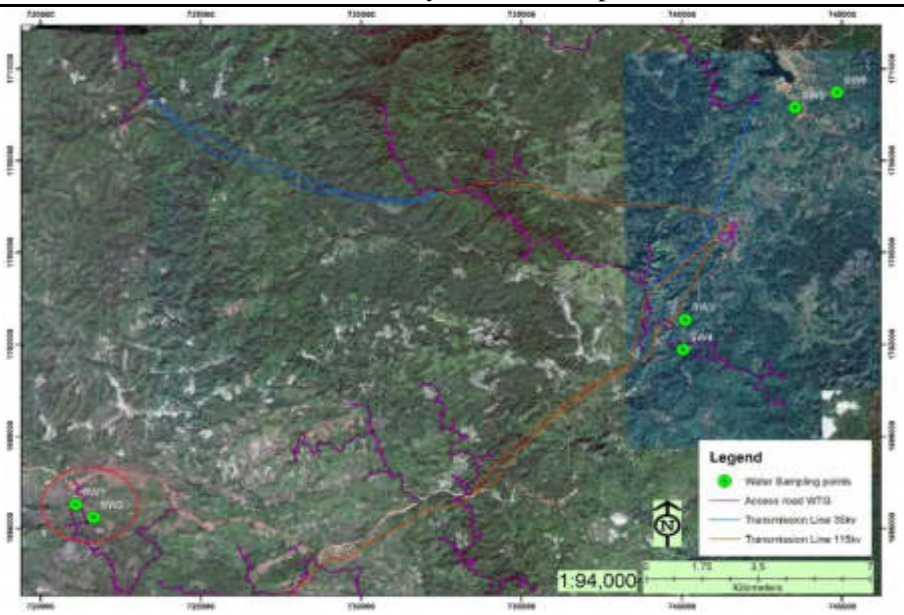
Approved By .....
(Top Management)
14/09/2021

Field Record

1	Water Sampling Point	**SW02**				On Site Parameters	Result
2	Date	12/8/2021				pH	7.9
3	Time	17:05				DO	8.3
4	Location	Village	District		Province	Conductivity	7.4
		Daktiem	Dakcheung		Sekong	Salinity	0
5	Coordinate	N	721658			TDS	3.7
		E	1696351			Air temperature	25
6	Observations	Oder	Color	Turbidity		Water temperature	22.3
		Non	Clear	light			
8	Environment Condition in the Sampling Point	It is a small-medium stream with all year water flow. It is the same stream with water sampling for SW1. The sampling point covere by mixed forest area which provides all year round of soil saturation with clear water and no smell but it is a muddy bed.					

Photo Sampling Survey

Water Survey Location Map



Name of Sampling Equipment	
PONPE 510PD pH/COND./SALT/DO METER	
Recorded By	
Name: KeoOudone	
Signature: Date: 12/08/2021	

Phanthamit Analytical Lab Co., Ltd.
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Tel: +856-21-263962 E-mail: info@phanthamit.com

ACCREDITED LABORATORY
ISO/IEC 17025

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-016
Sampling Source	:	Surface Water	Sample No.	:	W64080165
Sample Name	:	SW02	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:05
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Ammonia*	mg/L	SM 2017:4500-NH_3 F: Phenate	ND	-	-	-
Biochemical Oxygen Demand*	mg/L	SM 2017:5210 B: 5-Day BOD test, Azide Modification	ND	-	0.30	1.00
Chemical Oxygen Demand**	mg/L	SM 2017:5220 C: Closed Reflux, Titrimetric	ND	5-7	1.00	4.00
Chloride**	mg/L as Cl	In-house method: SOP-LAB-013 based on SM 2017:4500-Cl B	ND	-	1.00	3.00
Hardness**	mg/L as $CaCO_3$	In-house method: SOP-LAB-013 based on SM 2017:2340 C	<10.0	-	3.00	10.0
Iron*	mg/L	SM 2017:3500-Fe B: Phenanthroline	0.13	-	0.01	0.10
Alkalinity*	mg/L	SM 2017:2320 B: Titration	<10.0	-	3.00	10.0
Nitrate*	mg/L as NO_3	SM 2017:4500-NO_3 E: Cadmium Reduction	ND	-	0.09	0.22
Nitrite*	mg/L as NO_2	SM 2017:4500-NO_2 B: Colorimetric	ND	-	0.02	0.07
Oil and Grease*	mg/L	SM 2017:5520 B: Partition-Gravimetric	ND	-	0.70	2.00
Sulfate *	mg/L as SO_4^{2-}	SM 2017:4500-SO_4^{2-} E: Turbidimetric	<5.00	-	1.50	5.00
Total Suspended Solids	mg/L	SM 2017:2540 D: Dried at 103-105°C	3.70	≤ 25	1.00	2.50
Ortho Phosphate *###	mg/L	Based on APHA (2017)	ND	-	-	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
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**Out of Accreditation Scope
* Parameter Not Accredited ISO/IEC 17025:2017
Parameter tested by ALS Laboratory Group(Thailand) Co.,Ltd.

Approved By .....
(Top Management)
14/09/2021

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Tel: +856-21-263962 E-mail: info@phanthamit.com

ACCREDITED LABORATORY
ISO/IEC 17025

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-016
Sampling Source	:	Surface Water	Sample No.	:	W64080165
Sample Name	:	SW02	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:05
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Coliform Bacteria *#	MPN/100mL	SM 2017:9221 B: MPN Test	2,100	5,000	-	1.8
Phosphorus *#	mg/L as P	SM 2017:4500-P: Ascorbic Acid	< 0.15	-	0.01	0.15
Total Nitrogen *#	mg/L as N	SM 2017:4500-N: Calculation	< 5	-	-	-
ORP *#	mV	ORP Meter	-40.8	-	-	-
Aluminium *#	mg/L	SM 2017:3500 By ICP-OES	0.21	-	0.01	0.10
Arsenic *#	mg/L	SM 2017:3500: Continuous Hydride Generation/Atomic Absorption Spectrometric	ND	0.01	0.0005	0.0020
Cadmium *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.005	0.002	0.003
Calcium *#	mg/L	SM 2017:3500 by ICP-OES	< 1.00	-	0.50	1.00
Mercury *#	mg/L	SM 2017:3500 By Cold-Vapor, Atomic Absorption Spectrometric	ND	0.001	0.0005	0.0020
Copper *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	1.5	0.01	0.02
Lead *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.01	0.005	0.010
Magnesium *#	mg/L	SM 2017:3500 By ICP-OES	< 1.00	-	0.50	1.00
Sodium *#	mg/L	SM 2017:3500 By ICP-OES	1.12	-	1.00	1.00
Potassium *#	mg/L	SM 2017:3500 by ICP-OES	< 1.00	-	0.02	0.05
Zinc *#	mg/L	SM 2017:3500 by ICP-OES	< 0.03	1.0	0.01	0.02

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

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Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Samxay District, Attapeu Province	Report No.	:	6409-016
Sampling Source	:	Surface Water	Sample No.	:	W64080165
Sample Name	:	SW02	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:05
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Manganese *#	mg/L	SM 2017:3500 by ICP-OES	0.2	1.0	0.01	0.03
Nickel *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	0.1	0.02	0.10
Pesticides *##						
Organochlorine Group						
Aldrin	µg/L	In-house method TM-CH-090 based on	ND	0.1	0.012	0.05
α-BHC	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.02	0.012	0.05
α-Endosulfan	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.012	0.05
β-BHC	µg/L		ND	-	0.012	0.05
Dicofol	µg/L		ND	-	0.012	0.05
β-Endosulfan	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	0.1	0.012	0.05
cis-Chlordane	µg/L		ND	-	0.012	0.05
Endosulfan Sulfate	µg/L		ND	-	0.012	0.05
Endrin	µg/L		ND	Must Not Have	0.012	0.05
γ-BHC	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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Phanthamit Analytical Lab Co.,Ltd

Approved .....
(Top Management)
14/09/2021

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Samxay District, Attapeu Province	Report No.	:	6409-016
Sampling Source	:	Surface Water	Sample No.	:	W64080165
Sample Name	:	SW02	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:05
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organochlorine Group						
HCB	µg/L	In-house method TM-CH-080 based on	ND	-	0.012	0.05
Heptachlor	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.2	0.012	0.05
Heptachlor-exo-epoxide	µg/L	EPA method 508 (1995) Revision 3.1	ND	0.2	0.012	0.05
Methoxychlor	µg/L		ND	-	0.012	0.05
o,p'-DDT	µg/L		ND	-	0.012	0.05
o,p'-DDE	µg/L		ND	-	0.012	0.05
o,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDE	µg/L		ND	-	0.012	0.05
p,p'-DDT	µg/L		ND	-	0.012	0.05
Total DDT	µg/L		ND	1.0	0.012	0.05
trans-Chlordane	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
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Remark:
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Phanthamit Analytical Lab Co.,Ltd

Approved by
(Top Management)
14/09/2021

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-016
Sampling Source	:	Surface Water	Sample No.	:	W64080165
Sample Name	:	SW02	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	17:05
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Anilofos	µg/L	In-house method TM-CH-080 based on	ND	-	0.031	-
Aznphos-ethyl	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Azaphos-methyl	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Chlorfenvinphos	µg/L		ND	-	0.031	-
Chlorpyrifos	µg/L		ND	-	0.031	-
Diazinon	µg/L		ND	-	0.031	-
Dichlorvos	µg/L		ND	-	0.031	-
Dicrotophos	µg/L		ND	-	0.031	-
Dimethoate	µg/L		ND	-	0.031	-
EPN	µg/L		ND	-	0.031	-
Ethion	µg/L		ND	-	0.031	-
Ethoprophos	µg/L		ND	-	0.031	-
Etrimfos	µg/L		ND	-	0.031	-
Fenitrothion	µg/L		ND	-	0.031	-
Fenthion	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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Phanthamit Analytical Lab Co.,Ltd

(Top Management)
14/09/2021

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Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TEST REPORT

TESTING No.0162

Customer	: 600 MW Monsoon Wind farm Project	Request No.	: W6408022	
Address	: Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	: 6409-016	
Sampling Source	: Surface Water	Sample No.	: W64080165	
Sample Name	: SW02	Sampling Date	: 12/08/2021	
Sampling By	: Customer	Sampling Time	: 17:05	
Sampling Method	: Grab Sample	Received Date	: 16/08/2021	
Tested Date	: 16/08/2021-14/09/2021	Reported Date	: 14/09/2021	

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Malathion	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Methamidophos	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Methidathion	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Mevinphos	µg/L		ND	-	0.031	-
Monocrotophos	µg/L		ND	-	0.031	-
Omethoate	µg/L		ND	-	0.031	-
Parathion-methyl	µg/L		ND	-	0.031	-
Phosalone	µg/L		ND	-	0.031	-
Phosphamidon	µg/L		ND	-	0.031	-
Pirimiphos-ethyl	µg/L		ND	-	0.031	-
Pirimiphos-methyl	µg/L		ND	-	0.031	-
Profenofos	µg/L		ND	-	0.031	-
Prothiofos	µg/L		ND	-	0.031	-
Terbufos	µg/L		ND	-	0.031	-
Triazophos	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
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= Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
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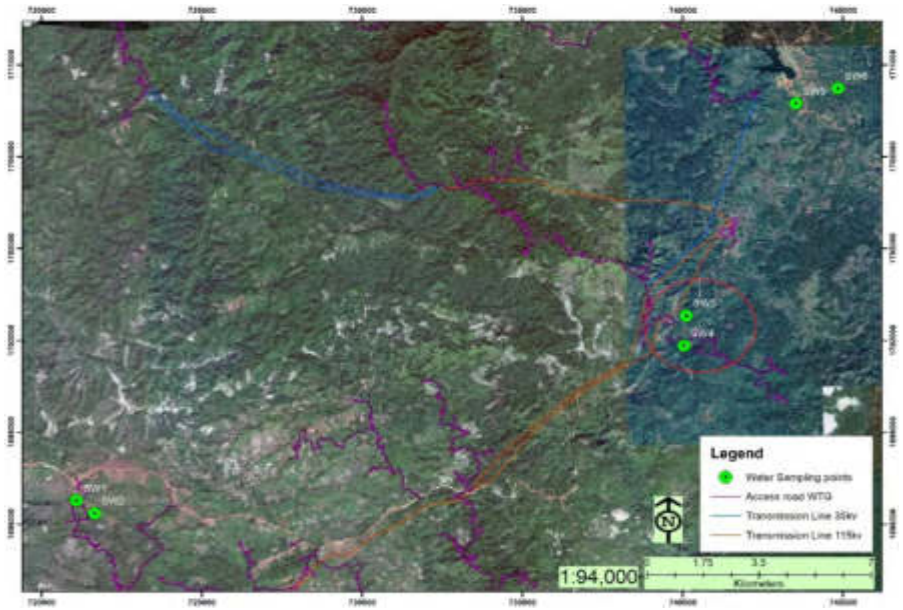
Approved By .....
(Top Management)
14/09/2021

Field Record

1	Water Sampling Point	**SW03**				On Site Parameters	Result
2	Date	12/8/2021				pH	7.3
3	Time	14:45 PM				DO	9.1
4	Location	Village	District		Province	Conductivity	27.7
		Dakrun	Dakcheung		Sekong	Salinity	0.01
5	Coordinate	N	740122			TDS	13.9
		E	1702793			Air temperature	27
6	Observations	Oder	Color	Turbidity		Water temperature	22
		Non	Clear	light			
8	Environment Condition in the Sampling Point	It is a small stream with water runs through an underpass drain of the main road. The sampling point is in a downstream area of the road (away from the road around 20-30m). Upstream area of the sapling location is grazing areas with nearby areas has small-big trees covering the areas. There are small and big rocks along the stream flow with clear water and no smell					

Photo Sampling Survey

Water Survey Location Map



Name of Sampling Equipment	
PONPE 510PD pH/COND./SALT/DO METER	
Recorded By	
Name: KeoOudone	
Signature: Date: 12/08/2021	

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ACCREDITED LABORATORY
ISO/IEC 17025

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-017
Sampling Source	:	Surface Water	Sample No.	:	W64080166
Sample Name	:	SW03	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:45
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Ammonia*	mg/L	SM 2017:4500-NH_3 F: Phenate	ND	-	-	-
Biochemical Oxygen Demand*	mg/L	SM 2017:5210 B: 5-Day BOD test, Azide Modification	< 1.00	-	0.30	1.00
Chemical Oxygen Demand**	mg/L	SM 2017:5220 C: Closed Reflux, Titrimetric	21.5	5-7	1.00	4.00
Chloride**	mg/L as Cl^-	In-house method: SOP-LAB-013 based on SM 2017:4500-Cl B	ND	-	1.00	3.00
Hardness	mg/L as $CaCO_3$	In-house method: SOP-LAB-013 based on SM 2017:2340 C	10.9	-	3.00	10.0
Iron*	mg/L	SM 2017:3500-Fe B: Phenanthroline	0.33	-	0.01	0.10
Alkalinity*	mg/L	SM 2017:2320 B: Titration	16.8	-	3.00	10.0
Nitrate*	mg/L as NO_3^-	SM 2017:4500-NO_3^- E: Cadmium Reduction	ND	-	0.09	0.22
Nitrite*	mg/L as NO_2^-	SM 2017:4500-NO_2 E: Colorimetric	ND	-	0.02	0.07
Oil and Grease*	mg/L	SM 2017:5520 B: Partition-Gravimetric	ND	-	0.70	2.00
Sulfate *	mg/L as SO_4^{2-}	SM 2017:4500-SO_4^{2-} E: Turbidimetric	< 5.00	-	1.50	5.00
Total Suspended Solids	mg/L	SM 2017:2540 D: Dried at 103-105°C	7.20	≤ 25	1.00	2.50
Ortho Phosphate *###	mg/L	Based on APHA (2017)	ND	-	-	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
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* Parameter Not Accredited ISO/IEC 17025:2017
Parameter tested by ALS Laboratory Group(Thailand) Co.,Ltd.

Approved By: .....
(Top Management)
14/09/2021

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LABORATORY ACCREDITATION
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-017
Sampling Source	:	Surface Water	Sample No.	:	W64080166
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:45
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Coliform Bacteria *#	MPN/100mL	SM 2017:9221 B: MPN Test	11,000	5,000	-	1.8
Phosphorus *#	mg/L as P	SM 2017:4500-P: Ascorbic Acid	< 0.15	-	0.01	0.15
Total Nitrogen *#	mg/L as N	SM 2017:4500-N: Calculation	< 5	-	-	-
ORP *#	mV	ORP Meter	0.40	-	-	-
Aluminium *#	mg/L	SM 2017:3500 By ICP-OES	0.15	-	0.01	0.10
Arsenic *#	mg/L	SM 2017:3500: Continuous Hydride Generation/Atomic Absorption Spectrometric	ND	0.01	0.0005	0.0020
Cadmium *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.005	0.002	0.003
Calcium *#	mg/L	SM 2017:3500 by ICP-OES	1.90	-	0.50	1.00
Mercury *#	mg/L	SM 2017:3500 By Cold-Vapor, Atomic Absorption Spectrometric	ND	0.001	0.0005	0.0020
Copper *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	1.5	0.01	0.02
Lead *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.01	0.005	0.010
Magnesium *#	mg/L	SM 2017:3500 By ICP-OES	1.76	-	0.50	1.00
Sodium *#	mg/L	SM 2017:3500 By ICP-OES	1.65	-	1.00	1.00
Potassium *#	mg/L	SM 2017:3500 by ICP-OES	< 1.00	-	0.02	0.05
Zinc *#	mg/L	SM 2017:3500 by ICP-OES	ND	1.0	0.01	0.02

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
* Parameter Not Accredited ISO/IEC 17025:2017
# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION ISO/IEC 17025
TESTING No.0162

TEST REPORT

Request No. : W6408022
Report No. : 6409-017

Customer : 600 MW Monsoon Wind farm Project
Address : Dakcheung District, Sekong Province and Sanxay District, Attapeu Province
Sampling Source : Surface Water
Sample Name : SW03
Sampling By : Customer
Sampling Method : Grab Sample
Tested Date : 16/08/2021-14/09/2021

Sample No. : W64080166
Sampling Date : 12/08/2021
Sampling Time : 14:45
Received Date : 16/08/2021
Reported Date : 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Manganese *#	mg/L	SM 2017:3500 by ICP-OES	0.10	1.0	0.01	0.03
Nickel *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	0.1	0.02	0.10
Pesticides *##						
Organochlorine Group						
Aldrin	µg/L	In-house method TM-CH-090 based on	ND	0.1	0.012	0.05
α-BHC	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.02	0.012	0.05
α-Endosulfan	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.012	0.05
β-BHC	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	-	0.012	0.05
β-Endosulfan	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	0.1	0.012	0.05
cis-Chlordane	µg/L		ND	-	0.012	0.05
Endosulfan Sulfate	µg/L		ND	-	0.012	0.05
Endrin	µg/L		ND	Must Not Have	0.012	0.05
γ-BHC	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

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ISO/IEC 17025
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	: 600 MW Monsoon Wind farm Project	Request No.	: W6408022
Address	: Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	: 6409-017
Sampling Source	: Surface Water	Sample No.	: W64080166
Sample Name	: SW03	Sampling Date	: 12/08/2021
Sampling By	: Customer	Sampling Time	: 14:45
Sampling Method	: Grab Sample	Received Date	: 16/08/2021
Tested Date	: 16/08/2021-14/09/2021	Reported Date	: 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organochlorine Group						
HCB	µg/L	In-house method TM-CH-090 based on	ND	-	0.012	0.05
Heptachlor	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.2	0.012	0.05
Heptachlor-exo-epoxide	µg/L	EPA method 508 (1995) Revision 3.1	ND	0.2	0.012	0.05
Methoxychlor	µg/L		ND	-	0.012	0.05
o,p'-DDT	µg/L		ND	-	0.012	0.05
o,p'-DDE	µg/L		ND	-	0.012	0.05
o,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDE	µg/L		ND	-	0.012	0.05
p,p'-DDT	µg/L		ND	-	0.012	0.05
Total DDT	µg/L		ND	1.0	0.012	0.05
trans-Chlordane	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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Standard for Surface Water
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3. LOQ = Limit Of Quantification
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# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Phanthamit Analytical Lab Co.,Ltd

Approved By ....
(Top Management)
14/09/2021

PAL
Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,

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ISO/IEC 17025

Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION BLA-055
TESTING No.0162

TEST REPORT

Request No. : W6408022
Report No. : 6409-017

Customer : 600 MW Monsoon Wind farm Project
Address : Dakcheung District, Sekong Province and Sanxay District, Attapeu Province

Sampling Source : Surface Water
Sample Name : SW03
Sampling By : Customer
Sampling Method : Grab Sample
Tested Date : 16/08/2021-14/09/2021

Sample No. : W64080166
Sampling Date : 12/08/2021
Sampling Time : 14:45
Received Date : 16/08/2021
Reported Date : 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Anilofos	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Azinphos-ethyl	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Azinphos-methyl	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Chlorfenvinphos	µg/L		ND	-	0.031	-
Chlorpyrifos	µg/L		ND	-	0.031	-
Diazinon	µg/L		ND	-	0.031	-
Dichlorvos	µg/L		ND	-	0.031	-
Dicrotophos	µg/L		ND	-	0.031	-
Dimethoate	µg/L		ND	-	0.031	-
EPN	µg/L		ND	-	0.031	-
Ethion	µg/L		ND	-	0.031	-
Ethoprophos	µg/L		ND	-	0.031	-
Etrimfos	µg/L		ND	-	0.031	-
Fenitrothion	µg/L		ND	-	0.031	-
Fenthion	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark: 1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017
Standard for Surface Water

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[1] Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Phanthamit Analytical Lab Co.,Ltd

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14/09/2021

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Vientiane Capital, Lao PDR.

LABORATORY ACCREDITATION BLA-055

ISO/IEC 17025

TEST REPORT

TESTING
No.0162

Customer	: 600 MW Monsoon Wind farm Project	Request No.	: W6408022	
Address	: Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	: 6409-017	
Sampling Source	: Surface Water	Sample No.	: W64080166	
Sample Name	: SW03	Sampling Date	: 12/08/2021	
Sampling By	: Customer	Sampling Time	: 14:45	
Sampling Method	: Grab Sample	Received Date	: 16/08/2021	
Tested Date	: 16/08/2021-14/09/2021	Reported Date	: 14/09/2021	

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Malathion	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Methamidophos	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Methidathion	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Mevinphos	µg/L		ND	-	0.031	-
Monocrotophos	µg/L		ND	-	0.031	-
Omethoate	µg/L		ND	-	0.031	-
Parathion-methyl	µg/L		ND	-	0.031	-
Phosalone	µg/L		ND	-	0.031	-
Phosphamidon	µg/L		ND	-	0.031	-
Pirimiphos-ethyl	µg/L		ND	-	0.031	-
Pirimiphos-methyl	µg/L		ND	-	0.031	-
Profenofos	µg/L		ND	-	0.031	-
Prothiofos	µg/L		ND	-	0.031	-
Terbufos	µg/L		ND	-	0.031	-
Triazophos	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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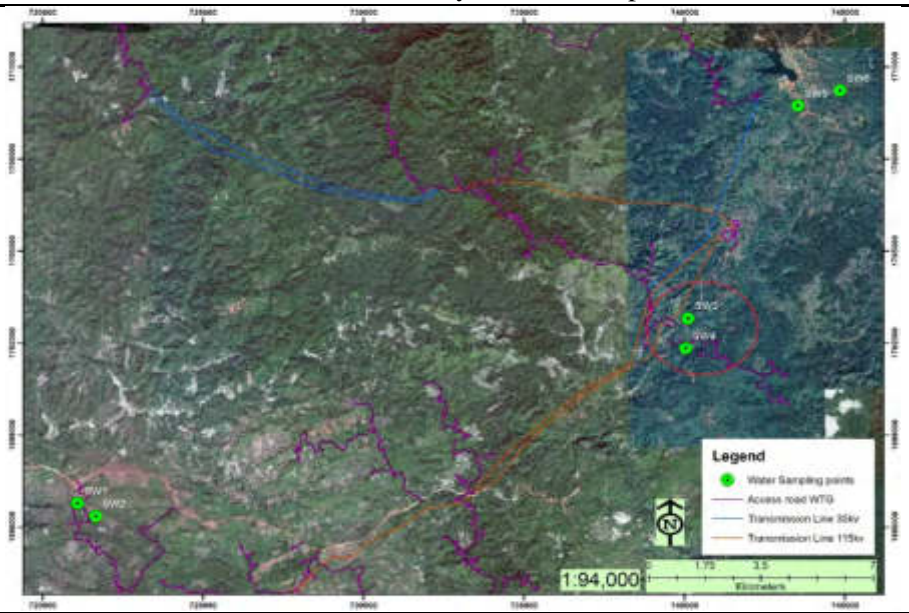
14/09/2021

Field Record

1	Water Sampling Point	**SW04**				On Site Parameters	Result
2	Date	12/8/2021				pH	7.4
3	Time	15:30 PM				DO	9.4
4	Location	Village	District		Province	Conductivity	41
		Dakrun	Dakcheung		Sekong	Salinity	0.02
5	Coordinate	N	740039			TDS	20.7
		E	1701833			Air temperature	26
6	Observations	Oder	Color	Turbidity		Water temperature	21.4
		Non	Clear	light			
8	Environment Condition in the Sampling Point	It is a small stream with small and bi trees covering along the stream reach. It is adjacent to agricultural lands of local people. There is an indication of soil erosion from the nearby agricultural lands runs into the stream. There are small trees near the sampling location. The stream bed consists of small to medium grevel sizes. The stream has a clear coulor with no smell					

Photo Sampling Survey

Water Survey Location Map



Name of Sampling Equipment	
PONPE 510PD pH/COND./SALT/DO METER	
Recorded By	
Name: KeoOudone	
Signature: Date: 12/08/2021	

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LABORATORY ACCREDITATION
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-018
Sampling Source	:	Surface Water	Sample No.	:	W64080167
Sample Name	:	SW04	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	15:30
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Ammonia*	mg/L	SM 2017:4500-NH_3 F: Phenate	ND	-	-	-
Biochemical Oxygen Demand*	mg/L	SM 2017:5210 B: 5-Day BOD test, Azide Modification	ND	-	0.30	1.00
Chemical Oxygen Demand**	mg/L	SM 2017:5220 C: Closed Reflux, Titrimetric	12.9	5-7	1.00	4.00
Chloride**	mg/L as Cl^-	In-house method: SOP-LAB-013 based on SM 2017:4500-Cl B	ND	-	1.00	3.00
Hardness	mg/L as $CaCO_3$	In-house method: SOP-LAB-013 based on SM 2017:2340 C	17.6	-	3.00	10.0
Iron*	mg/L	SM 2017:3500-Fe B: Phenanthroline	0.15	-	0.01	0.10
Alkalinity*	mg/L	SM 2017:2320 B: Titration	24.0	-	3.00	10.0
Nitrate*	mg/L as NO_3^-	SM 2017:4500-NO_3^- E: Cadmium Reduction	ND	-	0.09	0.22
Nitrite*	mg/L as NO_2^-	SM 2017:4500-NO_2 E: Colorimetric	ND	-	0.02	0.07
Oil and Grease*	mg/L	SM 2017:5520 B: Partition-Gravimetric	ND	-	0.70	2.00
Sulfate *	mg/L as SO_4^{2-}	SM 2017:4500-SO_4^{2-} E: Turbidimetric	< 5.00	-	1.50	5.00
Total Suspended Solids	mg/L	SM 2017:2540 D: Dried at 103-105°C	6.20	≤ 25	1.00	2.50
Ortho Phosphate *###	mg/L	Based on APHA (2017)	ND	-	-	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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**Out of Accreditation Scope
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Parameter tested by ALS Laboratory Group(Thailand) Co.,Ltd.

Approved By .....
(Top Management)
14/09/2021

ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
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Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-018
Sampling Source	:	Surface Water	Sample No.	:	W64080167
Sample Name	:	SW04	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	15:30
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Coliform Bacteria *#	MPN/100mL	SM 2017:9221 B: MPN Test	3,900	5,000	-	1.8
Phosphorus *#	mg/L as P	SM 2017:4500-P: Ascorbic Acid	< 0.15	-	0.01	0.15
Total Nitrogen *#	mg/L as N	SM 2017:4500-N: Calculation	< 5	-	-	-
ORP *#	mV	ORP Meter	26.1	-	-	-
Aluminium *#	mg/L	SM 2017:3500 By ICP-OES	0.17	-	0.01	0.10
Arsenic *#	mg/L	SM 2017:3500: Continuous Hydride Generation/Atomic Absorption Spectrometric	ND	0.01	0.0005	0.0020
Cadmium *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.003	0.002	0.005
Calcium *#	mg/L	SM 2017:3500 by ICP-OES	4.02	-	0.50	1.00
Mercury *#	mg/L	SM 2017:3500 By Cold-Vapor, Atomic Absorption Spectrometric	ND	0.001	0.0005	0.0020
Copper *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	1.5	0.01	0.02
Lead *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.01	0.005	0.010
Magnesium *#	mg/L	SM 2017:3500 By ICP-OES	1.95	-	0.50	1.00
Sodium *#	mg/L	SM 2017:3500 By ICP-OES	1.49	-	1.00	1.00
Potassium *#	mg/L	SM 2017:3500 by ICP-OES	2.41	-	0.02	0.05
Zinc *#	mg/L	SM 2017:3500 by ICP-OES	ND	1.0	0.01	0.02

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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Approved By .....
(Top Management)
14/09/2021

ACCREDITED LABORATORY
ISO/IEC 17025

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Tel: +856-21-263962 E-mail: info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-018
Sampling Source	:	Surface Water	Sample No.	:	W64080167
Sample Name	:	SW04	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	15:30
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Manganese *#	mg/L	SM 2017:3500 by ICP-OES	0.03	1.0	0.01	0.03
Nickel *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	0.1	0.02	0.10
Pesticides *##						
Organochlorine Group						
Aldrin	µg/L	In-house method TM-CH-090 based on EPA method 507 (1995) Revision 2.1 and EPA method 508 (1995) Revision 3.1	ND	0.1	0.012	0.05
α-BHC	µg/L		ND	0.02	0.012	0.05
α-Endosulfan	µg/L		ND	-	0.012	0.05
β-BHC	µg/L		ND	-	0.012	0.05
Dicofol	µg/L		ND	-	0.012	0.05
β-Endosulfan	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	0.1	0.012	0.05
cis-Chlordane	µg/L		ND	-	0.012	0.05
Endosulfan Sulfate	µg/L		ND	-	0.012	0.05
Endrin	µg/L		ND	Must Not Have	0.012	0.05
γ-BHC	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-018
Sampling Source	:	Surface Water	Sample No.	:	W64080167
Sample Name	:	SW04	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	15:30
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organochlorine Group						
HCB	µg/L	In-house method TM-CH-090 based on	ND	-	0.012	0.05
Heptachlor	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.2	0.012	0.05
Heptachlor-exo-epoxide	µg/L	EPA method 508 (1995) Revision 3.1	ND	0.2	0.012	0.05
Methoxychlor	µg/L		ND	-	0.012	0.05
o,p'-DDT	µg/L		ND	-	0.012	0.05
o,p'-DDE	µg/L		ND	-	0.012	0.05
o,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDE	µg/L		ND	-	0.012	0.05
p,p'-DDT	µg/L		ND	-	0.012	0.05
Total DDT	µg/L		ND	1.0	0.012	0.05
trans-Chlordane	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark: 1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017
Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017,
APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
* Parameter Not Accredited ISO/IEC 17025:2017
# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-018
Sampling Source	:	Surface Water	Sample No.	:	W64080167
Sample Name	:	SW04	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	15:30
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Anilofos	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Azinphos-ethyl	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Azinphos-methyl	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Chlorfenvinphos	µg/L		ND	-	0.031	-
Chlorpyrifos	µg/L		ND	-	0.031	-
Diazinon	µg/L		ND	-	0.031	-
Dichlorvos	µg/L		ND	-	0.031	-
Dicrotophos	µg/L		ND	-	0.031	-
Dimethoate	µg/L		ND	-	0.031	-
EPN	µg/L		ND	-	0.031	-
Ethion	µg/L		ND	-	0.031	-
Ethoprophos	µg/L		ND	-	0.031	-
Etrimfos	µg/L		ND	-	0.031	-
Fenitrothion	µg/L		ND	-	0.031	-
Fenthion	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
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Approved By .....
(Top Management)
14/09/2021

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	: W6408022	
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	: 6409-018	
Sampling Source	:	Surface Water	Sample No.	: W64080167	
Sample Name	:	SW04	Sampling Date	: 12/08/2021	
Sampling By	:	Customer	Sampling Time	: 15:30	
Sampling Method	:	Grab Sample	Received Date	: 16/08/2021	
Tested Date	:	16/08/2021-14/09/2021	Reported Date	: 14/09/2021	

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Malathion	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Methamidophos	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Methidathion	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.051	-
Mevinphos	µg/L		ND	-	0.051	-
Monocrotophos	µg/L		ND	-	0.051	-
Omethoate	µg/L		ND	-	0.031	-
Parathion-methyl	µg/L		ND	-	0.031	-
Phosalone	µg/L		ND	-	0.031	-
Phosphamidon	µg/L		ND	-	0.031	-
Pirimiphos-ethyl	µg/L		ND	-	0.031	-
Pirimiphos-methyl	µg/L		ND	-	0.031	-
Profenofos	µg/L		ND	-	0.031	-
Prothiofos	µg/L		ND	-	0.031	-
Terbufos	µg/L		ND	-	0.031	-
Triazophos	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd.

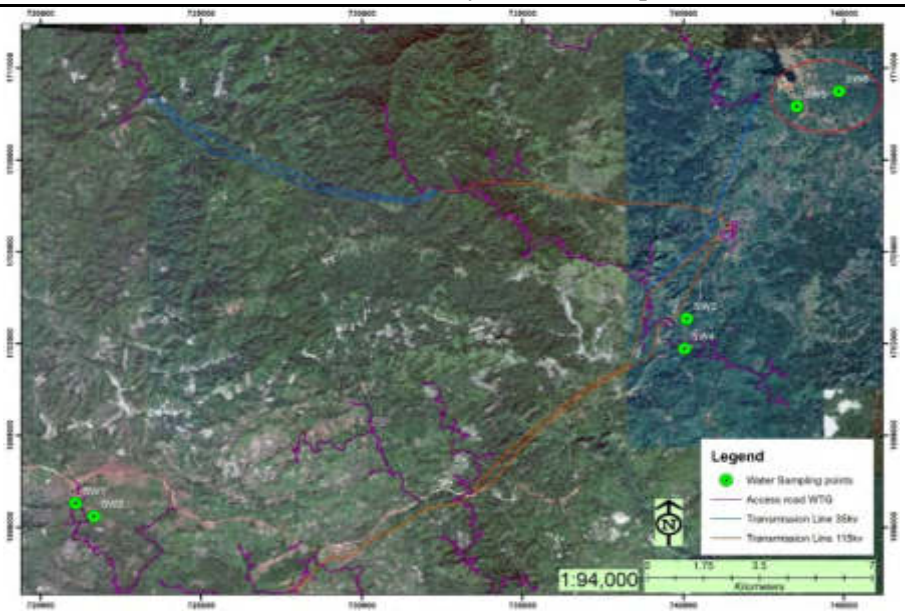
Approved By .....
(Top Management)
14/09/2021

Field Record

1	Water Sampling Point	**SW05**				On Site Parameters	Result
2	Date	12/8/2021				pH	7.4
3	Time	14:00 PM				DO	9
4	Location	Village	District		Province	Conductivity	25
		Dakbong	Dakcheung		Sekong	Salinity	0.01
5	Coordinate	N	743535			TDS	13.6
		E	1709743			Air temperature	29
6	Observations	Oder	Color	Turbidity		Water temperature	26.4
		Non	Clear	light			
8	Environment Condition in the Sampling Point	It is a full year water folw stream. The sampling point is by main road (about 20-30 off set from the road) with encloses by local houses, plantations and cattle cages. It was observed there is an erosion from agricultural areas discharging to the stream. There was also some small and big trees along the stream reach. Water in the stream is clear with no smell.					

Photo Sampling Survey

Water Survey Location Map



Name of Sampling Equipment	
PONPE 510PD pH/COND./SALT/DO METER	
Recorded By	
Name: KeoOudone	
Signature: Date: 12/08/2021	

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-019
Sampling Source	:	Surface Water	Sample No.	:	W64080168
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:00
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Ammonia*	mg/L	SM 2017:4500-NH_3 F: Phenate	ND	-	-	-
Biochemical Oxygen Demand*	mg/L	SM 2017:5210 B: 5-Day BOD test, Azide Modification	< 1.00	-	0.30	1.00
Chemical Oxygen Demand**	mg/L	SM 2017:5220 C: Closed Reflux, Titrimetric	11.7	5-7	1.00	4.00
Chloride**	mg/L as Cl^-	In-house method: SOP-LAB-013 based on SM 2017:4500-Cl B	ND	-	1.00	3.00
Hardness	mg/L as $CaCO_3$	In-house method: SOP-LAB-013 based on SM 2017:2340 C	11.4	-	3.00	10.0
Iron*	mg/L	SM 2017:3500-Fe B: Phenanthroline	ND	-	0.01	0.10
Alkalinity*	mg/L	SM 2017:2320 B: Titration	16.8	-	3.00	10.0
Nitrate*	mg/L as NO_3^-	SM 2017:4500-NO_3^- E: Cadmium Reduction	ND	-	0.09	0.22
Nitrite*	mg/L as NO_2^-	SM 2017:4500-NO_2^- E: Colorimetric	ND	-	0.02	0.07
Oil and Grease*	mg/L	SM 2017:5520 B: Partition-Gravimetric	ND	-	0.70	2.00
Sulfate *	mg/L as SO_4^{2-}	SM 2017:4500-SO_4^{2-} E: Turbidimetric	< 5.00	-	1.50	5.00
Total Suspended Solids	mg/L	SM 2017:2540 D: Dried at 103-105°C	6.10	≤ 25	1.00	2.50
Ortho Phosphate *###	mg/L	Based on APHA (2017)	ND	-	-	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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**Out of Accreditation Scope
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Parameter tested by ALS Laboratory Group(Thailand) Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
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Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-019
Sampling Source	:	Surface Water	Sample No.	:	W64080168
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:00
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [2]
Coliform Bacteria *#	MPN/100mL	SM 2017:9221 B: MPN Test	4,900	5,000	-	1.8
Phosphorus *#	mg/L as P	SM 2017:4500-P: Ascorbic Acid	< 0.15	-	0.01	0.15
Total Nitrogen *#	mg/L as N	SM 2017:4500-N: Calculation	<5	-	-	-
ORP *#	mV	ORP Meter	24.7	-	-	-
Aluminium *#	mg/L	SM 2017:3500 By ICP-OES	0.22	-	0.01	0.10
Arsenic *#	mg/L	SM 2017:3500: Continuous Hydride Generation/Atomic Absorption Spectrometric	ND	0.01	0.0005	0.0020
Cadmium *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.003	0.002	0.003
Calcium *#	mg/L	SM 2017:3500 by ICP-OES	2.31	-	0.50	1.00
Mercury *#	mg/L	SM 2017:3500 By Cold-Vapor, Atomic Absorption Spectrometric	ND	0.001	0.0005	0.0020
Copper *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	1.5	0.01	0.02
Lead *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.01	0.005	0.010
Magnesium *#	mg/L	SM 2017:3500 By ICP-OES	1.47	-	0.50	1.00
Sodium *#	mg/L	SM 2017:3500 By ICP-OES	1.40	-	1.00	1.00
Potassium *#	mg/L	SM 2017:3500 by ICP-OES	< 1.00	-	0.02	0.05
Zinc *#	mg/L	SM 2017:3500 by ICP-OES	ND	1.0	0.01	0.02

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

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Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6809-019
Sampling Source	:	Surface Water	Sample No.	:	W64080168
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:00
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Manganese *=	mg/L	SM 2017:3500 by ICP-OES	< 0.03	1.0	0.01	0.03
Nickel *=	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	0.1	0.02	0.10
Pesticides *##						
Organochlorine Group						
Aldrin	µg/L	In-house method TM-CH-090 based on	ND	0.1	0.012	0.05
α-BHC	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.02	0.012	0.05
α-Endosulfan	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.012	0.05
β-BHC	µg/L		ND	-	0.012	0.05
Dieofol	µg/L		ND	-	0.012	0.05
β-Endosulfan	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	0.1	0.012	0.05
cis-Chlordane	µg/L		ND	-	0.012	0.05
Endosulfan Sulfate	µg/L		ND	-	0.012	0.05
Endrin	µg/L		ND	Must Not Have	0.012	0.05
γ-BHC	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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= Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

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14/09/2021

Phanthamit Analytical Lab Co., Ltd.

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ISO/IEC 17025

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TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-019
Sampling Source	:	Surface Water	Sample No.	:	W64080168
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:00
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organochlorine Group						
HCB	µg/L	In-house method TM-CH-090 based on	ND	-	0.012	0.05
Heptachlor	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.2	0.012	0.05
Heptachlor-exo-epoxide	µg/L	EPA method 508 (1995) Revision 3.1	ND	0.2	0.012	0.05
Methoxychlor	µg/L		ND	-	0.012	0.05
o,p'-DDT	µg/L		ND	-	0.012	0.05
o,p'-DDE	µg/L		ND	-	0.012	0.05
o,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDE	µg/L		ND	-	0.012	0.05
p,p'-DDT	µg/L		ND	-	0.012	0.05
Total DDT	µg/L		ND	1.0	0.012	0.05
trans-Chlordane	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

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Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By: .....
(Top Management)
14/09/2021

ACCREDITED LABORATORY
ISO/IEC 17025

Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION
ILA-055
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-019
Sampling Source	:	Surface Water	Sample No.	:	W64080168
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:00
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Anilofos	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Azinphos-ethyl	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Azinphos-methyl	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Chlorfenvinphos	µg/L		ND	-	0.031	-
Chlorpyrifos	µg/L		ND	-	0.031	-
Diazinon	µg/L		ND	-	0.031	-
Dichlorvos	µg/L		ND	-	0.031	-
Dicrotophos	µg/L		ND	-	0.031	-
Dimethoate	µg/L		ND	-	0.031	-
EPN	µg/L		ND	-	0.031	-
Ethion	µg/L		ND	-	0.031	-
Ethoprophos	µg/L		ND	-	0.031	-
Etrimfos	µg/L		ND	-	0.031	-
Fenitrothion	µg/L		ND	-	0.031	-
Fenthion	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
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Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Phanthamit Analytical Lab Co.,Ltd

(Top Management)
14/09/2021

PAL
ACCREDITED LABORATORY

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LABORATORY ACCREDITATION
ILA-055

ISO/IEC 17025

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TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-019
Sampling Source	:	Surface Water	Sample No.	:	W64080168
Sample Name	:	SW05	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	14:00
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Malathion	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Methamidophos	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Methidathion	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Mevinphos	µg/L		ND	-	0.031	-
Monocrotophos	µg/L		ND	-	0.031	-
Omethoate	µg/L		ND	-	0.031	-
Parathion-methyl	µg/L		ND	-	0.031	-
Phosalone	µg/L		ND	-	0.031	-
Phosphamidon	µg/L		ND	-	0.031	-
Pirimiphos-ethyl	µg/L		ND	-	0.031	-
Pirimiphos-methyl	µg/L		ND	-	0.031	-
Profenofos	µg/L		ND	-	0.031	-
Prothiofos	µg/L		ND	-	0.031	-
Terbufos	µg/L		ND	-	0.031	-
Triazophos	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS

2. Container : Customer

Remark:

1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water

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Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....

(Top Management)

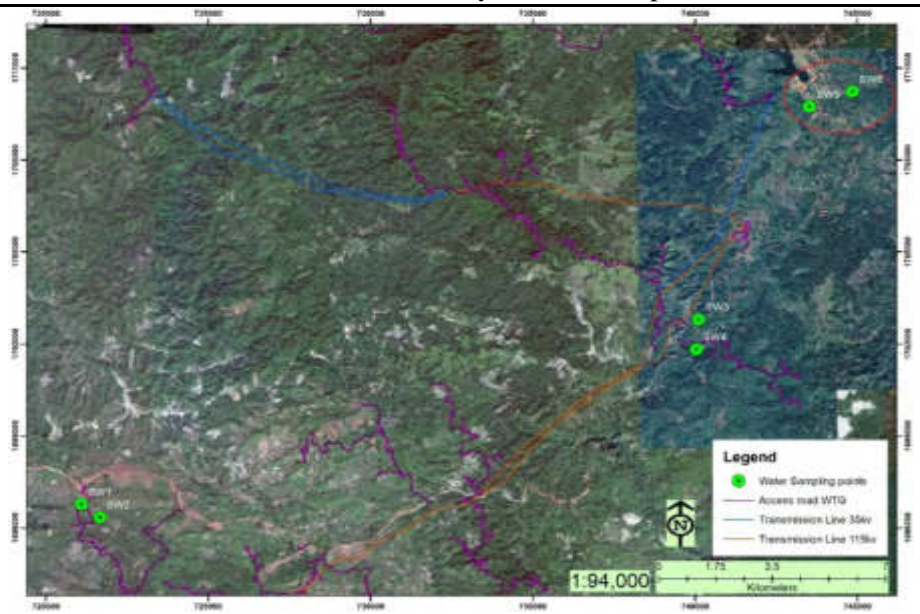
14/09/2021

Field Record

1	Water Sampling Point	**SW06**				On Site Parameters	Result
2	Date	12/8/2021				pH	6.3
3	Time	12:50 PM				DO	10.8
4	Location	Village	District		Province	Conductivity	26.4
		Dakbong	Dakcheung		Sekong	Salinity	0.01
5	Coordinate	N	744844			TDS	13.2
		E	1710236			Air temperature	30
6	Observations	Oder	Color	Turbidity		Water temperature	26.4
		Non	Clear	light			
8	Environment Condition in the Sampling Point	Water sampling location at the same stream with SW05, nearby area is coffee, and casava plantation, and is close to community about 1Km					

Photo Sampling Survey

Water Survey Location Map



Name of Sampling Equipment	
PONPE 510PD pH/COND./SALT/DO METER	
Recorded By	
Name: KeoOudone	
Signature: Date: 12/08/2021	

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No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

LABORATORY ACCREDITATION
TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-020
Sampling Source	:	Surface Water	Sample No.	:	W64080169
Sample Name	:	SW06	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	12:50
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Ammonia*	mg/L	SM 2017:4500-NH_3 F: Phenate	ND	-	-	-
Biochemical Oxygen Demand*	mg/L	SM 2017:5210 B: 5-Day BOD test, Azide Modification	ND	-	0.30	1.00
Chemical Oxygen Demand**	mg/L	SM 2017:5220 C: Closed Reflux, Titrimetric	ND	5-7	1.00	4.00
Chloride**	mg/L as Cl	In-house method: SOP-LAB-013 based on SM 2017:4500-Cl B	ND	-	1.00	3.00
Hardness	mg/L as $CaCO_3$	In-house method: SOP-LAB-013 based on SM 2017:2340 C	10.9	-	3.00	10.0
Iron*	mg/L	SM 2017:3500-Fe B: Phenanthroline	0.44	-	0.01	0.10
Alkalinity*	mg/L	SM 2017:2320 B: Titration	14.4	-	3.00	10.0
Nitrate*	mg/L as NO_3^-	SM 2017:4500-NO_3^- E: Cadmium Reduction	1.50	-	0.09	0.22
Nitrite*	mg/L as NO_2^-	SM 2017:4500-NO_2^- E: Colorimetric	ND	-	0.02	0.07
Oil and Grease*	mg/L	SM 2017:5520 B: Partition-Gravimetric	ND	-	0.70	2.00
Sulfate *	mg/L as SO_4^{2-}	SM 2017:4500-SO_4^{2-} E: Turbidimetric	< 5.00	-	1.50	5.00
Total Suspended Solids	mg/L	SM 2017:2540 D: Dried at 103-105°C	7.10	≤ 25	1.00	2.50
Ortho Phosphate *###	mg/L	Based on APHA (2017)	ND	-	-	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
**Out of Accreditation Scope
* Parameter Not Accredited ISO/IEC 17025:2017
Parameter tested by ALS Laboratory Group(Thailand) Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

ACCREDITED LABORATORY
ISO/IEC 17025

Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: Info@phanthamit.com

TESTING
No.0162

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-020
Sampling Source	:	Surface Water	Sample No.	:	W64080169
Sample Name	:	SW06	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	12:50
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Coliform Bacteria *#	MPN/100mL	SM 2017:9221 B: MPN Test	2,100	5,000	-	1.8
Phosphorus *#	mg/L as P	SM 2017:4500-P: Ascorbic Acid	<0.15	-	0.01	0.15
Total Nitrogen *#	mg/L as N	SM 2017:4500-N: Calculation	<5	-	-	-
ORP *#	mV	ORP Meter	27.6	-	-	-
Aluminium *#	mg/L	SM 2017:3500 By ICP-OES	0.26	-	0.01	0.10
Arsenic *#	mg/L	SM 2017:3500: Continuous Hydride Generation/Atomic Absorption Spectrometric	ND	0.01	0.0005	0.0020
Cadmium *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.003	0.002	0.003
Calcium *#	mg/L	SM 2017:3500 by ICP-OES	2.16	-	0.50	1.00
Mercury *#	mg/L	SM 2017:3500 By Cold-Vapor, Atomic Absorption Spectrometric	ND	0.001	0.0005	0.0020
Copper *#	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	1.5	0.01	0.02
Lead *#	mg/L	SM 2017:3500 by ICP-OES	ND	0.01	0.005	0.010
Magnesium *#	mg/L	SM 2017:3500 By ICP-OES	1.41	-	0.50	1.00
Sodium *#	mg/L	SM 2017:3500 By ICP-OES	1.22	-	1.00	1.00
Potassium *#	mg/L	SM 2017:3500 by ICP-OES	1.03	-	0.02	0.05
Zinc *#	mg/L	SM 2017:3500 by ICP-OES	ND	1.0	0.01	0.02

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
* Parameter Not Accredited ISO/IEC 17025:2017
# Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Approved By: .....
(Top Management)
14/09/2021

Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.

TEST REPORT

Customer	:	600 MW Monsoon Wind farm Project	Request No.	:	W6408022
Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province	Report No.	:	6409-020
Sampling Source	:	Surface Water	Sample No.	:	W64080169
Sample Name	:	SW06	Sampling Date	:	12/08/2021
Sampling By	:	Customer	Sampling Time	:	12:50
Sampling Method	:	Grab Sample	Received Date	:	16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	:	14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Manganese *=	mg/L	SM 2017:3500 by ICP-OES	< 0.03	1.0	0.01	0.03
Nickel *=	mg/L	SM 2017:3500 by Atomic Absorption Spectrometer	ND	0.1	0.02	0.10
Pesticides *##						
Organochlorine Group						
Aldrin	µg/L	In-house method TM-CH-090 based on EPA method 507 (1995) Revision 2.1 and EPA method 508 (1995) Revision 3.1	ND	0.1	0.012	0.05
α-BHC	µg/L		ND	0.02	0.012	0.05
α-Endosulfan	µg/L		ND	-	0.012	0.05
β-BHC	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	-	0.012	0.05
β-Endosulfan	µg/L		ND	-	0.012	0.05
Dieldrin	µg/L		ND	0.1	0.012	0.05
cis-Chlordane	µg/L		ND	-	0.012	0.05
Endosulfan Sulfate	µg/L		ND	-	0.012	0.05
Endrin	µg/L		ND	Must Not Have	0.012	0.05
γ-BHC	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark:
1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water
SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF
2. LOD = Limit Of Detection
ND = Not Detected
3. LOQ = Limit Of Quantification
* Parameter Not Accredited ISO/IEC 17025:2017
= Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd
Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....
(Top Management)
14/09/2021

Phanthamit Analytical Lab Co., Ltd.
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Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TEST REPORT

Request No. : W6408022

TESTING
No.0162

Customer : 600 MW Monsoon Wind farm Project

Report No. : 6409-020

Address : Dakcheung District, Sekong Province and Sanxay District, Attapeu Province

Sampling Source : Surface Water

Sample No. : W6408169

Sample Name : SW06

Sampling Date : 12/08/2021

Sampling By : Customer

Sampling Time : 12:50

Sampling Method : Grab Sample

Received Date : 16/08/2021

Tested Date : 16/08/2021-14/09/2021

Reported Date : 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organochlorine Group						
HCB	µg/L	In-house method TM-CH-090 based on	ND	-	0.012	0.05
Heptachlor	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	0.2	0.012	0.05
Heptachlor-exo-epoxide	µg/L	EPA method 508 (1995) Revision 3.1	ND	0.2	0.012	0.05
Methoxychlor	µg/L		ND	-	0.012	0.05
o,p'-DDT	µg/L		ND	-	0.012	0.05
o,p'-DDE	µg/L		ND	-	0.012	0.05
o,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDD	µg/L		ND	-	0.012	0.05
p,p'-DDE	µg/L		ND	-	0.012	0.05
p,p'-DDT	µg/L		ND	-	0.012	0.05
Total DDT	µg/L		ND	1.0	0.012	0.05
trans-Chlordane	µg/L		ND	-	0.012	0.05

Physical Appearance: 1. Sample : Yellow, SS

2. Container : Customer

Remark: 1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water

SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF

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ND = Not Detected

3. LOQ = Limit Of Quantification

* Parameter Not Accredited ISO/IEC 17025:2017

Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....

(Top Management)

14/09/2021

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Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TEST REPORT

Request No. : W6408022

TESTING

Address	:	Dakcheung District, Sekong Province and Sanxay District, Attapeu Province		
Sampling Source	:	Surface Water	Sample No.	: W64080169
Sample Name	:	SW06	Sampling Date	: 12/08/2021
Sampling By	:	Customer	Sampling Time	: 12:50
Sampling Method	:	Grab Sample	Received Date	: 16/08/2021
Tested Date	:	16/08/2021-14/09/2021	Reported Date	: 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Anilofos	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Azinphos-ethyl	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Azinphos-methyl	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Chlorfenvinphos	µg/L		ND	-	0.031	-
Chlorpyrifos	µg/L		ND	-	0.031	-
Diazinon	µg/L		ND	-	0.031	-
Dichlorvos	µg/L		ND	-	0.031	-
Dicrotophos	µg/L		ND	-	0.031	-
Dimethoate	µg/L		ND	-	0.031	-
EPN	µg/L		ND	-	0.031	-
Ethion	µg/L		ND	-	0.031	-
Ethoprophos	µg/L		ND	-	0.031	-
Etrimfos	µg/L		ND	-	0.031	-
Fenitrothion	µg/L		ND	-	0.031	-
Fenthion	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS
2. Container : Customer

Remark: 1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017
Standard for Surface Water

SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF

2. LOD = Limit Of Detection
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3. LOQ = Limit Of Quantification

* Parameter Not Accredited ISO/IEC 17025:2017

Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....
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14/09/2021

PAL
ACCREDITED LABORATORY
ISO/IEC 17025

Phanthamit Analytical Lab Co., Ltd.
No. 122, Unit 5, Dongpalane Thong Village, Sisattanak District,
Vientiane Capital, Lao PDR.
Tel: +856-21-263962 E-mail: info@phanthamit.com

TEST REPORT

Request No. : W6408022

TESTING No.0162

Customer : 600 MW Monsoon Wind farm Project

Report No. : 6409-020

Address : Dakcheung District, Sekong Province and Sanxay District, Attapeu Province

Sampling Source : Surface Water

Sample No. : W64080169

Sample Name : SW06

Sampling Date : 12/08/2021

Sampling By : Customer

Sampling Time : 12:50

Sampling Method : Grab Sample

Received Date : 16/08/2021

Tested Date : 16/08/2021-14/09/2021

Reported Date : 14/09/2021

Parameter	Unit	Standard Method	Result	Standard [1]	LOD [2]	LOQ [3]
Pesticides *##						
Organophosphate Group						
Malathion	µg/L	In-house method TM-CH-090 based on	ND	-	0.031	-
Methamidophos	µg/L	EPA method 507 (1995) Revision 2.1 and	ND	-	0.031	-
Methidathion	µg/L	EPA method 508 (1995) Revision 3.1	ND	-	0.031	-
Mevinphos	µg/L		ND	-	0.031	-
Monocrotophos	µg/L		ND	-	0.031	-
Omethoate	µg/L		ND	-	0.031	-
Parathion-methyl	µg/L		ND	-	0.031	-
Phosalone	µg/L		ND	-	0.031	-
Phosphamidon	µg/L		ND	-	0.031	-
Pirimiphos-ethyl	µg/L		ND	-	0.031	-
Pirimiphos-methyl	µg/L		ND	-	0.031	-
Profenofos	µg/L		ND	-	0.031	-
Prothiofos	µg/L		ND	-	0.031	-
Terbufos	µg/L		ND	-	0.031	-
Triazophos	µg/L		ND	-	0.031	-

Physical Appearance: 1. Sample : Yellow, SS

2. Container : Customer

Remark: 1. Lao Environmental Standard, Ministry of Natural Resources Environment, No 81, Date 07/02/2017 Standard for Surface Water

SM: Standard Methods for the Examination of Water and Wastewater, 23rd Edition, 2017, APHA, AWWA, and WEF

2. LOD = Limit Of Detection

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* Parameter Not Accredited ISO/IEC 17025:2017

Parameter tested by Eastern Thai Consulting 1992 Co.,Ltd

Parameter tested by Asia Medical and Agricultural Laboratory and Research Center Co.,Ltd

Approved By .....

(Top Management)

14/09/2021

APPENDIX D LANDSCAPE AND VISUAL FIELD LOGS, AND SAMPLING RAW DATA

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 01	Ban Namtiap	**X** 698867	**Y** 1691144	26.10.2021
PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR01.1-VSR01.10
	Date	26.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	26.10.2021	*Village along the road*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	26.10.2021	*None*	

TOPOGRAPHY	Surveyor Name	Xayyasit	Date	26.10.2021
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.				
✓ Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	✓ Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			Surveyor Name	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			Date	26.10.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	River	Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
✓ Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (*PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE – is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors*)	Surveyor Name	Xayyasit
	Date	26.10.2021
A community along the road.		

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 02	Ban Paor	**X** 711277	**Y** 1694801	26.10.2021
PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR02.1-VSR02.11
	Date	26.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	26.10.2021	*Village along the road, School*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	26.10.2021	*None*	

TOPOGRAPHY	Surveyor Name	Xayyasit	Date	26.10.2021
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.				
✓ Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	✓ Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			Surveyor Name	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			Date	26.10.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	River	Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
✓ Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	
✓ School				

LOCAL INFORMATION (*PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE – is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors*)	Surveyor Name	Xayyasit
	Date	26.10.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 03	Ban Daksa	**X** 734409	**Y** 1717973	3.11.2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR03.1-VSR03.5
	Date	3.11.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	3.11.2021	*Mountain, forest, village*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	3.11.2021	*None*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	3.11.2021

Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.

✓ Flat	Plain	Coast	Craggy (rocky, steep, uneven, pointed)	
✓ Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	✓ Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	3.11.2021
Building/Structures	*Farming*	✓ *Landcover/Vegetation*	*Water*	*Infrastructures*
Farm Building	✓ Pasture	Woodland – Coniferous/Decidous	River	Footpath
Masts/Poles	Olive Plantations	✓ Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	✓ Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	3.11.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 04	Ban Chaling	**X** 718458	**Y** 1704417	14/11/2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR04.1-VSR04.8
	Date	14.11..2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	14.11.2021	*Forest and Village nearby river*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	14.11.2021	*Village cemeteries*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	14.11.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
✓ Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	✓ Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	✓ Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	14.11.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	✓ River	Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	14.11.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 05	Ban Daktreb	**X** 729578	**Y** 1695290	31.10.2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR05.1-VSR05.9
	Date	31.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	31.10.2021	*Village, School, Road*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	31.10.2021	*None*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	31.10.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
✓ Flat	Plain	Coast	Craggy (rocky, steep, uneven, pointed)	
✓ Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	✓ Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	31.10.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	✓ Pasture	Woodland – Coniferous/Decidous	River	✓ Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
✓ Pylons	Vineyards	Marsh	Lake	Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	
✓ School				

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	31.10.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 06	Ban Dakdor	**X** 738363	**Y** 1700377	28.10.2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR06.1-VSR06.8
	Date	28.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	28.10.2021	*Forest, School*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	28.10.2021	*None*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	28.10.2021

Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.

✓ Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
✓ Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	✓ Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	28.10.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	*Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	River	✓ Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	✓ Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	
✓ School				

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	28.10.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 07	Dakchueng	**X** 743524	**Y** 1710931	29.10.2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR07.1-VSR07.8
	Date	29.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	29.10.2021	*Urban, Road, Store and Shop*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	29.10.2021	*None*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	29.10.2021

Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.

✓ Flat	Plain	Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	✓ Rolling Lowland	Estuary	Mountain Ridge	
✓ Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	29.10.2021
✓ *Building/Structures*	*Farming*	*Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	River	Footpath
✓ Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
✓ Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
✓ Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	29.10.2021

This place is intown of Dakchueng district.

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 08	Ban Chalernxay	**X** 722913	**Y** 1676582	23/11/2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR08.1-VSR08.9
	Date	23.11..2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	23.11.2021	*Building along the road*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	23.11.2021	*None*	

TOPOGRAPHY	Surveyor Name	Xayyasit	Date	23.11.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
✓ Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	✓ Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			Surveyor Name	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			Date	23.11.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	✓ River	Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
✓ Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (*PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE – is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors*)	Surveyor Name	Xayyasit
	Date	23.11.2021
There are a big village of Xanxay district		

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 09	Ban Maithavone	**X** 738830	**Y** 1687061	23/11/2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR09.1-VSR09.8
	Date	23.11..2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	23.11.2021	*Village and Casava farm*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	23.11.2021	*None*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	23.11.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			

✓ Flat	Plain	Coast	Craggy (rocky, steep, uneven, pointed)	
✓ Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	✓ Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	23.11.2021
Building/Structures	✓ *Farming*	*Landcover/Vegetation*	*Water*	*Infrastructures*
✓ Farm Building	Pasture	Woodland – Coniferous/Decidous	River	Footpath
Masts/Poles	Olive Plantations	✓ Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	✓ Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	23.11.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 11	Boundary Laos and Vietnam	**X** 754164	**Y** 1719633	29.10.2021
PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR11.1-VSR11.9
	Date	29.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	29.10.2021	*Forest and Road*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	29.10.2021	*Boundary protected area*	

TOPOGRAPHY	Surveyor Name	Xayyasit	Date	29.10.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
Flat	Plain	Coast	Craggy (rocky, steep, uneven, pointed)	
✓ Undulating	Rolling Lowland	Estuary	✓ Mountain Ridge	
Rolling	✓ Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	✓ Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			Surveyor Name	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			Date	29.10.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	✓ Woodland – Coniferous/Decidous	River	Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (*PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE – is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors*)	Surveyor Name	Xayyasit
	Date	29.10.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 12	Ban Souksavang	**X** 747981	**Y** 1677805	23/11/2021
PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR12.1-VSR12.8
	Date	23.11..2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	23.11.2021	*Settlement along the road*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	23.11.2021	*None*	

TOPOGRAPHY	Surveyor Name	Xayyasit	Date	23.11.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
✓ Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	✓ Rolling Lowland	Estuary	Mountain Ridge	
✓ Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			Surveyor Name	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			Date	23.11.2021
✓ *Building/Structures*	✓ *Farming*	✓ *Landcover/Vegetation*	*Water*	✓ *Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	River	Footpath
✓ Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
✓ Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (*PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE – is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – onsider both local and international visitors*)	Surveyor Name	Xayyasit
	Date	23.11.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 13	Along the road	**X** 7235899	**Y** 1689411	23/11/2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR13.1-VSR13.9
	Date	23.11..2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	23.11.2021	*Old farm along the road*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	23.11.2021	*None*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	23.11.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
Flat	✓ Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	✓ Rolling Lowland	Estuary	Mountain Ridge	
✓ Rolling	Plateau (a separate raised area above a flat area)	Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	23.11.2021
Building/Structures	*Farming*	*Landcover/Vegetation*	*Water*	*Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	River	Footpath
✓ Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
Pylons	Vineyards	Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors***)**	**Surveyor Name**	Xayyasit
	Date	23.11.2021

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 15	Sekamarn 3 Hydropower	**X** 753565	**Y** 170663	29.10.2021

PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR15.1-VSR15.8
	Date	29.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	29.10.2021	*River, Reservoir, Forest*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	29.10.2021	*Reservoir protect area*	

TOPOGRAPHY	**Surveyor Name**	Xayyasit	**Date**	29.10.2021
	Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			
Flat	Plain	Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	✓ Broad Valley	Scarp Cliff (vertical or almost vertical face)	
✓ Steep	✓ Rolling Hills	Narrow Valley	✓ Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			**Surveyor Name**	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			**Date**	29.10.2021
✓ *Building/Structures*	*Farming*	✓ *Landcover/Vegetation*	✓ *Water*	✓ *Infrastructures*
Farm Building	Pasture	✓ Woodland – Coniferous/Decidous	✓ River	Footpath
Masts/Poles	Olive Plantations	Scrub/thicket	Stream	Track
✓ Pylons	Vineyards	✓ Marsh	Lake	✓ Road-major/minor
Industry	Orchards	Peat bog	✓ Reservoir	Motorway
Settlement/Villages	Field Sizes	Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	
✓ Hydropower				

LOCAL INFORMATION (***PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE*** *– is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors*)	**Surveyor Name**	Xayyasit
	Date	29.10.2021

There are reservoir area and far from urban around 30km, this place can improve and developing to be tourism attraction.

FIELD SURVEY LANDSCAPE ASSESSMENT SHEET

SURVEY POINT NO	LOCATION	COORDINATES		DATE
Insert number stored in the GPS record	*Write here the place name*	*Insert coordinates in UTM WGS84 (meters)*		*Insert date as dd/mm/yyyy*
VSR 16	Ban Chavik+Nalaiy	**X** 695340	**Y** 1703968	26.10.2021
PANORAMIC PHOTOS NO.'s	**Surveyor Name**	Xayyasit	*Take some photographs that illustrate the characteristics of the landscape at this location*	VSR16.1-VSR16.11
	Date	26.10.2021		
LANDSCAPE TYPE	**Surveyor Name**	Xayyasit	*Describe main landscape type, for example "farmland with rivers" or "forest/ woodland/ coastal landscape/ mountains…*	
	Date	26.10.2021	*Forest and River*	
PROTECTED AREAS	**Surveyor Name**	Xayyasit	*Identify and Photographs the Protected Areas adjacent to the Project Area*	
	Date	26.10.2021	*None*	

TOPOGRAPHY	Surveyor Name	Xayyasit	Date	26.10.2021

Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.

Flat	Plain	✓ Coast	Craggy (rocky, steep, uneven, pointed)	
Undulating	✓ Rolling Lowland	Estuary	Mountain Ridge	
Rolling	Plateau (a separate raised area above a flat area)	✓ Broad Valley	Scarp Cliff (vertical or almost vertical face)	
Steep	Rolling Hills	Narrow Valley	Deep Gorge	

DOMINANT LANDCOVER AND LANDSCAPE ELEMENTS			Surveyor Name	Xayyasit
Tick one or more of these if they correspond to the landscape you see. You can add options in the blank cells.			Date	26.10.2021
Building/Structures	*Farming*	*Landcover/Vegetation*	✓ *Water*	*Infrastructures*
Farm Building	Pasture	Woodland – Coniferous/Decidous	✓ River	Footpath
Masts/Poles	Olive Plantations	✓ Scrub/thicket	Stream	Track
Pylons	Vineyards	✓ Marsh	Lake	Road-major/minor
Industry	Orchards	Peat bog	Reservoir	Motorway
Settlement/Villages	Field Sizes	✓ Moor/heath	Canal	Railway
Urban	Boundaries – fencelines/hedges	✓ Inter tidal mudflat	Waterfall	Boats/Ships/Ferries
Mineral Works			Ocean	

LOCAL INFORMATION (*PLEASE MAKE COMMENT ON THE LOCAL USE OF THIS LANDSCAPE – is it enjoyed by locals as an amenity, is it a location of visit or tourist interest – consider both local and international visitors*)	Surveyor Name	Xayyasit
	Date	26.10.2021

A place local peoples enjoyed after farm work.

APPENDIX ETURBINE COORDINATES

Coordinates of the Project's Wind Turbines

No.	Wind Turbine	Coordinates	
		Easting	Northing
1	WA001	722223.2155	1715517.999
2	WA002	722557.2085	1715354.999
3	WA003	722704.2142	1715042.999
4	WA004	722952.2086	1714775.998
5	WA007	721734.6936	1714175.113
6	WA008	722061.2113	1713247.999
7	WA009	722255.2168	1712962.999
8	WA010	722258.2091	1712601.998
9	WA011	722483.2135	1712330.999
10	WA012	722490.2084	1711966.998
11	WA013	722588.2162	1711633.998
12	WA014	722550.2079	1711243.998
13	WA015	740051.2674	1712013.997
14	WA016	740236.264	1711665.998
15	WA017	740734.274	1711166.998
16	WA018	741133.2751	1710964.998
17	WA019	740947.2744	1710400.998
18	WA020	740995.2647	1710025.998
19	WA021	734023.2494	1708217.998
20	WA022	734874.2539	1708262.998
21	WA023	734923.2546	1707917.998
22	WA024	735123.2486	1707617.998
23	WA029	730947.2367	1708128.998
24	WA030	731320.2418	1707695.998
25	WA031	731523.2417	1707344.999
26	WA032	731815.2425	1706946.998
27	WA033	732804.2404	1707479.998
28	WA034	732967.2473	1707156.998
29	WA035	733548.2507	1707033.998
30	WA036	733830.2497	1706767.998
31	WA037	734123.249	1706517.998
32	WA038	734482.2489	1706182.999
33	WA039	734892.2511	1706052.998

No.	Wind Turbine	Coordinates	
		Easting	Northing
34	WA040	735023.2488	1705717.998
35	WA041	735221.2548	1705424.998
36	WA042	735079.2463	1704874.998
37	WA043	736076.252	1705485.998
38	WA044	736281.2524	1705210.998
39	WA045	736528.2583	1704944.998
40	WA046	736813.0889	1704749.313
41	WA047	737195.0304	1704623.748
42	WA048	738998.2582	1705220.998
43	WA049	738946.2655	1704799.999
44	WA050	738701.2657	1704345.998
45	WA051	738779.6221	1704001.699
46	WA052	737667.4663	1704577.79
47	WA053	738846.2644	1702683.998
48	WA054	738871.267	1702310.998
49	WA055	723204.2112	1710075.999
50	WA056	740795.2705	1702049.998
51	WA057	740973.2653	1701755.998
52	WA058	741266.2678	1701528.998
53	WA059	741539.2703	1701276.998
54	WA060	722547.2139	1709227.998
55	WA061	742658.2802	1701408.998
56	WA062	742817.279	1701097.998
57	WA063	743172.2772	1700893.998
58	WA064	742963.2751	1700258.998
59	WA065	742429.9642	1701649.699
60	WA066	731949.2357	1700693.998
61	WA067	732299.2458	1700138.998
62	WA068	732459.2477	1699779.998
63	WA069	732870.2456	1699531.999
64	WA070	732876.243	1699157.998
65	WA071	733160.2481	1698968.999
66	WA073	732058.4444	1695753.879
67	WA074	727512.44	1699351.846

No.	Wind Turbine	Coordinates	
		Easting	Northing
68	WA075	723125.2071	1688682.885
69	WA076	732835.2462	1696848.998
70	WA077	733299.2494	1696642.998
71	WA078	733393.2469	1696227.998
72	WA079	733702.2457	1695841.998
73	WA080	732469.2437	1695636.998
74	WA081	732863.2462	1695398.998
75	WA082	733114.2485	1695119.998
76	WA083	733389.243	1694898.999
77	WA084	733590.243	1694593.998
78	WA085	734416.2513	1694326.998
79	WA086	734982.2531	1694194.999
80	WA087	735436.2523	1694002.998
81	WA088	734258.253	1693547.998
82	WA089	734313.2437	1693072.998
83	WA090	734724.2478	1692925.998
84	WA091	734901.2453	1692634.999
85	WA092	735095.2467	1692348.998
86	WA093	734970.248	1691917.998
87	WA094	727849.5559	1697919.135
88	WA095	728028.6367	1698473.429
89	WA096	728037.7019	1698862.684
90	WA099	727750.3014	1699091.968
91	WA102	718068.202	1698229.998
92	WA103	718260.2036	1697802.998
93	WA104	718593.1998	1697457.998
94	WA111	721994.826	1691227.97
95	WA120	722430.2095	1693855.998
96	WA121	722350.2079	1694247.999
97	WA122	722245.2097	1694772.998
98	WA123	721796.2156	1695292.999
99	WA124	721407.2101	1695611.998
100	WA125	720775.2072	1696065.999
101	WA131	725052.2198	1690272.998

No.	Wind Turbine	Coordinates	
		Easting	Northing
102	WA132	725095.2156	1689890.998
103	WA133	720974.2099	1696564.998
104	WA134	721073.2067	1695832.998
105	WA138	738787.2583	1701851.998
106	WA141	722442.2131	1693462.998
107	WA142	723423.2208	1685617.999
108	WA143	723719.2154	1685389.998
109	WA144	723946.2166	1685117.999
110	WA145	724187.2229	1684852.998
111	WA146	724369.2192	1684517.998
112	WA147	724987.2247	1684371.999
113	WA148	725046.2211	1684020.998
114	WA150	725084.2248	1683026.998
115	WA153	721181.2099	1697252.999
116	WA154	742238.279	1710044.998
117	WA155	723081.2191	1710537.998
118	WA110	721750.3114	1691514.769
119	WA0050	722079.05	1715877.952
120	WA0060	723282.0115	1709114.067
121	WA0250	730684.2375	1709528.998
122	WA0260	730741.2379	1709155.998
123	WA0270	730860.2326	1708833.998
124	WA0280	730908.2424	1708479.998
125	WA128	734627.9992	1691299.037
126	WA130	725079.2183	1691035.998
127	WA1050	722854.8858	1689406.985
128	WA1060	722613.0275	1688889.279
129	WA1070	722668.6049	1690185.209
130	WA1080	721391.1197	1691973.725
131	WA1090	721566.8061	1692511.968
132	WA1390	722670.9387	1689729.941
133	WA1490	725070.217	1683407.998

APPENDIX FSPECIFICATIONS OF THE TRANSMISSION LINE

APPENDIX K_1 35 kV TRANSMISSION LINE

600 MW Monsoon Onshore Wind Farm in Laos

Proposed 35 kV transmission line

1. 35kV underground and overhead Transmission Line Design and concept

Underground cable will be directly buried under 0.8 meters, consider the protection of pipes when crossing the road, cable wells at the joints area only, and there will be no cable wells at other locations.

Overhead lines should avoid residential areas, grave areas, and protected areas, and the line should try to go direct way to be as short as possible. The path should be kept at least 40 meters away from the WTG, and the cable is at least 7 meters above the ground, structure of double-circuit on the same tower or single-circuit on the same tower where it is applicable.

2. Proposed conductor and ground wire

The conductor is steel core aluminum stranded wire, and the ground wire is Optical Fiber Composite Overhead Ground Wire (OPGW).

3. Proposed insulation coordination

35kV shall conform to the latest applicable IEC standards.

4. Proposed insulator strings

The material of insulator strings is glass, porcelain or composite materials, and the quantity is to be determined with the material, voltage level and local altitude conditions.

5. Proposed load condition and wire arrangement

The structure of double-circuit on the same tower or single-circuit on the same tower where it is applicable, the load is confirmed according to the weather conditions on site.

6. Proposed support structure and foundation design concept

The iron tower adopts angle steel tower, which is designed and calculated according to weather conditions such as span, wire type, wind load, etc. The height of the tower is about 20-30m, all tower materials are hot-dip galvanized for corrosion protection, and the foundation adopts an extended foundation, using soil and concrete. The weight bears the load transferred from the upper part.

7. Lighting protection and grounding

This project adopts the lighting protection by installation OPGW on the top of the tower, the tower itself is grounded through grounding material, which is galvanized flat steel.

APPENDIX K_2 115 kV TRANSMISSION LINE

600MW Monsoon Onshore Wind Farm in Laos

Q.6 Proposed 115kV transmission line

February 2021

TABLE OF CONTENT

1 Project Description

The Owner is developing an onshore wind farm project, with a total installed capacity of approximately 600MW, in Sekong and Attapeu provinces, Laos (the "Project" or "Wind Farm"). The Project has been developed under an exclusive right granted by the Government of Laos ("GOL"), through the Memorandum of Understanding ("MoU") and Project Development Agreement ("PDA") executed in November 2011 and August 2015, respectively, on land with a total area of approximately 680sqkm (the "PDA Exclusive Land" or the "Site").

The Project has been approved by the Government of Vietnam ("GOV") and the GOL as the first cross-border wind power project under a collaboration for the power sector in accordance with a Memorandum of Understanding between the GOV and the GOL for the supply electrical energy from power projects located within Laos to Vietnam Electricity ("EVN").

In September 2019, IEAD executed a Tariff Memorandum of Understanding ("Tariff MOU") with EVN which was approved by the Ministry of Industry and Trades of Vietnam for the export and sale of all power generated from the Project to the Vietnamese grid. Subsequently, in July 2020, the Prime Minister of Vietnam approved the plan for importing power generated from the Project to Vietnam's power system via a 500kV grid connection and approved the addition of a 500kV transmission line from the Project to the Thanh My Substation to the Revised Power Development Plan VII of Vietnam.

Although the Project is located in Laos, it plans to export and sell all generated power to the Vietnamese grid. The EVN will act as a power off taker while the EVN National Power Transmission Corporation ("EVN-NPT") will act as a grid operator of the Project.

1.1 Scope of Work

The transmission lines to be supplied, constructed and installed under this Project includes:
Design, supply, delivery, transport, construction, installation, testing and commissioning of the Project from the WTGs, BOP (including intermediate onsite substations and 500kV onsite substation) and up to the interface point between the 500kV onsite substation and the 500kV transmission line (section in Laos).

2 General Requirement

2.1 Contractor Organization

The EPC Contractor shall maintain in its project site offices, the project organization charts of management, control and execution of the Contract. The EPC Contractor's organization and personnel shall be as stated in the proposal. Any changes in the organization and personnel will be allowed only upon approval of the Engineer of his written request.
The EPC Contractor shall maintain an up-to-date project organization charts, which shall be submitted to the Engineer for approval in the event of any changes.

2.2 Key Personnel

The key positions in the organization charts of the EPC Contractor pertain to individuals assigned to management/supervisory positions, who at any time during the execution of the work can give decision and recommendation to the Engineer on maters pertaining to the proper and curly completion of the Work.
The appointment, transfer and replacement of personnel to all key positions shall be subject to the Engineer 's prior approval.
Engineering and procurement in key positions shall be committed to continue through the Contract period in order to maintain continuity.

2.4 Standards ad Codes

All equipment, materials, fabrication and tests under these Specifications shall conform to the latest applicable standards, manuals and specifications contained in the following list or to equivalent applicable standards, manuals and specifications established and approved in the country of manufacture,

and accepted as equivalent by the Engineer:

♦	ACI	American Concrete Institute
♦	AISC	American Institute of Steel Construction
♦	ANSI	American National Standard Institute, Inc.
♦	ASCE	American Society of Civil Engineer
♦	ASME	American Society of Mechanical Engineer
♦	ASTM	American Society for Testing Materials
♦	AWS	American Welding Society
♦	CCITT	International Telegraph Consultative Committee
♦	IEC	International Electromechanical Commission
♦	IEEE	Institute of Electrical and Electronics Engineer
♦	ISO	International Standards Organization
♦	NEMA	National Electric Manufacturers Association
♦	TISI	Thai Industrial Standard Institute

Any details not specifically covered by these Standards and Specifications shall be subject to acceptance of the Engineer. In the event of contradictory requirements between the standards and these specification requirements, the terms of the Specifications shall be applicable.

In some places, reference is made to certain manufacturers' products, brand-name materials and items identified by registered trade-marks. This has been done to define and establish standard of quality and/or performance, and is not intended to restrict the procurement of materials or equipment to a particular manufacturer.

Any Reference made to standards and specifications, or to equipment and materials of a particular manufacture shall be identified as "or equivalent". The EPC Contractor may propose equivalent standards, specifications, materials or equipment which shall be equal in every respects to that specified. If the EPC Contractor, for any reason, proposes any equipment equivalent to, or deviated from, the above standards, the EPC Contractor shall state the exact nature of the change and the reason for making the change, and shall submit complete specifications of the materials, as well as copies of pertinent standards, for the acceptance of the Engineer, and the decision of the Engineer regarding the matter of quality will be final.

The EPC Contractor is required to provide two original copies of all standards referred in this

Specification to the Engineer within 60 days after receipt of award of the contract. All cost incurred shall be borne by the EPC Contractor.

3 Technical Requirement

3.1 Survey

3.1.1 Location survey

The location survey of the transmission line route had been performed by the Engineer. Two (2) copies of key map, plan & profile drawings and structure list for the work covered by this Contract will be furnished to the EPC Contractor after award of the Contract. All points of reference such as angle points on tangent and termination points, throughout the entire route of location survey, have been established in the field with concrete posts. However, some or all posts and / or reference points may be destroyed or undiscovered at the time of construction and some discrepancy may be found, the EPC Contractor shall be required to perform re-locating to ensure the correctness of those posts or reference points at his own expenses.

3.1.2 Check Survey

Not less than 15 days prior to the commencement of the work, the EPC Contractor shall submit qualifications of personnel, work program, and list of survey equipment for reviewing by the Engineer.

The EPC Contractor shall perform all necessary check survey work which consists of determination, checking and laying out the accurate center line and elevation of all the reference points, based on the key map and plan & profile drawings furnished. Should an angle point marker be disturbed or destroyed, it shall be re-established by the EPC Contractor using reference ties set by the Engineer. The EPC Contractor shall determine the overall length of each tangent and any discrepancy from the plan and profile length in excess on 5 k meters where k is the length in kilometers, shall be equally prorated among all of the span lengths in that tangent. Where a major distance measurement error can be isolated to a certain span or spans or where the cumulative error over the entire tangent is in excess of 10 k meters, the matter shall be referred to the Engineer for resolution. Furthermore, the EPC Contractor shall check the minimum clearance of conductor crossing the existing the existing highway, railway, major waterway, telecommunication lines, power lines and any other object that will create less vertical clearance than that required.

During the check survey, if not enough side clearance is found, then the EPC Contractor shall perform

side clearance survey and submit to the Engineer along with recommendation for the solution of problem.

3.1.3 Tower Location

The EPC Contractor shall locate all towers at the stations shown on the plan and profile drawings. If the site of any tower as spotted in the plan & profile drawings is not suitable by reason of topographical, geological or any other affecting conditions, the EPC Contractor shall be required to recommend the proper locations of towers to the Engineer for consideration. The EPC Contractor shall carry on the work in accordance with the Engineer decision.

In case of the transmission line passing over hilly and mountaineous country and unequal legs of towers to be required, the EPC Contractor shall perform the diagonal profile and plan drawings for the selection of individual leg extension.

In the event of the EPC Contractor requesting to increase the height of the tower due to unavailability of any leg extension to suit his design, he shall be entitled to no claim for any material furnished or work performed in this respect.

Two (2) copies of corrected key map, plan & profile drawings, structure lists, check survey data, four (4) copies of diagonal profile and plan drawings of hill side structures including the proposed individual leg extension shall be submitted to the Engineer for approval.

3.1.4 Tower Staking

a. At each tower site, the EPC Contractor shall provide three red stakes on the center line of the transmission line. One stake is to be located at the center of the proposed tower location with the other two reference stakes located on the center line of the transmission line, 15 m ahead and behind the centre stake. The top of the centre stake shall be driven to an elevation to be known as the working point from which the line and level of the tower shall be established.

b. At deviation or angle towers, the EPC Contractor shall also provide red orientation pegs along the bisector of the deviation angle of the line.

c. The tower site number and elevation of the top of the stakes shall be marked on the sides of each stake. The EPC Contractor shall provide adequate protection for all stakes to prevent disturbance during Right-of-Way clearing, site preparation and tower construction.

d. The EPC Contractor shall install any stakes and carry out any and all survey required to complete the design and construction of the line.

3.1.5 Survey Personnel and Instruments

The surveys, tower staking and other associated survey shall be performed and responsible by qualified and experienced surveyors and other experienced personnel. The survey instruments shall be in good operating conditions suitable for the works intended and shall be well calibrated before being utilized in the field.

3.1.6 Clearing of Right-of-Way and Danger Trees

All right-of-way clearing and trimming of danger trees shall be as specified herein and shown on the drawing unless specifically directed by the Engineer. The area to be cleared shall be determined from the check survey reviewed by the Engineer.

(1)Within 8 Meters of Any tower Leg.

All trees, brush and stumps within 8 meters of any tower legs shall be cut off as close to the ground as practicable except trees to be stamped “Forest Department” according to the applicable Forest Act. These trees shall be cut to a height of not more than 30 centimeters above the ground.

(2)Outside 8 Meters of Any Tower Leg.

All trees, brush and stumps within the right-of-way but not within 8 meters of any tower leg shall be cut to a height of not more than 30 centimeters above the ground with the exception of trees, crops and other vegetation of commercial value which shall be cut according to the guidelines specified herein or as directed by the Engineer.

3.2 Soil Investigation

3.2.1 Soil Investigation

The EPC Contractor shall be required to perform soil investigation at each tower location to the depth specified in the Contract. The sub-soil investigation shall be performed by Light Ram Sound (Kunzelstab) Test. The details of performing the test, tools and equipment to be used shall be submitted to the Engineer for approval.

The test shall be performed in such a manner that the number of blows per 10 cm of penetration can be obtained continuously along the boring depth. The data obtained from soil investigation shall include date of test, tower number, station, ground surface condition, sample elevation, natural density of soil, limit of strata, maximum water level, ground water level and soil classification up to the depth of sub-soil test. The data thus obtained shall be prepared in the form to show the nature and extent of the soil strata over the area under consideration and submitted to the Engineer.

Selection of foundation type shall be made for each tower foundation to suit its particular site conditions. The determination of pile length for pile type foundation shall be based on the result of sub-soil test, employing over load factors specified on the drawing. The Engineer reserves the right to make final selection of foundation type for each tower site based upon its judgment of the nature of sub-soil conditions or other factors affecting construction or operation of the transmission line.

Four copies of the foundation list shall be submitted for approval of the Engineer.

3.2.2 Ground Resistance and Ground Resistivity

The EPC Contractor is required to perform ground resistance test and ground resistivity test at every tower location. Method of measurement, tools and instruments shall be submitted to the Engineer for approval.

The measurement of ground resistance shall be performed at each meter to the depth of not more than 10 m from ground surface or until ground resistance value of 5 ohms or less are obtained at any adjacent levels. The procedure of each measurement shall be in accordance with Article 9.00, Methods of Measuring Ground Resistance of IEEE Standard No.81

Recommended Guide for Measuring Ground Resistance and Potential Gradients in the Ground.

The EPC Contractor may use drilling rod (s) of soil investigation equipment during performing the soil investigation test as grounding electrodes for measuring the ground resistance.

The measurement of ground resistivity expressed in ohm-meter shall be performed in accordance with Article 8.02, Four-Point Method of IEEE Standard No.81.

The EPC Contractor shall recommend the type of grounding electrodes in accordance with the results of ground resistances and ground resistivity obtained. Selection of grounding electrode type shall be suitable for each tower and its particular site conditions. The data obtained shall be prepared in the form and submitted to the Engineer for approval.

Four copies of list of ground electrode shall be submitted for approval of the Engineer.

3.3 Foundation Work

3.3.1 General

The EPC Contractor is required to design, for each tower type, suitable foundations for each kind of soil classified hereunder.

The responsibility for proving the adequacy of the foundation type at each tower site shall remain to the EPC Contractor according to the results of soil investigation performed by the EPC Contractor and reviewed by the Engineer.

3.3.2 Soil Classification

The soil has been classified into six classes as follows :

Soil Class	Description	Density kg/cu. m.	Angle of Repose	Ultimate Bearing Capacity kg/sq.m.
I	Very Soft	900	0	-
II	Soft	1,000	4	10,000
III	Fair	1,500	15	20,000
IV	Good	1,700	16	40,000
V	Hard	1,900	24	60,000

Soil class I, II are submerged Soil Condition. Rock shall be classified into soil class V.

3.3.3 Foundation Type

Foundation type for each soil class shall be as follows:

Soil Class	Foundation Type

I II III, IV, V	Long Pile Short Pile Pad & Dug FND

Configuration and minimum requirements of each foundation type shall be as shown on the drawings.

3.3.4 Design Requirement of Foundation

Foundation design shall be such that the tower shall be securely supported and unbalanced displacement that may cause harmful effect to the tower shall not be produced.

The loads acting on the foundation shall be the maximum loads determined from each tower loading condition and shall take the leg extension of tower into account.

Stability of foundation shall conform to the following requirements :

a. Resistance to uplift and overturning plus uplift Load factor ( )

Suspension Tower 1.6

Tension Towers 1.9

b. Resistance to compression and overturning plus compression

Load factor ( )

Suspension Tower 1.9

Tension Towers 2.2

Foundation design loads shall be calculated on the basis of the maximum axial and horizontal tower base reactions exclusive of tower overload factor and further multiplied by the load factors specified above. Maximum foundation shear force from any load combination for the download leg will be assumed to act simultaneously with the maximum foundation compression force. Maximum foundation shear force from any load combination for the uplift leg will be assumed to act simultaneously.

All combinations of tower and leg extension heights, as stated in the tower design specification, shall be considered in determining the maximum tower base reactions.

Concrete for foundation shall have a minimum 28-day cylindrical strength of 210 kg/cm^2, using 300 kg cement content per cubic meter.

Steel reinforcement shall conform to TIS 20 for round bar and TIS 24 for deformed bars.

Maximum stresses in concrete and steel reinforcement, taking the specified overload factors shall be as specified in ACI 318.

3.3.5 Design Requirements of Piles

Piles shall be prestressed concrete piles, reinforced concrete piles or cast in situ piles. Design and manufacturing of piles shall conform to the requirements of ACI Recommendation for Design, Manufacture and Installation of Concrete Pile except as specified herein.

Piles shall have the following characteristics :

Type of Pile	Min. Effective Perimeter, cm	Length m	Allowable Structural Capacity		Moment Bending
			Tension, kg	Compression, kg	
Short Pile	80	Upto 10	7,000	14,000	As required
Long Pile	120	8-20	15,000	30,000	As required
Long Pile	160	8-24	20,000	40,000	As required
Cast-in-Situ	35	upto 20	15,000	30,000	As required
Dug Foundation	100	10	18,000	34,000	As required

Piles shall also be designed to provide adequate strength to resist stresses produced during handling and transportation as well as the expected driving stresses without damaging the piles.

Concrete for pile shall have a minimum 28-day cylindrical strength of 350 kg/cm^2, using minimum cement content of 400 kg per cubic meter.

Dug Foundation is used in Slope areas in order to protect the environment and decrease excavation.

Prestressing wires and plain round bars shall conform to TIS 95 and TIS 20 respectively.

To anchor each pile with the pile cap, dowel bars shall be provided. Dowel bars shall be designed to

develop full allowable tension load of the pile. The length of the dowel bars pre-embedded in the top part of pile during manufacturing shall be as follows :

• Short pile	2	m
• Long pile	3.3	m

3.3.6 Drawing for Approval

Design calculation and detail for each type of foundation and pile shall be submitted for approval of the Engineer. Such details shall show the following requirements :

a. Design

1.) Detailed calculation of loads acting on foundation for each loading condition.

2.) Calculation showing stability of foundations as specified in Clause 3.2.1.4.

3.) Maximum stresses in concrete and in steel reinforcement at any critical section.

4.) Loads acting on each pile for each loading condition.

5.) Detailed calculation of stub angle and cleat angle, if any. 6.) Design of piles.

b. Detail

1.) Detailed dimensions of foundation.

2.) Details of setting dimensions of foundation for every type of leg extension.

3.) Details of placing of all reinforcing steel which shall conform to the Building Code Requirements for Reinforced Concrete (ACI 318) and the Manual of Standard Practice for Detailing Reinforced Concrete Structure (ACI 315) unless otherwise as specified herein and shown on the drawings.

4.) Details of type, size and length of each reinforcing steel including details of bar bending.

5.) Details of concrete covering for protection of steel reinforcement which shall not be less than 5 cm for structure exposed to weather or backfill or submerged, and 7.5 cm for concrete placed directly against ground, rock and surfaces subject to corrosion caused by sulphates or corrosive chemicals.

6.) Details of cut off elevation of piles which shall not be less than 15 cm above the bottom of base pad of the foundation.

7.) Details of spacing of piles which shall not be less than 3.0 times diameter or the largest side of the pile.

8.) Details of size and length of dowel bars embedded in the base pad of the foundation.

9.) Details of piles which shall conform to the following requirements :

- Pile tip shall be flat
- Covering of concrete over main reinforcement shall be 25 mm
- Edge and corner shall be chamfered
- Lifting point shall be indicated and provided

3.3.7 Foundation Orientation For Towers

The EPC Contractor shall assume full responsibility for the accuracy of the exact location and orientation of each tower foundation. If not specified, the foundation orientation of each tower shall be placed in such a manner that the position of the longitudinal axis of the tower crossarm will lie

a. in a plane perpendicular to the traverse of the line for the foundation of each tower in a straight line section.

b. in a plane bisecting the interior angle formed by the intersection of the adjacent line traverses for the foundations of each angle towers.

c. in a plane perpendicular to the traverse of the line route (regardless of the traverse of the slack span) for foundations of each dead end tower except where otherwise indicated on the drawing(s).

3.3.8 Installation of Piles

a. Handling, Transportation and Storage

Piles shall not be handled, transported or stored in any way which will result in damage to the pile. Piles shall be lifted and blocked for storage at predesignated points in such a manner that bending stresses will be within acceptable limits specified in the design of piles.

The Engineer reserves the right to reject any pile at any time throughout the delivery and storage if it is determined that the pile may be unsuitable due to improper fabrication, handling or storage.

b. Installation

Piles shall be installed accurately to the required position, alignment and depth with gravity steam, internal combustion hammers or by other means accepted by the Engineer. The drop length of the hammer shall not exceed 90 cm. The weight of the hammer and the striking part shall be at least equal to the weight of the pile being driven and shall develop an energy per blow of not less than 3 kg-m per 10 kg of weight driven.

During driving, an accurate record of the penetration and blow count of each pile driven shall be kept by the EPC Contractor. These records shall be available to the Engineer at all times.

For estimating and evaluation purpose, the ultimate resistance of vertical piles shall be determined by the following formula :

$Q = WH/(S + So/2)\ S_o = (2\ WHL/AE)^{1/2}$

Where

= Ultimate resistance to driving in kg

= Weight of striking parts of hammer in kg

= Height of drop for the hammer in cm

= Average penetration, in cm per blow for the last 5 blows

= Elastic compression of pile in cm if all available hammer energy is used for compression of pile

= Length of pile as driven in cm

= Cross-sectional area of pile, sq.cm

E = Modulus of elasticity for pile material, kg/sq.cm (recommended value of 2.2×10^5 kg/sq.cm)

= Efficiency of hammer. Values given below may be substituted by manufacturer's efficiencies or net delivered energies if based on actual tests:

Diesel hammer: 100%

Single-acting air or steam hammer: 80%

Gravity hammers: 100% for hammers released by triggers 75% for hammers actuated by rope and friction winch

The pile driving procedure shall not subject piles to excessive and undue abuse producing crushing and spalling of the concrete, injurious splitting, deformation of the steel or misalignment. The pile to be driven shall be ensured that the top face is perpendicular to the longitudinal axis of the pile and that no steel reinforcement or dowel bars protrude from the head.

Piles being driven shall have an adequate driving head to distribute the blow of the hammer to the head of the pile. The driving head shall be axially aligned with the hammer and the pile. Between the driving head and the hammer, there shall be a cap block to protect the pile and the hammer from damage. Cap blocks may be made of hard wood or other materials capable to transmit the energy to the pile effectively without excessive elastic energy losses.

The top of the piles shall be covered by suitable cushion while they are being driven. Cushions shall be at least 10 cm thick of soft wood block or 16 layers of gunny sacks. A new cushion shall be provided for each pile, or replaced during driving when the cushion becomes highly compressed, charred or burned.

Piles shall be secured against lateral movement during driving by leads or other suitable means. Excessive manipulation of piles during or after driving to force them into proper positions will not be permitted. All piles pushed up by the driving of adjacent piles or by other causes shall be driven down. The top of the piles at cut-off elevation shall not be out of position shown on the drawings more than 1 per cent of pile length nor more than 15 cm after driving.

Any pile damaged by reason of internal defects, or by improper driving, or driven out of its proper location shall be corrected at the EPC Contractor's expenses by one of the following methods accepted by the Engineer for pile in question:

1. pile shall be withdrawn and replaced by a new pile and, if necessary, a longer one.
2. second pile shall be driven adjacent to the defective pile.

All materials forced up between the piles shall be removed to the base elevation accepted by the Engineer before gravel subbase or concrete is placed.

All piles, except the reinforcement therein, shall be cut-off to true horizontal plan at the specified elevation. Reinforcement steel shall be left extending from all piles above the specified cut-off planes for anchorage into the base pad of the footings as shown on the drawings.

When the pile has been driven a short distance below grade, the extension of pile or lowering of the pile cap may be employed.

If the extension of pile is exercised, the use of epoxy grout and a doweled splice is recommended. Splices should develop the requisite strength in compression, bending, tension, shear and torsion at the point of splices during driving and in service.

3.3.9 Soil Excavation

Soil excavation for footings shall include all excavation required for installation of footings, leveling around the individual tower footings and grading or preparation for construction at the tower site. Where necessary or as directed by the Engineer, adequate drainage shall be provided around the tower site. Excavated materials shall be laid aside and shall be used for backfill and embankment at the tower site from which it was excavated, and the excess materials shall be spread evenly around the site. Where excavation is on farm or cultivated land, the top soil should be stripped and laid aside, separate from other excavated soil, and placed back on top of the backfill to be made after the concrete foundation has been constructed.

Foundation excavation shall be sufficient to result in concrete footings with lines and dimensions as shown on the drawings and within the tolerances herein specified. Embedment depths shown on the drawing shall be maintained at the shallowest part of an excavation, if on sloping ground.

Excavation for footing shall conform to the dimensions and elevations shown. The excavation shall extend a sufficient distance from footings to allow inspection and placing and removal of forms, except where concrete footings are authorized to be deposited directly against excavated surface. When concrete is to rest on a surface other than solid rock, special care shall be taken not to disturb soil at the bottom of the excavation. Excavation to the final level shall not be made until just before the concrete is to be

placed. Such grading shall be done as may be required to prevent surface water from flowing into the excavation. If necessary, the excavation shall be shored to retain the hole and to protect the workers. The shoring shall be removed as the hole is backfilled. Any

mud, silt, or other objectionable material which accumulate in the bottom of the excavation shall be removed prior to pouring of concrete. In case of over excavation without specific direction or required to remove loose, muddy, or objectionable material which has accumulated in the bottom of the excavation, the base of the concrete pad shall be extended to the bottom of the excavation. All additional work of this nature shall be at the EPC Contractor's expense.

During excavation, if it is discovered that underground water level different from that specified in the Foundation Lists, the EPC Contractor shall notify the Engineer for resolution.

Foundation excavations when unattended shall be covered to prevent injury to humans, livestock or wildlife. Excavation subject to caving shall be properly shored before allowing workmen to enter.

3.3.10 Rock Excavation

The EPC Contractor shall furnish all materials and equipment to perform all work required for excavation of rock at the location where concrete or rock foundation is to be constructed. Rock excavation may be made by drilling, barring, wedging, blasting or compressed-air tools.

Blasting will be permitted only when proper precautions are taken for the protection of persons, work and public or private property. Any harm or damage done to the persons, work or property by blasting shall be the sole responsibility of the EPC Contractor.

Hauling, storage and handling of explosives shall be carried out in strict compliance with the requirements of the applicable laws and regulations.

Plans and methods of operation for blasting including sites and schedule shall be submitted to the Engineer for reviewing prior to implementation. Caps, exploders, or fuses shall not be kept or transported in the same place as dynamite or other explosives. An inventory of all explosive materials shall be kept and the Engineer shall be notified immediately of loss or theft. The Engineer shall be notified a minimum of 48 hours prior to each use of blasting.

All expenses of rock excavation shall be included in the price of foundation.

3.3.11 Backfill

Backfilling shall not be carried out until the Engineer has inspected the foundation.

Suitable excavated soil may be used as backfill material. Rock and soil not suitable for compaction shall at the EPC Contractor's own cost be removed and replaced with a suitable backfill to the acceptance of the Engineer. Organic matter and silt shall not be used as backfill material. All temporary timbering, shuttering, etc. and all decomposable or perishable material shall be removed from the excavations prior to backfilling.

Backfill shall be placed in layers of approximately 15 cm thickness. Each layer shall be carefully compacted by the use of mechanically operated tamping machines. The material to be compacted shall contain no stones grater the 10 cm in diameter.
In backfilling for concrete footings, the pad of the footing shall be covered first with a 30 cm layer of fine material before any coarse material is deposited.

Prior to and during compacting operation, the backfill shall have the optimum practicable moisture content required for the purpose of compaction.

The material shall be compacted to 85 per cent of the maximum density obtainable in the Standard Proctor Density Test as specified in ASTM D698(Method A).

The Engineer will periodically perform backfill soil density tests to insure the desired degree of backfill compaction is achieved. The test apparatus and man-power to perform the tests shall be provided by the EPC Contractor at his expenses.

Backfill shall be carried out to a minimum height of 20 cm above the original ground surface to compensate for future settlement of the filling. All backfill of tower foundation shall be protected in an accepted manner from being washed away by running water. At all tower positions, the surface of the ground shall be sloping from the tower legs to provide drainage as required. No additional payment will be made for such work.

3.3.12 Stub Setting

Stub angles shall be placed in the tower footings and set accurately to the grade and alignment

designated on the drawing. The stub angles shall be supported in the proper position by means of a rigid frame or equivalent suitable device to prevent displacement during the placing of concrete and to insure placement of the stub angles within the tolerances specified below:

1. *Vertical Dimensions.* The difference in elevation between identical parts of any two stub angles shall not exceed 1/1000 of the computed horizontal distance between the two stub angles. The actual elevation of any stub angle shall not differ from the prescribed elevation by more than 6 mm of its correct position.

2. *Horizontal Dimensions.* The difference in horizontal distance from the computed distance between identical parts of any two stub angles shall not exceed 1/1000 of the computed distance between two stub angles.

3. *Stub Alignment.* The faces of each stub angle shall not deviate from parallel with the corresponding faces of the tower by more than 3.3/1000 horizontally. The batter of the stub angles shall not differ from the correct batter by more than 1/200 of the exposed stub.

4. *Rotation.* The transverse axis of each tower shall not deviate from the bisector of the interior line angle at the tower by more than 12 minutes of arc, or one part in 300 whichever is smaller.

3.3.13 Concrete Work

a. General

The EPC Contractor shall supply all labour, materials and equipment required for the concrete work for tower foundations.

The mix proportions shall be submitted to the Engineer for approval on the basis of producing concrete having suitable workability, density, impermeability, durability, and required strength, without the use of an excessive amount of cement and without exceeding a net water-cement ratio of the concrete (exclusive of water absorbed by the aggregates) of
0.60 by weight.

The slump of the concrete, after the concrete has been deposited but before it has been consolidated, shall not be less than 5 cm and not exceed 7.5 cm for concrete not placed under water.

b. Cement

The cement shall be Portand cement conforming to ASTM C150 or TIS
15. It shall be delivered to the site in bulk cement containers or in sealed bags clearly marked with the maker's name and shall be carefully stored in a water proof shed with a raised floor or in a silo of approved design. Each consignment of cement shall be stored apart from earlier consignment and the cement shall be used in the order in which it is delivered. Any consignment which has become caked or otherwise adversely affected, shall not be used and shall be removed from site immediately.

If required by the Engineer, samples from the cement to be used on Site are to be taken to a laboratory or testing station accepted by the Engineer to demonstrate compliance with the Specification. The cost of test shall be borne by the EPC Contractor.

c. Aggregate

All aggregates shall be obtained from sources accepted by the Engineer, and shall be clean and free of clay, earth, organic matter, salt or other impurities.

For both the fine and coarse aggregates proposed to be used for the works, the EPC Contractor shall furnish samples to the Engineer together with such full details and test results as the Engineer may require. No aggregates may be used in the works until they have been accepted by the Engineer.

During the work, the Engineer shall order such tests as he may consider necessary on the aggregates and any aggregates found to have unsuitable characteristics at any time shall not be used in the work and shall be immediately removed from the site, at no extra costs.

The various fractions of fine and coarse aggregates shall be stored separately and in such a manner as to avoid the admixture of dirt in the concrete. Aggregates shall be handled in such a way that separation is avoided.

The grading of the fine and coarse aggregates shall be such that when they are mixed in the proportions decided for the required class of concrete, the grading of the combined aggregate shall be suitable for making a dense concrete of appropriate workability, containing the proportions of cement and water prescribed.

The proportions of fine and coarse aggregates and the maximum size of coarse aggregates to be used shall be accepted by the Engineer.

The EPC Contractor shall be responsible for mixing the aggregates in the proportions accepted by the Engineer. He shall submit samples of the concrete material to the Engineer well in advance of commencing any concrete work, and also have test cylinders made and tested for the aggregates and the cement he intends to use. Concrete works must not commence until such samples and test are to the Engineer 's acceptance. All cost of tests shall be borne by the EPC Contractor.

d. Water

The water to be used for mixing and curing of concrete shall at all times be kept clean and free from deleterious matters such as oil, acid, alkali, silt, salts, organic materials, etc., and shall be obtained only from sources accepted by the Engineer.

e. Admixtures

The EPC Contractor may use admixture, if required, listed below in order to improve the quality of concrete or mortar such as workability

and finish and water tightness as per Manufacturer's instructions only with the acceptance of the Engineer.

1) Water-reducing and set-retarding agent to ASTM C494.

2) Plastizer.

f. Steel Reinforcement.

The steel reinforcement shall conform to TIS 20 or TIS 24. All steel reinforcement shall be tested for compliance with those applicable standards at the EPC Contractor’s expenses.

Steel reinforcement shall be placed in the concrete wherever shown on the drawings or as directed by the Engineer. Bending of all bars shall be made to smooth curves. Standard hooks shall have 180-degree bend and extend of 4 bar diameters parallel to the main leg of the bar. Kinked bars shall not be used.

Splicing of reinforcing bars not shown on the drawings will be permitted only with prior acceptance of the Engineer and shall be placed at points of minimum stress, if possible. All reinforcing bar splices shall meet the requirements of ACI Standard 318.

Before the reinforcing bars are placed, the surfaces of the bars and any bar supports shall be cleaned of

heavy or flaky rust, loose mill scale, dirt, greese, or other foreign substance which in the opinion of the Engineer are objectionable. Heavy or flaky rust
which cannot be removed by firm rubbing with burlap or equivalent treatment is considered objectionable. After being placed, the reinforcing bars shall be maintained in a clean condition until they are completely embedded in the concrete.

Reinforcing bars shall be accurately placed on concrete or metal chairs or spacers and secured in position so that they will not be displaced during the placing of the concrete. Special care shall be exercised to prevent any disturbance or the reinforcement in concrete that has already been placed.

All bars, dowels, spacers and stirrups shall be securely tied at all intersections with not less than 1.2 mm diameter black, annealed tie wire.

Reinforcing bars will be inspected in compliance with the requirements as to size, shape, grade, length, position and amount after they have been placed and prior to the placing of concrete.

All reinforcing bars shall be placed and spaced in the foundations such that the concrete cover indicated on the drawings is maintained within a tolerance of plus or minus 7 mm and the center-to-center bar spacings are maintained within a tolerance of plus or minus 26 mm.

g. Concrete Mixing

Cement shall be measured by weight, either by use of one or more complete bags or by weighing on site. Other ingredients shall be measured by weight or by volume, and concrete shall be mixed in batches using one or more complete bags of cement. When mixing by volume is adopted, suitable batch boxes of approved dimensions shall be made and used for the measurement of coarse and fine aggregates. A suitable container for the measurement of water shall also be used.

All concrete shall be thoroughly mixed by machine with only sufficient water to ensure a workable mix. Consistency tests shall be made when required by the Engineer. The slump in a truncated cone 300 mm high and of standard dimensions shall be between 50 and 75 mm, corresponding to a stiff plastic consistency.

h. Formwork

All formwork shall be accurately constructed to prevent loss of concrete and to produce the correct foundation shape. Formwork shall be sufficiently strong to withstand the pressure arising from the

concrete during compaction and shall be capable of removal without undue disturbance to the concrete. Wooden formers shall be kept wet if necessary to prevent shrinkage. Formwork shall not be removed before the concrete has sufficiently hardened and in no case less than 24 hours after pouring. Where undercutting of the excavations is permitted the EPC Contractor shall ensure the soil is excavated correctly to template and the surfaces lined with waterproof paper to prevent of cement or fine aggregate from the concrete block.

i. Placing and Compacting

Concrete shall be transported from the mixer to the place of casting in such a manner that separation of the aggregates does not occur.

The concrete shall be placed in its final position as soon as possible and in no case more than half an hour after mixing. The method of placing shall be such as to ensure that the concrete in its final position may be dense and homogenous.

Compacting shall be carried out in a manner accepted by the Engineer and vibrators and other compacting equipment shall be to the acceptance of the Engineer.

Joints in the concrete foundations are to be avoided as much as possible. Where the construction of the foundation is such that joints are unavoidable adequate bond between the old and new concrete shall be ensured by chipping the old concrete to a rough, clean surface free from loose particles. immediately before placing the new concrete, this

Cleaned surface shall be primed with a layer approximately 15 mm thick of a wet mix of cement and fine sand in equal proportions. The Engineer may require the EPC Contractor to use bonding agent at no additional cost.

The Engineer can stop any concrete work whenever weather conditions are unfavorable and the EPC Contractor has not taken necessary precautions.

j. Surface Finish

Unless otherwise shown on the drawings. All permanently visible concrete surfaces shall have a regular finish of uniform texture, free from holes, pins and formwork.

Concrete that is damaged or honeycombed must be removed by chipping to sound concrete and replaced with mortar or concrete or non-shrink concrete as shall be directed by the Engineer at the EPC

Contractor's expenses. If major defects occur, the Engineer has the right to refuse the defective parts, if necessary a whole foundation should then be removed.

The upper surface of the concrete for all types of foundations shall be sloped in an approved manner to prevent accumulation of water and the whole exposed surface shall be rendered with concrete composed of one part of cement to two parts of sand.

The EPC Contractor shall protect all concrete against injury until final acceptance by the Engineer.

k. Curing

All concrete shall be cured by being kept continuously moist for a period of at least 14 days after casting, though in certain cases the Engineer may vary this period. The curing shall be effected by covering all concrete surfaces with a layer of sand, to be kept wet by continuous watering.

Curing compounds shall not be used without the permission of the Engineer.

l. Concrete tests

The EPC Contractor shall provide testing equipment and one set of three cylinders taken from fresh concrete for each tower foundation but not less than three cylinders for each day of concreting. The test cylinder shall be made and cured in accordance with ASTM C31 and shall be tested in accordance with ASTM C39 under the supervision of the Engineer and at the EPC Contractor's expense.

The strength of concrete shall be represented by at least five sets of tests (15 specimens) for one mixed design using same source of material. To

conform to the requirements of the Specification, the average of any five consecutive strength tests shall be equal to or greater than the specified strength and not more than 20 per cent of the strength tests shall have values less than the specified strength.

If strength tests fail to conform to the requirements, the Engineer may require changes in concrete proportion considered necessary to secure the required strength at no extra cost.

Furthermore, the Engineer may require compression tests on hardened concrete in accordance with ASTM C42 for that portion of the foundation where the questionable concrete has been placed. All expenses incurred in the performance of additional tests shall be borne by the EPC Contractor.

Termite Treatment

Termites are wily, elusive and stubborn. They multiply fast and, if you destroy them in one place, they will ‘pop up’ in other places with greater vigour and in larger numbers. In fact, any attempt to get rid of them superficially only serves to scatter the infestation.

Chemical treatment is the only method of termite prevention and control ever proven to be totally effective.The basic principle of termite control is to treat the soil under the building with chemicals that remain in the soil for a long period and do not allow termites to pass through. This can be achieved through different procedures on buildings under construction.

Pre-construction soil treatment is the one ideal method of termite control for buildings under construction. The soil all around the foundations and under the floor slab is first charged with termiticide to seal it. This creates the chemical barrier that termites cannot pass through.

After Excavation and before laying foundations lean concrete placement application of Anti termite is applied to keep the termites out.This is anoher method of termite treatment.

3.4 Steel Towers

3.4.1 Tower Family

Tower family to be designed, supplied and erected shall be as follows:

500 kV Transmission Line Double Circuits (Steel Tower, 400 meter ruling span)

Tower Type	Application	Line Angle (Degree)	Wind Span (m)	Weight Span (m)
5-SZC1	Suspension	0	500	750
5-SZC2	Suspension	0-3	700	950
5-SZC3	Suspension	0-3	900	1200
5-SZC4	Suspension	0	1200	1800
5-SZCK	Suspension	0	500	750
5-SJC1	Light Angle Tension	0-20	450	800
5-SJC2	Medium Angle Tension	20-40	450	800
5-SJC3	Heavy Angle Tension	40-60	450	800
5-SDJC	Terminal	0-60	300	400
5-SHJC	Transposition	0-20	300	400

3.4.2 Tower Outline

The outlines of the towers shall, in general, conform to those indicated on the drawings, and shall be such as to provide the required minimum clearance between conductors, and between conductors and tower steel, indicated in the clearance diagrams.

Towers shall be designed for leg extensions of heights indicated on the drawings, and for use with any combination thereof. The effect of maximum height differential of leg extension combination shall be taken into account.

Plan bracing of towers at the levels of crossarms shall be such a type to prevent the cross section of the towers from deforming from the original form under tensional loading.

The included angle between any two connecting stressed members shall not be less than 15 degrees.

The dimensions of the tower bases shall be such as to give the most economical structures, considering foundations and right-of-way conditions.

3.4.3 Material

Material shall be as follows :

a. Shapes and Plates

All shapes and plates shall be hot-rolled conforming to EN 10025 S235J for structural grade and EN 10025 S355J & S420J for high strength grade.

b. Connection Bolts and Nuts

Connection bolts and nuts shall conform to ASTM A394.

c. Lock Washers

Lock washers shall conform to ASA B27.1

d. Cable Attachment Devices

Cable attachment devices shall conform to ASTM A36 or ASTM A572 Grade 50.

e. Step Bolts

Step bolts shall conform to ASTM A307

f. Tower Signs

Tower signs shall be mild steel. The thickness shall not be less than 2 mm.

3.4.4 Load and Resistance of Towers

Towers shall be designed following Load and Resistance Factor Design as described in ASCE Manual and Report on Engineering Practice No. 74, Guideline for Electrical Transmission Line Structural Loading in which represented by the following equation:

$$\gamma Q \leq \varnothing R_i$$

Where Q is the design loads, R_i is the mean strength of any component to be designed and γ and $\varnothing$ are load and strength factors specified hereunder.

- Load factor

(γ)

	500 kV
Wind Load	1.15
Other Loads	1.0

- Strength factor ($\varnothing$) for member and bolt : 0.85

3.4.5 Tower Design Criteria

The recommended loadings (Q) are as follows:

3.4.5.1 Extreme Wind Loading, Transverse

All wires intact, with a transverse wind of 132 and 105 kg/sq.m on shield wire and conductor respectively and 520 kg/sq.m on the projected area of one face of tower, 26°C final tension. Load factor (γ) and strength factor (∅) as specified.

3.4.5.2 Extreme Wind Loading, Longitudinal

All wires intact, with a longitudinal wind of 520 kg/sq.m on the projected area of one face of tower, 26°C final tension. Load factor (γ) and strength factor (∅) as specified

3.4.5.3 Oblique Wind

On Conductor and Optical Ground Wire / Shield Wire

Transverse Load = (Normal extreme wind load) Cos^2 Where = an angle of wind direction to the
transverse axis of the tower.

On Tower

Transverse Load = (Normal extreme wind load) k Cos Longitudinal Load= (Normal extreme wind load) k Sin Where k = 1.0 + 0.55 x x Sin^2(2)

In which is the solidity ratio of the tower.

3.4.5.4 Failure Containment Loading

All wires intact, 26°C no wind plus unbalanced longitudinal load equal to 100% of the tension in one shield wire and / or a percentage, defined below, of the tension in phase conductor.

- Suspension tower - 70% of the tension in conductor
- Tension tower - 100% of the tension in conductor Load factor (γ) and strength factor (∅) as specified.

Two shield wires or combination of one shield wire and any one of phase conductor or combination of any two phase conductors shall be considered at a time.

3.4.5.5 Stringing and/or Maintenance Loading

All wires intact, everyday temperature (EDT) no wind, plus 200 per cent of vertical load and longitudinal load defined below.

- Suspension tower - 100% of everyday stringing tension
- Tension tower - 200% of everyday stringing tension Two shield wires or combination of one shield wire and any one of phase conductor or combination of any two phase conductors shall be considered at a time.

Load factor (γ) and strength factor (∅) as specified.

3.4.5.6 Uplift Loads

All tower components of tension towers shall be capable to withstand vertical uplift loads equal to downward vertical loads specified in each loading case.

3.4.6 Tower Design

The towers shall be designed in accordance with the stiffness method and shall follow all requirements of ANSI / ASCE Standard 10-90, "Design of Lattice Steel Towers", unless otherwise specified herein.

a. Loading

Tower loading shall be in accordance with those specified in Clause 3.3.5.

b. Members

The ultimate stresses in tension and compression allowed in design shall not be greater than the yield point of the steel. The buckling stresses of compression member shall be as specified in ASCE Guide for Design of Steel Transmission Towers.
The determination of the stresses allowed in design shall take the strength factor specified in Clause 3.3.4 into consideration.

In computing the net section for tension members, the diameter of the bolt hole shall be taken as 2.5 mm greater than the nominal diameter of the bolt. The determination of net section area shall be as specified in the ASCE, Guide for Design of Steel Transmission Towers.

The minimum thickness of members shall be as follows:

Legs and main compression members in crossarms and galvanized steel wire peak	6 mm
• All other member having computed stresses	5 mm
• Redundant members	5 mm
• Gusset plates	6 mm

The slenderness ratio for members shall not exceed the following limits :

- Legs and compression members in crossarms 120
- Other compression members 200
- Redundant members 250
- Tension members 375

Redundant members supporting leg members or supporting other members shall be designed for a transverse load at each node point of minimum 2.0% of the maximum load in the leg member or the other member respectively.

All members which can be subject to the weight of a linesman shall be designed for an ultimate load of

1.5 kN, at the most unfavorable point, without permanent deformation.

c. Connections

All connections shall be bolted. Welding may be used for minor details subject to the acceptance of the Engineer.

The minimum number of bolt for stressed members for 500 kV towers shall be two.

The minimum diameter of connection bolts shall be 16 mm for 500 kV lines respectively.

The ultimate shear and bearing stresses for bolts and members allowed in design shall take the strength factor specified in Clause 3.3.4 into condideration.

3.4.7Detailing

3.4.7.1 General

Tower dimensions, framing, member sizes and length, number, size and length of bolts, thickness of each filler, and other necessary details to fabricate each piece shall be shown on the detailed drawings. No change shall be made without the written acceptance of the Engineer.

All web members shall be in one piece where practicable. All double diagonal web system members shall be connected at their point of intersection by at least one bolt.
Lowest bolt hole in stub for connection of the main bracing member shall be at 50 mm level above the concrete level.

3.4.7.2 Joints

All joints shall be such that eccentric stresses are kept minimum as practicable.

Opening between members at the bolt tightening points, created by tower structure, shall be completely filled by the use of fillers with proper thickness.

Gusset plates, where used, shall be designed by the EPC Contractor.

3.4.7.3 Bolt Spacing

Minimum bolt spacing shall be two point five (2.5) times the bolt diameter.

The distance from the center of a fastener hole to the end of any connected part shall not be less than two (2.0) times the bolt diameter minus five (5.0) mm and the distance to the adjacent edge shall not be less than one point five (1.5) times the bolt diameter.

3.4.7.4 Leg Attachment

The connection of the tower to concrete foundation shall be by means of a stub angle. The stub angle shall be of the same size as the leg of the tallest tower.

3.4.7.5 Conductor and Overhead Ground Wire / Shield Wire Attachment

Conductor and overhead ground wire or shield wire attachment devices shall be suitably furnished on all crossarms to suspend or terminate insulator strings or overhead ground wire or shield wire assemblies. The devices shall have minimum ultimate tensile strength equal to that of the hardware.

3.4.7.6 Step Bolts

The minimum diameter of step bolt shall be of 16 mm and shall have round or hexagonal head. Each step bolt shall be provided with two hexagonal nuts. The minimum bolt length and length of unthreaded portion shall be 180 and 125 mm respectively. Step bolts shall not be used as connection bolts.

The step bolts shall be spaced alternatively on the inner gauge line on each face of the angle about 400 mm on centers. They shall be furnished for one leg of each tower from a point 2.5 m above the top of the concrete to ladder starts for 500 kV line.

3.4.7.7 Ladder

Ladders are required on 500 kV towers. Ladders shall be fastened securely to the tower with sufficient intermediate supports to furnish a safe and rigid structure for climbing. Ladders shall be centered on a face of the tower which is perpendicular to the line (transverse face) and shall extend from the base elevation up to the peak of the tower. Rungs shall be spaced approximately 35 cm on centers. Guardrail shall be provided to protect lineman from falling.

3.4.7.8 Anti-climbing Devices.

Each tower shall be fitted with an anti-climbing device to prevent unauthorized persons from climbing the tower. The anti-climbing device shall be fixed at a height of approx. 3 meters above the foundation. It shall provide suitable lockable gates adjacent to the step bolt legs.

3.4.7.9 Tower Signs

The EPC Contractor shall furnish all materials for tower signs as shown on the drawing, including all bolts, nuts, washers, brass eyelets fitted with the holes and supporting structures, if required, for attaching tower signs to the towers as specified in the structure list.

The colors of figure and background shall be as described on the drawing and shall be weather-proof, baked enamel finish paint, vitreous or stove enamel.

The EPC Contractor is required to make shop holes in the tower members for attaching signs at the locations described hereunder.

- *Aerial Patrol Signs.* Aerial patrol signs shall be attached to upper member of the top crossarm.

- *Phasing Signs.* Phasing signs shall be attached to upper member of the crossarms.

- *Danger Signs.* Danger signs shall be attached to bracing members at the level about two meters from ground level.

- *Circuit Name Signs.* Circuit name signs shall be attached to the upper member

of the crossarm.

3.4.8 Fabrication

3.4.8.1 General

Workmanship for fabrication shall be first class throughout. All pieces must be straight, true to detailed drawings and free from lamination flaws and other defects. All clipping, back-cuts, grindings, bends, holes and etc. must be true to detailed drawings and free of burrs.

All identical pieces bearing the same erection number must be exactly interchangeable with each other and interchangeable in their relative position in all towers of structures or which they form a part.

Threads of bolts and nuts shall be cleanly rolled or cut and the face and head of nut shall be truly at right angle to the axis of the bolt.

3.4.8.2 Cutting

Members shall be cut or sheared to length. The ends, unless as shown on the drawings, must be square with the length. The use of burning torch is not permitted for cutting.

3.4.8.3 Punching

The diameter of bolt hole shall not exceed 1.5 mm plus the bolt diameter.

Holes are to be punched with racks and jigs employed to ensure accuracy throughout. The punches and dies for this work must be maintained sufficiently sharp so as to produce clean round holes normal to the plane of material, free of burrs, folds, depressed or upset edges.

Holes in bent members which may be affected by the bending operation shall be laid out and punched or drilled after bending. Holes which are elongated or otherwise distorted by bending will not be accepted.

Mis-drilled or mis-punched hole shall not be refilled. Member of such hole shall be discarded.

3.4.8.4 Bending

All bending of high strength structural steel must be done hot. Bends of a difficult nature on structural steel must be done hot, but otherwise cold bending can be employed.

3.4.8.5 Welding

Welding shall not be made without the acceptance of the Engineer and when so given the following shall apply:

Welding shall be executed only by certified welders. Lap joints shall be avoided wherever possible.

Welds intended for pickling before galvanizing must be continuous and free from cavities and pits which might form acid receptacles.

No field welding will be accepted.

3.4.8.6 Marking

All individual pieces shall be marked with the correct designations shown on the detailed drawings. Markings shall be done by stamping the marks into the metal before galvanizing, and details shall be clearly legible after galvanizing. The number and letter shall be a minimum of 12 mm in height.

Marking of bolts shall be made on bolt heads to identify manufacturer, grade, size, length and threaded length. Markings may be raised or depressed.

3.4.8.7 Galvanizing

Galvanizing for structural steel products shall meet the requirements of ASTM A123. In addition, welded assemblies, which may be particularly susceptible to cracking and/or distortion, shall be galvanized and tested in accordance with ASTM A143. All holes in material shall be free of excess spelter after galvanizing.

Galvanizing for bolts, step bolts, U-bolts, shackles, nuts, locknuts, fillers, washers, spring washers, and similar hardware shall meet the requirements of ASTM A153.

Excess spelter shall be removed by appropriate means acceptable to the Engineer.
Nuts shall be galvanized after threading. Retapping of nuts after galvanizing, if required to insure free running of nut on bolt, shall be such that sufficient protective zinc or tapping oil will remain on threads in nuts.

The uniformity of coating test shall be made in accordance with ASTM A239. The minimum repetition times for one minute dip in uniformity test shall be as follows :

Steel shapes and plates	6
Bolts, nuts and similar hardware except threaded parts	4

Finished galvanized materials shall be dipped into the solution of dichromate after galvanizing for white rust protection during sea transportation and storage.

3.4.9 Test

3.4.9.1 Quality Assurance Test

a. Routine Test

The EPC Contractor is required to perform the following tests at his own expense on samples selected at random by and at the presentation of the Engineer or the Engineer's representatives, if any.

1. *Dimensional Check.* The dimensional checks of all material shall be performed to meet the requirements of ASTM A6

2. *Visual inspection of all material before and after galvanizing shall be made.* Embitterment tests shall be made in accordance with ASTM A143. Uniformity of coating tests shall be made in accordance with ASTM A239. Thickness of coating tests shall be in accordance with ASTM A90. Size of test "lot" and number of tests shall be in accordance with the appropriate ASTM standards.

3. *Physical tests on samples of structural steel section.* The tests to be carried out shall include yield strength, ultimate tensile strength and percentage elongation. One set of tests shall be carried out for each 50 tons of steel passing through the fabrication plant.

4. *Galvanizing tests on samples of structural steel sections.* The tests to be carried out shall include determination of weight of zinc coating, adherence of zinc coating and uniformity of zinc coating. One set of tests shall be carried out for each 50 tons of steel passing through the fabrication

plant.

5. *Mechanical and galvanizing tests on bolts and nuts.* Mechanical property and galvanizing tests on samples of bolts and nuts shall be carried out in accordance with the requirements of ASTM A394.

b. Shop Assembly Test

One tower of each type and height, including every combination of leg extensions, shall be assembled in the shop to such an extent as to ensure proper field erection. Any member distorted, twisted or bent due to incorrectness of detailed drawing shall be corrected. Towers those have been previously assembled for load testing will not be required to be reassembled in the shop, except as necessary to prove the details of every combination of leg extension for the towers. Reaming of unfair holes will not be permitted. A reasonable amount of drifting will be allowed in assembling.

If any errors on the drawings or fabrication are discovered, all incorrect drawings shall be revised and the corrected part shall be re-fabricated and re-assembled. All revised drawings shall be resubmitted for reviewing.

3.4.9.2 Load Test

The load test shall, in general conform to the requirements of IEC-60652, Loadings Tests on Overhead Line Towers except otherwise specified here under :

1. Loads shall be incremented to 50%, 75%, 90% and 100% of the maximum specified loads, including all load factors and strength factor. Each load increment shall be maintained for 2 minutes except the 100% load for which case the loads shall be held for 5 minutes.

2. Load increments for destruction test shall be 5% after 100% of the maximum specified load has been applied successfully. Each load increment shall be held for 2 minutes.

3. Deflections shall be measured at each increment of loading to provide transverse and longitudinal deflections at the structure top center, at the elevation of middle crossarms and at least one intermediate point of tower body.

4. The tested tower shall not be used for construction.

5. Two set of three specimens selected from failed member(s) and undisturbed members shall be physically tested after destruction of tower at the EPC Contractor's expenses.

3.4.10 Packing and Shipping

The tower members shall be satisfactorily containerized or packaged in such a manner to protect them from damage during transportation, handling and for outdoor storage in hot, wet, humid and dusty condition. Where necessary, heavy parts shall be mounted on skid so that cable slings for handling can readily be attached. Where it is unsafe to apply external sling to a package, attached sling shall be provided and shall project through the package so that attachment can readily be made.

Plastic or rubber cushion shall be provided between layers of steel members in a package. Steel belts used for wrapping shall have gunny sack bounded underneath in such a manner to protect galvanizing of tower members.

Plates, bolts, nuts and washers shall be supplied in the rigid cases.

3.4.11 Data and Drawings.

3.4.11.1 Design Drawings.

The design drawings shall show the following data and information:

1. Scaled line diagram of the tower showing all redundant, bracing members and their sizes completely dimensioned and proved in compliance with all clearance requirements.

2. All loadings and their manners of application including the determination of wind load on tower. Wind load on towers shall be applied at each panel point along the height of the towers.

3. Tables showing :

3.1 Total stresses in each member for each loading case and the critical case.

3.2 The effective slenderness ratio, calculated capacity and ratio of maximum total stress to calculated capacity for each member and connection.

3.3 Size and type of steel for each member and number of bolts required for its connection.

3.4 The compression and uplift reactions and corresponding horizontal shears at each leg of all towers for all loading cases.

3.4.11.2 Detailed Drawings

Detailed drawings shall be complete with sizes and detailed dimensions of all members. At each joint, there shall be the number, size and length of bolts, number and size of fillers and detailed dimensions of gusset plate, if any.

All members and plates shall be designated on drawings, the EPC Contractor shall endeavor to use as few designation as possible, and each member of identical size and detail shall have the same designation, regardless of its position in the structure.
The member and plate designation shall be successively grouped on individual drawing. The groups of designation shall be indicated on the drawings.

A proper cross-index shall be furnished, correlating the tower part numbers with the tower types and the drawing number.

Drawings shall include material list which shall give the size, length and galvanized weight of each member and the total weights of body, body

extension, leg extension and stub conforming to detailed drawing. It shall also include the number of bolts, nuts, washers and cable attachment devices per tower.

3.4.12 Handling and Storage

Care shall be taken during handling and storage to prevent tower injury to members or damage to galvanized or other protective surfaces. No steelwork shall be dragged over the ground surface or handled in such a manner as to damage the galvanized surfaces. Throwing of tower steel into piles on conveyances, onto the ground, or skidding of steel members over each other is not permitted.

All superficial rust stains, corrosive salts and other foreign materials deposited prior to or during installation of the towers shall be removed without causing damage to the protective surfaces.

In addition, any foreign material that will tend to adhere permanently to the towers shall be removed.

3.4.13 Tower Erection

The EPC Contractor shall erect the tower and accessories in accordance with the approval detailed drawings. Towers shall be complete with all members in place and bolts including step bolts and ladder (if any) securely tightened before any stringing work is started. No steel tower shall be installed until at least seven days after the last placing of the concrete in the footing and back-filling has been completed

Towers may be erected by any suitable method, provided that no overstressing of any component parts, footings, stubs, etc., occurs. Horizontal loads on foundations during tower erections shall be avoided or reduced to a minimum.

Prior to commencing any erection the EPC Contractor shall submit four copies of the method(s) of erection and the erection plant proposed for use to the Engineer. All necessary tools and equipment shall be provided by the EPC Contractor. Erection towers shall be performed with first- class workmanship and under the supervision of well qualified site engineer and foremen.
The bolts shall be installed in such a manner that the nuts and spring washers are in “up” or “out” position.

Upto the height of three meters above ground level, the threads of all bolts left over the nuts shall be flattened.

If shop errors in the steel members are discovered, the EPC Contractor shall notify the Engineer who will decide whether the errors may be corrected in the field, or the members returned to the fabricator for correction or replacement at the EPC Contractor’s expense.

A reasonable amount of drifting will be allowed in assembling towers, but reaming for correction of mismatched holes due to shop errors will not be permitted.

Members that are bent, twisted or otherwise deformed in storage, transportation, handling or erecting operations shall be straightened or replaced by the EPC Contractor. Straightening shall be done only by

the use of methods that will not injure the galvanized coating.

Members that are injured in a manner causing reduction in their strength shall be replaced.

3.4.14 Damaged Galvanizing

All galvanizing damages as a result of transportation, handling, storage, repair operations of deformed or bent members, field drilling or installing shall be repaired by the EPC Contractor. The damage area shall be cleaned by wiping with clean rags saturated with mineral spirits of xylene followed by wire brushing. After wire brushing, the area shall be recleaned with solvent to remove residue and shall be given a minimum of two coats of an accepted galvanizing repair paint.

The percentage of pure zinc by weight in dry film of galvanizing repair paint shall not be less than 85.

3.4.15 Tower Signs

The EPC Contractor shall install the tower signs on the tower in a manner described hereunder and as specified on the drawing.

a. *Tower-Number Signs.* The EPC Contractor is required to stencil each towers with a number (final) as indicated on the plan & profile drawings on legs designated by The Engineer at a height about 4 m above the ground level. The letters shall be 8 cm high in black paint over a two- coat yellow background. The background shall extend 2.5 cm above and below the numbers and shall be the full width of the numbers.

b. *Aerial Patrol Signs.* Aerial patrol signs shall be installed on the first tower in each five station kilometer as specified in the structure lists.

c. *Phasing Signs*. Phasing signs shall be installed on terminal towers, the first tower in each ten station kilometer and both towers adjacent to a transposition towers.

d. *Danger Signs.* Danger signs shall be installed on each tower located at the terminal, near roadways and on the river banks or where directed by the Engineer in such a manner that they can be seen by the passer-by.

e. *Circuit Name Signs.* Circuit name signs shall be installed on the terminal towers

approaching substation.

3.4.16 Water-Proof Painting of Bottom Part of Towers

For protection of the stub angles and the bottom part of the tower up to
0.50 m above the pedestal top, two coatings of bituminous paint shall be applied on each pedestal top and each bottom part of the tower. Before proceeding with the paint coating operation, all objectionable surface irregularities shall be removed, and the surfaces cleaned of dirt and grit. Preparation of surfaces and method of application of paint coatings shall be done in accordance with manufacturer recommendation, or as directed by the Engineer.

The paint shall conform to ASTM D1187: Asphalt-Base Emulsions for Use as Protective Coatings for Metal. The EPC Contractor shall be required to submit full details of the paint, inhibitor, cleaning solvent and other related materials, together with recommended method of application to the Engineer. No paint coating operation shall be done before direction of the Engineer.

3.4.17 Air Navigation Obstruction Marking

3.4.17.1General

If required in the Contract and in the portion of River Crossing, the Contractor shall furnish and install or apply materials for markings of towers and shield wire and for lightings of towers as shown on the drawing and specified hereafter.

3.4.17.2 Marking of Steel Tower

The Contractor shall apply all cleaning and painting materials for the air navigation obstruction marking of the required steel towers according to the following requirements.

a. Paints

The colour of the paint shall be orange and white. Standard colour of the paint shall be as follows :

	Colour Munsell's Number
Orange (Yellowish-red) White	2.5 YR 6 / 13
	N – 9.5

The primer paint shall be zinc dust zinc oxide.

b. Painting

All painting operations shall be performed after the steel towers have been completely erected and the air navigation obstruction lighting installed, if any. All oil, grease and dirt shall be removed from surfaces before paint is applied. No painting shall be done in cold, damp, foggy or dusty atmospheres.

One coat of priming paint followed by two coats of finish paints shall be applied to all exposed surfaces of the required steel towers. The colours of finish coats shall be applied alternately orange and white in approximately equal vertical sections, beginning at the top with orange. Each section of furnish coats shall be approximately equal to tower base width. Section lines between colour shall be sharply defined but in no case shall be less than seven sections.

The quantity of paint and thickness of each coat shall not be less than the following values :

	Quantity kg / sq.m	Minimum Thickness m
Primer	0.07 – 0.09	10
First finish	0.13 – 0.16	30
Second finish	0.13 – 0.16	30

Each coat shall be allowed to dry or harden thoroughly before the next coat is applied. A minimum of 4 days are required for drying of each operation.

Prior to commencement of the painting work, the Contractor shall submit a work program including the quality of paint and dimension of painting sections for the acceptance of the Engineer.

3.4.18 Marking of Shield Wire

The shield wire shall be marked with orange and white colored fiber glass spheres. The spheres shall be 600 mm in diameter and shall have appropriate preformed armor set suitable for overhead

ground wire. Any metal parts, if used, for holding the spheres in position shall be made of stainless steel and shall not cause rust or harmful effects to the overhead ground wire / shield wire.

The position of the spheres shall meet the following requirements :

a. In any span, the spheres shall be spaced at a minimum distance of 40 m from each other along the span.

b. The spheres on the two overhead ground wires of any span shall be so staggered that the maximum distance between any two spheres is not greater than 40 m.

c. The first and the last spheres in any span shall be approximately 10 m from the towers defining span.

3.4.19 Lighting of Steel Tower

If required in the Contract and in the portion of Mekong River Crossing, the detailed specifications of air navigation obstruction lights shall be as shown on the Drawing.

4 Attentions

The design is for reference only, it may be adjusted and subject to the final detail engineering design.

APPENDIX K_3 500 kV TRANSMISSION LINE

600 MW Monsoon Onshore Wind Farm in Laos
Proposed 500 kV transmission line

1. TECHNICAL SOLUTION FOR FOUNDATION

Applicable standards, regulation- Concrete and reinforced concrete- Design standard TCVN 5574-2012- Specifications for design of foundation for buildings and structures TCXD 9362- 2012- Bolts and Nuts TCVN 1896-76; TCVN 1915-76.- All documents used for design of foundation for buildings and structures.

Foundation Types -According to the geotechnical engineering investigation report and the hydro meteorological reports, combined with the various types of tower construction.

Foundation Material

- Concrete:
  + Concrete lining has grade: B7.5
  + Other Concrete has grade: B15All shall conform to Vietnam Standard: TCVN 5574-2018
- Reinforcement: Foundation deformed bars and plain round bars shall conform to Vietnam Standard: TCVN 1651-2018 and TCVN 5574-2018

2. TECHNICAL SOLUTION FOR TOWER

Selecting phase distance and phase arrangement on the tower

For the current double-circuit lines, the pyramid-shaped steel tower layout with 3-phase vertical conductor, the two circuits located on both sides of the tower are widely used because it has the advantage of the right of way as well as the less landoccupied area.

The distance between the cross arm: Suspension tower: 10.5m;
Tension tower:10.9m the length of cross arm: Suspension tower: 7.5m, 7.8m, 8.0m; Tension tower:11m. The length of ground wire cross arm: Suspension tower: 7.5m; Tension tower:8.2m.

The distance between the conductor cross-arm and the ground wire cross-arm: Suspension tower: 9.0m; Tension tower: 9 m.
The distance from the ground to the lowest cross-arm is Suspension towers: 33m, 38m, and 43m; Tension tower: 24m, 30m, 36m.

The distance from the conductor to the tower shall be ensured according to the conditions from the electricity bring part to the earthing parts according to current regulations.

Selecting material of the tower

On the line, two circuits galvanized steel towers, assembled by bolts shall be used. The tower is calculated with standard wind pressure at a height of 10m with Q = 60 daN/m_2.

- Material making tower:
  + Towers are made of shaped steel and plate steel embedded by bolts
  + Bars/members with L ≥120 x120 mm shall use SS540 steel or type with equivalent strength.
  + Bars/members with L ≤ 100 x 100 mm shall use SS400 steel or type with equivalence strength.
  + Bolts with durability grade of 4.6; 5.6 and 6.6 according to standards TCVN 1816-76 and TCVN 1915-76 shall be used.

Load Cases

a. **Suspension towers calculated in 4 modes**
   - Normal mode, the wind is perpendicular to the line, maximum wind pressure Qmax, the conductor and the lightning conductor are not failure. - Normal mode, the wind is oblique 45 degrees to the line, maximum wind pressure Qmax, the conductor and the lightning conductor are not failure. - Failure mode of one lightning conductor, failure conductor, maximum wind pressure Qmax. - Failure mode of 1 phase conductor on the same circuit, lightning conductor and other conductors without failure, maximum wind pressure Qmax.

b. **Tension towers calculated in 4 modes**
   Normal mode, the wind is perpendicular to the line, maximum wind pressure Qmax. Conductor and earth wire no failure. - Normal mode, the wind is 450 to

the line, maximum wind pressure Qmax. Conductor and earth wire no failure. - Failure mode of one lightning conductor, conductor is not failure, maximum wind pressure Qmax. - Failure mode of one phase on same circuit; lightning conductor and conductor are not failure, maximum wind pressure Qmax. - Erection mode (it is calculated with wind velocity V=10m/s, corresponding to wind pressure Q = 6.5 daN/m2 at basic elevation of 30m), corresponding to 2 cases: + Case 1: Stringing 3 conductors toward one side, lightning wire is not stringed. + Case 2: Lightning wire is not stringed toward one side; conductor is not stringed.

Tower Family

- The following sixteen types of towers shall be designed for the 500kV double circuit transmission line. Specific conditions of use are shown as follow:

Types of Suspension	**Wind Stress**	**Wind Span (m)**	**Weight Span (m)**
Type A	60daN/m2	Lwind ≦400	Lmax = 700
Type B	400 < Lwind ≦700	Lmax = 800	

Type of Tension	**Wind Stress**	**Wind Span (m)**	**Weight Span (m)**	**Deviation Angle (**
Type A (N522)	IA (60daN/m2)	Lwind ≦ 600	Lmax = 850	$\alpha \leqq 20^{\circ}$
Type A (N511)		Lwind ≦ 550	Lmax = 600	$20 < \alpha \leqq 40^{\circ}$
Type B (N511)		Lwind ≦ 650	Lmax = 1800	$40 < \alpha$
		Dead end		

3. CONDUCTOR AND OVERHEAD GROUND WIRE

Select voltage level, number of circuits

According Pursuant to the Prime Minister's Documentary No. 938/TTg-CN dated 21st July, 2020 on the policy of importing electricity from the MonSoon Wind Farm and 500kV T/L projects for connection. Therefore, the voltage level is selected is 500kV. To ensure stable power transmission from MonSoon Wind farm, then transmit power through 500kV Thanh My Substation, the

transmission line is selected with two circuits. When one circuit is fault, the other circuit still ensures the transmission ability all the capacity of MonSoon Wind Farm, maintaining capacity on the regional system.

Technical specification of conductor ACSR330/43
(TCVN 6483-1999; IEC 61089; IEC 61957):

Material of conductor: aluminum strands reinforced with a core of galvanized steel wires		
Number and diameter of wires: Aluminum Steel	mm mm	54/2.8 7/2.8
Overall diameter of stranded conductor	mm	25.2
Total area of conductor Aluminum Steel Total	mm2 mm2 mm2	332 43.1 375.1
Mass of conductor Without grease Grease Total	kg/km kg/km kg/km	1255 7.5 1262.5
Rated strength	daN	10378 (min)
Modulus of elasticity of conductor	daN/mm2	7050
Coefficient of linear expansion of conductor	per °C	19.4 x 10-6
Maximum DC resistance of conductor per 1km at 20℃	Ω/km	0.0869 (max)
Assumed maximum full load current per conductor	A	≥ 749

Selecting lightning wire and fiber optical cable

Ground wire conductor

To avoid direct lightning strikes on the conductor, it is necessary to using a ground wire conductor. For 230kV and above, T/L of two circuits with a large distance between the two circuits, to ensure lightning protection for conductors (Protection angle is not greater than 20◦), it is necessary to using 2 ground wire conductors (one ground wire conductor and one ground wire conductor combined with optical fiber cable).

Insulator specifications

Insulator string used on the transmission line uses glass or ceramic insulators. In this project, the insulation is selected in accordance with IEC 305, 383 and 120, which has been widely applied in the world. To reduce corrosion of Pin

insulator, insulators are selected with zinc - sleeve around the pin. The insulator is manufactured according to standards IEC-60305; IEC-60120; IEC-60383-1.

APPENDIX G SUMMARY OF EIA CONSULTATION

Summary of Past Engagement Activities for the Project

Table 1: Engagement with Affected Communities during EIA

No.	Date	Meeting Location and Communities	Number of Attendees			Methods of Engagement	Key Topics Discussed and Stakeholder Feedback	Relevant ESIA Considerations
			Male	Female	Total			
2nd Consultation for EIA Preparation, 7-23 September 2020 (18 villages)								
1	9 September 2020	Ban Dak Tiem, Dakcheung District				Disseminate the information about the project to the village peoples by giving the explanations on the change of locations, boundaries of the project, benefits, and potential impacts of the project. Provides the opportunity to participants from all parties to ask questions and give comments. Interviews were conducted to collection data on viewpoint, socio-economic data, data on population, ethnic groups, living style, land use and forest data that are related to the livelihoods of the people and other social data in the villages.	■ Provide funding assistance for improving clean water system to the village. ■ Provide funding assistance for building the village administration office. ■ Provide promotion fund to create vocation for the people in the village, such as: recruit village labor force to work with the project. ■ Help to improve access road to the village and the road within the village. ■ Request the project to provide a new transformer to the village, because the existing transformer is out of use.	■ Information dissemination will be considered in the ESIA and SEP. A SEP will be prepared for the Project including future and on-going engagement required to ensure stakeholders are provided sufficient information on the potential impacts. ■ The impact assessment including information on mitigation measures for the social receptors is provided in ***Section 8.5*** of the ESIA Report.
2	10 September 2020	Ban Dak Seng, Dakcheung District				As above	In general, the village Administration Authority and the people agree with the project which will come to undertake development in the vicinity area of the village. As the village is not affected from the installation of wind turbine towers and the construction of road in this village area, it has no request to the project.	■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Impacts to community health and safety are assessed in Section 8.5.4 of the ESIA Report. This includes proposed mitigation measures. ■ Village heads will be informed prior to construction, this commitment is included in Section 9 (ESMP) of the ESIA Report.
3	12 September 2020	Ban Dak Yang, Dakcheung District				As above	■ Help to build dispensary (health center), gravity-fed water system, toilets for the village.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report.

No.	Date	Meeting Location and Communities	Number of Attendees			Methods of Engagement	Key Topics Discussed and Stakeholder Feedback	Relevant ESIA Considerations
			Male	Female	Total			
							■ Help to provide water pipes or build and install irrigation system to supply water for rice cultivation for the village in order to increase rice production and achieve rice sufficiency for consumption in the village. ■ Help to provide fund for improving road from Ban Dak Yang to Ban Dak King to allow travel on vehicle more convenient. ■ Help to build school for the village.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures.
4	12 September 2020	Ban Sieng Ar, Dakcheung District				As above	■ Help to clear the access road to Ban Xieng Mai and to Ban Sieng Ar and road within the village to each production area of the people according to the suitability of the village area. ■ Help to provide fund for sufficient supply of gravity-fed water system and toilets to the poor people or to each family in the village. ■ Help to build bridge crossing Houay Air stream to facilitate the travel in the village. ■ Help to build a permanent primary school for the village to assist inclusive education in the village. ■ Help to build a dispensary to provide facilities to the village in case of sickness or emergency in the village area. ■ After the construction of the project, the village shall be able to use the electricity widely.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Reliable and affordable electricity will be provided to the affected villages. Priority will be given to the households affected by the Project's land acquisition, then poor households within the Project's affected communities, and finally the entire the affected villages if possible. Refer to Section 8.5.2 for more details.
5	14 September 2020	Ban Dak Treb, Dakcheung District				As above	■ If the land (crop cultivation land, paddy field land, construction land, etc.) of the village people is affected, the project must give reasonable compensation. ■ Request to undertake the village settlement planning along the sides of Road 16A. ■ Help for vocation allocation, provide fund for animal raising to each family in the village. ■ Help to provide fund for building the village administration office (size:10 x 20 m), expand the electricity network, build large irrigation system-scale, build complete secondary school and sport field, build dispensary, provide toilet seats and fruit- roofing sheets and tree saplings to the village. ■ Help to provide fund for building bridge crossing Houay Ang stream at 3 points. ■ Provide fund for buying 5 motorcycles and full set of community radio with 4 loud speakers for the village. ■ When the project is launched, request to adopt the policy to recruit village labour force to work with the project.	■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders. ■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021.
6	14 September 2020	Ban Dak Dern (Dak Yand), Dakcheung District				As above	■ If the land (crop cultivation land, paddy field land, construction land, etc.) of the village people is affected, the project must give reasonable compensation. ■ Help to provide fund for the construction and improvement of road within the village and road to the agricultural areas, and help the clearing of areas for lowland paddy cultivation to the people in order to decrease the slash-and-burn cultivation practice in the village. ■ Provide fund for building the village administration office, 2 complete secondary schools and build water closets and provide toilet seats, teaching & learning equipment to all schools in the village. ■ Provide rice to poor families in the village.	■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021. ■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report.
7	15 September 2020	Ban Xieng Luang, Dakcheung District				As above	■ Help the clearing of additional areas for lowland paddy cultivation for the people within the village. ■ Help the area clearing for road and livelihood place for the people in the village. ■ In case of occurrence of land impact, request to avoid the impact on paddy field land, crops cultivation land and construction land of the people in the village. ■ Avoid selecting the wind turbine tower site which is located near the village area. ■ In case the project is required to clear the paddy field land and coffee plantation land of the people, the project must give reasonable compensation. ■ Request to provide assistance to poor families in the village. ■ If the project is constructed, request the project to pay financial obligation to the village at the rate of 1 million Kip per 1 tower which shall be considered as the funding assistance to the village land which is affected by the project.	■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021 ■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes

No.	Date	Meeting Location and Communities	Number of Attendees			Methods of Engagement	Key Topics Discussed and Stakeholder Feedback	Relevant ESIA Considerations
			Male	Female	Total			
								for land acquisition are conducted in conjunction with relevant stakeholders.
8	16 September 2020	Ban Dak Dor, Dakcheung District				As above	■ Request for help to build irrigation to supply water to the rice field for the village. ■ Request for help to improve the road within the village and the school area. ■ Request for help to build the village administration office.	■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Village heads will be informed prior to construction, this commitment is included in Section 9 (ESMP) of the ESIA Report.
9	16 September 2020	Ban Dak Yoin				As above	■ Before carrying out any activity during the pre construction phase, the project shall contact or coordinate with the village first. ■ In case there is any area of the village which is affected, it is requested that compensation for damage shall be made for each household including for the collective forest area of the village based on the laws and regulations and on the suitability of the compensation. ■ Request for help to make new village area planning. ■ Request for help to provide fund for building new school. ■ Request for help to clear the area for rice field area and build the water channel to supply water to rice field conveniently. ■ Request for help to build gravity-fed water system with clean water for the village. ■ Request for help to provide fund for the construction of fish pond and fish breed to make the collective fish pond of the village. ■ Request for help to provide medicines for general and collective use in the village	■ Village heads will be informed prior to construction, this commitment is included in Section 9 (ESMP) of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021.
10	16 September 2020	Ban Dak Run, Dakcheung District				As above	■ Provide fund for building school (size: 32 m x 28 m with 4 classrooms), including the supply of educational equipment, tables and chairs for students. ■ Request for help to build the village administration office (size: 8 m x 7 m), including the furniture which are necessary for use at the office. ■ If there is the construction of towers in the village area, request to give the priority of hiring to the workforce of the village.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures.
11	19 September 2020	Ban Dak Kang, Dakcheung District				As above	■ Request for help to improve the road within the village, including the production area of the village (with the length of about 9 km). ■ Request for help to provide taps of gravity- fed water system for the whole village. ■ Request for help to make new rice field area planning to the people in the village. ■ Request for help to build water closets and provide the toilet seats for the village. ■ Request for help to improve the canal or to build the irrigation system and install the pipe to drain and supply water for rice cultivation better than before. ■ Request for help to improve and make village area planning to allow it to become orderly. ■ Request for help to provide rice to poor families in the village.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures.
12	9 September 2020	Ban Dak Dor, Sanxay District				As above	■ Request to give reasonable compensation for the land area affected by the project based on actual situation. ■ The village have worried about the impact on natural livestock raising. ■ Request to make village area planning to allow it to become more orderly. ■ Before commencing the construction, the project must perform the ceremony of offerings in accordance with the tradition and belief of the people in the villages ■ Request to build the village administration office and improve the access road to the village to allow convenient travel; and build the bridge crossing Houay Ang stream. ■ Request the project to help to pay the obligation to the village for using as budget for village Fund and provide 1 motorcycle for serving the work of the village administration office. ■ Request the project to hire the people in the village to work as workers in the project and help to reduce the problem of unemployment	■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Impacts to cemeteries and other cultural heritage are assessed in Section 8.5.8 of the ESIA Report. This includes proposed mitigation measures. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes

No.	Date	Meeting Location and Communities	Number of Attendees			Methods of Engagement	Key Topics Discussed and Stakeholder Feedback	Relevant ESIA Considerations
			Male	Female	Total			
								for land acquisition are conducted in conjunction with relevant stakeholders.
13	9 September 2020	Ban Dak Xied, Sanxay District				As above	■ The Village Administrative Authority has agreed with the project which will come to assist in the development of the village. ■ Request the project to give reasonable compensation to project affected persons, including for collective land of the village based on actual situation. ■ Provide assistance to poor people; help to provide job to the people in the village.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders.
14	10 September 2020	Ban Dak Samor, Sanxay District				As above	■ Request for help to provide fund for road improvement and make the planning of village area to allow it to become orderly. ■ Request to build 1 village administration office and the gravity-fed water system for the whole village. ■ Help to provide loud speaker system and telephone signal network for the village. ■ Help to provide livestock to the people in the village.	■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021.
15	10 September 2020	Ban Dak Nong, Sanxay District				As above	■ Help to provide gravity-fed water system to the village and toilet seats and build water closets to the village widely. ■ Request for help to build a village administration office, dispensary and make the plan of the village area to make it orderly. ■ Request for help to build bridges across each stream in the village. ■ Request for help to provide 1 motorcycle for serving the administrative work of the village. ■ Request for help to clear land for production purpose for the village.	■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures.
16	10 September 2020	Ban Dak Nhok, Sanxay District				As above	■ The village has generally agreed with the project which will come as the village also want the project to come to develop and help the village. ■ Request for help to provide fund for building road, telephone signal network for the village, gravity-fed water system, toilet seats, assistance to poor families in the village and make village plan to allow the village to become orderly. ■ Request the project to recruit the workforce or workers from the village to work with the project.	■ Impacts from worker influx are assessed in Section 8.5.5 of the ESIA Report. This includes proposed mitigation measures. ■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders.
17	11 September 2020	Ban Nam Ngone Neua, Sanxay District				As above	■ The village has agreed with the establishment of the project. ■ In case the people's land and the village collective land are affected, compensation for project affected persons must be fully carried out become starting the project construction work. ■ Request the company to pay monthly tax to the village at the rate of 2,500,000 kip per month. ■ Request for help to build the village administration office and provide office equipment in full. ■ Request for help to improve the road within the village and surrounding the village area. ■ Request for help to provide food and vehicle for collective use of the village. ■ Request for help to bore artesian wells and build electric network for the areas which have no network or have insufficient network in the village ■ Request for help to build school and provide full set of educational equipment. ■ In case the project comes to contact for the actual construction, the project shall first communicate and contact with the Administration Authority.	■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021. ■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures

No.	Date	Meeting Location and Communities	Number of Attendees			Methods of Engagement	Key Topics Discussed and Stakeholder Feedback	Relevant ESIA Considerations
			Male	Female	Total			
18	12 September 2020	Ban Dak Padoo Mai, , Sanxay District				As above	■ This village has agreed with the establishment of the project. ■ Before starting the construction work, the project shall coordinate with the village. In case in the future, the selection of land for using in the project construction affects the production land of the people, the project must find the solution or give reasonable compensation before starting the implementation of the project. ■ Request the project to build the village administration office, kindergarten, primary ■ school and complete secondary school, water closets and toilets, gravity-fed water system, village meeting hall, accommodation place for voluntary teachers and 1 motorcycle for using as collective asset of the village. ■ Request for help to make the plan of rice field area and other agricultural production areas for the people in the village. ■ Request for help to improve the village surrounding road to allow it to be used in both seasons and make new plan of the village to ensure orderliness in the village.	■ Village heads will be informed prior to construction, this commitment is included in Section 9 (ESMP) of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report.
1st Consultation for EIA Preparation, 12-21 November 2014 (16 villages)								
1	2014	16 villages (as listed below for 2014)				Socio-economic data collection		
2	12 November 2014	Ban Prao, Dakcheung District				Disseminate Project related information and consultation at village level	■ Request the project developer to avoid the installation of the wind turbine towers on the village cemetery or graveyard. Any tower planned to be located on this place shall not be allowed to be installed because it is a sacred and respected place of the village. ■ When the project comes to conduct the survey in each time, it shall take along someone from the village for helping to avoid the prohibited places. ■ Request to improve the infrastructure system and public facilities, such as: improve the access road to the village and to the production areas, provide clean water, gravity-fed water system, build village administration office, and help to connect the electricity to the village. ■ Promote vocation for the people; adopt the policy to recruit village labour force to work with the project. ■ Help to build the dispensary (health center) or to establish village medical boxes; provide the fund for building toilets for the people. ■ Build schools; provide scholarships for poor children in the villages. ■ Promote animal raising, particularly cattle, buffaloes, pigs, goats, ducks, chickens and others; provide training on the prevention of animal diseases in the villages. ■ Give reasonable and fair compensation for loss to the project affected persons. ■ Have the policy to assist poor families that have no labour force to undertake the production.	■ Impacts to cemeteries and other cultural heritage are assessed in Section 8.5.8 of the ESIA Report. This includes proposed mitigation measures. ■ The impact assessment including information on mitigation measures for the social receptors is provided in ***Section 8.5*** of the ESIA Report. ■ Impacts to livelihoods and land use, including rice paddies, is included in ***Section 8.5.3*** of the ESIA Report. This includes proposed mitigation measures. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders.

Table 2: Engagement with Other Interested Stakeholders during EIA and ESIA Preparation

No.	Date	Meeting Location	Stakeholder Organization/ Groups	Number of Attendees	Methods of Engagement	Key Topics Discussed and Stakeholder Feedback	Relevance in the ESIA
Engagement with Other Interested Stakeholders for EIA Preparation							
1	July 2018	Meeting room of the Provincial	• Mr. Phouvong Luangxaysana, Director	63	Consultation Meeting at Technical Level	The opinions and proposals of the participants of this meeting may be summarized as follows:	■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures

		Department of Natural Resources and Environment of Sekong Province	General of Department of Natural Resources and Environment Policy (now Department of Environment), • Mr. Phetdaovong Bounmysavat, Deputy Director of Provincial Department of Natural Resources and Environment of Sekong Province, • Mr. Phounsouk Phichit, Deputy Director of Provincial Department of Natural Resources and Environment of Attapeu Province ,and • Participants from other agencies of central, provincial and district levels, .			1. The study on risk of impacts shall separate and analyze to allow to see clearly the direct impacts and indirect impacts, such as: - Impact on production land; - Impact on area which is overlapping with the area of other development - project located nearby; - Plan of the access road to the tower foundations; - Budget for environmental management activities; - Plan of road use for transport of materials to the project; - Wastes and wastewater management; - Supervision of workers; - Plan of management and restoration of borrow pits; - Prohibitions of the project relating to the environmental management, such as: hunting, logging, fishing, etc.; - Impact on forests; and - Impact on birds. 2. In order to ensure clear analysis of the risk of impacts on each aspect, it is required to make more detailed and clearer analysis, such as: - The impact assessment shall be based on each activity of the project and shall be summarized in the table that show the impacts in full. - Data of the project development plan to allow to see the overall picture of the project development plan.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report. ■ Impacts and processes for land acquisition are provided in Section 8.5.3 of the ESIA Report. Note that this is based on preliminary land and asset registration undertaken by Innogreen in November and December 2021. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders.
2	May 2016	Meeting room of the District Administration Office of Dakcheung District of Sekong Province	• Deputy Chief of Environmental and Social Impact Assessment Unit, • Deputy Chief of District of Dakcheung District of Sekong • Deputy Chief of District of Sanxay District of Attapeu Province • Deputy Director of Provincial Department of Natural Resources and Environment of Sekong Province • Deputy Director of Provincial Department of Natural Resources and Environment of Attapeu Province • Other participants	70	Consultation Meeting at District Level	1. The general opinions show agreement and consensus with the construction and development of the 600 MW Monsoon Wind Farm Project. 2. Request to have the Environmental Management and Monitoring Plan including the Socio-Economic Development Plan and budget of this investment project. 3. Request to conduct detailed study of data on impacts to the peoples and to closely coordinate with the locality to clearly determine compensation for production land of the peoples; and to ensure the coordination and consultation in each level to create awareness and understanding about this project development plan. Request to increase the technical information of the project to allow to know the risks and impacts and avoid the anxieties relating to the construction of the project. 4. Request to conduct the study on the impacts in each phase of the project and the activities of the project in a detailed and clear manner and make comparison of the data of the environmental standards values in the project area. 5. Request to contribute to assist in the construction and improvement of infrastructure, improvement of livelihood of the people in the project area in order to ensure public participation in varous activities of the project.	■ The impact assessment including information on mitigation measures for the social receptors is provided in Section 8.5 of the ESIA Report ■ Impacts to livelihoods and land use, including rice paddies, is included in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures. ■ Impacts to community health and safety are assessed in Section 8.5.4 of the ESIA Report. This includes proposed mitigation measures. ■ Information dissemination will be considered in the ESIA and SEP. A SEP will be prepared for the Project including future and on-going engagement required to ensure stakeholders are provided sufficient information on the potential impacts. ■ Land and economic displacement is assessed in Section 8.5.3 of the ESIA Report. This includes proposed mitigation measures.The Project will ensure all required processes for land acquisition are conducted in conjunction with relevant stakeholders.

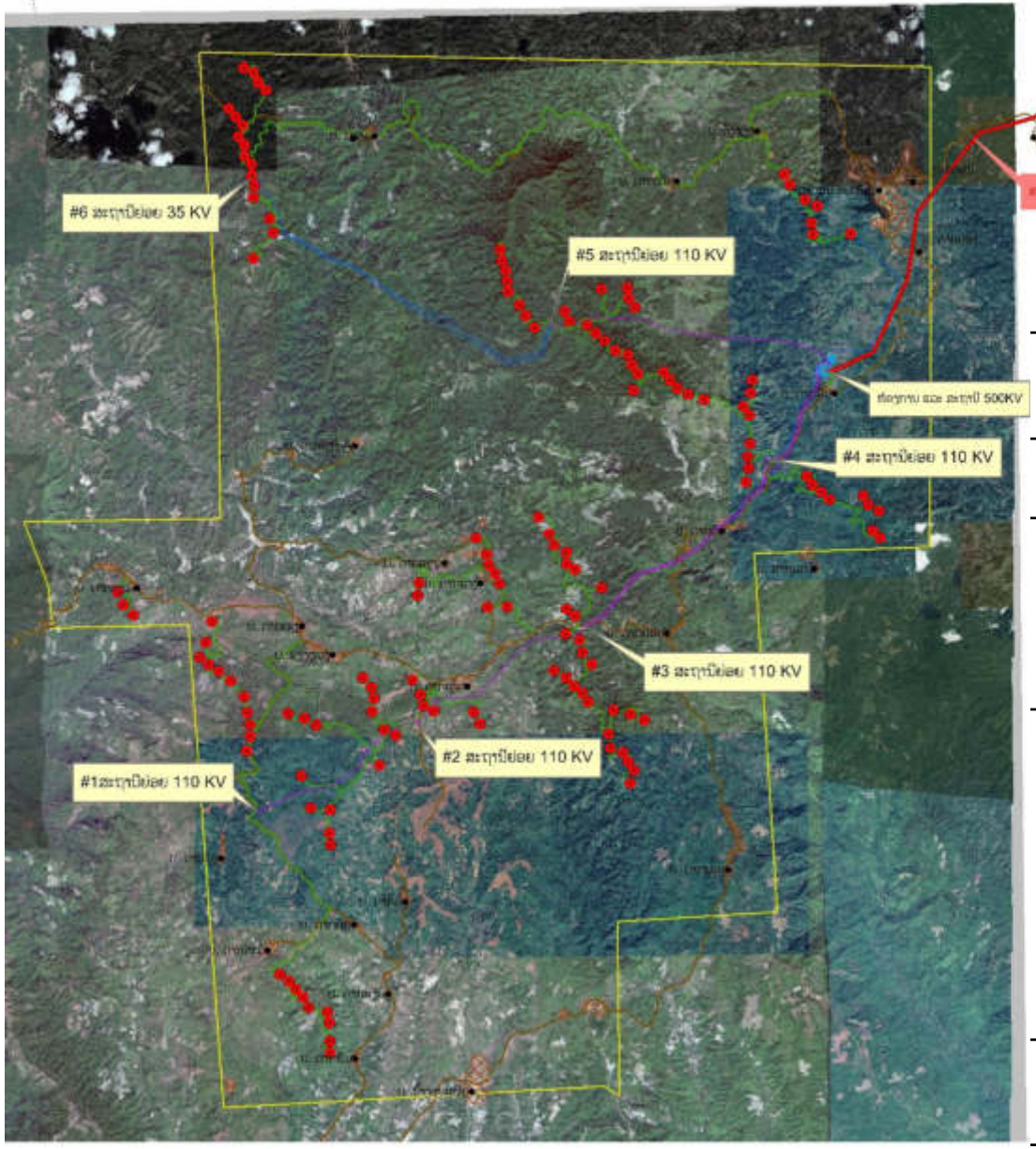
APPENDIX H ESIA POWERPOINT PRESENTATION

Monsoon Wind Lao

ໂຄງການຜະລິດໄຟຟ້າຈາກກັງຫັນລົມ 600 ເມກາວັດ

ເມືອງດາກຈຶ່ງ, ແຂວງເຊກອງ ແລະ ເມືອງຊານໄຊ, ແຂວງອັດຕະປື

ທີ່ຕັ້ງແຜນຜັງ ແລະ ອົງປະກອບຂອງໂຄງການ



Monsoon Wind Lao

ຊື່ໂຄງການ	ໂຄງການຜະລິ ດໄຟຟ້ າຈາກກັງຫັ ນລົ 600 ເມກາວັດ
ຜູ້ພັດທະນາ ໂຄງການ	ບໍລິສັດ ອິມແພກ ເອັນເນີຈີເອເຊຍ ດີວີ ລົບເມັ້ ນ ຈຳກັດ
ມູນຄ່າໂຄງການ	900 ລ້ານ ໂດລາ
ກັງຫັນລົມ ແລະ ເສັ້ນທາງ ເຂົ້າຫາ	ມີກັງໝົ ດ148 ຕົ້ ນ ແລະ ຜະລິ ດໄ ໄດ້ 4-4.5 ເມກາວັ /ຕົ້ , ຄວາມສູງຂອງ ເສົາ 141 ແມັດ ມີເສັ້ນທາງເຂົ້ າຫາທຸກເສົ 6ກແມັດ ງ
ສະຖານີ ແລະ ສາຍສົ່ງ	ມີສະຖານີ ຍ່ 6ອສະຖານີ ແລະ ສະຖານີ ໃຫຍ່ 500 ກວ 1 ສະຖານີ ມີສາຍສົ່ງ 115 ກວ ແລະ 35 ກວ ຈາກ ສະຖານີຍ່ອຍມາສະຖານີ ໃຫຍ່ ແລວສາຍສົ່ງ 500 ກວ ຈາກສະຖານີ ໃຫຍ່ ໄປ ຫວຽດນາມ 21.28 ກມ ມີ ທັງໝົດ 47 ເສົາສາຍສົ່ງ
ໄລຍະໂຄງການ	ໄລຍະສ ຳປະທານ25 ປີ, ໄລຍະການ ກໍ່ສ້າງ 3 ປີ

ກິດຈະກຳການກໍ່ສ້າງ ແລະ ດຳເນີນງານຂອງໂຄງການ

ໄລຍະການກໍ່ສ້າງ

ໄລຍະການດຳເນີນງານ

1

- ປັບປຸງ ແລະ ກໍ່ສ້າງ ເສັ້ນທາງເຂົ້າເຖິງ
- ກະກຽມການກໍ່ສ້າງ
- ກໍ່ສ້າງຮາກຖານເສົາ

2

ຂົນສົ່ງອຸປະກອນ

3

ປະກອບຕິດຕັ້ງເສົາ ກັ້ງຫັນ ລົມ

4

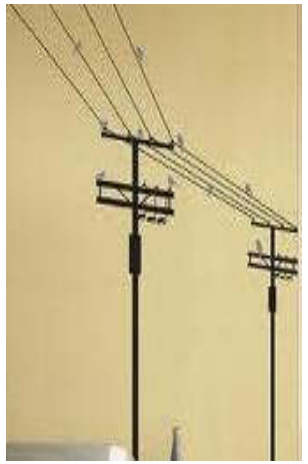
- ລະບົບສາຍສົ່ງໄຟຟ້າ
- ບຳລຸງຮັກສາ
- ການຟື້ນຟູພື້ນທີ

5

- ຈຳໜ່າຍ ໄຟຟ້າ
- ການພັດທະ ນາຊຸມຊົນ







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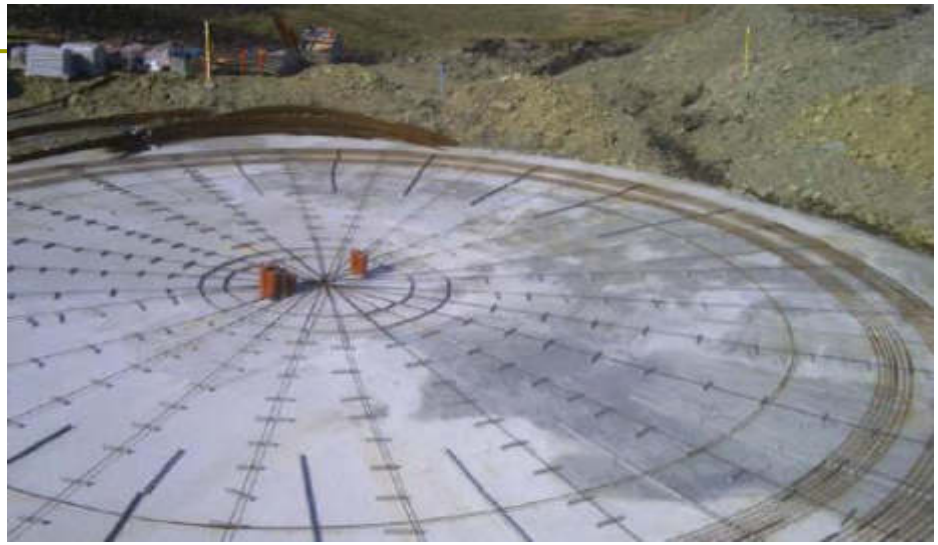

ຕົວຢ່າງການຂົນສົ່ງ

ຕົວຢ່າງການຕິດຕັ້ງ

ຜົນກະທົບທີ່ອາດເກີດ- ດ້ານກາຍະພາບ

ດ້ານ	ຜົນກະທົບທີ່ອາດເກີດ
ຄຸນນະພາບອາກາດ	• ຂີ່ຝຸ່ນໃນຊ່ວງກໍ່ສ້າງ - ຈາກລົດແລ່ນ, ກອງດິນຫິນ, • ການປ່ອຍຄວັນອາຍເສັຍຂອງລົດໜັກ ແລະ ເຄື່ອງຈັກ ໃນຊ່ວງກໍ່ສ້າງ ແລະ ຊ່ວງເຮັດວຽກໂຄງການ.
ດິນ ແລະ ການເຊາະເຈື່ອນ	• ຂອງແຫຼວທີ່ເປັນອັນຕະລາຍເຊັ່ນນ້ຳມັນ ຮົ່ວໄຫລຊຶມອອກ • ກິດຈະກຳການກໍ່ສ້າງຕ່ ່າງໆຕ້ອງໄດ້ ມີການຕັດຕົ້ນໄມ້,ຂຸກເປີກໜ້າດິນ, ມີ ການຂຸດ-ການດຸ ດອອກ ຊຶ່ງມີຄວາມເປັ ນໄປໄດ້ຕໍ່ການການເຊາະເຈື່ອນໃນ ລະດູຝົນ
ຄຸນນະພາບນ້ຳ	• ຕະກອນດິນເຊາະເຈື່ອນລົງໃສ່ຫ້ວຍເຮັດໃຫ້ນ້ຳຂຸ່ນ • ຂອງແຫຼວທີ່ເປັນອັນຕະລາຍເຊັ່ນນ້ຳມັນ ຮົ່ວໄຫລຊຶມລົງສູ່ຫ້ວຍ • ບັນຫານ້ຳເປື້ອນຕ່າງໆ ສາມາດເກີດຂຶ້ນໄດ້ຈາກທີ່ຢູ່ອາໄສ ແລະ ຈາກການນຳ ໃຊ້ຕ່າງໆ ຂອງພະນັກງານ ແລະ ຄົນງານຢູ່ແຄ້ມກໍ່ສ້າງ
ສຽງດັງ	• ຈາກເຄື່ອງກົນຈັກກໍ່ສ້າງ • ການຂົນສົ່ງເຂົ້າ-ອອກພື້ນທີ່ໂຄງການ • ໃນໄລຍະດຳເນີນງານ: ແມ່ນນຳໃຊ້ກັງຫັນລົມລຸ້ນບໍ່ມີສຽງດັງແຮງ

ຜົນກະທົບທີ່ອາດເກີດຕ້ານຊີວະນາໆພັນ

ດ້ານ	ຜົນກະທົບທີ່ອາດເກີດ
ປ່າໄມ້	• ການບຸກເບີດຖີ້ມຕົ້ນພືດຕົ້ນໄມ້ ເພື່ອການສ້າງທາງເຂົ້າໄປ ແລະ ການບຸກເບີກບ່ອນຕັ້ງເສົາກັ້ງຫັນລົມ, • ທຳລາຍຕໍ່ຕົ້ນໄມ້ ແລະ ພືດພັນ ໃນຊ່ວງກໍ່ສ້າງ
ສັດປ່າ	• ການບຸກເບີກພື້ນທີ່ເພື່ອການກໍ່ສ້າງ ເປັນການທຳລາຍ ຖິ່ນທີ່ຢູ່ອາໄສຂອງສັດປ່າ • ສຽງດັງຈາກກົນຈັກກໍ່ສ້ າງ ອາດສ້າງຄວາມແຕກຕື່ນໃຫ້ແກ່ສັດປ່າ ຢ້ານກົວ ແລ ໜີໄປຢູ່ບ່ອນອື່ນ. • ກຳມະກອນທີ່ເຂົ້າມາເຮັດວຽກ ແມ່ນມີຄວາມສ່ຽງຕໍ່ການລັກລອບລ່າສັດປ່າທີ່ມີຢູ່ພາຍໃນ ແລະ ອ້ອມຂ້າງ ພື້ນທີ່ໂຄງການມາເປັນອາຫານ.

ຜົນກະທົບທີ່ອາດເກີດຕ້ານເສດຖະກິດ-ສັງຄົມ

ດ້ານ	ຜົນກະທົບທີ່ອາດເກີດ
ການນຳໃຊ້ທີ່ດິນ	• ດິນນຳໃຊ້ຖືກກະທົບຈາກເຂດກໍ່ ສ້າງ ແບບຊົ່ວຄາວ ແລະ ຖາວອນ
ຊັບສິນ	• ຜົນລະປູກ, ຕົ້ນໄມ້ ຖືກບຸກເບີກອອກຈາກເຂດກໍ່ສ້າງ
ການຈະລາຈອນ ແລະ ຄວາມປອດໄພ	• ອຸປະຕິເຫດຈາກການຈະລາຈອນ • ບັນຫາ ຄຸນນະພາບສຽງນັນ ແລະ ອາກາດ ໃນຊ່ວງກໍ່ສ້າງ • ອຸປະຕິເຫດຕໍ່ກຳມະກອນ • ອຸປະຕິເຫດ ເກີດຂຶ້ນກັບ ຊຸມຊົນ ທີ່ສະໜາມກໍ່ສ້າງ
ຂີ້ເຫຍື້ອ/ສິ່ງເສດເຫຼືອ	• ການຖອກເສດດິນ ແລະ ເສດຂອງແຫຼວ ແບບຊະຊາຍ • ການຄຸ້ມຄອງບໍ່ດີ ຕໍ່ ເສດວັດຖຸອັນຕະລາຍ ທີ່ເຮັດໃຫ້ດິນມີຜົດປົນເປື້ອນ , ກະທົບຕໍ່ ນ້ຳໃຕ້ດິນ ແລະ ສຸຂະພາບ • ການຄຸ້ມຄອງກຳມະກອນ ບໍ່ໄດ້ດີອາດເຮັດໃຫ້ມີການຖິ້ມຂີ້ເຫຍື້ອ ຊະຊາຍ
ມໍລະດົກດ້ານວັດທະນະທຳ	• ແລວເສັ້ນທາງ, ສາຍສົ່ງ ອາດຖືກເຂດປ່າຊ້າ ແລະ ສະຖານທີ່ທາງດ້ານ ວັດທະນະທຳ.

ເຂດດິນທີ່ຈະຖືກຜົນກະທົບ

ຜົນກະທົບຖາວອນ 2,750 ຕາແມັດ

ເຂດບຸກເບີກເພື່ອກໍ່ສ້າງ 26 ແມັດ

ເສັ້ນທາງຖາວອນ 6 ແມັດ ແລະ ຮ່ອງລະບາຍນ້ຳ 1 ແມັດ ຝັງສາຍໄຟ 1 ແມັດ ລວມ ເປັນ 8 ແມັດ

ຂະບວນການຊົດເຊີຍຜົນກະທົບ

ເກັບຂໍ້ມູນ ຜົນກະທົບ

ສ້າງຕັ້ງຄະນະກຳມະການຂັ້ນ ແຂວງ, ເມືອງ

ກຳນົດຫົວໜ່ວຍລາຄາຊົດເຊີຍ

ລົງວັດແທກເກັບຂໍ້ມູນລະອຽດ, ຂຶ້ນບັນຊີລາຍການຜົນກະທົບ ເພື່ອຄິດໄລ່ມູນຄ່າທົດແທນ

ຂະບວນການໄກ່ເກ່ຍຮ້ອງທຸກ ແລະ ການແກ້ໄຂ

ລົງທົດແທນ ແລະ ຊົດເຊີຍຜົນ ກະທົບ

ຜົນປະໂຫຍດ

- ✓ ປະຊາຊົນໄດ້ນຳໃຊ້ເສັ້ນທາງຮ່ວມກັບໂຄງການເພື່ອໄປເຂດທຳການຜະລິ ດ
- ✓ ອ້ອມຮອບເສົາກັງຫັນລົມ ສາມາດເຮັດການຜະລິດ ແລະ ລ້ຽງສັດໄດ້ ປົກກະຕິ
- ✓ ສາມາດພັດທະນາເປັນແຫຼ່ງທ່ອງທ່ຽວ ດຶງດູເອົາຄົນເຂົ້າມາທຽວຊົມ ສ້າງລາຍຮັບໃຫ້ທ້ອງຖິ່ນ

ນະໂຍບາຍຂອງໂຄງການ

- ໂຄງການແມ່ນເນັ້ນການພັດທະນາແບບຍືນຍົງ ໂດຍຈະພະຍາຍາມຫຼີກລ້ຽງຜົນກະທົບຕໍ່ ປະຊາຊົນໃຫ້ຫຼາຍທສຸດ
- ດິນທຳການຜະລິດຂອງປະຊາຊົນທີ່ໄດ້ຮັບຜົນກະທົບ ຈະໄດ້ຮັບການທົດແທນເປັນເງິນສົດດ້ວຍມູນຄ່າປ່ ຽນແທນ
- ສຳລັບຜົດລົ້ ມລຸ ກທີ່ຍັງບໍ່ສາມາດເກັບກ່ ຽວໄດ້ ໃຫ້ທົດແທນເປັ ນເງິນສົດສຳລັບຜົນຜະລິດໃນມູນຄ່າປ່ ຽນແທນ ໂດຍອີງໃສ່ ສະມັດຕະພາບໃນການຜະລິດຕໍ່ເນື້ , ຕົ້ ອທີ່ ນໄມ້ ກິນໝາກ ທົດແທນເປັນເງິນສົດ ຕາມມູນຄ່າປ່ຽນແທນເທົ່າກັບຊະນິດ ແລະ ຜົນຜະລິດ ແລະ ສຳລັບຕົ້ນໄມ້ອຸດສະຫະກຳ ທົດແທນເປັນເງິນສົດ
- ໂຄງການແມ່ນຈະຫຼີ ກລ້ ຽງຜົນກະທົບດ້ານວັດທະນະທຳໃຫ້ຫຼາຍທີ່ສຸດ ການອອກແບບຂອງໂຄງການ ທັງແລວເສັ້ນທາງເຂົ້າຫາໂຄງການ ແລະ ຈຸດພື້ນທີ່ຕັ້ງເສົາກັງຫັນລົມ ຈະຄັດເລື ອກເອົາຈຸດທີ່ ຕັ້ງເສົາ ຫຼື ເຂດກໍ່ສ້າງ ທີ່ບໍ່ແມ່ນເຂດເຊື່ອຖື ຂອງຊົນ ເຊັ່ນ: ປ່າຊ້າ, ປ່ າສັ ກສິ . ຖ້າຫາກຫຼີ ທີ່ບໍ່ ສາມາດຫຼີ ກລ້ຽງໄດ້ ທາງໂຄງການຈະຮ່ວມກັບຄະນະກຳມະການເຮັດວຽກຮ່ວມກັບບັນດາອຳນາດການປົ ກຄອງ ຜູ້ເຖົ້າແກ່ແນວໂຮມ ແລະ ເຈົ້າກົ ກເຈົ້າເຫຼົ່າບ້ານ ເພື່ ອຫາທາງອອກຮ່ວມກັນ ເຊິ່ງອາດຈະເປັນ ອງຄອບ ຫຼື ປົວແປງຊົດເຊີຍຕາມຮີດຄອງ ແລະ ການນັບຖືຂອງທ້ອງຖິ່ ນ
- ນະໂຍບາຍຂອງໂຄງການແມ່ນໃຫ້ບຸ ລິມະສິດແກ່ແຮງງານທ້ອງຖິ່ນເປັ ນຫຼັກ ປະຊາຊົນທ້ ອງຖິ່ນ ຈະໄດ້ເຂົ້າຮ່ວມເຮັດວຽກນຳໂຄງການ ຕາມຕຳແໜ່ງງານ ທີ່ ເໝາະສົມ ແລະ ທັ ກສະສື ມີແຮງງານ ຂອງແຕ່ ລະຄົນ ໂດຍສະເພາະຊົນພາຍໃນບ້ານທີ່ມີຜົນກະທົບຕໍ່ທີ່ດິນ
- ແຜນພັດທະນາຊຸມຊົນ ຈະໄດ້ພັດທະນາ ແລະ ໃຊ້ເວລາໃນການພິຈາລະນາຂໍ້ ສະເໜີແນະ ກ່ຽວກັບຄວາມຕ້ ອງການຂອງຊຸມຊົນ ແລະ ວິທີ ການເຮັດໃຫ້ ໂຄງການສາມາດຊ່ວຍປັ ບປຸງມາດຕະຖານການດຳລົງຊີວິດຂອງຊຸ ມຊົນ ຂໍ້ສະເໜີແນະຈະໄດ້ເນັ້ນສະເພາະຄວາມຕອ້ງການຂອງຊຸມຊົນ ສຳລັບການລົງທຶ ນພັດທະນາໃນຂົງເຂດໂຄງລ່າງພື້ນຖານ ການທ່ອງທ່ຽວ, ການສຶ ກສາ ແລະ ສຸຂະພາບຂອງຊຸມຊົນ

ສະແດງຄຳຄິດເຫັນ ແລະ ຂໍ້ສະເໜີ