

# Annual Environmental and Social Monitoring Report (January to December 2021)

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Project Number: 53255-001

## THAILAND: ENERGY ABSOLUTE HANUMAN 260 MW WIND POWER PROJECT

Prepared by Advance Energy Plus Co., Ltd.

For Energy Absolute Public Company Limited submitting to the Asian Development Bank

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## CONTENTS

I.	INTRODUCTION.....	3
A.	PURPOSE OF THE REPORT .....	3
B.	BACKGROUND OF THE PROJECT .....	3
C.	PROJECT MANAGEMENT ARRANGEMENTS .....	8
D.	ENVIRONMENTAL OVERVIEW OF THE PROJECT AREA.....	10
II.	ENVIRONMENTAL AND SOCIAL MANAGEMENT .....	11
A.	COMPLIANCE WITH ENVIRONMENTAL AND SOCIAL SAFEGUARDS RELATED PROJECT REQUIREMENTS .....	11
B.	ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL AND SOCIAL PERFORMANCE MONITORING.....	14
C.	STATUS OF ESMP IMPLEMENTATION .....	15
III.	ENVIRONMENTAL AND SOCIAL (E&S) MONITORING .....	19
A.	RESPONSIBILITIES IN MONITORING OF ENVIRONMENTAL AND SOCIAL SAFEGUARDS .....	19
B.	ENVIRONMENTAL QUALITY STANDARDS .....	19
C.	ENVIRONMENTAL AND SOCIAL MONITORING DATA.....	26
IV.	PUBLIC CONSULTATION, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM .....	29
V.	LABOUR AND WORKING CONDITIONS .....	35
VI.	INSTITUTIONAL STRENGTHENING AND TRAINING .....	35
VII.	CONCLUSION .....	36
VIII.	APPENDICES.....	37

## Appendices

Appendix 1 Environment and Social Management Plan (ESMP)  
Appendix 2 Support documents / photos of the ESMP Implementations  
Appendix 3 Noise Monitoring Report  
Appendix 4 Shadow Flicker Management Report  
Appendix 5 Biodiversity Monitoring Report  
Appendix 6 Hazardous Waste Management  
Appendix 7 Minutes of Meetings of Stakeholder Consultations  
Appendix 8 Corporate Social Responsibility Activities  
Appendix 9 Grievance Records  
Appendix 10 Training Records in Year 2021

## I. INTRODUCTION

### A. PURPOSE OF THE REPORT

1. This environmental and social monitoring report presents the project's environmental and social performance in compliance with the requirements of ADB's Safeguards Policy Statement (2009) (ADB SPS), applicable laws and regulations of Thailand and applicable good international industry practices. The project is categorized as "B" for environment, "C" for involuntary resettlement (IR) and "C" for Indigenous Peoples based on ADB SPS. This report describes and assesses the implementation of the environmental and social management plan (ESMP) prepared for this project during its operation.

2. This report includes the background information of the project and the status of implementation from January to December 2021. It also includes information on activities related to information disclosure, grievance redress and capacity building.

### B. BACKGROUND OF THE PROJECT

3. Energy Absolute Public Company Limited ("EA") is developing 5 Hanuman Wind Power Projects with total capacity 260 MW (Non-firm SPP contract with EGAT) in Sap Yai, Thap Sathit and Bamnet Narong district, Chaiyaphum province, approximately 300 km north-east of Bangkok (the "Project" or "Hanuman"). The Project is being developed by EA using five special purpose vehicles ("SPV" or collectively refer as "the company") incorporated in Thailand: (1) Nayanglak Development Company Limited, (2) Nayanglak Wind Power Company Limited, (3) Pongnok Development Company Limited, (4) Benjarat Development Company Limited, and (5) Banchuan Development Company Limited. The summary of project details is provided in Table 1 and the wind turbine coordinates are provided in Table 2.

**Table 1. Project details**

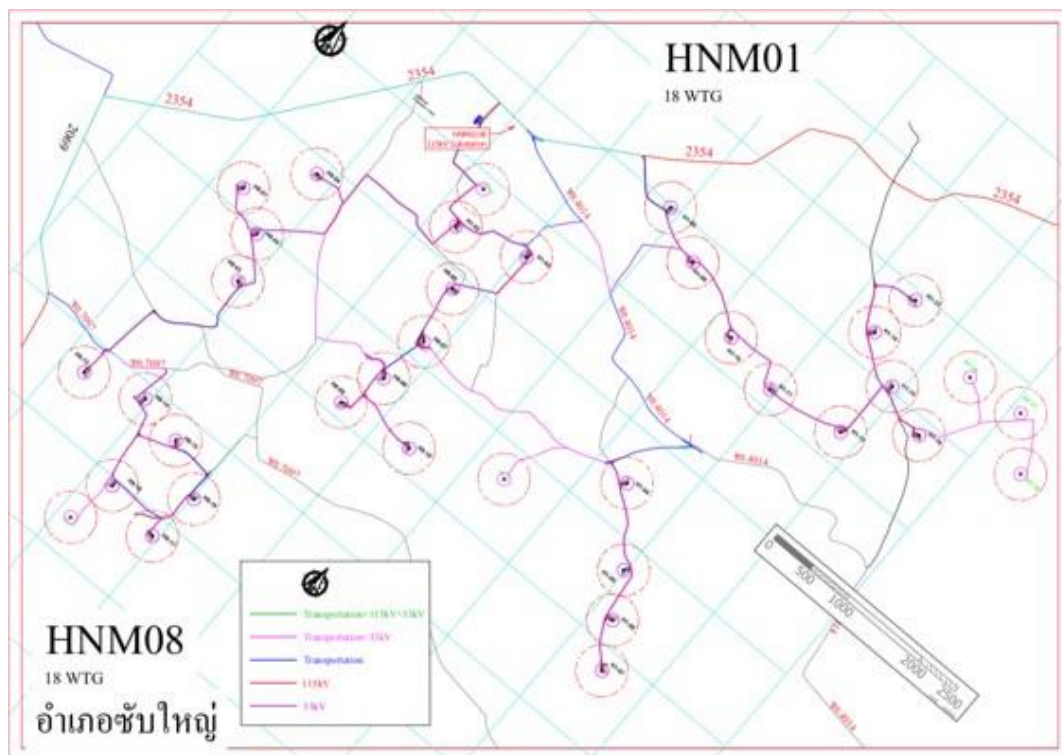
No.	Project name / SPV	Capacity (MW)	Number of Turbines	Location
1	HNM 1 (Nayanglak Development Co., Ltd.)	45	18	Tha Kup sub-district, Sap Yai district
2	HNM 5 (Pongnok Development Co., Ltd.)	48	19	Watabaek sub-district, Thap Sathit district
3	HNM 8 (Nayanglak Wind Power Co., Ltd.)	45	18	Tha Kup and Sap Yai sub-district, Sap Yai district
4	HNM 9 (Benjarat Development Co., Ltd.)	42	16	Watabaek sub-district, Thap Sathit district
5	HNM 10 (Banchuan Development Co., Ltd.)	80	32	Ban Chuan sub-district, Bamnet Narong district
<b>Total</b>		<b>260</b>	<b>103</b>	

The Hanuman Wind Project utilises 103 Siemens Gamesa 2.5 MW wind turbines with a hub height of 153 meters and rotor diameter of 126 meters.

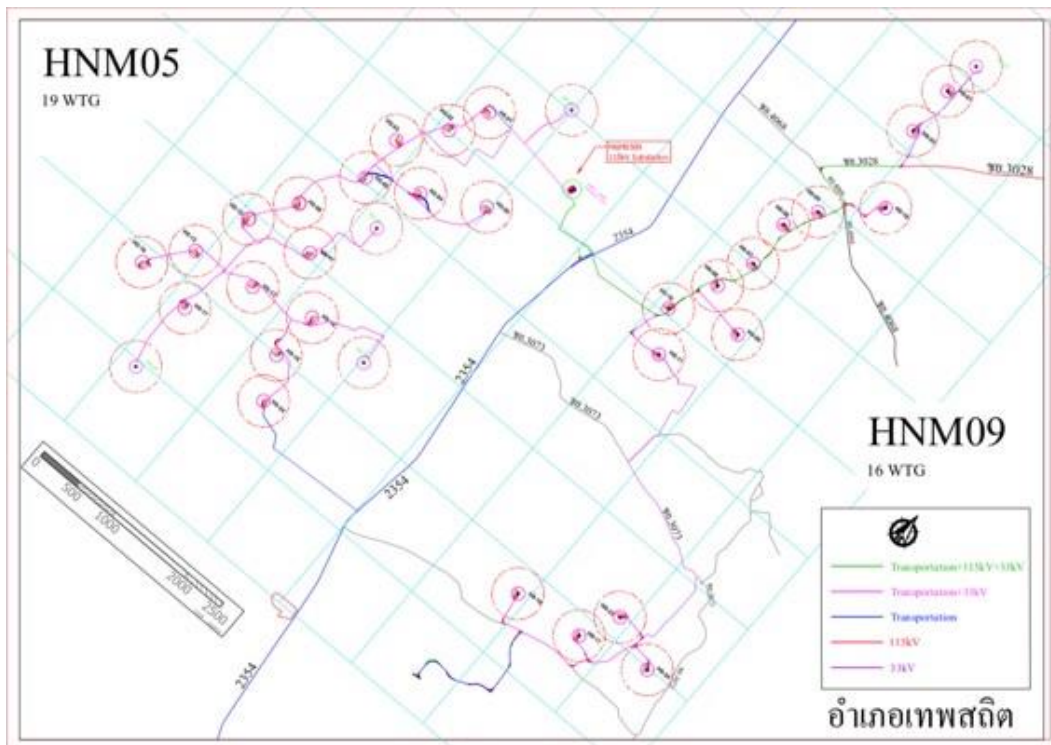
The turbines have a wind speed cut in of 3 m/s and cut out wind speed of 25 m/s. Each turbine stand requires 1 rai area around the footing for exclusive use. This land is leased from the local government and a service agreement with the former tenant of that land is also in place.

There are 3 onsite substations for the project (Substation 1 for HNM1&HNM8 at 2 rai, Substation 2 for HNM5&HNM9 at 2 rai and Substation 3 for HNM10 at 3-3-0 rai).

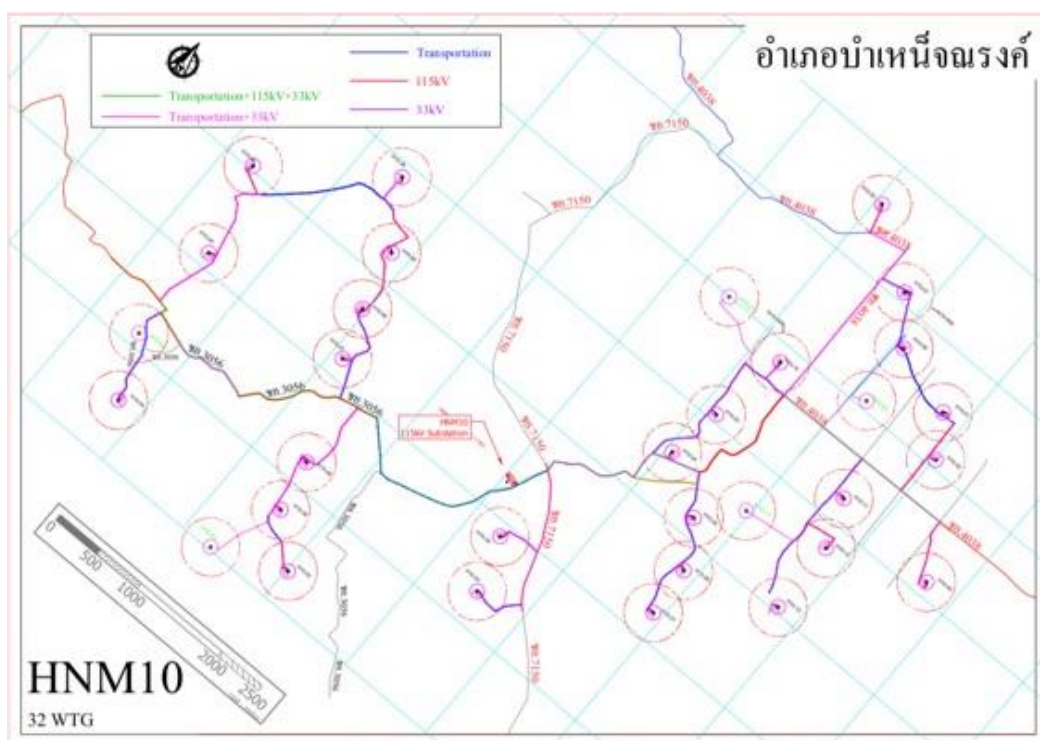
The turbines are connected to feeder lines to each of the dedicated substations, which step up the power to 115kV and transmitted to the EGAT substation at Nong Bua Rawe (the “EGAT NBR substation”). The 115 kV line has 3 vertically stacked phase lines at a height of 20 m and a 12 m right of way. The total length of 115 kV lines is approximately 70 km while 33 kV lines ran for a total of around 90 km.



**Figure 1.** HNM1 and HNM8 project layout.



**Figure 2.** HNM5 and HNM9 project layout.



**Figure 3.** HNM10 project layout.

**Table 2. Wind turbine generator (WTG) coordinates**

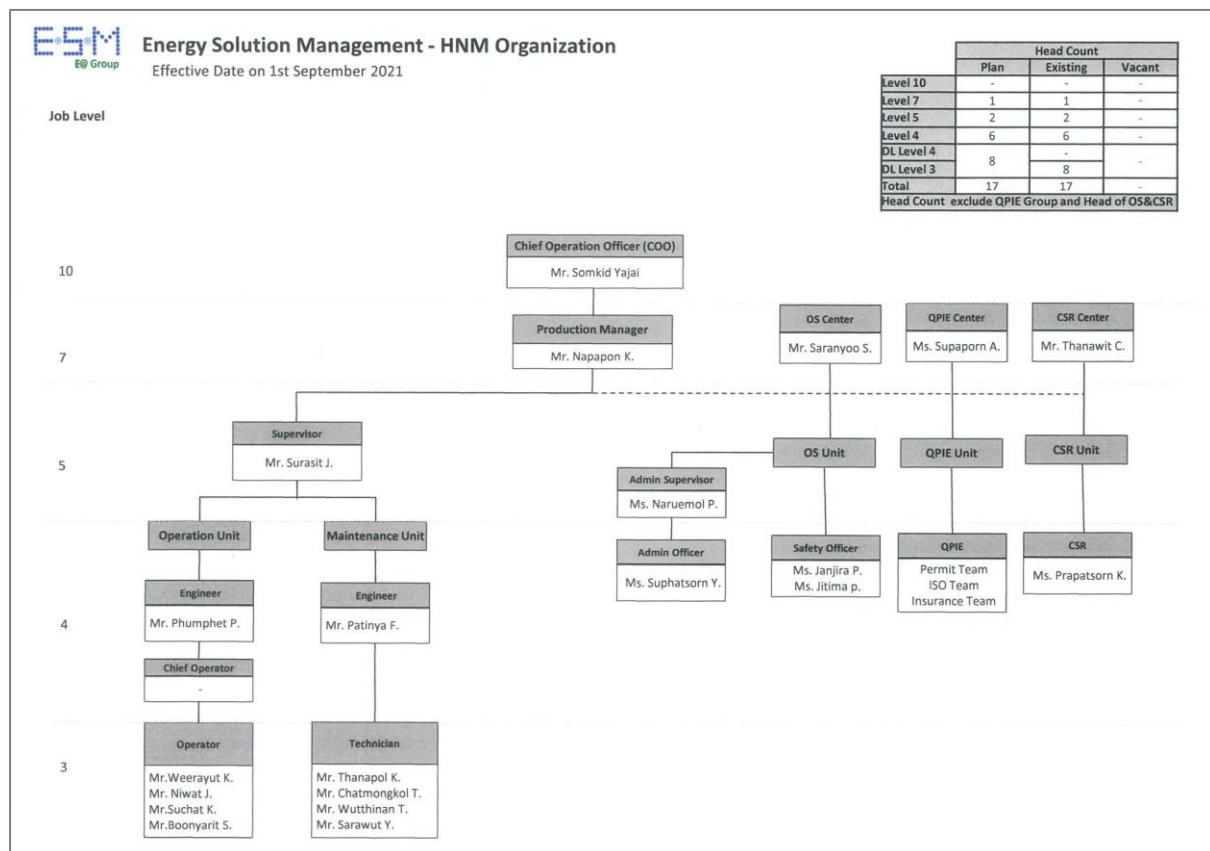
<b>No.</b>	<b>WTG No.</b>	<b>Coordinates</b>
1	HNM1 WTG1	15°38'48.3"N 101°39'18.0"E
2	HNM1 WTG2	15°38'55.3"N 101°39'44.7"E
3	HNM1 WTG3	15°39'38.3"N 101°40'16.8"E
4	HNM1 WTG4	15°39'24.7"N 101°40'32.2"E
5	HNM1 WTG5	15°39'18.7"N 101°40'58.8"E
6	HNM1 WTG6	15°39'13.8"N 101°41'20.8"E
7	HNM1 WTG7	15°39'17.8"N 101°41'50.4"E
8	HNM1 WTG8	15°39'40.9"N 101°41'54.0"E
9	HNM1 WTG9	15°39'51.6"N 101°41'36.8"E
10	HNM1 WTG10	15°40'09.1"N 101°41'40.9"E
11	HNM1 WTG11	15°39'33.8"N 101°42'12.2"E
12	HNM1 WTG12	15°40'00.6"N 101°42'12.9"E
13	HNM1 WTG13	15°40'02.2"N 101°42'34.8"E
14	HNM1 WTG14	15°39'46.0"N 101°42'48.5"E
15	HNM1 WTG15	15°38'17.4"N 101°41'03.1"E
16	HNM1 WTG16	15°37'53.7"N 101°41'21.6"E
17	HNM1 WTG17	15°37'38.1"N 101°41'29.6"E
18	HNM1 WTG18	15°37'22.5"N 101°41'37.9"E
19	HNM8 WTG01	15°39'04.1"N 101°39'17.9"E
20	HNM8 WTG02	15°38'30.7"N 101°39'31.4"E
21	HNM8 WTG03	15°38'09.8"N 101°39'36.1"E
22	HNM8 WTG04	15°37'51.0"N 101°40'21.9"E
23	HNM8 WTG05	15°38'28.9"N 101°38'29.9"E
24	HNM8 WTG06	15°37'58.5"N 101°38'08.9"E
25	HNM8 WTG07	15°38'02.5"N 101°38'25.6"E
26	HNM8 WTG08	15°37'46.3"N 101°38'30.6"E
27	HNM8 WTG09	15°37'52.0"N 101°39'32.6"E
28	HNM8 WTG10	15°37'36.4"N 101°39'26.6"E
29	HNM8 WTG11	15°37'39.2"N 101°39'55.2"E
30	HNM8 WTG12	15°36'48.5"N 101°38'09.0"E
31	HNM8 WTG13	15°36'54.6"N 101°38'32.0"E
32	HNM8 WTG14	15°36'25.9"N 101°38'44.4"E
33	HNM8 WTG15	15°36'07.1"N 101°38'38.1"E
34	HNM8 WTG16	15°36'49.9"N 101°38'49.3"E
35	HNM8 WTG17	15°36'38.5"N 101°39'07.8"E
36	HNM8 WTG18	15°36'19.5"N 101°39'04.9"E
37	HNM5 WTG01	15°29'06.5"N 101°25'03.0"E
38	HNM5 WTG02	15°28'53.2"N 101°24'55.9"E
39	HNM5 WTG03	15°28'38.6"N 101°24'43.8"E
40	HNM5 WTG04	15°28'29.5"N 101°25'02.5"E
41	HNM5 WTG05	15°28'39.9"N 101°25'23.4"E
42	HNM5 WTG06	15°28'21.5"N 101°24'43.8"E
43	HNM5 WTG07	15°27'59.6"N 101°24'30.3"E
44	HNM5 WTG08	15°27'44.7"N 101°24'19.9"E

No.	WTG No.	Coordinates
45	HNM5 WTG09	15°27'49.3"N 101°24'45.9"E
46	HNM5 WTG10	15°28'10.8"N 101°24'59.0"E
47	HNM5 WTG11	15°27'27.6"N 101°24'37.6"E
48	HNM5 WTG12	15°27'23.8"N 101°24'12.6"E
49	HNM5 WTG13	15°27'09.9"N 101°24'00.6"E
50	HNM5 WTG14	15°27'06.5"N 101°24'23.0"E
51	HNM5 WTG15	15°26'41.5"N 101°24'23.6"E
52	HNM5 WTG16	15°27'32.6"N 101°25'01.6"E
53	HNM5 WTG17	15°27'31.4"N 101°25'24.5"E
54	HNM5 WTG18	15°27'14.5"N 101°24'59.3"E
55	HNM5 WTG19	15°26'59.8"N 101°25'06.2"E
56	HNM9 WTG01	15°29'25.4"N 101°25'24.9"E
57	HNM9 WTG02	15°28'39.3"N 101°26'44.8"E
58	HNM9 WTG03	15°28'53.7"N 101°26'36.8"E
59	HNM9 WTG04	15°29'02.3"N 101°26'59.2"E
60	HNM9 WTG05	15°29'10.5"N 101°26'45.2"E
61	HNM9 WTG06	15°29'24.2"N 101°26'50.0"E
62	HNM9 WTG07	15°29'41.1"N 101°26'50.2"E
63	HNM9 WTG08	15°29'52.4"N 101°26'55.9"E
64	HNM9 WTG09	15°30'08.5"N 101°27'13.7"E
65	HNM9 WTG10	15°30'33.8"N 101°27'03.4"E
66	HNM9 WTG11	15°30'52.3"N 101°27'04.1"E
67	HNM9 WTG12	15°31'05.5"N 101°27'05.6"E
68	HNM9 WTG13	15°27'20.5"N 101°27'33.6"E
69	HNM9 WTG14	15°27'12.4"N 101°27'53.2"E
70	HNM9 WTG15	15°27'06.6"N 101°27'26.5"E
71	HNM9 WTG16	15°27'04.6"N 101°27'00.6"E
72	HNM10 WTG01	15°32'18.0"N 101°33'51.6"E
73	HNM10 WTG02	15°32'06.6"N 101°34'10.2"E
74	HNM10 WTG03	15°31'52.1"N 101°34'18.4"E
75	HNM10 WTG04	15°31'36.1"N 101°34'19.5"E
76	HNM10 WTG05	15°32'35.4"N 101°33'54.8"E
77	HNM10 WTG06	15°33'06.1"N 101°33'34.3"E
78	HNM10 WTG07	15°33'00.6"N 101°33'60.0"E
79	HNM10 WTG08	15°33'08.2"N 101°34'28.7"E
80	HNM10 WTG09	15°33'58.1"N 101°33'53.0"E
81	HNM10 WTG10	15°33'41.4"N 101°34'16.3"E
82	HNM10 WTG11	15°33'27.9"N 101°34'27.3"E
83	HNM10 WTG12	15°33'20.1"N 101°34'49.9"E
84	HNM10 WTG13	15°33'09.7"N 101°34'57.1"E
85	HNM10 WTG14	15°32'36.9"N 101°35'20.1"E
86	HNM10 WTG15	15°32'42.2"N 101°34'42.2"E
87	HNM10 WTG16	15°32'23.6"N 101°34'48.7"E
88	HNM10 WTG17	15°32'02.1"N 101°34'48.8"E
89	HNM10 WTG18	15°32'19.1"N 101°34'21.7"E

No.	WTG No.	Coordinates
90	HNM10 WTG19	15°31'24.5"N 101°33'26.7"E
91	HNM10 WTG20	15°31'07.0"N 101°33'32.2"E
92	HNM10 WTG21	15°31'04.3"N 101°32'24.6"E
93	HNM10 WTG22	15°30'48.7"N 101°32'28.6"E
94	HNM10 WTG23	15°30'35.6"N 101°32'42.7"E
95	HNM10 WTG24	15°30'26.3"N 101°32'18.9"E
96	HNM10 WTG25	15°31'35.9"N 101°32'12.5"E
97	HNM10 WTG26	15°31'51.4"N 101°32'07.3"E
98	HNM10 WTG27	15°32'10.5"N 101°32'02.9"E
99	HNM10 WTG28	15°32'30.6"N 101°31'50.5"E
100	HNM10 WTG29	15°32'03.4"N 101°31'13.4"E
101	HNM10 WTG30	15°31'34.8"N 101°31'18.3"E
102	HNM10 WTG31	15°31'03.3"N 101°31'17.4"E
103	HNM10 WTG32	15°30'43.0"N 101°31'26.7"E

### C. PROJECT MANAGEMENT ARRANGEMENTS

4. Safety and CSR officers at the project level responsible for overseeing the compliance of biodiversity, water, noise, shadow flicker. safety and municipal and management waste issues, and attend training courses on related topics, together with ESM staff.



**Figure 4.** Wind farm O&M, Hanuman project department organization chart



**Table 3. Role and Responsibility of each department**

<b>Department</b>	<b>Responsibility</b>
Operation and Maintenance (O&M)	<ul style="list-style-type: none"> <li>• Ensure that all O&amp;M requirements, such as corrective actions, patches, configuration updates, and installation of new capabilities, are implemented and tested in timely fashion and properly documented through compliance with a planned maintenance process and procedures that supports configuration management and control best practices</li> <li>• Coordinate and collaborate with other technical managers and staff and users regarding planned and unplanned O&amp;M activities</li> <li>• Conduct production planning, operation, quality control and maintenance to be complied with the master plan and policy</li> <li>• Control plant production yield according to the company target</li> </ul>
Administration	<ul style="list-style-type: none"> <li>• Provide general administrative support to all departments.</li> <li>• Reporting into a management team on strategy and business planning</li> <li>• Plan and coordinate administrative procedures and systems and devising ways to streamline processes</li> <li>• Handle supplier contract management.</li> <li>• Coordinate and maintain company's documents and office properties.</li> <li>• Develop and implement, monitoring general service to support all and to ensure that all facilities are operating effectively</li> </ul>
Office Administration & Safety (OS)	<ul style="list-style-type: none"> <li>• Develop and implement organizational safety programs.</li> <li>• These specialists review and conduct risk assessments to detect potential hazards and plan precautionary measures.</li> <li>• Provide a plan to use personal protective equipment (PPE) for employees.</li> <li>• Develop a Site Safety Management Plan for the project to ensure a safe work environment for all company employees, contractors, visitors and community</li> </ul>
Quality Permit Insurance and Environmental (QPIE)	<ul style="list-style-type: none"> <li>• Update institutional Quality, Health, Safety and Environment policies</li> <li>• Develop and execute environment plans in the workplace according to legal guidelines.</li> <li>• Monitor compliance to policies and laws by inspecting employees and operations.</li> </ul>
Corporate Social Responsibility (CSR)	<ul style="list-style-type: none"> <li>• To formulate and execute proactive CSR strategy and to engage both internal and external stakeholders via various communication platforms to better fulfil our responsibility and enhance the CSR image of the Company.</li> <li>• Develop and edit relevant CSR communications and promotional materials, including CSR Report, publicity on print and social media.</li> </ul>

## **D. ENVIRONMENTAL OVERVIEW OF THE PROJECT AREA**

5. In term of environmental and social impacts, the company-initiated preparation of an initial environmental examination report in 2015 (The IEE was revised in year 2020). based on international standards to evaluate potential impacts pre-construction, construction and operation period based on project details and existing environment in the surrounding area. Assessment of the physical resources, biological resources, human use value and quality of life has been given careful attention and the project has proposed the mitigation measure and monitoring plan for environmental and social impacts.

The key environmental and social impacts of the project have been identified as being associated with Land Use, Noise, Shadow Flicker and Biodiversity Impacts during Operational Phase.

- The land use is in compliance with Thai regulation. The project company entered into a long-term lease agreement with the land owner “Agricultural Land Reform Office”
- The noise monitoring program is designed to comply with the International Finance Corporation (World Bank Group) 2007 Environment, Health, and Safety (EHS) Guidelines (Noise Management) and Thai regulation. The noise monitoring is conducted twice a year at sensitive receptors by third party. The noise monitoring for each period is last 72 hours including weekday and weekend. The noise monitoring equipment (Type 1 or 2 sound level meter meeting all appropriate IEC standard) are determined to be located approximately 1.5 m. above the ground and no closer than 3 m. to any reflecting surface. The general noise level standard by the International Finance Corporation (World Bank Group) 2007 Environment, Health, and Safety (EHS) Guidelines (Noise Management) is 55 dBA (daytime) and 45 dBA (night time), and the maximum increase in background noise level (3 dBA). The general noise level standard and the annoyance noise level for Thai regulation is 70 dBA and 10 dBA respectively.
- The shadow flicker model is designed to comply with the Environmental, Health, And Safety Guidelines for Wind Energy (August 7, 2015). The shadow flicker is modelled and predicted based on an astronomical worst-case scenario by using the software called “WindPRO”. The Environmental, Health, And Safety Guidelines for Wind Energy (August 7, 2015) recommends that the predicted duration of shadow flicker effects at sensitive receptors should not exceed 30 hours per year and 30 minutes per day. Thailand has no standard on shadow flicker impact.
- For biodiversity impact, the project has appointed the Faculty of Forestry, Kasetsart University, to study on bird and bat resources, impact assessment and mitigation measure development and etc. since October 2019 to March 2022 (The end of contract period may be extended to recover some months that the expert team could not onsite survey in year 2021).

## II. ENVIRONMENTAL AND SOCIAL MANAGEMENT

### A. COMPLIANCE WITH ENVIRONMENTAL AND SOCIAL SAFEGUARDS RELATED PROJECT REQUIREMENTS

6. **Applicable Thai Regulations.** The wind power plant project in Thailand is not required to develop an EHIA, EIA or IEE report according to Thai regulation, “The Announcement of Ministry of Natural Resources and Environment for the Type and Size of Projects or Activities to be developed an environmental impact assessment (EIA) and Rules, Methods, Practices and Guidelines for EIA development” dated in Thai Government Gazette on 20 June B.E. 2555 (A.D.2002). However, an IEE report has been prepared in order to assess the potential impacts and establish the preventive and mitigation measures. These issues include, among others:

a) Thai Noise Regulation

Noise level standards are divided into two groups as described below;

i) Ambient Noise Level Standard

Maximum Sound Level ( $L_{max}$ )  $\leq 115$  dB(A) and A-Weighted Equivalent Continuous Sound Level ( $L_{eq}$ ) 24 hours  $\leq 70$  dB(A) as prescribed in Thai noise standard “Notification of Environmental Board No. 15 B.E. 2540 (1997)”

ii) Annoyance Noise Level Standard

The sound pressure level of annoyed sound is set at 10 dB(A) and the sound is indicated to be annoyance provided that the calculated annoyance level is higher than 10 dB(A) or greater than the background noise ( $L_{90}$ ) as prescribed in the Thai noise standard “Notification of Environmental Board No. 29 B.E. 2550 (2007)”

**Table 4. Thai Noise Standards**

Noise Level Standard	Standard (dBA)
Maximum Sound Level ( $L_{max}$ )	$\leq 115^{1/}$
A-Weighted Equivalent Continuous Sound Level ( $L_{eq}$ ) 24 hours	$\leq 70^{1/}$
Annoyance Noise Level	$\leq 10^{2/}$

Source: <sup>1/</sup> The Notification of Environmental Board No. 15 B.E. 2540 (1997)

<sup>2/</sup> The Notification of Environmental Board No. 29 B.E. 2550 (2007)

### The World Bank Group EHS Guidelines for Wind Energy and General Guidelines

a) Noise Level Guidelines

As per the General EHS Guideline (April 30, 2007) by the World Bank Group, the noise level guidelines are presented in Table 5, or result in a maximum increase in background levels of 3 dBA at the nearest receptor location off-site.

**Table 5. Noise Level Guidelines by the World Bank Group**

Receptor	One Hour L <sub>Aeq</sub> (dBA) <sup>1/</sup>	
	Daytime (07:00-22:00)	Nighttime (22:00-07:00)
Residential; institutional; educational	≤ 55	≤ 45
Industrial; commercial	≤ 70	≤ 70

Source: <sup>1/</sup> The General EHS Guidelines (April 30, 2007)

b) Shadow Flicker standard

As per the EHS Guideline for Wind Energy (August 7, 2015) by The World Bank Group, it is recommended that the predicted duration of shadow flicker effects experienced at a sensitive receptor not exceed 30 hours per year and 30 minutes per day on the worst affected day, based on a worst-case scenario.

The worst-case scenario is defined as follows:

- a) There is continual sunshine and permanently cloudless skies from sunrise to sunset.
- b) There is sufficient wind for continually rotating turbine blades.
- c) Rotor is perpendicular to the incident direction of the sunlight.
- d) Sun angles less than 3 degrees above the horizon level are disregarded (due to likelihood for vegetation and building screening).
- e) Distances between the rotor plane and the tower axis are negligible.
- f) Light refraction in the atmosphere is not considered.

Regarding the relevant licenses of wind energy project in operation period, the Energy Industry Operation License and Power Generation license are required. In this regard, the project has these two licenses as summarized in Table 6.

**Table 6. Compliance with national and local laws and regulations on Environment and Social Protection**

Permit/license (including Operational, EHS permitting)	Description of requirement	Status as of (monitoring year)
<b>Operations</b>		
Energy Industry Operation license for HNM 1	The license holder must comply with the rules, procedures and conditions specified in the Energy Industry Act, B.E. 2550 (2007).	Issued date 24 January 2018 Valid until 23 January 2028
Energy Industry Operation license for HNM 5		Issued date 24 January 2018 Valid until 23 January 2028
Energy Industry Operation license for HNM 8		Issued date 10 January 2018 Valid until 9 January 2028
Energy Industry Operation license for HNM 9		Issued date 10 January 2018 Valid until 9 January 2028
Energy Industry Operation license for HNM 10		Issued date 10 January 2018 Valid until 9 January 2028
Power Generation license for HNM 1	The license holder must comply with the rules, procedures and conditions specified in Energy Development and Promotion Act B.E.2535 (1992).	Issued date 23 November 2018 Valid until 22 November 2022
Power Generation license for HNM 5		Issued date 8 February 2019 Valid until 7 February 2023
Power Generation license for HNM 8		Issued date 23 November 2018 Valid until 22 November 2022
Power Generation license for HNM 9		Issued date 8 February 2019 Valid until 7 February 2023
Power Generation license for HNM 10		Issued date 8 February 2019 Valid until 7 February 2023

## **B. ROLES AND RESPONSIBILITIES FOR ENVIRONMENTAL AND SOCIAL PERFORMANCE MONITORING**

7. The environmental and social management plan (ESMP) provides the delivery mechanism to address the adverse environmental and social impacts of the proposed project during its implementation, to enhance project benefits, and to introduce standards of good practices to be adopted during all project stages. The primary objectives of the ESMP are to:

- 1) Facilitate the implementation of the mitigation measures identified in this report.
- 2) Define the responsibilities of the project proponents, contractors, and environmental issues among them.
- 3) Define a monitoring mechanism and identify monitoring parameters in order to:
  - Ensure the full implementation of all mitigation measures.
  - Ensure the effectiveness of the mitigation measures, and
  - Provide a mechanism for taking timely action in the face of unanticipated environmental or social situations.

Hanuman's CSR and safety officers at the project level is responsible to oversee the compliance of general environmental protection measures and specific mitigation measures as reflected in the ESMP are properly implemented. The operator and technical officers support CSR and safety officers during both construction and operation of the project. The contractor will be subject to certain liabilities under the environmental laws of the country and under its contract with the company. The mitigation and monitoring measures during operation period are summarized below;

- 1) The project company shall carry-out all mitigation measures as indicated in ESMP. A report of mitigation measures shall be developed and submitted to the local administration organization and the Energy Regulatory Commission (ERC).
- 2) ERC shall review the report and/or onsite monitoring as appropriate (ERC shall recommend or suggest to the project company in case of unfulfilled activity of the mitigation measures (if any))
- 3) The local administration organization shall inform the carried-out mitigation measures to the people in the community (the local administration organization shall recommend or suggest to the project company in case of unfulfilled activity of the mitigation measures or any complaints from their people (if any))
- 4) The project company shall immediately take action on ERC/local administration's comments and then inform the result to both parties.

### C. STATUS OF ESMP IMPLEMENTATION

8. The potential environmental and social impacts of the Project based on the IEE report are associated with Land Use, Noise, Transportation, Waste, Biodiversity and Shadow Flicker impacts during the operational phase.

9. Where potential environmental and social impacts have been identified, the IEE report has examined the extent to which these impacts would be mitigated and sets out the Environmental and Social Management Plan to mitigate and manage these potential impacts as shown in Appendix 1 Environment and Social Management Plan. The status of ESMP implementation during operation period as shown in the table below.

**Table 7. Status of ESMP compliance to IEE following Thai laws and regulations**

Predicted Operational impact issues	Mitigation Measure(s)	Schedule	Responsibility	Status
Noise	<ul style="list-style-type: none"> <li>• Check and maintain machine according to the manufacturer recommendation to prevent noise from machinery.</li> <li>• Measure the noise level by qualified 3<sup>rd</sup> party after the operation to manage the noise impact. Preliminary noise sound level monitoring by using Digicon DS-46SD is also implemented for preliminary observation stage</li> <li>• Control the speed of a vehicle in the project areas by placing speed and noise limit sign.</li> <li>• Provide personal protective equipment such as earplugs to workers working near wind turbines.</li> <li>• Maintenance and repairs of the turbines will be taken on regular basis</li> </ul>	<ul style="list-style-type: none"> <li>• As per the manufacturer recommendation</li> <li>• Within 1 year after operation twice a year</li> <li>• Daily</li> <li>• Daily</li> <li>• As per the manufacturer recommendation</li> </ul>	<ul style="list-style-type: none"> <li>• Siemens Gamesa and O&amp;M</li> <li>• QPIE, Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Siemens Gamesa and O&amp;M</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Ensuring that drivers follow traffic laws strictly.</li> <li>• Limit the speed of vehicles running through the community, not to exceed 60 km/h or less than the laws stated.</li> <li>• Inspect and maintain the condition of roads to functioning safely all seasons.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> <li>• Daily</li> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> </ul>

Predicted Operational impact issues	Mitigation Measure(s)	Schedule	Responsibility	Status
	<ul style="list-style-type: none"> <li>• Install the aircraft warning lights on the wind turbine tower complying with the security requirements of a building in the flight path.</li> <li>• Post information boards about public safety hazards and emergency contact information.</li> </ul>	<ul style="list-style-type: none"> <li>• 1 time before start operation</li> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Complied</li> </ul>
Drainage and flood protection	<ul style="list-style-type: none"> <li>• Provide and maintain storm water drainages to be in good condition</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> </ul>
Waste Management	<ul style="list-style-type: none"> <li>• Provide adequate waste bins at the project area and contact the agencies authorized by the government to pick up for further disposal.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> </ul>
Biodiversity	<ul style="list-style-type: none"> <li>• Use of finish that will reduce blade glint (e.g. matte grey paint) to minimise reflection which possibly blind bird species flying in the area</li> </ul>	<ul style="list-style-type: none"> <li>• Bird and Bat Survey on daily basis</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> </ul>
Economic and Social	<ul style="list-style-type: none"> <li>• Engage and support community events such as participating in the tradition of the community to establish a good relationship with the community.</li> <li>• Notify project general information and impact prevention measures.</li> <li>• Provide a procedure for receiving complaints or suggestions from the community.</li> </ul>	<ul style="list-style-type: none"> <li>• At least 1 time/year</li> <li>• At least 1 time/year</li> <li>• At least 1 time/year</li> </ul>	<ul style="list-style-type: none"> <li>• CSR</li> <li>• CSR</li> <li>• CSR</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> </ul>
Health and Safety	<b>Electrical safety</b> <ul style="list-style-type: none"> <li>• The electrical systems shall meet the relevant standard.</li> <li>• Provide preventive maintenance plan for machines to ensure safety machines remain effective and comply with the standard.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> <li>• Daily</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Complied</li> </ul>



Predicted Operational impact issues	Mitigation Measure(s)	Schedule	Responsibility	Status
	<ul style="list-style-type: none"> <li>• Provide electrical safety and electrical emergency response procedure</li> </ul> <p><b>Fire safety</b></p> <ul style="list-style-type: none"> <li>• Install fire protection system in the buildings as prescribed in Notification of Ministry of Labour, B.E. 2555 (2012), Re: Management Standard on Safety Occupational Health and Working Environment Related to Fire Prevention and Protection or comply with other internationally accepted standards.</li> <li>• Inspect the fire extinguishers regularly and ready for use at any time.</li> <li>• Provide fire emergency response procedure.</li> </ul> <p><b>Occupational health</b></p> <ul style="list-style-type: none"> <li>• Provide 24-hr security guard with radio communication/communication equipment.</li> <li>• Provide appropriate personal protective equipment</li> <li>• Conduct training before commencing work.</li> <li>• Provide work safety manual</li> <li>• Preventive Maintenance and inspection of personal protective equipment shall be carried out regularly and ready for use at any time.</li> <li>• Provide the health check-up for all employees before start working at least once a year.</li> <li>• Record the incident of accident along with description, causes identification, location, severity and solution options.</li> </ul>	<ul style="list-style-type: none"> <li>• Daily</li> <li>• Daily</li> <li>• Daily</li> <li>• Daily</li> <li>• Daily</li> <li>• Daily</li> <li>• 1 time before commencing work</li> <li>• Daily</li> <li>• As per manufacturer recommendation</li> <li>• 1 time before start work and 1 time/year</li> <li>• Every time of incident occurs</li> </ul>	<ul style="list-style-type: none"> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> <li>• Safety</li> </ul>	<ul style="list-style-type: none"> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> <li>• Complied</li> </ul>
Shadow Flicker	<ul style="list-style-type: none"> <li>• Planting tree of the affected receptors (if any)</li> </ul>	<ul style="list-style-type: none"> <li>• As appropriate</li> </ul>	<ul style="list-style-type: none"> <li>• CSR and O&amp;M</li> </ul>	<ul style="list-style-type: none"> <li>• No affected receptors</li> </ul>

<b>Predicted Operational impact issues</b>	<b>Mitigation Measure(s)</b>	<b>Schedule</b>	<b>Responsibility</b>	<b>Status</b>
	<ul style="list-style-type: none"> <li>• Potential changes to the wind farm operating regime to minimize operation of the offending turbines during times of shadow flicker</li> <li>• Blades will be coated with a low reflectivity treatment to prevent reflective glint from the surface of the blade</li> <li>• Provide for relocating affected houses to a suitable proximate location, if necessary</li> </ul>	<ul style="list-style-type: none"> <li>• As appropriate</li> <li>• As appropriate</li> <li>• As appropriate</li> </ul>	<ul style="list-style-type: none"> <li>• CSR and O&amp;M</li> <li>• CSR and O&amp;M</li> <li>• CSR and O&amp;M</li> </ul>	<ul style="list-style-type: none"> <li>• No affected receptors</li> <li>• Complied</li> <li>• Not necessary</li> </ul>

The support documents / photos of the implemented ESMP above are provided in Appendix 2

### **III. ENVIRONMENTAL AND SOCIAL (E&S) MONITORING**

#### **A. RESPONSIBILITIES IN MONITORING OF ENVIRONMENTAL AND SOCIAL SAFEGUARDS**

10. The E&S monitoring was monitored on a regular basis and all outcomes shall comply with the requirements, suggested action plans and scheduled monitoring as described in the Environmental and Social Management Plan. QPIE team has led the monitoring requirements in the ESMP as per the IEE report (the revised IEE year 2020).

#### **B. ENVIRONMENTAL QUALITY STANDARDS**

11. Relevant environmental quality standards and criteria are based on the General Environmental, Health and Safety (EHS) Guidelines of the World Bank Group (2007) and the national standards. The monitoring of environmental quality is provided in Table 9.

The relevant environmental quality standards and criteria for the monitoring program are provided as follows.

- 1) General Noise Level Standard is prescribed in Thai noise standard Notification of Environmental Board No. 15 B.E. 2540 (1997)
- 2) Annoyance Noise Level Standards is prescribed in the Thai noise standard Notification of Environmental Board NO. 29 B.E. 2550 (2007)
- 3) Noise Level Guidelines are prescribed in the General Environmental, Health and Safety (EHS) Guidelines of the World Bank Group (2007), and the Shadow flicker effects are prescribed in the Environmental, Health and Safety (EHS) Guidelines for Wind Energy of the World Bank Group (2015).

12. The below summary is to describe any exceedances and potential issues which were observed during the monitoring period year 2021.

Regarding shadow flicker impact, Thailand has no standard on shadow flicker impact. However, according to the EHS Guidelines for Wind Energy (August 7, 2015), it is recommended that the predicted duration of shadow flicker effects at receptors should not exceed 30 hours per year and 30 minutes per day. As results of shadow flicker models in a worst-case scenario, there were total nine receptors predicted to exceed these standards.

The project conducted site survey on the affected receptors, and it was found that there were six receptors which had tree covering/window shading/rooftop covering up to 80% on the window facing to the WTGs, and other three receptors had no window facing to the WTGs. The project also conducted shadow flicker site-specific assessments in the summer months (March-May) at all nine affected receptors. It was found that some shadow flickers were not occurred as predicted because there were a lot of cloud or no sufficient wind for continually rotating turbine blades. However, the project conducted the community stakeholder consultations to assess the impact at all identified affected sensitive receptors. The results were shown that all the sensitive receptors had no concern on shadow flicker impact. Details of shadow flickers are provided in Appendix 4 (The Shadow Flicker Management Report).

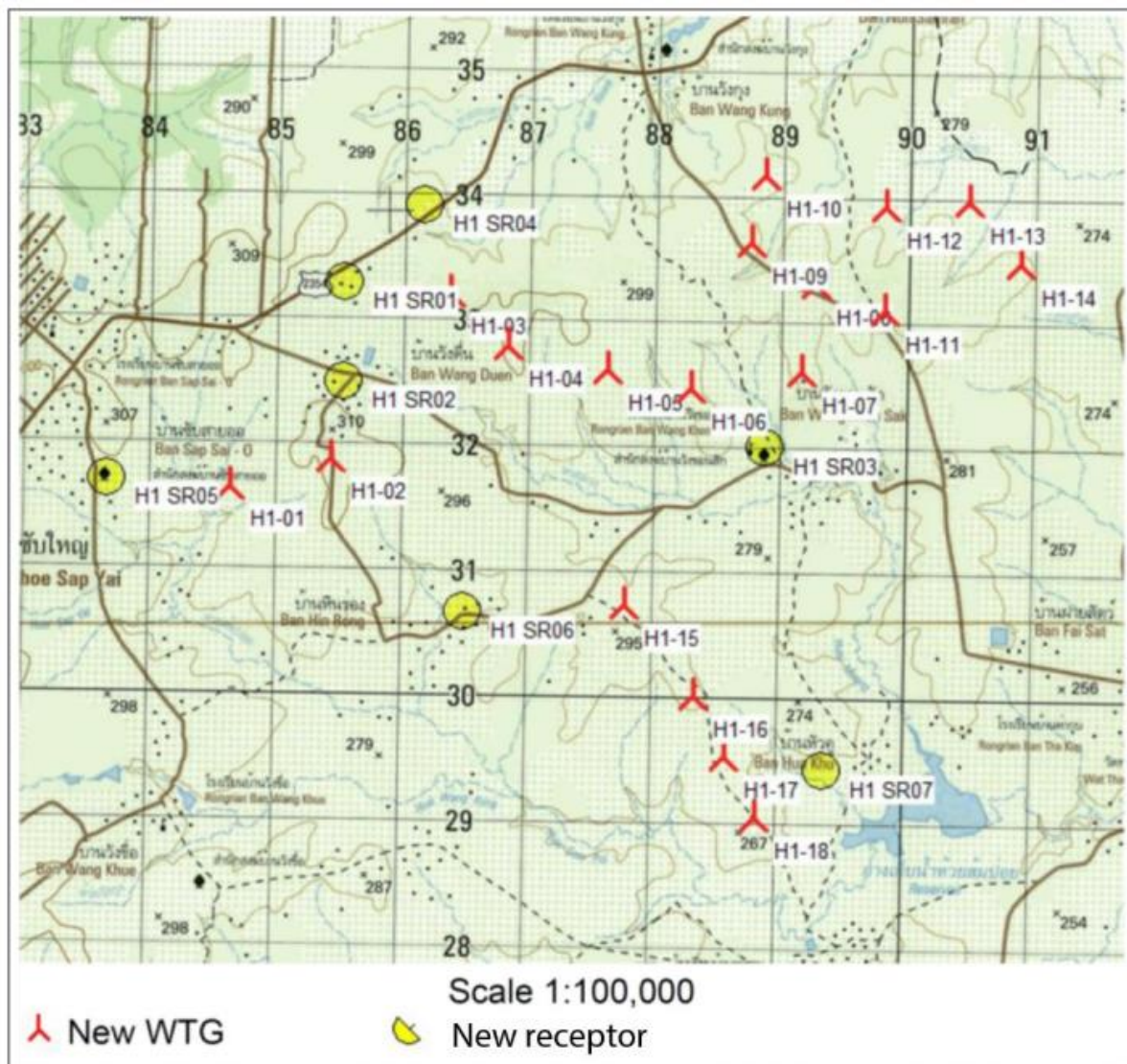
**Table 9. Environmental and Social Monitoring Plan**

<b>Impact Issue</b>	<b>Parameter</b>	<b>Location</b>	<b>Method of Monitoring</b>	<b>Frequency</b>
1. Biodiversity	Monitoring, reporting, inspection and record keeping of birds and bats carcasses.	Project area	Daily report and monthly report submission.	Daily
2. Noise	Noise level	At the receptors	The noise monitoring program is designed to monitor twice a year. The noise monitoring for each period is last 72 hours including weekday and weekend. The noise monitoring equipment/ sound level meters are determined to be located approximately 1.5 m. above the ground and no closer than 3 m. to any reflecting surface.	Twice a year
	grievance record related to noise impact from WTG	Project area and nearby communities	Grievance record submission	When the complaint had been received.
3. Shadow Flicker	Shadow flicker monitoring report (please see Appendix 4 Shadow Flicker Management Report)	At the receptors	Conduct the routine monitoring at the receptors on the expected duration of flicker impacts.	Scheduled monitoring as per the expected duration of flicker impacts.
	Grievance record related to shadow flicker from WTG	Project area and nearby communities	Grievance record submission	When the complaint had been received.
4. Waste Pollution	Quantity of waste generated	Project area	Monthly report submission	Daily
5. Occupational Health and Safety	EHS training records Health surveillance report Usage of proper PPEs Incident records	Project area	Monthly report submission	Monthly
6. Community Health and Safety	Grievance records submitted by the local communities	Surrounding communities of the Project	Grievance record submission	When the complaint had been received.

The noise and shadow flicker monitoring locations for each project are presented in the Tables and Figures below.

**Table 10. The monitoring locations for HNM 1 project**

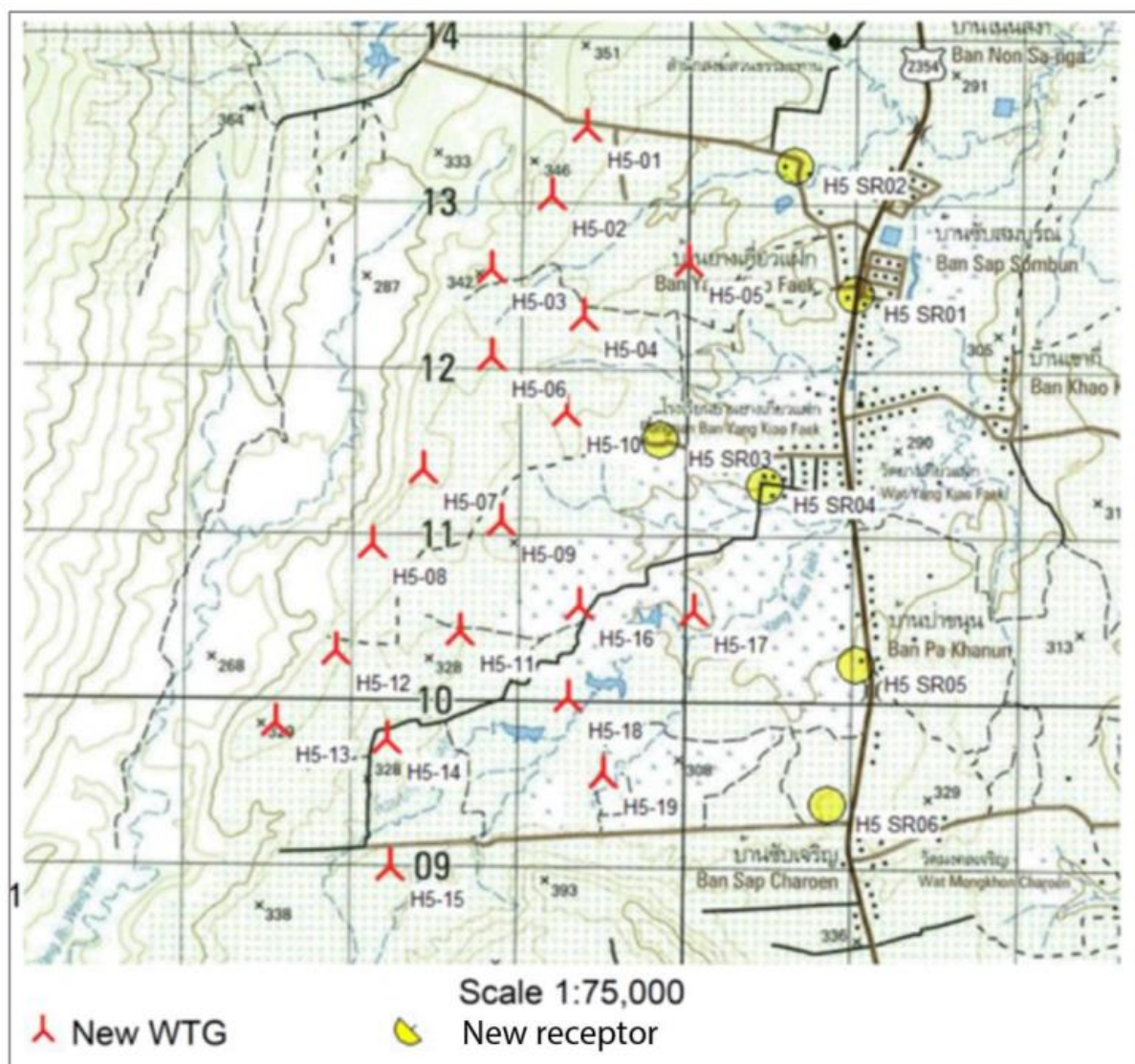
Receptors		
No.	Name	Coordinates
SR01	House	15.661404,101.663459
SR02	House	15.654310,101.663406
SR03	Wat Pa Wang Khon Sak (Temple)	15.649585,101.694557
SR04	Wat Phet Phu Nged Dharma Center	15.667044,101.669341
SR05	Wat Sap Sai-O (Temple)	15.647298,101.645907
SR06	House	15.637740,101.672188
SR07	House	15.626230,101.698781



**Figure 5.**The monitoring locations for HNM 1 project

**Table 11. The monitoring locations for HNM 5 project**

Receptors		
No.	Name	Coordinates
SR01	Sap Somboon Community	15.475967,101.432519
SR02	House	15.482968,101.429124
SR03	Ban Yang Kiao Faek Water Supply	15.468060,101.421568
SR04	House	15.465558,101.427434
SR05	Moo 20 Women Group	15.455764,101.432563
SR06	House	15.448205,101.430887

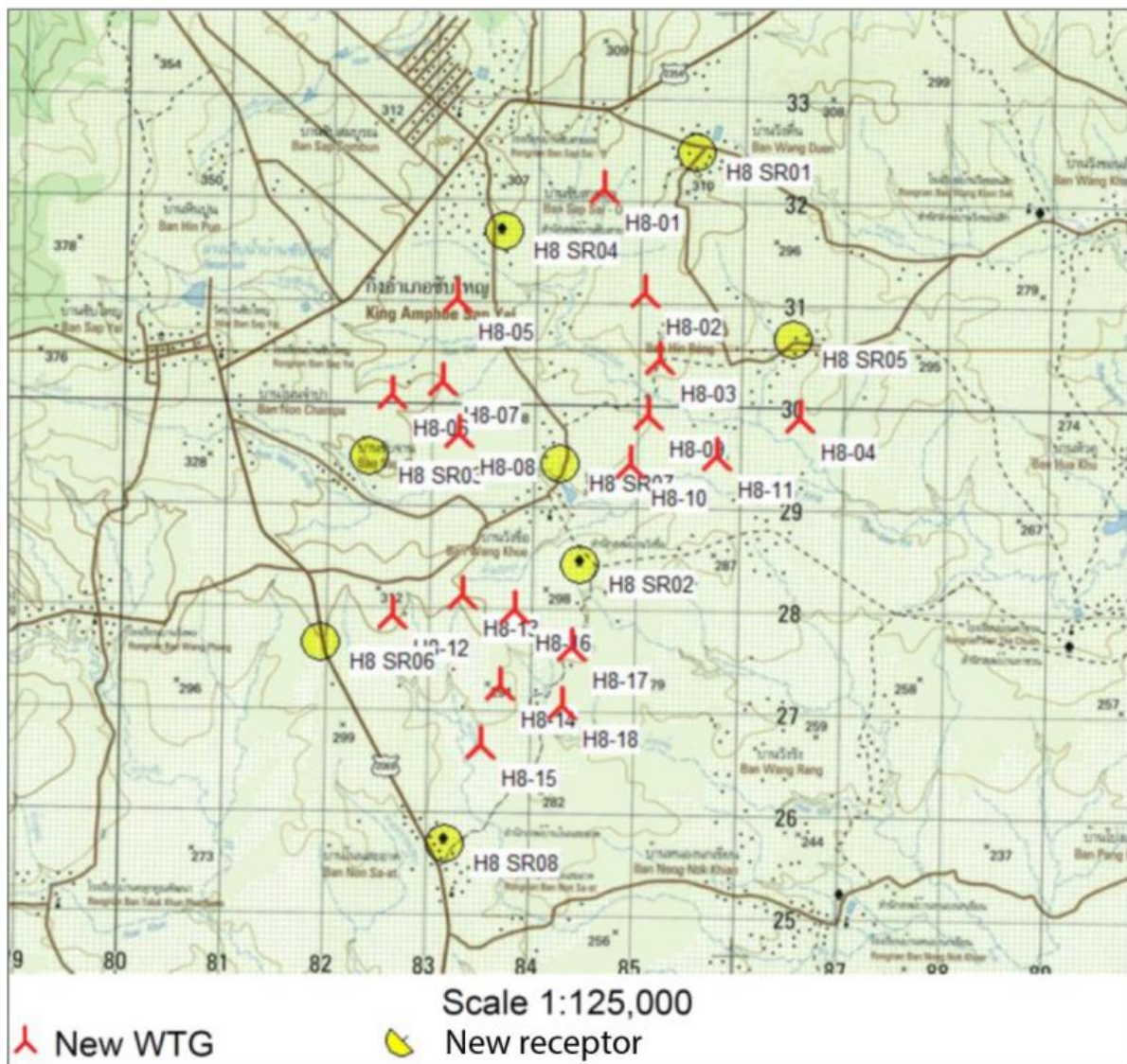


**Figure 6.**The monitoring locations for HNM 5 project



**Table 12. The monitoring locations for HNM 8 project**

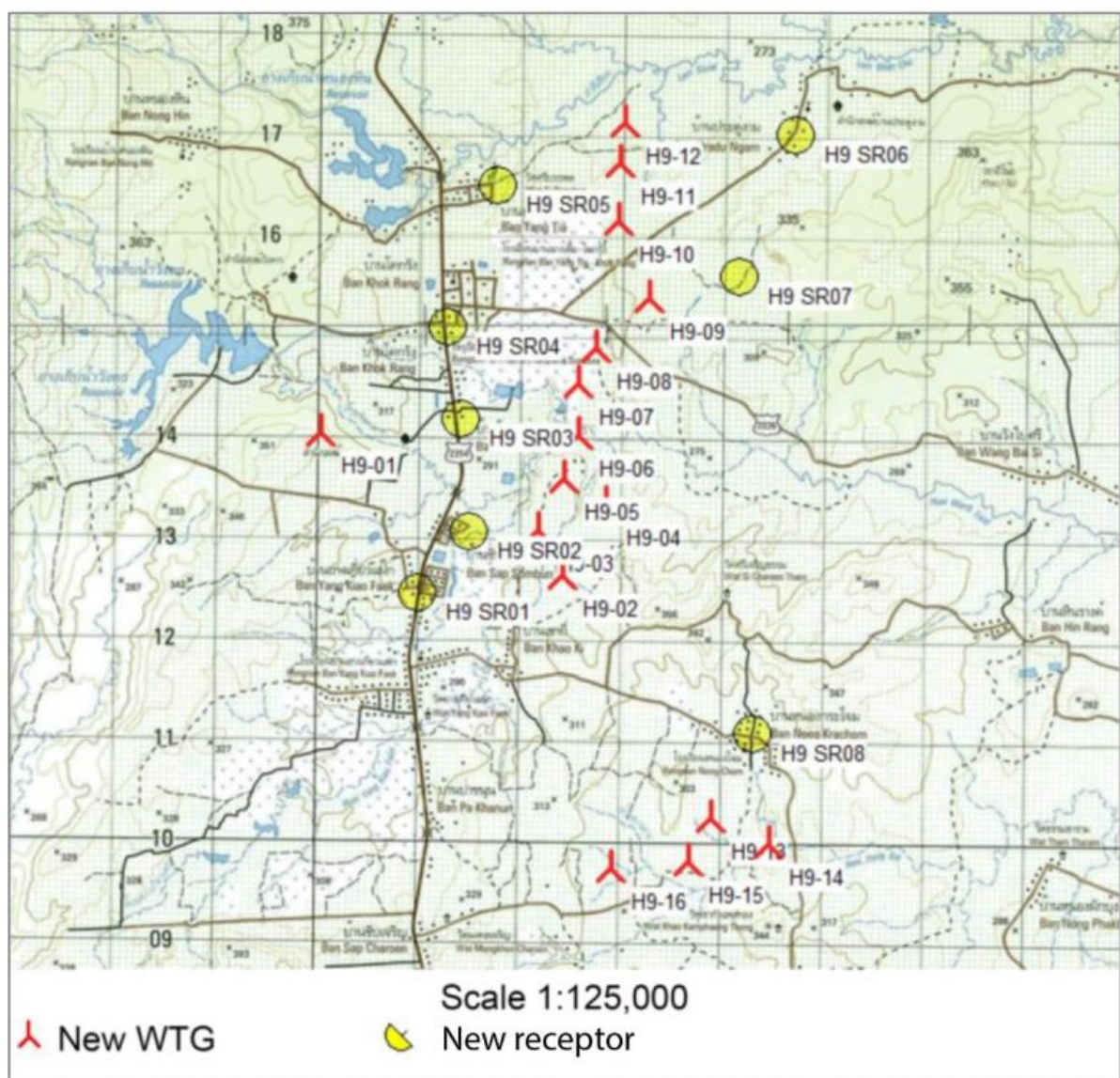
Receptors		
No.	Name	Coordinates
SR01	House	15.654310,101.663406
SR02	Wat Pa Wang Kue (Temple)	15.617906,101.652934
SR03	Wat Baan Sap Jan (Temple)	15.627450,101.633782
SR04	Wat Sap Sai O (Temple)	15.647298,101.645907
SR05	House	15.637740,101.672188
SR06	Restaurant	15.611051,101.629349
SR07	Ban Wang Kue (House of Priest)	15.626691,101.651133
SR08	Ban Nonsa-ard School	15.593098,101.640691



**Figure 7. The monitoring locations for HNM 8 project**

**Table 13. The monitoring locations for HNM 9 project**

Receptors		
No.	Name	Coordinates
SR01	Sap Somboon Community	15.475967,101.432519
SR02	Wat Sap Somboon Sawang Dharma (Temple)	15.481492,101.437131
SR03	Ban Non Sa-nga Community	15.49155,101.436478
SR04	Tripracha Phattanasuksa School	15.499794,101.435276
SR05	Ban Yang Tie Community	15.512531,101.439894
SR06	Ban Pra-do Ngam Community	15.516928,101.467228
SR07	House	15.504328,101.462058
SR08	Ban Nong Krajom Community	15.463317,101.463186

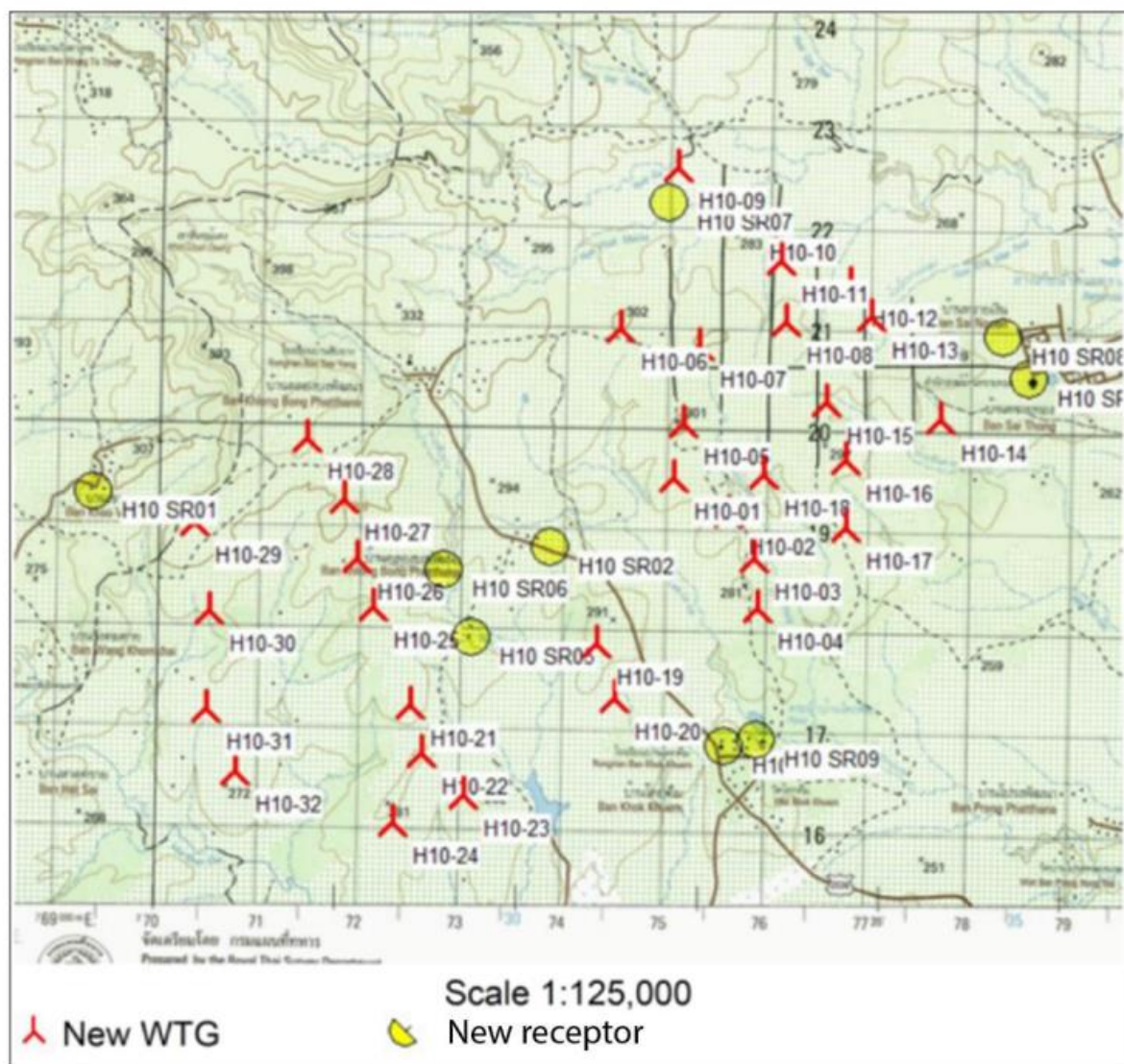


**Figure 8. The monitoring locations for HNM 9 project**



**Table 14. The monitoring locations for HNM 10 project**

Receptors		
No.	Name	Coordinates
SR01	Wat Khao Wong Phra-chan (Temple)	15.536902,101.511000
SR02	Khong Bong Phattana (Public Sport Center)	15.532039,101.553014
SR03	Ban Kok Kum School	15.514303,101.569090
SR04	Ban Sai Thong (House of Priest)	15.547201,101.597008
SR05	House	15.524031,101.545827
SR06	House	15.530053,101.543296
SR07	House	15.562946,101.563778
SR08	House	15.550886,101.594687
SR09	Wat Ban Kok Kum (Temple)	15.514886,101.572017



**Figure 9. The monitoring locations for HNM 10 project**

### C. ENVIRONMENTAL AND SOCIAL MONITORING DATA

**Table 15. Environmental monitoring data**

Impacts	Unit	Location	Monitoring Period	Results	Standard (IFC Guidelines)	Thailand Regulations
Biodiversity (please see Appendix 5 Biodiversity Monitoring Report)	Number of bird carcass	Project area	Jan - Dec 21	0	N/A	N/A
	Number of bat carcass	Project area	Jan - Dec 21	33	N/A	N/A
Noise (please see Appendix 3 Noise Monitoring Report)	Background noise increased in Daytime (dBA)	Receptors of HNM1 Receptors of HNM5 Receptors of HNM8 Receptors of HNM9 Receptors of HNM10	29 Jun-2 Jul 21, 8-11 Dec 21 4-7 Jul 21, 3-6 Dec 21 29 Jun-2 Jul 21, 8-11 Dec 21 4-7 Jul 21, 3-6 Dec 21 4-7 Jul 21, 3-6 Dec 21	-4.9 -0.9 -6.2 to -2.2 -5.0 to -2.6 -6.6 to -1.2	3 dBA	N/A
	Background noise increased in Night time (dBA)	Receptors of HNM1 Receptors of HNM5 Receptors of HNM8 Receptors of HNM9 Receptors of HNM10	29 Jun-2 Jul 21, 8-11 Dec 21 4-7 Jul 21, 3-6 Dec 21 29 Jun-2 Jul 21, 8-11 Dec 21 4-7 Jul 21, 3-6 Dec 21 4-7 Jul 21, 3-6 Dec 21	-6.3 -4.3 -6.0 to -4.3 -6.6 to -4.9 -9.4 to -5.9	3 dBA	N/A
Solid waste	Volume of waste generated (ton)	Project area	Jan - Dec 21	26.665	N/A	N/A
	Contracts with collection and treatment companies	The project collected waste at the project area and take it to Waste Disposal Center once a week. The Waste Disposal Center is managed by Ban Chuan Subdistrict Administrative Organization.	Jan - Dec 21	26.665	Complied	Complied
Hazardous waste	Volume of waste generated (ton)	Project area	Jan - Dec 21	- Contaminated container 0.14 ton - Oil wiped rag 10.68 ton - Used oil 1.60 ton	N/A	N/A

Impacts	Unit	Location	Monitoring Period	Results	Standard (IFC Guidelines)	Thailand Regulations
				- Light bulb 0.10 ton		
	Contracts with collection and treatment companies	Hazardous waste collected and disposed by Better World Green (Public) Co., Ltd.(BWG) Who is accredited by the Department of Industrial Works, Ministry of Industry. The Factory operation license for disposal and license for transport of hazardous waste are provided in Appendix 6.	Jan - Dec 21	In year 2021, the hazardous wastes were collected by BWG for disposal 2 times (March and August) as following details: - Contaminated container 0.14 ton - Oil wiped rag 10.68 ton - Used oil 1.60 ton - Light bulb 0.10 ton (Support documents are provided in Appendix 6 Hazardous Waste Management)	Complied	Complied

**Table 16. Occupational Health and safety monitoring data**

Occupational Health and Safety Incidents	Number of Incidents	Investment Name Occupational Health and Safety Incident Details
<u>Fatalities/injuries</u>	0	1. Date(s) of fatality: - 2. Cause of fatality: - 3. Corrective or preventive measures to prevent reoccurrence: -
Total Lost Time Accidents (including vehicular)	0	1. Date(s) of lost time accidents: - 2. Cause(s) of lost time accident(s): - 3. Corrective or preventive measures to prevent reoccurrence: -
Total number of lost workdays resulting from incidents.	0	1. Total lost workdays this reporting period: 0 2. Total lost workdays last reporting period: 0
Total man-hours worked (total hours worked by all employees) during the reporting period and Incidence calculation.		1. Total man-hours worked this reporting period: 41,310 hours 2. Incidence = total lost workdays/total hours worked: 0 3. Incidence this reporting period: 0 4. Incidence last reporting period: 0 5. Incidence next to last reporting period: 0
Trainings	10	1. Environment, Occupational Health and Safety Training for contractor on 18 Mar 2021 2. Environment, Occupational Health and Safety Training for contractor on 7 May 2021 3. Environment, Occupational Health and Safety Training for contractor on 2 Jun 2021 4. Environment, Occupational Health and Safety Training for contractor on 24 Jun 2021 5. Environment, Occupational Health and Safety Training for new staff on 19 Aug 2021 6. Environment, Occupational Health and Safety Training for contractor on 16 Sep 2021 7. Basic Fire Fighting Training on 5-6 Oct 2021 8. Environment, Occupational Health and Safety Training for contractor on 12 Oct 2021 9. First Aid and Cardiopulmonary Resuscitation Training on 13 Nov 2021 10. Basic Fire Fighting Training on 3 Dec 2021

Personnel should be trained in environmental, health and safety matters including accident prevention, safe lifting practices, the use of Material Safety Data Sheets (MSDS), safe chemical handling practices, proper control and maintenance of equipment and facilities, emergency response, personal protective equipment (PEP), emergency response, etc.

#### IV. PUBLIC CONSULTATION, INFORMATION DISCLOSURE AND GRIEVANCE REDRESS MECHANISM

13. For public consultation, the projects conducted community stakeholder consultations to collect recommendations and assess impacts related to the projects, and then to develop mitigation plans/measures (if needed). The stakeholder consultations were conducted in period of July - December 2021 as summarized in Table 17.

**Table 17. Summary of stakeholder consultations**

No.	Stakeholders	Location coordinate	Consultation date
<b>HNM1</b>			
1	House	15.661404,101.663459	13 Dec 21
2	House	15.654310,101.663406	23 Dec 21
3	Wat Pa Wang Khon Sak (Temple)	15.649585,101.694557	5 Dec 21
4	Wat Phet Phu Nged Dharma Center	15.667044,101.669341	5 Dec 21
5	Wat Sap Sai-O (Temple)	15.647298,101.645907	19 Dec 21
6	House	15.637740,101.672188	30 Nov 21
7	House	15.626230,101.698781	19 Dec 21
<b>HNM5</b>			
1	Sap Somboon Community	15.475967,101.432519	5 Dec 21
2	House	15.482968,101.429124	19 Nov 21
3	Ban Yang Kiao Faek Water Supply	15.468060,101.421568	11 Dec 21
4	House	15.465558,101.427434	22 Nov 21
5	Moo 20 Women Group	15.455764,101.432563	6 Aug 21
6	House	15.448205,101.430887	19 Dec 21
<b>HNM8</b>			
1	House	15.654310,101.663406	23 Dec 21
2	Wat Pa Wang Kue (Temple)	15.617906,101.652934	19 Dec 21
3	Wat Baan Sap Jan (Temple)	15.627450,101.633782	19 Dec 21
4	Wat Sap Sai O (Temple)	15.647298,101.645907	19 Dec 21
5	House	15.637740,101.672188	30 Nov 21
6	Restaurant	15.611051,101.629349	8 Jul 21
7	Ban Wang Kue (House of Priest)	15.626691,101.651133	12 Sep 21
8	Ban Nonsa-ard School	15.593098,101.640691	23 Nov 21
<b>HNM9</b>			
1	Sap Somboon Community	15.475967,101.432519	5 Dec 21
2	Wat Sap Somboon Sawang Dharma (Temple)	15.481492,101.437131	1 Dec 21
3	Ban Non Sa-nga Community	15.49155,101.436478	6 Dec 21
4	Tripracha Phattanasuksa School	15.499794,101.435276	6 Dec 21
5	Ban Yang Tie Community	15.512531,101.439894	31 Dec 21
6	Ban Pra-do Ngam Community	15.516928,101.467228	31 Dec 21
7	House	15.504328,101.462058	31 Dec 21
8	Ban Nong Krajom Community	15.463317,101.463186	8 Dec 21
<b>HNM10</b>			
1	Wat Khao Wong Phra-chan (Temple)	15.536902,101.511000	10 Dec 21
2	Khong Bong Phattana (Public Sport Center)	15.532039,101.553014	21 Dec 21
3	Ban Kok Kum School	15.514303,101.569090	10 Dec 21
4	Ban Sai Thong (House of Priest)	15.547201,101.597008	2 Dec 21

5	House	15.524031,101.545827	1 Oct 21
6	House	15.530053,101.543296	21 Nov 21
7	House	15.562946,101.563778	22 Nov 21
8	House	15.550886,101.594687	21 Nov 21
9	Wat Ban Kok Kum (Temple)	15.514886,101.572017	10 Dec 21

During the consultations, the topics of discussions were listed as follows:

- The project team provided introductions to the stakeholders
- The project team provided objectives of the consultations to the stakeholders
- The project team interviewed to collect personal information of the stakeholders (e.g. address, name, gender, age, occupation, working hour, free time/available time).
- The project team interviewed to collect recommendations and opinions related to the projects from the stakeholders.
- The project team interviewed to collect impacts information related to the projects (e.g. community economic, water, air, waste, transport, occupational health and safety, noise, shadow flicker) from the stakeholders.

As results of the consultations, all of them had no concern on impacts of community economic, water, air, waste, transport, occupational health and safety, noise and shadow flicker. The minute of meetings are provided in Appendix 7.

14. The CSR team visited the areas surrounding the Hanuman project and participated in several community events. CSR activities are summarized in monthly basis as shown in Appendix 8 and Table below.

**Table 18. Summary of the Corporate Social Responsibility (CSR) activities of Hanuman project**

Month	Date	Activities
January	14 Jan 2021	Donated food and beverage to villagers during the COVID-19 pandemic at Khok Phet Patana Subdistrict Administrative Organization, Bamnet Narong District, Chaiyaphum Province.
	14 Jan 2021	Attended a meeting of COVID-19 Protective Measures at Sap Yai District Office, Chaiyaphum Province.
February	2 Feb 2021	Welcomed the visit of the Permanent Secretary of Chaiyaphum Province District Chief Officer of Sap Yai for learning and understanding of renewable energy at the project site.
	16 Feb 2021	Attended a meeting with villagers near HNM1 to build relationships and work together.
	23 Feb 2021	Participated in blood donation at Sap Yai District Office, Chaiyaphum Province.
	20-25 Feb 2021	Donated and installed a solar pump to village of Baan Wang U-Dom, Tha Kup Subdistrict, Sap Yai District, Chaiyaphum Province.
March	4 Mar 2021	Welcomed the visit of the Chairman of Ombudsman and team for learning and understanding of renewable energy at the project site.
	16 Mar 2021	Participated in sacrificial ceremony of Phraya Phakdi Chumphon at Sap Yai District Office, Chaiyaphum Province.
	17 Mar 2021	Donated solar PV panels to Ruam Raj Wittayanukul School, Chaiyaphum Province.

Month	Date	Activities
	29-31 Mar 2021	Donated and installed a solar PV to Baan Wang Khon Sak School, Chaiyaphum Province.
April	7-9 Apr 2021	Participated in Songkran Festival and Day of Older Persons at Sap Yai Subdistrict Administrative Organization, Tha Kub Subdistrict Administrative Organization and Tako Thong Subdistrict Administrative Organization, Chaiyaphum Province.
	10 Apr 2021	Installed a solar PV to Baan Wang Khon Sak School, Chaiyaphum Province.
	11-13 Apr 2021	Donated drinking waters during Songkran Festival at Sap Yai Subdistrict Administrative Organization, Tha Kub Subdistrict Administrative Organization, Tako Thong Subdistrict Administrative Organization, Ban Chuan Subdistrict Administrative Organization, Khok Phet Patana Subdistrict Administrative Organization, Huai Yai Chio Subdistrict Administrative Organization. Watabaek Subdistrict Administrative Organization, Nong Bua Rawae Municipality and community service points.
May	14 May 2021	Welcomed the visit of Sap Yai District Officers for monitoring on COVID-19 Protective Measures at the project site.
	25 May 2021	Welcomed the visit of the Red Cross of Chaiyaphum Province team for learning and understanding of renewable energy at the project site.
June	4 Jun 2021	Welcomed the visit of a candidate of Miss Grand Chaiyaphum for promoting tourism in Chaiyaphum Province.
	12-30 Jun 2021	Donated drinking waters to communities (Baan Non Sa-Ard and Baan Nong Jod) during the COVID-19 pandemic.
	17 Jun 2021	Donated drinking waters during vaccination event at Sap Yai District Office.
July	13-16 Jul 2021	Donated food and beverage to medical staff at Bamnet Narong Hospital, Thep Satit Hospital, Sap Yai Hospital, Bamnet Narong District Public Health, Wat Pa Yub (state quarantine) and Thep Satit District Office.
	16 Jul 2021	Participated the (anti-drug) Sport at Baan Wang Kom Khai and Bamnet Narong Police Station.
	16 Jul 2021	Visited the project of Cows School, the cattle farming knowledge center at Ruam Rat Witthaya Nukun School, Noen Sa-nga district, Chaiyaphum province.
August	13 Aug 2021	Donated money and supported on setting up the field hospital (district level) at Bamnet Narong District Office.
	13 Aug 2021	Donated money and supported on setting up the field hospital (district level) at Thep Satit District Office.
	16 Aug 2021	Donated money and supported on setting up the field hospital (district level) at Sap Yai District Office.
	21 Aug 2021	Lent candle and rains-cloths on Buddhist Lent Day at Phong Tiger Cave (House of Priest) and Pho Kiri Khet Dharma Place.
	24 Aug 2021	Participated in blood donation at Sap Yai Wittayakom School.
September	4 Sep 2021	Donated survival bags to impoverished people and bedridden patients in communities (Baan Sup Yan and Baan Khok Khum).
	14 Sep 2021	Donated drinking waters to communities during the COVID-19 pandemic at Bamnet Narong District Office and Tako Thong Subdistrict Administrative Organization.

Month	Date	Activities
	20 Sep 2021	Visited the project of Cows School, the cattle farming knowledge center at Ruam Rat Witthaya Nukun School, Noen Sa-nga district, Chaiyaphum province.
	24 Sep 2021	Presented the renewable energy to Chulachomklao Royal Military Academy via online (Zoom).
October	5 Oct 2021	Donated survival bags to communities at Bamnet Narong District Office, Khok Phet Patana and Ban Chuan Districts.
	7 Oct 2021	Donated preventive equipment of COVID-19 to District Public Health.
	13 Oct 2021	Visited the project of Cows School, the cattle farming knowledge center at Ruam Rat Witthaya Nukun School, Noen Sa-nga district, Chaiyaphum province.
	27 Oct 2021	Donated preventive equipment of COVID-19 and survival bags to Nong Bua Rawae District Office.
November	4 Nov 2021	Participated a Buddhist Kratin Ceremony at Wat Nong E-Lor, Bamnet Narong District.
	6-7 Nov 2021	Participated a Buddhist Kratin Ceremony at Sap Yai District Office and Thep Satit District Office.
December	15 Dec 2021	Welcomed the visit of Energy Regulatory Commission (ERC) team at the project site.
	16 Dec 2021	Arranged a trip for community leaders to site visit new wind farm projects in Khon Khaen, Maha Sarakham and Kalasin Provinces.
	27 Dec 2021	Participated in handover ceremony of the project of Cows School, the cattle farming knowledge center to Ruam Rat Witthaya Nukun School, Noen Sa-nga district, Chaiyaphum province.
	29-30 Dec 2021	Donated beverages to the staff at community service points during New Year Festival.

15. A Grievance Redress Mechanism (GRM) has been devised to provide a venue to discuss issues through conflict resolution and address issues adequately for both external and internal stakeholders (e.g. community members/project staff/contractors/ subcontractors/ workers and etc.). During project construction and operation, CSR officer and CSR Center are responsible to receive and handle complaints or queries regarding the project.

A complainant can submit a complaint or query via verbal, letter, telephone, email, Line application and e-mail. Any complaint filed will be immediately handled and analyzed by the related department and inform back to the complainant within 3-5 working days (severe / complicated case) or 15 working days (general case). The grievance procedure flow chart shown in Figure 11.

The designated officer will be maintaining a record to keep track of the following:

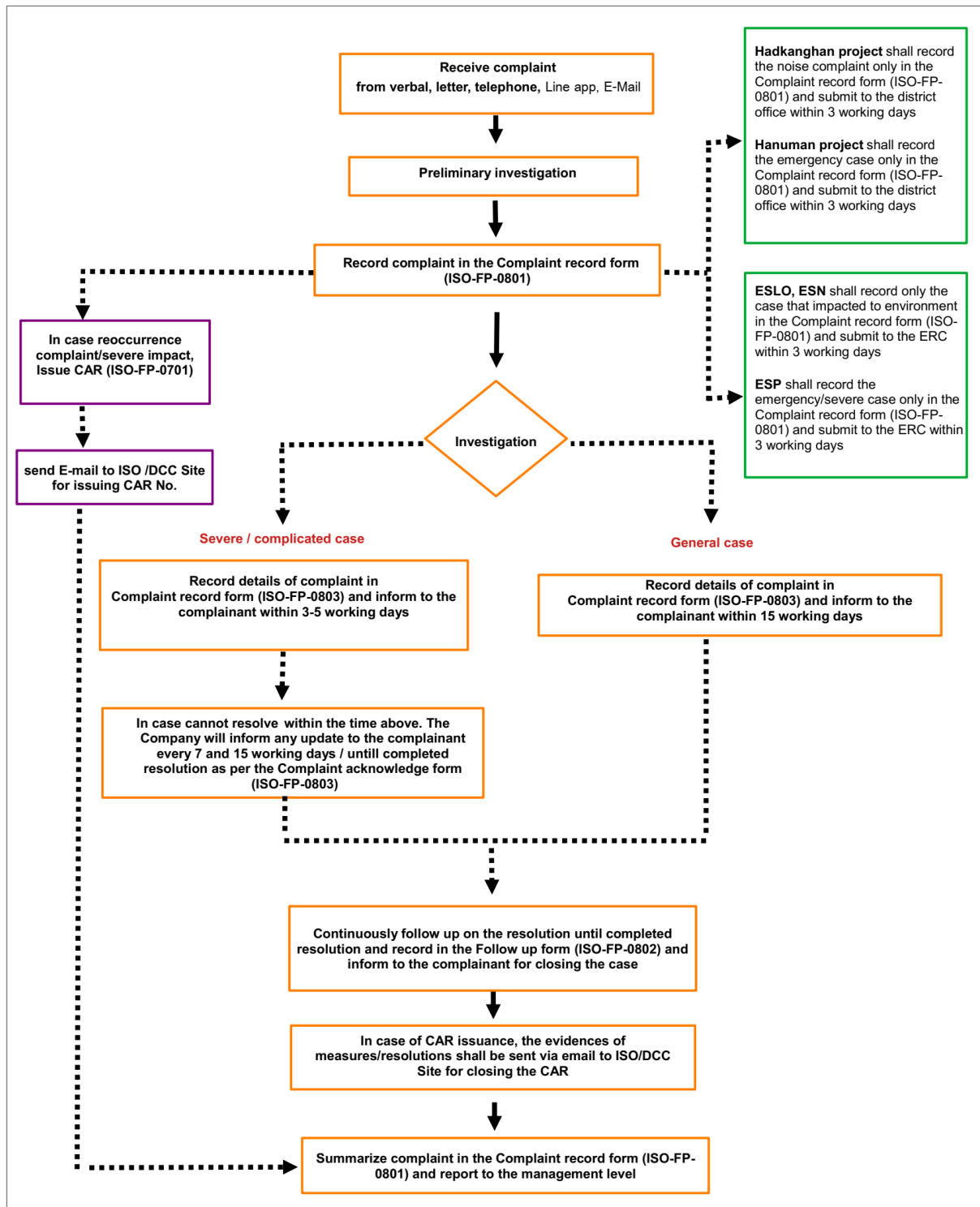
1. date of the complaint,
2. details about the complainant,
3. name or contact information (if any)
4. description of grievance,
5. actions taken,
6. follow up requirements (if any),
7. the target date for the implementation of the mitigation measures,



The record book will include a narrative on the actual measures/process undertaken to handle or mitigate these concerns.

For the period of year 2021, there are no grievances received from both external and internal stakeholders. The grievance record is presented in Appendix 9 Grievance Record.

Grievance/ Dispute date	Complainant	Issue	Resolved (Y/N)	Action taken	Date closed
no grievances received in year 2021					



**Figure 10** Grievance procedure flow chart

## V. LABOUR AND WORKING CONDITIONS

### 16. Workforce information

# of direct employees	# female direct employees	# employees terminated	# employees hired	# Contractor employees
14	4	-	-	76

17. The company strictly requires all contractors to comply with the company rules and related laws and regulations.

## VI. INSTITUTIONAL STRENGTHENING AND TRAINING

18. The training programme was undertaken for project staff and contractors as presented in the following table and training records in 2021 are shown in Appendix 10.

**Table 8. The summary of training program**

No.	Subject	Trainee	No. of trainees	Trainer	Training Date
1	Environment, Occupational Health and Safety Training for contractor	Contractor	4	Safety Officer	18 Mar 2021
2	Environment, Occupational Health and Safety Training for contractor	Contractor	2	Safety Officer	7 May 2021
3	Environment, Occupational Health and Safety Training for contractor	Contractor	6	Safety Officer	2 Jun 2021
4	Environment, Occupational Health and Safety Training for contractor	Contractors	5	Safety Officer	24 Jun 2021
5	Environment, Occupational Health and Safety Training for new staff	New staff	1	Safety Officer	19 Aug 2021
6	Environment, Occupational Health and Safety Training for contractor	Contractor	26	Safety Officer	16 Sep 2021
7	Environment, Occupational Health and Safety Training for contractor	Contractor	1	Safety Officer	12 Oct 2021
8	Basic Fire Fighting Training	HNM ESM Staff and Contractors	65	Safety Officers	18 Oct 2021
9	First Aid and Cardiopulmonary Resuscitation Training	HNM ESM Staff and Contractors	65	Mr. Panumate Kosolkittiwong	13 Nov 2021
10	Basic Fire Fighting Training	HNM ESM Staff and Contractors	60	Nava Siri Group (Accredited party)	3 Dec 2021

## VII. CONCLUSION

19. Regarding the assessment results on the EHS performance of the project, the project is compliance with the relevant Thai regulations and ADB Safeguards Policy Statement requirements.

The project has assigned the safety and CSR officers at the project level to responsible for overseeing the compliance of biodiversity, water, noise, shadow flicker, occupational health & safety, and waste management issues. The project has developed all relevant safety manual and conducted EHS training for project staff and contractors. The project also has a grievance mechanism to provide a venue to discuss issues through conflict resolution and address issues adequately. The project has often participated in communities' activities, as the results a good relationship with nearby communities are received.

The project has implemented activities on the Environmental and Social Management Plan as per the IEE. The noise monitoring results of year 2021 were not over the relevant Thai standard and the General Environment, Health, and Safety (EHS) Guidelines (Noise Management) of the World Bank (April 30, 2007). The shadow flicker model results in a worst-case scenario revealed that there are nine receptors with shadow flicker exposure above the recommendation standards by the Environmental, Health, and Safety Guidelines for Wind Energy (August 7, 2015). As results of potential shadow flicker impacts, the project conducted a survey to assess the actual condition at all nine impacted receptors. In addition, the project conducted the shadow flicker site-specific assessment in the summer months (March-May) for year 2021 as per the shadow flicker models. Furthermore, the project conducted the community stakeholder consultations to assess the impacts at all identified affected sensitive receptors. The results were shown that all the sensitive receptors had no concern on noise and shadow flicker impacts as these impacts did not affect to their daily life. Noise and shadow flicker monitoring will be continued in annual basis to assess the impacts and then provide specific measures as necessary.

For biodiversity impact, the project has assigned the Faculty of Forestry, Kasetsart University, to study on bird and bat resources, impact assessment and mitigation measure development, etc. In parallel, the project has conducted monitoring of bird and bat carcasses impacted twice a day. The monitoring data from both sources (the expert team from Kasetsart University and the project staff) in the period of year 2021 shown that there was no bird carcass found in the project area. There were 33 bat carcasses found in the project area (The number of bat carcasses was reduced from 130 cases in year 2019 and 48 cases in year 2020). All 33 bat cases in year 2021 were found only in HNM10 area.

The most impact wind turbines of bat were WTG9 (6 cases) and followed by WTG13 and WTG30 (4 cases each) of HNM10. As planned, the expert will select the most impact wind turbines and install bat detectors to collect data and then analyse to design appropriate mitigation measures for the project. The completed study on biodiversity including appropriate mitigation measures is expected to be contained in the final report in year 2022.

## **VIII. APPENDICES**

- Appendix 1 Environment and Social Management Plan (ESMP)
- Appendix 2 Support documents / photos of the ESMP Implementations
- Appendix 3 Noise Monitoring Report
- Appendix 4 Shadow Flicker Management Report
- Appendix 5 Biodiversity Monitoring Report
- Appendix 6 Hazardous Waste Management
- Appendix 7 Minutes of Meetings of Stakeholder Consultations
- Appendix 8 Corporate Social Responsibility Activities
- Appendix 9 Grievance Records
- Appendix 10 Training Records in Year 2021