Environmental and Social Impact Assessment – Volume 2

Environmental and Social Baseline Loi Hai 2 Wind Farm Project

Thuan Binh Wind Power Joint Stock Company

29 January 2021

Project No.: 0575014

The business of sustainability

ERM

Document details	
Document title	Environmental and Social Impact Assessment – Volume 2
Document subtitle	Environmental and Social Baseline Loi Hai 2 Wind Farm Project
Project No.	0575014
Date	29 January 2021
Version	0.0
Author	ERM Team
Client Name	Thuan Binh Wind Power Joint Stock Company

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	0.0	ERM Team	Paola R	Paola R	29 January 2021	Text

Signature Page

29 January 2021

Environmental and Social Impact Assessment – Volume 2

Environmental and Social Baseline Loi Hai 2 Wind Farm Project

Mark Watson
Partner in Charge

ERM Vietnam
3rd Floor, Saigon Finance Centre
09 Dinh Tien Hoang, Dakao Ward
District 1, Ho Chi Minh City
Vietnam

CONTENTS

List of Tables

List of Figures

Acronyms and Abbreviations

Name	Description
AOI	Area of Influence
BaU	Business as Usual
CMS	Central Monitoring System
CO2	Carbon Dioxide
CSR	Compensation, Support and Resettlement
DMS	Detailed Measurement Survey
DoNRE	Department of Natural Resources and Environment
DWT	Deadweight tonnage
EAA	Ecologically Appropriate Area
EAAA	Ecological Appropriate Area for Analysis
EHS	Environmental, Health and Safety
EIA	Environmental Impact Assessment
EOR	Energy Outlook Report
EPC	Engineering, Procurement, and Construction
EPFIs	Equator Principle Financial Institutions
EPP	Environmental Protection Plan
EPs	Equator Principles
ERM	Environmental Resources Management
ES	Ecosystem Services
ESHIA	Environment Social Health Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMP	Environment and Social Management Plan, Health and Safety
FGD	Focused Group Discussion
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIIP	Good International Industry Practice
GN	Guidance Notes
Hz	hertz
IA	Impact Assessment
IFC	International Finance Corporation
IFC	International Finance Corporation’s
IFC PS	International Finance Corporation – Performance Standard
ISO	International Organisation for Standardisation
IUCN	International Union for Conservation of Nature
kg	kilogram
km	kilometre
kV	Kilovolt
LEP	Law on Environment Protection

m	metre
m/s	metre per second
m2	square metre
MES	Millennium Ecosystem Service Assessment
MoNRE	Ministry of Natural Resources and Environment
MW	megawatt
NTFP	Non-timber forest product
OHS	Occupational Health and Safety
POP	Persistent Organic Pollutants
RE	Renewable Energy
SCADA	Supervisory Control and Data Acquisition
SEA	Strategic Environmental Assessment
SPS	Safeguard Policy Statement
TCFD	Task-force on Climate- related Financial Disclosures
TPES	Total Primary Energy Supply
UNFCC	United Nation Framework Convention on Climate Change
WPP	Wind Power Project
WRI	World Resource Institute

7. ENVIRONMENTAL BASELINE

7.1 Climate and Meteorology

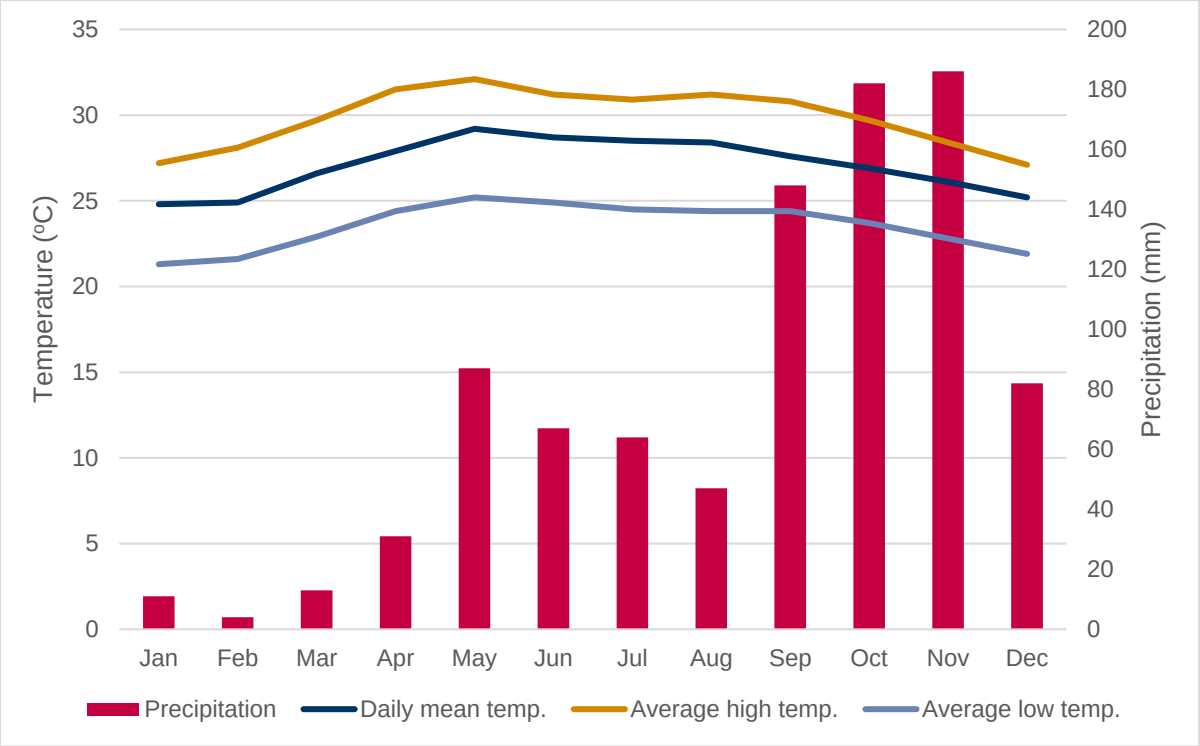
7.1.1 Temperature and Precipitation

The climate of Thuan Bac district, where the project is located, as well as the whole Ninh Thuan province, is classified as tropical monsoon, which is characterised by a hot and dry oceanic climate, with virtually no cold winter. The summer starts in early April, when temperatures gradually increase and peak in May and June, while the lowest temperatures usually occur in December and January. Annual mean temperatures vary between 25 ºC to 27 ºC at different stations in the province, and tend to be higher in the Eastern region than in the West. The difference between hottest month and coolest month is around 4.1 ºC. The absolute highest temperature ever recorded at Phan Rang station is 39.4ºC, while the lowest is 16.1ºC.

Ninh Thuan province falls in the driest region of the country, however, due to the characteristics of topography, the rainfall distribution varies greatly between areas of the province. The annual precipitations range from the lowest of 920 mm at Phan Rang station (20 km from the Project location) to 1,544 mm at Song Pha station located in the Western mountainous region. Especially, the upstream reach of Song Cai Phan Rang river experiences the annual precipitation of more than 2,000 mm.

The wettest months are October and November, while the dry season lasts from January to April every year. The rainfall received in rainy season accounts for 65% to 75% of annual rainfall. The number of rainy days in a year varies between 96 to 99 days.

The temperature and rainfall data recorded at Phan Rang station are presented in Figure 7.1 below.

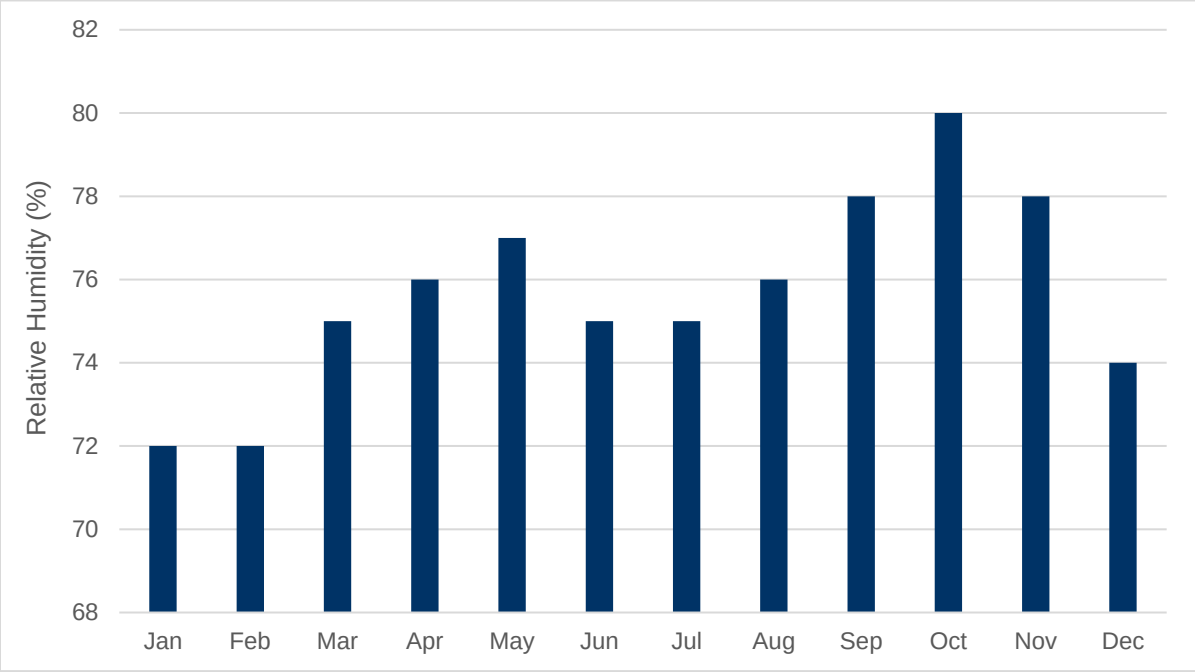


Source: ERM, based on data of Phan Rang meteorological station and climate-data.org

Figure 7.1 Temperature and Rainfall Data of Phan Rang Station, Ninh Thuan Province

7.1.2 Relative Humidity

The annual average humidity in the region is relatively low compared to other regions of the country. Annual average relative humidity ranges from 76.0 to 77.0%. The lowest average humidity is about 61% at Cam Ranh station (23 km from the Project site) and 37% at Phan Rang station (20 km from the Project site). The average monthly values of relative humidity recorded at Phan Rang station vary between 72% and 80% as shown in Figure 7.2.

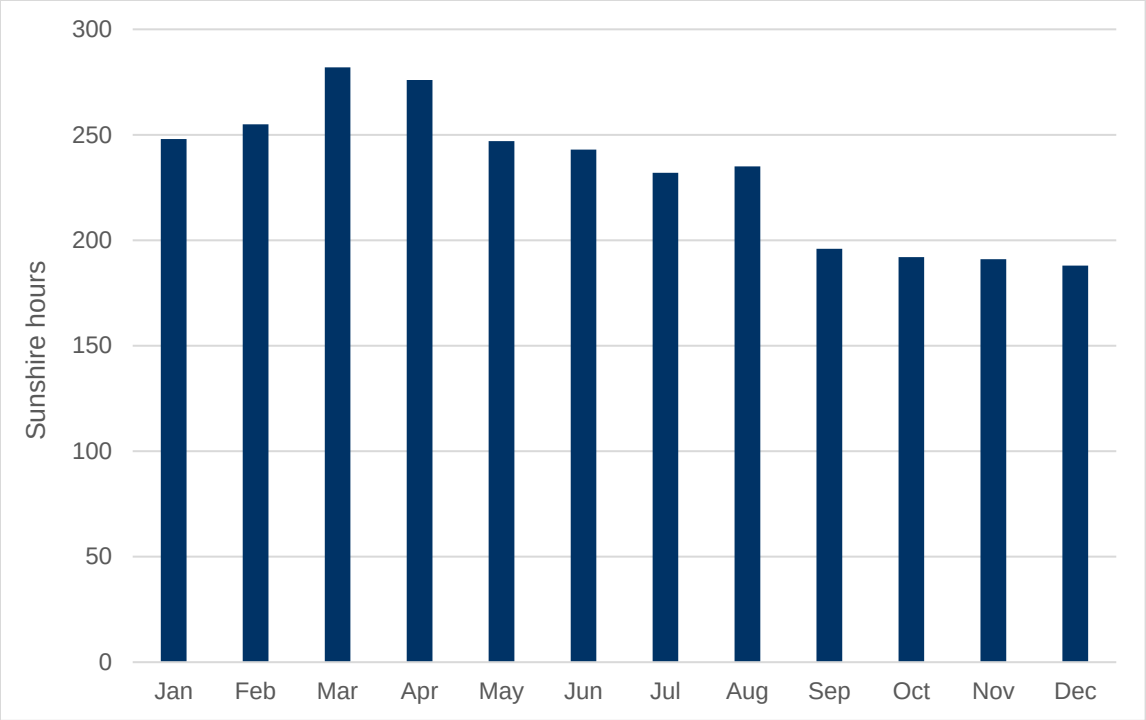


Source: ERM, based on data of Phan Rang meteorological station

Figure 7.2 Average Relative Humidity at Phan Rang Station, Ninh Thuan Province

7.1.3 Sunshine Hours

Ninh Thuan province, particularly the Project area, falls in the sunniest region of the country, having around 2,800 of sunshine hours per year as recorded at Phan Rang station, comparing with 1,700 to 2,500 of sunshine hours per year in other regions of the country. The sunniest months are March and April, while the month with least sunshine hours is November. The monthly average numbers of sunshine hours vary from 188 hours (in December) to 282 hours (in March) as shown in Figure 7.3.



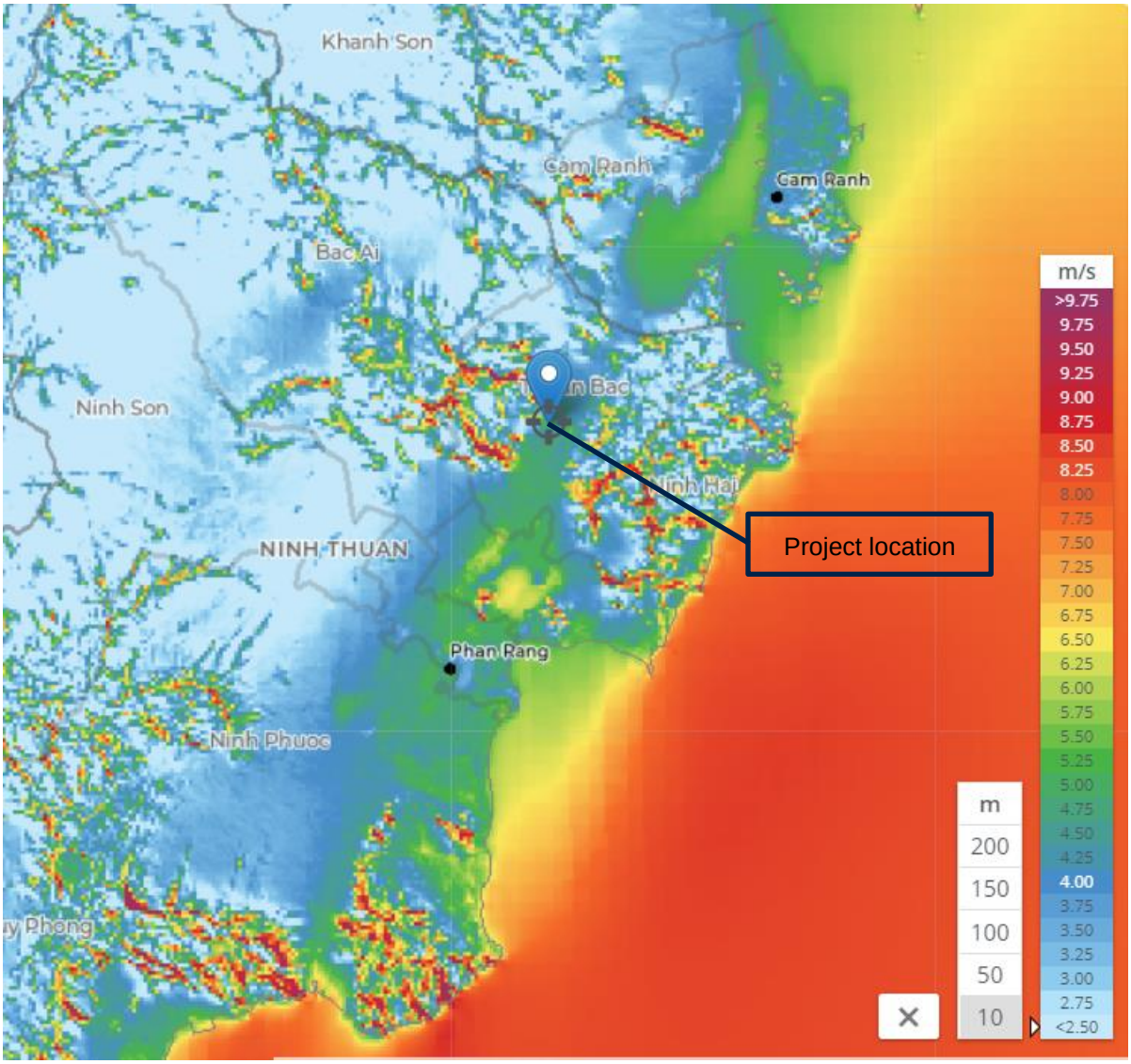
Source: ERM, based on data of Phan Rang meteorological station

Figure 7.3 Average Number of Sunshine Hours at Phan Rang Station

7.1.4 Winds

Ninh Thuan is the windiest province of the nation, with the average wind speed of 7.2 m/s as measured at 65 m above the ground at Phuoc Minh station located in Ninh Phuoc district, comparing with the national average of 6.5 m/s (EVN, 2007).

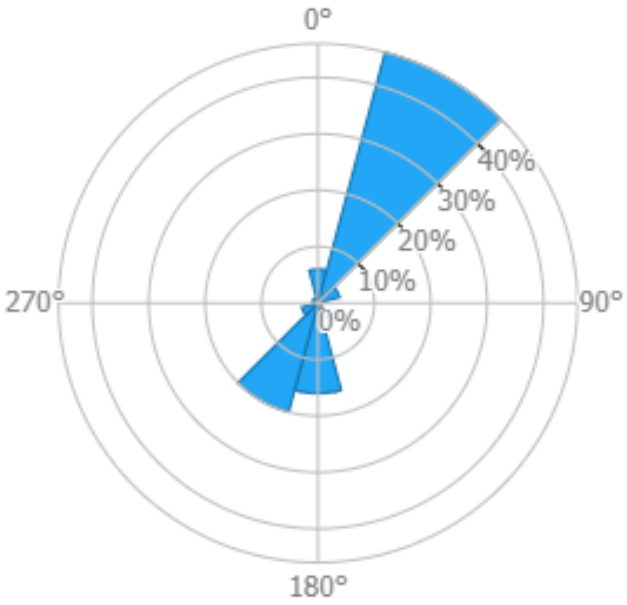
In Project area, the wind speed is 6.2 m/s at 10 m as estimated by the mathematical model jointly developed by the Department of Wind Energy at the Technical University of Denmark and WBG. The mean wind speed map of the Project area and the surroundings is presented in Figure 7.4.



Source: Global Wind Atlas (https://globalwindatlas.info)

Figure 7.4 Mean Wind Speed Map at 10 m

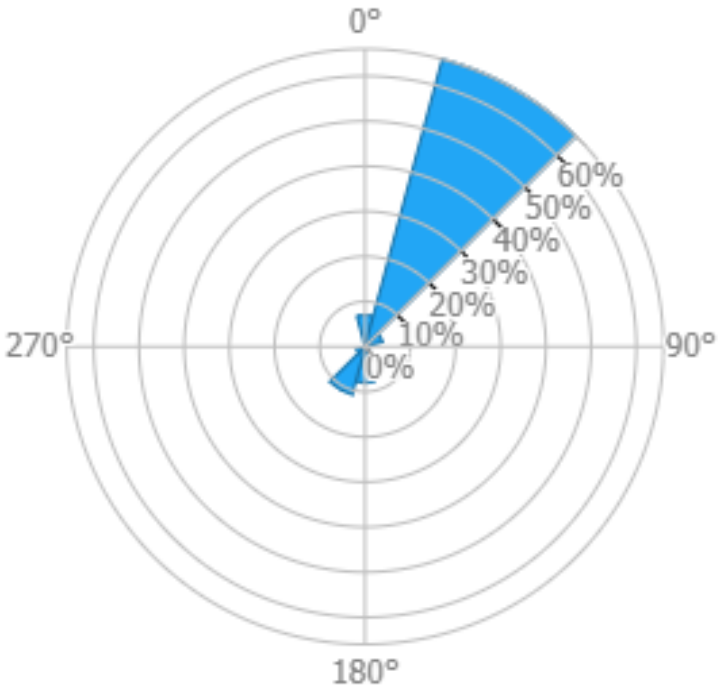
The prevailing wind direction is North-Northeast as the wind blows from this direction for 46% of the time, as shown in the wind frequency rose below:



Source: Global Wind Atlas (https://globalwindatlas.info)

Figure 7.5 Wind Frequency Rose at 10 m

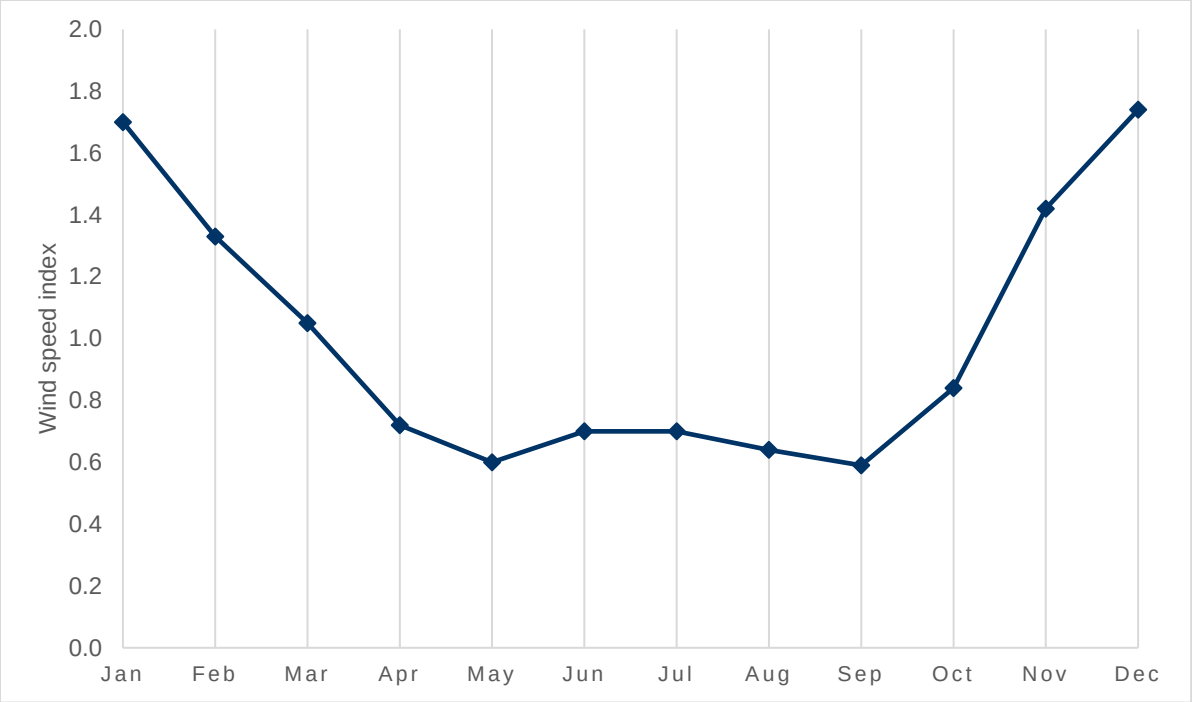
66% of strongest wind blows from the North-Northeast as shown in wind speed rose below.



Source: Global Wind Atlas (https://globalwindatlas.info)

Figure 7.6 Wind Speed Rose at 10 m

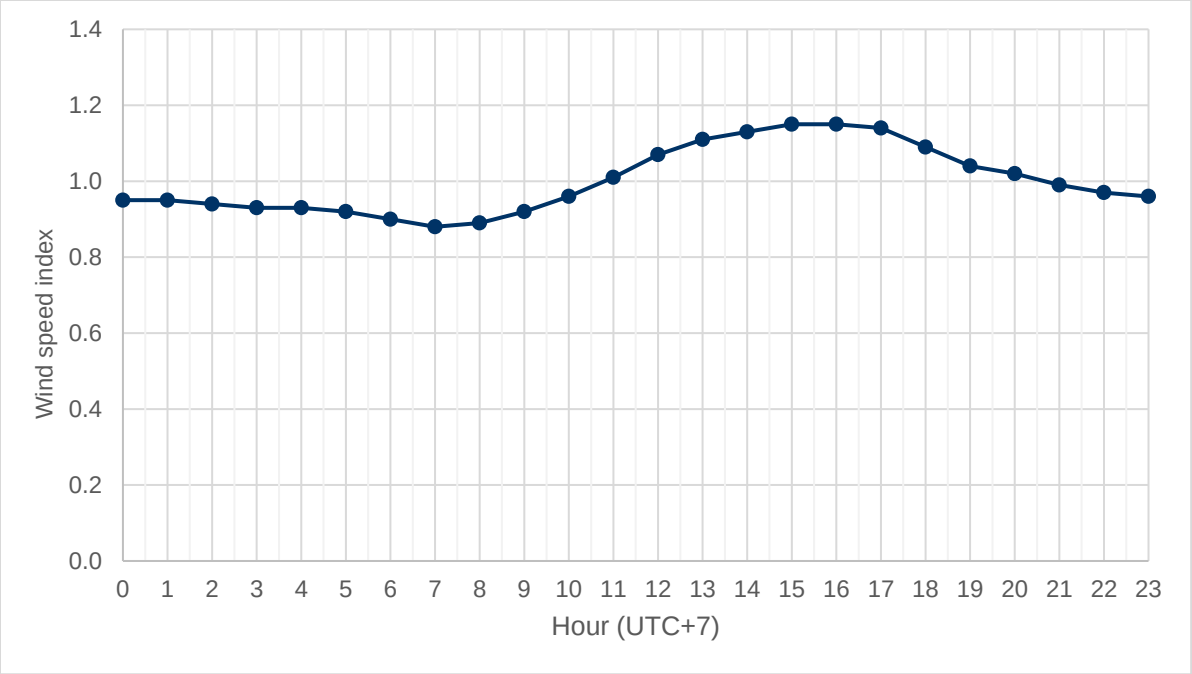
January and December are the windiest months, then the wind speeds gradually decrease in the following months and become low from May to September before increasing again starting from October. The monthly wind speed variability is presented in Figure 7.7.



Source: ERM, based on the data from Global Wind Atlas (https://globalwindatlas.info)

Figure 7.7 Monthly Wind Speed Variability of Project Area

During the day, the windiest time are normally in the afternoon, from 13:00 to 17:00, while the wind speeds become lowest in the morning at 07:00. The hourly wind speed variability is presented in Figure 7.8 .



Source: ERM, based on the data from Global Wind Atlas (https://globalwindatlas.info)

Figure 7.8 Hourly Wind Speed Variability of Project Area

7.1.5 Natural Hazards

7.1.5.1 Storms and Tropical Depressions

The coastal area of Ninh Thuan province has a history of experiencing tropical cyclones. The stormy season normally falls in October and November. The Project area is close to the coastal line but the frequency of direct landfall is not high, and the area is mainly affected by the circulation of the tropical cyclones.

According to the statistics recorded at Cam Ranh and Phan Rang meteorological stations, from 1978 to 2015, there were 45 tropical cyclones affecting the coastal area of Ninh Thuan and Binh Thuan province. 14 of them (31%) are considered “storms”, which the wind speeds are higher than level 7 (50 to 61 km/h) of the Beaufort scale at the time when the storms made landfall, while the majority of them (69%) are considered “tropical depressions”, which the wind speeds are lower than level 7.

7.1.5.2 Tornados

No tornados were recorded in Thuan Bac district during the period from 1971 to 1997. The nearby Ninh Son district experienced 01 tornado during the same period, being the only district In Ninh Thuan province experiencing a tornado.

7.1.5.3 Flash Floods

A flash flood is a rapid flooding of low-lying areas: washes, rivers, dry lakes and depressions. It may be caused by heavy rain associated with a severe thunderstorm, hurricane, tropical storm.

No flash flood was recorded in Thuan Bac district from 1958 to 1997. Other districts of Ninh Thuan province experienced 04 flash floods in the same period.

7.1.5.4 Lightning Strikes

The lightning flash density of the Project area is 3.4 times/km^2/year, comparing to the national average of 10 times/km^2/year (IBST, 2009). The annual average number of days having thunderstorm is 25 days (Cam Ranh station) and 19 days (Phan Rang station).

7.1.5.5 Earthquake

According to the QCVN 02:2009/BXD, Annex 6: Zoning of peak ground acceleration, Thuan Bac district, the area where the Project is located, has the peak ground acceleration agR = 0.2403 m/s^2, therefore, the Project area has the macroseismic intensity of level V in MSK-64 scale.

The most recent earthquake recorded near this region was on 15 July 2020, when an earthquake with the magnitude of 4.0 Richter hit the offshore area of Binh Thuan province[1]. The epicenter of the quake was at 10.398 degrees North latitude, 108.295 degrees East longitude (170 km from the Project site) with a focal depth of approximately 10 km, according to the Centre for Earthquake Information and Tsunami Warning, Vietnam Institute of Geophysics. No damages were reported.

[1] https://vietnamnet.vn/en/society/earthquake-hits-off-binh-thuan-coast-no-tsunami-warning-657968.html

Source: ERM, based on data provided by Centre for Earthquake Information and Tsunami Warning

Figure 7.9 The Location of Epicentre of the Earthquake on 15 July 2020 in Relation to Project Area

7.1.6 Topography

The Project is located in a relatively flat-terrain area, with elevations vary from 25 m to 50 m above the mean sea level, except the area near the Western hilly area where the elevation is about 60 m. There are some low hills and natural erosion cliffs situated along the streams.


Source: ERM

Figure 7.10 Landscape of Project Area

7.1.7 Geological Condition

The Loi Hai 2 Wind Farm Project area lies in the Nam Bộ (Southern) Block which is a part of the Malaysia – Miami 'geosynclinals system' and is recognized as a continental rift filled with thick (6 km) Cainozoic Deposits.

During the FS survey in 2018, the team made a geological survey of study area. The surveyed area is quaternary sediments amQIV in the middle of mountains, sedimentary materials are layers of clay loam in the LH2-HK1 drill hole and clayed sand mixed with gravel in the LH2-2 drill hole.

Complex of the geological formation in the foundation of "Loi Hai 2 wind farm" is as follows:

- Dinh Quan complex - phase 2. Depth at the LH2-HK1 drill hole is 23 m and at the LH2-HK2 drill hold is 26 m: Medium-grain granite biotite hornblende stone in colour of white greyish-black.
- Quaternary (amQIV2) and (mbQIV2-3). In scope of survey, the aggregates of the Quaternary amQIV2 are: clayed sand mixed with gravel in colour of grey and blue grey in the LH2-HK2 drill hole and clay loam in colour of blue grey and yellow brown in the LH2-HK1 in thickness of less than 11.7 m.

The results of the geographical survey at two pier positions showed that geological conditions of the surveyed area is simple. In the scope of research of drill holes (maximum depth of drill hold is 30m), layers of stone and soil are distributed as follows:

- Layer 1: Quaternary sediments (amQIV2): Blue-gray-yellow-brownish clay loam in hard state, thickness of 4.5m.
- Layer 1a: Quaternary sediments (amQIV2): Yellow-grey-blue-grey clay loam mixed with gravel in semi-hard state, thickness of 8.7m.
- Layer 2a: Zone IA (Weathered granite m, x) – Clay loam mixed with gravel in colour of blue grey in hard state, thickness of 5m.
- Layer 2: Zone IA (Weathered granite) – Clay loam, clayed sand mixed with gravel in yellow gray in hard or semi-hard state, thickness of 13.5m.
- Layer 3: Integral granite in colour of grey-white, blue-black. Appears at depth of 23.0m to the end of drill hole of 30m or deeper

7.2 Ambient Air Quality

Air quality is monitored 6 times per year (once every 2 months) by the Department of Natural Resources and Environment of Ninh Thuan province at 6 different locations in the province. Among these, 2 locations are considered as “baseline environment” and 4 locations are considered as “impact monitoring”. Office Thuan Bac district’s People Committee, which is about 2 km from the boundary of Loi Hai 2 wind farm project, is one of the 4 impact monitoring locations. Other impact monitoring locations are located in Thuan Bac district, Ninh Son district and Ninh Hai district. Impact monitoring locations are shown in Figure 7.11.

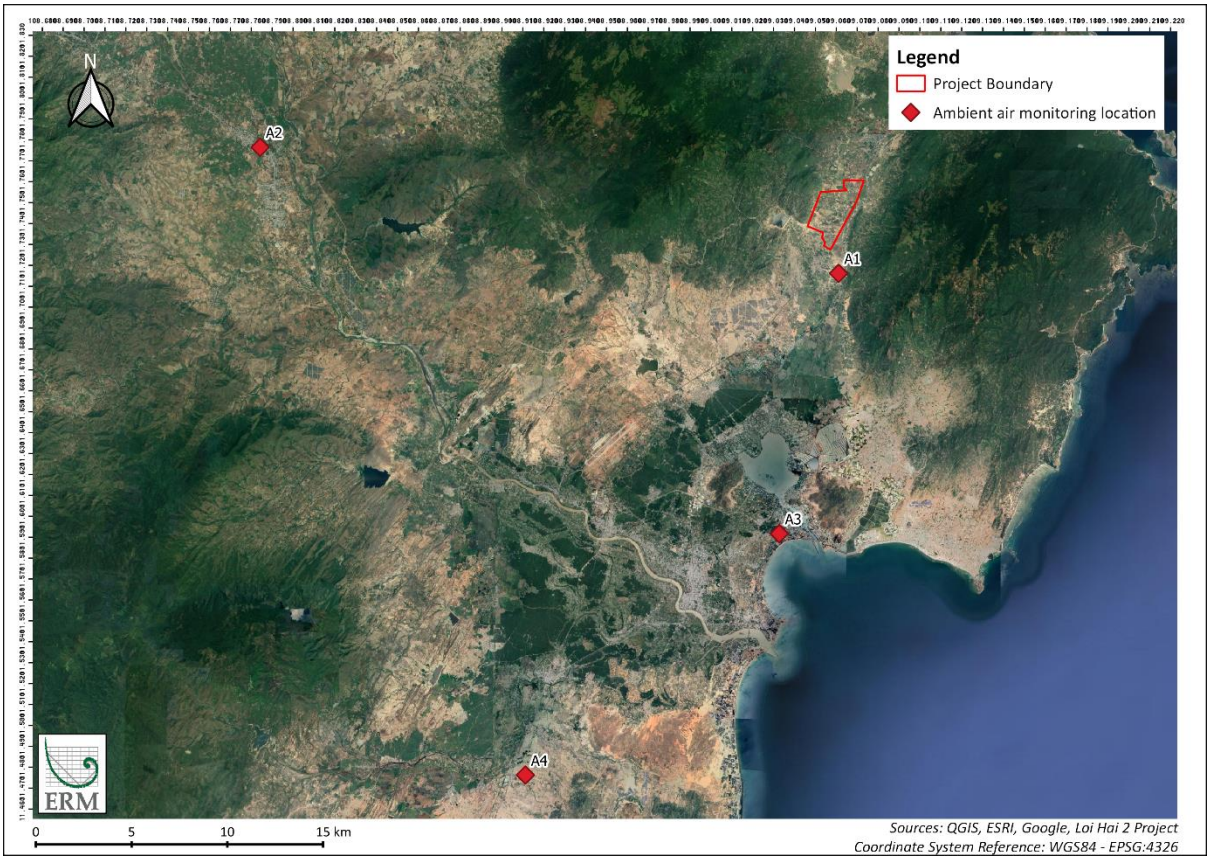
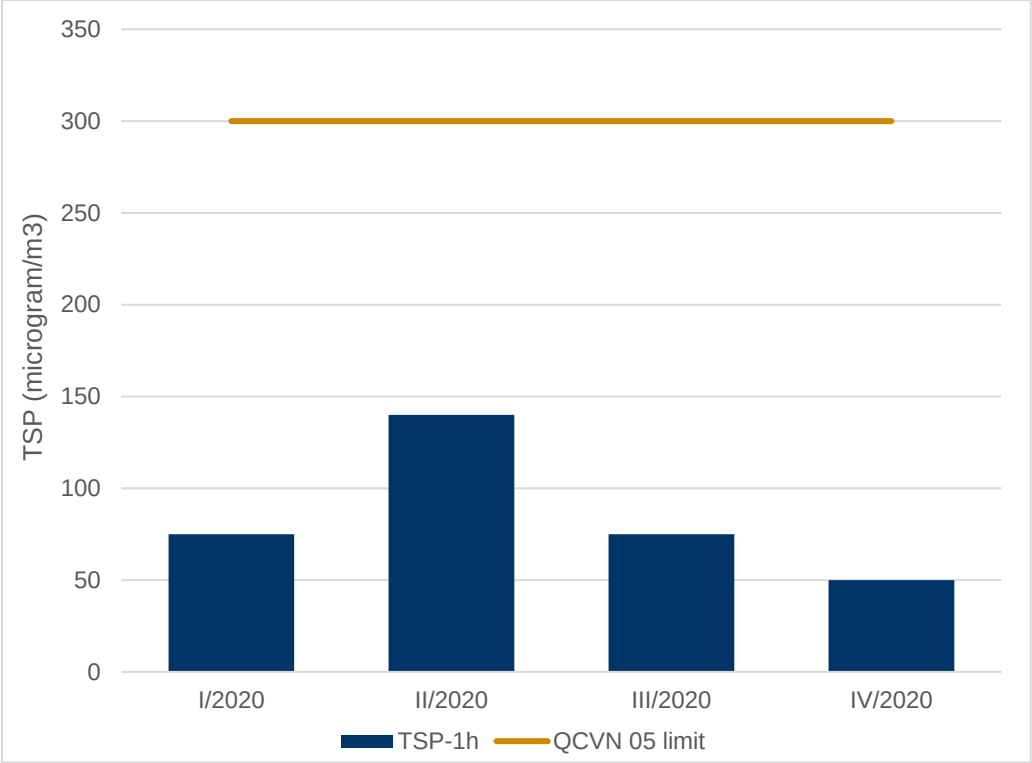


Figure 7.11 Ambient Air Quality Monitoring Locations by Ninh Thuan DONRE

At the time of preparation of this ESIA, the reports for the first 4 monitoring events performed in 2020 were available on the website of Ninh Thuan DONRE[2]. It is noted that the monitoring was carried out in compliance with the Circular 24/2017/TT-BTNMT of the Ministry of Natural Resources and Environment stipulating the environmental monitoring techniques, and may not comply with WBG’s standards. However, because of no other sources of data was available, the data from this monitoring report will be used as the reference to present the baseline air ambient air quality of Project area.

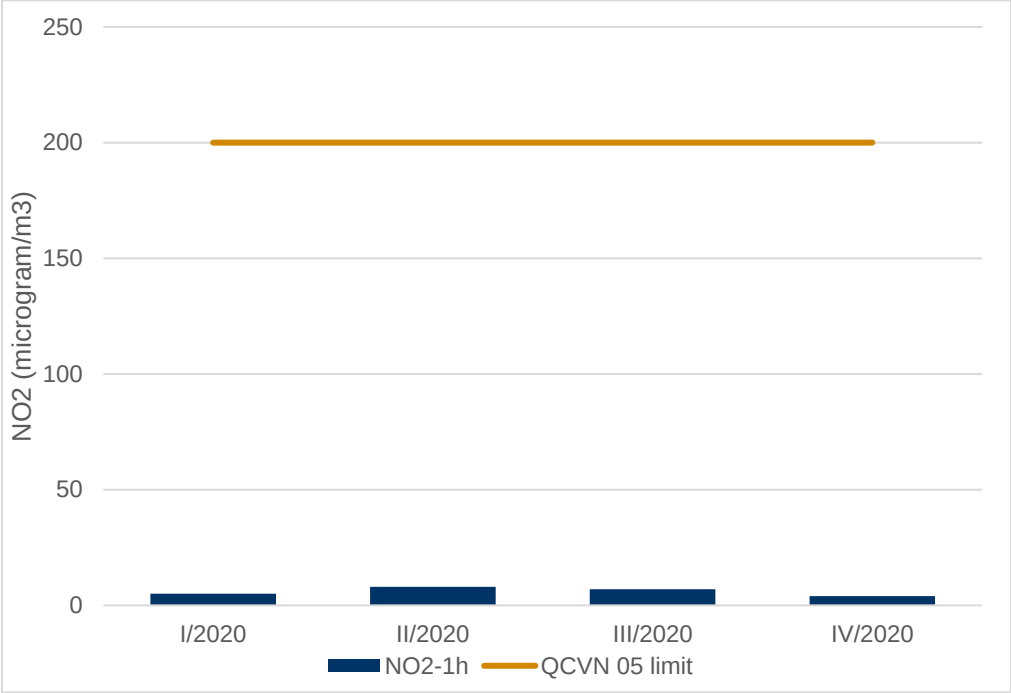
The ambient air quality parameters that were measured are TSP, NO_2, CO and O_3. In all monitoring events, the measured values of these parameters were well below the permissible limits set by QCVN 05:2013 - National technical regulation on ambient air quality. Therefore, it can be concluded that the air quality of Project area is not polluted. Summary of the monitoring results are presented in figures below.

[2] http://sotnmt.ninhthuan.gov.vn/Ketquaquantrac.aspx



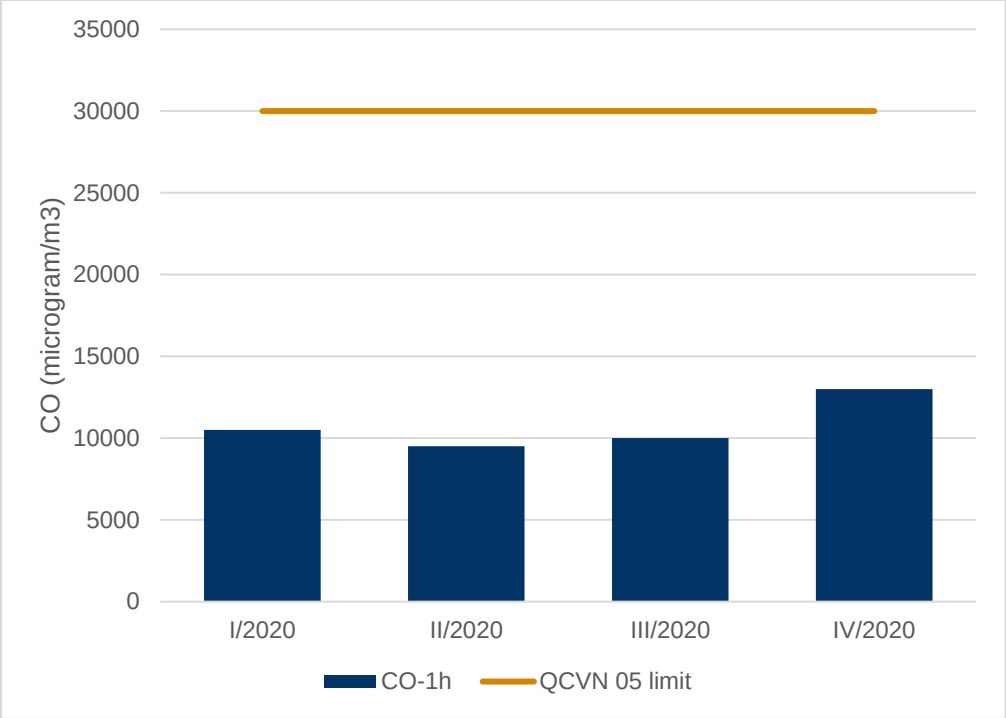
Source: ERM, based on data from reports of Ninh Thuan DONRE

Figure 7.12 TSP Monitoring Results in 2020 at Loi Hai District People's Committee



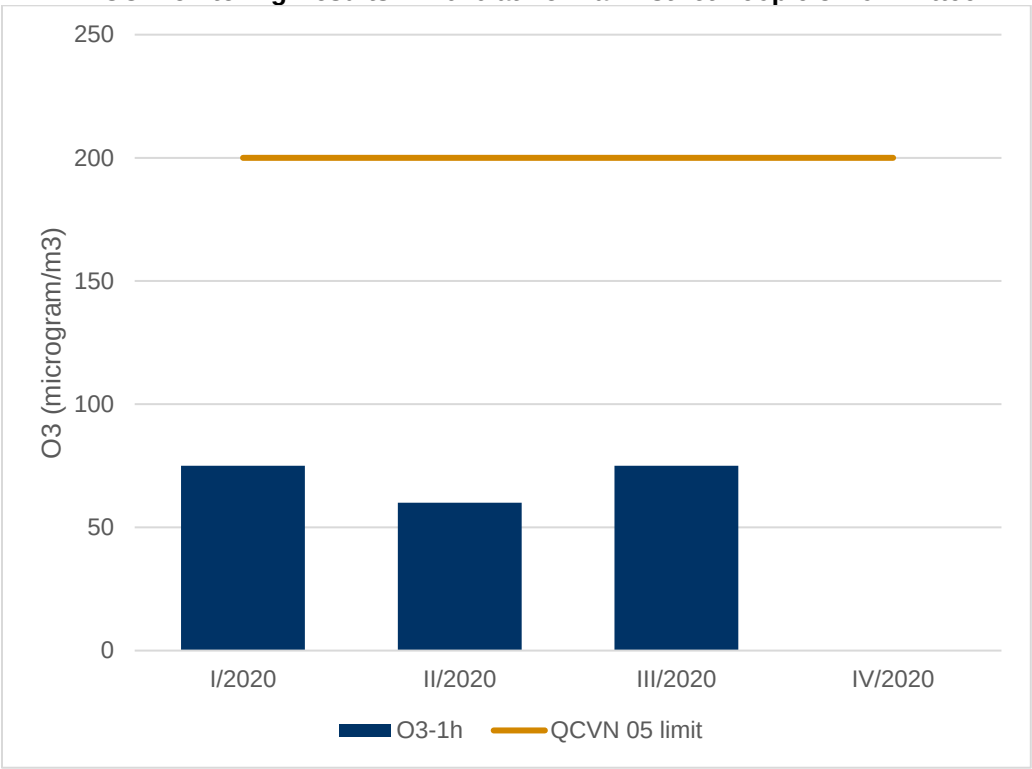
Source: ERM, based on data from reports of Ninh Thuan DONRE

Figure 7.13 NO_2 Monitoring Results in 2020 at Loi Hai District People's Committee



Source: ERM, based on data from reports of Ninh Thuan DONRE

Figure 7.14 CO Monitoring Results in 2020 at Loi Hai District People's Committee



Source: ERM, based on data from reports of Ninh Thuan DONRE (no data available for 4th monitoring)

Figure 7.15 CO Monitoring Results in 2020 at Loi Hai District People's Committee

7.3 Noise

7.3.1 Monitoring Program

Noise levels were measured at 2 different locations (N1 and N2) from November 9th to November 11th, 2020 using sound level meters. N1 is representative for the administrative centre of Loi Hai commune, consisting of 3 villages: Ba Rau 1, Ba Rau 2 and An Dat, while N2 is representative for scattered dwellings located along the National Highway 1A. This selection follows WBG's General EHS Guidelines for noise, which states that "*in general, the noise level limit is represented by the background or ambient noise levels that would be present in the absence of the facility or noise source(s) under investigation*".

At each location, noise levels were supposed to be measured for 48 hours continuously. However, sometimes, the measurement was stopped due to heavy rain or battery replacement. Additional monitoring hours were added to compensate for these periods. Considering this, a total, 48 hours of measurement was performed at each selected location.

Every 10 minutes, the values of L_{eq}, L_{max}, L_{min}, L_1, L_{10}, L_{90}, $L_{eqOctave}$ were automatically logged by the sound level meter. Meteorological factors such as wind speed, wind direction, temperature were also recorded using a mini weather station.

The instrument was mounted at 1.5 m above the ground using a tripod placed far from any reflecting surface. In case of light rain, an umbrella with a noise-reducing towel placed on top was also attached to the tripod. Windscreen (WS-10) was also used to reduce effects by windy weather.

Noise monitoring locations are presented in Table 7.1 and shown in below.

Table 7.1 Noise Level Measurement Location and Time

Site	Address	Coordinates	Description	Distance to nearest turbine
N1	Suoi Da Hamlet, Loi Hai commune, Thuan Bac District, Ninh Thuan Province	11°44'52.8"N, 109°04'20.6"E	represents the group of dwellings along National Highway 1A	0.85 km to WTG5
N2	An Dat Hamlet, Loi Hai commune, Thuan Bac District, Ninh Thuan province	11°43'15.1"N; 109°03'21.0"E	represents the administrative center of Thuan Bac distict	1.95 km to WTG1

Both locations are categorised as "Normal area" as defined in QCVN 26:2010/BTNMT National Technical Regulations for Noise, and "Residential, institutional, educational area" as defined in IFC General EHS Guideline.

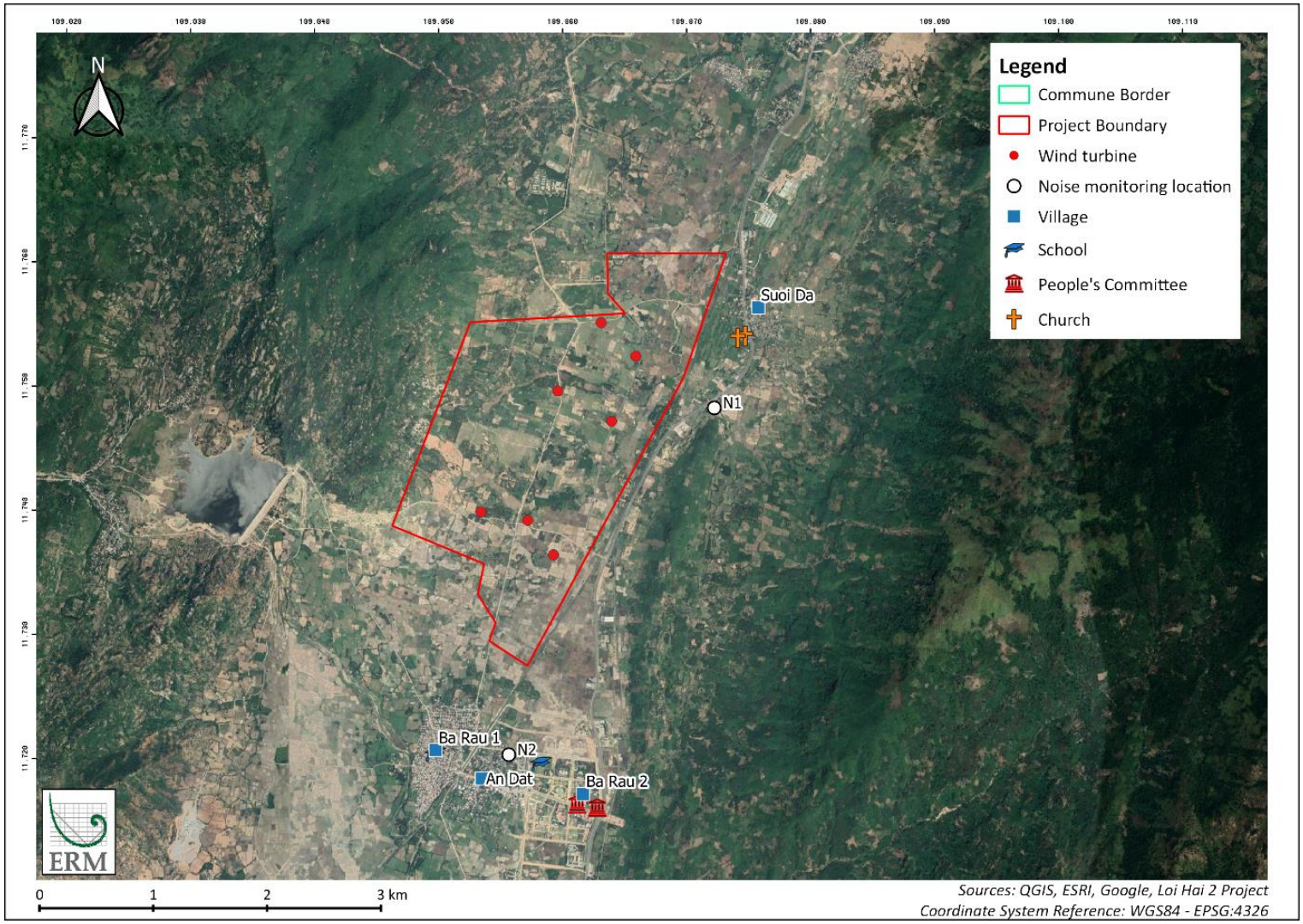


Figure 7.16 Map of Noise Monitoring Locations

Figure 7.17 Site Setup for Noise Monitoring Location N1 (above) and N2 (below)

7.3.2 Noise Monitoring Results

Summary of noise levels are presented in table below:

Table 7.2 Baseline Noise Monitoring Results

Noise levels	N1		N2		Permissible limits	
	Day 1	Day 2	Day 1	Day 2	QCVN 26:2010/BTNMT[3]	IFC General EHS Guidelines 1.7[4]
$L_{Aeq, day}$ (dBA)	52.7	54.3	56.7	52.6	70	55
$L_{Aeq,night}$ (dBA)	56.1	52.4	53.8	48.1	55	45

[3] for Normal area, as defined in QCVN 26:2010/BTNMT National Technical Regulation on Noise

[4] for Residential, institutional and educational area, as defined in IFC General EHS Guideline 1.7: Noise

Noise levels	N1		N2		Permissible limits	
	Day 1	Day 2	Day 1	Day 2	QCVN 26:2010/BTNMT[3]	IFC General EHS Guidelines 1.7[4]
$L_{Aeq,24h}$ (dBA)	54.3	53.6	56.0	51.4	-	-

Generally, the daytime noise levels at two locations are lower than IFC standards, except the L_{Aeq} in day 1 at N2 were slightly higher than the permissible limit of 55 dBA. However, the night-time noise levels at both locations exceeded IFC standards by a large margin (from 3 to 11 dBA). This can be explained as below:

- The site N1 is close to NH 1A, therefore the noise levels are highly affected by traffic. The most significant sources of noise are dump trucks moving in and out a nearby quarry, vehicles circulating at highway. In addition, background noise due to dogs barking, roosters crowing, insect buzzing, bird chirping were also recorded, especially during the night time.
- At the site N2, the recorded noise was identified to come from various sources such as motorbikes, cars and trucks passing by, music from loud speakers, concrete mixer and insects, sometimes the train whistle (the track is 270 m away). During the night time, the man-made noise were lessened but the sounds of insects significantly contributed to the increased the recorded noise levels.

In conclusion, the existing noise levels at residential areas near the future Loi Hai 2 wind farm meet the WBG standards for the daytime but largely exceed the night-time limit because of man-made and natural sources of noise. However, it is noted that the noise levels here are still generally under the permissible limits set by QCVN 26:2010/BTNMT National Technical Regulation on Noise, for the daytime as well as the night time.

8. BIODIVERSITY BASELINE

This chapter presents the collected information (from desktop review and field survey) about the biodiversity values occurring at the Project's area, and then, assesses if this triggers critical habitat when reviewed against the criteria in IFC Guidance Note 6: Biodiversity conservation and sustainable management of living natural resources (2019). Guidance Note 6 (GN6) corresponds to Performance Standard 6 (PS6) issued in 2012 and provides updated guidance on the interpretation of the standard.

The definition of areas in this chapter are as follows:

- The Project Area is defined as the development boundaries. It is the Projects footprint of disturbance;
- Important conservation areas, such as World Heritage Areas (WHAs) and Key Biodiversity Areas (KBAs), were identified within a 50 km radius. The extent of this analysis is generated by the IBAT search engine and is used in the baseline chapter to determine the proximity of conservation areas;
- The Project AoI is the entire area being affected by Project and the client's activities. The AoI has been assessed to define habitat values in the immediate Project vicinity where species may regularly occur; and
- Where a species is identified to have or is likely to have a regular occurrence in the Project AoI, the Ecologically Appropriate Area of Analysis (EAAA) has been defined as required under IFC PS6 for that species. The EAAA is used to identify the presence of critical habitat for that species (through the application of the IFC PS6 critical habitat thresholds outlined in the IFC PS6 Guidance Note).

8.1 Critical Habitat Assessment Methodology

Critical Habitat may not be limited to pristine or highly biodiverse areas, but rather may include both modified habitat and natural habitats across the broader landscape that supports the biodiversity values that trigger the Critical Habitat criterion. Critical Habitats can therefore be a subset of both modified habitat and natural habitat.

Assessment for Critical Habitat is undertaken as a screening process against the criteria defined within IFC PS 6 Guidance Note (section 8.9). This involves analysis of desk-based data collection, habitat mapping and incorporation of field survey results conducted by AF-consultation in 2017. Critical Habitat criteria are defined in PS6 Guidance Note 6 (IFC 2012, revised 2019), Paragraphs GN69 to 97.

Table 8.1. provides details of the qualifying requirements for Criteria 1 to 3 (i.e. thresholds), while details of the likely qualifying interests for Criterion 4 and 5 will be defined based on research and expert opinion. The criteria listed have been used to complete this assessment.

The five criteria are 'triggers' in that if an area of habitat meets any one of the criteria, it will be considered Critical Habitat irrespective of failing to meet any other criterion. This approach is generally more cautious but is used more widely in conservation. Critical Habitat criteria, therefore, have two distinctive characteristics. First, components of biodiversity are essentially assigned to only two levels of conservation significance, those that trigger Critical Habitat and those that do not (Tier considerations being secondary to this primary Critical Habitat determination). Second, each criterion is applied separately and not in combination, meaning that the scores are not cumulative.

Table 8.1 Critical Habitat Criteria (IFC PS6 Guidance Note 2012)

Criteria	Thresholds
Criterion 1: Critically Endangered (CR) / Endangered (EN) species:	(a) Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (0.5% of the global population AND 5 reproductive units of a CR or EN species); (b) Areas that support globally-important concentrations of an IUCN Red-listed VU species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a). (c) As appropriate, areas containing nationally/regionally-important concentrations of an IUCN Red-listed EN or CR species.
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;	(a) Areas that regularly hold ≥10% of the global population size AND ≥10 reproductive units of a species.
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species;	(a) Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle. (b) Areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress.
Criterion 4: Highly threatened and/or unique ecosystems; and/or	(a) Areas representing ≥ 5% of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN. (b) Other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.
Criterion 5: Areas associated with key evolutionary processes	No set criteria

***Notes**:*
Restricted-range/ Endemic Species = Species with world distributions of less than 50,000km^2;
Migratory species = Any species or lower taxon of wild animals, in which a significant proportion of the members of the entire population or any geographically separate part of the population cyclically and predictably crosses one or more national jurisdictional boundaries (CMS, 1979) ;
Congregatory Species = Species that gather in globally significant numbers at a particular site and at a particular time in their life cycle for feeding, breeding or resting (during migration) (Langhammer, Bakarr and Bennun, 2007).

This section aims to identify candidate species that are potential to occur within the EAAAs and assess them against the criteria described in Table 8.1. The candidate species include threatened species (e.g. endangered, critically endangered species), endemic or range-restricted species, migratory or congregatory species, threatened or unique ecosystems, and areas associated with key evolutionary processes.

The potential for occurrence of species is determined based on the availability of suitable habitats within the EAAAs and the field survey results. The Project's land covers suggested limited suitable habitats for aquatic species, thus they are all considered unlikely to occur within the EAAAs.

8.2 Ecologically Appropriate Area of Analysis (EAAA)

In accordance with IFC PS6, in Critical Habitat, clients should consider project-related impacts in the context of the wider landscape or seascape setting and for each species that regularly occurs within the project AoI identify an EAAA. The EAAA should take into consideration the distribution of the species or ecosystems, ecological patterns, processes, features, and functions that are necessary for maintaining that species. Given the high level of overlap between two major groups of species, volant (those that can fly) and terrestrial, two broad EAAAs have been spatially defined for this project. This is the area of analysis used to assess the applicability of the critical habitat criteria and thresholds.

Critical Habitat Screening will consider candidate species within two EAAAs including EAAA1 and EAAA2 (Figure 8.1). The EAAA1 will be assessed for avian and bat fauna whereas EAAA2 will be assessed for herpetofauna, non-volant mammals and flora. Aquatic species such as fish are unlikely to be adversely affected by the Project activities, thus they are not considered as receptors in the EAAAs. The factors that were taken into consideration for the identification of the EAAAs include surrounding environmental conditions, surrounding land uses, main habitat types for critical habitat candidate species and existing anthropogenic barriers such as highway roads. The identification of EAAA1 considered the concept of home ranges (the extent to which species normal foraging or daily movement range will overlap with the Project, or habitats where staging migrant birds may rest and feed before passing through the Project area), which are often very broad for avian species.

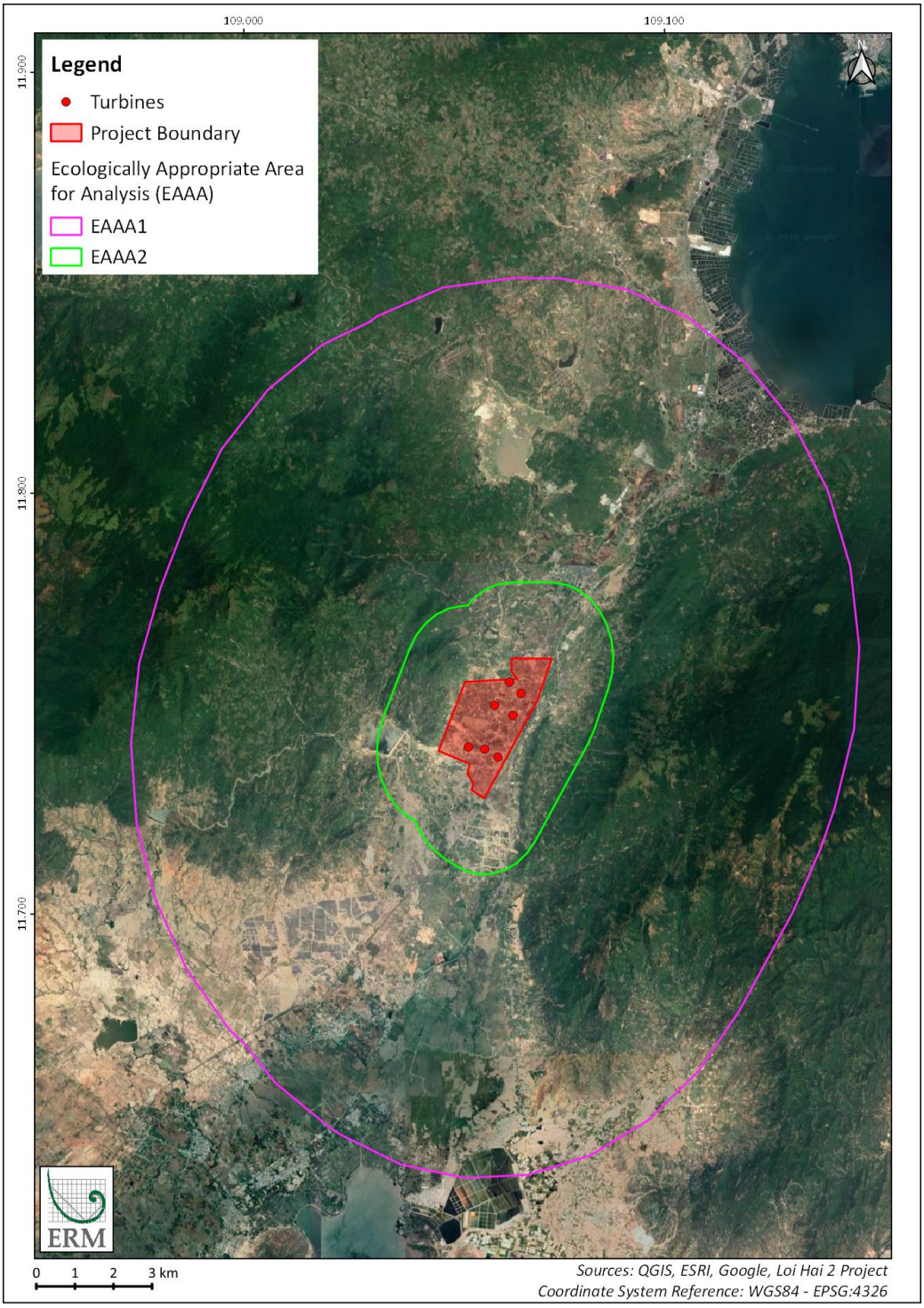


Figure 8.1 EAAAs of Loi Hai 2 Project

8.3 Natural and Modified Habitat

This section indicates the land classification within the EAAAs and the Project areas. Hence, it provides the input to predict which species will be likely to occur within these areas as well as indicate whether no-net-loss (NNL) or net gain (NG) will be required for natural habitat or critical habitat loss respectively.

8.3.1 Land Classification within the EAAA1

In total, the EAAA1 is an area of about 34,359.3 ha (Figure 8.2, Table 8.2) covering a diverse range of habitat that can be important for avian and bat species such as forest, surface water, aquaculture (fish farms), agricultural land (rice crop fields), and also including areas of built-up land (houses and other infrastructure).

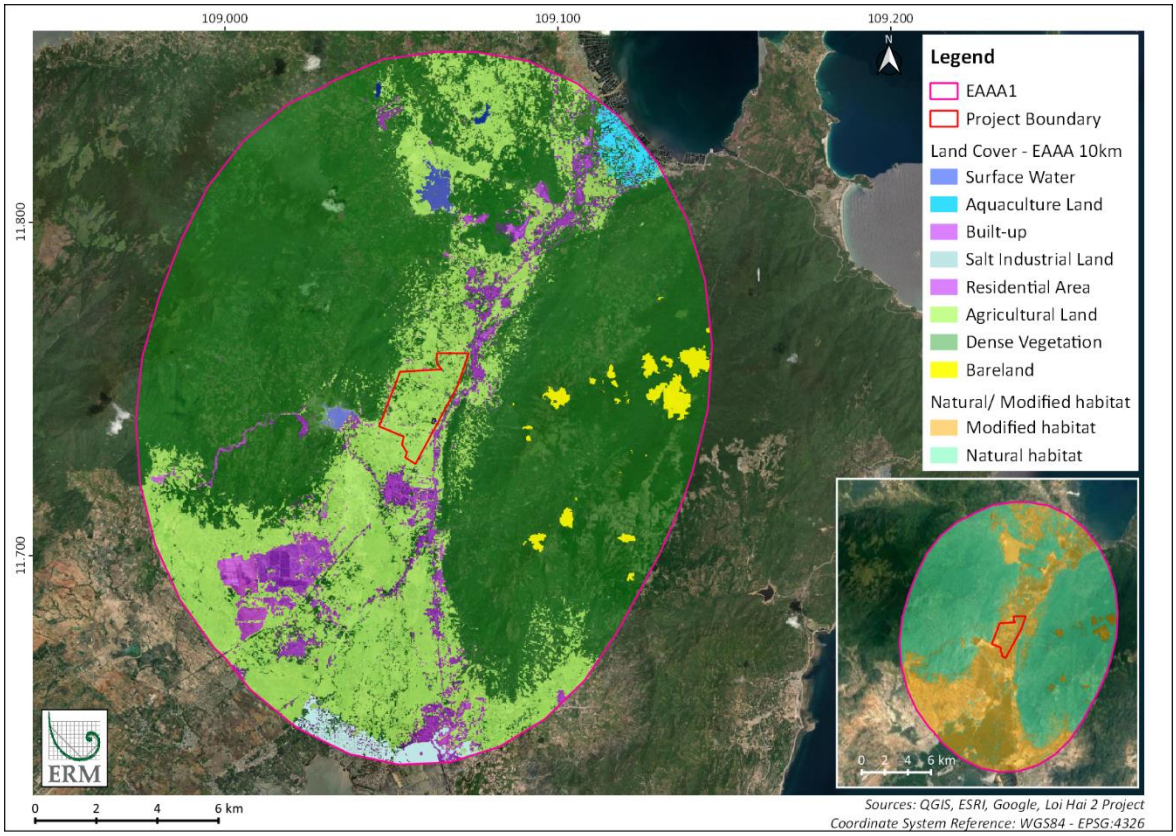


Figure 8.2 Land Cover Classifications within EAAA1

Table 8.2 Area of Each Land Cover and Habitat Type within the EAAA1

Type of habitat	Natural/ Modified Habitat	Area (ha)	Percentage (%)
Surface Water	Natural Habitat	179.1	0.5
Dense Vegetation	Natural Habitat	21,902.6	63.7
Aquaculture Land	Modified Habitat	214.1	0.6
Built- up	Modified Habitat	2186.4	6.5
Agricultural Land	Modified Habitat	9189.5	26.7
Salt Industrial Area	Modified Habitat	352.79	1
Bare land	Modified Habitat	334.8	1
Total		**34,359.3**	**100**

8.3.2 Land Classification within the EAAA2

The EAAA2 is about 3,339.2 ha in size (Figure 8.3, Table 8.3) covering various types of habitat including built-up, agricultural land, surface water and dense vegetation. The majority of dense

vegetation is the representation of forest within Song Trau Protection Forest and Nui Chua KBA. Nui Chua Key Biodiversity Area (KBA) contains habitat supporting Black-shanked douc langur (section 8.8.2).

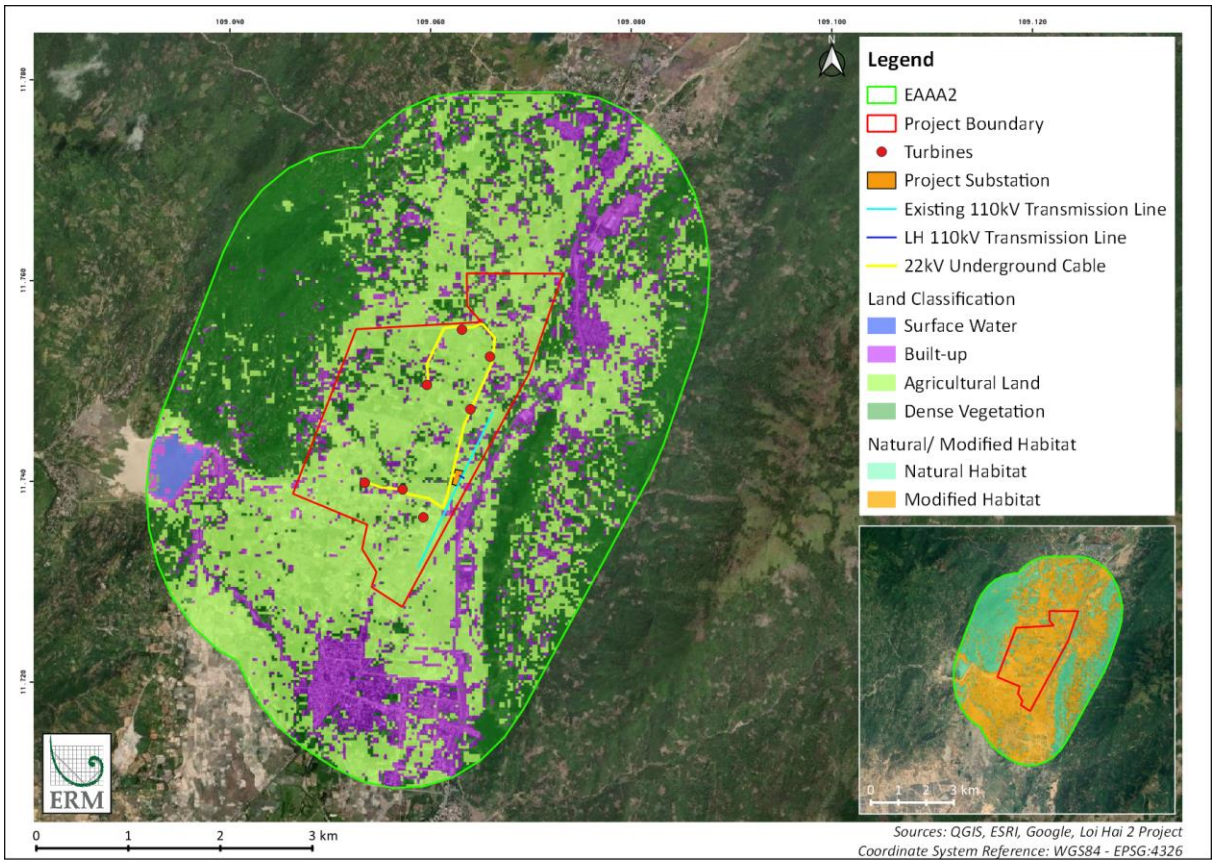


Figure 8.3 Land Cover Classifications within EAAA2

Table 8.3 Area of Each Land Cover and Habitat Type within the EAAA2

Type of habitat	Natural/ Modified Habitat	Area (ha)	Percentage (%)
Surface Water	Natural Habitat	22.1	0.7
Dense Vegetation	Natural Habitat	1,145.0	34.3
Built- up	Modified Habitat	592.1	17.7
Agricultural Land	Modified Habitat	1,580.0	47.3
Total		**3,339.2**	**100**

8.3.3 Natural and Modified Habitat within the Project Area

The EAAA2 is about 7.5241 ha in size and via remote sensing, the forest within the Project area is considered to be very sparse due to human disturbance (Figure 8.4, Table 8.4) and arid conditions. Therefore, the Project provides limited suitable habitats for terrestrial fauna like non-volant mammals and amphibians. In addition, some reptiles may occur within this area.

Overall, the Project is located in agricultural land that is considered as modified habitat.

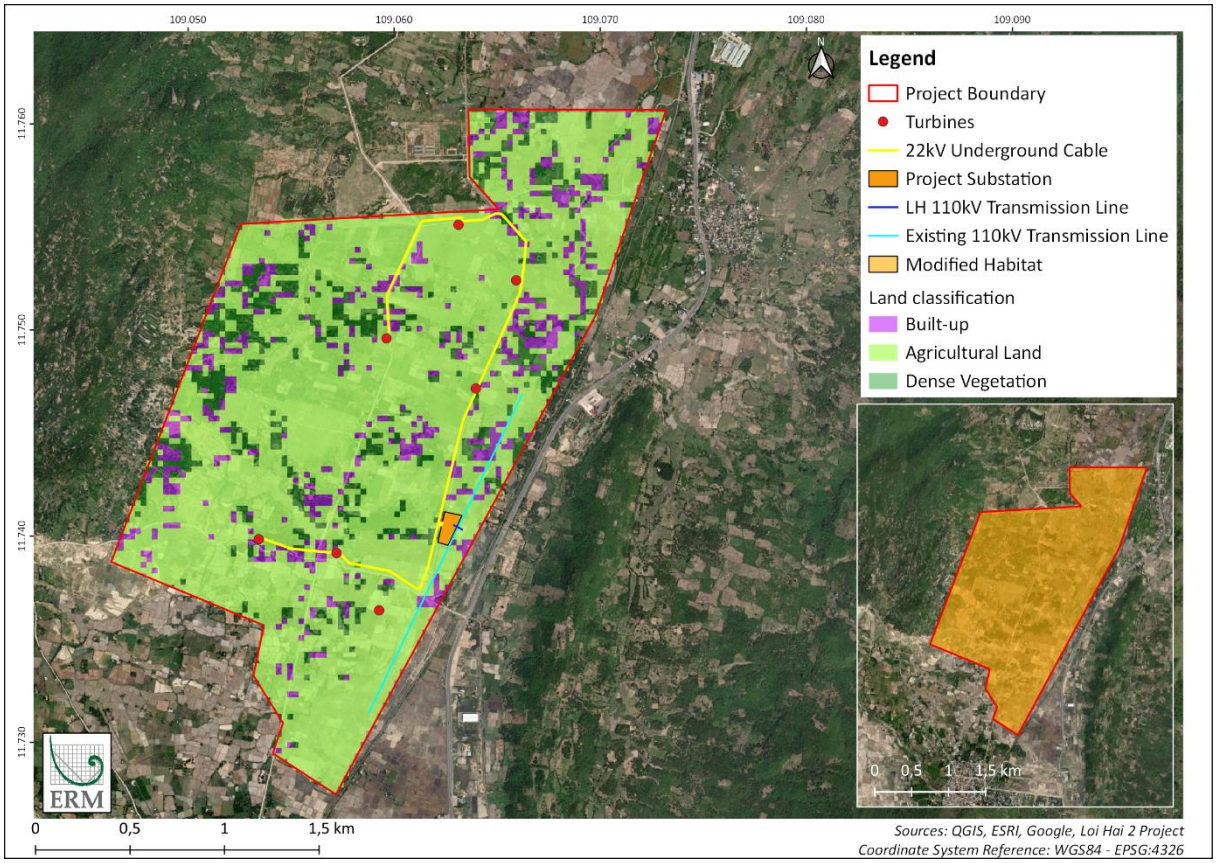


Figure 8.4 Land Cover Classifications within the Project area

Table 8.4 Land Area and Household Affected by the Project Components

Item	Type of habitat	Natural/ Modified Habitat	Number of items	Total area (ha)	Percentage (%)
Fixed-term land occupation: 2.6886 ha total					
Turbine foundations	Agricultural Land	Modified Habitat	7	0.8796	11.7
Internal roads and 22kV underground cable			-	2.9530	39.3
110kV Substation & Operation house			1	1.2662	16.8
Temporary land occupation: 4.8356 m^2 total					
Laydown area (blades and towers)	Agricultural Land	Modified Habitat	7	1.8826	25
Construction site (Crane installation area)			7	0.5427	7.2
25m Transmission Line/Safety Corridor					
(Activities will be restricted on the land under the transmission line and in the safety corridor)					
Transmission line 110kV for connection			1	-	
Total				**7.5241**	**100%**

8.4 Important Sites

The detail of desktop screening can be found in the Scoping Report prepared by ERM in December 2020. Two marine protected areas namely Nha Trang Bay and Thuy Trieu that supporting numerous marine biodiversity such as coral reefs, demersal fishes, mollusks, echinoderms, algae and seagrass. However, the project is located approximately 5km from the shore, it is espected that most unlikely it will affect marine life. In addition, no available document mentions the bird species within these two marine protected areas. Consequently, the Marine Protected Area features are unlikely to have any connectivity with the Project. Figure 8.5 and Table 8.5 illustrates the summary of important sites in the adjacent areas. Within 50 km radius from the Project area, there is one Important Bird Area (IBA) namely Phuoc Binh IBA.

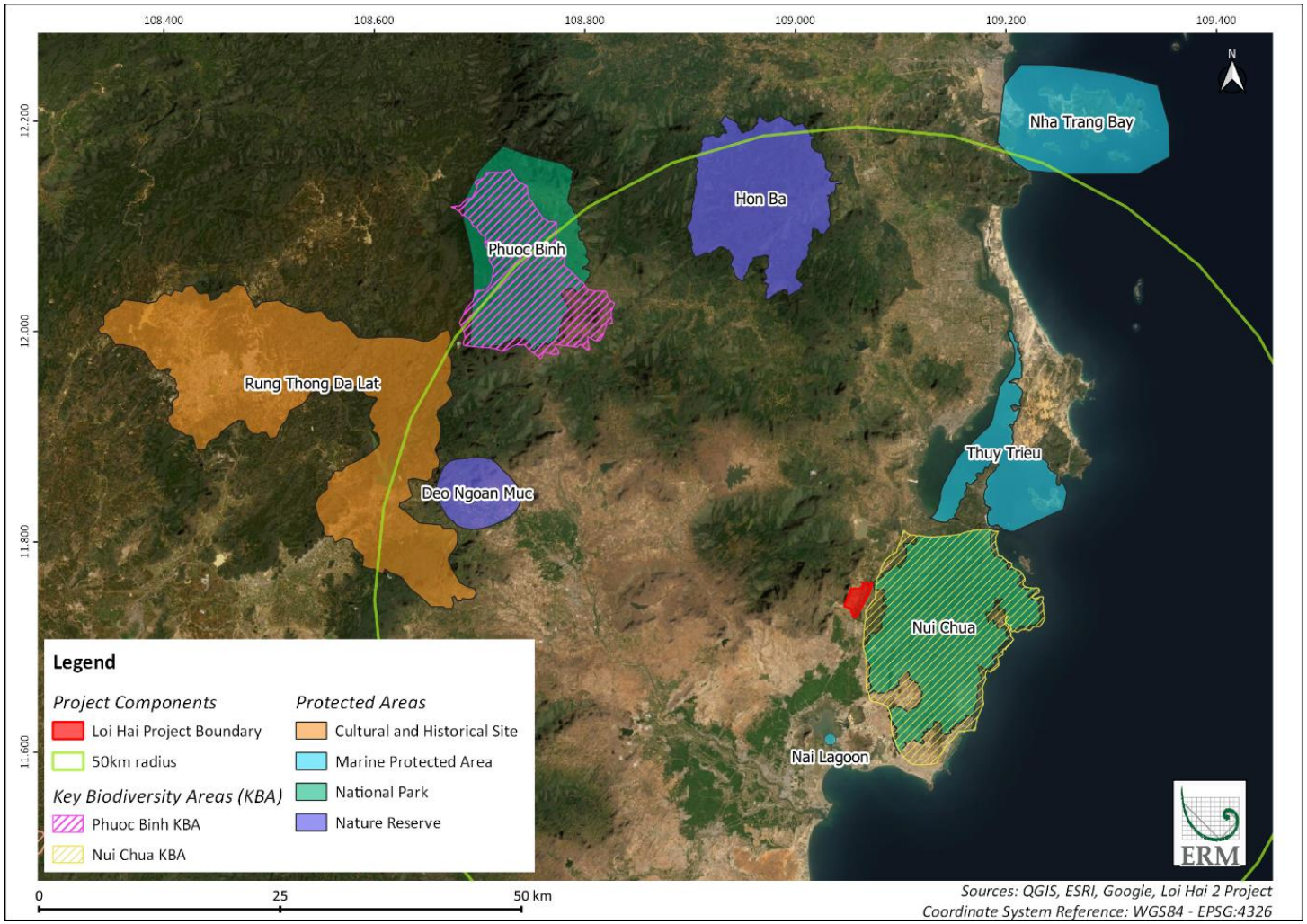


Figure 8.5 Key Biodiversity Areas and Protected Areas within 50km Radius from Project Area

Table 8.5 Summaries of Important Areas Surrounding the Project within 50km Radius

S/N	Area	Description of area	Threatened species	Note
Ecoregion				
1	Southern Vietnam Lowland Dry Forest Ecoregion	Area: 13,500 square miles The majority of the ecoregion is occupied by dipterocarp, thin forests and semi-deciduous closed mixed forests (Nguyen *et al.*, 2011). The first woody community encountered away from the beach in southern Vietnam is generally a thicket community that gives way to a low scrubby forest further inland.	■ Flora: Sao lá hình tim *Hopea cordata* [IUCN CR; VNRB DD]; *Shorea falcata* [IUCN CR; VNRB CR] ■ Non-volant mammals: Red-shanked Douc Langur (*Pygathrix nemaeus*) [IUCN CR; VNRB EN]; Red-cheeked gibbon (*Nomascus gabriellae*) [IUCN EN; VNRB EN]; Pileated gibbon (*Hylobates pileatus*) [IUCN EN]	These threatened species are unlikely to occur within the EAAA2 as the area does not contain appropriate habitat.
World Heritage Site				
2	World Heritage Site	None of the World Heritage Sites overlaps with the EAAAs and the Project area.		Not relevant
3	Biosphere Reserves	None of the Biosphere Reserves overlap with the EAAAs and the Project area.		Not relevant
Ramsar Site				
4	Ramsar Site	None of the Ramsar Sites area within the EAAAs and the Project area. The closest one is Bau Sau Wetlands And Seasonal Floodplain which is 185km to the Project area.		Not relevant

S/N	Area	Description of area	Threatened species	Note
Key Biodiversity Area (KBA)				
5	Phuoc Binh KBA (Phuoc Binh Important Bird Area)	Area: 236 km^2 Approximate Distance from Project Location (km): 47.5 km Phuoc Binh KBA overlaps almost entire the area of Phuoc Binh National Park. The area is also designated an Important Bird Area (IBA) (Birdlife International, 2020).	■ Birds: Pale-capped Pigeon (*Columba punicea)* [IUCN VU, VNRB EN][5], Collared Laughingthrush (*Trochalopteron yersini)* [IUCN EN][6], Crested Argus (*Rheinardia ocellata)* [IUCN EN] ■ Non- volant mammals: Red-cheeked Gibbon, Gaur (*Bos gaurus)* [IUCN VU; VNRB EN] ■ Flora: Krempf's Pine (*Pinus krempfii)* [IUCN VU], *Fujian Cypress* [IUCN VU; VNRB EN], *Podocarpus neriifolius* [IUCN NT].	The Phuoc Binh IBA contains different habitats from the EAAA and the mammal and flora species for which is designated have no connectivity with the project. Birds species may fly traverse the EAAA1 but it is unlikely this will affect the species Phuoc Binh KBA is designated for due to their ecology and habitat requirements: ■ Pale-capped Pigeon: It frequents a wide variety of habitats from the lowlands up to 1,600 m, chiefly primary or secondary evergreen forest, but also open, deciduous dipterocarp forest, bamboo, and agricultural fields or overgrown cultivation, particularly in close proximity to forest areas. ■ Collared Laughingthrush is resident in the dense undergrowth of the primary and logged montane evergreen forest, secondary growth and scrubs bordering forest, occupying a narrow altitudinal band from 1,500-2,440 m, although it has been recorded below 1,450 m. ■ Crested Argus: it is resident in the primary and secondary evergreen forest.

[5] BirdLife International. 2020. Columba punicea. The IUCN Red List of Threatened Species 2020: e.T22690191A180939007. https://dx.doi.org/10.2305/IUCN.UK.2020-3.RLTS.T22690191A180939007.en. Downloaded on 20 January 2021.

[6] BirdLife International. 2017. Trochalopteron yersini (amended version of 2016 assessment). The IUCN Red List of Threatened Species 2017: e.T22715758A110435138. https://dx.doi.org/10.2305/IUCN.UK.2017-1.RLTS.T22715758A110435138.en.

S/N	Area	Description of area	Threatened species	Note
6	Nui Chua KBA	Area: 290 km^2 Approximate Distance from Project Location (km): 5 km	■ This KBA is considered to support Black-shanked Douc Langur (Pygathrix nigripes) [IUCN CR; VNRB EN] (Bang Vu pers.comm.)	Its habitat requirements and the intervening habitat between the EAAA2 and Nui Chua make connectivity with the project highly unlikely.
Protected Area (PA)				
7	ASEAN Heritage Parks (AHPs)	None of the AHPs overlap with the EAAAs and the Project area.		Not Relevant
8	National Protected Area - Rung Thong Da Lat Cultural and Historical Site	Area Size: 280 km^2 Approximate Distance from Project Location (km): 50 km Status Year: 1977 IUCN Category: V Management Board: Established The vegetation of Lam Vien Cultural and Historical Site is characterised by coniferous forest, the majority of which is natural forest dominated by Khasia Pine (*Pinus kesiya)* [IUCN LC].	Vietnamese Greenfinch (*Carduelis monguilloti)* [IUCN LC][7] is a bird species endemic to the southern Vietnam.	The area of suitable habitat for Vietnamese Greenfinch (*Carduelis monguilloti)* is actually thought to be increasing as a result of deforestation, which leads to increases in the area of scrub and Khasi pine *Pinus kesiya* forest. EAAA1 appears to not contain similar habitat for this species.
9	National Protected Area - Nui Chua National Park	Area Size: 298.65 km^2 Approximate Distance from Project Location (km): 5 km Status Year: 2003 IUCN Category: II Management Board: Established	■ Non-volant mammals: Black-shanked Douc Langur (*Pygathrix nigripes*) [IUCN CR; VNRB CR] ■ Flora: Agarwood (*Aquilaria crassna*) [IUCN CR; VNRB EN], *Afzelia xylocarpa* [IUCN EN], *Sindora siamensis* [IUCN LC; VNRB EN]	Its habitat requirements and the intervening habitat between the project site and Nui Chua make connectivity with the project highly unlikely.

[7] BirdLife International. 2018. Chloris monguilloti. The IUCN Red List of Threatened Species 2018: e.T22720350A132000832. https://dx.doi.org/10.2305/IUCN.UK.2018-2.RLTS.T22720350A132000832.en.

S/N	Area	Description of area	Threatened species	Note
			(Tran & Dang, 2015; vncreatures, n.d.).	
10	National Protected Area - Phuoc Binh National Park	Area Size: 198 km^2 Approximate Distance from Project Location (km): 47.5 km Status Year: 2006 IUCN Category: II Management Board: Established	■ Four mammal species indigenous to Indochina: Yellow-cheeked Gibbon (*Nomascus gabriellae*) [IUCN EN; VNRB EN], Black-shanked Douc Langur, Owston's Civet (*Chrotogale owstoni)* [IUCN EN; VNRB VU], Large-antlered Muntjac (*Muntiacus vuquangensis*) [IUCN CR; VNRB VU]. ■ Birds: Collared Laughingthrush (*Trochalopteron yersini*) [IUCN EN], Indochinese Wren-babbler (*Rimator danjoui*) [IUCN NT][8] and Vietnamese Greenfinch (*Chloris monguilloti*) [IUCN LC].	Due to lacking connective habitat, the non-volant mammals within National Park are considered not relevant to the Project. Birds species may traverse the EAAA1 but it is unlikely the project area supports species relevant to Phuoc Binh National park: ■ Collared Laughingthrush: refer to no.5 ■ Vietnamese Greenfinch: refer to no.8 ■ Indochinese Wren-babbler: this species habitats in forest.
11	National Protected Area - Deo Ngoan Muc Nature Reserve	Area Size: 20 km^2 Approximate Distance from Project Location (km): 40 km Status Year: 1986 IUCN Category: IV Management Board: No The forest at Deo Ngoan Muc is heavily degraded as a result of human activity associating with road construction.	It is unlikely that the site supports populations of many mammal and bird species of high conservation importance	Not relevant

[8] BirdLife International. 2016. Rimator danjoui. The IUCN Red List of Threatened Species 2016: e.T103869790A94477987. https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T103869790A94477987.en.

S/N	Area	Description of area	Threatened species	Note
12	National Protected Area - Hon Ba Nature Reserve	Area Size: 209.78 km^2 Approximate Distance from Project Location (km): 40 km Status Year: 2005 IUCN Category: Not Reported Management Board: Established	■ Non-volant mammal: Black-shanked Langur, White-Cheeked Gibbon (*Nomascus leucogenys*) [IUCN CR; VNRB EN], Pygmy Slow Loris (*Nycticebus pygmaeus*) [IUCN EN; VNRB EN]. ■ Reptile: Impressed Tortoise (*Manouria impressa*) [IUCN VU; VNRB VU].	Due to lacking connective habitat, the non-volant mammal and reptile within this area are considered not relevant to the Project.

8.5 Invasive Species

Invasive species are non-native species to a particular ecosystem and whose introduction and spread causes, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health. These species become naturalized in their introduced range, and often reproduce in large numbers and spread over a large area. This can result in competition and damage to native species. Invasive species have the capacity to exacerbate their role in ecosystem degradation.

According to the Global Invasive Species Database (GISD, n.d.), Vietnam is home to 131 invasive species, of which 102 are terrestrial species and 29 are aquatic species (freshwater and marine). The list of potential invasive species in the Project's area are shown in Appendix A.

8.6 Desktop Screening and Literature Review

The desktop review considered online sources, literature and environmental studies undertaken within 50 km radius of the Project area. IBAT was used as the main source for identifying threatened species and important conservation areas. Additional sources that verifies the IBAT screening included:

- Alliance for Zero Extinction (AZE);
- BirdLife International;
- Global Biodiversity Information Facility (GBIF);
- International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (the 'IUCN Red List') and their profiles; and
- IUCN Red List of Ecosystems.

The information is combined with mortality survey information from the 2017 studies undertaken by AF-Consulting JSC (see section 8.7) and used to evaluate potential critical habitat triggers that may be associated with the EAAAs. The result of desktop screening is interpreted in Critical habitat assessment (section 8.9).

8.7 Biodiversity Field Surveys (ESIA 2017)

This sections summarize the biodiversity field survey undertaken by AF-consultant in 2017.

8.7.1 Birds

8.7.1.1 Methodology

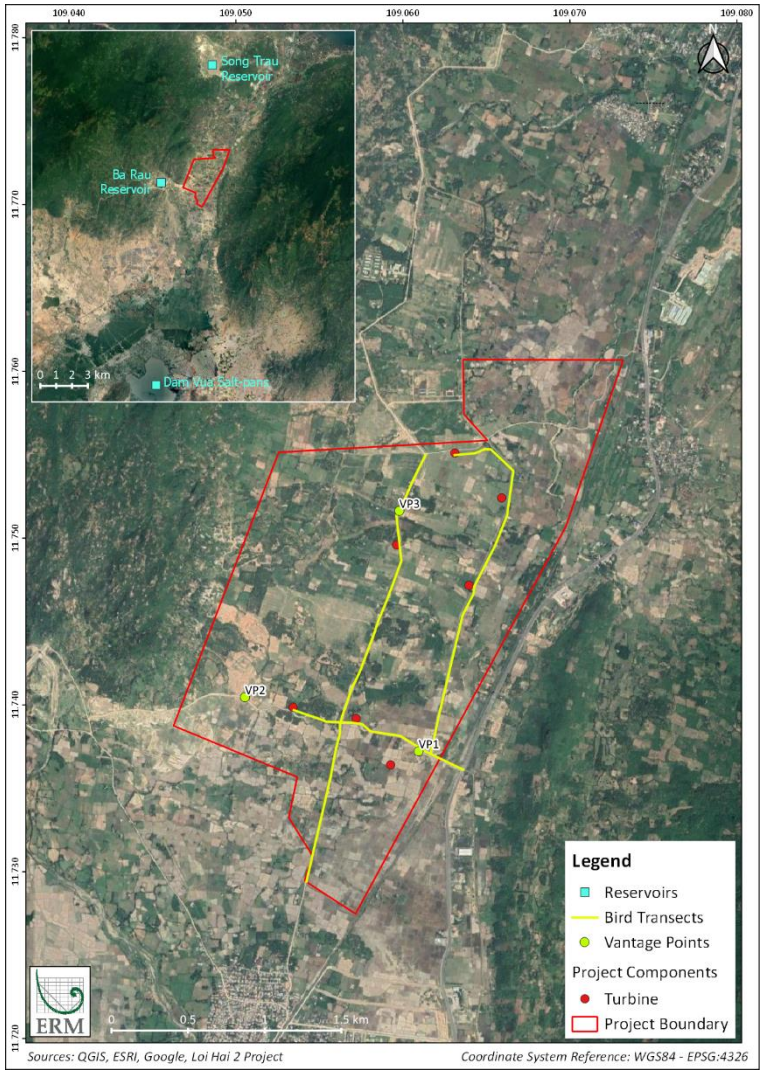
According to Bird Baseline Description (2017), bird surveys for Loi Hai 2 involved seven (07) field trip surveys undertaken between May 2017 and April 2018 (Bird Baseline Description 2017) (Table 8.6 and Figure 8.6) which covers migratory season from September to March.

- Transects: The three surveys taken in May, July and August 2017 were conducted using transects for MacKinnon lists (8-species list) to estimate the species richness. The observers walked on two transects on the two sides of the turbines using binoculars to detect bird species, identifiable vocalizations were also counted as records;
- Vantage Point: The four surveys used the Vantage Point Count method to assess risk species that are prone to collision. Three VPs were designed, and the analysis of potential risk of each species is based on its flight pattern and heights, behaviour, ecology and global population. A total 270 hours observations were performed from May 2017 to March 2018, average 90 hours at each VP; and
- Survey on Migrating and Resting Birds: these survey used scan and focus sampling. Roosting and foraging sites were selected namely Ba Rau reservoir, Song Tra reservoir and Dam Vua salt-pans.

As previously mentioned, surveys were deployed from 05:30 a.m to 08:00 a.m and 04:00 p.m to 07:00 p.m that is known as the most active time for birds.

Table 8.6 Survey Time

	The Project	Song Trau Reservoir	Dam Vua Salt-pans	Ba Rau Lake	Nui Chua National Park
Fieldwork 1: May 2017	16-17/05/2017	18/05/2017	18/05/2017		
Fieldwork 2: July 2017	08-09/07/2017	10/07/2017	11/07/2017	10/07/2017	11/07/2017
Fieldwork 3: August 2017	26-28/08/2017		29/08/2017		29/08/2017
Fieldwork 4: September 2017	09-11/09/2017		12/09/2017		
Fieldwork 5: Jan 2018	Vantage Point 28/01-01/02/2018				
Fieldwork 6: February 2018	Vantage Point 25/02-01/03/2018				
Fieldwork 7: April 2018	Vantage Point 03-10/04/2018				



VP1

VP2

VP3

Figure 8.6 Bird Survey Locations

8.7.1.2 Result

The list of birds recorded at Loi Hai wind farm in the first three surveys (MacKinnon list technique), along with the list of birds being prone to collision (Vantage Point) can be found in Appendix B.

Transect

A total of 40 bird species were recorded in the transect surveys. All these species are listed as IUCN Least Concern and none is listed in the Vietnam Red Data Book.

The most common species is Eurasian Tree Sparrow (*Passer montanus*) which has frequency of presence or relative abundance 70%, following are German's Swiftlet (*Aerodramus germani*, 65%), Indochinese Bushlark (*Mirafra erythrocephala*, 57%), Spotted Dove (*Streptopelia chinensis*, 51%) and Zebbra Dove (*Geopelia striata*, 51%).

The accumulation curve (Figure 8.7) shows that samples from 30 to 37 (Mackinnon list 30-37), there was no new species discovered. This means low chance to add a new species if surveys in the non-migratory season are carried out. Based on Jacknife estimation, the species richness is considered to be maximum 43 species during non-migratory season.

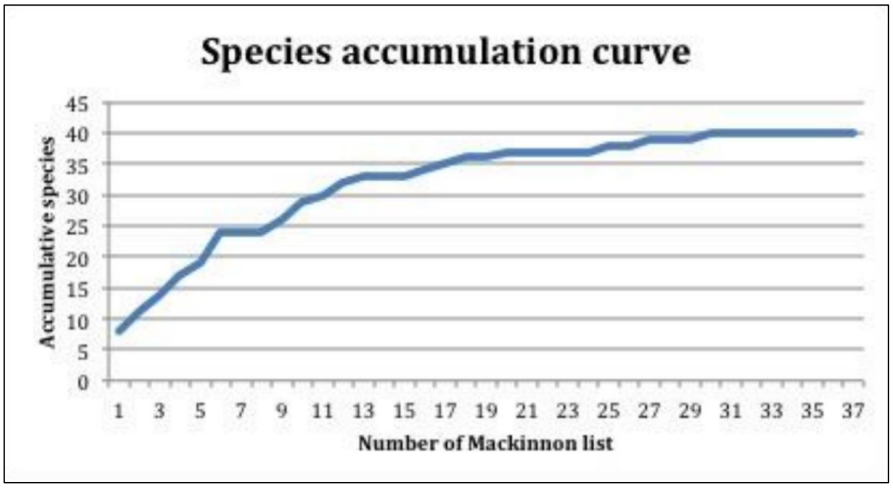


Figure 8.7 The accumulation curve

Vantage Point

Vantage point surveys recorded 36 species. Almost all are IUCN Least Concern species, except for two migratory birds registered as IUCN Near Threatened (NT) including Red-necked Stint (*Calidris ruficollis*) and Bar-tailed Godwit (*Limosa lapponica*).

- Red-necked Stint: A flock of 36 birds was counted on 7 April 2018 at 06:32, they flew northward through VP1. This species is wintering shorebird that comes to Vietnam coastal area during migration time. A total of 20 birds were also observed at Dam Vua salt-pan on 9 September 2017.
- Bar-tailed Godwit: A total of 27 were recorded over three occaisons. Four birds were seen from VP2 on 27 February 2018 that flew northward, 20 birds were seen from VP1 on 6 April 2018 and three birds were seen from VP2 on 8 April 2018.

Migrating and Resting Birds

Seven migratory birds were recorded at Loi Hai 2 Wind Farm area that were observed from December to April (Table 8.7). In addition, Dam Vua salt-pans is the most important area supporting the resting site for birds in the Project's proximity. For instance, there are 15 species recored including one NT which is migratory species (Red-necked Stint) and 14 LC species. The list of bird species was found in

Dam Vua salt-pans can be found in Table 8.7. Furthermore, no significant conservation bird was found in Song Trau and Ba Rau reservoir.

Table 8.7 Migrating Birds at Loi Hai Windfarm Area

No	English Name	Scientific name	Total count	IUCN Redlist
1	Little Ringed Plover	*Charadrius dubius*	360	LC
2	Common Greenshank	*Tringa nebularia*	137	LC
3	Wood Sandpiper	*Tringa glareola*	80	LC
4	Red-necked Stint	*Calidris ruficollis*	36	NT
5	Black-winged Stilt	*Himantopus himantopus*	20	LC
6	Bar-tailed Godwit	*Limosa lapponica*	27	NT
7	Oriental Pratincole	*Glareola maldivarum*	73	LC

Note: LC: Least Concern; NT: Near Threatened

8.7.2 Bats

8.7.2.1 Methodology

A previous study of bats for Loi Hai 2 was conducted once a month during a period of 12 months, beginning May 2017, one sampling session per month consisting on six days within the Project area and its surroundings (Table 8.8, Table 8.9 , Figure 8.8).

Table 8.8 Bat Survey Methods

Time Period	Method	Description
Daytime	Roost survey	In daytime, interviews with residents and searching for bat roosts were performed to find roosting sites. In order to locate a roost, the past and present uses by bats (and people) was determined by assessment: ■ Directly observe and census the bats at roost; ■ Search for guano; ■ Assess historical bat use; ■ Assess past human use;
Night time	Live sampling	Live sampling of bats was undertaken for six nights every month for twelve months within and nearby the project site. ■ Mist net: an assortment of mist nets were used according to local topography (e.g. 12m, 9m, 7m), all of which are 70 denier nets. Three mist nets were also deployed each night from 05.30p.m–06.00 a.m and attended constantly until 2200 hours, then checked again at dawn. ■ Harp-trap: four-bank harp traps with a capture surface of 2.4 m^2 were employed. Each sampling night, two harp traps were deployed from 5.30 p.m–06.00 a.m and checked for captures every 30 minutes until 2200 hours, then again at dawn.

Time Period	Method	Description
	Acoustic sampling	Acoustic sampling with one Echo Meter Touch bat detector was undertaken for six nights each month between May 2017 and Aril 2018 (except February 2018) within and nearby the project site. One night was devoted to sampling each of the six transects each month (simultaneously with live sampling). Acoustic sampling was conducted between 1800–2000 hours each night via three 20-minute point registrations located at the start, mid and end of each transect.

Table 8.9 Survey Time and Effort

	Transect						Live Sampling (overnight)	Acoustic Sampling
	LH1	LH2	LH3	NC	ST	CS		
12-17/05/2017	12/05	13/05	14/05	15/05	16/05	17/05	2 harp traps; 3 Mist nets (12m + 9m + 7m) (12-16/05/2017)	1800–2000 hrs
16-21/05/2017	18/06	16/06	17/06	20/06	19/06	21/06	2 harp traps; 3 Mist nets (12m + 9m + 7m)	
25-31/07/2017	26/07	30/07	25/07	28/07	27/07	29/07		
25-31/08/2017	25/08	30/08	27/08	28/08	26/08	29/08		
29/09-05/10/2017	30/09	01/10	03/10	02/10	29/09	04/10		
22-28/10/2017	24/10	25/10	27/10	22/10	23/10	26/10		
20-25/11/2017	23/11	24/11	25/11	20/11	21/11	22/11		
22-28/12/2017	27/11	25/12	28/12	22/12	23/12	24/12		
24-29/01/2018	28/01	27/01	29/01	24/01	25/01	26/01		
04-09/03/2018	05/03	07/03	09/03	04/03	06/03	08/03		
01-07/04/2018	03/04	07/04	02/04	05/04	04/04	01/04		

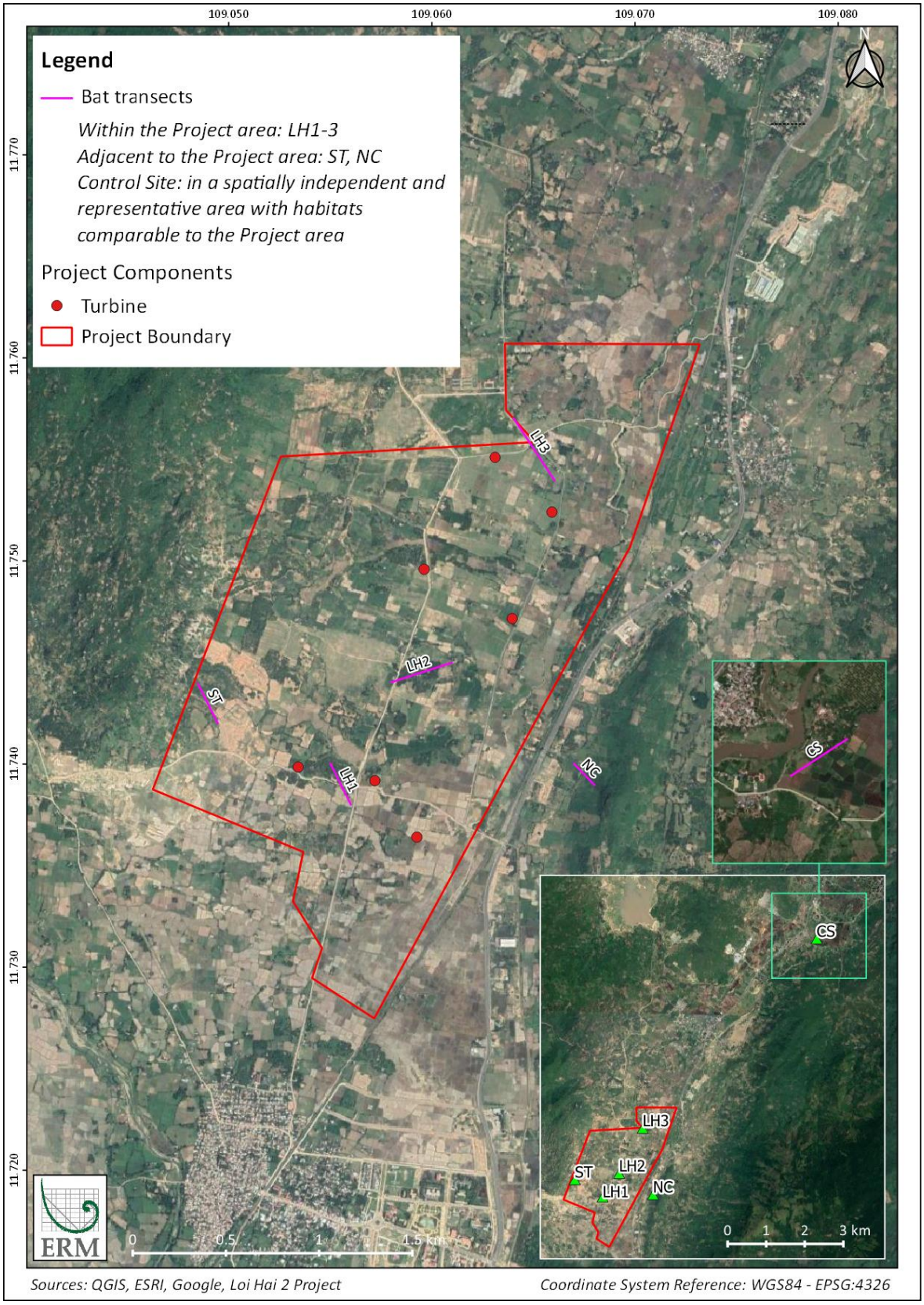


Figure 8.8 Bat Survey Locations

8.7.2.2 Results

Roosting searches

Interviews with residents and extensive daytime searches undertaken between May 2017 and April 2018 did not reveal the existence of any significant (e.g., >100 individuals) diurnal roosts for bats within the Loi Hai 2 Project area.

Live sampling and Acoustic Sampling

Generally, at least 25 bat species including four fruit bat taxa and 21 insectivorous species occur in the Project area, most, if not all of which, are likely present all year. Most species are listed as least concern, although there are two Near Threatened species namely Griffin's Leaf-nosed Bat (*Hipposideros griffini)* and Walston's tube-nosed bat (*Murina walstoni*). In addition one bat species, Chasen's horseshoe bat *(Rhinolophus chaseni,* has yet to be assessed as of January 2021. There is one species, which although it is IUCN LC, is listed as Vulnerable in the Vietnam Red Data Book, namely Thomas's horshoe bats (*Rhinolophus thomasi*).

Chasen's horseshoe bat is widely distributed within Indochina (Laos, Cambodia & Vietnam) and variably common in suitable habitats across their respective ranges. Walston's tube-nosed bat and Griffin's Leaf-nosed Bat is unlikely to qualify for threatened categories due to wide-range distribution. (Neil Furey[9] pers.comm). Dr. Furey has suggested that the Griffin's Leaf-nosed Bat is a nationally endemic species, but not a restricted range species, as the Extent of Occupancy is likely to be larger than 50,000km^2 (section 8.9.1.1). The presence of this species was also recorded in Nui Chua National Park.

Taxonomic structure

Per live-capture data, horseshoe bats (*Rhinolophidae*) and evening bats (*Vespertilionidae*) were best represented in species richness with six species apiece, followed by leaf-nosed bats (*Hipposideridae*) with five species and false vampire bats (*Megadermatidae*) with two species (Figure 8.9).

Additionally, the most abundant species was rousettus fruit bats (*Rousettus leschenaulti/ amplexicaudatus*) which represented 35% of captures, followed by greater short-nosed fruit bat (Cynopterus sphinx, 15%) and Andersen's leafnosed bat (*Hipposideros Pomona*,12%). These were followed by grand leaf-nosed bat (*Hipposideros grandis*) and cave nectar bat (*Eonycteris spelaea*) at 9% and 8% respectively.

[9] Dr Neil Furey is a conservation biologist who has worked in SE Asia since 1997 (resident since 1999), spending a decade in Vietnam and completing projects in Bangladesh, Cambodia, China, Hong Kong, India, Indonesia, Laos, Myanmar and Singapore. He has a proven record in designing and leading a variety of research and conservation initiatives including biodiversity surveys/monitoring for a diverse range of taxa, conservation needs evaluations (incl. environmental impact assessments), protected area creation, capacitybuilding programs and policy and legal developments. Based in Cambodia since 2009, much of his recent work has focussed on strengthening national capacity for conservation biology through his contributions to the Royal University of Phnom Penh. Dr Furey has co-produced two major treatments on the Indochinese bird fauna, is Chief Editor of the Cambodian Journal of Natural History, an Honorary Research Fellow of the UK Harrison Institute and serves on the editorial boards of two regional journals. He has an interest in assemblage ecology and specialises in SE Asian bats, for which he has co-described ten new taxa to science, serves as a member of the IUCN SSC Bat Specialist Group and publishes regularly in international journals.

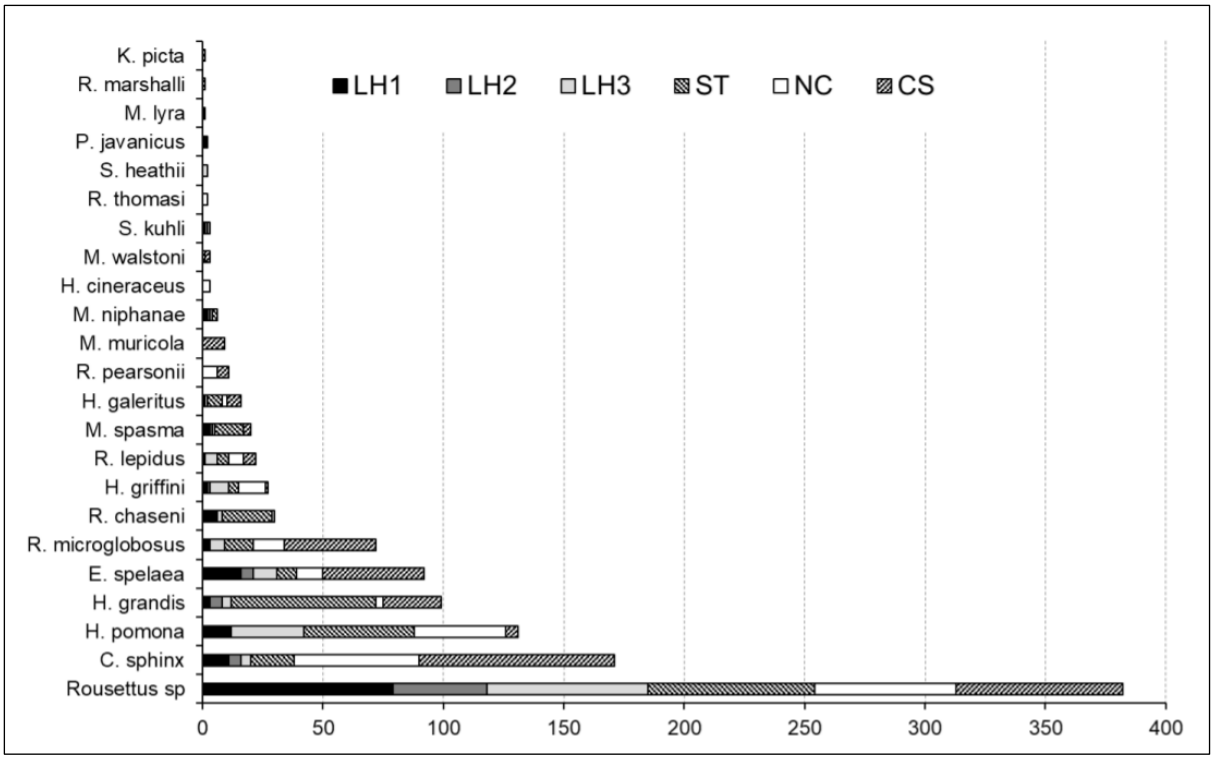


Figure 8.9 Relative abundance of bat species across transects in and around the Loi Hai project area, May 2017 – April 2018

Foraging strategies

The majority of recorded species is classified as insectivorous species that forage in the highly cluttered airspace within the forest interior (Strategy 1). Detail result is presented in Table 8.10.

Based on their foraging strategies, several recorded insectivores (i.e. *Taphozous melanopogon*) and frugivores (i.e. *Rousettus sp.* and *Eonycteris spelaea*) are known as good dispersers and can fly over long distances and they might be potential migrants; while other species are likely residents at Loi Hai 2 project site (Screening study of bats in and nearby Loi Hai 2 Wind Farm Project vicinity, 2021).

Table 8.10 Foraging Strategies of Bat Species within the Project Area

No.	Scientific name	English name	IUCN[1]	Roosting Preference	Foraging Strategy[2]	Collision Risk	Extent of Occurrence (EOO)	Population	Population Trend
	Pteropodidae	Old World fruit bats							
1	*Cynopterus sphinx*	Greater short-nosed fruit bat	LC	Foliage / Cave	IV	Medium	large	unknown	increasing
2	*Eonycteris spelaea*	Cave nectar Bat	LC	Cave	V	High	large	unknown	unknown
3	*Megaerops niphanae*	Ratanaworabhan's fruit bat	LC	Foliage	IV	Medium	large	unknown	unknown
4	*Rousettus* sp.	Leschenault's Rousette	LC	Cave	V	High	large	unknown	stable
	Megadermatidae	False vampire Bats							
5	*Megaderma lyra*	Greater False vampire	LC	Cave / Hollow tree	II	Medium	large	unknown	unknown
6	*Megaderma spasma*	Lesser False vampire	LC	Cave / Hollow tree	II	Medium	large	unknown	unknown
	Rhinolophidae	Horseshoe bats							
7	*Rhinolophus chaseni*	Chasen's horseshoe bat	NA	Cave / Hollow tree	I	Low	unknown	unknown	unknown
8	*Rhinolophus microglobosus*	Lesser brown horseshoe bat	NA	Cave / Hollow tree	I	Low	unknown	unknown	unknown
9	*Rhinolophus lepidus*	Blyth's Horseshoe bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
10	*Rhinolophus pearsonii*	Pearson's horseshoe bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
11	*Rhinolophus marshalli*	Marshall's horseshoe bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
12	*Rhinolophus thomasi*	Thomas's horseshoe bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
	Hipposideridae	Leaf-nosed bats							
13	*Hipposideros cineraceus*	Least Leaf-nosed bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
14	*Hipposideros galeritus*	Cantor's Leaf-nosed bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
15	*Hipposideros grandis*	Grand Leaf-nosed bat	LC	Cave / Hollow tree	II	Medium	large	unknown	unknown

No.	Scientific name	English name	IUCN[1]	Roosting Preference	Foraging Strategy[2]	Collision Risk	Extent of Occurrence (EOO)	Population	Population Trend
16	*Hipposideros griffini*	Griffin's Leaf-nosed bat	NT	Cave / Hollow tree	II	Medium	larger than 50,000 km^2	unknown	decreasing
17	*Hipposideros pomona*	Andersen's Leaf-nosed bat	LC	Cave / Hollow tree	I	Low	large	unknown	unknown
	Vespertilionidae	Evening bats							
18	*Murina walstoni*	Walston's tube-nosed Bat	NT	Foliage	I	Low	unknown	unknown	unknown
19	*Myotis muricola*	Nepalese whiskered Myotis	LC	Crevices in buildings	II	Medium	large	unknown	stable
20	*Pipistrellus javanicus*	Javan Pipistrelle	LC	Crevices in buildings	III	High	large	unknown	stable
21	*Scotophilus heathi*	Greater Asian yellow house bat	LC	Crevices in buildings	III	High	large	unknown	stable
22	*Scotophilus kuhlii*	Lesser Asian yellow house bat	LC	Crevices in buildings	III	High	large	unknown	stable
23	*Kerivoula picta*	Painted woolly bat	LC	Foliage	I	Low	large	unknown	decreasing
24	Phonic type 1 (FM ≈66 kHz)				III				
25	Phonic type 2 (FM <30kHz)				III				

***Note**:*
Strategy I=Insectivorous bats that forage in the highly cluttered airspace within the forest interior (or forest interior specialists);
Strategy II=Insectivorous bats that forage in partially cluttered spaces such as clearings, streams or other tunnels within the forest or above the canopy (edge and gap foragers); Strategy III=Insectivorous bats that forage in airspaces found in large clearings or high above the forest canopy (open-space foragers);
Strategy IV=fruit and nectar-eating bats that fly into the partially cluttered air-spaces between tree canopies, roost in small numbers and forage locally; and,
Strategy V=Fruit and nectar-eating bats that fly in unobstructed air-spaces, roost in large colonies and forage over large areas.

8.7.3 Flora

The survey reports vegetation is mainly a mix of wild trees, bushes and grasses, none of which meet critical habitat criteria (Table 8.11).

Table 8.11 Flora Species Recorded in Project Area

No.	Common Name	Scientific Name	IUCN Red List	Note
1	Shameplant	*Mimosa pudica*	LC	Not Native
2	Cactus	*Opuntia dellenii*	*NL*	Not Native
3		*Bidens pilosa*	*NL*	Not Native
4		*Ipomoea pes-caprae*	*NL*	Not Native
5	Creeping woodsorrel	*Oxalis corniculata L.*	*NL*	Not Native
6	Goosegrass	*Eleusine indica Gaerth*	LC	Native
7	Carpet-grass	*Axonopus compressus*	*NL*	Not Native
8		*Ageratum conyzoides L.*	LC	Not Native
9	Chicken spike	*Calotropis gigantean R.Br*	*NL*	Not Native
10		*Randia spinose*	*NL*	Not Native
11		*Lantana camara*	*NL*	Not Native
12	Broom weed	*Sida rhomhifolia L.*	*NL*	Not Native
13	Aloe vera	*Aloe barbadensis*	*NL*	Not Native
14	Small bamboo	*Phyllostachys*	*NL*	Not Native
15	Cashew fruits and nuts	*Anacardium occidentale*	*NL*	Not Native
16	Acacia leaves and flowers	*Acacia auriculiformis*	LC	Not Native
17	Eucalyptus leaves and flowers	*E. camaldulensis Dehnhardt*	*NL*	Not Native
18	Guava	*Psidium guajava*	LC	Not Native
19	Papaya	*Carica papaya*	DD	Not Native
20	Cassava	*Manihot esculenta*	*NL*	Not Native
21	Mango	*Mangifera*	*NL*	Not Native
22	Custard-apple	*Annona squamosa*	LC	Not Native

Notes: CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; DD : Data Deficient; NA : Not Assessed; LC: Least Concern; NL: Not Listed

8.7.4 Other Fauna Species

According to ESIA 2017, freshwater and terrestrial animal species was found within the Project area are considered to be common. The type of agro-ecosystem with the features of terrestrial ecosystem as well as the aquatic ecosystem of the project area is relatively poor, with no endemic wildlife species, so the negative impacts of the implementation of the project is negligible.

8.8 Biodiversity Value in the Adjacent Areas

8.8.1 Song Trau Protection Forest

Song Trau Protection Forest[10] is roughly 500m to the south of the Project (Figure 8.10). The management board of Song Trau Protection Forest currently manages approximately 5,000 ha in total of plantation forest and natural forest[11]. The management board conducts a management plan collaborating with local people to encourage the community to engage in forestation activities and forest fire prevention.

This area appears to support ecosystem services as the presence of financial value of flora species such as *Acacia, Melaleuca*. Based on satellite, the edge of Song Trau Protection Forest that is adjacent to the Project area is likely to be modified by agricultural activities.

[10] According to Circular 34/2009/TT-BNNPTNT, Vietnam's forests can be categorized into three categories based on use purposes, namely special use, production and protection under the Law on Protection and Development of Forest of the National Assembly:
- Protection forest: Protection forests are used mainly to protect water sources and land, prevent erosion and desertification, restrict natural calamities and regulate climate, thus contributing to environmental protection. Protection forest may include (1) headwater protection forests; (2) wind- and sand-shielding protection forests; (3) protection forests for tide shielding and sea encroachment prevention; and (4) protection forests for environmental protection.
- Special-use forest: Special-use forests, which are used mainly for conservation of nature, specimens of the national forest ecosystems and forest biological gene sources; for scientific research; protection of historical and cultural relics as well as landscapes; in service of recreation and tourism in combination with protection, contributing to environmental protection. Special-use forest may include (1) national parks; (2) nature conservation zones; (3) landscape protection areas; and (4) scientific research and experiment forests.
- Production forest: Production forests are used mainly for production and trading of timber and non-timber forest products in combination with protection, contributing to environmental protection, including (1) natural production forests; (2) planted production forests; (3) seeding forests, including the selected and recognized planted forests and natural forests.

[11] Available at: http://baoninhthuan.com.vn/news/108328p0c151/ban-quan-ly-rung-phong-ho-dau-nguon-ho-song-trau-nhieu-no-luc-trong-thuc-hien-nhiem-vu-bao-ve-va-phat-trien-rung.htm Accessed date: 20 Jan 2021

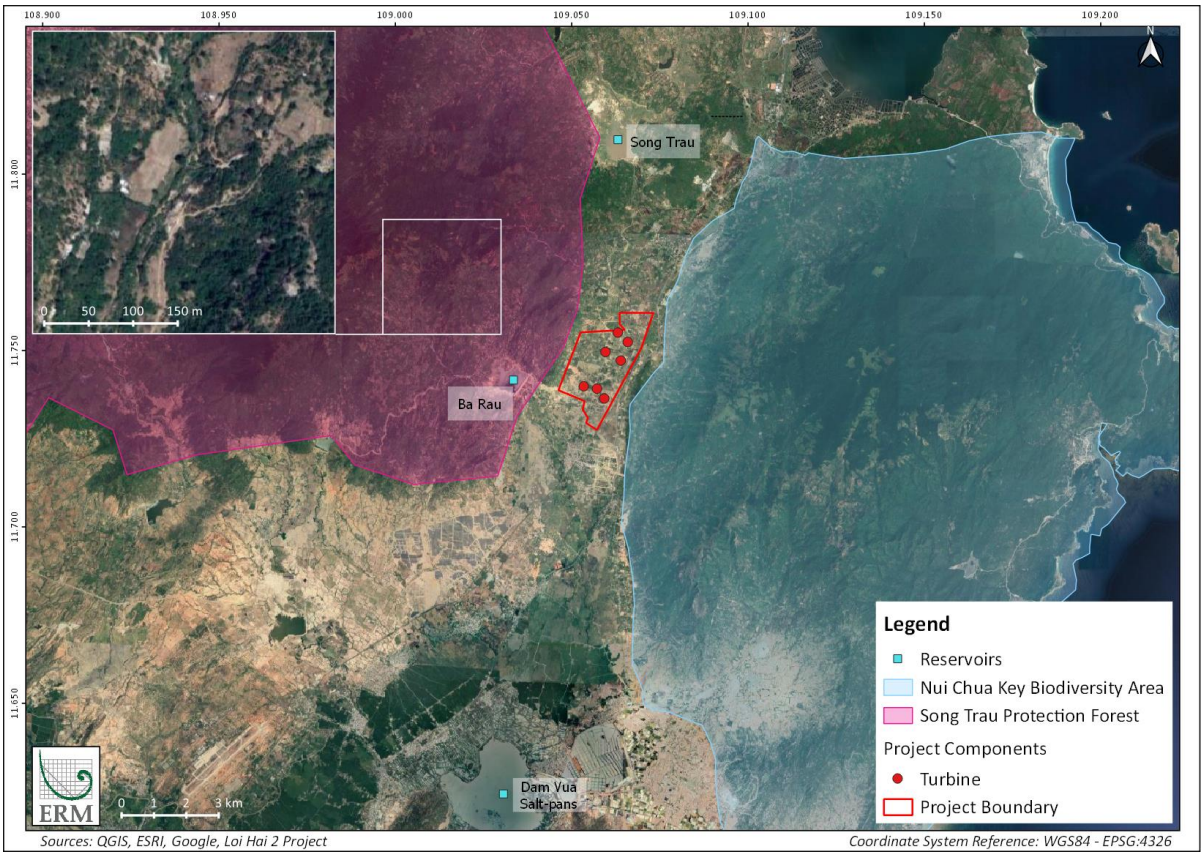


Figure 8.10 The Project's Transmission Line Intersecting with the Tuy Phong Protection Forest

8.8.2 Nui Chua National Park

Nui Chua National Park (NP), located at the northeast of Ninh Thuan Province, was established in 2003 according to Decision No.134/2003/QĐ-TTg dated 09 July 2003 signed by the Prime Minister on transforming Nui Chua Nature Conservation Zone into Nui Chua National Park, Ninh Thuan Province (Figure 8.10). Nui Chua NP is approximately 5 km to the east of the Project. The total area of Nui Chua National Park is 29,865 ha including 17,223 ha forest land, 5,290 ha non-forest land and 7,352 ha sea area (ESIA, 2017).

Vegetation of Nui Chua NP is very diversified and there exist dominant populations in different regions, such as:

- Plants on sea bed and sand
- Scattered tropical semi-dry broadleaf forest
- Tropical dry bushes savanna
- Tropical dry big trees, bushes, grass savanna
- Closed, hard leaved, low humid forest
- Evergreen closed sub-tropical rainy forest on low mountain

Scientists and researchers have found evidence of 1,504 terrestrial vascular plant species of 85 orders, 147 families and 596 genera of seven different phyla within Nui Chua National Park. There are some typical

plant species in this areas namely Chan chan (*Niebuhria siamensis* Kurz) [IUCN NE[12]], Găng gai (*Randia spinosa* Retz.) [IUCN NE], Tu hú (*Gmelina asiatica* L.) [IUCN LC] and Thành ngạnh nam (*Cratoxylum cochinchinensis* Lour.) [IUCN LC]. In addition, there are about 54 species of 10 different families that need to be strictly protected, notably including Agarwood (*Aquilaria crassna)* [IUCN CR] in the Thymeleaceae family; *Diospyros spp* in the Ebenaceae family and *Afzelia xylocarpa* [IUCN EN], *Sindora siamensis* [IUCN LC; VNRB EN] (ESIA, 2017).

With respect to fauna, some species are predicted according to some scientist, which may still exist in Nui Chua National Park, particularly:

- Mammals: Black-shanked douc Langur, Asiatic Black Bear (*Ursus thibetanus*) [IUCN VU, VNRB EN];
- Reptile: Leatherback (*Dermochelys coriacea*) [IUCN VU; VNRB CR], Green Turtle (*Chelonia mydas*) [IUCN EN, VNRB EN] , Loggerhead Turtle (*Caretta Caretta*) [IUCN VU; VNRB CR]; *Cyrtodactylus caovansungi* [IUCN EN], Bauer's Leaf-toed Gecko (*Dixonius aaronbaueri*) [IUCN LC; re-stricted range]; and
- Birds: Christmas Frigatebird (*Fregata andrewsi*) [IUCN CR], Silver Pheasant (*Lophura nycthemera*) [IUCN LC; VNRL LR], Coral-billed Ground-cuckoo (*Carpococcyx renauldi*) [IUCN VU], Green Peafowl (*Pavo muticus*) [IUCN EN; VNRL EN].

8.9 Critical Habitat Assessment

Based on the various data sources including desktop screening, literature review and field survey, this assessment indicates whether the EAAAs contain critical habitat.

8.9.1 Candidate Species

The completed critical habitat screening table is provided in Appendix D. Those considered suitable for assessment for critical habitat are discussed further in this section.

8.9.1.1 Within the EAAA1 – Avian Fauna

Based on IBAT screening, 180 candidate species are identified within the EAAA1 (Table 8.12) including two mammal species and 178 bird species.

Table 8.12 Candidate Species within the EAAA1

Class	Criterion 1 (Critically Endangered (CR) and/or Endangered (EN) species)	Criterion 2 (Endemic or restricted-range species)	Criterion 3 (Migratory or congregatory species)
Aves (Birds)	03 CR, 05 EN, 05 VU and 01 EN in Vietnam Red Data Book	03	167
Mammalia (Bats)	01 EN	02	0

Note: CR: Critically Endangered; EN: Endangered; VU: Vulnerable

[12] Not Evaluated

Table 8.13 Candidate Species under Criterion 1 and Criterion 2 within the EAAA

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)
1	Aves	*Trochalopteron yersini*	Collared Laughingthrush	EN	N/A	X	X
2	Aves	*Buceros bicornis*	Great Hornbill	VU	VU	X	
3	Aves	*Rhyticeros undulatus*	Wreathed Hornbill	VU	N/A	X	
4	Aves	*Columba punicea*	Pale-capped Pigeon	VU	EN	X	
5	Aves	*Carpococcyx renauldi*	Coral-billed Ground-cuckoo	VU	N/A	X	
6	Aves	*Nettapus coromandelianus*	Cotton Pygmy-goose	LC	EN	X	
7	Aves	*Gyps bengalensis*	White-rumped Vulture	CR	CR	X	
8	Aves	*Sarcogyps calvus*	Red-headed Vulture	CR	N/A	X	
9	Aves	*Emberiza aureola*	Yellow-breasted Bunting	CR	N/A	X	
10	Aves	*Rheinardia ocellata*	Crested Argus	EN	N/A	X	
11	Aves	*Pavo muticus*	Green Peafowl	EN	EN	X	
12	Aves	*Sterna acuticauda*	Black-bellied Tern	EN	N/A	X	
13	Aves	*Lonchura oryzivora*	Java Sparrow	EN	N/A	X	
14	Aves	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	VU	N/A	X	
15	Aves	*Schoeniparus klossi*	Black-crowned Fulvetta	LC	N/A		X
16	Mammalia	*Murina harpioloides*	Dalat Tube-nosed Bat	EN	N/A	X	X
17	Mammalia	*Hypsugo dolichodon*	Long-toothed Pipistrelle	DD	N/A		X

Note:
CR: Critically Endangered, EN: Endandered; VU: Vulnerable; LC: Least Concern, DD: Data Deficient; N/A: Not Applicable

No candidate species under Criterion 1 is likely to occur within the EAAA1 in numbers sufficient to meet the criterion thresholds. Additionally, the EAAA1 is unlikely to contain suitable habitat for some candidates which are restricted-range species (Criterion 2). Collared Laughingthrush [IUCN EN] has been found in Phuoc Binh IBA (section 8.4) within a 50 km radius of the Project which may transverse the EAAA1. However, taking into account that no available evidence indicates this species was recorded within the EAAA1, there is a low probability that the EAAA1 contains habitat supporting a number of individuals to meet thresholds of Criterion 1 and 2.

Furthermore, the majority of migratory or congregatory species are widespread. Despite these species may occur within the EAAA1, considering the very large Extent of Occurrence (EOO) in comparison to the proportionally small EAAA1, these species do not meet thresholds of Criterion 3. A flock of 36 individuals of Red-necked stint [IUCN NT] was recorded within the Project area inside the EAAA1 and 20 individuals were observed Dam Vua Salt-pans. The global population of this species is estimated at approximately 315,000 individuals[13] with the EOO[14] is around 3,360,000 km^2. This species is wintering shorebird that comes to Vietnam coastal area during migration time. To meet the thresholds of Criterion 3 (areas area known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population of a migratory or congregatory species at any point of the species' lifecycle.), roughly 3,150 individuals Red-necked Stint need to occur frequently occur within the EAAA1. Furthermore, a total of 27 individuals of Bar-tailed Godwit [IUCN NT] was recorded within the Project area inside the EAAA1. The global population is significantly more than 150,000[15] with the EOO is about 9,050,000 km^2. Similar to Red-necked Stint, to meet the thresholds of Criterion 3, a large number of individuals (considerably more than 1,500) is required to regularly occur within the EAAA1. Consequently, there is a low probability that the EAAA1 contains habitat supporting a number of individuals to meet thresholds of Criterion 3.

Dalat Tube-nosed Bat (*Murina harpioloides*) [IUCN EN] is only known from one location which is Dalat Plateau in Vietnam. The elevation of occurrence ranges from 1,400 meters to 1,800 meters. There is a possibility, that this bat also inhabits forested areas at the same elevations in neighbouring provinces Dak Lak and Khanh Hoa. Forest loss and degradation are the main threats to this species. The species had not been recorded within the EAAA1 during the preparation of this assessment. Due to the difference in topography between the Dalat Plateau and EAAA1, it is unlikely that the species presence occurs within the EAAA1.

Among the potential candidates, Griffin's leaf-nosed bat (*Hipposideros griffini*) [IUCN NT] was identified to be a national endemic species. Griffin's Leaf-nosed Bat is native in Vietnam. This species has only been recorded from three national parks, namely limestone karst of Cat Ba National Park, secondary forest in a mountain area in Chu Mom Ray and lowland forest in Cat Tien[16]. The species range probably includes at least some areas that lie between these isolated sites, although the IUCN regard the species as threatened as a consequence of its fragmented range. (Thong, 2012). There is no information about the population size of this species on a global context. However, four individuals were captured in Cat Ba National Park, two individuals from Chu Mom Ray National Park, and several individuals from Cat Tien National Park (Thong, 2012). Based on unpublished data, less than 30 individuals inhabit a cave in Cat Tien National Park. According to GBIF data, there was no observation of Griffin's Leaf–nosed Bat within 50km radius. Notwithstanding, the live trapping and acoustic survey recorded the presence of this species within the

[13] Available at: https://birdsoftheworld.org/bow/species/rensti/cur/introduction#:~:text=Global%20population%20estimated%20at%20315%2C000,2002%E2%80%932007%20data)%20(14 Access date: 28 Jan 2021

[14] Available at: http://datazone.birdlife.org/species/factsheet/red-necked-stint-calidris-ruficollis Access date: 28 Jan 2021

[15] Available at: http://nzbirdsonline.org.nz/species/bar-tailed-godwit. Access date: 28 Jan 2021

[16] Thong, V.D., Puechmaille, S.J., Denzinger, A., Dietz, C., Csorba, G., Bates, P.J.J., Teeling, E.C. and Schnitzler, H. 2012. A new species of Hipposideros (Chiroptera: Hipposideridae) from Vietnam. Journal of Mammalogy 93(1): 1-11.

Project area and Nui Chua National Park which is 2km to the East of the Project. However, as consultation with Dr Neil Furey, given that the occurrence of species are recorded within the geographic extent of Vietnam, the estimated extent of occurrence (EOO) appears to be considerably larger than 50,000km^2. Consequently, this species is unlikely to be candidate species for Critical Habitat under Criterion 2.

Source: New records of Hipposideros griffini from Lava Caves and the threats to its conservation in Vietnam

Figure 8.11 Griffin's Leaf-nosed Bat

Based on the application of screening criteria under IFC PS6, as detailed in Appendix D, the EAAA1 does not trigger critical habitat. .

8.9.1.2 Within the EAAA2 - Herpetofauna, Non-volant Mammals and Flora

Based on IBAT screening, 86 candidate species (Table 8.14) are indicated to occur within the EAAA2.

Table 8.14 Candidate Species within the EAAA2

	Criterion 1 (Critically Endangered (CR) and/or Endangered (EN) species)	Criterion 2 (Endemic or restricted-range species)	Criterion 3 (Migratory or congregatory species)
Amphibia	05 EN and 05 VU	10	0
Reptilia	03 CR, 01 EN, 04 VU and 01 EN in Vietnam Red Data Book (LC in IUCN Red List)		0
Non-volant mammal	03 CR, 07 EN, 11 VU and 01 CR in Vietnam Red List (DD in IUCN Red List)	05	05

	Criterion 1 (Critically Endangered (CR) and/or Endangered (EN) species)	Criterion 2 (Endemic or restricted-range species)	Criterion 3 (Migratory or congregatory species)
Magnoliopsida	04 CR, 04 EN, 02 VU	12	0
Liliopsida	01 CR, 02 EN	09	0

Note: CR: Critically Endangered; EN: Endangered; VU: Vulnerable: LC: Least Concerned; DD: Data Deficient

Table 8.15 List of Candidate Species within the EAAA2

No.	Class	Scientific Name	Common Name	IUCN Red List	Vietnam Red Data Book	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)
Amphibia							
1	Amphibia	*Rhacophorus vampyrus*	Vampire Flying Frog	EN	N/A	X	X
2	Amphibia	*Theloderma palliatum*	Cloaked Moss Frog	EN	N/A	X	X
3	Amphibia	*Hylarana montivaga*	N/A	EN	N/A	X	X
4	Amphibia	*Rhacophorus calcaneus*	Vietnam Flying Frog	EN	N/A	X	X
5	Amphibia	*Microhyla pulchella*	Pretty Narrow-Mouth Frog	EN	N/A	X	X
6	Amphibia	*Raorchestes gryllus*	N/A	VU	N/A	X	X
7	Amphibia	*Microhyla annamensis*	Vietnam Rice Frog	VU	N/A	X	X
8	Amphibia	*Kalophrynus honbaensis*	N/A	VU	N/A	X	X
9	Amphibia	*Microhyla arboricola*	Tree-dwelling Narrow-Mouth Frog	VU	N/A	X	X
10	Amphibia	*Microhyla pineticola*	Pine Narrow-Mouth Frog	VU	N/A	X	X
11	Amphibia	*Leptobrachium leucops*	N/A	VU	N/A		X
12	Amphibia	*Microhyla fusca*	Brown Rice Frog	DD	N/A		X
13	Amphibia	*Theloderma laeve*	N/A	DD	N/A		X

No.	Class	Scientific Name	Common Name	IUCN Red List	Vietnam Red Data Book	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)
Reptilia							
1	Reptilia	*Crocodylus siamensis*	Siamese Crocodile	CR	CR	X	
2	Reptilia	*Indotestudo elongata*	Elongated Tortoise	CR	EN	X	
3	Reptilia	*Cuora picturata*	Southern Viet Nam Box Turtle	CR	EN	X	X
4	Reptilia	*Cyrtodactylus caovansungi*	N/A	EN	N/A	X	X
5	Reptilia	*Ophiophagus hannah*	King Cobra	VU	CR	X	
6	Reptilia	*Python bivittatus*	Burmese Python	VU	N/A	X	X
7	Reptilia	*Naja siamensis*	Black And White Spitting Cobra	VU	N/A	X	
8	Reptilia	*Physignathus cocincinus*	Chinese Water Dragon	VU	VU	X	
9	Reptilia	*Varanus salvator*	Common Water Monitor	LC	EN	X	
10	Reptilia	*Dixonius aaronbaueri*	Bauer Leaf-toed Gecko	LC	N/A		X
11	Reptilia	*Cyrtodactylus bidoupimontis*	Bidoup Benta-toed Gecko	LC	N/A		X
12	Reptilia	*Cyrtodactylus phuocbinhensis*	N/A	LC	N/A		X
13	Reptilia	*Cyrtodactylus yangbayensis*	Yangbay Bent-toed Gecko	LC	N/A		X
14	Reptilia	*Gekko canaensis*	Cà Nà□ Marbled Gecko	LC	N/A		X
15	Reptilia	*Leiolepis guttata*	Spotted Butterfly Lizard	DD	N/A		X
16	Reptilia	*Cyrtodactylus irregularis*	Irregular Bow-fingered Gecko	DD	N/A		X

No.	Class	Scientific Name	Common Name	IUCN Red List	Vietnam Red Data Book	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)
17	Reptilia	*Oligodon macrurus*	Angel's Kukri Snake	DD	N/A		X
18	Reptilia	*Dibamus smithi*	Smith's Blind Skink	DD	N/A		X
19	Reptilia	*Gekko grossmanni*	N/A	DD	N/A		X
20	Reptilia	*Oligodon moricei*	Morice's Kukri Snake	DD	N/A		X
Mammalia							
1	Mammalia	*Pygathrix nigripes*	Black-shanked Douc Langur	CR	EN	X	
2	Mammalia	*Muntiacus vuquangensis*	Large-antlered Muntjac	CR	VU	X	
3	Mammalia	*Panthera pardus ssp. delacouri*	Indochinese Leopard	CR	CR	X	
4	Mammalia	*Chrotogale owstoni*	Owston's Civet	EN	N/A	X	
5	Mammalia	*Bos javanicus*	Banteng	EN	N/A	X	
6	Mammalia	*Nomascus gabriellae*	Red-cheeked Gibbon	EN	EN	X	
7	Mammalia	*Trachypithecus germaini*	Indochinese Silvered Langur	EN	N/A	X	
8	Mammalia	*Viverra megaspila*	Large-spotted Civet	EN	VU	X	
9	Mammalia	*Nycticebus pygmaeus*	Pygmy Slow Loris	EN	EN	X	
10	Mammalia	*Panthera tigris*	Tiger	EN	CR	X	
11	Mammalia	*Arctonyx collaris*	Greater Hog Badger	VU	N/A	X	
12	Mammalia	*Ursus thibetanus*	Asiatic Black Bear	VU	EN	X	
13	Mammalia	*Macaca leonina*	Northern Pig-tailed Macaque	VU	VU	X	
14	Mammalia	*Arctictis binturong*	Binturong	VU	EN	X	

No.	Class	Scientific Name	Common Name	IUCN Red List	Vietnam Red Data Book	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)
15	Mammalia	*Bos gaurus*	Gaur	VU	EN	X	
16	Mammalia	*Helarctos malayanus*	Sun Bear	VU	N/A	X	
17	Mammalia	*Macaca arctoides*	Stump-tailed Macaque	VU	VU	X	
18	Mammalia	*Macaca fascicularis*	Nicobar Crab-eating Macaque	VU	LR	X	
19	Mammalia	*Neofelis nebulosa*	Clouded Leopard	VU	N/A	X	
20	Mammalia	*Panthera pardus*	Leopard	VU	CR	X	
21	Mammalia	*Rusa unicolor*	Sambar	VU	N/A	X	
22	Mammalia	*Belomys pearsonii*	Hairy-footed Flying Squirrel	DD	CR	X	
23	Mammalia	*Rattus osgoodi*	Osgood's Vietnamese Rat	LC	N/A		X
24	Mammalia	*Leopoldamys milleti*	Millet's Leopoldamys	LC	N/A		X
25	Mammalia	*Euroscaptor parvidens*	Small-toothed Mole	DD	N/A		X
26	Mammalia	*Tragulus versicolor*	Silver-backed Chevrotain	DD	N/A		X
27	Mammalia	*Crocidura zaitsevi*	Mikhail Zaitsev's Shrew	DD	N/A		X
Magnoliopsida							
1	Magnoliopsida	*Hopea cordata*	Sao hinh tim	CR	DD	X	X
2	Magnoliopsida	*Shorea falcata*	Chai la cong	CR	CR	X	X
3	Magnoliopsida	*Polyspora gioii*	N/A	CR	N/A	X	X
4	Magnoliopsida	*Beilschmiedia macrocarpa*	N/A	CR	N/A	X	X
5	Magnoliopsida	*Camellia fleuryi*	N/A	EN	N/A	X	X

No.	Class	Scientific Name	Common Name	IUCN Red List	Vietnam Red Data Book	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)
6	Magnoliopsida	*Hopea ferrea*	N/A	EN	EN	X	
7	Magnoliopsida	*Dipterocarpus intricatus*	N/A	EN	N/A	X	
8	Magnoliopsida	*Magnolia bidoupensis*	N/A	EN	N/A	X	X
9	Magnoliopsida	*Hopea odorata*	N/A	VU	N/A	X	
10	Magnoliopsida	*Dipterocarpus alatus*	N/A	VU	N/A	X	
11	Magnoliopsida	*Oenanthe javanica*	Water Dropwort	LC	N/A		X
12	Magnoliopsida	*Cladopus fallax*	N/A	DD	N/A		X
13	Magnoliopsida	*Hydrobryum minutale*	N/A	DD	N/A		X
14	Magnoliopsida	*Limnophila polyantha*	Om nhieu hoa	DD	N/A		X
15	Magnoliopsida	*Pistacia weinmanniifolia*	N/A	DD	N/A		X
Liliopsida							
1	Liliopsida	*Zingiber yersinii*	N/A	CR	N/A	X	
2	Liliopsida	*Curcuma vitellina*	N/A	EN	N/A	X	X
3	Liliopsida	*Siliquamomum oreodoxa*	N/A	EN	N/A	X	X
4	Liliopsida	*Monochoria vaginalis*	Pickerel Weed	LC	N/A		X
5	Liliopsida	*Hornstedtia sanhan*	N/A	LC	N/A		X
6	Liliopsida	*Newmania cristata*	N/A	LC	N/A		X
7	Liliopsida	*Conamomum rubidum*	N/A	LC	N/A		X
8	Liliopsida	*Zingiber discolor*	N/A	LC	N/A		X
9	Liliopsida	*Curcuma arida*	N/A	LC	N/A		X
10	Liliopsida	*Ranalisma rostrata*	Mui vang	DD	N/A		X

Note:

CR: Critically Endangered, EN: Endandered; VU: Vulnerable; LC: Least Concern, DD: Data Deficient;

N/A: Not Applicable

The majority of EAAA2 is located in the modified habitat (agricultural area) which is unlikely to contain appropriate habitat for non-volant mammals except for some rat species. However, these rats are considered to be common with a stable population trend. For all other species, as detailed in Appendix D, it is unlikely there is sufficient habitat to support populations that would meet the criterion threshold, or their distribution does not overlap with the project site, or the site is unsuitable (e.g high elevation species).

Although herpetofauna may occur within the EAAA2, some large reptiles such as monitor or crocodile is unlikely to be recorded within the area due to high abundance of human activities. Bauer's Leaf-toed Gecko (*Dixonius aaronbaueri)* [IUCN LC] might occur in the EAAA2 due to its tolerance of degraded habitat, and there have been records of this species being found in plantations elsewhere. Nevertheless, according to ERM's experience, Bauer's Leaf-toed Gecko may be common with population trend is stable. Thus, no strong evidence indicates that the EAAA2 contain critical habitat supporting this species. Habitat for amphibians is limited and EEEA2 is highly unlikely to support amphibian populations that meet the criterion thresholds. . Though some species may occur within the EAAA2, the number of individuals is unlikely to meet the thresholds of Criterions.

Given the EAAA2 mainly is modified considerably by human actitives and degraded by invasive species, it is a low chance that candidate flora species occur within this area. Moreover, field survey did not record any presence of these species.

To sum up, the EAAA2 does not contain critical habitat.

8.9.2 Critical Habitat Assessment Results

Table 8.16 shows the overall results of CHA against the five biodiversity criterions of IFC PS6. The justifications for each candidate species against criteria 1, 2 and 3 are given in Appendix D.

Table 8.16 Critical Habitat Assessment Results

Criterion	Assessment result
Criterion 1	Based on the screening assessment, no species triggered critical habitat within the EAAAs under Criterion 1.
Criterion 2	Based on the screening assessment, no species triggered critical habitat within the EAAAs under Criterion 2.
Criterion 3	Based on the screening assessment, no species triggered critical habitat within the EAAAs under Criterion 3.
Criterion 4	No ecosystem in Vietnam have yet been assessed under IUCN Red List of Ecosystems and the site is highly modified. Therefore, the EAAAs does not contain highly threatened or unique ecosystem that trigger critical habitats under criterion 4.
Criterion 5	The EAAA2 is heavily modified and does not contain areas with high endemism or importance in maintain genetic diversity supporting key evolutionary processes. The EAAAs does not contain critical habitat under criterion 5.

Based on the application of screening criteria under IFC PS6, as detailed in Appendix D, the project does not trigger critical habitat.

8.10 No Net Loss of Natural Habitat

According to IFC PS6, a habitat can be described as geographical units that include terrestrial, marine, freshwater areas as well as airway passages.

Given the Project's components are all built in modified habitat, the requirement of NNL or NG will be not applied for these habitat. However, the airspace associated with the turbine layout is considered to be natural habitat for the volant species, and thus, loss of natural airspace will require NNL to be demonstrated. For the purpose of assessment this is understood to mean that populations of those species at risk from collisions would not be adversely affected. According to IFC PS6, mitigation measures to achieve NNL include:

- Avoiding impacts on biodiversity through the identification and protection of set-asides;
- Implementing measures to minimize habitat fragmentation, such as biological corridors;
- Restoring habitats during operations and/or after operations; and
- Implementing biodiversity offsets.

Further details about mitigation measures will be described later in the Biodiversity Impact Assessment section of this ESIA.

8.11 Ecosystem Service

8.11.1 Defining Ecosystem Services

Ecosystem Services (ES) are defined as the benefits that people, including businesses, derive from ecosystems (IFC, 2019)[17]. These services are substantial and varied, underpinning basic human health and survival needs as well as supporting economics activities, the fulfilment of people's potential, and enjoyment of life.

Guidance Notes (GN106 defines ecosystem services as the benefits that people, including businesses, obtain from ecosystem services and this definition is aligned with the Millennium Ecosystem Service Assessment (MES, 2006)[18], a UN initiated global assessment on such services. Ecosystem services are organized into four major categories (IFC, PS 6, para 2.):

Provisioning Services

These are goods or products obtained from ecosystems, such as food, water, timber and other products from NTFP (non-timber forest product).

Regulating Services

These include benefits obtained from an ecosystem's control of natural processes, such as climate regulation, disease control, erosion prevention, water flow regulation, and protection from natural hazards.

Cultural Services

These are the non-material benefits obtained from ecosystems, such as recreation, spiritual values, and aesthetic enjoyment.

[17] IFC, June 2019, retrieved on: January 2021, retrieved at : https://www.ifc.org/wps/wcm/connect/5e0f3c0c-0aa4-4290-a0f8-4490b61de245/GN6_English_June-27-2019.pdf?MOD=AJPERES&CVID=mRQjZva

[18] The Millennium Assessment, November 2006, retrieved on: January 2021, retrieved at : https://www.researchgate.net/publication/232660941_The_Millennium_Assessment/link/561541d808aed47facefbd62/download

Supporting Services

These are the natural processes such as soil formation, nutrient cycling and primary productivity, which maintain other ecosystem services.

In line with the IFC PS (2019), this chapter identifies and prioritizes ecosystem services at the Project Site and Area of Influence (AOI) as defined by GN117, establishing how these services are of relevance to affected local communities and are likely to be impacted by the Project. The following sections provide an assessment of potential impacts arising from construction and operational related activities of the Project on identified ecosystem services within the Project site and AOI.

8.11.2 Applicable Standards and Guidelines

The International Finance Corporation's (IFC) performance standards require projects to assess and preserve the benefits from ES. The IFC also requires that the environmental and social risks and impacts identification process consider the project and communites' dependences on ES. A fundamental component is to apply the mitigation hierarchy to determine measures to limit impacts on ES.

ERM has utilized the World Resource Institute (WRI) Guidelines: *Weaving Ecosystem Service into Impact Assessment* to guide the approach used to assess ES in relation to the project. The ES review was undertaken following a five-stage approach (WRI 2014):

- Screening assessment to Identify ES that may occur within the study area;
- Data Collection and prioritization for 'screened in' ES;
- Scoping to refine the list of ES based on those identified in the study area and potentially impacted by the project;
- Prioritization to identify ES importance to beneficiaries; and;
- Impact Assessment to identify the impacts to ES and their human beneficiaries as a result of the project.

8.12 Screening and Scoping

8.12.1 Area of Influence

The Area of Influence (AoI) as defined in the WRI Guidelines:

"*…area relevant to the assessment of project impacts and dependencies on priority ecosystem services. It includes (1) the ecosystems that supply the priority ecosystem services and (2) the locations where the project and affected stakeholders access priority ecosystem services.*"

For the purposes of this ES screening, the AoI will consist on community areas and sites used by the community for their livelihoods. The AoI was based on the Ecologically Appropriate Area of Analysis (EAAA) identified for the project (Figure 8.1). There are two EAAAs defined for the Project, namely the EAAA1 for the assessment of avifauna's critical habitats and the EAAA2 for reptiles and mammals. The assessments of critical habitats are analzyed in section 7 in the biodiversity baseline. The EAAA1 covers an area of about 34,359.3 ha, consisting of 22,081.7 ha of Natural habitats and 12,227.6 ha of Modified habitats; while the EAAA2 covers 3,339.2 ha consisting of 1167,1 ha and 2172,1 ha of Natural and Modified habitats respectively (see section 8 in ESIA Vol 2 Baseline)

The EAA1 transverses a diverse range of land covers that can be important for avian species such as forest, surface water, aquaculture land (fish farms), agricultural land (rice crop fields) and build-up land (houses and other infrastructures). The EAAA2 covers various types of habitat including built-up, agricultural

land, surface water and dense vegetation. The majority of dense vegetation in EAAA2 is the representation of forest within Song Trau Protection Forest and Nui Chua KBA.

8.12.2 Screening

An ES screening assessment was undertaken to determine the likely ES values that could be potentially important to affected communities. The types of ES that have been defined in the WRI Guideline is used as a basis to crosscheck ES that may or may not be found in the AoI; potential ES in the AoI that correspond with the definition are then screened in for prioritization. ES that are not found in the AoI and has very minimum used will be screened out. The results of the screening assessment are contained in Table 8.17. This assessment was done using available sources of primary data including information collected during the scoping visit, social and environment surveys. The survey also gathered information from local interviews with communities.

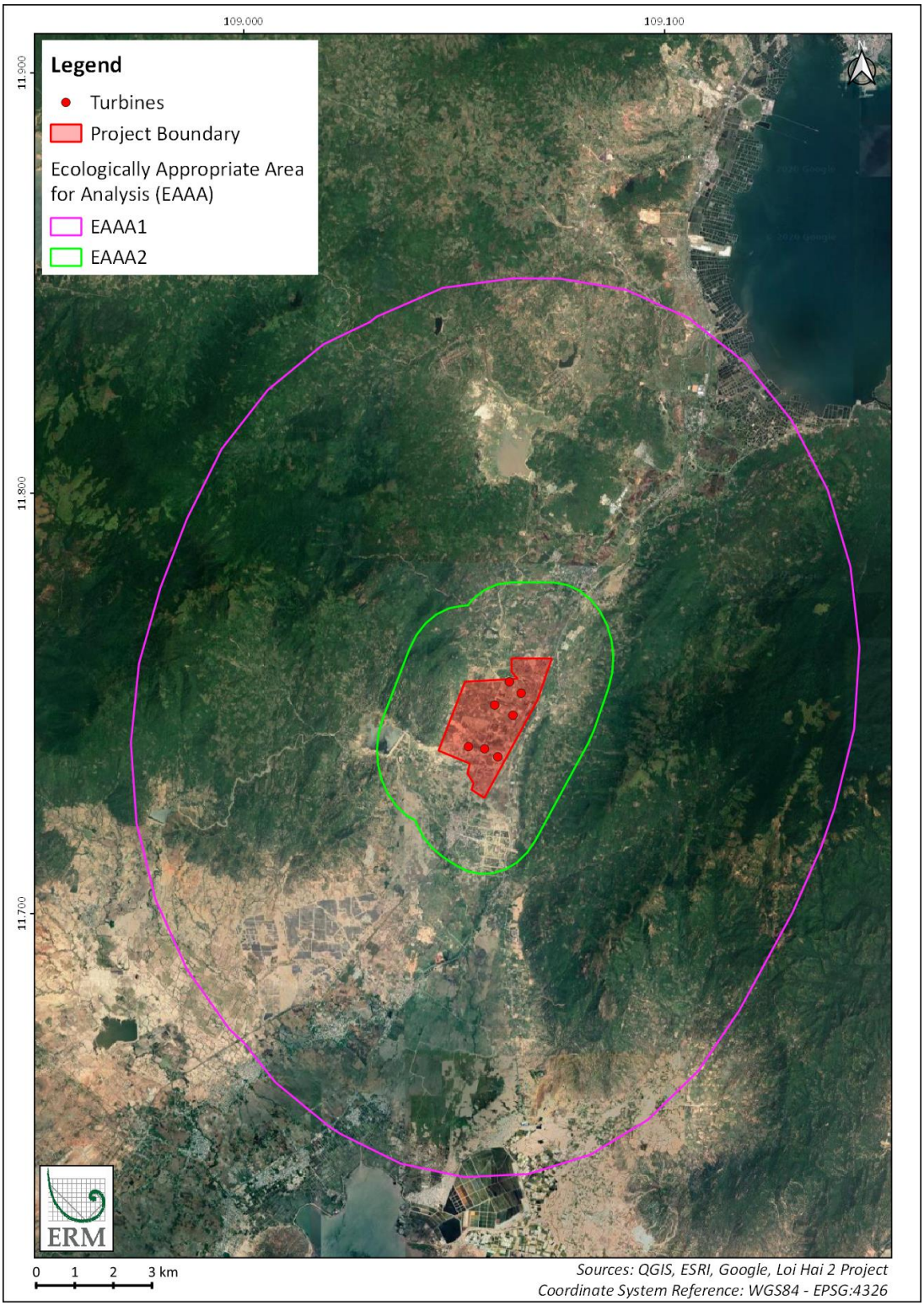


Figure 8.12 AOI ES Assessment of the Project

Table 8.17 ES Screening Assessment

Ecosystem Service Type	Description	Current Known Ecosystem Services	Screened in	Baseline section reference
Provisioning Services				
Food: wild-caught fish and shellfish & aquaculture	Fish caught for subsistence or commercial sale; Fish, shellfish, and/or plants that are bred and reared in ponds, enclosures, and other forms of fresh- or salt-water confinement for harvesting	People catch different types of coastal seafood such as small crabs, clams, mussels and some types of fish in lakes, rivers and streams to eat. There is no form of aquaculture or fishing in the sea given the commune is located far from the sea.	No	
Food: wild meat	Animals hunted for primarily food (recreational hunting covered under cultural services)	People trap rats and some other small animals in the forests to eat like rabbits and salamanders; but the volume is reported to be minor. Wild animals are not a primary food sources in the area. No forest loss is caused by the Project; thus the provisioning of wild meat is not affected.	No	
Food: cultivated crops	Annual and permanent crops grown for subsistence use and commercial sale	Agriculture activities of local people occur in field and upland field in mountainous area. Nearly half of the development of the Project involves the acquisition of locals' agricultural land. Seasonal crops: this region grows beans, corn, tapioca, rice, *Coix lacryma-jobi* (Coix lacryma-jobi is used for raising chickens, pigs). The Loi Hai commune PC authorities reported that due to some cultivation locations located in high hilly areas, lack of water, it is difficult to grow rice, so the local residents switched to planting corn and beans more and more today. Perennial plants: mango, cashew and grapes are planted. However, mango does not occupy much area and is not a type of tree with economic value, it is only planting for domestic use.	Yes	
Food: herbs and plants	Herbs and plants collected for food by local people	Local people plant vegetables such as bean and bamboo shoots. Local people use agricultural products as mentioned the row above for daily nutrient. Nearly half of the development of the Project involves the acquisition of locals' agricultural land.	Yes	

Ecosystem Service Type	Description	Current Known Ecosystem Services	Screened in	Baseline section reference
		The use of herbs was not reported during the survey.		
Livestock farming	Sedentary and nomadic livestock farming	Some households raise cows, goats or pigs with small numbers, from around 2-4 heads for domestic use and to 10-20 heads for sale. In FGDs, more than half of farmers shared that they also raise chicken and duck for both domestic use and sale. Some households also started raising pigeons with up to 200 heads. The main form of husbandry is captivity. The development of the Project does not affect land for livestock farming.	No	
Biomass fuel	Wood, dung and plant matter collected for charcoal, fuel	Firewood was reported using as a cooking biomass fuel. But local residents do rely on firewood for domestic activities like cooking. They collect firewood once or twice per week. No forest loss is caused by the Project; thus the provisioning of bioamss fuel is not affected.	No	
Timber and wood products	Wood collected for local use or for sale as timber, wood pulp and paper	No timber collection recorded in the area at the time of the survey. Forest exploitation (hunting, logging and forest products), used to be the main livelihood, but now plays a negligible role in livelihood activities. Local people do not rely on the forest for timber products. The Project also does not invole forest clearance	No	
Non- Timber Forest Products (NTFP)	Non-timber products collected from the forest. For example, cane, palm, straw, cotton, hemp, twine and rope, natural rubber	No non-timber products collection in the proximity area of the Project.	No	-
Freshwater	Freshwater for bathing, drinking, irrigation, laundry, household and industrial use	The drinking water sources commonly used by the local community are piped water and well water. As for other domestic activities, in addition to piped water and groundwater, there are additional uses of water from lakes, rivers and streams. As reported by the Commune People's Committee of Loi Hai, currently, 97% of households in the commune use clean water	Yes	

Ecosystem Service Type	Description	Current Known Ecosystem Services	Screened in	Baseline section reference
		Water for production irrigation is from lakes, rivers or wells. Within the AoI, the mining industry and a food processing facotry in Loi Hai commune, as well as other two industrial parks (Du Long and Thanh Hai) in nearby communes also consume freshwater in their production activities. The project will use local water sources such as piped water and feed water during project construction, which will add pressure on the freshwater resources together with the industries.		
Regulating services				
Biochemical, natural medicines, pharmaceuticals	Natural medicines, biocides, food additives, pharmaceuticals and other biological material for commercial or domestic use. For example, pelts, carved or decorative animal products, live animal trade	No natural medicine cultivation was reported.	No	
	Genes and genetic information used for animal breeding, plant improvement, and biotechnology	Evidence suggests that there is no current use of genes and genetic information used for animal breeding, plant improvement, and biotechnology.	No	
Ecosystem functions	The influence ecosystems have on air quality by extracting chemicals from the atmosphere (i.e., serving as a “sink”) or emitting chemicals to the atmosphere (i.e., serving as a “source”)	Evidence suggests that the Project area has no influence on air quality in the vicinity.	No	
	Carbon sequestration (impacts on global climate change) regulation	Evidence suggests that the Project area has no influence on Carbon sequestration that have major impacts on global climate change in the vicinity.	No	

Ecosystem Service Type	Description	Current Known Ecosystem Services	Screened in	Baseline section reference
	of temperature, shade air quality by vegetated areas			
	Influence ecosystems have on the timing and magnitude of water runoff, flooding, and aquifer recharge	Evidence suggests that the Project area has no influence on water runoff, flooding, and aquifer recharge in the vicinity.	No	
	Role played by vegetation and bacteria in the filtration and decomposition of organic wastes and pollutants and the assimilation and detoxification of compounds.	Evidence suggests that the Project area has no influence on filtration and decomposition of organic wastes and pollutants in the vicinity.	No	
	Role of natural habitats (e.g. wetlands, beaches, reefs) in protecting crops, buildings, recreation areas from waves, wind and flooding from coastal storms.	The Project area is a farmland for growing rice, cassava, corn and cashew, and surrounded by Nui Chua national park (5km away) in the east and Song Trau watershed protection forest (2km away). As such, the area is provided water and protected from flood, erosion and storms by these two forests. However, the development of the Project does not involve the clearing of Song Trau watershed protection forest and Nui Chua National Park.	No	
	Regulation of fire frequency and intensity (e.g. dense forest can provide firebreaks)	No information	No	
	Predators from forests, grassland areas, etc. may control pests attacking crops or livestock	Pests can be controlled by a lot of taxon including birds, bats, small mammals and reptiles. Avifauna and chirpoteran are subjected to fatalities due to turbine and transmission line collisions, which may lead to decreased number of predators.	Yes	

Ecosystem Service Type	Description	Current Known Ecosystem Services	Screened in	Baseline section reference
	Influence ecosystems have on the incidence and abundance of human pathogens	There are no ecosystems that will influence the abundance of human pathogens in the area.	No	
	Role of vegetation in regulating erosion on slopes and riparian areas	The Project's vegetation clearance mostly occur in a plain area, that is mainly served for agriculture activity. Erosion of soil on slopes or riparian areas are unlikely to occur.	No	
	Birds, insects and some small mammals pollinate certain flora species, including some agricultural crops	Birds, bats and other fauna can be impacted by the Project in various ways that might result in the reduction of populations of these taxon within the Project's area.	Yes	
Cultural Services				
Spiritual, religious or cultural value	Natural spaces or species with spiritual, cultural or religious importance	There are no natural spaces or species of cultural significant in the area. Even though Raglai ethnic minority people living in the area but no natural spaces or species with spiritual, cultural or religious importance of them reported in the survey.	No	
	Cultural value placed on traditional practices such as hunting, fishing, crafts and use of natural resources.	Evidence suggests that the Project area is not considered as areas for cultural value on traditional practices.	No	
	Use of natural spaces and resources for tourism and recreation (e.g. swimming, boating, hunting, bird-watching, fishing)	No forms of natural spaces and resources for tourism and recreation in the Project's area.	No	
	Cultural value placed on the aesthetic value provided by landscapes, natural landmarks	There is no specific culturally aesthetic landmarks in the Project area.	No	-

Ecosystem Service Type	Description	Current Known Ecosystem Services	Screened in	Baseline section reference
	Information derived from ecosystems used for intellectual development, culture, art, design, and innovation.	Evidence suggests that the Project area is not considered as areas for intellectual development, culture, art, design, and innovation.	No	-
Supporting Services				
Non-use value of biodiversity (e.g. existence, bequest value)	Species and areas valued globally as of high conservation value	Many species of globally conservative concerns may be present in the Nui Chua National Park and face disturbances and/or mortality risks due to the development of the Project.	Yes	2.13
	Formation of biological material by plants through photosynthesis and nutrient assimilation.	Evidence suggests that Project impacts on AoI is not considered relevant to formation of biological material by plants through photosynthesis and nutrient assimilation.	No	3.4.1.1.9
	Flow of nutrients (e.g., nitrogen, sulfur, phosphorus, carbon) through ecosystems.	Evidence suggests that Project impacts on AoI is not to be relevant to the service for flow of nutrients.	No	3.4.1.1.9
	Flow of water through ecosystems in its solid, liquid, or gaseous forms.	No river or streams within the area of 3km from the Project site. The Project area is an arid farmland receiving irrigation water from Song Trau lake-2km away.	No	-
	Natural soil forming processes throughout vegetated areas.	Evidence suggests that Project impacts on AoI is not considered relevant for natural soil forming processes.	No	-
	Natural spaces that maintain species populations and protect the capacity of ecological communities to recover from disturbances.	The airspace that the Project acquires can important for volant fauna who has large home-range and can commute between Nui Chua National Park and Song Trau Protection Forest.	Yes	2.13

Notes: [a] *Numbers in this column refer to sections within the Socio-Economic Baseline Report which forms part of this ESHIA*
[b] *WRI Guidelines: Weaving Ecosystem Service into Impact Assessment*

8.13 Ecosystem Services Scoping

The scoping exercise was undertaken to refine the list of ES that have:

- **Potential Beneficiaries:** Known and potential beneficiaries for a service at the local, national, and / or global level;
- **Sources of Impact:** Potential sources of impact were considered based on the social data obtained for the site;
- **Project Dependence:** IFC PS-6 requires that the ES assessment take into consideration any services that the Project may rely upon during construction, operation and/or decommissioning. Therefore, all services for which there is a potential project dependency were scoped into the prioritization stage.

The goal of the scoping exercise was to identify a list of ES to be assessed during the surveys.

8.13.1 Approach

The WRI guidelines and IFC PS6 requires that priority ES are identified and impacts to those services are assessed (IFC, 2012). The prioritization process is aimed at identifying those services for which Project impacts would be most likely to result in adverse impacts on project affected communities and other beneficiaries. Using the information collected through the baseline data collection and stakeholder engagement processes, ES were prioritized according to a priority matrix ranking two criteria:

- Importance of the ES to the beneficiary which considers the intensity of use, degree of dependence and the importance expressed by the project affected communities; and
- Irreplaceability of the ES, which refers to the availability of alternatives, the accessibility, cost and appetite for those alternatives as discussed with the beneficiary.

8.13.2 Results

After compiling baseline information on the importance and irreplaceability of each service, these ratings were combined to assign a priority rating to the service grading from Low to Major as shown in the ES prioritization matrix in Table 8.18.

ES identified as High priority or Major priority were considered Priority ES. The weight given to each of these components varied slightly depending upon the service provided to community and industries in the area, but stakeholder values were given precedence over other criteria where the rating was not clear.

In addition to the above, according to the IFC definition on priority ES, all services for which project dependencies are identified are considered priority services. The importance and irreplaceability of services relied upon by the Project was assessed through the same prioritization process outlined above, with the Project filling the role of the beneficiary.

In addition to the prioritization exercise, the baseline data collection process provided the opportunity to collect information on the status, trends, and sustainability of resource use as they pertain to the habitats and species that support ES. This information was gathered through secondary sources and field work by the environment team and where appropriate through engagement with local stakeholders. This information is important for the assessment of impacts on ES and therefore on local people as the final receptors of these changes.

Table 8.19 outlines the results of Prioritization assessment for each type of ecosystem service.

Table 8.18 ES Prioritization Matrix

Importance to Beneficiaries		Irreplaceability		
		High (2)	**Moderate (3)**	**Low (5)**
Low (1)	The service is used and valued by parts of the community, but it is not important in maintaining quality of life or livelihoods of Project Affected Communities.	**Low Priority (2)**	**Low Priority (3)**	**Moderate Priority (5)**
Medium (2)	The service is readily used by some members of the Project Affected Communities for income or subsistence, but they are not dependent upon the service for their livelihoods, and not everyone utilizes the service.	**Low Priority (4)**	**Moderate Priority (6)**	**High Priority (10)**
High (3)	The service is highly important in maintaining the livelihoods of the Project Affected Communities, and is used by most of the community regularly.	**Moderate Priority (6)**	**High Priority (9)**	**Major Priority (15)**
Essential (4)	The service is essential to maintain the health of the Project Affected Communities, and the service is used by all members of the community.	**High Priority (8)**	**Major Priority (12)**	**Major Priority (20)**

Irreplaceability definition	
High	Many spatial alternatives exist that are readily available to the Project Affected Communities, and there are no major impediments to their usage.
Moderate	Spatial alternatives exist but are either less accessible than the affected service, or there are other barriers to their use such as distance, cost and skills required to access the service.
Low	There are few to no spatial alternatives available to the Project Affected Communities.

Priority Ranking	
Low Priority	2 to 4
Moderate Priority	5 to 6
High Priority	8 to 10
Major Priority	12 to 20

Table 8.19 Result of Prioritization

Ecosystem service	Trends and sustainability	Beneficiaries	Importance to beneficiaries	Irreplaceability	Potential Alternatives	Priority
Provisioning Service						
Food: cultivated crops	Decrease supply due to Project's land acqutisiton	All villages that cultivate crops within AoIs of project location.	High	High	Besides crops from the community agricultural land, the local people can purchase the cultivated crops in the market. (see Agriculture section in in Baseline chapter)	Moderate Priority (6)
Food: herbs and plants	Decrease supply due to Project's land acqutisiton	All villages that cultive herbs and plants within AoIs of project location.	High	High	Besides vegetables from the community agricultural land, the local people can purchase the vegetables in the market. (see Agriculture section in in Baseline chapter)	Moderate Priority (6)
Freshwater for bathing, drinking, irrigation, laundry, household and industrial use	The additional consumption of pipped water during the construction phase of the Project is unlikely to decrease the supply for industrial uses, as well as domestic and irrigation uses, even in dry season	All villages and industries within AoIs of project location.	High	High	Many alternatives for accessing water such as well water and clean water station (see Water Supply section in Baseline Chapter)	Moderate Priority (6)

Ecosystem service	Trends and sustainability	Beneficiaries	Importance to beneficiaries	Irreplaceability	Potential Alternatives	Priority
Regulating services						
Predators from forests, grassland areas, etc. may control pests attacking crops or livestock	Cannot estimate	All villages within AoIs of project location.	Medium	High	Many species can control pests and another alternative for predator is use of pesticides.	Low Priority (4)
Birds, insects and some small mammals pollinate certain flora species, including some agricultural crops	Cannot estimate	All villages within AoIs of project location.	Moderate	High	Birds and bats who can be impacted by the Project; however other alternatives for pollinaotrs are availabe which include insects, small mammals and human as well.	Low Priority (4)
Supporting Services						
Species and areas valued globally as of high conservation value	Species whose population trends are decreasing can be impacted due the Project's development.	No communities within AoIs of project location may gained direct benefit from this service.	Low	Moderate	Flying fauna have large home range and can easily use other similar airspace in surrounding areas available in the Projects' AoI	Low Priority (3)
Natural spaces that house species populations and protect the capacity of ecological communities to recover from disturbances.	Increase trends of habitat loss. Loss of home range of volant species due to the loss of airspace which is considered as natural habitat.	No communities within AoIs of project location may gained direct benefit from this service.	Low	Moderate	Flying fauna species have large home range and can easily use other similar airspace that are available in the Projects' AoI. No clerance of forests that can affect the foraging and nesiting grounds of other fauna.	Low Priority (3)

8.14 Priority Ecosystem Services

Ecosystem services identified as High Priority or Major Priority were considered Priority Ecosystem Services. However, after understanding the combination between the importance to beneficiaries and the irreplaceability, the highest rank in the prioritization is the moderate priority (6). This result is mainly due to high numbers of alternative and no significant barrier to access the ecosystem service in the project location. These services (see Table 8.20) will then be assessed further in impact assessment.

Table 8.20 The Priority Ecosystem Service

Priority Ecosystem Service	Description
Food: cultivated crops	There will be potential disturbances and loss of agricultural land to local economic activities of the communities to be impacted by the project development.
Food: herbs and plants	There will be potential disturbances and loss of agricultural land to local economic activities relating herbs and plants.
Freshwater	The community and industries will use freshwater resources including groundwater from wells, piped water and rivers. The Project will consume piped water but only during project construction.

9. SOCIO-ECONOMIC BASELINE

9.1 Introduction

9.1.1 Objectives

The socio-economic assessment for the proposed Loi Hai 2 Wind Power Project (the Project) to understand the social sensitive and possible economic impact, which associated with the Project. The development of the Project may have certain social and economic impacts which may be negative or positive. Regarding the negative socio-economic impacts need to be avoided as much as possible. The impacts which cannot be avoided need to be mitigated and managed. Hence, the key objectives of the assessment are follows:

- Gather data about socio-economic conditions in the Project area to help identify potential impacts;
- Identify and analyse the issues needs and concerns of Project Affected persons (PAPs), vulnerable communities and ethnic minority (EM) groups;
- Obtain insight into the living patterns of the possibly affected population, especially vulnerable people and EM groups;
- Identify and understand the perceptions and concerns of stakeholders, including local authorities and communities, who might be affected by the Project's construction and operation activities; and
- Establish criteria to assist the strategies formulation to maximize the project benefits and minimize the project impacts on the affected communities.

The baseline report analyses the socio-economic and cultural contexts at national and local (provincial, district, and commune) levels. It also includes socio-economic characteristics at household-level for the affected communities. The findings reported are based on a review of socio-economic conditions collected during site visits between 9th and 11th November 2020. Efforts have been made to highlight the differences between surveyed areas and genders on socio-economic parameters.

9.1.2 Methodology

9.1.2.1 Research Area

The research area was in Loi Hai Commune, Thuan Bac District, Ninh Thuan Province where all Project components are located. At a village-level, three villages of Suoi Da, Ba Rau 1 and Ba Rau 2 of Loi Hai Commune were selected for the survey along with consultations with local authorities given they are located adjacent to Project components and identified as potentially affected by the Project during the scoping step.

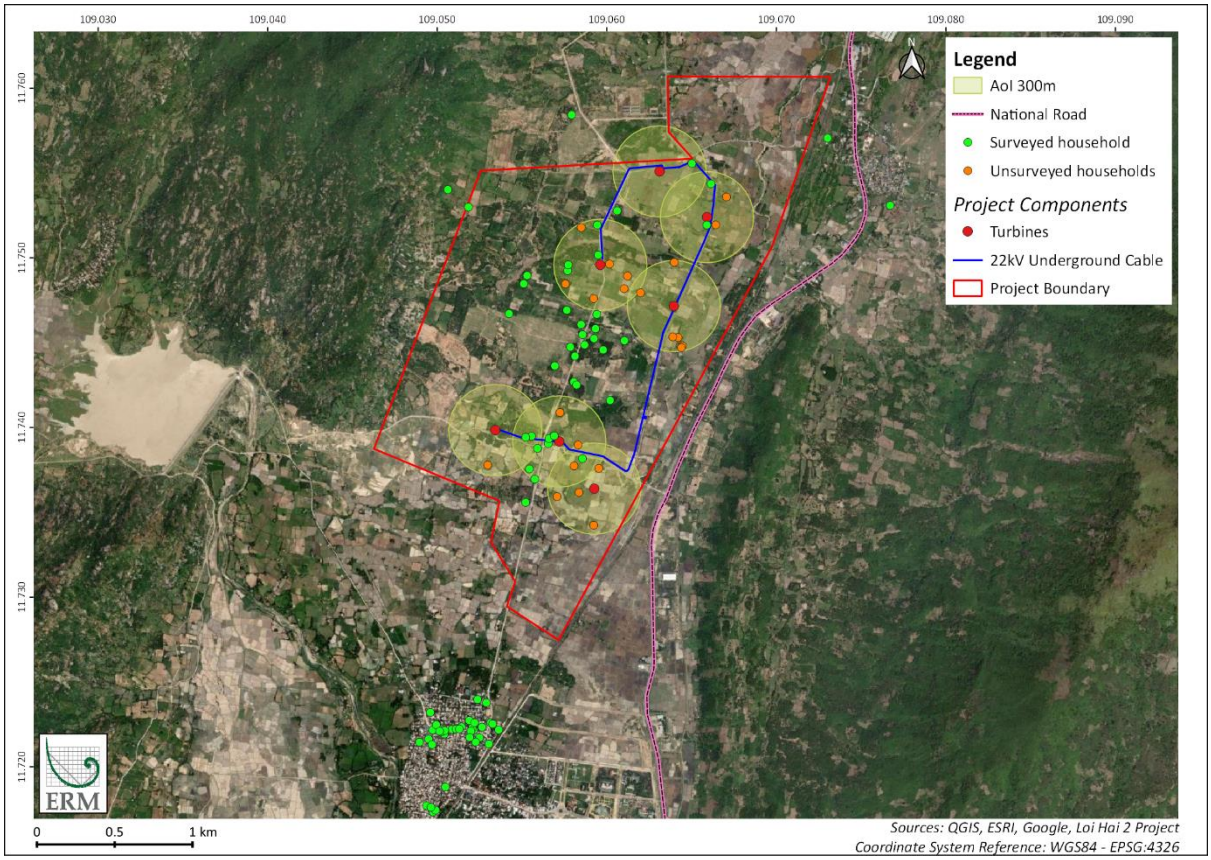


Figure 9.1 Research Area for Socio-economic Baseline Study in November 2020

The socio-economic data collection was designed so that information was gathered at the national, local, and household levels in enough detail and representation to detect changes in the socio-economic baseline condition of affected communities towards the Project. The task includes as well secondary socio-economic baseline data collection and primary socio-economic data collection. Data for the national level is from secondary data sources and desk-based research while data for the local and household levels is based on both secondary and primary data sources.

9.1.2.2 Primary Data Collection

The study undertook the primary data collection with a multi-layer approach to socio-economic analysis using mixed methods which combine qualitative and quantitative methods, including semi-structured interviews with local authorities, household surveys, focus group discussions (FGDs), key informant interviews (KIIs), and field observations.

9.1.2.2.1 Meetings with Authorities

Semi-structured Interviews were applied to collect updated information about the socio-economic conditions of the study area as well as the key concerns and perceptions of local authorities about the Project. Suggestions from local authorities were also collected for the Project to consider the environmental and social performance management and impact mitigations. This consultation with the authorities assisted the team in confirming the development trends and current status of socio-economic conditions, infrastructure, and public services.

The consultation process also aimed to inform stakeholders about Project progress while assessing awareness at different levels and identifying some of the key issues, concerns, and expectations of the community (see Table 9.1).

Table 9.1 Engagement with Local Authorities for the ESIA Report Development

Level of Governance	Organisations	Date of Engagement	Topics Covered in the Interviews and Meetings
Thuan Bac District Authorities	People's Committee of Thuan Bac district Thuan Bac District Land Fund Development Center Thuan Bac District Ethnicity Committee	9 Nov 2020	■ Update about Project progress and current status of the ESIA; ■ Obtain up to date socio-economic data about infrastructure and public services, health, livelihoods, and employment of people in the district; and ■ Gain feedback or perceptions about Project development.
Communal Authorities	People's Committee of Loi Hai commune	10 Nov 2020	■ Update about Project progress and current status of the ESIA; ■ Obtain up to date socio-economic data about infrastructure and public services, health, livelihoods, and employment of people in the commune; ■ Obtain information on the supporting programs available in the area, especially for ethnic minority community; ■ Gain feedback or perceptions about Project development; and ■ Obtain acceptance and support from the People's Committee to conduct the household survey and FGDs in the area.

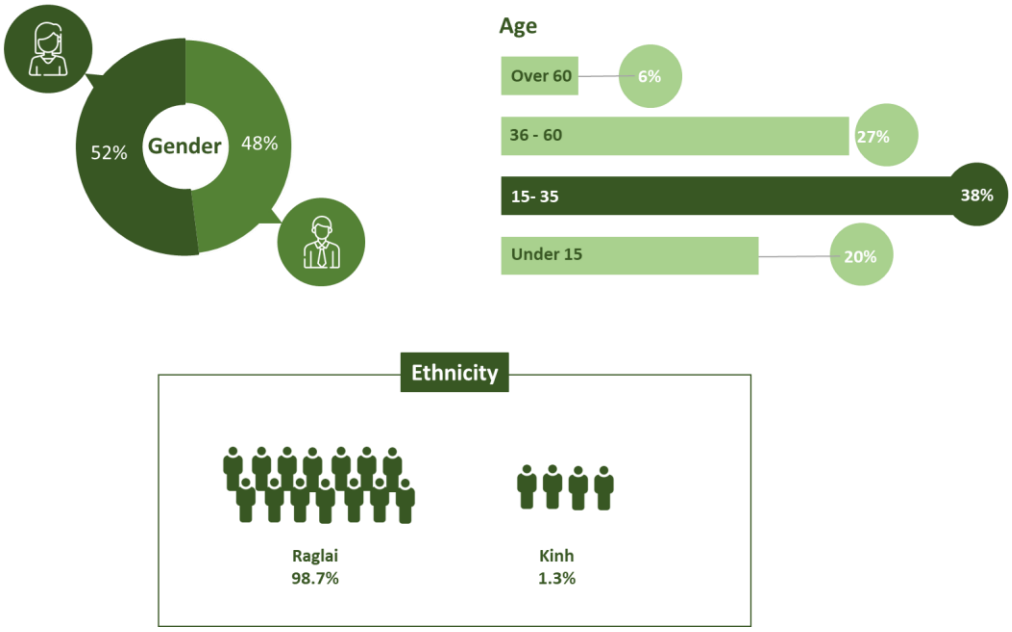
These interviews collected general information about the health status and public services in the community, socio-economic condition, welfare policies, safety and security, and other supported programs for local people. Each interview lasted approximately 1.5 – 2 hours. Researchers made some additional observations in surveying by exploring local infrastructures such as roads, schools, and commune health centers to overview the local context.

9.1.2.2.2 Households Interviews

A list of 31 households initially identified as having agriculture land parcels within the Project were obtained from the Project Owner at time of the baseline survey in November 2020. Among whom, five (5) households were unavailable for interviews (those no longer lived in the commune and not recognized by the local authorities, and those were not contactable/reachable after three attempts). As a result, 26 households out of the 33, were involved in the household interviews.

In addition, to gain an insight into the socio-economic conditions of the Project's affected areas, 64 households in the surrounding villages of Ba Rau 1, Ba Rau 2 and Suoi Da village of Loi Hai Commune were randomly selected and invited to participate in the survey.

In total, the household surveys were conducted with representatives of with 524 household members living in Loi Hai Commune within (524 HH members). A summary of the demographic information of the surveyed population is provided in Figure 9.2.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.2 Summary of Demographic Information of the Surveyed Population

The household surveys were organised in collaboration with the commune level authorities, and in particular the village heads as local guides. The point of contact for interviews at the household level was any appropriate adult member present at the household. The interviews were mostly conducted at the community house but in all cases, respondent's home visits were offered by the interviewers. In addition, depending on respondent's availability and convenience, some interviews were organised at their house.

The survey was carried out based on a structured questionnaire which was tested to ensure the proper language use, local dialect and adequate modification. The questionnaire was designed to collect the following data:

1. Population;
2. Ethnicity;
3. Religion;
4. Vulnerability status[19] (i.e. who by virtue of gender, ethnicity, age, physical or mental disability, economic disadvantage, or social status may be more adversely affected by the Project development)
5. Education;
6. Livelihoods and employment;
7. Income and expenditure;
8. Land, housing and household assets
9. Health;
9. Access to public services;

[19] Vulnerable status may stem from an individual's or group's race, color, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. Additionally, factors such as gender, age, ethnicity, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources need to be considered (IFC, 2012).

10. Community relationship; and
11. Awareness and perception of the Project.

9.1.2.2.3 Focus Group Discussion

FGD was conducted with six (06) groups including:

- Agriculture farmers (two groups)
- Ethnic Minority (EM) Group (Raglai people)
- Women Group
- Vulnerable People Group
- Village mass organizations Group

The FGDs aim to obtain qualitative information about the socio-economic conditions, supported policies, livelihood activities, and collect local demands related to their livelihood restoration. The 06 FGDs were conducted with a total of 64 representatives dominated by female participants. The FGDs followed the standard guidelines, which were modified to reflect the local context. Some key demographic indicators of FGD attendants are presented in Table 9.2.

Table 9.2 Key Demographic Indicators of FGD Participants

Characteristics	Participants				
Total of participants	64				
Number of FGD	Farmers	Union	Vulnerable	Women	Ethnic minority (Raglai)
	2	1	1	1	1
Gender	Male			Female	
	27			37	
Average age of participants	38 years old				
Occupation	Farmers	Housewife		Part-time job	
	48	3		13	

9.1.2.2.4 Key Informant Interview

Village heads of the affected villages and leaders of the Raglai eithnic group were identified as key informants and hence, involved in the KIIs. Two KIIs were organized included:

- KII with village head and Raglai leader in Ba Rau 1 village; and
- KII with village head and Raglai leader in Ba Rau 2 village.

The KII was semi-structured with major questions prepared in advance in the form of checklists. The questions for the village head concentrated on general information about the community, social networks, community context, employment, and perceptions about the Project. The interview lasted approximately one hour and was recorded..

9.1.2.3 Secondary Data Collection

The socio-economic data collection is designed to cover the information from the national level to a regional and local level. Data for the national, provincial, and district levels are mostly from secondary data sources and desk-based research, including Statistical Yearbook 2019 and socio-economic

reports of NinhThuan Province, districts, and communes. Secondary data are also obtained from the portal of NinhThuan province and other social media channels.

9.1.2.4 Data Analysis

The data were analysed by mixed methods research, involves mixing and combining both quantitative and qualitative analytical research techniques.

The quantitative analysis components were based on household surveys. All answered questionnaires were managed in an excel file after the data was refined. Then, the next stage mainly involved the use of descriptive statistics to compute reading comprehension. Besides, other quantitative data from secondary sources also employed to describe a fuller picture of the socio-economic status of the population. On the other hand, the qualitative analysis components were based on FGDs and KIIs. Basically, the interview data were analysed based on a systematic coding and further developed in a stage-wise collaborative process, to test for the applicability, common understanding and adequacy of the code system. The coded segments are then grouped and synthesised up into the following main categories:

- Human capital
- Natural capital
- Financial capital
- Physical capital
- Social capital
- Vulnerability
- Gender profile
- Local perception about the Project
- Needs assessment for livelihood restoration

9.1.2.5 Data Limitations

The undertaken study is structured around the project information as provided by the stakeholders, any significant changes in the proposed activities may result in the variation of the outcome. The environmental and social study, based on the available documents and community consultations, is undertaken by ERM and the observations from the site survey conducted. Many households are not informed about the Project and land acquisition, which consequently influences the sample selection considerably and leading to information insufficiency. Besides, the interviews about the overall vulnerability, livelihood activities, and impacts before and after Loi Hai Project with affected people who are currently living in the commune also faced hurdles. The reason is that the interviews have to rely on the memory of interviewees, hence the collected information may not as accurate as expected. Furthermore, most of the interviewed people were ethnic minority people who were not comfortable to share ideas, especially sharing their income and daily expenses. As a result, it was difficult to estimate exactly for households having both cash and subsistence income.

The individuals in a household are different in their income and consumption habits. Some interviewees are the breadwinner; others are spouses and/or dependents. An unexpected problem called proxy reporting arises, exemplified by the fact that working men do not always know their household’s expenditure as accurate as their wives but still responds to the interview.

9.2 National Overview

9.2.1 Demographic Information

The Socialist Republic of Vietnam is located on the Indochina peninsula in Southeast Asia. It is bordered by China to the North, Laos and Cambodia to the west, the Gulf of Thailand to the southwest, and the East Sea to the East and South, and is composed of a mainland area of 331,230 km^2 and more than 4000 islands. It has a population of 96.2 million (2019), equivalent to an increase of 1.56% in comparison with 2018, of which the urban population was 33.12 million people (34.4%), and the rural population was 63.08 million people (65.6%). The male and female population was 47.88 million people and 48.32 million people respectively, with the corresponding share of 49.77% and 50.23% (Vietnam Population and Housing Census, 2019; also see Table 9.3 and Figure 9.3).

Table 9.3 Vietnam at a Glance

Viet Nam	
Full name	Socialist Republic of Viet Nam
Capital	Ha Noi
Largest city	Ho Chi Minh
Area	331,230 km^2
Official language	Vietnamese
Population	96,208,984 people
Ethnic groups	85.3% Kinh 14.7% Ethnic minorities
Main religion	13.2 million people are religious (13.7%) Catholic: 5.9 million people, 44.6% of the total number of religious followers and 6.1% of the total population Buddhism: 4.6 million people, 35% of the total religious followers and 4.8% of the total population
GDP	5,542.3 trillion VND (2018)
GDP per capita	58.5 million VND (2018)

Source: Vietnam General Statistic Office, 2018 and Vietnam Population and Housing Census, 2019[20]

[20] Vietnam Population and Housing Census 2019, retrieved on: 23 December 2019, at http://tongdieutradanso.vn/project-of-the-census.html

Source: Vietnam Population and Housing Census, 2019

Figure 9.3 Major Indicators of Vietnam Demography

Vietnam has a total of 54 ethnic groups. The Kinh ethnic group makes up the largest proportion with approximately 85.3% of the population, and mainly lives in the deltas and major cities while the other 53 ethnic minority groups, especially those with small populations, are scattered across mountainous and remotely rural areas. Vietnamese is the official language and is spoken by around 90% of the

population. Minority groups are distinguished by distinct languages including Tay, Hmong, Thai, and Khmer in the more remote rural areas. Some ethnic minority groups such as Tay, Thai, Nung, Hmong, Muong, Cham, Khmer, Kohor, Ede, Bahnar, and Jarai have their own writing systems (DFAT, 2017). Despite rapid economic growth in recent decades, ethnic minority communities living in mountainous and highland areas have been trapped in poverty. According to the World Bank (2013), ethnic minorities account for 14% of the total population, but they also account for up to 50% of the total poor population.

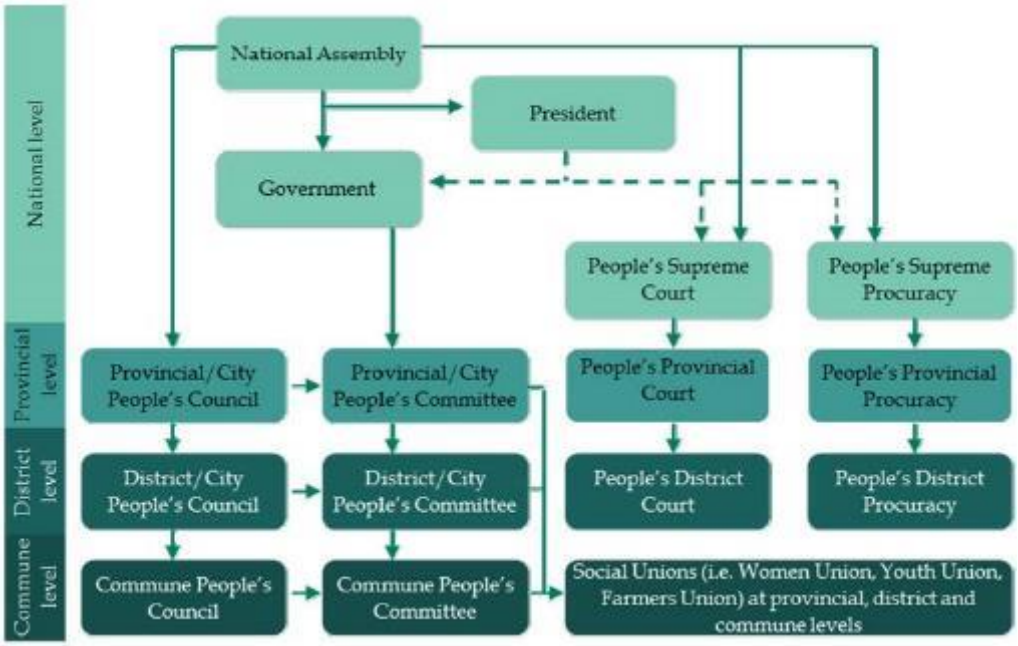
Labour force aged 15 years[21] and above in 2019 was 55.8 million persons with an increase of 417.1 thousand people's year-on-year. The employed labour force aged 15 years and above in 2019 was 54.7 million persons, including 19 million people working in the sector of agriculture, forestry and fishery, accounting for 34.7% of the total; 16.1 million people working in the industry and construction sector, making up 29.4%; and 19.6 million ones working in the service sector, representing 35.9%. In 2019, the unemployment rate was 1.98%, of which the unemployment rate in urban was 2.93%; and in the rural area was 1.51% (Vietnam General Statistic Office, 2019).

The average monthly income per capita in 2019 at current prices was about 4.2 million VND, higher than the income of 3.9 million VND in 2018. In 2019, the whole country recorded 68.5 thousand households suffering from food shortage, a decrease of 34.7% from the previous year, corresponding to 278 thousand persons suffering from this problem, a decline of 33.8%.

The human development index (HDI) of Vietnam is 0.693 and ranked 118 out of 189 countries in the latest United Nations Human Development Report 2019 (UNDP, 2019).

9.2.2 Institutional Context

The state system of governance of Vietnam has four levels: national, provincial, district and commune as illustrated in Figure 9.4.



Source: Own presentation by ERM

Figure 9.4 The State System of Vietnam

[21] Article 161-165 labour code 2012 mentions: a worker with age of 15 years old can work up to 40 hours a week with approval from their parents/their legal representative. They cannot work more than 8 hours a day, 40 hours a week. A worker considered as adult and do not need approval from their representative after they are at the age of 18 years old.

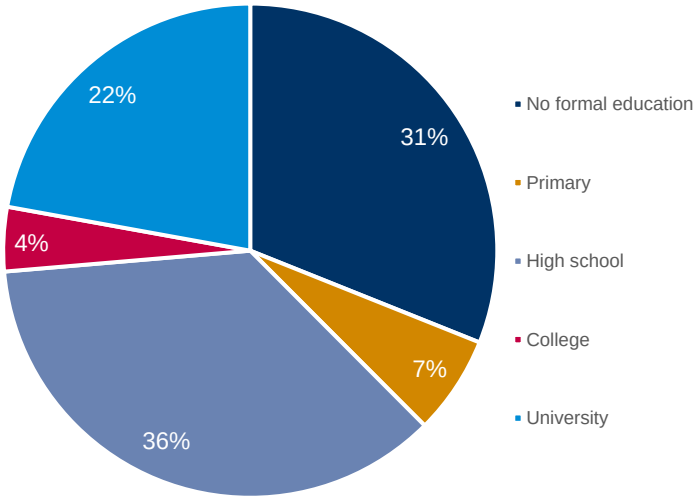
At the national level, the State of Vietnam consists of the National Assembly, the President, the Government, the People's Supreme Court and the People's Supreme Procuracy.

- The National Assembly is the supreme organ of state and the only body with constitutional and legislative power to draw up, adopt, and amend the constitution and to make and amend laws, to legislate and implement state plans and budgets, and to initiate or conclude wars, and to assume other duties and powers it deems necessary.
- The President represents Vietnam both domestically and internationally and maintains the regular and coordinated operation and stability of the national Government and safeguards the independence and territorial integrity of the country.
- The Government is the executive organ of the National Assembly, the highest body of state administration of the Socialist Republic of Vietnam. It carries out overall management of work for the fulfilment of the political, economic, cultural, social, national defence, security and external duties of the State.
- The Supreme People's Court supervises the judicial work of both the local People's Courts, which are responsible to their corresponding People's Councils, and the Military Tribunals. The People's Courts function at all levels of Government except the commune, where the commune administrative committee functions as a primary court.
- The Supreme People's Procuracy, with its local and military subdivisions, acts as a watchdog for the state. It monitors the performance of government agencies, maintains vast powers of surveillance, and acts as a prosecutor before the People's Courts.

The organization of institutional governance from provincial/city level to commune-level consists of:

- The People's Council at provincial, district and commune levels: a body of state power at the local level, representing the rights of the people and is elected by local people; and
- The People's Committee at provincial, district and commune levels: the executive body of the People's Councils and State administrative agencies at the local level. The People's Committee at the provincial/city and district level includes departments for different fields such as agriculture and rural development, natural resources and environment, transport, etc. The number of staff may vary from commune to commune depending on the size and area of the commune. Vietnam currently has 11,162 commune-level administration units, including 1,567 wards, 597 town and 9,064 communes[22]. The capacity of Vietnamese rural commune's human resources is required to be strengthened to meet the higher demand for the national development cause. Among 145,112 permanent staff of the commune level, 31% are reported to have no formal education (see Figure 9.5).

[22] Mai, Duc Ngoc. 2015. Can bo lanh dao chu chot cap xa o nong thon Viet Nam hien nay (Key Communal Human Resources in Contemporary Rural Vietnam). *Khoa hoc Xa hoi Viet Nam* 12 (2015): 19-27.



Source: Data from Mai Duc Ngoc, 2015

Figure 9.5 Formal Education Attainment of Commune-level Permanent Staff in Vietnam

While it is not recognised within the State's local administration system, village-level institutions as the basic unit of Vietnamese society and their interactions with the State are significantly crucial to understand Vietnamese socio-political characteristics and citizen's behaviours[23]. During the current New Rural Development Program, village leadership and participation are becoming more critical to participatory village development planning and implementation of grassroots democracy, and thus community development.

The village structure basically includes the Village Party Branch, led by the village party branch secretary (Bí thư Chi bộ thôn), Village People's Board (Ban Nhân dân thôn), led by the village head (Trưởng thôn) and Committee of Actions of the Fatherland Front's at the village (Ban Công tác Mặt trận thôn). Each village has its mass organisations including Women's Union, Farmer's Association, Veteran's Association, Youth Union and Elderly Association, and other social organisations such as the Red Cross Union and the Study Promotion Association. Each village has 5-12 solidarity groups in residential areas that are headed by local villagers. In line with the Government's Decree No. 34/2019/CP dated 24 April 2019, no more than three persons in a non-specialized activity in a village or street population group are entitled to a monthly allowance from the state budget, and only for the following titles: Village Party Branch Secretary; Village head; and Head of the Committee of Actions of the Front's work. In common practice, some village heads take on multiple titles, for example, the Village Party Branch Secretary, Deputy Party Branch Secretary, Village Militia Chief (thôn đội trưởng), or public officer.

9.2.3 Economy and Industry

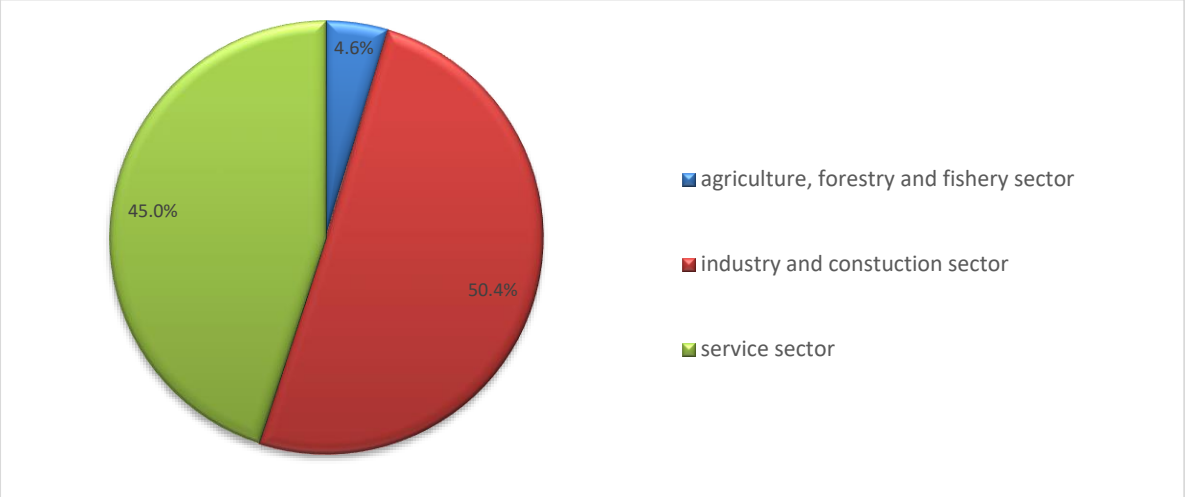
Vietnam is described as 'a development success story' with a dramatic transformation from one of the poorest countries in the world at the time of economic reforms in the 80s (known as Doi Moi or Renovation reforms), to 'low middle-income status' over a period of 25 years (DFAT, 2017).

Gross domestic product (GDP) in 2019 increased by 7.02% over 2019. Of which, the agriculture, forestry and fishery sector increased by 2.01%, contributing 4.6% to the general increase; industry and construction increased by 8.90%, contributed 50.4%; service sector increased by 7.3%, contributing 45%. Regarding the economic structure in 2019, the agriculture, forestry and fishery accounted for 13.96% of GDP; the industry and construction accounted for 34.49%; the service sector

[23] Nguyen, The Anh. 2003. Village versus State: The Evolution of State-Local Relations in Vietnam until 1945. *Southeast Asian Studies* 41(1): 101-123.

accounted for 41.64% and product tax minus product subsidies accounted for 9.91%. The corresponding structure of 2018 is 14.68%; 34.23%; 41.12%; and 9.97%.

According to the General Statistics Office of Vietnam (2018), GDP per capita was estimated to be 58.5 million VND, equivalent to 2,590 USD – 201 USD higher than in 2017. It is noted that GDP and GDP per capita of Vietnam in 2019 has not been officially released at the time of reporting.

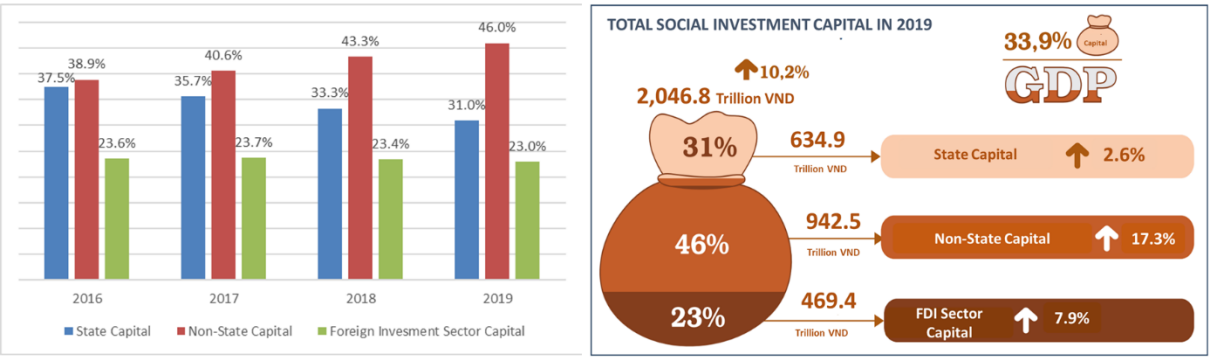


Source: Vietnam General Statistics Office 2019

Figure 9.6 GDP Contribution by Sector

By types of ownership, throughout 2016-2019, the GDP of the non-state economy always accounted for the highest proportion, and the foreign investment sector was the lowest one. In 2019, social investment capital at current prices reached 2,046.8 trillion VND, rising 10.2% over the previous year and equal to 33.9% of GDP (see Figure 9.7). These include:

- state-owned capital reached 634.9 trillion VND, accounting for 31% of the total capital and increasing 2.3% compared to the previous year;
- non-state sector reached 942.5 trillion VND, accounting for 46% and rising by 2.7%;
- FDI sector reached VND 469.4 trillion, accounting for 23% and decreasing by 0.4%.

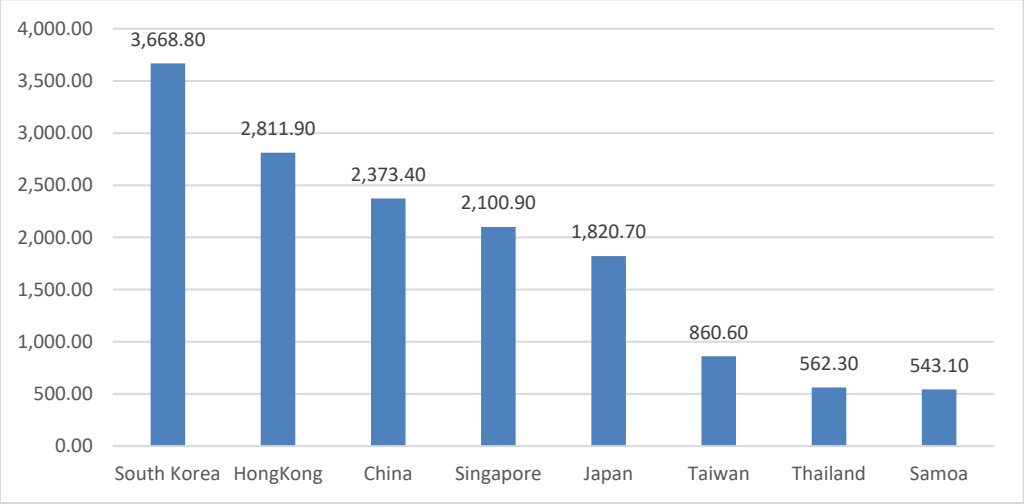


Source: Vietnam General Statistics Office, 2019

Figure 9.7 The Structure of Social Investment Capital during 2016-2019 and Details in 2019 (at Current Prices) (%)

In 2019, 81 countries and territories had new licensed direct investment projects in Vietnam. Of which, South Korea is the largest investor with 3,668.8 million USD, accounting for 21.9% of the total registered capital. Followed by Hong Kong Special Administrative Region (China), China, Singapore,

Japan, Taiwan, Thailand and Samoa in the top eight investors. Details of investment capital are shown in Figure 9.8.



Source: Vietnam General Statistics Office 2019

Figure 9.8 Top Eight Investor into Vietnam Market in 2019 (USD)

Export turnover was 263.45 billion USD, increased 8.1% compared to 2018, of which the domestic economic sector reached 82.10 billion USD, accounting for 31.2%. % of the total exports; the FDI sector (including crude oil) reached 181.35 billion USD (68.8%) added 4.2% to the total exports year on year.

Import turnover was at 253.51 billion USD, surged 7% compared to 2018. Of which, the domestic economic sector reached 108.01 billion USD, and the foreign-invested sector made 145.50 billion USD. These sectors both increased by 13.8% and 2.5% respectively.

9.3 Overview of Ninh Thuan Province

Ninh Thuan province is a coastal province of South-Central Vietnam. To the north, it borders on Khanh Hoa Province, to the west, on Lam Dong provinces, and to the south, on Binh Thuan Province. The Ninh Thuan coast is 105.8 km long. The coastal area has many bays suitable for tourism development and aquaculture development, and hatchery production is the strength of the fisheries sector. The province's major river is the Dinh River, which flows through the main lowland of the province and Phan Rang. It has several tributaries in the province and is connected to Don Duong Lake in Lam Dong Province.

Ninh Thuan is located along Vietnam's main north-south corridors. National Route 1A as well as the North–South Railway run through the province. Ninh Thuan’s main railway station is at Thap Cham. There are also two smaller railway stations, including Ba Rau and Ca Na, near the southern border. Phan Rang is connected to Da Lat by National Road 27 via Ngoan Muc Pass.

Ninh Thuan has three ports: Vinh Hy Port in the northeastern of Ninh Hai District, Ninh Chu Port in the southern of Ninh Hai District near Phan Rang, Ca Na Port in the south of the province. The nearest commercial airport is Cam Ranh International Airport.

Table 9.4 Ninh Thuan Province Overview

Ninh Thuan Province	
Number of cities:	1
Number of districts and cities	7
Area	3,358 km^2
Population	590.467
Poverty proportion	6.94%
Ethnic groups	Cham, Raglai, Koho, Hoa Tay, Nung.
Main religions	Catholicism, Buddhism, Brahmin, Islam
GRDP 2019	27,753 billion VND
GRDP per capita 2019	47,000,000 VND
Average income per capita 2019	2,834,000 VND

Sources: Ninh Thuan Statistical Yearbook 2019, Satellite image from Google Map, 2020.

9.3.1 Demographic Information

The natural area is 3,358 km^2, with seven administrative units including one city and six districts. Phan Rang -Thap Cham city is a provincial city, the political, economic and cultural center of the province, it is 350 km away from Ho Chi Minh City, 60 km from Cam Ranh airport, 105 km from Nha Trang city, and 110 km from Dalat city, and convenient for the exchange of socio-economic development. A list of the administrative units and the number of wards and communes is presented in Table 9.5.

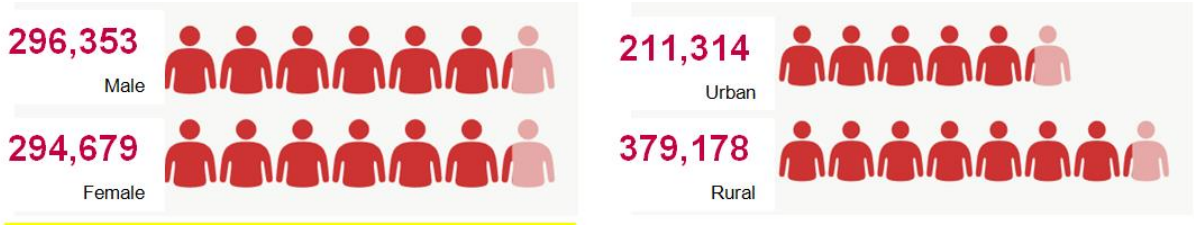
Table 9.5 Administrative Units in Ninh Thuan Province

Administrative units	Wards	Communes	Total
Phan Rang-Thap Cham City	15	1	16
Bac Ai District	-	9	9
Ninh Son District	-	8	8
Ninh Hai District	-	9	9
Ninh Phuoc District	-	9	9
Thuan Bac District	-	6	6
Thuan Nam District	-	8	8

Source: Ninh Thuan Statistics Office (2016)

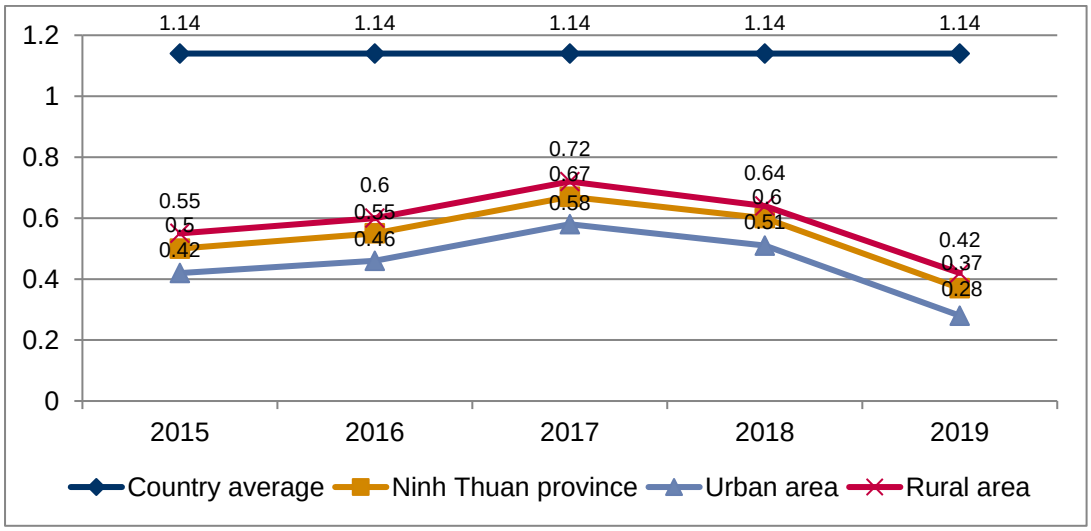
The estimated figure of the national average population of Ninh Thuan was 590,492 persons in 2019, an increase of 2,172 persons, and equivalent to a rise of 0.37% in comparison with that in 2018. The proportion of the population in urban areas continuously showed an upward trend; the population in

rural areas also experienced the same trend. The population structure by gender remained almost unchanged with the lower male population than female. In 2019, the urban population was 211,314 persons, accounting for 35.78%; the rural population was 379,178 persons, making up 64.22%; the male and female population was 190,119 persons and 189,059 persons, respectively, with the corresponding shares of 50.14% and 49.86%.



Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.9 Population in Ninh Thuan Province by Gender and Living Area

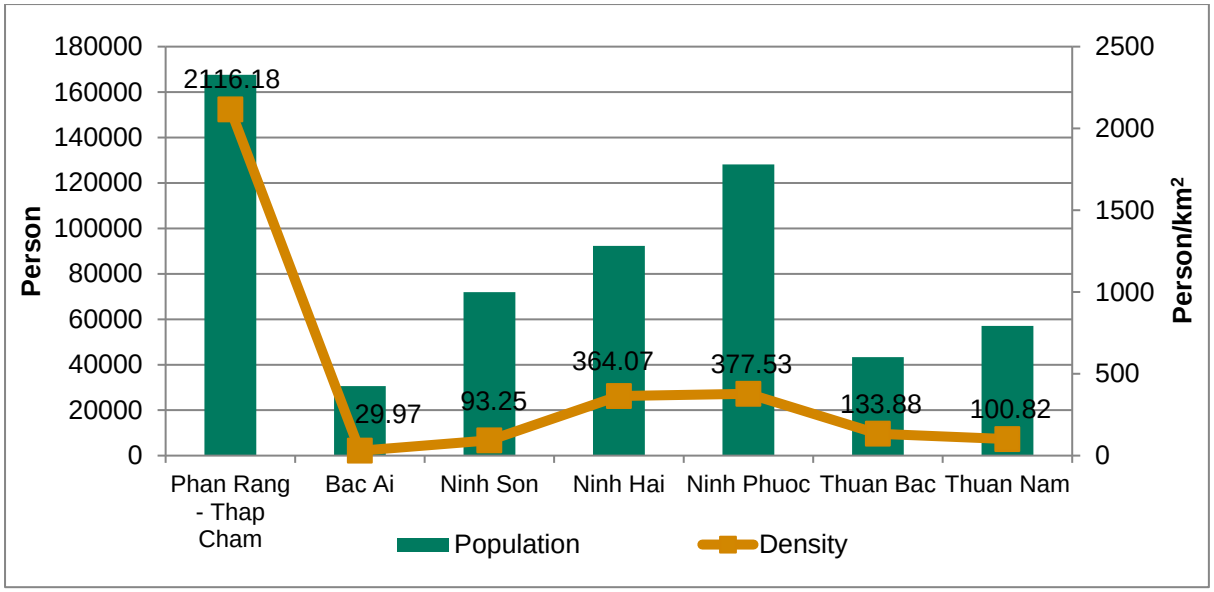


Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.10 Population Growth Rate of Ninh Thuan Province and Country Average over 2015 – 2019

The trendlines in Figure 9.10 describes the population growth rate of Ninh Thuan province and the country on average. In general, Ninh Thuan maintains a lower growth rate compared to the country average. There is no difference in the patterns of the growth rate of the whole province, the urban and rural areas. The growth rate in the rural area has always been the highest, while its counterpart in the urban area is the lowest during the whole period.

Meanwhile, the average growth rate of the country for the period 2010 – 2019 was 1.14%, the population growth rate of Ninh Thuan showed an uptrend from 2015 to 2017, followed by a downtrend from 2017 to 2019. It is observed that in 2017, there was a significant increase in Ninh Thuan province, its urban and rural population growth rate, which reached 0.72%, 0.58% and 0.72%, respectively, then dramatically went down at 0.37%, 0.28% and 0.42% respectively, in 2019.

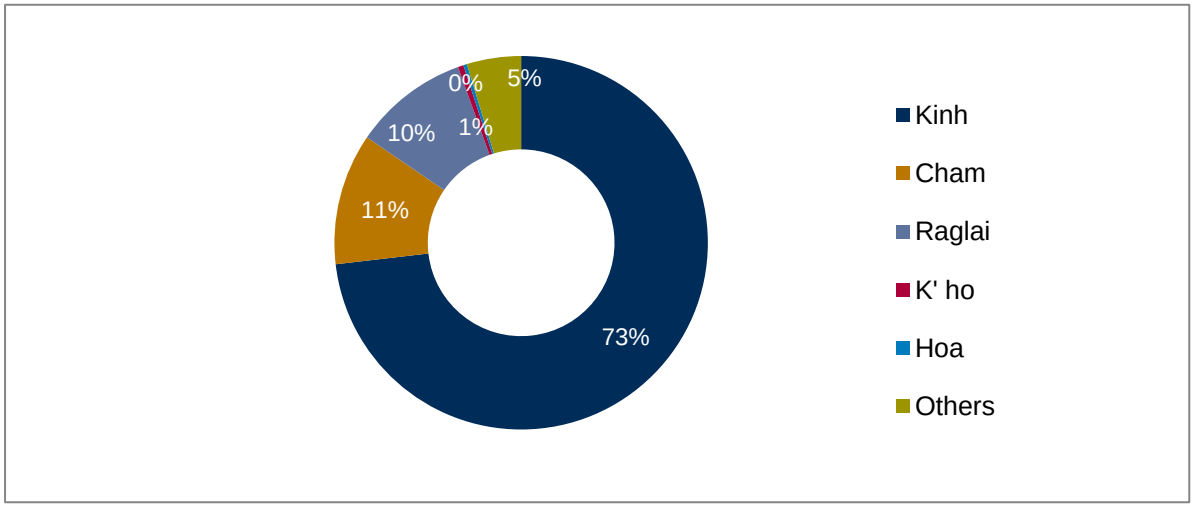


Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.11 Population and Density of City and Districts of Ninh Thuan Province in 2019

The population of Ninh Thuan is unevenly distributed among the cities and districts. The population is most concentrated in Phan Rang – Thap Cham city, followed by Ninh Phuoc district. Phan Rang – Thap Cham also has the highest population densities (approximately 200 people/km²). While Ninh Son, Thuan Bac and Thuan Nam district have no considerable difference in population, Ninh Hai and Ninh Phuoc district also follow the same trend. Bac Ai has the smallest population size, which is 29.97 people/km². Details are visualized in Figure 9.11.

Thirty-four ethnic minorities are living in Ninh Thuan, comprising Kinh (73.16%) which is a dominant ethnic group in the province, and a small percentage including Cham (11.38%), Raglai (9.97%), K'Ho, Hoa and others (See Table 9.6). Kinh people concentrate mostly on the plains, cities and towns. It is reported in the Ninh Thuan portal that groups of ethnic communities stay together in some specific locations in Ninh Thuan province. Table 9.6 provides specific places where most of the ethnic minority communities are living.



Source: Ninh Thuan online news, 2019.

Figure 9.12 Structure of Ethnic Groups in Ninh Thuan Province (%)

Table 9.6 Popular Settlement Locations of Ethnic Groups in Ninh Thuan Province

Ethnic Groups	Popular locations
Kinh	Kinh people scattering in all 7 cities and districts (as of 2019), but most found in cities and downtown such as Phan Rang – Thap Cham, Ninh Hai, Thuan Bac, Thuan Nam, Ninh Son, Ninh Phuoc.
Cham	Ninh Phuoc district, Thuan Nam district, Thuan Bac district,
K'ho	Living areas to the borders with Lam Dong, includes Ninh Son District and Bac Ai District
Raglai	Bac Ai, Ninh Son, Thuan Bac, Ninh Hai and Thuan Nam
Hoa	Phan Rang – Thap Cham city, Ninh Hai, Ninh Phuoc, Thuan Bac District.

Source: Ninh Thuan online news, 2019 and Vietnamese News Agency, 2019 [24].

As the ethnic minorities and the Kinh groups live together in many communities in the districts and towns of Ninh Thuan, the official language of Ninh Thuan is the Vietnamese language and it is not an issue for ethnic minority people and the former. It is reported in the ethnic minority development plan (EMDP) of Ninh Thuan province by World Bank[25] that most ethnic minority people use the Vietnamese language to communicate with the people from other groups while still using their languages to communicate with each other in their communities.

There are five main religions in Ninh Thuan province, namely Catholicism, Buddhism, Islam, Brahmin and Protestantism. Catholicism is 97,560 people, followed by Buddhism is 44,226 people, Brahmin is 62,699, Islam is 4,990. There are some monotheistic syncretic religions in Ninh Thuan province, including Protestantism (11,220 followers), Cao Dai (1,784 followers). The religions in Ninh Thuan province are distributed in different districts and cities, as shown in Table 9.7.

The religious activities are various and supported by the Government and philanthropists in accordance with the Vietnam Law.

Table 9.7 Religions Distribution in Districts in Ninh Thuan Province

Religion	District
Buddhism	Phan Rang, Ninh Hai
Catholicism	Ninh Son, Phan Rang
Protestantism	Lam Son, Phan Rang
Islam	Xuan Hai, Nhon Son, Ninh Phuoc, Thuan Nam
Brahmin	Bac Son, Thanh Hai, Ninh Phuoc, Thuan Nam

Source: Ninh Thuan online news, 2019.

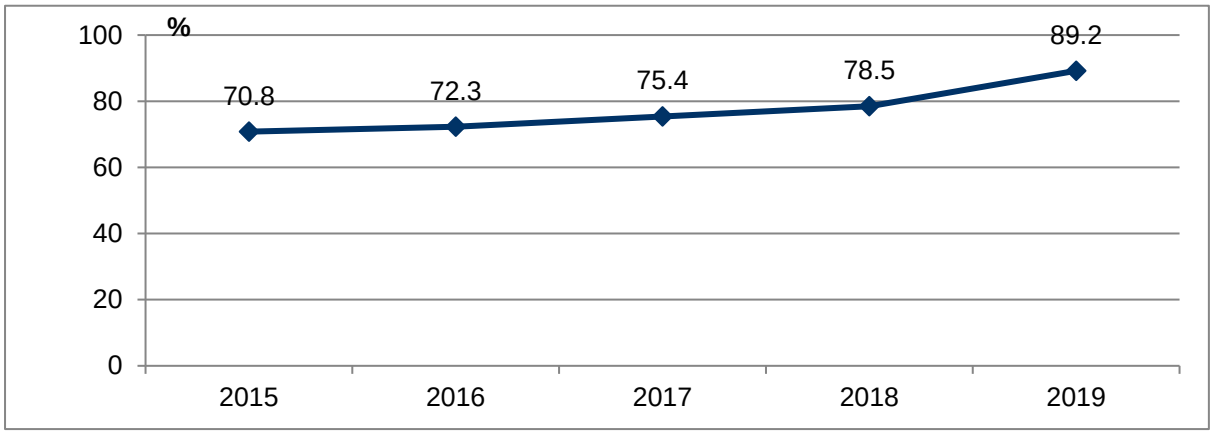
[24] Tin Tuc news, 2019, retrieved on 29 March 2019, at https://baotintuc.vn/tin-tuc/tang-cuong-dao-tao-tieng-dan-toc-raglai-cho-cong-chuc-vien-chuc-20190329081943148.htm

[25] http://documents1.worldbank.org/curated/en/591941498220993324/pdf/SFG3439-v1-REVISED-PUBLIC-ENDR-Final-draft-EMDP-Ninh-Thuan.pdf

9.3.2 Healthcare

9.3.2.1 Healthcare Facilities

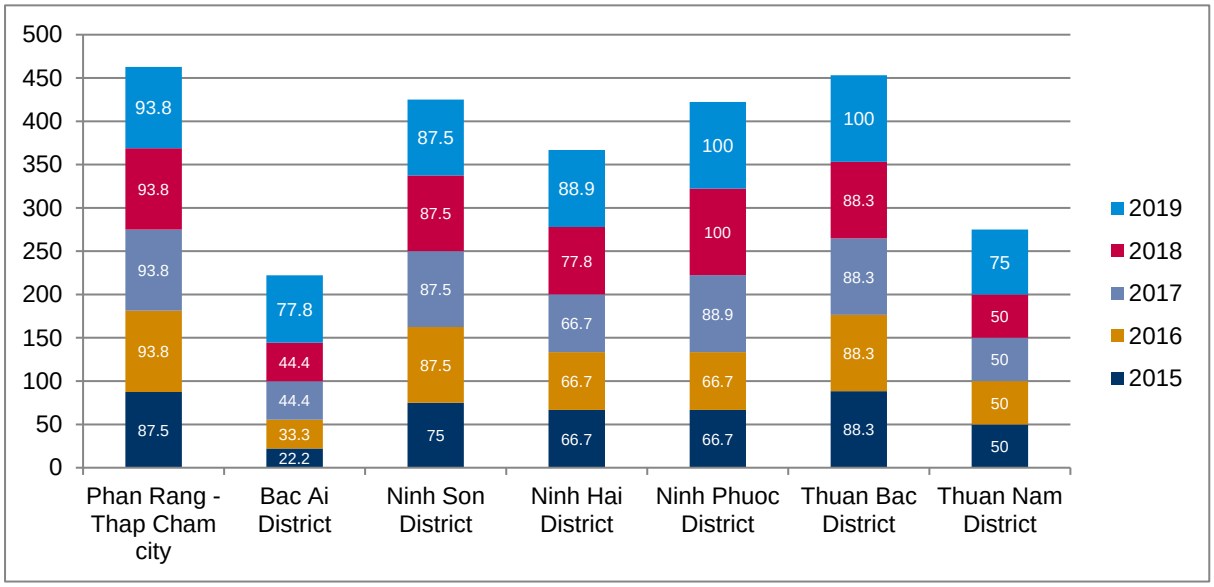
Regarding healthcare facilities, Ninh Thuan province has 89.2% of communes/wards meeting national health standards in 2019. The statuses went up throughout the year from 2015 to 2019, as reported and shown in Figure 9.13.



Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.13 Rate of Communes/ Wards Meeting the National Health Standards of Ninh Thuan Province, 2010 – 2019

Among the cities and districts of Ninh Thuan province, in 2019, Ninh Phuoc and Thuan Bac districts were qualified for the national standards on commune-level health care. It could be seen that Bac Ai had a low percentage of wards/communes that met the national standards in the period of 2015 - 2018; then dramatically successful reaching 77.8% of qualified communes in 2019. The detailed rate of each city/district is displayed in Figure 9.13. The standards included ten sets of criteria which are regulated by the Ministry of Health in Decision No. 4667/2014/QĐ-BYT on promulgating national standards on commune-level healthcare to 2020. The structure of the standards is summarized in Table 9.8.



Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.14 Rate of Communes/ Wards Meeting National Health Standards of Ninh Thuan Province by City/District (%)

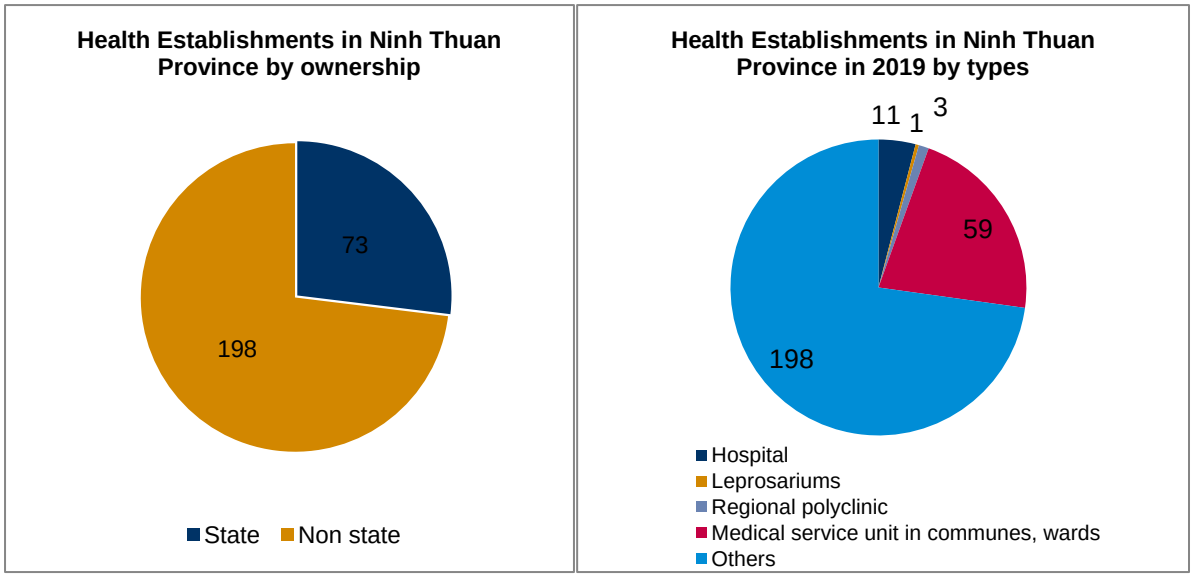
Table 9.8 National Standards on Healthcare in Communes, 2011 - 2020, Regulated in Decision No. 4667/2014/QĐ-BYT of Ministry of Health[26]

No.	Criteria sets	Number of sub-criteria	Points
1	Directing and operating health care work	2	3
2	Health staff	4	10
3	Health facilities	6	11
4	Equipment, drugs, and other means	6	9
5	Planning - Finance	4	10
6	Preventive medicine, HIV/AIDS prevention and Food safety	6	17
7	Examination, treatment, rehabilitation, and traditional medicine	5	14
8	Maternal - children health care	7	13
9	Population - Family planning	4	9
10	Education & communication on health care	2	4
Total		**46**	**100**

Source: Ministry of Health, 2014

In order to be qualified, a medical service unit in communes must have at least 80 points, and the points for sub-criteria must be above 50% of the maximum points for that sub-criterion.

By the end of 2019, there were a total of 271 health establishments in Ninh Thuan province, among these are 59 medical service units in wards and communes. There are 11 hospitals and 198 other private health establishments. Figure 9.15 shows a brief profile of health establishments in Ninh Thuan province in 2019 by types and ownership.

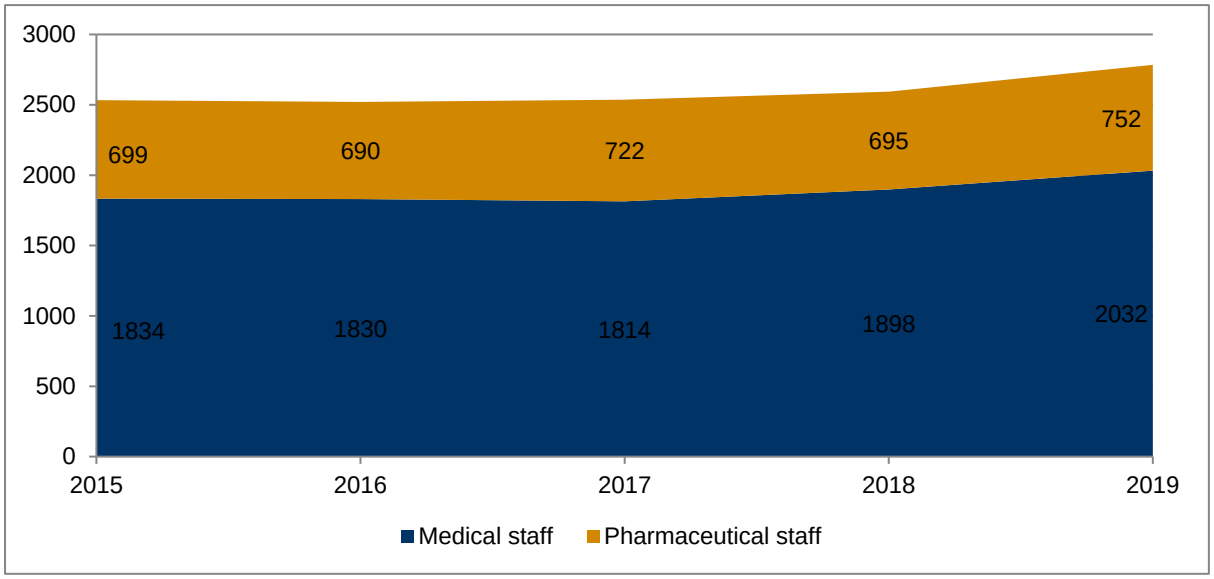


Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.15 Health Establishments by Types and Ownership in Ninh Thuan Province, 2019

[26]Thu vien phap luat 2020, retrieved on 30 December 2020, at https://thuvienphapluat.vn/van-ban/the-thao-y-te/Quyet-dinh-4667-QD-BYT-2014-Bo-tieu-chi-quoc-gia-ve-y-te-xa-giai-doan-den-2020-258367.aspx

During the period from 2015 – 2019, the number of health staff in Ninh Thuan province was increasing. It is observed that the growth rate of medical staff is higher than the growth rate of pharmaceutical staff. The trends of changes are displayed in Figure 9.16.

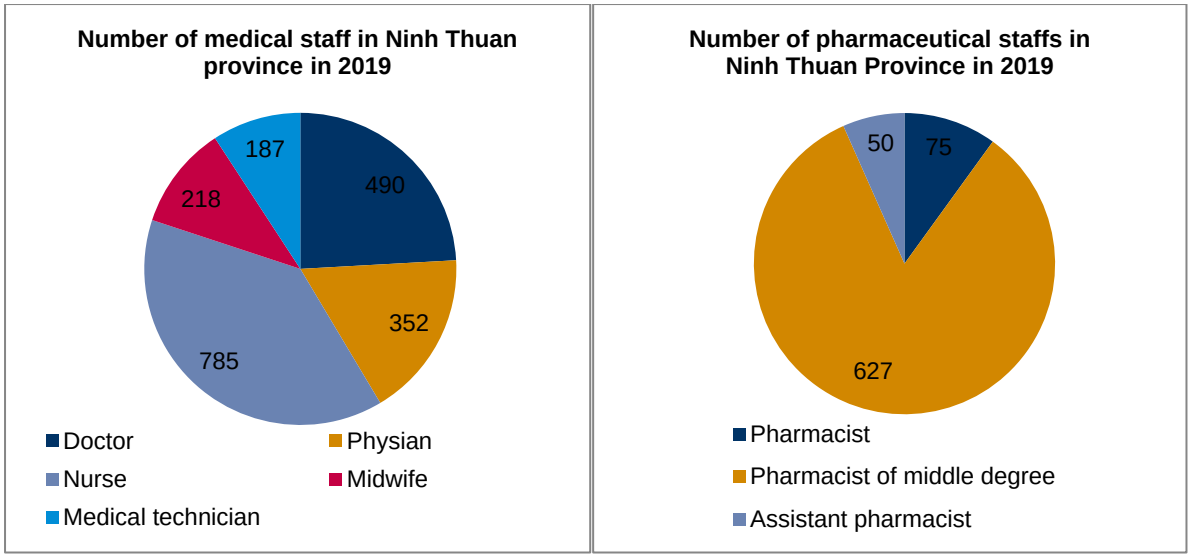


Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.16 Changes of Health Staff Numbers in Ninh Thuan Province, 2015 – 2019

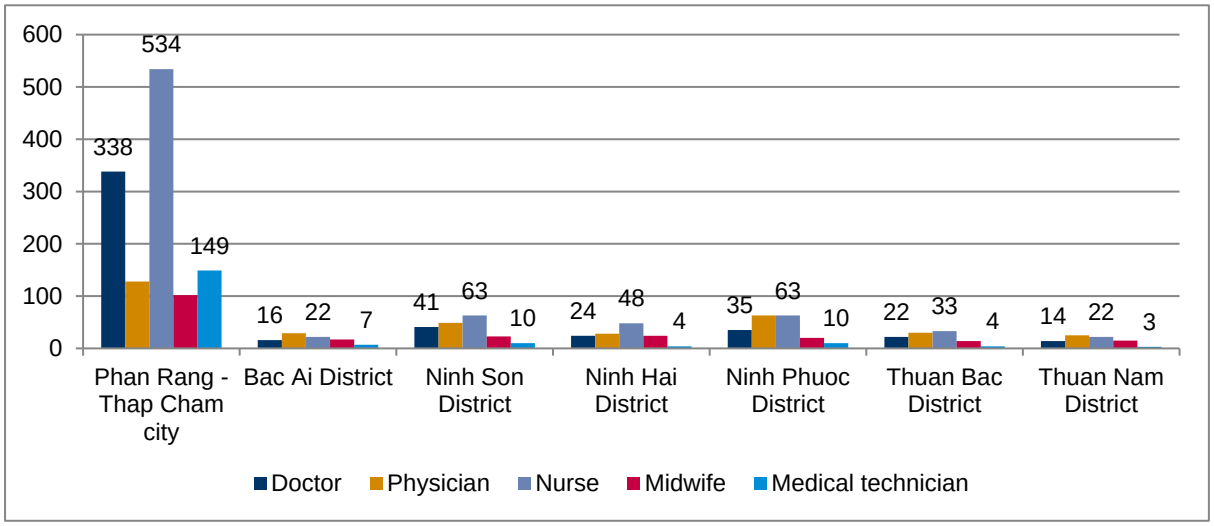
To be more specific, in 2019, of all the medical staff, doctors and physicians accounted for 41.44% in Ninh Thuan province. Nurses accounted for 38.63%, midwives accounted for 10.73% and the remaining is the medical technician. Regarding the pharmaceutical staff, the proportion of pharmacists and the assistant pharmacist is 16.62%, while 83.38% of staff are middle degree pharmacists. The structure of the medical staff and pharmaceutical staff are visualized in Figure 9.17.

In Ninh Thuan province, as of 2019, the ratio of patient beds over 10.000 inhabitants were 29.3, which is reported to increase by 10.1% compared to that of 2018. There are 8.3 doctors per 10,000 inhabitants, which is slightly higher than the ratio of health staff per 10,000 people in the country (8 doctors/10,000). However, the workforce is unevenly distributed throughout the province, 338 out of 490 doctors of Ninh Thuan work for health establishments in Phan Rang city. Therefore, this rate in the remaining districts is only 3.6 doctors per 10,000 inhabitants. This indicates that the healthcare workforce in the districts of Ninh Thuan province is currently insufficient to meet manpower norms and practical needs; especially, in the mountainous and remote areas have severe shortages of healthcare workers, which merely have around 16 doctors in Bac Ai and 14 doctors in Thuan Nam province. Figure 9.18 details the number of medical staff by the district in Ninh Thuan province.



Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.17 Structure of Medical Staff and Pharmaceutical Staff in Ninh Thuan Province, 2019



Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.18 Number of Medical Staff by District in Ninh Thuan Province, 2019

9.3.2.2 Healthcare Programs

In 2019, there were 1,550 cases of Dengue, 2.2 times more than in 2018. Hand, foot and mouth disease was detected with 356 cases, decreased 70% compared to 2018. Other infectious diseases causing the epidemic include diarrhea (1,640 cases), dysentery (189 cases), mumps (92 cases); and chickenpox (71 cases). No cases of influenza A or Zika virus disease were found in the province. There was no death due to the above diseases.

Regarding mental healthcare, there were 25 new patients with schizophrenia, an increase of 07 cases compared to the previous year. The number of schizophrenic patients was 670 cases, in which 655 has been treated stably, reaching 97.8%. The number of newly discovered epilepsy patients is 30, decreasing by 49 cases. The number of epilepsy patients was 810 cases, with 795 cases stably treated.

Regarding the National Target Program on HIV/AIDS Prevention and Control, there were many positive results. Among the 11,346 samples tested with HIV in 2019, there were 38 new cases

detected. In 2019, the whole province had 528 HIV-infected people (with 373 male and 155 female), 190 cases converted to AIDS, 13 died from HIV/AIDS and 325 HIV-infected people alive. The HIV/AIDS prevalence rate in the community is currently 0.048%.

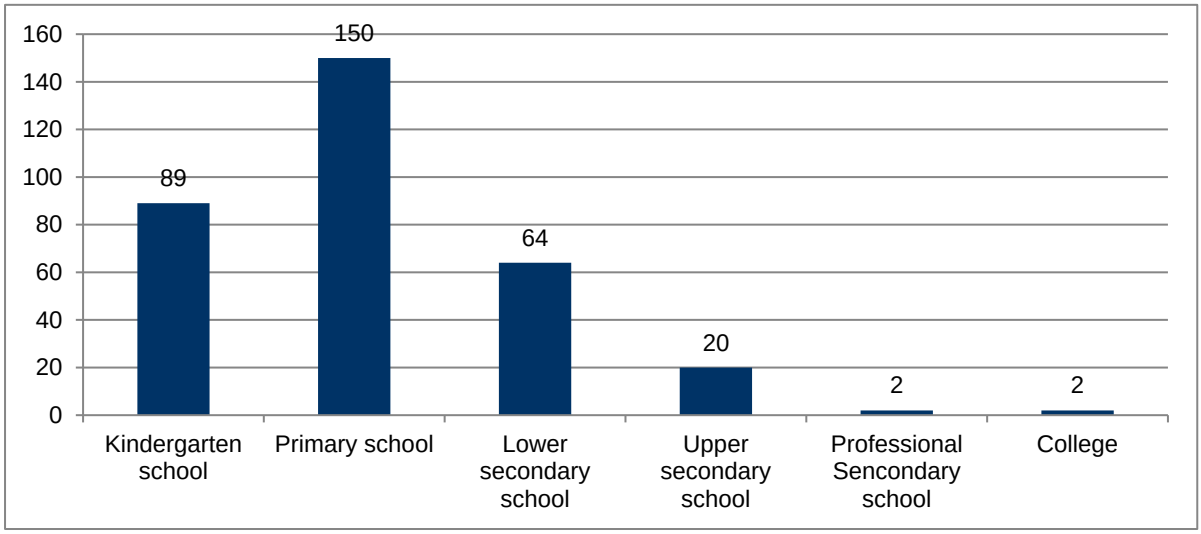
In terms of the National target program on food safety and hygiene (food safety and hygiene), diverse activities were implemented. The program's objective is to ensure food safety during the Lunar New Year was undertaken through the mass media, an Action Month for Food Safety was also implemented. The Health Service Department coordinated with Provincial Radio and Television to promote the campaign "Say no to unhygienic food" with a frequency of three times a week. There were 230 interdisciplinary inspections at 6,034 food production, trading and processing establishments in the province in 2019.

9.3.3 Education

Education in Vietnam follows the National Education System Framework, which has four main education levels:

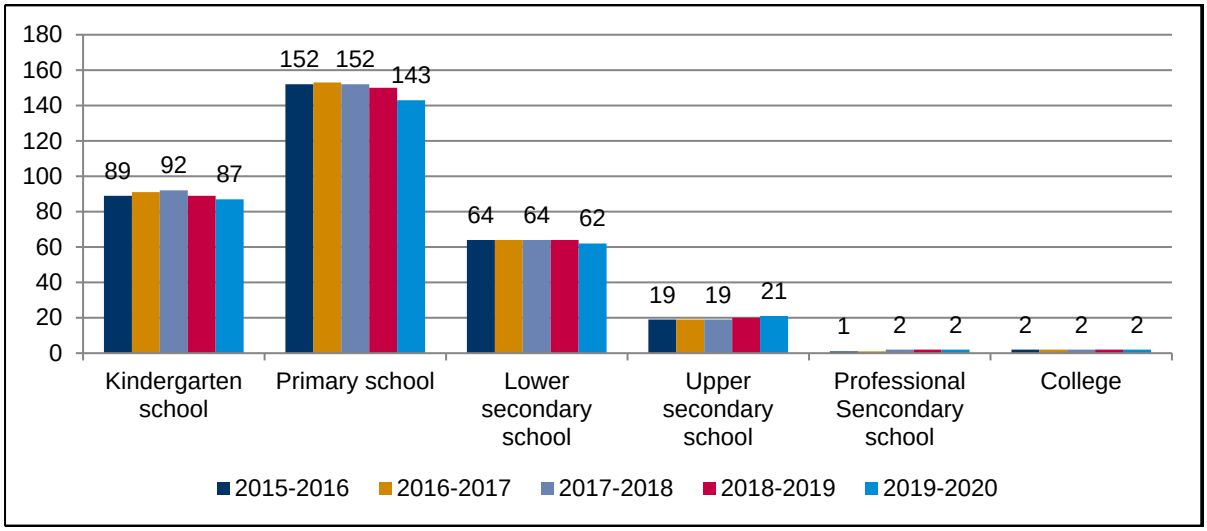
- Preschool Education: Kindergarten
- General Education: Primary Education, Lower Secondary Education, Upper Secondary Education
- Professional Education: Professional/ Vocational Secondary Education, College Education
- Higher Education: Undergraduate Education, Postgraduate Education

In Ninh Thuan province, the number of schools at higher levels of education is fewer than in general education schools. There are 89 kindergartens, 234 schools of general education (including primary schools, lower & upper secondary school). There are two professional secondary schools, two colleges and no university located in cities and town districts for students who have finished his/her general education and preferred to join those institutions or travel to other provinces for higher education. Figure 9.19 shows the number of schools in Ninh Thuan province 2019 of all levels.



Source: Ninh Thuan Statistical Yearbook 2019

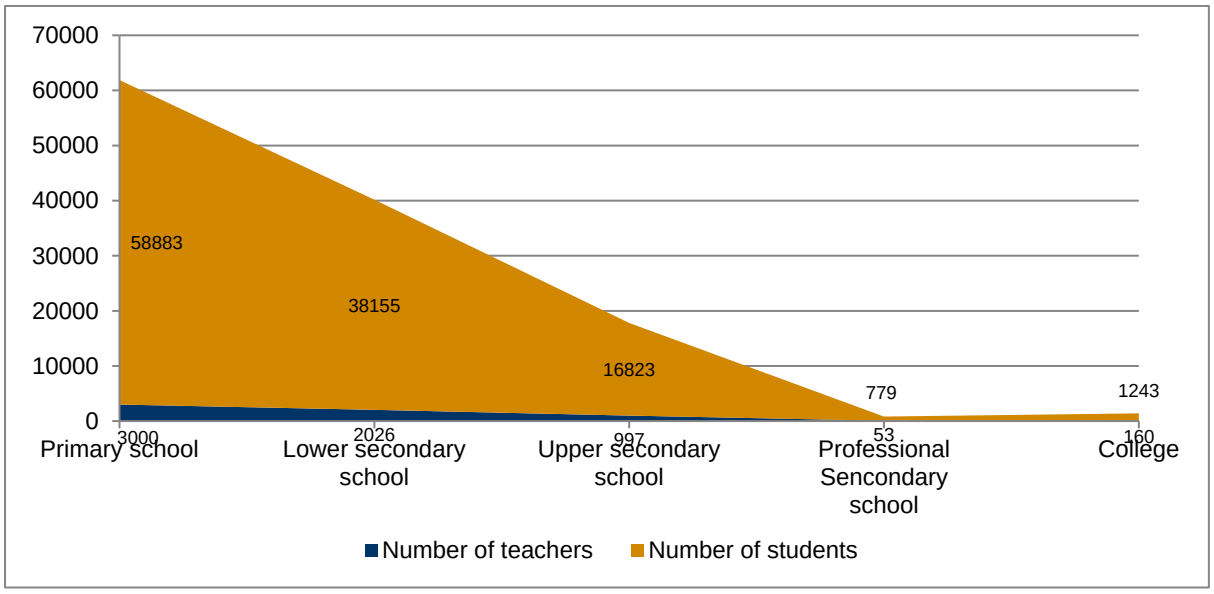
Figure 9.19 Number of Schools in Ninh Thuan Province, 2018-2019



Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.20 Changes in Number of Schools in Ninh Thuan Province by School Years, 2015 – 2020

The above chart gives an overview of the changes in the number of schools in Ninh Thuan province. It is observed that in general, there are minor fluctuations in different types of schools from 2015 to 2020. In detail, the number of higher education institutions stayed stable during the period of time.



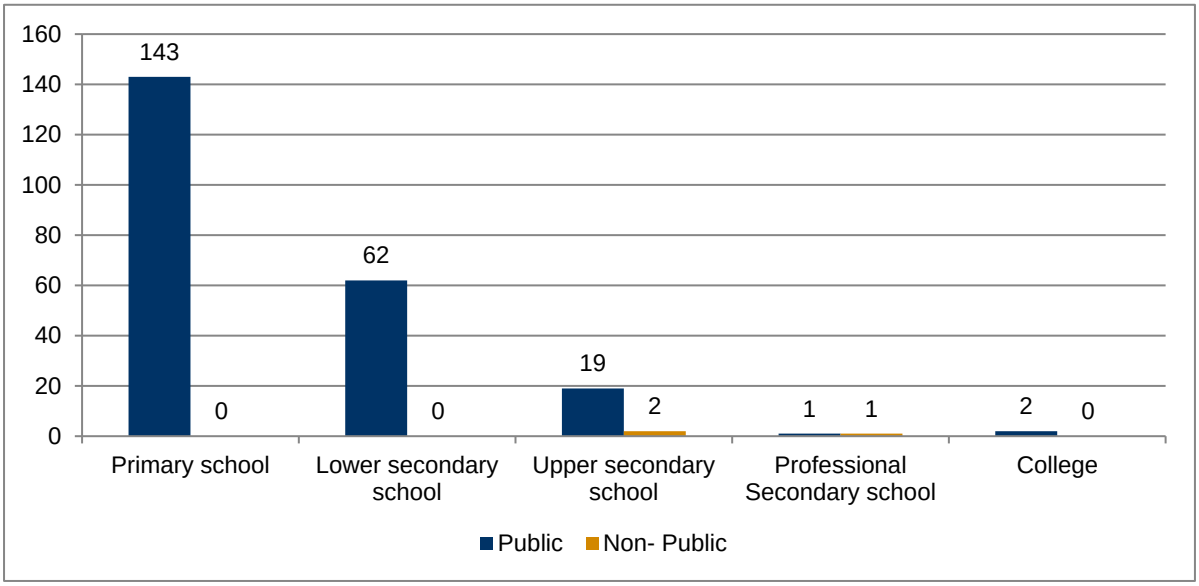
Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.21 Number of Teachers and Students in Ninh Thuan Province by Schools, 2018-2019

Figure 9.21 shows that the number of teachers and students in general education schools was higher than that in higher education institutions. Specifically, it is reported that the crowded schools are primary schools that had 58,838 pupils and 3,000 teachers in the school year 2018-2019. In the same period, the number of students and teachers in professional secondary schools and colleges of Ninh Thuan province was 779 students with 53 teachers, 1243 students with 160 teachers, respectively.

In the school year 2018 – 2019, it was reported that the general graduation rate from upper secondary school is 88.1% in the school year 2018 – 2019, there is no specific number of pupils who were graduating from a professional school, colleges and universities.

Regarding the ownership of the schools in Ninh Thuan province, it is noticed that almost all the schools are state-owned. There are 23 kindergartens and three general education schools owned by individuals who operate the schools for monetary and material benefits**.** Figure 9.22 shows the number of public and non-public schools in the Ninh Thuan province in 2019.



Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.22 Number of Public and Non-public Schools in Ninh Thuan Province by Education Levels, 2019.

9.3.4 Economy, Livelihoods and Employment

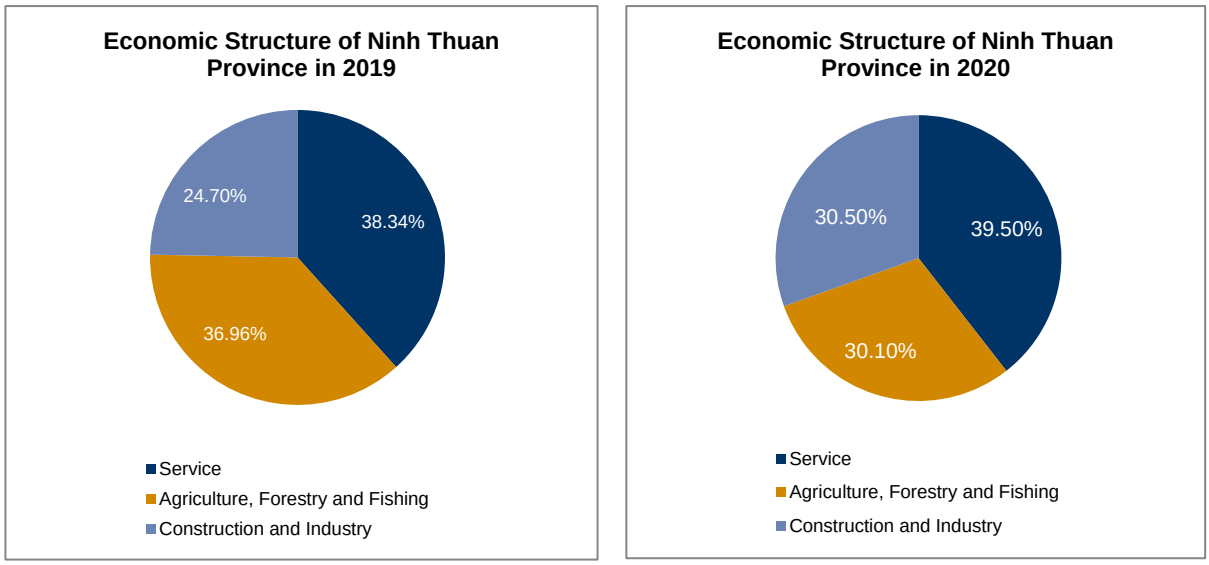
9.3.4.1 Economic

9.3.4.1.1 Economic Structure

By the end of 2019, roughly 38.34% of the GRDP was contributed by the service sector. Agriculture, Forestry and Fishing contributed 36.96%, Construction and Industry contributed 24.7% to the GRDP.

Despite the impact of COVID-19 epidemic, the GRDP of the province in the first six months of 2020 still increased (8.46%) compared to the same period last year. Compared with provinces from Thanh Hoa to Binh Thuan, Ninh Thuan stands the first position in growth rate. The economy of Ninh Thuan Province has profitable growth, at 7.4% and change in the right direction that was expected. The proportion of service accounts for 39.5%, Construction and industry is 30.5%. The remaining proportion is taken by Agriculture, Forestry, Fishing (30.5%)[27] illustrates the differences in the economic structures of Ninh Thuan province between 2019 and 2020.

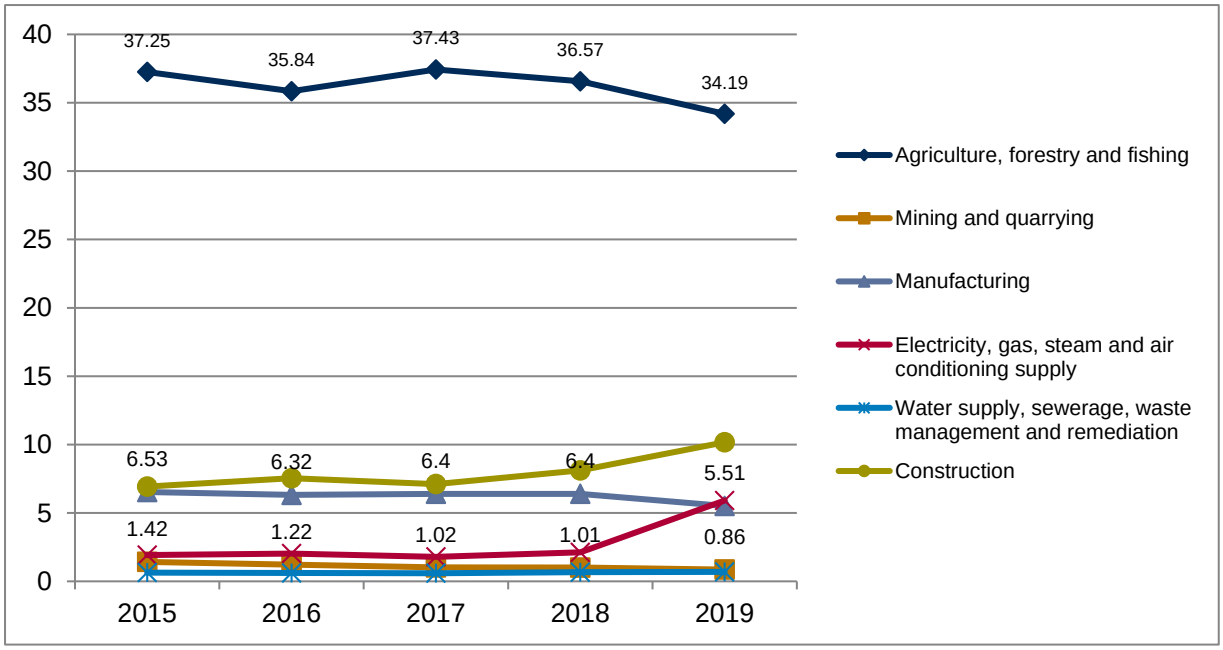
[27] Ninh Thuan socio-economic report 2019



Sources: Ninh Thuan socio-economic report 2019

Figure 9.23 Economic Structure of Ninh Thuan Province in 2019 and Projected for 2020.

Regarding the gross domestic product structure among economic activities in 2019, Figure 9.24 shows the growth rates of some sectors slightly declined while some increased in comparison to previous years. The agriculture, forestry and fishing, and manufacturing sectors all had a lower growth rate compared to 2018, with 34.19% and 5.54%, respectively. However, in the whole period, agriculture, forestry and fishing had the highest percentage among the sectors. Mining and quarrying and water supply, sewerage, waste management and remediation had the same pattern and stayed at the lowest level (0.86%). Construction and Electricity, gas, steam, and air conditioning supply both had an increased growth rate with 10.17% and 5.91%, respectively.

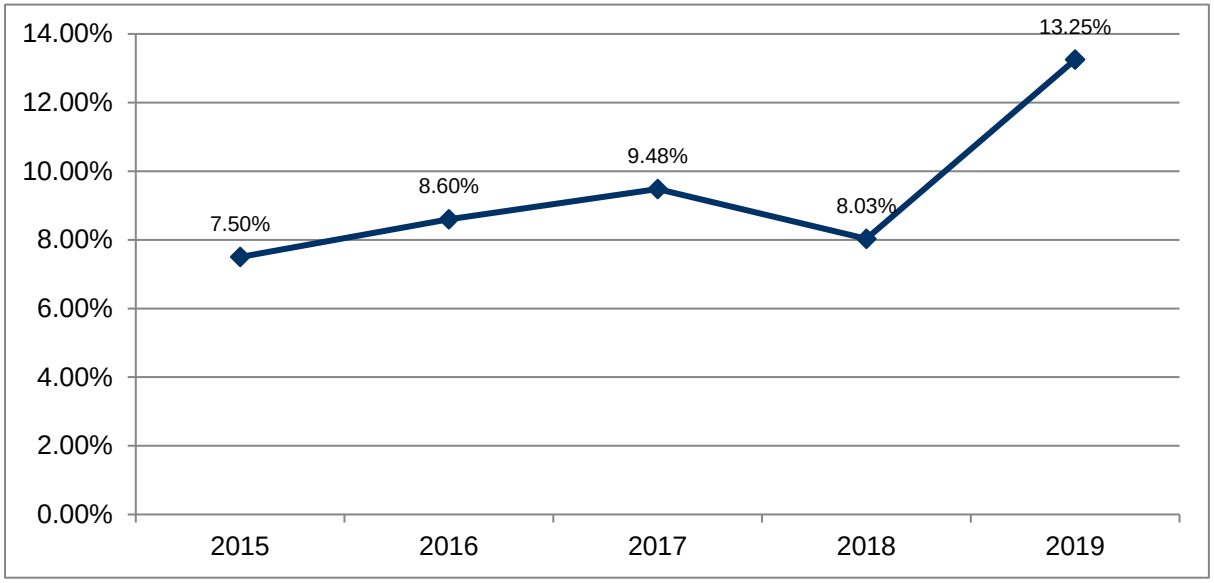


Source: Ninh Thuan Statistical Yearbook 2019

Figure 9.24 Structure of Gross Domestic Product at Current Prices of Ninh Thuan Province by Kind of Economic Activity (%)

9.3.4.1.2 Economic Development Trend

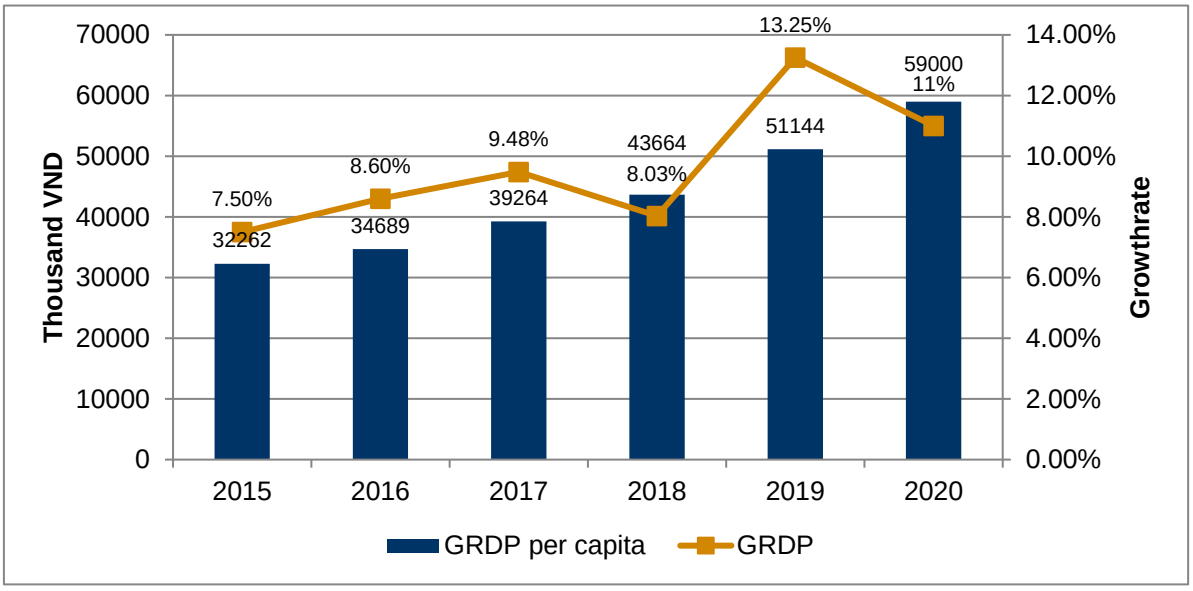
Generally, the economic development of Ninh Thuan province went up and down from 2015 to 2019. The GRDP growth rate raised from 7.05% in 2015 to 9.48% in 2017, but then decreased to 8.03 in 2018. It boosted remarkably from 8.03% in 2018 to 13.25% in 2019. Figure 9.25 shows the trendline of Ninh Thuan province in developing economy through its GRDP.



Sources: Ninh Thuan Statistical Yearbook 2019

Figure 9.25 GRDP Growth Rate of Ninh Thuan Province, 2015 – 2019

In general, it is positive that the GRDP per capita has been increasing in the whole period from 2015 to 2020. The governmental management aimed to increase GRDP per capita up to 59,000 in 2020. However, the growth rate of GRDP was unstable, which was 7.50% in 2015, increased to 9.46% in 2017, then decreased to 8.03% in 2018. The growth rate was dramatically going up to 13.25% in 2019 but fell to 11% in 2020.



Sources: Ninh Thuan Statistical Yearbook 2019, Ninh Thuan socio-economic report 2020.

Figure 9.26 GRDP per Capita & Growth Rate of Ninh Thuan Province, 2015 – 2020

Table 9.9 Trends of Changes in the Economic Structure of Ninh Thuan Province, 2015 – 2019

Year	Agriculture, Forestry, Fishing	Construction & Industry	Service	Product taxes less subsidies on production
2015	37.25%	17.43%	37.32%	8.00%
2016	35.84 %	17.71%	38.60%	7.85%
2017	37.43%	16.92%	38.51%	7.14%
2018	36.57%	18.31%	38.01%	7.11%
2019	34.19%	23.14%	35.50%	7.17%

Sources: Ninh Thuan Statistical Yearbook 2019

9.3.4.2 Livelihood and Employment

Ninh Thuan is a famous land for ancient Cham architecture with many traditional festivals. Having a coastline of 105 km, the province has many beautiful beaches that have been famous for a long time such as Ninh Chu and Ca Na beaches. These conditions facilitate for developing the tourism of Ninh Thuan.

As having a long coastline, Ninh Thuan has developed some marine business, including fishing, aquatic breeding. Regarding agriculture, although being known as the driest region in the country, but it is an advantage to develop a number of high-yield and high-quality livestock crops for specific products such as grapes, cotton, sugarcane, tobacco, cashew, neem and goats, sheep.

In terms of industrial production, its primary industries are salt production, agricultural, forestry and aquatic products, materials production, mining and mineral processing, garment, and handicraft production. Due to its specific weather, which has the highest wind speed the highest average daily sunshine hours in the country, it is an ideal place to develop wind power and solar energy industry.

These advantages create a large number of jobs for local people in Ninh Thuan province in the field of hospitality, service, and agriculture but job shortage in the industry. Figure 9.27 shows that nearly 90% of the employed population was doing simple jobs to earn their livings, which do not require skills to accomplish.

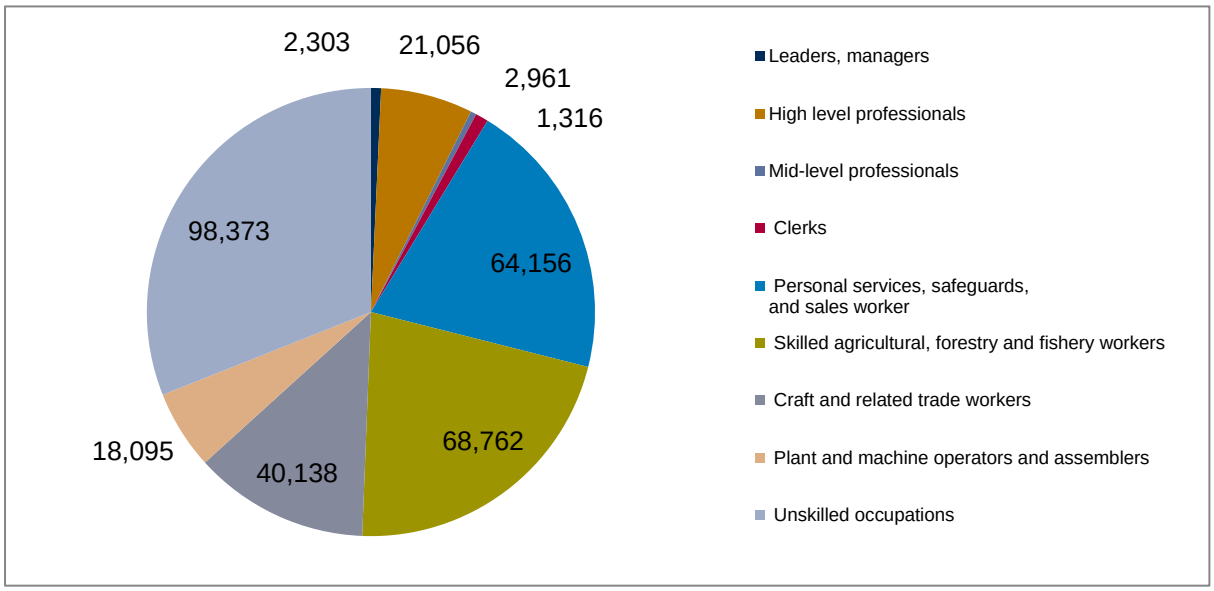
Simple jobs or unskilled occupations are clearly defined in the Appendix of Decision No.114/1998/QĐ-TCTK on 29 March 1998 by the General Statistics Office of Vietnam[28]. There are three main categories of unskilled occupations:

1. Unskilled occupations on trades and services
2. Unskilled occupations in agriculture, forestry, and fishing
3. Unskilled occupations in mining, constructions, industry, transportation, and others.

Apart from the majority, 19.5% of employed people work on services, safeguards, and sale workers, 20.09% of employed people work on skilled agricultural, forestry and fishery workers, 12% of people work on craft and related trade workers. Those are a common type of popular jobs in the province. Another group of jobs that 6.39% of the employed population is working on high level professional, and 5.49% of workers working on plant and machine operators and assemblers at factories or

[28] General Statistics Office of Vietnam, 2020, retrieved on 31 December 2020,at http://www.gso.gov.vn/default.aspx?tabid=405 &idmid=6&ItemID=6323

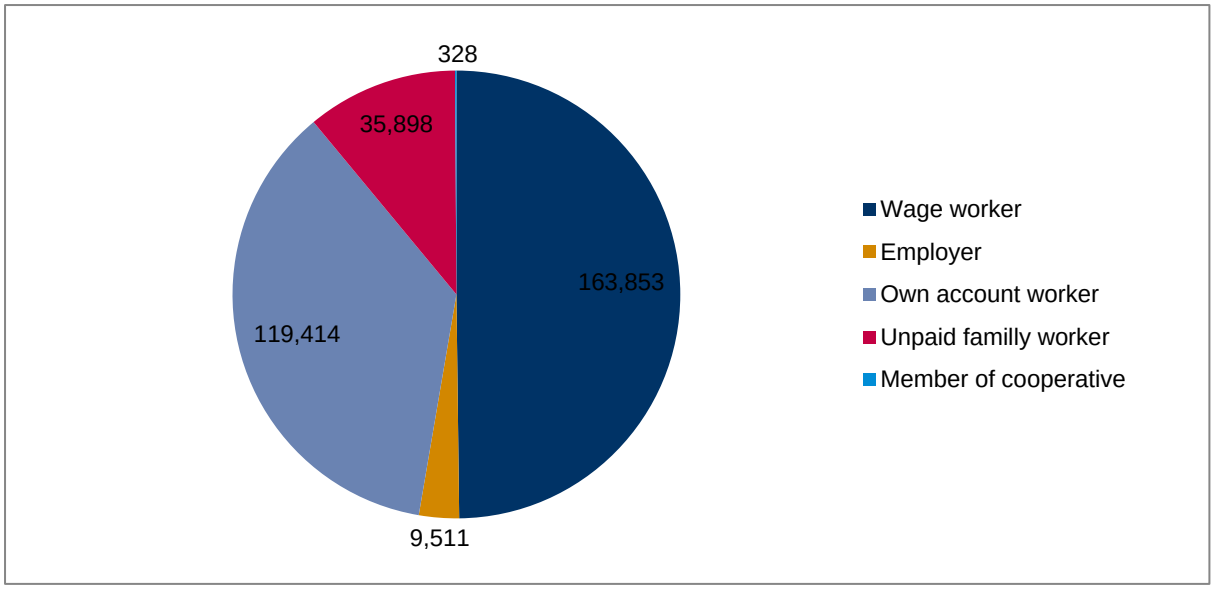
industrial areas. Other groups of occupation in Ninh Thuan province in minor with details displayed in Figure 9.27.



Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.27 The Employed Population at Age 15 and Above by Occupation, Ninh Thuan Province, 2019 (people)

From another point of view, when dividing the employed population by the status of employment, there was a large share of wage workers (49.8%), then own-account workers (36.29%) and unpaid family workers (10.9%). There was only 2.89% of the employed population are employers, and 0.09% are members of a cooperative. Figure 9.28 visualizes the structure of employment in Ninh Thuan province by status in employment.



Source: Ninh Thuan Statistical Yearbook 2019.

Figure 9.28 Employed Population at Age 15 And Above by Status in Employment, Ninh Thuan Province, 2019

9.3.5 Future Development Planning

9.3.5.1 Policies/ Plans/ Supporting Programs for Livelihood Development Implemented in the Area & Level of Effectiveness

The state government has implemented plans, and projects during different periods to improve the livelihoods of poor households or households in remote rural areas. According to Decision 1722/2016/TTg on the national target program on sustainable poverty reduction in the 2016-2020 period[29], there are five projects:

- ***Project 1 (also known as Project 30A)*** is to support poor districts and communes, including (i) investment in production and daily life infrastructure; (ii) production support and diversification the livelihoods of the poor in poor communes and districts; (iii) improvement on the quality of human resources in poor districts and communes that are participating in labour export, to raise incomes and reduce poverty.
- ***Project 2 (also known as Project 135)*** is to support poor communes in mountainous border areas, including (i) investment on infrastructure; (ii) production support and livelihood diversification; (iii) improvement on the capacity of grassroots cadres.
- ***Project 3*** is to support in production and livelihood diversification in communes not included in projects 30A and 135.
- ***Project 4*** is to communicate on poverty reduction to the poor and improve information access of the poor.
- ***Project 5*** is to improve the Government's capacity to monitor the programs.

Following the state projects, each province in the country proposes plans and acts accordingly. Project 30A and Project 135 are designed to improve the livelihoods of ethnic communities.

9.4 Overview of Thuan Bac District

Thuan Bac district is one of seven districts and cities of Ninh Thuan Province. It is the northern gateway to the province, located in the key economic region of South Ninh Thuan - North Ninh Thuan. It also has a geographical location and a relatively convenient transportation system, which brings favourable conditions for the district in connecting socio-economic development with other places inside and outside the province. Approximately 20 km of the National Highway 1A passing it. The North-South unified railway runs through the district. Its location is near Ba Ngoi seaport, Ninh Chu port and Cam Ranh international airport.

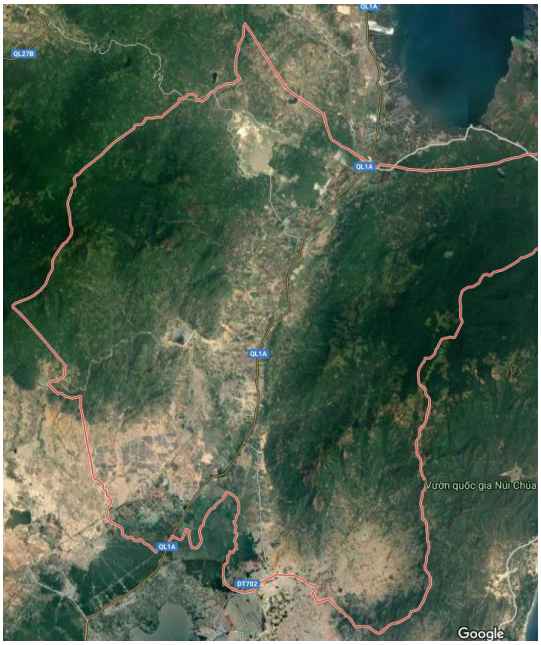
Centre of Thuan Bac District

The district is located in the arid region of the country, having a typical semi-arid monsoon tropical climate characterized by high temperature, dryness, storms, abundant sunshine and wind, which helps the district to develop wind power and solar industry with a large capacity. The average annual temperature is 27^0C, the annual rainfall is 700-800mm, the rainy season usually starts in September and ends in November.

[29]Industry and Trade Magazine, 2020, retrieved on 20 March 2020, at: http://tapchicongthuong.vn/bai-viet/chinh-sach-giam-ngheo-ben-vung-mot-so-ket-qua-va-van-de-dat-ra-69629.htm

Table 9.10 Thuan Bac at a Glance

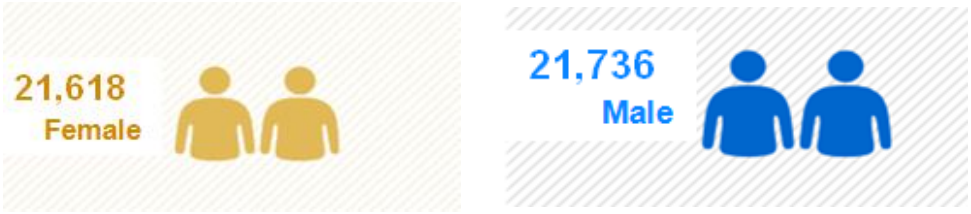
Thuan Bac District	
Number of communes	6 communes
Area	319,93 km^2
Population	42,354 people
Population density	136.2 people/km^2
Poverty rate Near-poor rate	14.51% 20.67%
Ethnicity	27 ethnic groups



Source: Thuan Bac Statistical Yearbook 2019

9.4.1 Demographic Information

The population of the whole district of Thuan Bac is 42,354 people, with a relatively equal ration of males and females, as shown in Figure 9.29. The district's population is not evenly distributed, concentrated mainly in the Centre and East, much sparsely in the Western of communes (Table 9.11). 100% of the population live in a remote area.



Source: Thuan Bac Statistical Yearbook 2019

Figure 9.29 Population by Gender in Thuan Bac District, Ninh Thuan Province, 2019

Table 9.11 Area and Population of Town and Communes in Thuan Bac District

No.	Town/Commune	Area (Km^2)	Population (people)
1	Loi Hai	6,820	13,584
2	Cong Hai	7,492.53	7,889
3	Bac Phong	2,233.88	5,780
4	Bac Son	6,292.44	8,933

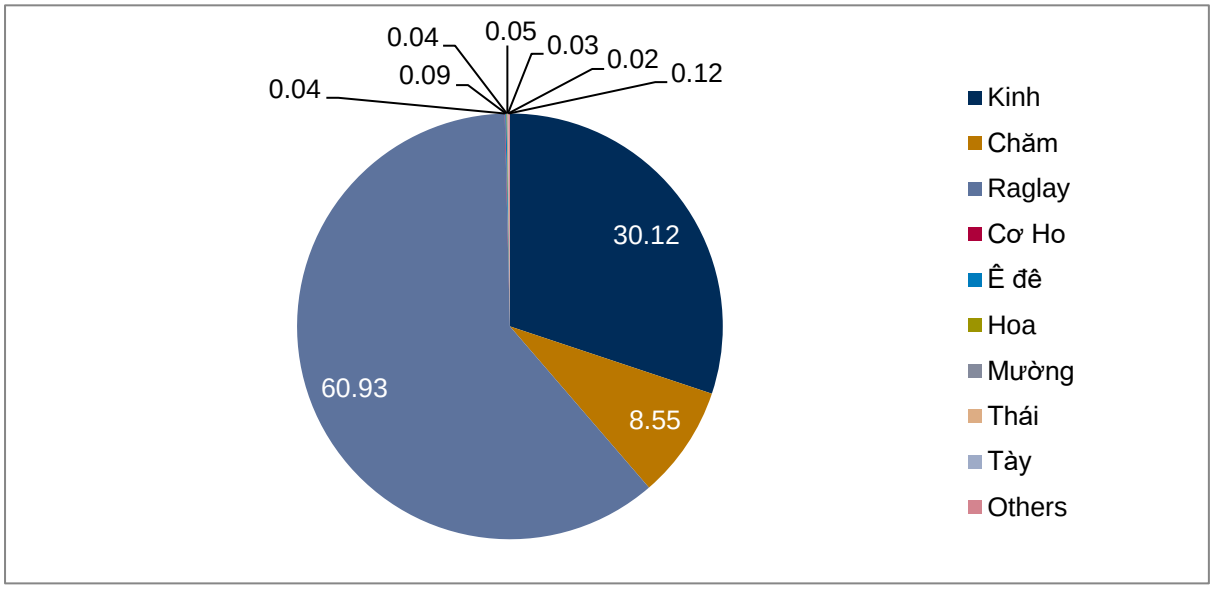
No.	Town/Commune	Area (Km^2)	Population (people)
5	Phuoc Khang	4,686.55	2,490
6	Phuoc Chien	4,396.69	4,678

Source: Thuan Bac Statistical Yearbook 2019

Thuan Bac district has a population of 43,354 people. The ethnic minorities account for 69.88% of the district population, in which the Raglai has more than 26,398 people, the Cham has 3,704 people, the remaining are the Kinh people and other ethnics minorities. All the Raglai and Kinh people live in most of the communes and mainly concentrate on Loi Hai and Cong Hai communes with the proportion of 23.37%, 36.01% and 29.06%, 22.76%, respectively. The Cham people merely live in Bac Son commune.

According to Thuan Bac Ethnic Affairs Department, the population of the province is mainly ethnic minorities, with 27 ethnic groups living in the district. Raglai people is the largest among ethnic groups in Thuan Bac has 26,398 people accounting for 60.89% of the district's population, the Kinh have about 13,049 people, accounting for 30.10% of the population, there are 3,705 Cham people accounts for 8.55%, E-de people has 41 people (0.09%), and Muong people has 22 people (0.05%), other ethnic groups sharing a small percentage of the whole district population.

The Kinh people live throughout the district but are concentrated mostly in Bac Phong, along with Bac Son, Cong Hai and Loi Hai communes. The Raglai people live in most of the communes and towns except Bac Phong commune. The Cham people who live in Bac Son commune make up the majority of the commune (41%).



Source: Thuan Bac Statistical Yearbook 2019

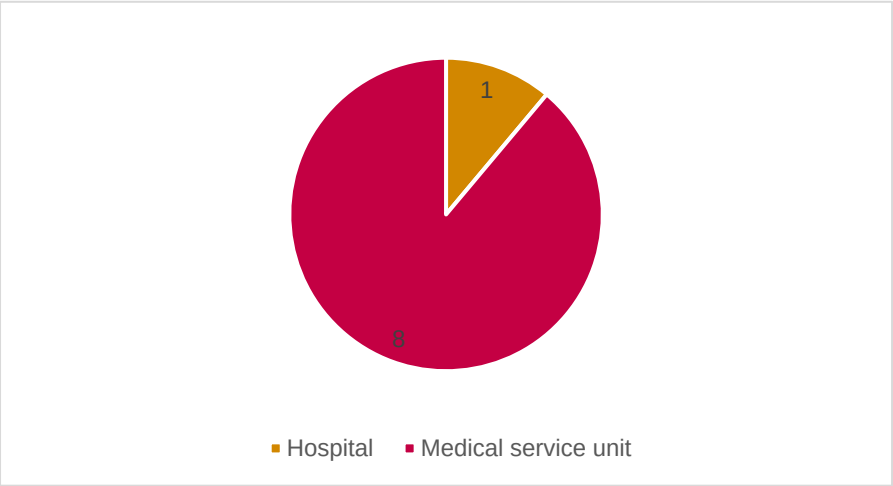
Figure 9.30 Population by Ethnic Groups in Khanh Vinh District, Ninh Thuan Province, 2019 (%)

9.4.2 Healthcare Facilities and Programs

Health facilities and programs

By the end of 2019, there were nine health establishments in Thuan Bac district, which are all owned by the government and most of them (8) are commune health clinics, only one district hospital. All health units in the district were satisfied with national health standards. Figure 9.31 shows a brief profile of health establishments in Thuan Bac district in 2019 by types.

In 2019, on average, Thuan Bac had 5.2 doctors per 10,000 inhabitants, which is lower than the health staff ratio per 10,000 people in Ninh Thuan province (8.3 doctors/10,000) and the country (8 doctors/10,000). This rate indicates that the healthcare workforce in the district is currently insufficient to meet the health care demands of local people.

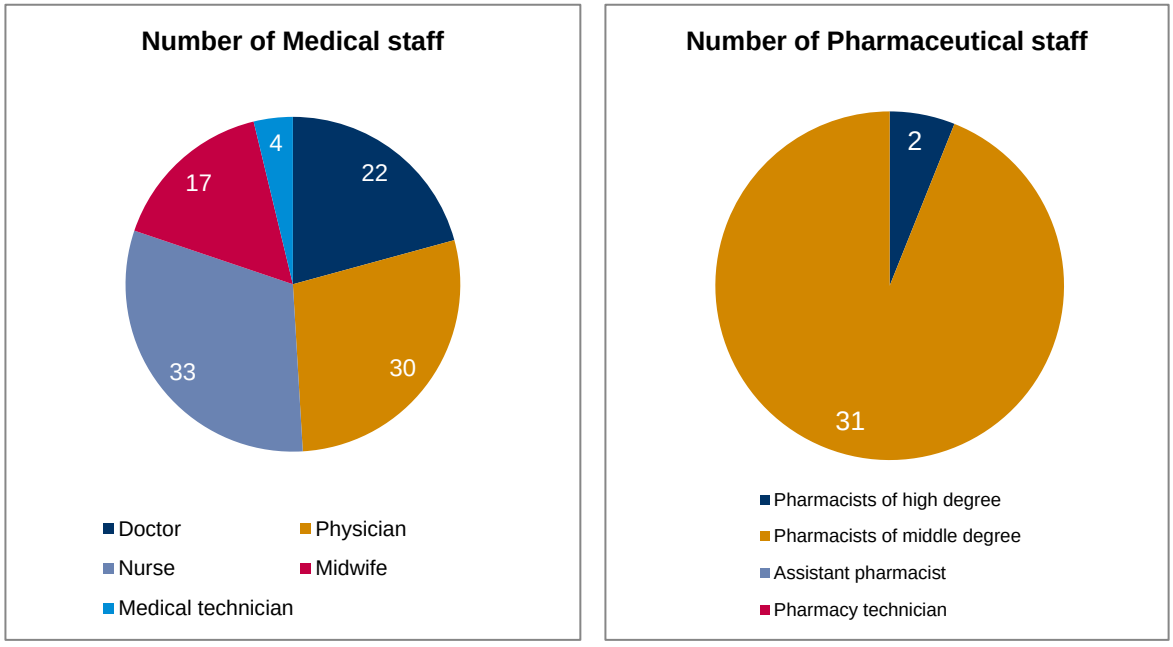


Source: Thuan Bac Statistical Yearbook 2019

Figure 9.31. Health Establishments by Types in Thuan Bac District, 2019.

The structure of health staff in Thuan Bac district was similar to that of Ninh Thuan province, where the number of physicians and nurse were the largest. Of all 106 medical staff in Thuan Bac district, doctors and physicians accounted for 49.06%. Nurses accounted for 31.13% (n=33), and the remaining was the midwife (16.04%) and medical technician (3.77%).

Regarding the pharmaceutical staff, 93.94% of the staff are middle degree pharmacists, while the proportion of high degree within the pharmaceutical staff is just 6.06%, and there is no assistant pharmacist and pharmacy technician in the district. The structure of the medical staff and pharmaceutical staff are visualized in Figure 9.32**.**



Source: Thuan Bac Statistical Yearbook 2019

Figure 9.32. Structure of Medical Staff and Pharmaceutical Staff in Thuan Bac District, 2019

Thuan Bac General Hospital

It was reported in the Ninh Thuan Statistical Yearbook 2019 that there was 100% of communes in Thuan Bac district have doctors. It is a great effort of the local authorities for health care services in the district because, in 2017, only 33.33% of communes in Thuan Bac district have doctors. Besides, by 2019, Thuan Bac has 100% of commune health units meeting national health standards, while in 2018, the rate of this indicator was merely 83.3%. This fact shows a breakthrough in the health care development of Ninh Thuan province in terms of improving the health care services for local people in remote areas.

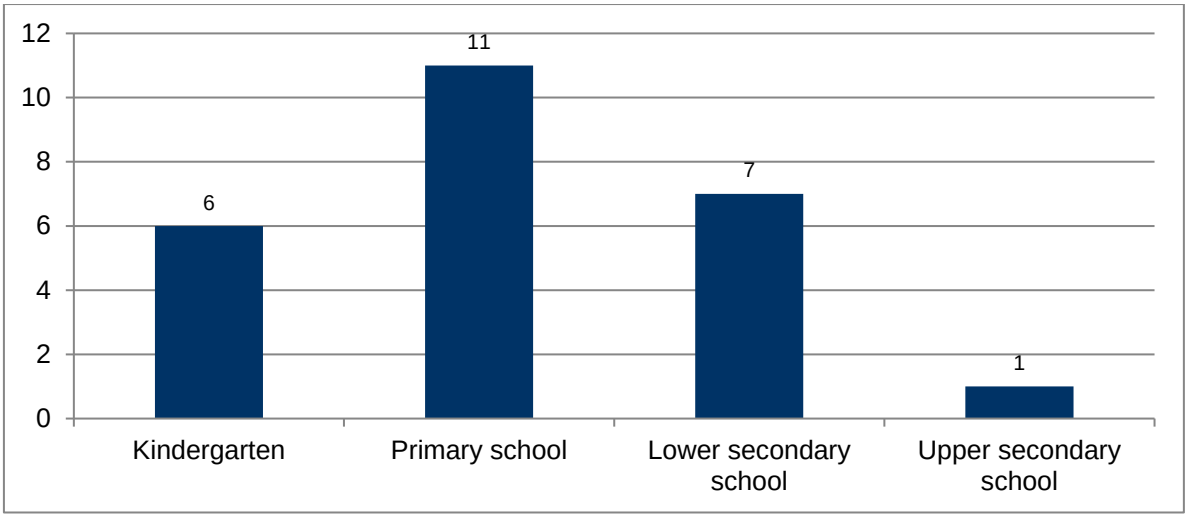
Regarding community health programs for local people, some programs have been implemented in Thuan Bac district to improve the health status and well-being of local people as follows:

- The project "Community Development in Thuan Bac District" sponsored by the non-governmental organization Catalyst Foundation, was implemented at Loi Hai commune from 2014 to 2018. It has many objectives, among which is improving the quality of meals for families and children in the Project's beneficiary groups in order to reduce the number of children who are undernourished or at risk of malnutrition and support children's education costs; raising awareness of people about health and increasing opportunities to access quality healthcare services for people in the project area; and creating and maintaining the social care services in the community to assist beneficiaries, including vocational training, basic health care, psychological counselling. This Project is now in its second phase lasting from 2017 to 2022 with the same objectives.
- The plan “Ethnic minority development plan” belonged to the project “Invest in building and developing the grassroots healthcare system” sponsored by the World Bank, will be implemented from 2020 to 2024. It aims at improving the preventive care services, primary health care, contributing to ensuring health, improving the longevity of the ethnic minorities.

In Thuan Bac district, the system of village health workers (y tế thôn bản) plays an essential role in primary healthcare for local people. Due to mountainous terrain and low level of education, local people used to prescribe their own treatment and medication instead of seeking doctors’ advice when they have any health problems.

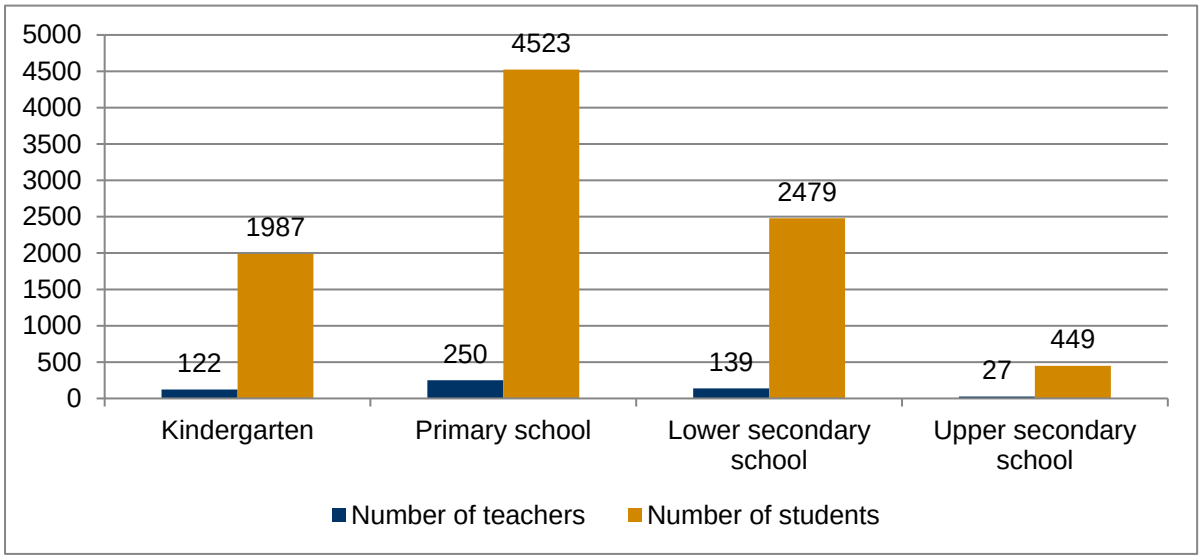
9.4.3 Education

In 2019, there were a total of 25 schools from kindergarten to the secondary school level. The number of kindergartens was six, and primary schools were 11. There were seven lower secondary schools and only one upper secondary school in the Thuan Bac district. Figure 9.33 shows the number of schools in the district by 2019.



Source: Thuan Bac Statistical Yearbook 2019

Figure 9.33 Number of Schools in Thuan Bac District, 2019



Source: Thuan Bac Statistical Yearbook 2019.

Figure 9.34 Number of Teachers and Students by Educational Levels in Thuan Bac District, 2018-2019

Generally, in the school year 2018-2019, the structures of teachers and pupils by education level share quite the same pattern. In kindergarten, 122 teachers were working with 1987 infants, so the number of students per teacher was calculated at around 16 pupils. For primary schools, the number of teachers and students took the largest area with 250 teachers and 4,523 students (each teacher was responsible for around 18 pupils). The lower secondary schools have 139 teachers and 2,479 students that were around 18 students per teacher and upper secondary school was roughly 16 students. Figure 9.34 shows a particular number of teachers and students by educational levels.

According to Ninh Thuan online news, nearly 70% of students in the district are ethnic minorities. In recent years, the district has seen comprehensive development in education in terms of infrastructures and labor forces. At present, most of the local communes have primary schools, by the beginning of the school year 2019-2020, there are nine schools in the district qualified the national standard of education, which accounts for 39.1%.

Figure 9.35 A Primary School in Thuan Bac District

Ms. Tran Thi Thu Huong, Head of Education and Training of Thuan Bac District, said that the most serious difficulty in local education is maintaining the number of students. In recent years, there have been many cases of secondary students dropping school. In the school year 2017-2018, only 91.7% of secondary students went to school (an increase of 2% compared to the previous school year). However, the district still had 206 students who have not graduated, including 183 students at the secondary level. Basically, the school and classroom facilities have met the requirements of teaching and learning, but still having abundant facilities needs to be upgraded and repaired. In addition, the lack of teachers, especially preschool teachers, is also a problem that the district is facing.

9.4.4 Economy, Livelihoods and Employment

Thuan Bac is one of the two poorest districts of Ninh Thuan province. The Statistical Office has just reported the annual average GDP per capita in 2019 of Thuan Bac district is 23.2 million VND/person, which is double than that in 2011. However, compared to the provincial average GDP, Thuan Bac's GDP is only equal to 45.5%. By the end of 2019, Thuan Bac district has 2.467 poor households, 1.891 near-poor households, which accounts for 20.67% and 13.34% of the total number of poor households and near-poor households of the province, respectively. The poverty rate of the district in 2019 is 14.51%, experiencing a significant reduction compared with the rate in 2016 (33.43%).

Despite achieving many remarkable results, poverty reduction in the district is still limited due to the unfavourable producing conditions the geographical difficulties. Consequently, some communes like Phuoc Khang and Phuoc Chien commune are experiencing a high rate of poverty with 51.55% and 57.49%, respectively.

9.4.4.1 Economic Structure

Agriculture is a critical sector for the economic development of the district. Promoting the advantages of irrigation projects which have been invested, residents in the district have expanded production scale, applying scientific and technical advances to agricultural production in order to increase the yield.

The production has focused on food crops such as rice and maize; short-term industrial crops such as sugarcane and cassava and also grows vegetables, beans to serve the market in the province. The commune government has defined the key task in agriculture development to promote the restructuring of crops and animals, aiming to increase high–value products. In 2019, Thuan Bac

developed green asparagus trees with a scale of ten hectares; green skin pomelo tree seven ha; custard apple is 15 hectares and will continue to multiply these areas in the near future.

Regarding animal husbandry, the total number of cattle and poultry in the whole district in 2015 is 247, 200 heads, respectively. Livestock concentrated on developing mainly on the herds of cattle, pigs and poultry. Aquaculture is gradually developed with an area of 10.5 hectares, which produce 85 tons of aquatic products annually.

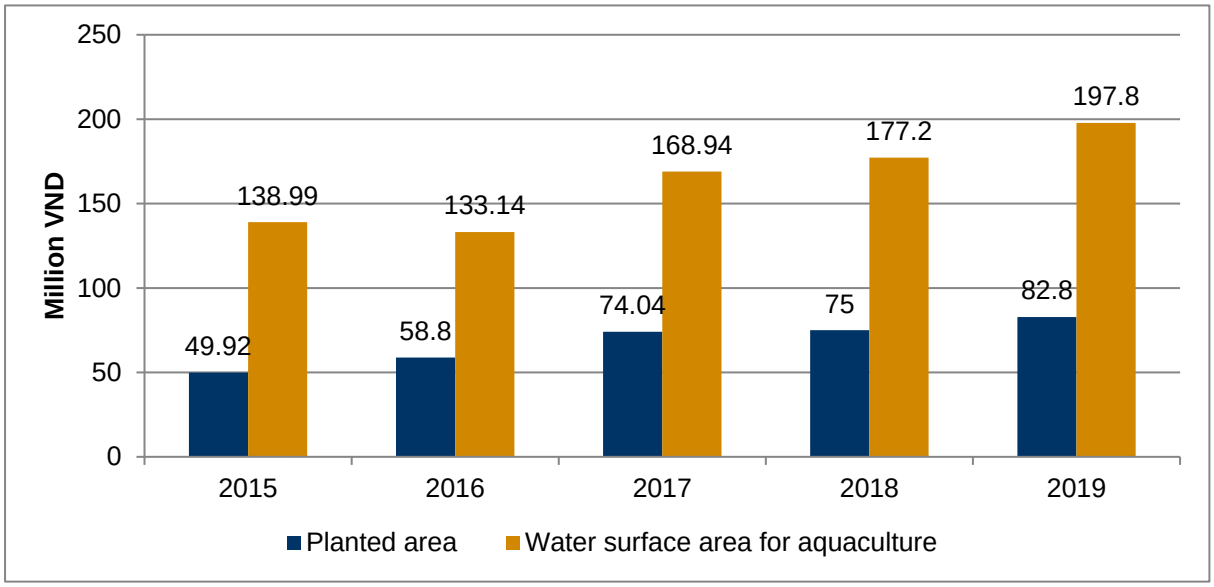
In terms of aquaculture, the annual aquaculture area was at the smallest scale of the whole province, account for only 9 ha (0.8%) or made up 0.13% of fishery production of the province.

The structure of the production value of economic sectors in the district tends to focus on the agriculture sector. Consequently, the district government has focused on accelerating the transformation of crop structure to improve farmers' income as well as develop agricultural production. Mr. Chamaléa Lan in Ba Rau 1 village in Loi Hai commune said that his family moved 2 ha of dryland planting rice to cultivate hybrid corn, leading to the double income compared to the previous year. In 2019, the district converted a total of 269.5 ha of the crop.

In order to implement the restructuring successfully, a sustainable approach, such as selecting specific crops suitable for the climatic and soil conditions in each region, implementing the scientific-technical transfer model, promoting the association of product consumption, has been applied. In addition to hybrid corn and green beans, which have been massively produced in 6 communes for a long time, some new breeds have been introduced, such as green grapes and asparagus, which have a higher value than traditional crops.

Mr. Nguyen Chau Canh, Head of the District Department of Agriculture and Rural Development, said that Thuan Bac has both plain and mountainous topography, hence, when implementing the crop restructuring program, the district must wisely choose the right model for each area based on the actual conditions. After that, the district government should direct the farmers to follow that planning.

The Thuan bac Yearbook 2019 provides the data about the product value obtained in 1 ha of planting area and water surface area for aquaculture. It could be observed from Figure 9.36 that there was an increase in both the value of planted and aquatic products during the period 2015 to 2019. Constantly, aquatic products bring a higher value than agricultural products, 2.4 times than its counterpart in 2019. However, the increase in agriculture products is higher than its counterpart, experiencing from 49.92 million VND to 82.8 million VND in 2019.



Source: Thuan Bac District Statistics Office 2019

Figure 9.36 Product Value Obtained per 1 ha in Thuan Bac District, 2015-2019.

In 2019, regarding animal husbandry, Thuan Bac was one of the districts which was dealing with the African swine fever (ASF) epidemic, that are so complicated and widely spread, farmers, especially small backyard farms, had to depopulate pig herds to focus on cleaning, disinfection, and prevention and control of ASF, transferring to other domestic animals. This problem puts the local people at a high risk of losing their income and extreme anxiety when investing in animal husbandry.

Besides, Loi Hai commune also aims to shift the economic structure towards "Industry - construction, trade - service, agriculture". Up to now, many big projects have been implemented in the district such as: Dam Nai wind project (put into operation in phases 1, 2); Trung Nam wind and solar power plant project, Xuan Thien solar power plant (in progress); Du Long Industrial Park project (restarted); District Central Market (completed and put into operation from the end of November 2018). Currently, Thuan Bac is calling for investment in a number of projects such as: Suoi Tien tourist area, TM9 commercial - service area, An Dat residential area. These projects have contributed to promoting socio-economic development, created jobs and stable incomes for local people, contributed to the construction and development of Loi Hai commune.

9.4.4.2 Main Types of Livelihoods in the District

People in the district mostly earn their livings by farming or raising animals. Their annual income is 23 million VND, which is much lower than the provincial GDP. The district government also has had many vocational training programs such as cultivation techniques rice and corn; raising skills for cows, goats and sheep; and knitting and garment techniques. After being equipped with the knowledge, rural workers know how to do business, apply high economic efficiency models, such as: "1 must, 5 reduce" model in Bac Phong and Cong Hai commune; custard apple planting and knitting model in Phuoc Chien commune; black pigs and goats raising model.

Besides, there are 40 enterprises in the district that can provide 838 labours, accounting for only 2% of the district population. Mostly, workers in Thuan Bac work in a food processing company (Thong Thuan Seafood Company Limited). 526 labours are working in other provincial enterprises, 09 working in Saudi Arabic and Japan.

9.4.5 Future Development Planning

The People's Committee of Thuan Bac district keep promoting the mobilization of investment resource for socio-economic development, deploy the local potentials and advantages together with the protection of environmental resources. Some specific objectives for 2021[30]:

- The agricultural sector increase by 32.4% of the production value
- The construction industry increased by 22% of the production value
- Service industry increased by 22% of the production value
- State budget revenue reached 54.2 billion VND
- Create new jobs for 900 workers, provide vocational training for 200 local inhabitants.
- Reduce the poverty rate by 2.5%, Proportion of hygiene water accessibility reach 98%.

In the term 2020 - 2025, the Party Committee of Thuan Bac district continues to achieve the goal of a rapid and sustainable growth. Exploiting all resources to strengthen the industry, tourism and services, the district aims at a higher growth rate in the next period (2020-2025) of socio-economic development than the last one, focusing on improving the quality, efficiency and competitiveness of the economy;

[30] Ninh Thuan Government Online, 2020, retrieved on 18 December 2020, at http://www.ninhthuan.gov.vn/chinhquyen/thuanbac/Pages/UBND-HUYEN-THUAN-BAC-TRIEN-KHAI-KE-HOACH-THUC-HIEN-NHIEM-VU-PHAT-TRIEN-KINH-TE---XA-HOI-NAM-2021.aspx

restructuring the economy in the direction of increasing the proportion of industries, and services with competitive advantages. Thuan Bac strive for an annual increase in production of all branches by 19-20%; in which industry - construction increased 22-23%, trade - service increased 21-23%; making Thuan Bac a key renewable energy region and a tourist destination in the North of the province [31]

Comrade Le Kim Hoang, Chairman of Thuan Bac District People's Committee, said: To achieve the goal, in the next term, the district will continue to promote industrial development on the basis of identifying two key sectors including clean energy and processing industry, which are the driving forces to promote the growth quickly and efficiently. The district will focus on supporting and removing difficulties for the investors to speed up the construction of Du Long Industrial Park. The authority will set up maintenance centers for wind and solar power and support the renewable energy industry. Thuan Bac will also call for the construction of meat processing factories using local livestock.

9.4.6 Ethnic Minority

Thuan Bac mountainous midland district has a natural land area of nearly 320 km^2, but most of the land is hills and mountains with soil slopes and rocky gravel. The potential for development is small, hence socio-economic and people's lives still have many difficulties, particularly the ethnic minority people.

It is reported that the livelihood activities of the ethnic minorities in Thuan Bac district rely on short-term crops like rice, sugar cane, corn. These kinds of crops adapted to soils and climates of the district. Besides, fruit trees (green skin pomelo, and custard apple) and raise livestock (cows, goats, sheep, pigs) are at small scales and for daily family meals. Ethnic minority households are being laid money on annual crops and limited to participate in the key agriculture value chains.

The vocational training program for the poor and ethnic minorities is offered free of charge for youth and farmers. The program focuses on agriculture and livestock techniques occupations such as cattle raising, fattening goats, techniques of growing asparagus, grapefruit. Other manual occupations like welding and sewing are also in the programme. Regarding wage-based labour, some young people in the working-age get job opportunities at nearby Industrial Park as workers, and a few people are involved in labour export. The majority of ethnic minority people are still working as seasonal workers, mainly find employment in simple or manual labour jobs in the communes. Language barriers and low educational attainment are factors inhibiting these ethnic minorities from attaining decent job opportunities, reducing access to better employment or productive opportunities, resulting in their low earnings and high risk-taking.

Government Supporting Programs for Ethnic Minority Community in Thuan Bac District

Over the past years, Thuan Bac district adopted several supported programs for ethnic minorities living in the district, such as loan support, vocational training, residential land, production land and welfare policies. Specifically, Thuan Bac district is implementing the socio-economic development program which brings benefits to ethnic minority and mountainous areas in Ninh Thuan province, which follows the Resolution No. 04-NQ/HU, issued on September 30th, 2016 of the Executive Committee on behalf of the District Party Committee on continuing to implement the work of sustainable poverty reduction, period 2016-2020 in the District. This is one of the major development programs of the district which aim to improve the well-being of ethnic minority people and people who are living in remote areas with regards to transforming the economic structure, applying appropriate production forms to contribute to reducing poverty sustainably in the community. Additionally, some development programs are being implemented in the district, such as (Program 135, Program 30a and New Rural Program). Such programs are in the array of programs of economic development - social, political, and security and defence; in detail, support to diversify the livelihoods for the poor communes.

[31] Ninh Thuan online news, 2020, retrieved on 8 Jan 2021, at http://baoninhthuan.com.vn/news/115720p0c25/thuan-bac-tao-dong-luc-phat-trien-cac-nganh-kinh-te-chu-luc.htm

9.4.7 Policies/ Plans/ Supporting Programs for Livelihood Development

The state government has implemented plans and projects during different periods to improve the livelihoods of poor households or households in remote rural areas. According to Decision 1722/2016/TTg on the national target program on sustainable poverty reduction in the 2016-2020 period[32], there are five projects:

- ***Project 1: Education and training objectives of Thuan Bac district*** is in line with Decree 29-NQ/TW dated 04 Nov 2013 to develop an education and training plan between 2016 and 2020including (i) investment in school infrastructure; (ii) improvement on teaching quality and capacity building for teachers; (iii) improvement of enrolment at all level.
- ***Project 2 (also known as Project 135)*** is to support poor communes in mountainous border areas, including (i) investment on infrastructure; (ii) production support and livelihood diversification; (iii) improvement on the capacity of grassroots cadres.
- ***Project 3*** is to support in production and livelihood diversification in communes not included in projects 30A and 135. Following the state projects, each province in the country proposes plans and acts accordingly. Project 30A and Project 135 are designed to improve the livelihoods of ethnic communities.
- ***Project 4*** is to communicate on poverty reduction to the poor and improve information access of the poor.

In 2020, via the supporting programs of the authority, 282 people participated in vocational training and in the whole district, 1,150 people were employed, and thus the rate of poor households in the district decreased by 4.48%. Due to the investment in infrastructure for mountainous areas, from 2016 up to now, the locality has invested in building a new pumping station in Xom Bang village (Bac Son commune), solidifying 13 km of canals of all kinds, building four small irrigation projects in Phuoc Khang commune. This construction has made an important contribution to converting crops and improving income per unit area of the district. The national target program for sustainable poverty reduction has brought many positive results for the whole district. Typically, in Phuoc Khang commune, in the past five years, there are 182 poor and near-poor households that have just escaped poverty by having been supported with 10,000 plant varieties, 5.5 hectares of productive land.

9.5 Overview of Communes within the Area of Influence

9.5.1 Overview of Loi Hai Commune

Loi Hai is one of the communes of Thuan Bac district, which was established in 1979. Loi Hai commune has a total area of 16,200 km^2. It is located in the center of Thuan Bac district, where the administrative center of the district is placed. The commune is bounded by Cong Hai commune to the north, Bac Son and Bac Phong communes to the south, Phuoc Khanh commune to the east and Bac Son commune to the west. Along with National Highway 1A and the North-South railway, Loi Hai location and its transportation links provide the potential for developing socio-economic and cultural. At present, the whole commune has 3,102 households with 14,139 people or the average HH size is 4.56 people. There are 06 villages in the commune, including An Dat, Ba Rau 1, Ba Rau 2, Kien Kien 1, Kien Kien 2, and Suoi Da.

[32]Industry and Trade Magazine, 2020, retrieved on 8 Jan 2021, at: http://tapchicongthuong.vn/bai-viet/chinh-sach-giam-ngheo-ben-vung-mot-so-ket-qua-va-van-de-dat-ra-69629.htm

Table 9.12 Loi Hai at a Glance

Loi Hai commune		
Number of villages	6 villages	
Area	16,200 km^2	
Population	14,139 people	
Number of households	3,102 households	
Poverty proportion	Poor household: 14.60% Near poor household: 24.85%	
Annual Average Income per capita (2019)	22 million VND/people/year	

Source: Loi Hai Socio-economic report 2019 and Meetings with Loi Hai People's Committee, July 2020.

Nine ethnic groups are living in Loi Hai commune, of which mainly Raglai ethnic group accounts for 82%[33] of the total population. Other people including Kinh, Hoa, Khmer, Muong, Cham, Gia rai, Ko ho and Ma. The population of Loi Hai commune is 14,137 people, with a relatively equal ratio of males and females, 49.5% and 50.5%, respectively. The residents in the commune mostly follow Buddhism and Catholics. There are one pagoda and two churches within the commune.

9.5.2 Economy, Livelihoods and Employment

As reported by the Chairman of Loi Hai People's Committee, agriculture is the main economic sector in the commune. More specifically, rice and maize are popular food crops and cassava, cashew trees are perennial crops in the commune. Both types of crops are critical that generate income for communal households and contribute to increasing agricultural productivity for the commune. Local people reported that most of the households in the commune grow rice or maize as annual crops and planting cassava, cashew as perennial crops. Additionally, due to the advantage of the climate and geography of the commune, local farmers also grow some types of beans, vegetables, and fruit trees.

A facilitation in asparagus planting

Following the seasonal plan, in the period 2019-2020, the People's Committee of the commune implemented the winter-spring crop production plan with a total area and output of 76.5 ha with 12.5 tons, in which corn area accounts for 5 ha with the average productivity 2.5 tons per ha, the total food production area reaches 12.5 ha, the livestock area is 36 ha, the asparagus area is 0.5 ha, the vegetable area is 20 ha, the area of all kinds of bean plants is five ha, the fruit trees, and perennials area is 10 ha. The summer-autumn crop and the season crop in 2020 had to be stopped due to water shortage prediction during these seasons.

[33] PC Commune Loi Hai, during Social Baseline Survey 2020

The remarkable program in the commune is the reconstructing agriculture products to have products with a higher value. Climate change has contributed to the lack of water in the commune, which has been gradually become a pressing issue, hence, the need to change from traditional crops to more adaptive plants has arisen. Some types of crops have been applied in this program in Loi Hai commune, such as hybrid corn, sticky corn, green beans, peanuts, asparagus and custard apple. Besides their higher economic value compared to rice and maize, these new crops are also drought-tolerant, less water-consuming, shorter harvest time (2.5-3 months), suitable for the local soil and climate.

Mr. Je Lak Sinh, Ba Rau 2 village, said that thanks to the commune government's support and guidance, his family have changed 5 ha of rice to cultivate peanuts. This is the right decision because due to the lack of water, rice production will be ineffective. Currently, his peanuts cultivation is developing quite well, promising a high yield crop. Moreover, the interest from this cultivation can be double than of growing rice.

Mr. Vo Ngoc Phuong, Vice Chairman of the Commune People's Committee, said that changing the plant structure is a significant policy of the locality. In recent years, the reconstruction has brought economic efficiency to several households, which can attract more people to participate in. In the coming time, the commune will continue to propagate farmers, especially Raglai people, to participate in converting into higher economic crops, to increase people's income.

Moreover, in order to adapt to the dryness caused by climate change, new technology has been applied to save water during plantation. An economic irrigation model has been used in some high-value products like asparagus and other vegetables. Mr Phan Tan Thai, a farmer in Kien Kien 2 village, said that thanks to the economic irrigation, his family not only saved water for irrigation but also reduced labor costs, increased productivity, and quality of vegetables, so more customers bought his product, which brought higher income for his family.

Table 9.13 presents information about other economic sectors of the commune in 2020, according to the socio-economic report 2020 of the commune, which focuses on the food production, forestry, husbandry, industry, and handicraft units. Being landlocked, Loi Hai commune is deprived of any marine resources and overwhelmed by mountains, limiting aquaculture, freshwater fishing, and trading and services activities in the commune.

Table 9.13 Details of the Agriculture Area and Productivity in Loi Hai in 2020

Cultivation and husbandry	Forestry
In 2020, total cultivated area: 76.5 ha, corn 5 ha, vegetable and bean 25 ha, asparagus 0.5ha, fruit trees and perennials 10 ha, livestock area 36 ha Total grain food production: 12.5 tons. In 2020, the total number of buffaloes and cows: 6,956 heads; goats and sheep: 4,744 heads.	Forest land area: 3,240.52 ha.

Source : Loi Hai Socio-economic report 2019

The forest management and protection has been focused during the last period, especially on contracting to households and organizations for management and protection, which contribute to enhancing the community responsibility in forest management and protection. Every year, 100 ha of forest trees will be newly planted, and 2.160 ha of forest is contracted to be managed.

Regarding to the industry, the noticeable types of businesses in the commune is mining and agriculture service. There is only one food processing factory in Loi Hai, namely Son Hai Jelly Joint Stock Company. There are two industrial parks in the nearby commune: Du Long located in Bac Son commune and Thanh Hai located in Thanh Hai commune, belonged to Phan Rang – Thap Cham city.

9.5.2.1 Economic Policies and Programs

There are two main programs that supported the livelihoods of the local community. The first one is **Decision 65/QĐ-UBND has been implementing to support the agricultural production and rural services in Ninh Thuan province in the period of 2017-2020**. This policy aims to support the extension of economic irrigation, reconstructing from inefficient crops to more valuable ones, cooperation to create a value chain for agricultural products, applying good agricultural practice.

The second one is **Decision 135/1998/QD-TTg, which is a Program on socio-economic development for extremely difficult communes in ethnic minority and mountainous areas**. Phase IV of this Decision (2016-2020) was defined as a project of the national target program about sustainable poverty reduction aims to invest in socio-economic infrastructure facilities, agricultural production development, diversifying livelihood activities, capacity building for community and grass-root leaders in poor districts, communes, border communes, communes in former safety zones and extremely disadvantaged villages. According to the categorization of the Program, Loi Hai is identified as Area II.[34]

9.5.2.2 Employment

As reported by the local authority, there is no unemployment rate statistic of Loi Hai commune; most of the communal people are farmers who are working on their farms or as hired/day labourers for other households in the commune. There are 28 enterprises in the communes, operating in food processing, waste management, quarrying, mining, providing several jobs for local labours. Son Hai Jelly Joint Stock Company create jobs for more than 100 local workers. While Thanh Hai industrial park has been filled with factories, providing 1.500 labours with an average income of 4.9 million VND per month, the Du Long industrial park is still vacant due to the lack of infrastructure investment. In Cam Thinh Dong commune, which is approximately 20 kilometres from Loi Hai commune and belonged to Khanh Hoa province, there are two industrial parks, Nam Cam Ranh and Suoi Dau, which can also provide jobs for Loi Hai's residents.

Although the primary vocational training program has been deployed at the commune, a small number of young people obtain such training. Nevertheless, it is difficult to get relevant jobs within the commune. Also, the training quality was recognized do not meet the job requirements of local enterprises; local people are mostly refused when applying for jobs to the companies.

Moreover, some employees who even graduated from vocational training have not yet applied their learned knowledge as they have not strongly oriented to invest capital, have not had plans to develop their careers. Therefore, the effectiveness of vocational training is still not high.

9.5.3 Education

There are five public schools in Loi Hai commune, including one kindergarten, two primary schools, and two secondary schools. There is no high school in Loi Hai.

It is reported that the education facilities meet the demand of local people with 18 classes of kindergarten school, 52 classes of primary school, and 22 classes of secondary school. The primary school has up to 1,442 students attending the school year 2019-2020. Averagely, a teacher was in

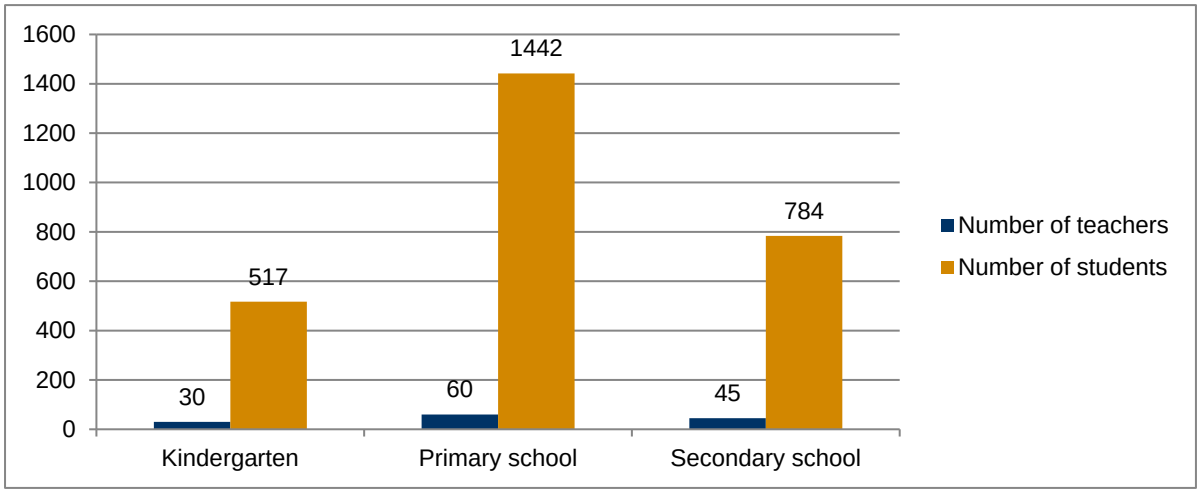
[34] A commune area II is a commune with 1 of the following 3 criteria:

a) The total percentage of poor and near-poor households is at least 55% (provinces in the Southeast region, the Mekong River Delta region is 30% or more) according to the multidimensional poverty line in the period 2016-2020 and having not enough 3 out of 6 conditions (for communes with ethnic minority households 60% or more, having not enough two out of six conditions) specified at Point c, Clause 1, Article 3 of this Decision;

b) The total rate of poor and near-poor households is from 15% to less than 55% (provinces in the Southeast region, the Mekong River Delta region from 15% to less than 30%) according to the multidimensional poverty line 2016 - 2020;

c) The total percentage of poor and near-poor households is below 15% according to the multi-dimensional poverty line in the 2016-2020 period, and there is at least one extremely difficult village

charge of 24 students in this grade. Both kindergarten and secondary school have the same class scales, which are 17 infants/students per teacher. Figure 9.37 shows the number of teachers and students in Loi Hai commune.



Source: Secondary data provided by Loi Hai commune

Figure 9.37 Number of Teachers and Students in Loi Hai Commune in the School Year 2019 – 2020.

In the absence of official data about the drop-out of students in the commune, sharing from local authorities shows that the drop-out rate is relatively high at students who completed primary school but do not want to go higher education. The commune is reportedly the target area of the government educational policy, in particular, students of poor, nearly poor and ethnic minority households in the commune access to all educational levels without tuition fee.

Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.38 Ba Rau Primary School in Ba Rau 1 Village

9.5.4 Health

The Commune Health Center (CHC) has met the national standard of Commune Health Center for the past five years. Children's immunization rate is quite good, with around 97.8% of children get the vaccination. The communication activities on the prevention of common health diseases are being conducted regularly through different channels, including broadcasting on loudspeakers and via health hamlet/village collaborators. The CHC also focuses on public health care activities[35], including:

- Child malnutrition prevention and control activities are always carried out by activities such as a chart of height and weight monitoring for children under 5 years old, monthly measuring to assess malnutrition.
- Supplementation of vitamin A for postpartum mothers and children from six months to under 36 months of age.
- Communication of scientific model for baby and childcare and nurturing

9.5.5 Safety and Security

The commune authorities regularly coordinate to patrol, check and control to ensure traffic security and safety in the area. In addition, the commune also develops a plan to launch a rush attack to suppress crime, protect the safety before, during, and after holidays.

It was reported in the meeting with Loi Hai commune PC (November 2020) that social evils were not identified in the area, the most concern is the drinking habit of local people. The PC authorities also shared that the security will be reinforced when more industries developed in the locality.

9.5.6 Infrastructure and Public Services

9.5.6.1 Road

There is an inter-commune road connecting the communes of Loi Hai, Bac Phong, Phuoc Khang, Phuoc Chien and 85% is a concrete road, and travel is also convenient. Most of the inter-village roads are also concreted. According to the socio-economic report in 2019 and 2020, since road concreting is one of the New Rural Development criteria, the commune authority had made their efforts to construct and upgrade commune roads and village roads to ensure all roads and routes of the commune not to be muddy in the rainy season and dusty in the dry season. Therefore, the local roads in the surveyed communes are gradually concreted. Within 2019, 04 local roads were concreted and newly constructed achieved the Loi Hai Commune's socio-economic plan. The commune has the National Highway 1A and the North-South railway going through Ba Rau village, connecting the commune with other provinces.

[35] Thu vien phap luat, 2020, retrieved on 30 December 2020, at https://thuvienphapluat.vn/van-ban/the-thao-y-te/Quyet-dinh-4667-QD-BYT-2014-Bo-tieu-chi-quoc-gia-ve-y-te-xa-giai-doan-den-2020-258367.aspx


Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.39 Local Roads in Loi Hai Commune

9.5.6.2 Electricity Access

The national grid has covered 100% of the villages in the entire district. However, many families build their temporary houses on agricultural land, where electricity is not available. Therefore, they tend to use the solar panel as an alternative.

9.5.6.3 Water Access

Within the National target program's funding on building new rural areas, the Center for Clean Water and Sanitation in the Rural Area of Ninh Thuan built a new water supply system, upgraded and expanded water supply systems to all the villages in Loi Hai. However, many households could not afford money to install meters and pipes connecting from the central system into the house; hence, the government directed the Social Policy Bank to lend money to underprivileged people so that they bring clean water to their homes. Consequently, as reported by the Commune People's Committee of Loi Hai, currently, 97% of households in the commune use clean water, meeting the Ministry of Health's requirements.

9.5.6.4 Irrigation System

The main system of streams and lakes for irrigation located in Loi Hai include[36]:

- Ba Rau lake: with a capacity of 4.7 million m^3, was built for the purpose of supplying water to Du Long Industrial Park and serving agricultural production.
- Kien Kien stream with a capacity of about 1.3 million m^3 connected to the irrigation system of canals 2 and 3 of Song Trau to irrigate about 20 ha of agricultural land.
- Ba Ho spillway located in two communes Cong Hai and Loi Hai (with a total length of 5,294 m to irrigate 100ha agriculture land.

Irrigation system was observed placed along the farming area of the commune (See Figure 9.40).

[36] Ninh Thuan Government Portal, retrieved on 30 December 2020, at http://www.ninhthuan.gov.vn/chinhquyen/thuanbac/Pages/Gioi-thieu-chung.aspx

Source: Google map, 2020.

Figure 9.40 Main System of Streams and Lakes for Irrigation Located in Loi Hai Commune (Left); and the Irrigation System in Loi Hai (Right)

9.5.6.5 Waste Management System

Nam Thanh Co., Ltd. is a domestic waste treatment plant for the whole Ninh Thuan Province located in Kien Kien village, Loi Hai commune. Waste is gathered in one place, and the garbage trucks come to collect it. The monthly garbage collection and treatment fee is 15,000VND per household and 25,000VND per household for household-scale business.

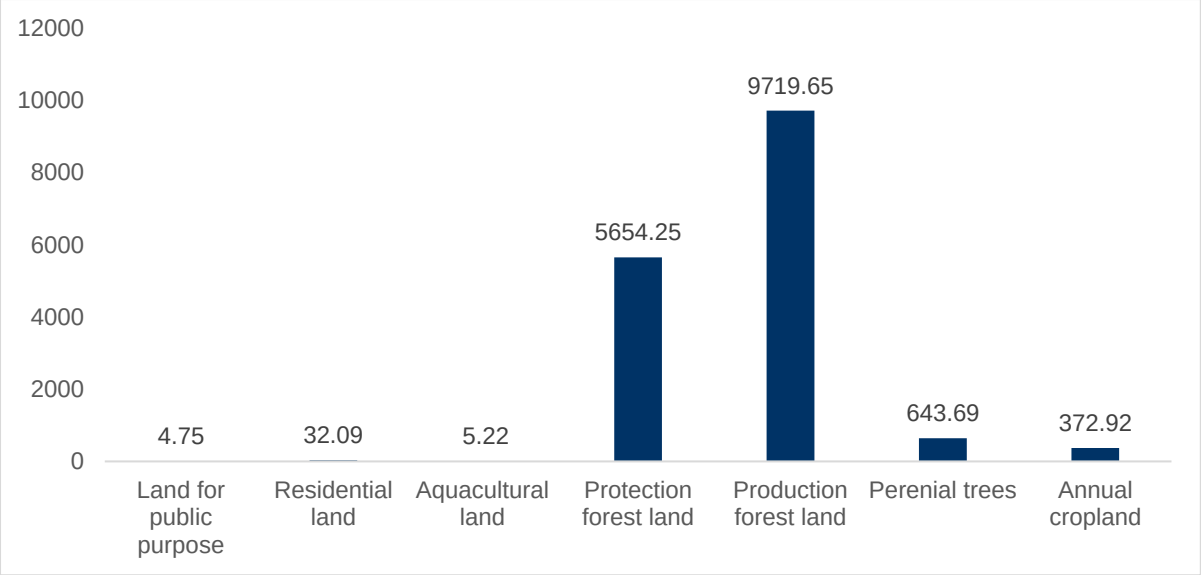
The drainage system is not available in the locality. Domestic wastewater is discharged to the road and absorbed into the soil. From the survey (of 90 households), it is identified that approximately 60% of surveyed households using a septic tank for sewage treatment, about 36% had no toilets, and the rest had toilets without a septic tank.

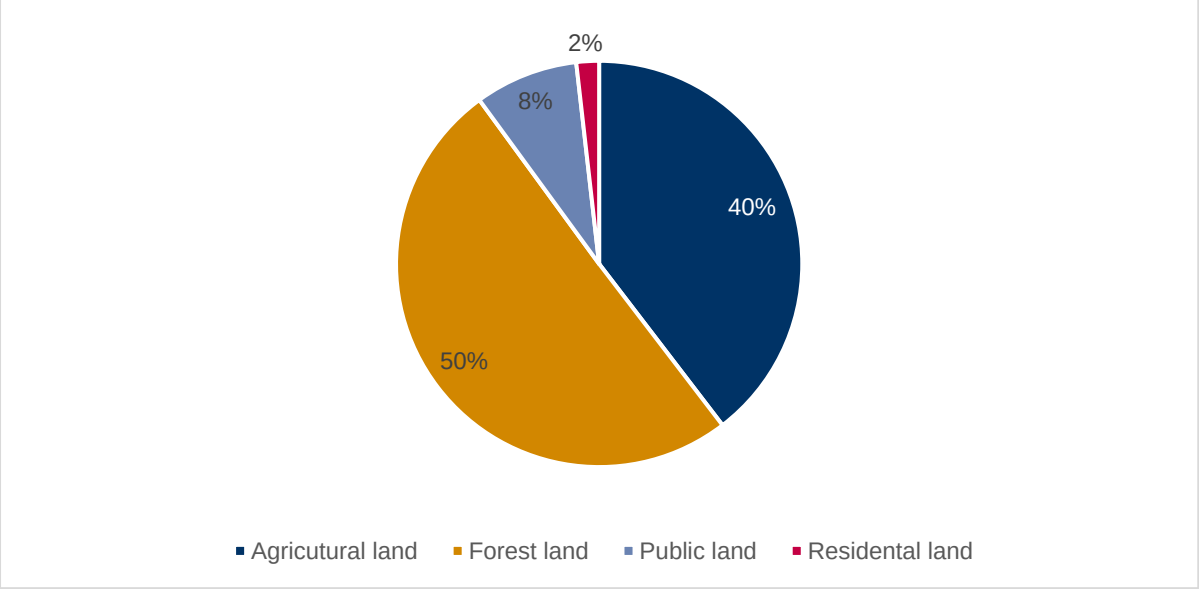
9.5.6.6 Tele-communication

As reported by the Loi Hai People's Committee, up to now, roughly 90% of households have had telecommunications/telephone connected to the internet. Furthermore, the commune benefits from Ninh Thuan province broadcasts news in Raglai language one hour every day on the provincial radio and television, and up to 80- 90% of the Loi Hai households have televisions to be able to access to the Raglai language channel.

9.5.7 Land Use

Loi Hai has approximately 6,363 ha of all purposes of land use, including agricultural land, forest land, land for a public purpose and residential land. There is no aquaculture land in Loi Hai. Forest land is the largest proportion of land use in Loi Hai, account for 50.35% with 3,204 ha. Agricultural land is the second, with 2,520 ha and account for 39.60%.

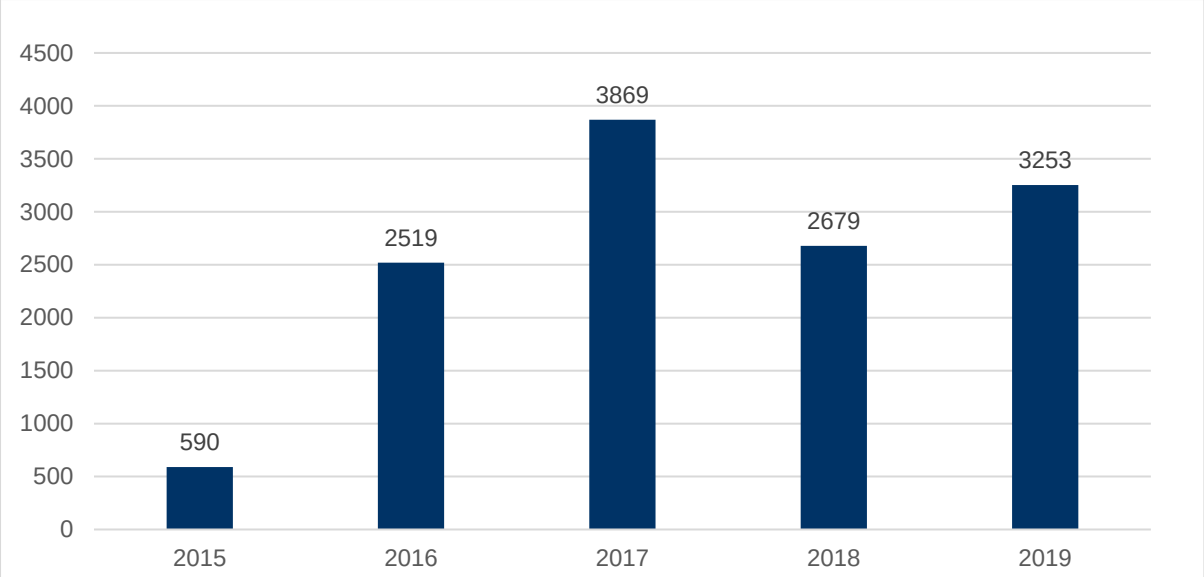




Source: Secondary data provided by Loi Hai commune

Figure 9.41 Land Use Structure and Areas of Loi Hai Commune

According to agricultural land, food crops with grain occupy a considerable weight in the cultivated area of Loi Hai. The food crop area with grain tends to increase substantially between 2015 and 2020; except in 2018, the area is decreased than the previous year.



Source: Secondary data provided by Loi Hai commune

Figure 9.42 Area Size of Cultivated Land by Year

9.5.8 Ethnic Minority

The population of Loi Hai is approximately 13,580 people, and Raglai ethnic minority people[37] makes up for 82% of this number[38]. The summary of Raglai people profile is below.

History: Raglai is an ethnic group in the Malayo - Polynesien linguistic group (this group in Vietnam includes Cham, Raglai, Chu Ru, Ede, Giarai). Regarding the ethnic origins of this group, although scientists are still debating, they all agree that they are originally island residents (originally from Southeast Asia or migrated from islands in the South China Sea to the East. South Asia). During cultural exchange with the Cham. The Cham people developed into a powerful kingdom, the Raglai people gradually moved to live in the mountainous areas of the Central Highlands, although some still live in coastal areas with the Cham.

Language: Raglai language belongs to the Malayo- Polynesian language group (of the Austronesian language family). As a result of their contacts with mainly Kinh people, the Raglai are bilingual or multi-lingual. They can use both Kinh language and their native language. Raglai do not have their own script, in 2019 Ms. Mau Thi Bich Phanh-a Raglai people in Bac Ai district, Ninh Thuan province created Raglai script in the Latin alphabet. In 2019, Ninh Thuan Government has approved the Raglai script in Ninh Thuan province. Accordingly, the Raglai script includes a phonetic system, an alphabet consisting of 27 letters, the Raglai script and the basic principles of the Raglai writing system. At the same time, the province government has decided to implement the compilation of Raglai language books in high schools starts from grade 1 in Bac Ai and Thuan Bac district since January 2020. This aims to preserve and promote the value of ethnic culture, language and writing of Raglai people.

[37] Raglai People considered nationally by government as ethnic minority group in Vietnam. Even though, their population in the project area is considered as majority, nationally they are considered as having minor population number.
[38] PC Commune Loi Hai during Social Baseline Survey, July 2020

Livelihood activities: The lives of the traditional Raglai people are almost limited to bur (hamlets) or palei (villages) Each palei usually consists of several dozen roofs of a lineage. Family members usually include fathers, mothers, and unmarried children. The leader of the panel is the po palei (village chief), usually the person who publicly first cleared the land. The village chief is responsible for making offerings to heaven and earth in case of severe drought. The most prestigious person in the family line is called kay palei (village elder). The village elder is the one who runs all activities, presides over festivals, organizes a team to combat beasts as well as intruders. The Raglai cultivate swidden fields as their primary economic activity, they grow rice, corn, fruit trees and acacia. The Raglai also practice animal husbandry, raising cows, buffalo, pigs, and poultry. They sell or trade animals and also use them for food.

Raglai people playing mã la (traditional musical instrument of the Raglai) during new rice festival

Clothing: It is hard to find the traditional clothing of the Raglai. Today, men wear pants and a shirt, women wear skirts or pants and shirts. In the past, men did not wear shirts but were attired only a simple, undecorated loin cloth. On the traditional festival days, women wear long dresses ornamented with square pieces of red and white-colored cloth at the top.

Housing: Formerly, the Raglai lived in the houses built on stilts. Today, houses built directly on the ground are more popular.

Culture: Previously, the Raglai has many family lineages living in one village. In critical situations, the "Committee of Elders" will be established based upon the approval of each member in the village. Now, the village head is selected by the representatives of households according to the election law of government to become the Village Head and they are sometimes not an elderly but a young person with a high education level and knowledgeable. Because of the Kinh people migrating to the area for the long-term, the Raglai people are influenced by the Kinh culture. The customs of wedding parties, ground-breaking ceremonies, public holidays or Tet festival are all celebrated identically to the Kinh people. Moreover, Raglai people also celebrate “new rice festival” in September or October of the year when they have finished rice sowing and have laid-back time for the harvest season. There is also a festival of Gongs (cồng chiêng) known as Mã la festival, in which people gather and drink wine (rượu cần), sing and play Gongs. This festival is no longer regularly celebrated nowadays because fewer numbers of households have Gongs and they are only elderly. The Raglai are matriarchal. After the wedding, a man becomes the key labour for the wife’s family, but the wife’s family makes significant decisions. Children take their mother’s family name, and only daughters have the right of inheritance. Nowadays, in the family, women and men have the same role in making important decisions relating to finance, assets buying, children's education and division of labour. However, women are reportedly spending time more than men to look after their children and have other daily family activities such as washing and cleaning. There are many last names of Raglai families as Chamalea, Pi Năng, KaTơr, Pupu, Asah, Tala, Jack, Taing, Cao, of which Chamalea is dominated. Each last name has its storytelling about their origin in particular and their nation in general[39].

For the Raglai people after death, although the dead have already been buried, the relationship with the living person has not yet been terminated as the soul of the dead is still hidden in the human realm, so there must be a Grave Leaving Ceremony. This ceremony is the most important event in a person's life, which is the day of eternal farewell between the living and the dead so that the dead can truly

[39] World Bank, Ethnic Minority Development Plan-Ninh Thuan Subproject, 2017, retrieved on 12 December 2020, at http://documents1.worldbank.org/curated/en/591941498220993324/pdf/SFG3439-v1-REVISED-PUBLIC-ENDR-Final-draft-EMDP-Ninh-Thuan.pdf

return to eternity. The ceremony is conducted in three days, with many different rituals, which have a deep spiritual meaning, passed from generation to generation, and mostly preserved.

Religion: Raglai people remain free of beliefs such as Christian, Catholic, and Buddhism. There are some religious worship facilities near their living places. Importantly, it can be seen that a priest is an influential person of the Raglai community, given they know how to cure the illness, set the wedding day and death burying day and solve other spouse-related problems. Thanksgiving offerings to the priest could be pigs or money, depending on the events of the families after finishing their jobs.

9.6 Living Conditions of Local People in the Affected Commune

9.6.1 Overview of the Surveyed Population

The socio-economic baseline was carried out in Loi Hai commune, where affected households (AHs) whose land is acquired for the development of the Loi Hai 2 Wind Power Project (The Project). The AHs reside in Ba Rau 1, Ba Rau 2 and Suoi Da village of Loi Hai commune, Thuan Bac district, Ninh Thuan province, on the side of National Highway 1A.

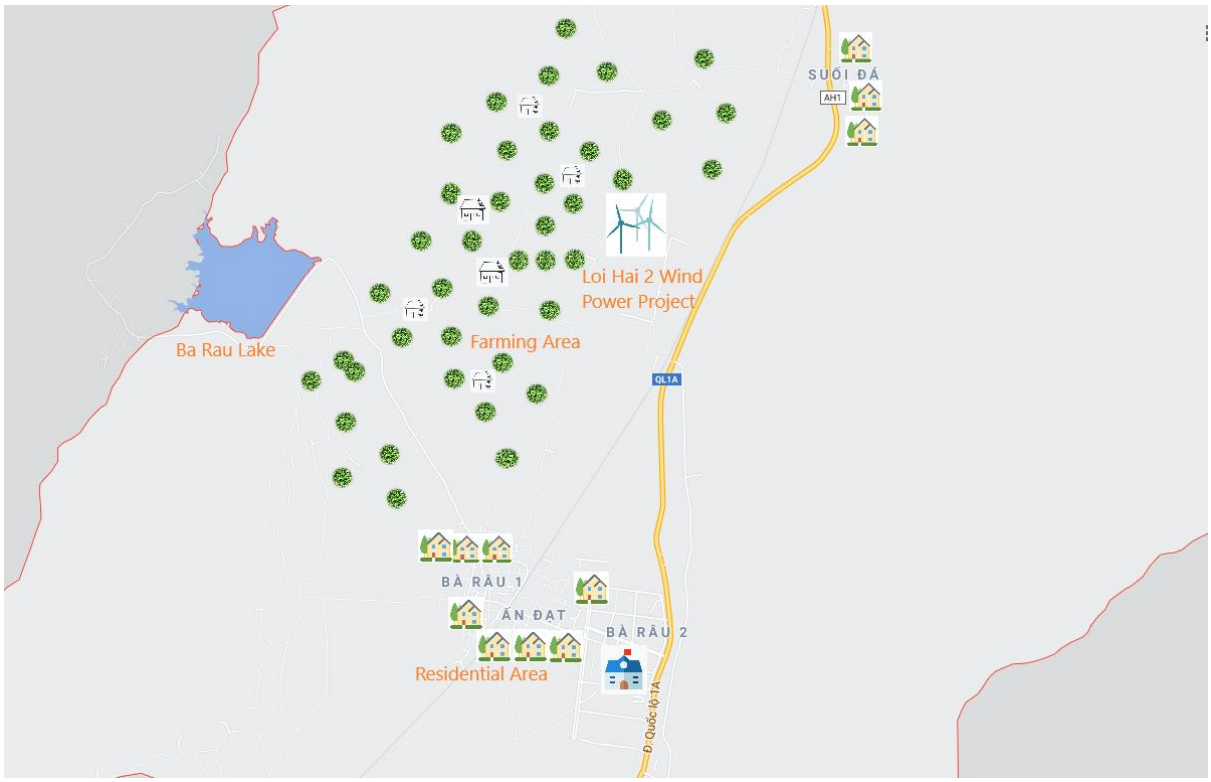


Figure 9.43 Surveyed Areas

This section analyses the survey results with the sampling of 90 households and six FGDs. The study was conducted from 9 to 11 November 2020. Male interviewees in the surveyed households account for 37% (n=33), which is less than female counterparts, 63% (n=57).

The sample size of the survey is 90 households, including AHs and other households who are living surrounding the Project. A list of 31 households who were initially identified as having land parcels within the Project site was obtained from Project Owner at time of the survey, of which, 26 households were contactable and agreed to provided information, account for 83.8%. Sixty-four (64) other households living in the close proximity of the Project site were randomly selected and recruited into the survey. After data cleaning and validation, the final survey sample is 90 households, as shown in Table 9.14.

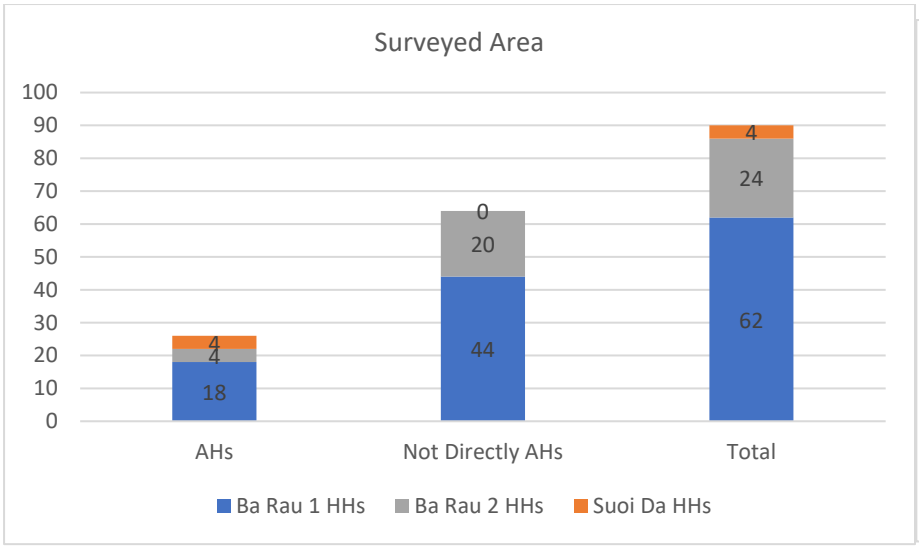
Table 9.14 Number of the Surveyed Households and Population by Village

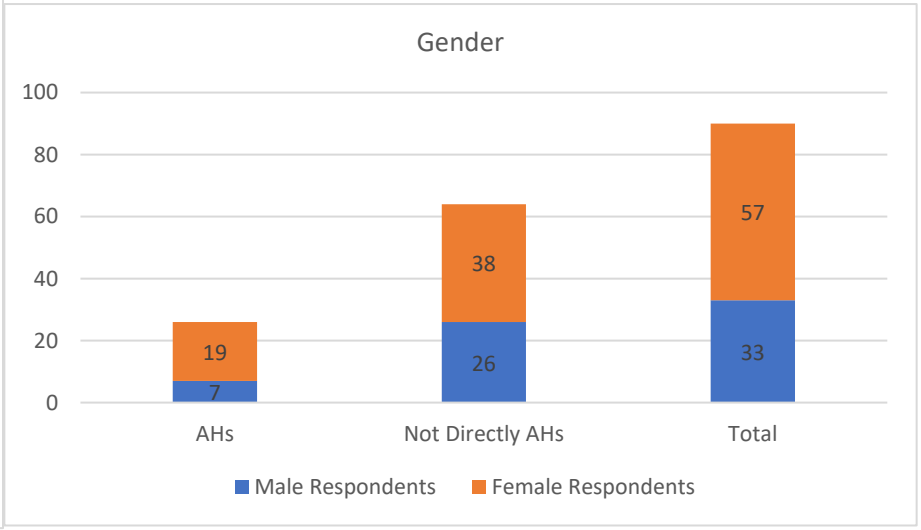
Surveyed household and Population	Ba Rau 1		Ba Rau 2		Suoi Da		Total	
	HHs	People	HHs	People	HHs	People	HHs	People
AHs	18	104	4	20	4	18	26	142
Not Directly AHs	44	253	20	129	0	0	64	382
Total	62	357	24	149	4	18	90	524

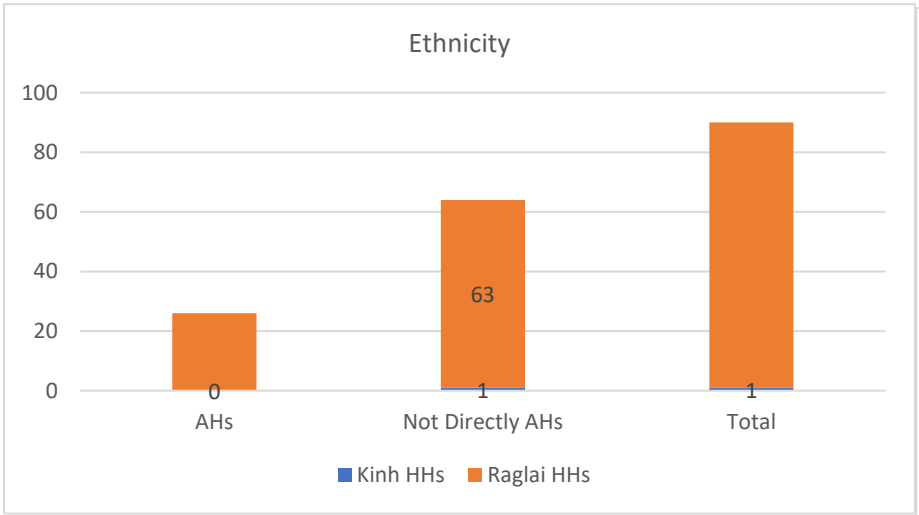
Source: Socio-economic baseline conducted by ERM, 2020

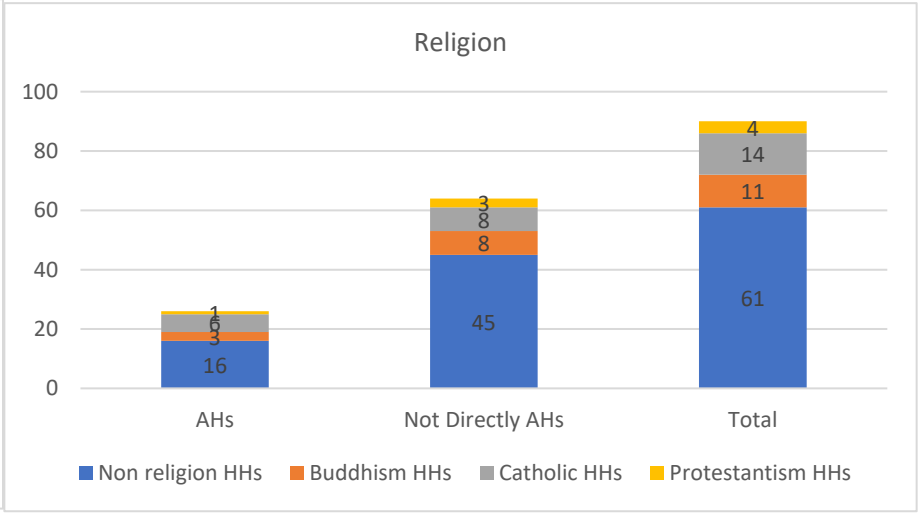
In three studied villages, there were 62 households from Ba Rau 1 village, 24 from Ba Rau 2 village and four from Suoi Da village. As indicated in Table 9.14, more than two-third interviewers were from Ba Rau 1 village where AHs mainly reside.

On average, the surveyed households had lived in the local residence for 45.9 years. There were only two households has lived there under 10 years. Detailed analysis of the surveyed population by the surveyed area (village), gender, ethnicity, and religion is showed in Figure 9.44.









Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.44 Overall Information of the Surveyed Respondents

In 524 surveyed population, Table 9.15 shows that people aged 15-35 years old made up the largest share (37.8%), followed by the people below 15 years old (29.6%), and lastly people with the age over 60 years old (5.7%). The age structure of AHs and not directly AHs was quite similar to the share of members of all four age groups. Descriptions of surveyed populations are provided in Table 9.15.

Table 9.15 Demographic Descriptions of Household Survey

Age group	AHs		Not directly Ahs		Total	
	#	%	#	%	#	%
<15 years	35	24.6%	120	31.4%	155	29.6%
15 - 35 years	57	40.1%	141	36.9%	198	37.8%
36 - 60 years	41	28.9%	100	26.2%	141	26.9%
>60 years	9	6.3%	21	5.5%	30	5.7%
Total	142	100.0%	382	100.0%	524	100.0%

Source: Socio-economic baseline conducted by ERM, 2020

As indicated in Table 9.16, 77.8% (n=70) of the surveyed households were male-headed HHs. Most of the surveyed households were the Raglai, there was only one surveyed respondent was the Kinh people.

Table 9.16 Socio-Demographic Characteristics of the Surveyed Households by Different Categories

Households' categories	Affected households		Not directly AHs		Total	
	#	%	#	%	#	%
HH head's gender	26	28.9%	64	71.1%	90	100.0%
Male-headed HH	20	22.2%	51	56.7%	71	77.8%
Female-headed HH	6	6.7%	13	14.4%	19	21.1%
Religion						
Non religion	16	17.8%	45	50.0%	61	67.8%
Buddhism	3	3.3%	8	8.9%	11	12.2%
Catholic	6	6.7%	8	8.9%	14	15.6%
Protestantism	1	1.1%	3	3.3%	4	4.4%
Ethnicity						
Kinh	0	0.0%	1	1.1%	1	1.1%
Raglai	26	28.9%	63	70.0%	89	98.9%
HH poverty status						
Poor/near-poor household	6	6.7%	19	21.1%	25	27.8%
Non-poor household	20	22.2%	45	50.0%	65	72.2%
Household size (people)	5.5		6		5.8	

Households' categories	Affected households		Not directly AHs		Total	
	#	%	#	%	#	%
HH head's age	49.3		49.1		49.4	
Monthly average income (thousand VND)	6,621		5,868		6,085	
Monthly average expenditure (thousand VND)	5,421		6,926		6,491	

Source: Socio-economic baseline conducted by ERM, 2020

In terms of religion, 67.8% (n=61) of surveyed population claimed that they are non-religion followed by Catholic with 15.6% (n=14) and Buddhism with 12.2% (n=11). Only four HHs are Protestantism, accounting for 44.4%. On average, each household had 5.8 members, and the average household size of AHs (5.5) is less than that of not-directly AHs (6.0). This average household size was greater than the national average (3.7) reported in Vietnam Household Living Standard Survey 2018 and also greater than the province average of Ninh Thuan in 2019 (4.2)[40]. In terms of the average income and expenditure, there were differences between affected household group and not-directly affected households in balance, while monthly average income of AHs was 6,621 thousand VND, slightly higher than that of not-directly AHs, 5,868 thousand VND, their monthly average expense (5,421 thousand VND) was less than that of their counterparts (6,929 thousand VND). Although the research team tried to balance the number of genders when inviting participants to take part in the FGDs, female respondents are likely to be more than male counterpart, with 58% and 42% respectively. The surveyed results also showed that women in the project area is quite well aware of the social and economic problems and participate very actively in the movements and activities in the local community, the position of women has changed and rose higher. This is advantageous in mobilizing females to participate in project activities.

The age group of people is one of the important variables indicating conceptions and opinions of each generation of the same problem. In this baseline, the average age of HH respondents is 45.1 and of FGD participants is 38.4 years old, representing the objectivity and reliability of the baseline results. These are most of people who have a voice in the family should be favourable for the recognition and evaluation on the actual condition of issues related to the socio-economic situation of the family as well as of the local. It is also a group of people who decides mainly on the key issues of the ability and the willingness of the family to participate in the activities of local projects. Up to 75% of participants joined in FGDs are farmers reflecting the dominance of agriculture in the economic structure of the surveyed area (See Table 9.17).

Table 9.17 Characteristics of FGD Participants

Characteristics	Participants				
Total of participants	64				
Number of FGD	Farmers	Union	Vulnerable	Women	Ethnic minority
	2	1	1	1	1
Gender	Male			Female	
	27			37	
Average age of participants	38.4				

[40] Ninh Thuan Statitiscal Yearbook 2019

Characteristics	Participants		
Occupation	Farmers	Housewife	Part-time job
	48	3	13

Source: Socio-economic baseline conducted by ERM, 2020

9.6.2 Human Capital

9.6.2.1 Education Attainment

Human capital is an essential resource for every household, especially for AHs. Regarding the education level, the illiterate rate of the household head is relatively high as equal as 68.9% for surveyed households. The rate of illiterate female heads was found higher than that of male-headed households with a rate of 84.2% and 64.8% respectively. The survey also reveals that there is approximately one-fifth of household head achieved a primary school level (21.1%). Only a few people attained higher education levels, including secondary school (5.6%) and high school (3.3%). No one could achieve higher education, such as vocational education or college (See Table 9.18).

Table 9.18 Household Head's Education Attainment by Gender

Education of HH Head	Male (N=71)		Female (N=19)		Total (N=90)	
	#	%	#	%	#	%
Illiterate	46	64.8%	16	84.2%	62	68.9%
Primary school	18	25.4%	1	5.3%	19	21.1%
Secondary school	5	7.0%	0	0.0%	5	5.6%
High school	2	2.8%	1	5.3%	3	3.3%
Unknow	0	0.0%	1	5.3%	1	1.1%
Total	**71**	100.0%	**19**	100.0%	**90**	100.0%

Source: Socio-economic baseline conducted by ERM, 2020

Table 9.19 Literacy Rate of the Surveyed Population

Age group	Male		Female		Total		
	#	# illiteracy	#	# illiteracy	#	# illiteracy	%
Under 15 years old	72		83		155		
15 - 35	99	20	99	19	198	39	19.7%
36 - 59	69	50	72	63	141	113	80.1%
Over 60	11	7	19	17	30	24	80.0%
Total	**251**	**77**	**273**	**99**	**524**	**176**	33.6%

Source: Socio-economic baseline conducted by ERM, 2020

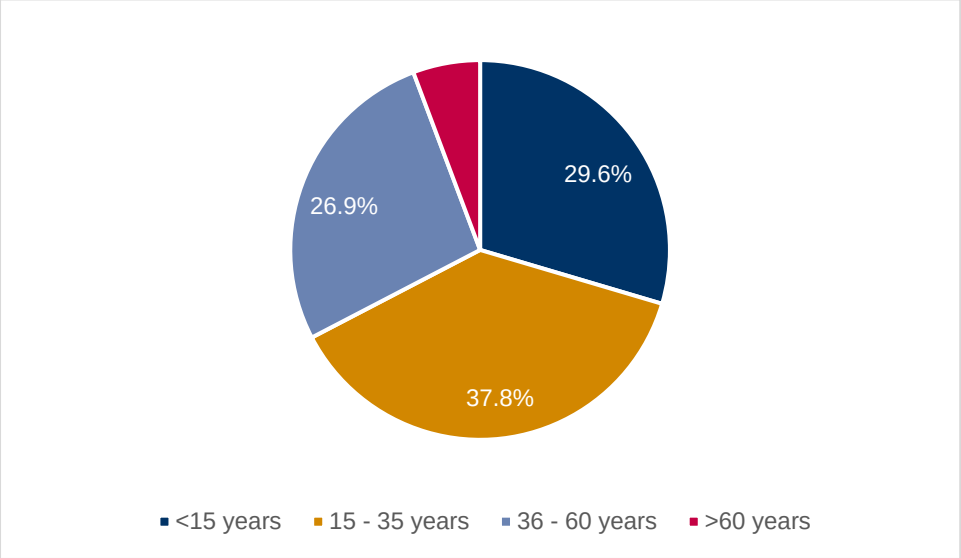
The social data collection has shown that many of the Raglai people can speak Vietnamese and are capable of communicating in Vietnamese with Kinh people or other ethnic minority people. However,

many of them do not know how to read and to write. Although the proportion of children enrolment in the primary school of Ninh Thuan province is 99.8% (2019)[41]. Table 9.19 showed that the rate of illiterate of the surveyed population was 33.6% (n=176). The highest proportion of illiteracy was of people who are older than 36 years old (80.1% for people 36-59 years old and 80.0% for over 60 years old). Only 19.7% (n=39) of people 15-35 years old, cannot read or write Vietnamese. Most people at the age of 36-60 are identified illiterate, up to 87.5% (63 out of 72) female, and 72.5%(50 out of 69) male in this group are reported as illiteracy. However, this rate decreases in the younger group at 15-35 years old, approximately 19.2% female and 20.2% male cannot read and write Vietnamese. Moreover, it was reported in the FGDs that the majority of local students dropped school after grade 6-8 in order to support their family in farming activities, finding a job or because they cannot find enjoyment in studying. Further discussion could be suggested when the specific data of the drop-out rate is available.

Thus, the education level of the surveyed population is relatively limited. This is one of the confirmed factors for understanding and communicating in providing information on the project in the future; It also requires more effort in mobilizing people to participate in project activities.

9.6.2.2 Labour Force

People in the surveyed households engaged different livelihoods. To assess the labour force, it is necessary to understand the age structure of the surveyed population (see Figure 9.45). In principle, only people from 15 years old legally engage into the workforce. Hence, the discussion excludes people who are under 15 in the data analysis. It is noted that some are identified still working when they are over the working age. These people mostly involve in land-based livelihood in which age is not a barrier factor as long as they are healthy enough to fulfil the task.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.45 Age Structure of the Surveyed Population

According to Figure 9.55, 339 respondents were in the working-age people (15-60), accounting for 64.7% (including 37.8% of people 15-35 years old and 26.9% of people from 36-60 years old). Meanwhile, the percentage of people over the working threshold was 5.7%, much lower than the rate of Vietnam's population aged 60 and above in 2019 (12.3% or 11.9 million), (according to ageingasia.org database[42]).

[41] Ninh Thuan Statistical Yearbook 2019

[42] Help Age (2019) Ageing population in Vietnam, retrieved on 11 September 2020, at https://ageingasia.org/ageing-populationvietnam/#:~:text=Demographic%20characteristics%3A%20Almost%20all%20older,in%20rural%20and%20mountainous%20areas

Table 9.20 Ratio of Labour Resources of the Surveyed Households in the Working Group

Categories	15-35			36-60			Total working age		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Famer	25	20	**45**	41	53	**94**	**66**	**73**	**139**
Part-time	66	28	**94**	21	9	**30**	87	37	124
Worker/fulltime	2	19	**21**	0	4	**4**	2	23	25
Unemployment	6	16	**22**	5	3	**8**	11	19	30
Others (students, housewives)	0	16	**16**	2	3	**5**	2	19	21
Total	**99**	**99**	**198**	**69**	**72**	**141**	**168**	**171**	**339**

Source: Socio-economic baseline conducted by ERM, 2020

By aged groups, it is noteworthy that people in different aged groups focused on different employment While 66.7% of people who are between 36 and 60 years old, working in agriculture as their main livelihoods (n=94), in comparison with 23.9% (n= 45) of their counterparts who are 15-35 years old. However, people in 15-35 years old are likely dominant in a part-time job, account for 50.0% (n=94), and this number of people in 36-60 years old was 21.3%(n=30). This was confirmed in FGDs, where participants said that younger people were more suitable for a part-time job, while older people more for an agricultural job. Another remarkable difference was the unemployment rate, where this rate was 11.7% (n=22), higher than that of the older group, 5.7% (n=8).

9.6.2.3 Livelihoods

9.6.2.3.1 Land-based Livelihood

As described above, agriculture is the dominant livelihood in the working population of the study. Among the employed population, it could be seen that agricultural livelihoods and day labour are the main occupations in the community. Local agricultural productions of the surveyed households are paddy field, maize, cassava, tobacco and fruit. However, recurring crop failures caused by severe droughts, which have brought significant damage to agriculture, have concerned Loi Hai farmers as they could only yield one crop per year instead of two or three like before. Consequently, many of them forcibly do a part-time job when having free time to increase their income. According to FGDs, paddy fields focused mainly on harvesting spring paddy, the average annual yield reached 60 quintals/ha, slightly higher than that of Thuan Bac district, 54.3 quintals/ha. However, due to unfavourable weather and drought, the number of autumn and winter paddy are decreased, in comparison with that of 05 previous years, it resulted in the production of paddy per year in total declined.

The average annual yield of maize reach 20-25 quintals/ ha, which is relatively lower than that of Ninh Thuan province (43.1 quintals/ha in 2019). Because a vast majority of Raglai people still pursue traditional upland cultivation (planting mixed maize and bean in their upland pilots), without putting fertilizer. It usually results in very low productivity and yield.

Similar to maize, the average annual yield of cassava was from 80-90 quintals/ha, much lower than that of the province, roughly 198 quintals/ha. Their cassava crops were mostly farmed in an upland area where depend solely on rainwater.

The Loi Hai commune PC authorities reported that due to some cultivation locations located in high hilly areas, lack of water, it is difficult to grow rice, so the local residents switched to planting corn and beans. To cope with drought, local people in recent years have also switched to high-value fruits, that could

grow in a dry area, such as growing grape, sesame, and jujube. Three HHs in FGDs reported growing sesame and one HHs growing grape.

This information was also verified in FGDs. The participants explained that there was a transition from land-based livelihoods today labour as drought and flood caused by climate changes in recent years have negatively impact on the productivity and number of crops per years.

Regarding animal husbandry, some households raise cows, goats or pigs with small numbers, from around 2-4 heads for domestic use and to 10-20 heads for sale. In FGDs, more than half of farmers shared that they also raise chicken and duck for both domestic use and sale. Some households also started raising pigeons with up to 200 heads.

It is understood that within the new rural development program, the local authority supports local people to diversify livelihoods. The support includes providing land and breeds to raise pigs and goats to help people escape poverty and maintain their lives. As a result, local people are more and more engaged in husbandry.

Corn farming

Cashew plants in the garden of suveyed household

Black pig raising

Chicken raising

Source: Socio-economic baseline conducted by ERM, 2020, and Ninh Thuan News, 2017, and Thoi Bao Kinh Doanh, 2020.

Figure 9.46 Livelihood Activities in Loi Hai Commune

9.6.2.3.2 Wage-based-livelihoods

In addition, there are some nut processing firms in Loi Hai regularly recruiting local labour. While younger workers under 30 years old, who have enough health to work for modern firms such as cashew, nut or seafood processing, the older workers only work for subcontractors who are located in Ba Rau 1

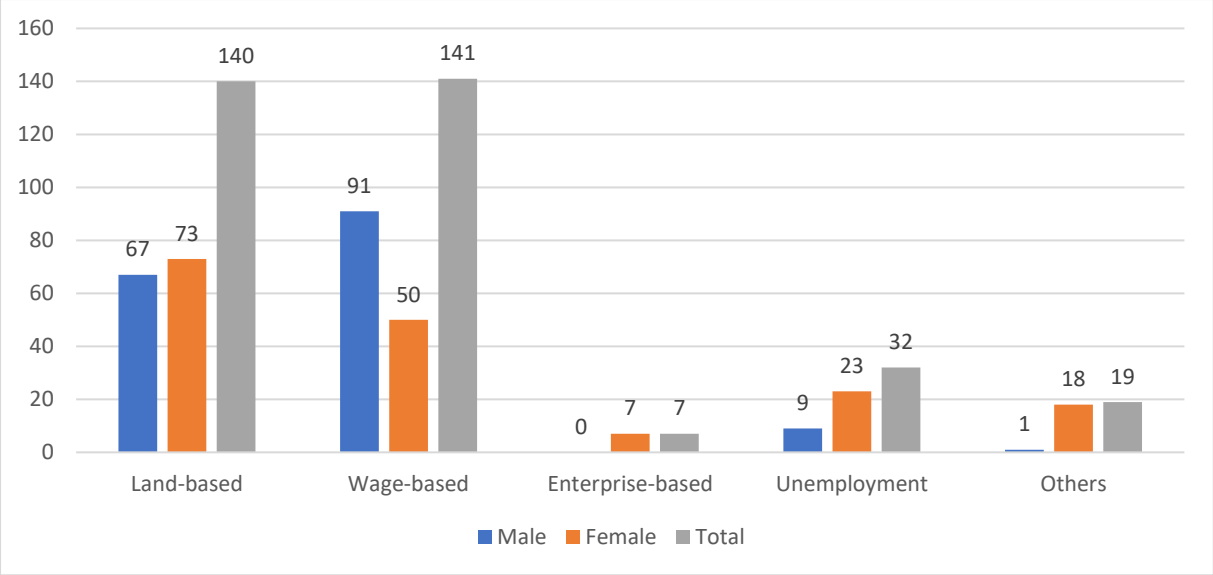
and Ba Rau 2 villages. Local people said that their income had been increased from the wage-based job. In the FGD with women, there were six out of ten women working as part-time workers in the food processing sector. They shared that the working time was flexible, convenient location. These subcontractors were established 2-5 years ago and FGD participants did not know the name of the companies.

Figure 9.47 A Local Cashew Nut Processing Workshop in Loi Hai

There were differences in livelihood distribution by gender. As indicated in Table 9.21, the wage-based group is the most dominant livelihoods in the surveyed population, account for 54.2% of the male population, and 29.2% of the female counterpart. Their works usually involve public and private companies and supporting cultivation for other farmers and food processing. Most of the wage-based male workers were part-time employees or day labour as seasonal workers. FGD participants revealed that they could earn 80,000-150,000 VND per day. Women are often hired to do light work or work for local food processing, which is not far from their house, whilst men do more physical work for better paid such as land preparation or construction work.

FDG participants stated an increase in the number of food processing firms in the commune, in which female workers are preferable to males. The following group is agriculture, which accounts for 39.9% of male respondents and nearly 42.7% of female participants. The rate of unemployment in females was 13.5%, higher than that of males, which is only 5.4%.

By gender, it can be observed that both males and females worked most in land-based and wage-based sectors. However, the number of male members working in the wage-based sector as their main livelihoods (n=91) was higher than that of female counterparts (n=50). Meanwhile, the number of people working in agriculture was nearly equal between male and female, account for 67 and 73 people. 71.8% of unemployed people are female (23 out of 32).



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.48 Livelihoods by Gender

Table 9.21 Livelihoods of the Surveyed Population by Working Age Group and Gender

Livelihood categories	Livelihood types	Male (n= 168)		Female (n= 171)	
		#	%	#	%
Land-based	Agriculture	67	39.9%	73	42.7%
Wage-based	Worker/staff	4	2.4%	23	13.5%
	Day labour	87	51.8%	27	15.8%
Enterprise-based	Small business	0	0.0%	7	4.1%
Unemployed		9	5.4%	23	13.5%
Others		1	0.6%	18	10.5%

Source: Socio-economic baseline conducted by ERM, 2020

The survey results showed that, in a total of 524 surveyed members, agricultural livelihood and day labour hold the highest percentages of the whole surveyed population with 29.6% (n=1550 and 24.0% 9N=126) respectively. Besides, children and the elderly population made up a large proportion of surveyed members, at 3.2% and 28,2% respectively. The unemployment rate was 3.1% (n=16), slightly lower than that of Ninh Thuan province in 2019 (3.7%). The livelihood distribution of both AHs and not directly AHs groups somehow are similar to the surveyed population. There were only seven females, accounting for 4.1% of the female population working as small business or self-employment. They mostly worked as small vendors or grocery owners.

Table 9.22 Livelihood Distribution of PAPs

Livelihood categories	Livelihood types	AHs		Not directly Ahs		Total	
		#	%	#	%	#	%
Land-based	Agriculture	44	31.0%	111	29.1%	155	29.6%
Wage-based	Worker/staff	5	3.5%	25	6.5%	30	5.7%
	Day labour	38	26.8%	88	23.0%	126	24.0%
Enterprise-based	Small business	1	0.7%	6	1.6%	7	1.3%
No income	Housewife	7	4.9%	14	3.7%	21	4.0%
	Unemployment	3	2.1%	13	3.4%	16	3.1%
	Retire	7	4.9%	10	2.6%	17	3.2%
Under working-age	Student	19	13.4%	57	14.9%	76	14.5%
	Under school age	18	12.7%	54	14.1%	72	13.7%
Others			0.0%	4	1.0%	4	0.8%
Total		142	100.0%	382	100.0%	524	100.0%

Source: Socio-economic baseline conducted by ERM, 2020

9.6.2.4 Health

Surveyed households reported facing critical health problems that could significantly influence their livelihood. Regarding the household level, 45.6% of surveyed households acknowledged that they had faced critical health problems. This figure was dominant in one patient per household (n=27), compared with two patients (n=11) and three patients (n=2). This figure of AHs (38.5%) was slightly lower than that of surveyed households (45.6%) (See Table 9.23)

Table 9.23 Percentage of Households Having a Critical Health Problem

Category	Number	Percentage
Total surveyed households	90	100%
Having a critical health problem	41	45.6%
No	49	54.4%
Affected households	26	
Having a critical health problem	10	38.5%
No	16	61.5%
Not Directly AHs	64	
Having a critical health problem	31	48.4%
No	30	51.6%

Source: Socio-economic baseline conducted by ERM, 2020.

As presented in Table 9.24, expenditure on healthcare purpose account for 3% of total household annual expense. Of which, there are 19 surveyed households paying for severe healthcare or injuries and these households spent 21 million VND on average for severe/ chronic health care.

Table 9.24 Health Expenses in Total Household Expenses

Categories	General Health Expense(/1,000VND)	Emergency Health Expense(/1,000VND)
Surveyed households	2,696	
With severe/chronic treatment	6,700	21,042
Others	6,700	
AHs (n=26)	2,718	
With severe/accident treatment (n=9)	3,133	8,678
Others (n=17)	2,499	-
Not Directly AHs (n=62)		
With severe/accident treatment (n=10)	2,707	32,170
Others (n=52)	2,590	

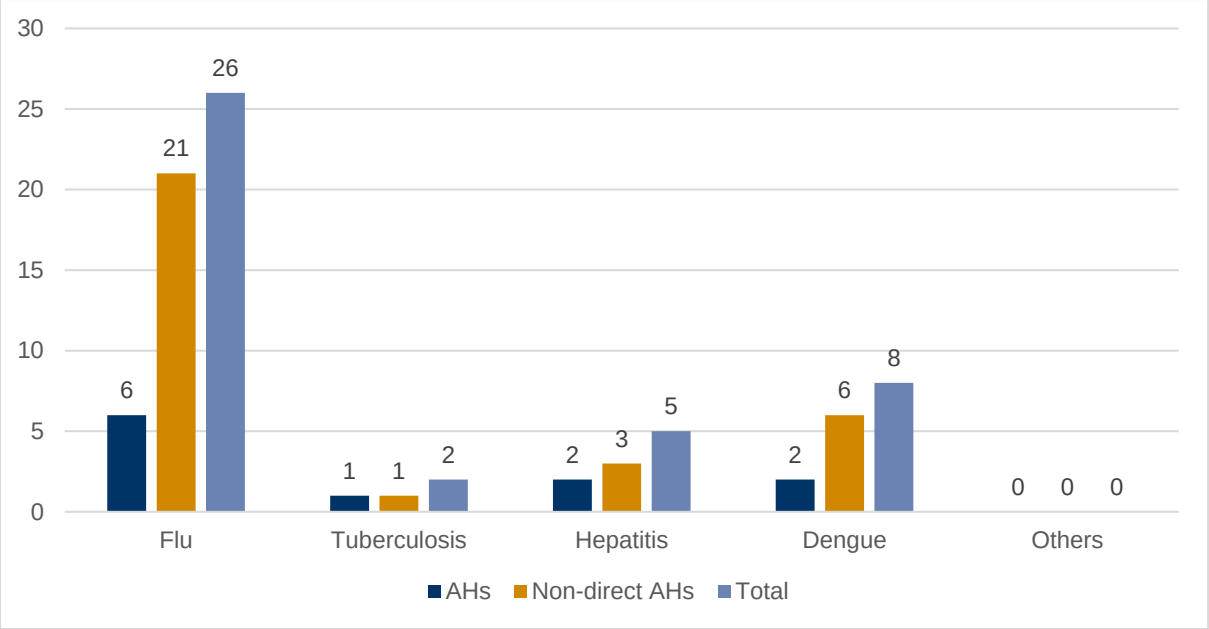
Source: Socio-economic baseline conducted by ERM, 2020

For AHs, there were nine AHs (34.6%) spending a significant amount of expenditure on severe health treatment, with the average amount of 8.7 million VND, less than nearly four times in comparison with the amount of Not Directly AHs (up to 32 million VND).

97.8% (n=88) HHs claimed that they spend 2.696 million on average for regular healthcare service. There were two HHs reported that they did not spend money on healthcare in the last 12 months. Two HHs are Raglai, eligible to subsidized healthcare card by law and they did not have any elderly in their families.

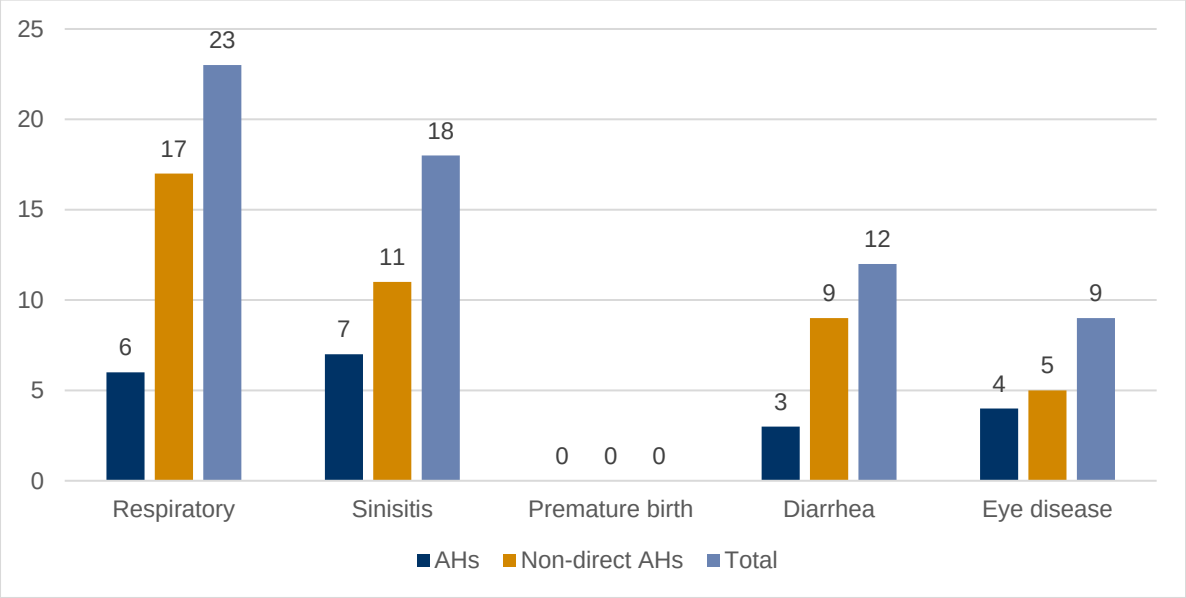
Over the last 12 months, some common infectious diseases have been reported by the interviewed households, included influenza, dengue and hepatitis. However, no interviewees claimed that they and their families had other infectious diseases such as sexually transmitted infections (STIs), hand-foot-and-mouth disease. The illness with the highest incidence was flu, which was subjected by 26 surveyed households. Common symptoms of this disease are sinusitis, cough, sore throat, runny nose, nasal congestion, and headache. The next common illnesses are dengue and hepatitis. Dengue is characterized by the mosquito, which thrives in stagnant water, bites and the dengue virus. Aiming to minimize dengue, environmental management strategy, which eliminates unnecessary container habitats that collect water such as plastic jars, bottles, cans, tires, and buckets, is recommended. Hepatitis prevention, on the other hand, relates to vaccination and treatment. Vietnam is one of the countries with a high prevalence, makeup to 10-15% population to be positive for hepatitis B virus, and Ninh Thuan is not an exception. Although Vietnam has made considerable progress in preventing viral hepatitis infections by expanding hepatitis B vaccination among infants, treatment expenditure could be a financial burden for the community in the long run.

Non-infectious diseases are likely more common in the community such as respiratory syndrome, sinusitis, diarrhoea and eye-related diseases. (See Figure 9.50).



Source: Socio-economic baseline conducted by ERM, 2020

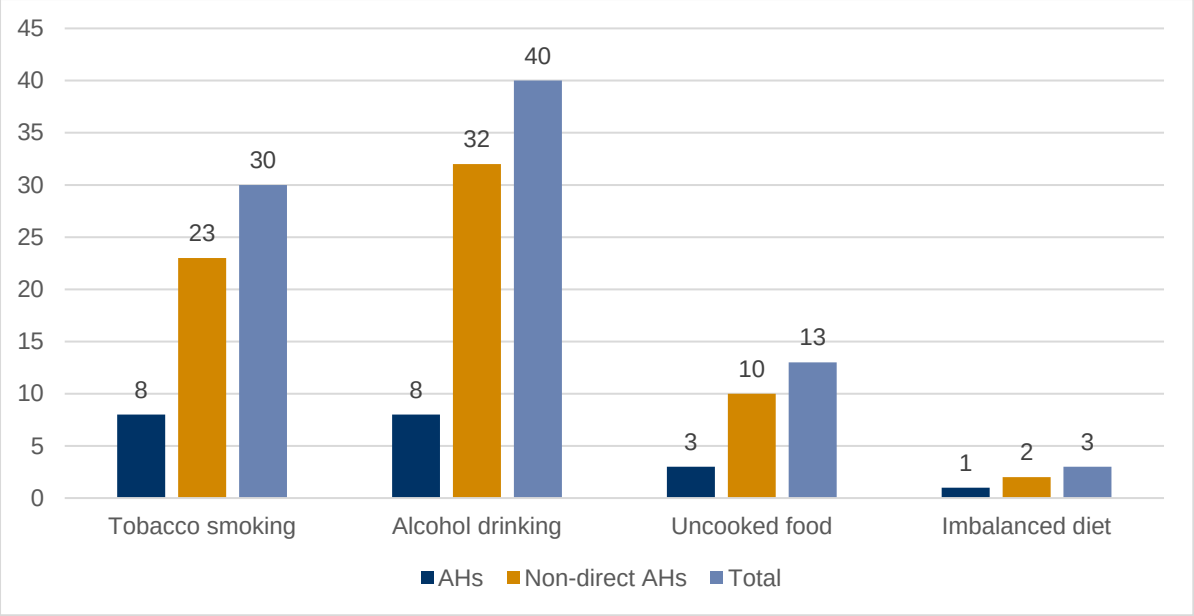
Figure 9.49 Infectious Disease Proportion in the Surveyed Population



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.50 Non-infectious Disease Proportion in the Surveyed Population

Health behaviours such as usage of tobacco, alcohol or drug, and a poor diet contribute importantly to health, mortality as well as expenditure for the community. To illustrate, smoking and alcohol drinking involve spending money on purchasing unhealthy products. The FGDs participants revealed that alcohol and cigarette addiction were becoming prevalent social issues in the community. In terms of an imbalanced diet, it was a challenge for surveyed respondents because most of them were not sure whether they had a balanced diet.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.51 Common Unhealthy Behaviours of the Surveyed Populations

Regarding primary health care facilities at Loi Hai commune, Thuan Bac district hospital and District Preventive Medicine Center are reportedly prioritized visiting by local people whenever they have health problems, account for 81.1% (n=73). It is quite different from other rural communities in Vietnam that the CHC normally is the priority in health accessibility of most rural inhabitants. The main reason is Loi Hai CHC, District Health Center and District Hospital locates in the same building. Moreover, this building is located in Loi Hai commune. Consequently, most of the local people can reach the health center within a 2-kilometre radius. Additionally, 98% surveyed population is Raglai ethnic minority, who is eligible for support health care card issued by the government, which helps them reduce healthcare expenditure significantly in a general health examination.

The provincial hospital is the second option for the local people in a health examination. Whenever they get serious health problems, they go to the provincial level hospital, which is located in Phan Rang and approximately 21 kilometers from Loi Hai commune.

9.6.3 Natural Capital

9.6.3.1 Land

Regarding land area, the survey showed that on average, each household possessed a cultivated area of 8,259m^2 or around 0.83 ha and slightly less than the figure of Thuan Bac district, 1.0 ha[43]. This figure was relatively less than the national average in 2017 (1.5ha)[44], or that of Ninh Thuan, 1.47 ha[20]

Most of the surveyed households have agricultural land, 96.7% (n=87). There were only 03 surveyed households that did not possess any agricultural land (3.3%). They are all Not Directly AHs. one HHs resides in Ba Rau 1 village, and two other HHs live in Ba Rau 2 village.

For AHs, each household has 0.94 ha on average, which was higher than the figure of not directly AHs, 0.78 ha. As Table 9.25 indicated, both residential land and cultivated land of AHs are likely larger than that of Not Directly AHs.

[43] Ninh Thuan Statistical Yearbook 2019

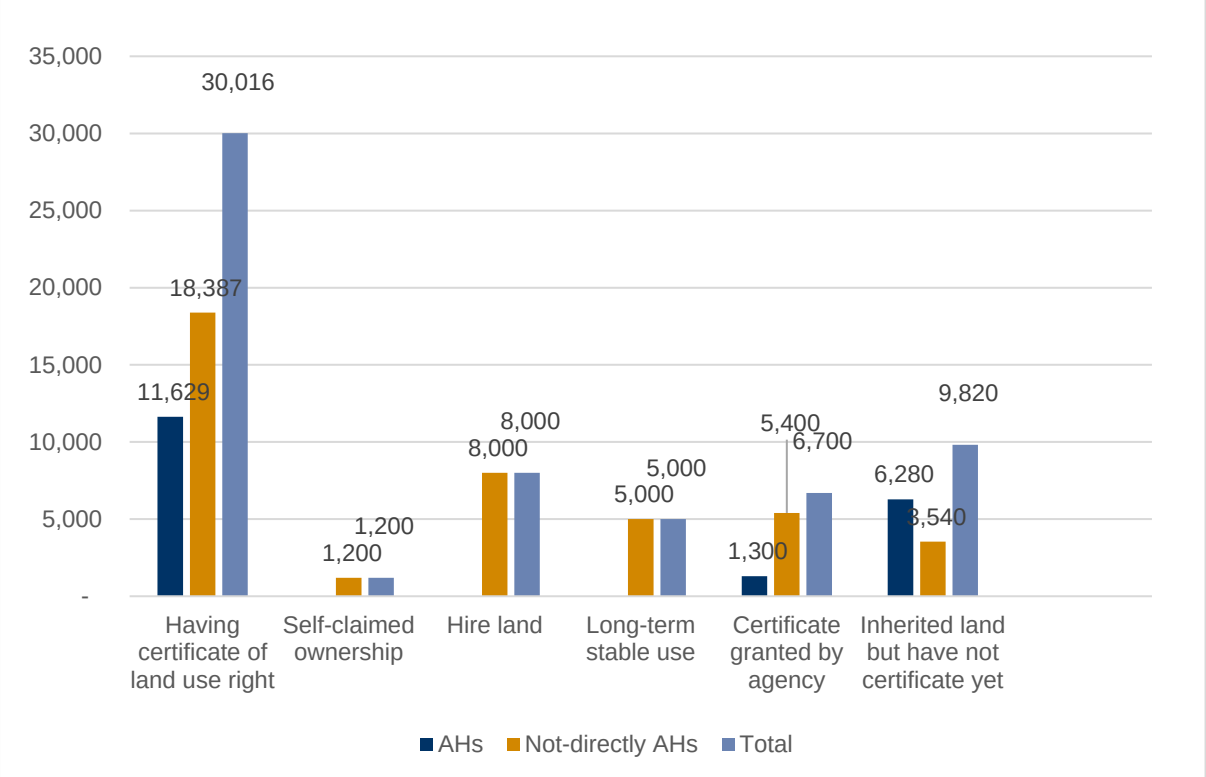
[44] GSO 2017, Vietnam Yearbook of Statistics 2017, Hanoi: Statistical Publishing House

Table 9.25 Average Current Land Area of the Surveyed Households and AHs (m^2)

Categories	Residential land ($m^{2)}$	Cultivated land (m^2)
Surveyed households	819	8.259
AHs	894	9,424
Not Directly AHs	568	7,762

Source: Socio-economic baseline conducted by ERM, 2020

Regarding land ownership paper, for households, the lands are inhabited and a valuable asset, so the certificate of land use rights and land ownership is a legal basis to prove the legality of citizens for land use. Especially for AHs, it shall be an important legal basis to apply the compensation price as well as determine compensation allowance for households. According to the survey results, 49.4% of survey households have a certificate of agricultural land use rights, 11.0% have a certificate of agricultural land granted by state agencies, 16.2% of households have no certificate of inherited land yet.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.52 Type of Land Use Ownership

As mentioned, most of the surveyed participants have not known about the Loi Hai 2 Wind Power Project and whether the land acquisition directly affects them or not.

9.6.4 Financial Capital

9.6.4.1 Income

The income discussed in this section is defined as income from livelihoods, social welfare and regular financial support from surveyed respondents' relatives. Loans are not summed into the income and are discussed separately in the following section.

The average household monthly income of 90 surveyed households was approximately 6.1 million VND, and a monthly per capita income was nearly 2.2 million VND (see Table 9.27). Although this figure is higher than the poverty threshold of MOLISA[45] standard, which is 900,000 VND per capita per month, it is slightly lower than the average income per capita of Ninh Thuan province, 2.8 million VND in 2019. Moreover, it is reported that there is an insignificantly higher in household income of AHs in comparison with that of Not Directly AHs in the survey as the figure is 6.6 million VND and 5.9 million VND, respectively. Similarly, a monthly per capita income of PAPs was 2.4 million VND and slightly higher than non-directly affected persons was 2.1 million VND.

Table 9.26 Monthly Income Per Household and Capita of the Surveyed Households

Surveyed HHs	Monthly Average Income per household	Monthly Maximum Income per household	Monthly Minimum Income per household	Monthly Average Income per capita
	('000VND/ household)	('000VND/ household)	('000VND/ household)	('000 VND/ capita)
All surveyed HHs	6,085	42,500	833	2,167
AHs	6,621	30,333	1,600	2,287
Not directly AHs	5,868	42,500	833	2,115

Source: Socio-economic baseline conducted by ERM, 2020

With the economic development condition, the household economic model is often mixed economy (e.g. agriculture combined day labour), so revenues are also quite plentiful. However, FGDs revealed that most of their extra works is low stability, such as seasonal employees, still they are a significant source of income in the household economy.

By gender, the survey showed the noticeable point is that there was a slight difference of average income per capita by gender of household heads. While the average income per capita of female-headed members was 2,761 thousand VND, this number of male-headed HH members was lower as equal as 2,504 thousand VND. This phenomenon is quite extraordinary for the Vietnam context. This survey has no information to explain this difference. It is suggested that further research should be conducted to explain this phenomenon if possible.

Table 9.27 Average Income per Capita by Gender of Household Heads

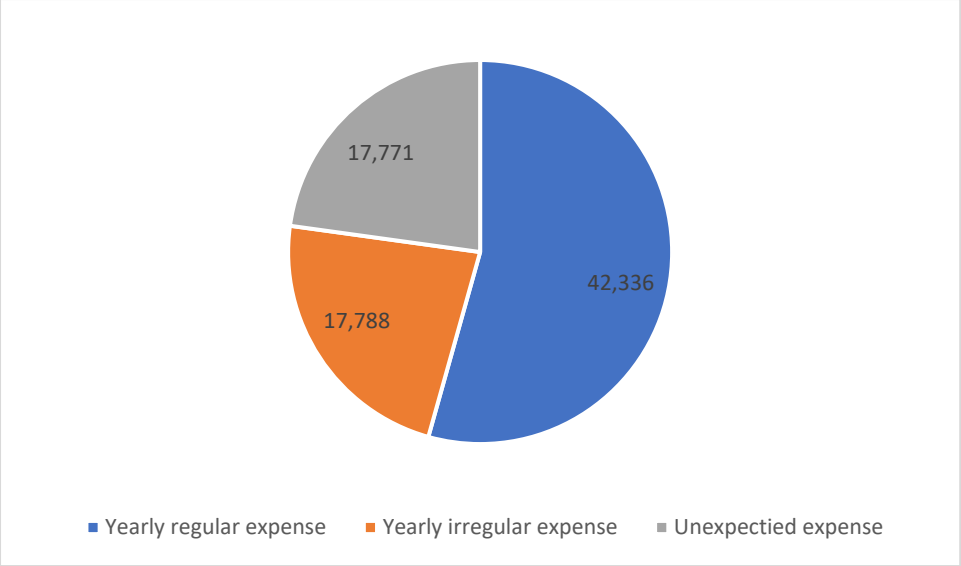
	Female-headed HHs	Male-headed HHs	Surveyed HHs
Average income per capita *(unit: thousand VND)*	2,761	2,504	2,556
Average household size *(unit: person)*	2.4	2.9	2.8

Source: Socio-economic baseline conducted by ERM, 2020

9.6.4.2 Expense

The spending of the surveyed community is categorized into (1) regular expenses refer to daily/monthly expenses (such as house rent, food, energy, transportation, communication, education, support for migrant members), (2) irregular expenses refers to occasional expenses throughout a year (such as health care, clothing, communal activities, debts/loans payment), and (3) unexpected expenses (such as house fixing or construction, severe medical problems, or other investment).

[45] According to Decision No.59/2015/QD-TTg, dated 19/11/2015, promulgating multidimensional poverty levels application during 2016 – 2020.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.53 Yearly Expense of Surveyed Households

As indicated in Figure 9.53, regular expenses account for the prevalent proportion, 54.4% (or 42,336 thousand VND/household/year). The irregular expense and unexpected expense made up a nearly equal proportion, 22.8% for each.

For the expenditure analysis, it is shown that the maximum expenditure of a household was roughly 24 million VND per month and the minimum expenditure was approximately 565 thousand VND per month. A household had such significantly high expenditure because they have to pay the debt, which is an average 15 million VND per year.

On average, households within the surveyed population spent approximately 6.5 million VND per month, and that number as per capita was roughly 2.3 million VND. See Table 9.28 for detailed information on average expenditure by AHs and Not Directly AHs.

Table 9.28 Average Expenditure of the Surveyed Households

Surveyed HHs	Monthly Average Expenditure per household	Monthly Maximum Expenditure per household	Monthly Minimum Expenditure per household	Monthly Average Expenditure per capita
	('000VND/house old)	('000VND/household)	('000VND/household)	('000 VND/capita)
All Surveyed HHs	6,491	24,908	565	2,345
AHs	5,412	24,908	565	1,901
Non-direct AHs	6,926	17,328	1,113	2,526

Source: Socio-economic baseline conducted by ERM, 2020

Table 9.29 Household's Yearly Regular Expense

Expense	Thousand VND	Percentage
Food	30,652	72.4%
Support for members living away	6,700	15.8%

Expense	Thousand VND	Percentage
Transportation	6,147	14.5%
Education	2,960	7.0%
Energy	2,427	5.7%
Communication	1,845	4.4%
House rent	1,438	3.4%
Total yearly expense per HH	**42,336**	

Source: Socio-economic baseline conducted by ERM, 2020

In this survey, regular expenditure includes foods, supporting family members living away, transportation, education, energy, communication, and house rent. So, the total yearly expenditure per household averagely is 42,336 thousand VND. Of which, food constitutes of the largest proportion, at 72.4%. This finding is consistent with the information from FGDs that the food typically accounts for a significant proportion of their limited income. They are followed by the support for members living away, 15.8%.

On the other hand, irregular expenditure relates to paying debt, social activities, health care, and clothing. It can be seen that in irregular expenses, paying debt accounts for the largest proportion, up to 86.1% of irregular expenditure. Moreover, according to surveyed households, irregular expense occurred, had led to the unusual height of yearly expenditure.

Table 9.30 Household's Yearly Irregular Expense

Irregular Expense	Thousand VND	Percentage
Debt	15,313	86.1%
Social activities	11,473	64.5%
Health care	2,697	15.2%
Clothing	2,586	14.5%
Total yearly expense per HH	**17,788**	**100.0%**

Source: Socio-economic baseline conducted by ERM, 2020

Following food, paying debt and communal activities such as wedding, anniversary, or other events were reported as moderate spending by most of the surveyed households. In particular, each household averagely spent around 2.5 million VND for food, and 950 thousand VND for communal events during a month. On the other hand, the medical and educational cost was not a burden for surveyed households since most of them had medical insurance and subsidiary for schooling offered by the government, except for special cases with severe diseases. Table 9.31 shows the average regular and irregular expenses of surveyed households in a month.

Table 9.31 Annual Average Expenditures of the Surveyed Households

	Regular expense	Irregular expense	Unexpected expense	Total
Surveyed households	42,336	17,788	17,771	77,895
AHs	35,238	18,715	11,096	65,049

	Regular expense	Irregular expense	Unexpected expense	Total
Not Directly AHs.	45,219	17,412	20,483	83,114

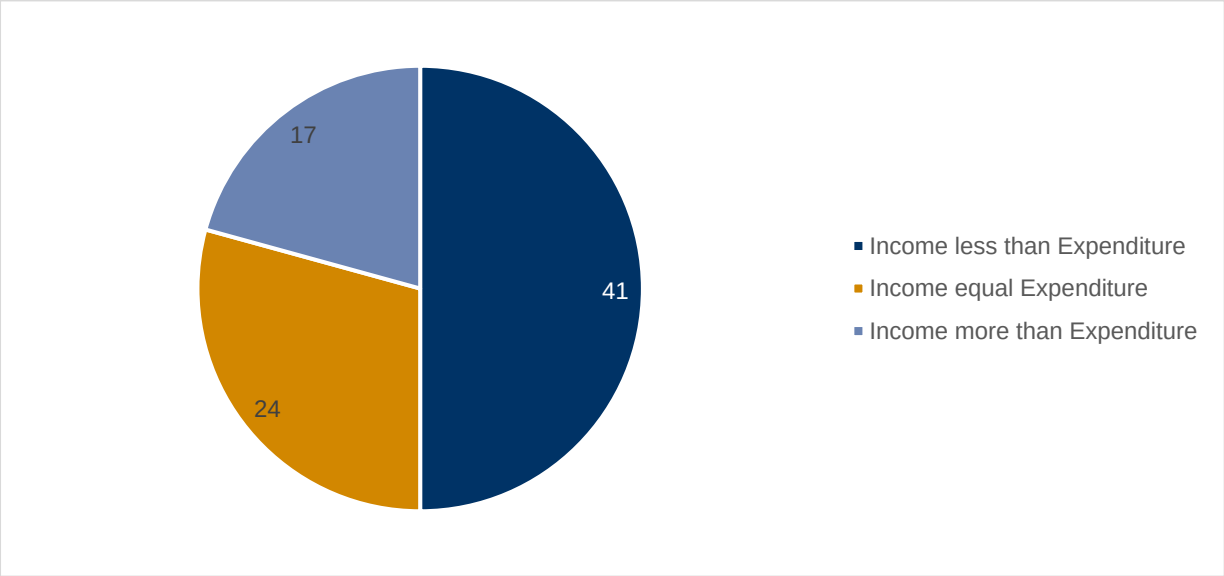
Source: Socio-economic baseline conducted by ERM, 2020

Averagely, a surveyed household spent 77.9 million VND a year. The monthly average expenditure per capita was 1,114 thousand VND, less than the nation's monthly average (2,545 thousand VND), even not as much as the rural areas average in 2018 (1,908 thousand VND) (GSO 2018)46. As indicated in Table 9.31 the expenditure of AHs was likely less than that of Not Directly AHs. However, it is important to note that the household size of AHs was 5.5 members per household while its counterpart was 6.0.

Surveyed households had many types of expenses as explained above, which was examined in this survey. On average, each affected household spent 65 million VND each year, of which 54% from regular expenses, 29% from irregular expenses, and 17% from unexpected expenses. Not Directly AHs spent at the same percentage for the regular expense (54%), and the rest they shared in similar proportion for their irregular expense and unexpected expense (20.9% and 24.6%, respectively).

9.6.4.3 Balance

Of the 90 surveyed households, 41 (45.6%) households responded they earned less than the amount of their expenditure, 24 (26.7%) households had an equal in their income and expenditure, and 17 (18.9%) households had income more than their spending. (See Figure 9.54)



Source: Socio-economic survey conducted by ERM, 2020

Figure 9.54 Income and Expenditure Balance of the Surveyed Households

9.6.4.4 Debt

Averagely, 56.7% of the surveyed households had debts, while this rate in the AHs was 42.3%, which was lower than that of Not Directly AHs with 62.5% (See Table 9.32). Each household averagely owned a debt of 28,114 thousand VND. This figure was significantly different between AHs and Not Directly AHs. AHs owned an average of 17,058 thousand VND, much lower than that of the counterpart (31,431 thousand VND) as presented in Table 9.33.

[46]GSO 2018, Results of Vietnam Living Standards Survey 2018, Hanoi: Statistical Publishing House

Table 9.32 Proportion of Having a Debt of the Surveyed Households

	Have debt	No debt	Total	% Having debt
All surveyed HHs	51	39	90	56.7%
AHs	11	15	26	42.3%
Not Directly AHs	40	24	64	62.5%

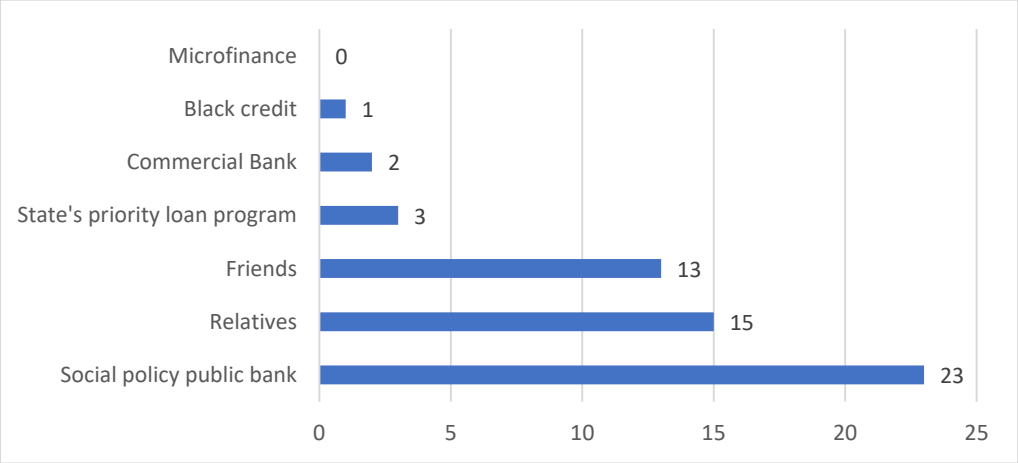
Source: Socio-economic survey conducted by ERM, 2020

Table 9.33 Households' Debt Average (thousand VND) by Affected Groups

Surveyed HHs	Average Debt per household	Maximum Debt per household	Minimum Debt per household
	('000VND/household)	('000VND/household)	('000VND/household)
All surveyed HHs	28,114	300,000	2,000
AHs	17,058	50,000	2,000
Not Directly AHs	31,431	300,000	2,000

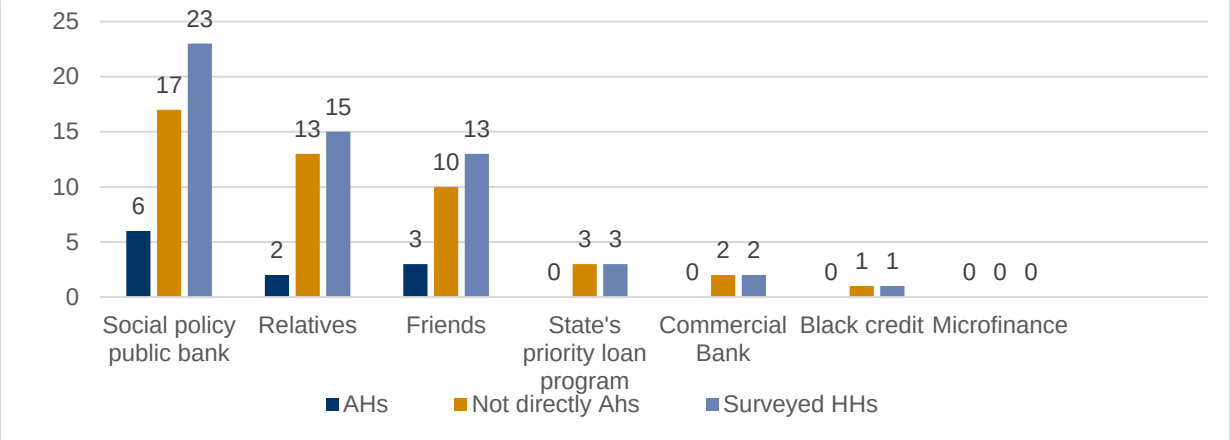
Source: Socio-economic survey conducted by ERM, 2020

In addition to the income for their livelihoods, 56.7% (n=51) of surveyed households received loans from different sources such as government financial organizations, their relatives, or their neighbours. Figure 9.55 indicates that most households have loans from the Vietnam Bank for Social Policies (VBSP), accounting for 45.1% of 51 households having debt. The following loans are from their relatives and neighbours, account for 29.4% and 25.5%, respectively. It is important to note that 4 households were receiving more than one source of financial support. One household borrowed from black credit. Detailed information could be found in Figure 9.55.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.55 Source of Financial Borrowing



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.56 Source of Financial Borrowing

As indicated in Figure 9.56, Social policy public bank is the preferred source of financial loaning for AH and not directly AHs groups. The next option could be either from their relatives or friends/ neighbours.

9.6.5 Physical Capital

9.6.5.1 Housing

All 90 engaged household representatives reported that they were living in a house. There are only two households, who are not AHs, built their houses on their relative's land or lived in their relative's house. In other words, 100% of 26 surveyed AHs have their own house. Moreover, the majority of surveyed households built their house on residential land, account for 88%, while approximately 12% surveyed households did that on agricultural land.

Table 9.34 House Ownership Type of the Surveyed Households

	AHs	Not Directly AHs	Total
Having their own house	26	62	88
Build on residential land	*21*	58	79
Build on agricultural land	5	4	9
Build house on their relative's land	0	1	1
Build on residential land	0	0	0
Build on agricultural land	0	1	1
Live in their relatives' house	0	1	1
Build on residential land	0	0	0
Build on agricultural land	0	1	1

Source: Socio-economic baseline conducted by ERM, 2020

It is reported that there were 49 HHs having huts or houses on their farming land, accounting for 54.4% of surveyed HHs. However, within the survey framework, it was not distinguished between the main

house and the house/hut on the farming land. By field trip observation, some HHs tend to live in their farming houses more than their main houses.

The typical house designed in the surveyed area was a semi-permanent house, which accounts for 51.7% of total surveyed households while 36.8% of surveyed households living in non-permanent houses, and the remaining ones (11.5%) living in a permanent house with one storey.

Non-permanent houses in Loi Hai commune

A semi-permanent house in Loi Hai commune

A permanent house in Loi Hai commune

Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.57 Photos of House Types of the Surveyed Households

9.6.5.2 Housing Facilities

Most of the surveyed households owned primary assets such as lamp/bulb, mobile phone, motorbike, bike, and colour TV (see Table 9.35). In the 2000s if any households had a mobile phone or a motorbike, they were considered prosperous. However, now when these items become very diversified, plentiful with many designs and reasonable prices, they are so close to the local families and becoming popular means of transportation and communication. Televisions are widely used in most households in the communes with the main purposes of entertainment and information.

From 10% up to 50% of households had other assets considered more expensive or bought just when a household has higher consumption demand, including cooker, TV cable, and water pump. A small number of households (less than 10%) within the survey owned other assets such as fridges, solar panels, and microwaves. There is not any household having a computer, washing machine, air conditioner, or car.

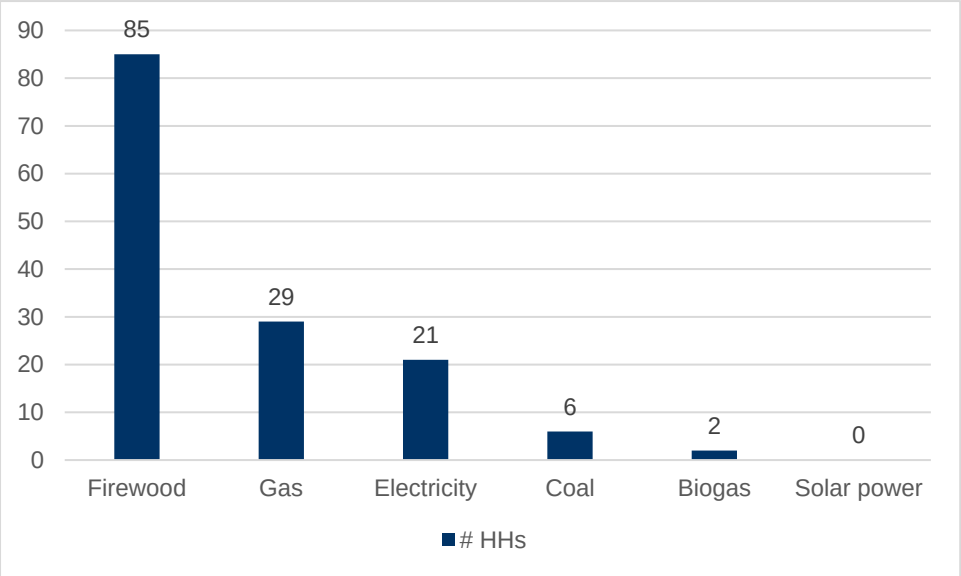
Table 9.35 Different Household Asset Items Owned by the Surveyed Households

Type of facilities	AHs (n=26)		Not Directly AHs (n=64)		Surveyed HHs (n=90)	
	#	%	#	%	#	%
Lamps/bulbs	26	100.0%	63	98.4%	89	98.9%
Mobile phone	23	88.5%	59	92.2%	82	91.1%
Motor bike	25	96.2%	59	92.2%	84	93.3%
Bike	22	84.6%	57	89.1%	79	87.8%
Color TV	22	84.6%	49	76.6%	71	78.9%
Cooker	16	61.5%	46	71.9%	62	68.9%
TV cable	11	42.3%	29	45.3%	40	44.4%
Water pump	4	15.4%	5	7.8%	9	10.0%
Fridge	0	0.0%	7	10.9%	7	7.8%
Solar panel.	1	3.8%	5	7.8%	6	6.7%
Microwave	0	0.0%	1	1.6%	1	1.1%

Source: Socio-economic baseline conducted by ERM, 2020

Domestic energy was classified into the main purpose, including cooking and light.

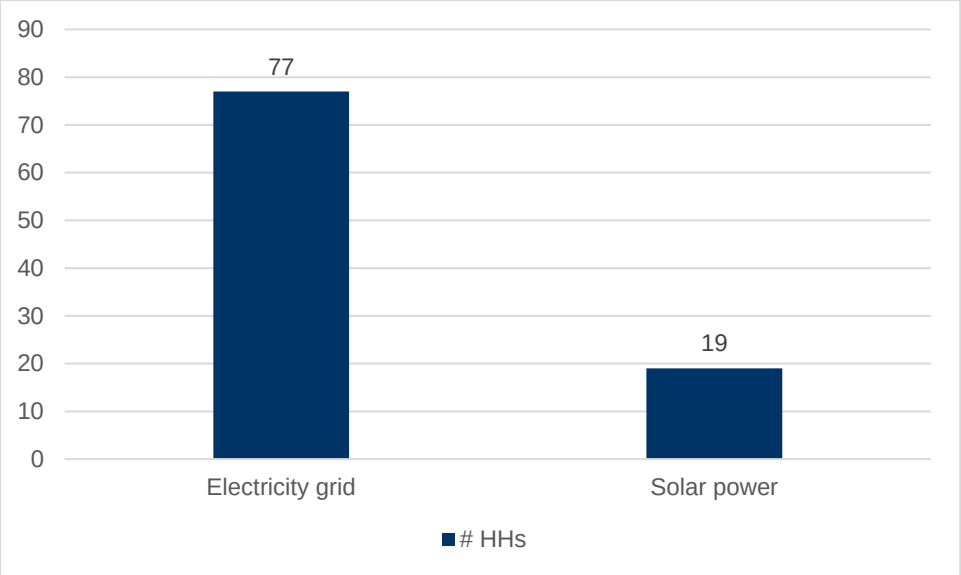
For cooking, local people use biogas, electricity, coal, firewood, and solar energy. There were 21 HHs who use a combination of different energy sources. The cooking source preference is currently still dominated by firewood, accounting for 94.4% (n=85). Followed by gas (n=29) and electricity (n=21). Only a few HHs use coal (n=6) and biogas (n=2) as their cooking energy source, and no HH is using solar power in cooking.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.58 Energy Sources for Cooking of the Surveyed HHs

Meanwhile, the electricity grid and solar power are the two main energy sources in domestic use. 77 HHs were using the electricity grid and 11 HHs using solar power for their domestic use, mostly for lighting.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.59 Energy Sources for Domestic Use of the Surveyed HHs

Water supply

Clean water is one of the criteria for evaluating the development of the surveyed population. When searching for information of water use in the activities of households in the project area, the survey results showed that the surveyed households mainly used one water source, accounting for 84.4%, and the percentage of households using two water sources accounted for 15.6%. The water sources which are using in the commune include piped water, well-water, and river water.

The surveyed data also indicated that piped water and well water are the two main sources of water for the surveyed households, account for 66.7% and 47.8%, respectively. Those households using groundwater because they live far from the main road and not accessible to the water supply system. A smaller proportion of households (15.6%) used both of the two water supply sources depending on the consumption purposes or/and availability of the water source. For these households, use well-water for bathing and washing but use piped water for eating and drinking in order to reduce the water bill. One household reported using river water for drinking, which is not classified as a clean water source and likely to transmit diseases such diarrhoea, cholera, dysentery, typhoid, and polio when not being well treated before drinking.

According to the households' evaluation on the quality of the water sources, the water is basically clean and clear. However, in FGDs, participants indicated that sometimes piped water was not clear enough, but the water quality had not changed fundamentally by season. Most of the households were less interested in investing in furthermore water treatment facilities.

Toilets

It is very critical to see that 41.1% of surveyed households had no toilet. Most of such households had the practice of open defecation in their field. This problem raises a concern for local government in terms of ensuring a hygienic living environment and preventing infectious diseases in the community. Regarding households with toilets, most of them are toilet with a septic tank, accounting for 56.7% of

the surveyed households. This rate is much lower than that of Ninh Thuan province, which is 90.5% in 2019 and even lower than the rate of using the improved toilet in rural Vietnam, 77%[47].

Table 9.36 Toilet Types of the Surveyed Households

	AHs		Not directly AHs		Total	
Having toilet with septic tank	15	57.7%	36	56.3%	51	56.7%
Having toilet with no septic tank	2	7.7%	-	0.0%	2	2.2%
No toilet	9	34.6%	28	43.8%	37	41.1%
Total	**26**		**64**		**90**	

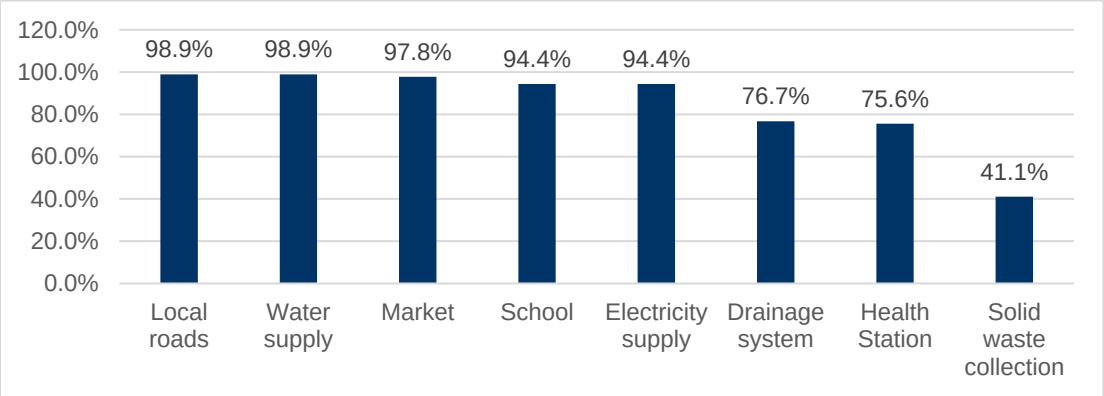
Source: Socio-economic baseline conducted by ERM, 2020

Some families live in both their house in the residential area and the temporary house built in the agricultural land for watching their farms. It is noted that the toilet coverage was collected for all houses reported. There are 11 households that reported that they have the toilet in only their main houses.

9.6.5.3 Access to Public Services

It was reported that local roads, market, school and electricity were the four main public facilities with above 90% of households reported having access. Followed by the proportion accessibility of water supply and health station, account from 70-80%. The solid waste collection was reported as the lowest proportion of public service accessibility of respondents, at 41.1%. (See details in Figure 9.60).

It is crucial to note that the rate of accessing CHC service was lower than other communes in Vietnam because local people tend to visit the district health centre, which is located in the same building.

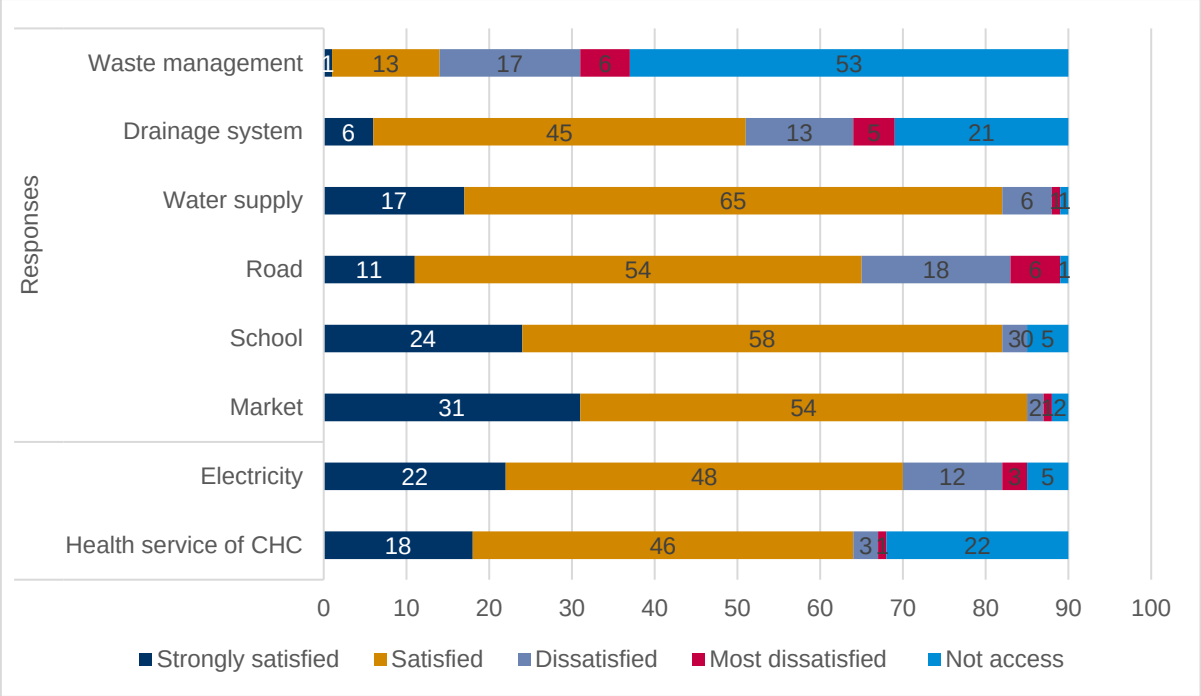


Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.60 Public Service Accessibility of the Surveyed Households

Access to public services and facilities is crucial for every aspect of living in the local community. It was reported that electricity supply, market, and roads were the three main public facilities with a positive response from most of the surveyed participants. Most of the respondents showed their satisfaction towards public services such as market, electricity, water supply, and road. However, waste management and drainage system should be improved. A detailed discussion of the public services is presented below.

[47] The World Bank. Climbing the Ladder Poverty Reduction and Shared Prosperity in VietNam. Washington, DC: The World Bank; 2018.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.61 Level of Satisfaction on Public Service

School

There is no high school in the Loi Hai commune. Loi Hai commune has one public kindergarten and two primary schools, and two secondary schools. The socio-economic reports 2019 of Loi Hai indicated that the kindergarten and Loi Hai primary schools met the national standard. A detailed number of schools in these communes are presented in Table 9.37**.**

Table 9.37 Number of Schools in the Affected Communes

Education facilities	School	Class	Number of teachers
Kindergarten	1	18	30
Primary school	2	52	60
Lower secondary school	2	22	45
Upper secondary school	0	0	0

Source: Socio-economic reports of Loi Hai 2019.

In addition to the educational system schools, there is a community learning center working in Loi Hai commune. The center is established to disseminate knowledge dissemination, awareness-raising and improvement of the community's living quality, implementation of industrial, agricultural and fishery promotion programs, and local projects.

Health care service

Health facilities at communal and district levels were prioritized by the surveyed households for *primary health care and mild illnesses, while the* provincial hospital was for severe illness or injury cases. Moreover, FGDs discovered some households regularly prescript themselves and prefer local

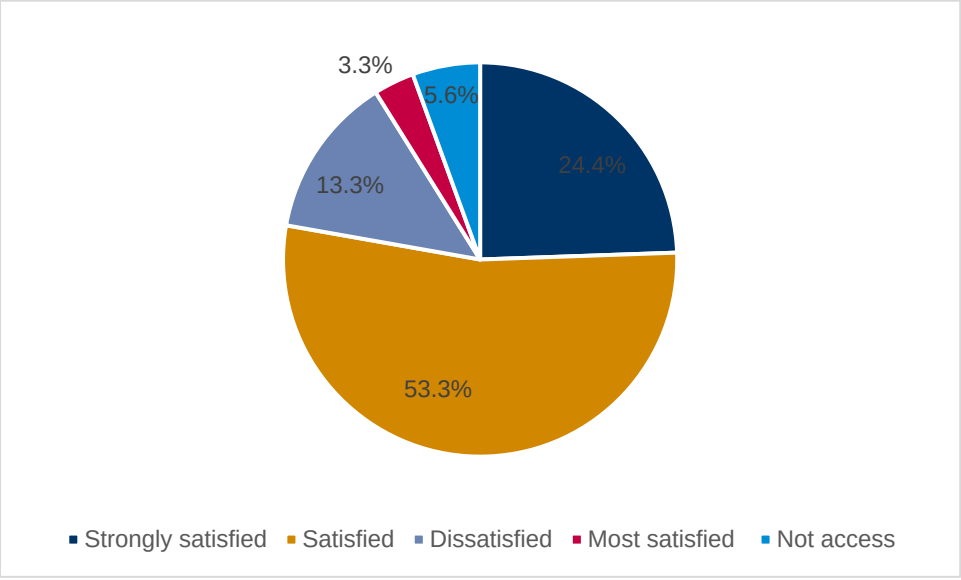
pharmacy to buy medicines when they have mild health problems such as nose-running, headache. As reported by most of the respondents when they were asked for a reason to buy medicine without a health check, "*because it is very convenient, cheap and for some minor diseases, it is effective*".

Loi Hai commune is categorized as a poor, near-poor commune with ethnic minorities, which brings some benefits to the commune residents, such as free health insurance. This is also one reason why the interviewed people expressed their satisfaction with the local health service. Many local people chose a district health center or hospital as their priority in healthcare instead of CHC, which was illustrated by 22 respondents claiming not using CHC service. Besides, the data indicates that only four respondents were unsatisfied with CHC. According to FGDs participants, health service generally meets their needs as the district health center is well-equipped with 60 beds and basic medical equipment.

Electricity access

As reported by all the villages, 85.5% (n=77) of the households are accessible to the national electricity grid for residential houses and temporary houses (built separately in their agricultural land). There are eight households accessing electricity in only their residential houses, which account for 8.9%. 07 households use the solar panel, and six households using power inverter for alternatives in either their temporary houses or residential houses. By village, 11 out of 13 households, residing in Ba Rau 1 village, one for Ba Rau 2 village and one for Suoi Da village, have no electricity at their temporary houses.

Regarding the satisfaction of electricity services, 85 respondents (94.4%) stated that they could access the national electric grid. The electric power system is responsible for ensuring the distribution of the grid and transforming station, the low voltage lines, the quality of voltage, the safety distance, and the protection corridor. The Figure showed that 53.3% of respondents satisfied, 24.4% strongly satisfied with the electricity service.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.62 Level of Satisfaction of Electricity Service

Market

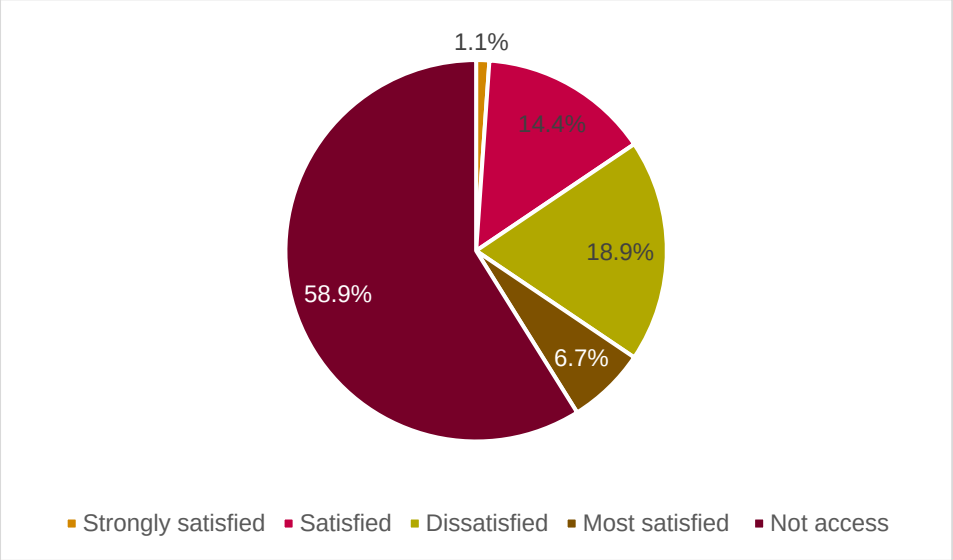
94% of surveyed respondents acknowledged that they were satisfied with Loi Hai village market, where they could find most of the things they need such as freshly-harvested products, clothing, and electronic devices. Moreover, due to its convenient location and daily opening, people can go shopping conveniently. The market was also renovated recently to be more hygiene and good-looking.

Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.63 Loi Hai Market

Waste management

According to Decision 94/QD-UBND of Ninh Thuan Provincial People Committee, waste collection is implemented in all villages of Loi Hai. In general, waste collection in these communes is improved and supported by the local people. However, 25.6% (n=23) of surveyed households showed their disappointment toward waste collecting service at two levels of "dissatisfied" or "most dissatisfied". They explained that the frequency of waste collection should be increased of collecting garbage should be done in front of their door, instead of asking households living in narrow paths/roads to bring waste to the assigned waste collection point. The other suggestion is that public areas need to be cleaner with no garbage on commune's roads and surrounding public areas, especially animal manure. A great proportion of surveyed households could not access waste collection service, accounting for 58.9% (n=53).



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.64 Perception of Surveyed Households about the Local Waste Management System

Road

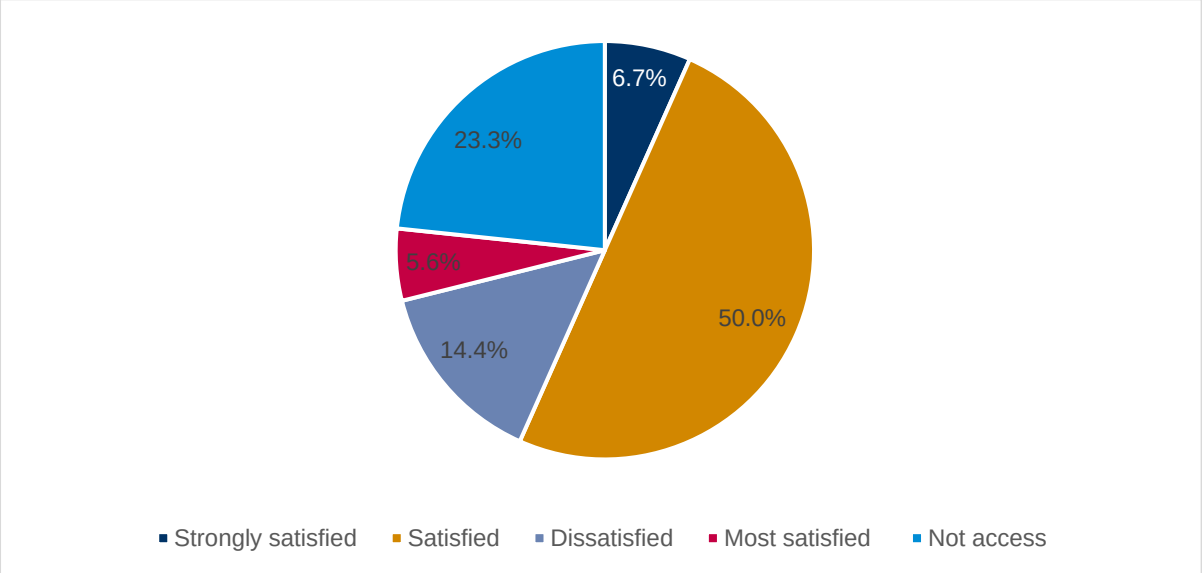
According to the socio-economic report in 2019 and 2020, as well as the data provided by the commune's People's Committee, local governments of Loi Hai commune have made their efforts to construct and upgrade commune roads and village roads to ensure all roads and routes of the commune not to be muddy in the rainy season and dusty in the dry season. Therefore, the local roads in the surveyed communes are gradually concreted. Within 2019, four local roads were concreted and newly constructed achieved the Loi Hai commune's socio-economic plan. According to the survey, 72% of surveyed participants were pleased about the local road. The main related suggestions are that the village's roads need to be fixed potholes and some roads should be widened. Ba Rau 1, Ba Rau 2 and Suoi Da villages remain unpaved roads that are not safe and convenient for local inhabitants, especially during the rainy season.

Hygienic Water

Most of the surveyed households can access hygienic water, and there was only one out of 90 households reported using river water (1.1%). The primary water sources in these communes are piped water and groundwater for their domestic activities. The survey showed that 91.1% of surveyed participants claimed that they are pleased with the water quality. There was only 7.8% (n=7) of respondents who are dissatisfied with water service. The cause of the dissatisfaction mostly relates to the high price of piped water. For some households, the water bill was too much to their affordability, especially poor households. Moreover, as mentioned above, 98.9% of respondents are the Raglai people, who are eligible to receive electricity subsidy from the government, so they tend to expect water subsidy. During FGDs, participants shared that they expected to be subsidized water bill.

Drainage system

It is reported that there were 76.7% of surveyed households could access the drainage system. 50% of surveyed households stated that they are satisfied with the drainage system, and 6.7% "strongly satisfied". 20.0 % respondents complained that drainage in their village was poor, water ran over the ground during rainy days. Flooding itself could lead to further health problems and cause traffic accidents. Drains from irrigated fields should also be properly designed and maintained and reach to a remote area.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.65 Level of Satisfaction with the Drainage System of Surveyed Households

9.6.6 Social Capital

Social capital is the effective functioning of social groups through interpersonal relationships, a shared sense of identity, a shared understanding, shared norms, shared values, trust, cooperation. In the framework of this report, some aspects of local household's capital will be examined.

9.6.6.1 Civil Society Organizations (CSOs)

Many Vietnamese CSOs are emerging, responding to the local's needs through various approaches, from policy advocacy to charity work. With the leading and support of the State, mass organizations are regularly meeting and organize various activities. However, the level of engagement of the community is still limited. The survey indicated that only 6.7% of respondents claimed that he/she is a member of any CSOs in the community.

Table 9.38 Participation in Civil Society Organisations

CSOs	Number of Participants	%
Village management board	1	1.1%
Party cell	2	2.2%
Women union	1	1.1%
Micro finance	1	1.1%
Religion	2	2.2%

Source: Socio-economic baseline conducted by ERM, 2020

9.6.6.2 Community Relationship

The vast majority of the respondents (more than 80%) felt able to be themselves with key trusted individuals, felt appreciated by others, and felt that they had people to share and help whenever someone in need. Most commonly, family, friends and/or neighbours were included in bonding social capital.

A high level of social trust emerged from the respondents' accounts of their relationships with neighbours, as did the prevalence of favours exchanged with neighbours, which were wide-ranging and encompassed both long-standing, on-going arrangements and more urgent, one-off favours. The most common value-added to social trust and neighbourliness was a willingness to lend money or share good seeds. The survey figured out that 25% of financial borrowing was from friends or neighbours. For some of the respondents, social trust was seen to be a basic human need. According to FGDs, many participants claimed that their neighbours were often their close friends

In addition to the family member investment, affected households also paid a medium amount of money for community activities which helped attach themselves to the local community life and enhance local bonds. Each household paid around 11.473 million VND a year for this important activity (accounting for 14.7% of total household annual expenses and 64.5% of total household annual irregular.

Table 9.39 Bonding Social Capital

Bonding social capital	Number of HHs Agreed	%
Trusted individuals	83	92.2%
Friendly and helping each others	80	88.9%
Willing to contribute to common works	87	96.7%

Source: Socio-economic baseline conducted by ERM, 2020

9.6.7 Vulnerability

Vulnerable households include ones that comply with least one of the following criteria:

- Poor/near poor with certification (as certificated by the Government);
- Households having physical disability or mental disability;
- Household with main labour being children (under 15 years old);
- Household with main labour being the elderly (55 for female and 60 for male);
- Headed households are illiteracy
- Elder people who is above age 60 living alone; and
- Single mom, women led/headed households.
- Ethnic minority households.

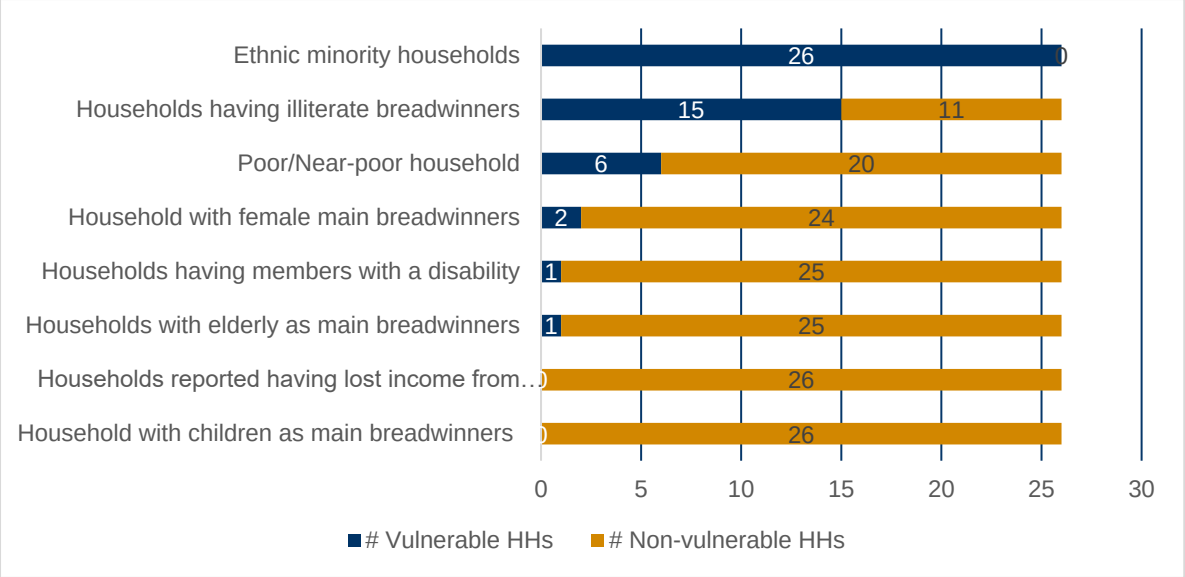
Table 9.40 Household Vulnerability's Profile

Vulnerable Categories	AHs		Not Directly AHs		Total	
	#	%	%	%	#	%
Poor/Near-poor household	6	7%	19	21%	25	28%
Household with female main breadwinners	2	2%	10	11%	12	13%
Household with children as main breadwinners	0	0	0	0	0	0%
Households with elderly as main breadwinners	1	1%	2	2%	3	3%
Ethnic minority households	26	29%	63	70%	89	99%
Households having members with a disability	1	1%	6	7%	7	8%
Households having illiterate breadwinners	15	17%	31	34%	46	51%
Households reported having lost income from agriculture because of land acquisition	0	0%	0	0%	0	0%

Source: Socio-economic baseline conducted by ERM, 2020

In all 90 surveyed households, up to one-third of households declared themselves as 'poor or near-poor households' with a certificate from the government. Roughly a-half of surveyed households reported that the headed households are illiterate. No households have children as main breadwinners, but three (3%) households have the elderly as the main breadwinners. No households reported a loss of income in agriculture due to land acquisition. Most of the surveyed households are Raglai ethnic minority, account for 99%, and all the project affected households are the Raglai people.

Regarding 26 affected households, 100% of them are Raglai EM people. 57.7% (n=15) households have illiterate breadwinners. The literature shows that poverty and illiteracy can mutually influence and reinforce each other in various ways.

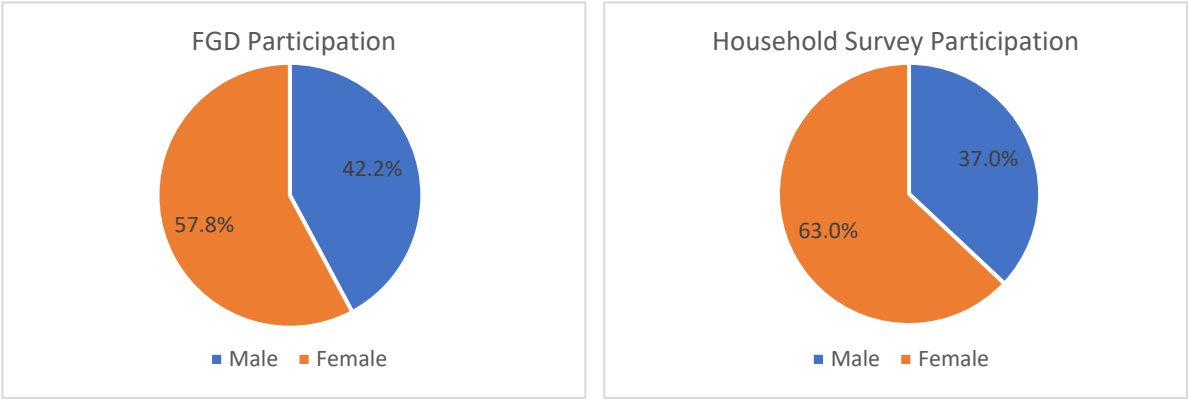


Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.66 Vulnerability's Profile of 26 AHs

9.6.8 Gender Profile

It is recognised that female is dominant in the whole survey. In 90 surveyed respondents for the household interview, 33 people (37%) are male, and 57 (63%) are female. Moreover, female participated in FGDs account for 57.8%, or 37 females out of 64 FGD participants.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.67 Gender Distribution of the Surveyed Participants

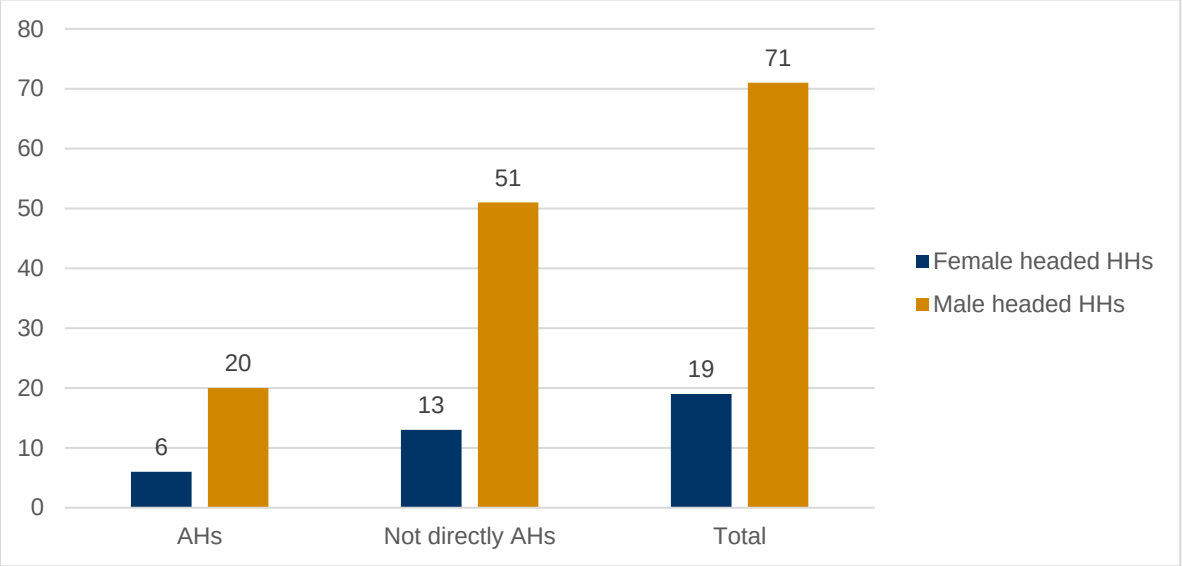
Table 9.41 Gender Distribution of the Surveyed Population

	Male		Female		Total	
	#	%	#	%	#	%
AHs	67	13%	75	14%	142	27%
Not Directly AHs	185	35%	197	38%	382	73%
Surveyed HHs	252	48%	272	52%	524	100%

Source: Socio-economic baseline conducted by ERM, 2020

Looking at the whole surveyed population, males and females shared a relatively equal proportion with 48% and 52%, respectively. This ratio is found identically in the subgroups of AHs and Not Directly AHs.

Holding household head positions was not rare, with 19 female-headed households out of 90 surveyed households (22.1%). Of which, three female-headed households are AHs, the remaining of 16 households are not directly AHs. FGD participants revealed that although male-headed households are popular in the community, most of the decisions related to family-wellbeing and overall household management were taken jointly. For example, crop-related decisions were largely made jointly, whereas males dominated in livestock marketing decisions. The other instance was that females were likely to be dominant in daily chores; males mostly made decisions concerning the social relationship. A better understanding of the cultural, social and economic environment in relation to gender roles can therefore mitigate impediments to the project design and implementation.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.68 Household Head by Gender

It was seen that females looked more vulnerable than males when it comes to human capital (the rate of illiteracy and educational levels). The illiteracy rates of female household heads, as well as female members, were higher than those of male household heads (84.2% versus 64.8%) and male members (42.1% versus 34.6%).

9.6.9 Local Perception about the Project

9.6.9.1 Project Acknowledgment

ERM representatives undertook a social perception survey and consultations during the site visit to appraise the socio-economic status of the resident population within the study area, the concerns/issues of the local population, and benefits/ expectations from the Project.

The structured questionnaire for the household survey was designed to assess local people's awareness about the Project. The perception of local people was also collected via the six FGDs. However, according to the household survey, only five out of 90 interviewees reported that they knew about the Project, accounting only for 6%. It is mainly because not much stakeholder's engagement happened on site before the social survey. The survey also reveals that verbal exchange among the community and the local authority are the two main lines of communication for the project information, approximately 4% and 2%, respectively. Most of the surveyed people's feedback is negative, particularly with the livelihood and income impacts, the decrease in the available land for agriculture due to Project development.

A total number of 26 households (142 people in total) are likely to be affected directly by land acquisition process. The number consists of 18 households in Ba Rau 1, four households in Ba Rau 2 and four households in Suoi Da. None of the affected households will lose their houses, they are expected to lose their agriculture land. In the turbine areas, all the affected areas are agricultural or land controlled by government organisation. It means that the land acquisition process are categorised as economic displacement and they will be compensated accordingly. The distribution of affected households and persons is given in Table 9.42. The average household size is 5.5 members.

Table 9.42 Project Affected Household and Persons

Village	Affected Households	Affected People
Ba Rau 1	18	104
Ba Rau 2	4	20
Suoi Da	4	18
Total affected	**26**	**142**

Source: Socio-economic baseline conducted by ERM, 2020

9.6.9.2 Local Concerns about Project Development

It is necessary to undertake consultation with potentially affected people and other community members to understand their points of view, obtain their input regarding environmental and social issues of concern, and take these into consideration during the preparation of the management framework and plans. Regarding social components, the baseline has identified the tentative affected households. Indigenous/ marginalized communities within the proposed site and its immediate vicinity also are paid attention to in the baseline.

Most FGD participants shared they would not worry about the proposed wind power project. However, some social and economic factors might be arisen during the installation and functioning of wind turbines. Specifically, during installation, there will be a demand for the labour force, which becomes a significant social factor that impacts the community. Some people shared that they will be nervous to see strangers in their villages, although this feeling is vague and inconspicuous. The others worried about traffic accidents and environmental issues during the installation. They explained that children usually played on the village roads because there were few motorbikes/ trucks, and they did will not know how to avoid possible accidents. Moreover, construction vehicles may carry oversized materials or drop dirt on the village roads, which also may affect the environment. However, they reported that they are not bothered by the sound of turbines and their light during the night-time from the existing wind farm projects.

In short, the potential environmental and social impacts due to the proposed Project have been identified in various project stages. According to the FGDs participants, they perceived that most of the impact that they expect might only relate to construction activities, which are inevitable but manageable through certain social and environmentally friendly practices. These impacts can be well mitigate at an early stage through proper engineering designs and adherence to best construction practices. This assessment should also include safety considerations for the workers in the site and related facilities, but nearby residents, especially those who live close to ancillary facilities like borrow areas.

9.6.9.3 The Perceived Impact of Land Acquisition

Table 9.43 Levels of Impact of Loi Hai Project to Surveyed Affected Households

Levels of impacts	Impact on livelihoods	
	Number of households	**Percentage**
No answer/ Do not know	51	57%
Minor impact	4	4%
Moderate impact	8	9%
Major impact	27	30%
Total	**90**	**100%**

Source: Socio-economic baseline conducted by ERM, 2020

The table provides information about the impact levels of Loi Hai project on the affected households (AHs). Only four AHs stated that they indicated that they would have a minor impact, eight AHs would have a moderate impact, and 27 AHs supposed that the Project will significantly impact them.

FGDs conducted with affected communities uncovered some significant concerns about the development of the Project. Each type of livelihood led to different concerns. Overall, the six FGDs indicate that participants want further information about the Project and a proper compensation for land acquisition.

However, they have some suggestions relating to land acquisition such as:

- To be fully and timely informed of the land acquisition.
- If the remaining cultivated land after the acquisition is too small, the project should have special support in agriculture activities, or the compensation should be based case-by-case.
- In terms of the lines of communication, they would like to be informed through their village head or on a face-to-face meeting. Some elderly people might need language assistance because they cannot read or write. As some old generations of Raglai people might not be able to speak general Vietnamese language.

9.6.10 Needs Assessment for Livelihood Restoration

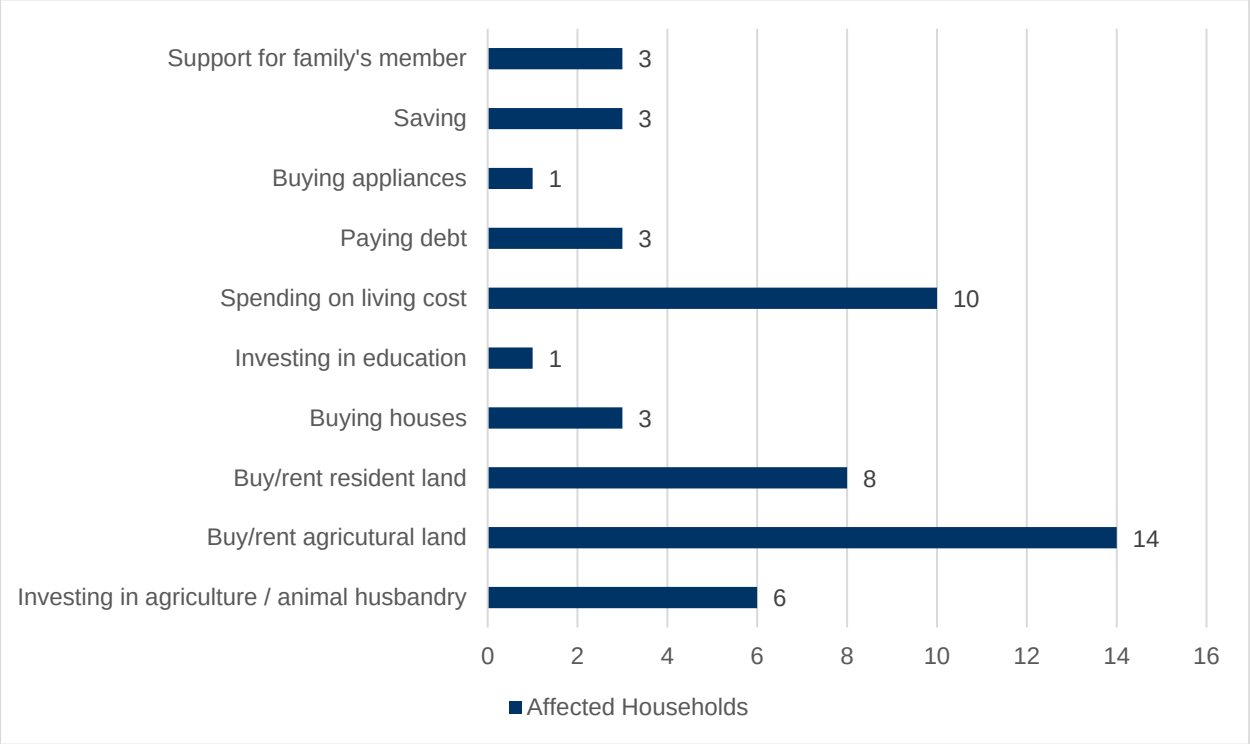
9.6.10.1 Use of Compensation

Livelihood restoration plans are essential in recovering income loss or livelihood resources. However, designing this plan is dependent on if studied households recognized how their livelihood or income will be affected by the Project and whether they are proactively in finding the approach to improve or restore the loss. If they did, they would have this plan in place; otherwise, they would not.

This understanding may help explain why only seven out of 26 AHs had a livelihood restoration idea, accounting for 26.9% of the total affected households. Considering 26 households claimed they will be more or less affected by the Project, the number of households having livelihood restoration ideas was also low. Thus, the challenge for AHs should be their awareness about the significance of the impact on their livelihood. This conclusion is confirmed via the FGDs where most participants shared that they were not aware of the Project impacts.

There was approximately a quarter of surveyed households reported that they may know livelihood restoration concepts. The survey showed that up to 14 households out of total surveyed households wish to keep investing in agricultural development, remaining respondents said that they want to attend

vocational training or to start a small business, which less depend on agricultural land. The use of compensation revealed plans for AHs as following Figure 9.69.



Source: Socio-economic baseline conducted by ERM, 2020

Figure 9.69 Plan of Using Compensation of Affected Households.

The data showed that households would use compensation mostly to invest in agricultural livelihoods (29.2% or 14 households), followed by expenses for living costs (38.5% or 10 AHs), and buying or renting resident land (30.7% or eight AHs). A small number of households would use this money to pay the debt, save money, buy a house or support households' members, at the same percentage of 11.5% or three AHs. There is only one household that would invest in education or buy appliances for their household. Moreover, no households would use it to buy new production facilities or buy a motorbike/car. It is important to notice that this information was answered in the form of assumption because most of the respondents (5.6%) did not know about the Loi Hai 2 project.

Demand for Livelihood Restoration

Based on the perceived impacts of the project development, affected households conveyed different demands on the project's support.

While only five surveyed households reportedly had some proposed ideas (see below on suggested program) of livelihood restoration program, although they did not know how much they will receive for compensation. However, it can be seen that households are likely aim to invest their livelihood in cultivation and husbandry. According to FGDs, the three preferences of participants in livelihoods are provision of agricultural productions, financial supporting and trainings.

Moreover, when asking about their suggestions about livelihood restoration that they wish to have, FGD participants suggested the following recommendations:

Suggested livelihood's program intervention areas:

- Communities believed that the provision of financial product (microfinance) would help to diversify their livelihoods. They expect it would substantially reduce their vulnerability to land acquisition.

Microfinance was a top of three suggestions for livelihood restoration based on FGD's participants' opinion.

- Animal husbandry program can also be an alternative livelihood for households whose land will be acquired. Some households suggested a program that may assist them to own and to raise cows, pigs and goats. The assistance should be inform of microcredits, livestock good breeding (type of cattle that identified as healthier and easier to breed), technical assistance on animal farming, and disease prevention for livestock. The vulnerable group during FGDs process, expected the Project to prioritize supporting them with animal husbandry program.
- In term of farming technique, the introduction of better crop management practices including enhanced irrigation efficiency and drought-resistant crop varieties which use less water while not compromising the yield
- Regular information disclosure program should be provided by project owner. This program is for those affected households that loss their land due to the Project construction but still allowed to continue their farming or plantation nearby project construction. The affected households wish to minimize impacts by being well-informed in the process of land acquisition and during construction process so that they can plan their next steps properly.
- For households with young members, they suggested to receiving training and be connected to nearby factories.

Education's sub-program intervention areas:

Although local students are free of charge for school fees at all education levels, survey findings show that the school drop-out rates of students are still considerable. Besides, the school's facilities, infrastructures, and teaching tools are not in the good condition. The reason is mostly due to the school have limited annual budget to improve school infrastructure or to buy new teaching equipment. Some educational supports should be carried out as:

- Raising awareness among local people related to the importance of education. The low motivation for learning was identified as a particular problem on rural communities and low-income households. Hence, the Project could, in coordination with local schools, organise soft skills training or career-oriented workshops to motivate rural youth to participate in the semi-skilled or skilled labour market.
- Connect with the compulsory education and routine education activities in the locality. This activity aims at increasing more opportunities for children of the poor and near-poor households to access job training, find non-farm jobs, and contribute to formulating a new trend of the education-loved tradition in the remoted areas. This may help to eliminate the poverty sustainably, erase the 'inherit' poverty from generation to generation.
- Provide vocational training programs for youth who have concluded with lower or upper education levels, focusing on professional skills in cooperation with local businesses. Job training, vocational orientation, job introduction, provision of labour market information. Establish commune-based centers for job introduction, vocational guidance in the province-level projects. FGDs with vulnerable people and the interviews with key informants in the commune show their consensus with these suggestions. This activity aims at providing sustainable employment opportunities for vulnerable households, especially for ethnic minority youth.

REFERENCES

Bamford, M. *et al.* (2008) *Migratory Shorebirds of the East Asian - Australasian Flyway; Population Estimates and Internationally Important Sites.* Canberra, Australia.: Wetlands International - Oceania. Available at: https://www.environment.gov.au/system/files/resources/782ebed5-6bdd-4a41-9759-b60273b52021/files/shorebirds-east-asia.pdf (Accessed: 20 October 2020).

Botov, A. *et al.* (2015) 'A new species of Dixonius (Squamata: Gekkonidae) from Phu Quy Island, Vietnam', *Zootaxa*, 4040, p. 48. doi: 10.11646/zootaxa.4040.1.4.

CMS (1979) 'Convention on the Conservation of Migratory Species of Wild Animals', in. Bonn, Germany: United Nation. Available at: https://www.cms.int/en/convention-text (Accessed: 28 September 2020).

Da Nang Today (2019) *10 ASEAN heritage parks of Viet Nam*. Available at: https://www.baodanang.vn/english/infographics/201912/10-asean-heritage-parks-of-viet-nam-3267079/ (Accessed: 28 September 2020).

Dang, S., Dang, M.-Q. and Hoang, N.-S. (2020) 'Helicteres binhthuanensis V.S.Dang (Malvaceae, Helicteroideae), a new species from southern Vietnam', *PhytoKeys*, 166. doi: 10.3897/phytokeys.166.57647.

Dudley, N. and Stolton, S. (2007) 'Defining Protected Areas', in. Almeria, Spain: IUCN.

Furey, N. and Racey, P. (2016) 'Can wing morphology inform conservation priorities for Southeast Asian cave bats?', *Biotropica*, 48, p. n/a-n/a. doi: 10.1111/btp.12322.

GISD (n.d.) *Invasive species in Vietnam*. Available at: http://issg.org/database/species/search.asp?st=sss&sn=&rn=Viet%20Nam%20(Vietnam)&ri=19416&hci=-1&ei=-1&fr=1&sts=&lang=EN (Accessed: 28 September 2020).

Global Forest Atlas (n.d.) *Ecoregions*. Available at: https://globalforestatlas.yale.edu/ecoregions (Accessed: 28 September 2020).

IBAT (n.d.) *Deo Nui San KBA factsheet*. Available at: https://www.ibat-alliance.org/kba-factsheet/22618 (Accessed: 30 September 2020).

IUCN (2016) *A global standard for the identification of Key Biodiversity Areas: version 1.0*. Available at: https://portals.iucn.org/library/sites/library/files/documents/2016-048.pdf.

Key Biodiversity Areas Partnership (2020) *Key Biodiversity Areas factsheet: Deo Nui San*. Available at: http://www.keybiodiversityareas.org/site/factsheet/22618 (Accessed: 16 December 2020).

Langhammer, P., Bakarr, M. and Bennun, L. (2007) *Identification and gap analysis of Key Biodiversity Areas: targets for comprehensive protected area systems*. Gland, Switzerland. Available at: https://www.iucn.org/content/identification-and-gap-analysis-key-biodiversity-areas-targets-comprehensive-protected-area-systems (Accessed: 28 September 2020).

Le, T. T. and Tran, H. M. (2000) *A rapid field survey of Kalon Song Mao Nature Reserve (Binh Thuan province) and Lo Go-Sa Mat Nature Reserve (Tay Ninh province), Vietnam.* Ha Noi: BirdLife International Vietnam Programme and the Forest Inventory and Planning Institute.

Nguyen, L. *et al.* (2011) *Forest Ecological Stratification in Vietnam*. Ha Noi: UN-REDD, RCFEE, p. 61. Available at: http://vietnam-redd.org/Upload/Download/File/Final_submited_Forest_ecological_stratification_After_Aki_comment_E_VTP_13102011_2240.pdf (Accessed: 28 September 2020).

Queiroz, J. S. de *et al.* (2013) *Vietnam Tropical Forest and Biodiversity Assessment*. US Foreign Assistance Act, p. 7.

Ramsar Convention on Wetlands (n.d.) *Viet Nam Ramsar*. Available at: https://www.ramsar.org/wetland/viet-nam (Accessed: 25 September 2020).

thiennhienviet (2004a) *Hon Cau-Vinh Hao Proposed Marine Protected Area*. Available at: https://www.thiennhienviet.org.vn/sourcebook/source_book/frs_search_fr2.html (Accessed: 20 September 2020).

thiennhienviet (2004b) *Kalon-Song Mao Nature Reserve*. Available at: https://www.thiennhienviet.org.vn/sourcebook/source_book/South%20east/SB%20Kalon-Song%20Mao.htm (Accessed: 28 September 2020).

Tri, N. and Gamble, T. (2010) 'A New Species Of Gekko (Squamata: Gekkonidae) From Tà Kóu Nature Reserve, Binh Thuan Province, Southern Vietnam', *Zootaxa*, 2346, pp. 17–28. doi: 10.5281/zenodo.193402.

UNESCO (2015a) *Viet Nam*. Available at: http://whc.unesco.org/en/statesparties/VN (Accessed: 28 September 2020).

UNESCO (2015b) *Vietnam Biosphere Reserves*. Available at: unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/asia-and-the-pacific/vietnam/ (Accessed: 28 September 2020).

Wikramanayake, E. and Rundel, P. (n.d.) *Southeastern Asia: Vietnam*. Available at: https://www.worldwildlife.org/ecoregions/im0211 (Accessed: 28 September 2020).

Xeno-canto (n.d.) *Deo Nui San Pass, Di Linh*. Available at: https://www.xeno-canto.org/location/map?lat=11.448&long=108.0641&loc=Deo%20Nui%20San%20Pass%2C%20Di%20Linh (Accessed: 16 December 2020).

APPENDIX A LIST OF INVASIVE SPECIES POTENTIALLY OCCUR WITHIN THE PROJECT AREA

No	Species	Class	System
1	*Abrus precatorius*	Magnoliopsida	Terrestrial
2	*Acacia farnesiana*	Magnoliopsida	Terrestrial
3	*Acacia mangium*	Magnoliopsida	Terrestrial
4	*Acanthogobius flavimanus*	Actinopterygii	Freshwater
5	*Achatina fulica*	Gastropoda	Terrestrial
6	*Acridotheres tristis*	Aves	Terrestrial
7	*Adenanthera pavonina*	Magnoliopsida	Terrestrial
8	*Aedes aegypti*	Insecta	Terrestrial
9	*Ageratum conyzoides*	Magnoliopsida	Terrestrial
10	*Alpinia zerumbet*	Liliopsida	Terrestrial
11	*Alternanthera sessilis*	Magnoliopsida	Terrestrial
12	*Anas platyrhynchos*	Aves	Freshwater_terrestrial
13	*Annona glabra*	Magnoliopsida	Terrestrial
14	*Anoplolepis gracilipes*	Insecta	Terrestrial
15	*Anoplophora chinensis*	Insecta	Terrestrial
16	*Anser anser*	Aves	Freshwater_terrestrial
17	*Ardisia crenata*	Magnoliopsida	Terrestrial
18	*Avian Influenza Virus*		Terrestrial
19	*Azolla pinnata*	Filicopsida	Terrestrial
20	*Bacopa monnieri*	Magnoliopsida	Terrestrial
21	*Banana bunchy top virus (BBTV)*		Terrestrial
22	*Bidens pilosa*	Magnoliopsida	Terrestrial
23	*Bothriochloa pertusa*	Liliopsida	Terrestrial
24	*Brontispa longissima*	Insecta	Terrestrial
25	*Caesalpinia decapetala*	Magnoliopsida	Terrestrial
26	*Carassius auratus*	Actinopterygii	Freshwater
27	*Cardamine flexuosa*	Magnoliopsida	Terrestrial
28	*Casuarina equisetifolia*	Magnoliopsida	Terrestrial
29	*Cenchrus echinatus*	Liliopsida	Terrestrial
30	*Ceratophyllum demersum*	Magnoliopsida	Terrestrial
31	*Cervus nippon*	Mammalia	Terrestrial
32	*Channa argus*	Actinopterygii	Freshwater
33	*Channa marulius*	Actinopterygii	Freshwater
34	*Chromolaena odorata*	Magnoliopsida	Terrestrial
35	*Cinnamomum camphora*	Magnoliopsida	Terrestrial
36	*Cipangopaludina chinensis*	Gastropoda	Freshwater
37	*Clarias batrachus*	Actinopterygii	Freshwater
38	*Clarias gariepinus*	Actinopterygii	
39	*Coccinia grandis*	Magnoliopsida	Terrestrial
40	*Colubrina asiatica*	Magnoliopsida	Terrestrial
41	*Columba livia*	Aves	Terrestrial
42	*Commelina benghalensis*	Liliopsida	Terrestrial
43	*Ctenopharyngodon idella*	Actinopterygii	Freshwater
44	*Cynodon dactylon*	Liliopsida	Terrestrial
45	*Cyperus rotundus*	Liliopsida	Terrestrial
46	*Cyprinus carpio*	Actinopterygii	Freshwater
47	*Diaphorina citri*	Insecta	Terrestrial

No	Species	Class	System
48	*Dioscorea bulbifera*	Liliopsida	Terrestrial
49	*Duttaphrynus melanostictus*	Amphibia	Freshwater_terrestrial
50	*Eichhornia crassipes*	Liliopsida	Terrestrial
51	*Epipremnum pinnatum*	Liliopsida	Terrestrial
52	*Ficus microcarpus*	Magnoliopsida	Terrestrial
53	*Gallus gallus*	Aves	Terrestrial
54	*Gambusia affinis*	Actinopterygii	Freshwater
55	*Hemidactylus frenatus*	Reptilia	Terrestrial
56	*Herpestes javanicus*	Mammalia	Terrestrial
57	*Hygrophila polysperma*	Magnoliopsida	Terrestrial
58	*Hypophthalmichthys molitrix*	Actinopterygii	Freshwater
59	*Hypophthalmichthys nobilis*	Actinopterygii	Freshwater
60	*Leucaena leucocephala*	Magnoliopsida	Terrestrial
61	*Ligustrum sinense*	Magnoliopsida	Terrestrial
62	*Limnophila sessiliflora*	Magnoliopsida	Terrestrial
63	*Lygodium japonicum*	Filicopsida	Terrestrial
64	*Lygodium microphyllum*	Filicopsida	Terrestrial
65	*Macaca mulatta*	Mammalia	Terrestrial
66	*Maconellicoccus hirsutus*	Insecta	Terrestrial
67	*Melastoma candidum*	Magnoliopsida	Terrestrial
68	*Mimosa diplotricha*	Magnoliopsida	Terrestrial
69	*Mimosa pigra*	Magnoliopsida	Terrestrial
70	*Mimosa pudica*	Magnoliopsida	Terrestrial
71	*Misgurnus anguillicaudatus*	Actinopterygii	Freshwater
72	*Monomorium floricola*	Insecta	Terrestrial
73	*Monopterus albus*	Actinopterygii	Freshwater
74	*Neyraudia reynaudiana*	Liliopsida	Terrestrial
75	*Nypa fruticans*	Magnoliopsida	Terrestrial
76	*Oreochromis*	Actinopterygii	Freshwater
77	*Oreochromis mossambicus*	Actinopterygii	Freshwater
78	*Oryctes rhinoceros*	Insecta	Terrestrial
79	*Oxalis corniculata*	Magnoliopsida	Terrestrial
80	*Paederia foetida*	Magnoliopsida	Terrestrial
81	*Panicum repens*	Liliopsida	Terrestrial
82	*Paratrechina longicornis*	Insecta	Terrestrial
83	*Paspalum vaginatum*	Liliopsida	Terrestrial
84	*Passiflora foetida*	Magnoliopsida	Terrestrial
85	*Pheidole megacephala*	Insecta	Terrestrial
86	*Pistia stratiotes*	Liliopsida	Terrestrial
87	*Poecilia reticulata*	Actinopterygii	Freshwater
88	*Pomacea canaliculata*	Gastropoda	Freshwater
89	*Pomacea insularum*	Gastropoda	Freshwater
90	*Porphyrio porphyrio*	Aves	Freshwater_terrestrial
91	*Prosopis*	Magnoliopsida	Terrestrial
92	*Prunus campanulata*	Magnoliopsida	Terrestrial
93	*Psidium guajava*	Magnoliopsida	Terrestrial
94	*Psittacula krameri*	Aves	Terrestrial

No	Species	Class	System
95	*Pterygoplichthys multiradiatus*	Actinopterygii	Freshwater
96	*Pterygoplichthys pardalis*	Actinopterygii	Freshwater
97	*Pterygoplichthys spp.*	Actinopterygii	Freshwater
98	*Pueraria montana var. lobata*	Magnoliopsida	Terrestrial
99	*Pycnonotus cafer*	Aves	Terrestrial
100	*Pycnonotus jocosus*	Aves	Terrestrial
101	*Pyrus calleryana*	Magnoliopsida	Terrestrial
102	*Python bivittatus*	Reptilia	Terrestrial
103	*Quadrastichus erythrinae*	Insecta	Terrestrial
104	*Rhodomyrtus tomentosa*	Magnoliopsida	Terrestrial
105	*Rottboellia cochinchinensis*	Liliopsida	Terrestrial
106	*Rubus moluccanus*	Magnoliopsida	Terrestrial
107	*Rubus niveus*	Magnoliopsida	Terrestrial
108	*Rusa unicolor*	Mammalia	Terrestrial
109	*Sagittaria sagittifolia*	Liliopsida	Terrestrial
110	*Solenopsis geminata*	Insecta	Terrestrial
111	*Striga asiatica*	Magnoliopsida	Terrestrial
112	*Syzygium cumini*	Magnoliopsida	Terrestrial
113	*Tapinoma melanocephalum*	Insecta	Terrestrial
114	*Terminalia catappa*	Magnoliopsida	Terrestrial
115	*Trachemys scripta elegans*	Reptilia	Freshwater_terrestrial
116	*Trapa natans*	Magnoliopsida	Terrestrial
117	*Urochloa maxima*	Liliopsida	Terrestrial
118	*Urochloa mutica*	Liliopsida	Terrestrial
119	*Viverricula indica*	Mammalia	Terrestrial
120	*Xanthomonas axonopodis pv.citri*	Gammaproteobacteria	Undefined
121	*Xylosandrus compactus*	Insecta	Terrestrial
122	*Yersinia pestis*	Gammaproteobacteria	Terrestrial
123	*Zizania latifolia*	Liliopsida	Terrestrial
124	*Zostera japonica*	Liliopsida	Terrestrial
125	*Zosterops japonicus*	Aves	Terrestrial

APPENDIX B LIST OF BIRDS SPECIES FOUND IN LOI HAI 2 WIND FARM

No.	English Name	Scientific name	Flight mode	Flight height band	Abundance	Potential risk	IUCN Red List	Extent of Occurrence (EOO) (km²)	Found during transect/ vantage point survey	Relative Abundance
1	Yellow Bittern	*Ixobrychus sinensis*	F	B, I	FC	M	LC	51,500,000	TR, VP	5%
2	Cinnamon Bittern	*Ixobrychus cinnamomeus*	F	I, I	FC	M	LC	25,400,000	TR, VP	16%
3	Grey Heron	*Ardea cinerea*	F	I, O	FC	M	LC	136,000,000	TR, VP	14%
4	Purple Heron	*Ardea purpurea*	F	I	FC	M	LC	131,000,000	TR, VP	3%
5	Great Egret	*Ardea alba*	F	B, I	FC	M	LC	36,800,000	VP	
6	Intermediate Egret	*Mesophoyx intermedia*	F	B, I	FC	M	LC	unknow	TR, VP	11%
7	Little Egret	*Egretta garzetta*	F	B, I, O	C	M	LC	151,000,000	TR, VP	35%
8	Cattle Egret	*Bubulcus ibis*	F, S	B, I	C	H	LC	349,000,000	TR, VP	41%
9	Chinese Pond Heron	*Ardeola bacchus*	F	B, I	C	H	LC	9,030,000	VP	
10	Black-crowned Night heron	*Nycticorax nycticorax*	F	I, O	FC	M	LC	296,000,000	VP	
11	Greater Coucal	*Centropus sinensis*	F	B	R	L	LC	19,600,000	TR, VP	11%
12	White-browed Crake	*Porzana cinerea*	F	B	R	L	LC	32,500,000	VP	
13	Red-wattled Lapwing	*Vanellus indicus*	F	B, I	FC	H	LC	15,100,000	TR, VP	8%
14	Little Ringed Plover	*Charadrius dubius*	F, P	B, I	C	H	LC	55,900,000	VP	
15	Common Greenshank	*Tringa nebularia*	F	I	C	H	LC	18,700,000	VP	
16	Wood Sandpiper	*Tringa glareola*	F	I, O	C	H	LC	23,000,000	VP	
17	Red-necked Stint	*Calidris ruficollis*	F	I	FC	H	NT	3,360,000	VP	
18	Black-winged Stilt	*Himantopus himantopus*	F, P	B, I	FC	M	LC	302,000,000	VP	
19	Bar-tailed Godwit	*Limosa lapponica*	F	I	FC	H	NT	9,050,000	VP	
20	Oriental Pratincole	*Glareola maldivarum*	F	B, O	FC	H	LC	25,400,000	TR, VP	3%
21	Red Collared-Dove	*Streptopelia tranquebarica*	F	B, I, O	C	H	LC	18,300,000	TR, VP	32%

No.	English Name	Scientific name	Flight mode	Flight height band	Abundance	Potential risk	IUCN Red List	Extent of Occurrence (EOO) (km^2)	Found during transect/ vantage point survey	Relative Abundance
22	Spotted Dove	*Streptopelia chinensis*	F	B, I, O	C	H	LC	unknow	TR, VP	51%
23	Zebbra Dove	*Geopelia striata*	P, F	B	C	L	LC	6,960,000	TR, VP	49%
24	German's Swiftlet	*Aerodramus germani*	F, S, G	B, I, O	C	H	LC	unknow	TR, VP	57%
25	Blue-tailed Bee-eater	*Merops philippinus*	F, S	B, I	FC	L	LC	22,800,000	TR, VP	14%
26	Black Drongo	*Dicrurus macrocercus*	F	B, I	R	L	LC	17,900,000	VP	
27	Barn Swallow	*Hirundo rustica*	F, G, S	B, I, O	C	M	LC	251,000,000	TR, VP	19%
28	Streak-eared Bulbul	*Pycnonotus blanfordi*	P	I	R	L	LC	1,910,000	TR, VP	5%
29	Common Myna	*Acridotheres tristis*	F	B, I, O	FC	L	LC	18,000,000	VP	
30	Vinous-breasted Starling	*Acridotheres burmannicus*	F, P	B, I, O	FC	L	LC	420,000	TR, VP	5%
31	White-shouldered Starling	*Sturnia sinensis*	F, P	B, I, O	FC	L	LC	1,070,000	TR, VP	5%
32	Zitting Cisticola	*Cisticola juncidis*	F	B	C	L	LC	134,000,000	TR, VP	43%
33	Eurasian Tree Sparrow	*Passer montanus*	F	I	C	L	LC	98,800,000	TR, VP	65%
34	Oriental Skylark	*Alauda gulgula*	F	B, I	FC	L	LC	24,000,000	VP	
35	Paddyfield Pipit	*Anthus rufulus*	F	B	C	L	LC	19,500,000	VP	
36	Plaintive Cuckoo	*Cacomantis merulinus*							TR	11%
37	White-throated Kingfisher	*Halcyon smyrnensis*							TR	24%
38	Green Bee-eater	*Merops orientalis*							TR	11%
39	Eurasian Hoopoe	*Upupa epops*							TR	8%
40	Lineated Barbet	*Megalaima lineata*							TR	5%
41	Ashy Woodswallow	*Artamus fuscus*							TR	24%
42	Common Iora	*Aegithina tiphia*							TR	22%

No.	English Name	Scientific name	Flight mode	Flight height band	Abundance	Potential risk	IUCN Red List	Extent of Occurrence (EOO) (km^2)	Found during transect/ vantage point survey	Relative Abundance
43	Burmese Shrike	*Lanius collurioides*							TR	8%
44	Black Drongo	*Dicrurus macrocercus*							TR	27%
45	Racket-tailed Treepie	*Crypsirina temia*							TR	8%
46	Indochinese Bushlark	*Mirafra erythrocephala*							TR	54%
47	Oriental Skylark	*Alauda gulgula*							TR	11%
48	Red-rumped Swallow	*Cecropis daurica*							TR	14%
49	Common Tailorbird								TR	3%
50	Pied Bushchat	*Saxicola caprata*							TR	3%
51	Oriental Pipit	*Anthus rufulus*							TR	32%
52	House Sparrow	*Passer domesticus*							TR	8%
53	White-rumped Munia	*Lonchura striata*							TR	30%
54	Nutmeg Mannikin	*Lonchura punctulata*							TR	5%

Note:

Flight mode: (F) Flapping; (G) Gliding; (S) Soaring; (P) Perching

Flight Height band: (O) Above the height of RSZ; (I) transverse RSZ; (B) Below the height of RSZ
Abundance: (C) Common; Fairly Common (FC); Rare (R)
Potential Risk: (H) High Risk; (M) Medium Risk; (L) Low Risk
TR: Found in transect surveys
VP: Found in vantage point surveys

APPENDIX C LIST OF BIRDS SPECIES FOUND IN DAM VUA SALT-PANS ON 9 SEPTEMBER 2017

No.	English name	Scientific name	IUCN Red List	Point Count	Migrant
1	Black-winged Stilt	*Himantopus himantopus*	LC	≥ 5	
2	Common Redshank	*Tringa totanus*	LC	≥ 1	
3	Eurasian Tree Sparrow	*Passer montanus*	LC	≥ 23	
4	Intermediate Egret	*Mesophoyx intermedia*	LC	≥ 1	
5	Lesser Sand Plover	*Charadrius mongolus*	LC	≥ 18	
6	Little Egret	*Egretta garzetta*	LC	≥ 10	
7	Little Ringed Plover	*Charadrius dubius*	LC	≥ 10	Migrant
8	Long-toed Stint	*Calidris subminuta*	LC	≥ 30	
9	Marsh Sandpiper	*Tringa stagnatilis*	LC	≥ 7	
10	Red-necked Stint	*Calidris ruficollis*	NT	≥ 20	Migrant
11	Ruddy Turnstone	*Arenaria interpres*	LC	≥ 3	
12	Whiskered Tern	*Chlidonias hybrida*	LC	≥ 20	
13	White-faced Plover	*Charadrius dealbatus*	LC	≥ 5	
14	Wood Sandpiper	*Tringa glareola*	LC	≥ 1	Migrant
15	Zebra Dove	*Geopelia striata*	LC	≥ 2	

Note: NT: Near Threatened; LC: Least Concern

APPENDIX D LIST OF CANDIDATE SPECIES WITHIN THE EAAA1 AND EAAA2

Table D. 1 Candidate species within the EAAA1

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
1	AVES	*Upupa epops*	Common Hoopoe	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Artificial/Terrestrial, Savanna	This migratory species is found throughout Asia, Europe and Africa. The EOO is estimated to be 77,600,000km2. The overall population is estimated at 5,000,000-10,000,000 individuals.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	11.876695, 108.409637
2	AVES	*Merops philippinus*	Blue-tailed Bee-eater	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Wetlands (inland)	This species is found throughout southern Asia, Southeast Asia and New Guinea. The species breeds in Vietnam. It has an EOO of 22,800,000 km2. The species global population has not yet been quantified	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, thus the species does not meet thresholds of Criterion 1 and 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.0709, 108.428
3	AVES	*Tringa glareola*	Wood Sandpiper	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Aquatic & Marine	This species inhabits northern Asia, most of Africa, southern Asia , Southeast Asia and Australaisa. The species utilises Vietnam during the non-breeding season. The EOO for this species is 23,000,000km2. The pupulation trend is stable	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect, VPs, Dam Vua salt-pans	11.8882, 108.424
4	AVES	*Lanius collurioides*	Burmese Shrike	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Savanna, Shrubland, Forest	This species is found throughout Bangladesh, southern China, eastern India, Myanmar, Thailand and Vietnam and Cambodia. The EOO for this species is 2,700,000km2. The global population has not yet been quantified, but considered stable.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	11.541028, 108.071524
5	AVES	*Artamus fuscus*	Ashy Woodswallow	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Savanna	This species is found throughout southern Asia (India, Himalayas, Thailand, Cambodia, Vietnam, and Malaysia). The EOO for this species 9,310,000km2. The global population for this species has not yet been quantified, although it is considered common within its range	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	11.9244, 108.447
6	AVES	*Cecropis daurica*	Red-rumped Swallow	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Rocky areas (eg. inland cliffs, mountain peaks), Wetlands (inland), Artificial/Terrestrial, Shrubland	The EOO for this species is 99,900,000km2. The global population is approximately in 10,000,000-500,000,000 individuals	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	11.8882, 108.424
7	AVES	*Cacomantis merulinus*	Plaintive Cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Shrubland, Grassland	This species is found throughout Southeast Asia and parts of India. The species actively breeds in Vietnam. The EOO for this species is 12,900,000km2. The global population has not yet been quantified but considered stable. The population in China has been estimated at c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	11.9362, 108.381

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
8	AVES	*Streptopelia tranquebarica*	Red Turtle-dove	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Savanna	This migratory species occurs in forest, shrub land and savannah habitat types. This species is distributed throughout Asia. The species winters in Vietnam, and species distribution includes the Project area. This species breeds in Indonesia and the Philippines. Its EOO is 18,300,000km2. The global population size has not been quantified, but the species is described as common to abundant, while national population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	10.9366, 108.177
9	AVES	*Merops orientalis*	Asian Green Bee-eater	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Desert, Wetlands (inland), Artificial/Terrestrial, Savanna, Shrubland	This species is found throughout southern Asia. The species is considered a resident of Vietnam. It has an EOO of 11,600,000km2. The species global population has not yet been quantified, but considered increasing and locally common throughout its very large range	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	10.9823, 108.339
10	AVES	*Saxicola caprata*	Pied Bushchat	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Savanna, Artificial/Terrestrial, Grassland, Wetlands (inland)	This species is inhabits western and southern Asia, Southeast Asia and New Guinea. The EOO for this species is 30,300,000km2. The global population has not yet been assessed, but considered to be stable	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	12.0585, 108.135
11	AVES	*Bubulcus ibis*	Cattle Egret	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Grassland, Artificial/Terrestrial	This wide ranging migratory species is found consistently through the following areas: USA, South America, Africa, southern Asia and Australasia. The species has an EOO of 349,000,000km2. The global population has been estimated at 4,000,000 – 9,850,000 individuals.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.9362, 108.381
12	AVES	*Dicrurus macrocercus*	Black Drongo	LC	N/A	NO	FALSE	FALSE	TRUE	Savanna, Artificial/Terrestrial, Shrubland, Grassland	This species is found throughout southern Asia and parts of Southeast Asia. The EOO for this species is 17,900,000km2. The global population has not yet been quantified, however, there is an estimated 10,000-100,000 breeding pairs in China	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	12.1024, 108.36
13	AVES	*Ixobrychus cinnamomeus*	Cinnamon Bittern	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Wetlands (inland), Forest, Artificial/Aquatic & Marine	This species is found parts of India, Pakistan, Bhutan, Myanmar, Bangladesh, Sri Lanka, south-eastern China and Southeast Asia. The EOO for this species 25,400,000km2. The global population has been estimated at 130,000-2,000,000 individuals	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.8835, 108.409

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
14	AVES	*Ixobrychus sinensis*	Yellow Bittern	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Aquatic & Marine, Wetlands (inland), Grassland, Forest	This species is found throughout Southeast Asia, eastern Asia and parts of the Himalayas. Its EOO is 36,000,000km2. The global population has been estimated at 100,000 – 1,000,000	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.879, 108.426
15	AVES	*Sturnia sinensis*	White-shouldered Starling	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Artificial/Terrestrial, Savanna	This species is found throughout south-eastern China. Taiwan, Thailand, Vietnam, Cambodia and Laos. The species utilises Vietnam in the non-breeding season. The EOO for this species 1,070,000km2. The global population has not yet been quantified, however, considered stable	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.9478, 108.443
16	AVES	*Hirundo rustica*	Barn Swallow	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland, Savanna, Shrubland	This widespread species is found on all continents except Antarctica. The species is continuously distributed along eastern Asia. Its EOO is 251,000,000km2. The global population of mature individuals is estimated at 290,000,000 – 499,999,999. This species was identified during field surveys.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, thus the species does not meet thresholds of Criterion 1 and 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.9362, 108.381
17	AVES	*Egretta garzetta*	Little Egret	LC	N/A	NO	FALSE	FALSE	TRUE	Marine Coastal/Supratidal, Marine Intertidal, Wetlands (inland), Grassland, Artificial /Aquatic & Marine, Marine Neritic, Forest	The Little egret is found throughout southern Asia, Southeast Asia, Australasia, parts of Europe, parts of Africa and parts of western Asia. Its EOO is 151,000,000km2. The global population is estimated at 660,000-3,150,000.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect, VPs, Dam Vua salt-pans	11.9498, 108.449
18	AVES	*Ardeola bacchus*	Chinese Pond-heron	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Wetlands (inland), Marine Intertidal, Artificial/ Aquatic & Marine	he population size may be moderately small to large, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	VPs	11.8882, 108.424
19	AVES	*Nycticorax nycticorax*	Black-crowned Nightheron	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Marine Intertidal	Tropical populations are not migratory but may undergo seasonal post-breeding dispersive movements (del Hoyo et al. 1992). In temperate regions breeding occurs in the local spring, with tropical and subtropical nesting generally coinciding with the rains	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	VPs	11.4629, 108.355

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
20	AVES	*Charadrius dubius*	Little Ringed Plover	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial /Terrestrial, Artificial / Aquatic & Marine	Siberian and other Asian populations migrate to wintering grounds in South-East Asia and India (only crossing Japan on the northward return migration) (del Hoyo et al. 1996). Some populations in South-East Asia, India, New Guinea and the Philippines do not migrate but are sedentary or locally nomadic in response to water levels	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect, VPs, Dam Vua salt-pans	11.9363, 108.445
21	AVES	*Tringa nebularia*	Common Greenshank	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Terrestrial, Artificial/Aquatic & Marine	This species is fully migratory and generally migrates overland on a broad front, although the majority of Western European birds passes through coastal and estuarine sites	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect, VPs, Dam Vua salt-pans	11.8665, 109.107
22	AVES	*Calidris ruficollis*	Red-necked Stint	NT	N/A	NO	FALSE	FALSE	TRUE	Grassland, Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal	During the breeding season the species uses low altitude montane tundra in the subalpine belt. In the non-breeding season it mainly uses coastal and intertidal mudflats, sheltered inlets, bays and lagoons but it also uses freshwater, brackish and saltwater wetlands and occasionally sandy beaches and rocky shorelines. The species is restricted to the East Asian-Australasian Flyway and habitat loss at critical stopover sites in the Yellow Sea is suspected to be the most important threat to this species.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect, VPs, Dam Vua salt-pans	11.8665, 109.107
23	AVES	*Ardea cinerea*	Grey Heron	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Aquatic & Marine	This species is a generalist in its habitat use, although shallow water, relatively large prey, and four or five months of ice-free breeding season are among the essential characteristics of its habitat	Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	11.8665, 109.107
24	AVES	*Glareola maldivarum*	Oriental Pratincole	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Wetlands (inland), Marine Intertidal, Artificial/Terrestrial	There is evidence to suggest that the European population (200,000-510,000 pairs, occupying 50-74% of the global breeding range) has declined by up to 30% over ten years (three generations), but this may reflect shifts in breeding populations, populations in Asia are not thought to be declining and wintering populations in Africa appear to be increasing.	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect	11.8882, 108.424

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
25	AVES	*Alauda gulgula*	Oriental Skylark	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Grassland, Wetlands (inland), Marine Intertidal, Artificial/Terrestrial	The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	N/A
26	AVES	*Ardea purpurea*	Purple Heron	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Wetlands (inland), Marine Intertidal	African and tropical-Asian populations are largely sedentary however, occasionally making local dispersive movements. In migratory populations, the autumn migration occurs from August to October, with the return passage in the spring beginning in March	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	Transect and VPs	N/A
27	AVES	*Limosa lapponica*	Bar-tailed Godwit	NT	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Marine Neritic, Marine Intertidal	The species is threatened by the degradation of stopover and non-breeding sites due to land reclamation, shellfisheries, pollution, human disturbance, reduced river flows, and in some areas the invasion of mudflats and coastal saltmarshes by mangroves (owing to sea-level rise and increased sedimentation and nutrient loads at the coast from uncontrolled development and soil erosion in upstream catchment areas)	This species was found in field survey. Considering the very large EOO in comparison to the proportionally small Project EAAA1, thus the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	VPs	N/A
28	AVES	*Trochalopteron yersini*	Collared Laughingthrush	EN	N/A	NO	TRUE	TRUE	FALSE	Forest, Shrubland	Trochalopteron yersini is endemic to the Da Lat plateau, Vietnam. It is known from a handful of localities the most important of which appear to be Mount Lang Bian, Mount Bi Doup and Chu Yang Sin National Park, with it recently discovered for the first time in Da Nhim Watershed Protection Forest (Mahood and Eames 2012). It is localised and generally uncommon. The population is estimated to number 2,500-9,999 mature individuals based on an assessment of known records, descriptions of abundance and range size. A government resettlement programme has greatly increased human pressure on the Da Lat plateau, increasing problems of forest degradation and fragmentation through logging, shifting agriculture, fuelwood-collection and charcoal production. It is resident in dense undergrowth of primary and logged montane evergreen forest, secondary growth and scrub bordering forest, occupying a narrow altitudinal band from 1,500-2,440 m, although it has been recorded below 1,450 m (Mahood and Eames 2012). It is generally encountered in monospecific flocks of 4-8 individuals. Juveniles have been collected between April-June, suggesting the main breeding season is probably from March-May.	This species was found in Phuoc Binh KBA within a 50km radius of the project. Considering the known distribution of species, it is unlikely that the EAAA1 contains habitat supporting a number of individuals meeting the thresholds of Criterions.	N/A	12.046923, 108.434891

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
29	AVES	*Buceros bicornis*	Great Hornbill	VU	VU	NO	TRUE	FALSE	TRUE	Wetlands (inland)	The EOO is quite large. The population trend is unknow. This species can be found in Phuoc Binh IBA.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
30	AVES	*Rhyticeros undulatus*	Wreathed Hornbill	VU	N/A	NO	TRUE	FALSE	FALSE	Forest	The species occurs in south-east Asia from southern Bhutan, Bangladesh and north-east India east to Cambodia, Laos and Vietnam, and south through Malaysia and Thailand to Indonesia (Sumatra, Borneo, Java, Bali and several nearby islands) and Brunei. The global population size has not been quantified, but the species is reported to be locally common in several areas across its wide range. The species has a very large home range (Keartumsom et al. 2011) and therefore requires large tracts of undisturbed forest. Forest destruction in the Sunda region has been extensive as a result of commercial and illegal logging, conversion to agriculture (particularly plantations) and increasing human population pressure. The species generally prefers areas with extensive forest cover, while it avoids areas with even low human population.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4883, 108.135
31	AVES	*Columba punicea*	Pale-capped Pigeon	VU	EN	NO	TRUE	FALSE	FALSE	Habitat type Forest, Shrubland, Artificial/Terrestrial	This species is native to India, Nepal, Vietnam. The global population is considered estimated at 2500-9999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 3,050,000 km2. This specice is mentioned in Vietnam Redlist	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426
32	AVES	*Turnix tanki*	Yellow-legged Buttonquail	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Artificial/Terrestrial, Shrubland, Forest	This migratory species occurs in grassland, forest and shrub land habitat types. This species is found in Bangladesh, Bhutan, Cambodia, China, India, Korea, Democratic People's Republic of, Lao People's Democratic Republic, Myanmar, Nepal, Pakistan, Russian Federation (Eastern Asian Russia), Thailand, Vietnam. Vietnam is identified as an area used for breeding. The EOO is estimated to be 19,400,000km2. The global population size has not been quantified, but the species is apparently common through much of its range and is considered to be stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	10.9819, 108.342

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
33	AVES	*Eurystomus orientalis*	Oriental Dollarbird	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Shrubland	The estimated EOO is 32,400,000 km2. The estimated population is unknown	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
34	AVES	*Merops leschenaulti*	Chestnut-headed Bee-eater	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Forest, Artificial/Terrestrial, Wetlands (inland)	This species is found and breeds in Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam. It has an EOO of 12,000,000km2. The species global population has not yet been quantified, but considered increasing and locally common throughout its very large range.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
35	AVES	*Clamator coromandus*	Chestnut-winged Cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Shrubland, Savanna, Forest	This species is found throughout southern Asia and Southeast Asia. Its EOO is 13,100,000km2. The global population has not yet been quantified, however, considered fairly common within its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9484, 108.451
36	AVES	*Cuculus micropterus*	Indian Cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout eastern and southern Asia and Southeast Asia. Its EOO is 26,200,000km2. The global population size has not been quantified, but the species is reported to be fairly common and widespread, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Korea and possibly c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Russia.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.473,108.066
37	AVES	*Cacomantis sonneratii*	Banded Bay Cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Shrubland	This species is found throughout Southeast Asia, parts of India and the Himalayas. The species actively breeds in Vietnam. The EOO for this species is 14,800,000km2. The global population has not yet been quantified, however, it is considered fairly common within its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381
38	AVES	*Chrysococcyx xanthorhynchus*	Violet Cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout Southeast Asia and parts of Myanmar. The species actively breeds in Vietnam. The EOO for this species is 10,600,000km2. The global population has not yet been quantified but considered descreasing.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
39	AVES	*Eudynamys scolopaceus*	Western Koel	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Forest, Artificial/Terrestrial	This species is found in southern Asia and Southeast Asia. The EOO for this species is 34,200,000km2. The global population has not yet been quantified, although considered common throughout most of its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9498, 108.449
40	AVES	*Loriculus vernalis*	Vernal Hanging-parrot	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Shrubland, Forest	This species is found throughout parts of India, Bangladesh, Myanmar, Cambodia, Vietnam, Thailand and Laos. The EOO for this species was 6,460,000km2. The global population for this species has not been quantified	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
41	AVES	*Hirundapus caudacutus*	White-throated Needletail	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Shrubland	This species is found in Southeast Asia. The EOO for this species is 6,460,000km2. The global population has not yet been quantified but considered stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
42	AVES	*Hirundapus cochinchinensis*	Silver-backed Needletail	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	This migratory species prefers forest habitat types and is distributed throughout Asia. This species distribution includes Vietnam. This species is also thought to reside in Cambodia, China, India, Laos, Malaysia, Myanmar, Nepal, Singapore and Thailand (Breeding locations unknown). Its EOO is 2,470,000km2. The global population size has not been quantified, but the species is reported to be locally common to uncommon	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426
43	AVES	*Apus pacificus*	Pacific Swift	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The estimated EOO is 27,400,000 km2. The estimated population is unknow	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
44	AVES	*Macropygia unchall*	Barred Cuckoo-dove	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout parts of Bhutan, China, Indonesia, Malaysia, Nepal, India, Bangladesh, Myanmar, Cambodia, Vietnam, Thailand and Laos. The EOO for this species was 19,000,000km2. The global population for this species has not been quantified, but is considered stable with the population in China estimated at c.100-100,000 breeding pairs.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.880202, 108.407035
45	AVES	*Treron curvirostra*	Thick-billed Green-pigeon	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The estimated EOO is 9,970,000 km2. The global population size has not been quantified, but the species is described as generally common to abundant (Gibbs et al. 2001).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.934282, 108.377384

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
46	AVES	*Gallinago stenura*	Pintail Snipe	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Grassland, Forest, Shrubland, Artificial/Aquatic & Marine	The Pintail Snipe is found throughout north-eastern Asia and parts of central Asia, parts of southern Asia and Southeast Asia. The species inhabits Vietnam during the non-breeding season. The EOO for this species is 12,900,000km2. The global population of individuals is estimated at 50,000 – 2,000,000	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9498, 108.449
47	AVES	*Gallinago gallinago*	Common Snipe	LC	N/A	NO	FALSE	FALSE	TRUE	Marine Neritic, Wetlands (inland), Grassland, Forest, Artificial/Aquatic & Marine	The Common Snipe is found throughout most of Asia (except central parts), Europe and parts of Africa. The species inhabits Vietnam during the non-breeding season. The EOO for this species is 21,500,000 km2. The global population of mature individuals is estimated at 15,000,000 – 29,000,000	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	10.9817, 108.342
48	AVES	*Tringa ochropus*	Green Sandpiper	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland	This species inhabits northern Asia, most of Africa, southern Asia, Europe and Southeast Asia. The EOO for this species is 24,600,000km2. The global population is estimated at 1,200,000-3,600,000 individuals. The popuation trend is increasing	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.3428, 108.897
49	AVES	*Aviceda leuphotes*	Black Baza	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This small Bird of prey species is found throughout parts of India, Bangladesh, Cambodian, Myanmar, Nepal, Thailand, Indonesia, Malaysia, Singapore, Sri Lanka and Vietnam. The species breeds in Vietnam and prefers forest and inland waters as its habitat type. The EOO for this species is 6,880,000km2. The global population has been estimated at >10,000 individuals.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
50	AVES	*Pernis ptilorhynchus*	Oriental Honey-buzzard	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Grassland	This migratory species is found from southern Asia, Southeast Asia to Eastern Russia Asia. Its EOO is 38,200,000km2. The global population is estimated at 100,000 individual and considered stable.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
51	AVES	*Circus melanoleucos*	Pied Harrier	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	This species is found through southern Asia, parts of Southeast Asia and parts of Mongolia, north eastern China and southeastern Russia. The species spends the non-breeding season in Vietnam. The EOO for this species is 6,080,000km2. There has been an estimated 10,000-100,000 breeding pairs in China during migration.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.7545, 108.364

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
52	AVES	*Accipiter badius*	Shikra	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Artificial/Terrestrial, Savanna, Shrubland	This migratory species is native to central and southern Africa, parts of central Asia, southern Asia and Southeast Asia. This species breeds in Vietnam. The global population is considered stable and estimated at 500,000 – 999,999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 62,500,000km2.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9423, 108.408
53	AVES	*Accipiter gularis*	Japanese Sparrowhawk	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Shrubland, Wetlands (inland)	This migratory species central eastern and Southeast Asia during the non-breeding season and China, Japan, Korea and Eastern Asian Russia during the breeding season. The EOO is 11,400,000km2. The global population is estimated to be in the tens of thousands and considered stable.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.1027, 108.362
54	AVES	*Butastur indicus*	Grey-faced Buzzard	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Forest, Artificial/Aquatic & Marine	This species is found throughout most of eastern Asia and Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 3,280,000km2. The global population for this species is estimated at > 100,000 individuals	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0465, 108.434
55	AVES	*Falco tinnunculus*	Common Kestrel	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Shrubland, Forest, Grassland	The Common Kestrel is distributed throughout Europe, most of Africa (except Sahara) and most of Asia. The EOO is 106,000,000km2. The global number of mature individuals is estimated at 4,000,000 – 6,500,000.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
56	AVES	*Falco severus*	Oriental Hobby	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Rocky areas (eg. inland cliffs, mountain peaks), Grassland	This species is found throughout southern and Southeast Asia (patchy). The species actively breeds in Vietnam. The EOO for this species is 20,300,000km2. The global population of mature individuals is estimated at 670 - 6,700. The species is found in moist lowland and mangrove forests, grasslands, rocky areas and artificial arable land/ plantations. The oriental hobby has a large home range.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.884201, 108.420625
57	AVES	*Oriolus chinensis*	Black-naped Oriole	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout eastern China, parts of southern Asia and parts of Southeast Asia. The EOO is 17,400,000km2. The global population has not yet been quantified, but the species is described as common, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; < c.100 breeding pairs and < c.50 individuals on migration in Taiwan; c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Korea and c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Russia	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
58	AVES	*Oriolus tenuirostris*	Slender-billed Oriole	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found in Myanmar, Butan, Bangladesh, vietnam. EOO is 1,600,000km2. The population trend is decreasing	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426
59	AVES	*Oriolus traillii*	Maroon Oriole	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	This species utilises the Himalayas, Myanmar, Thailand, southern China, Vietnam, Laos and Cambodia. The EOO for this species is 5,200,000km2. The global population has not been estimated, but considered fairly common to uncommon	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.520253, 108.06553
60	AVES	*Lalage melaschistos*	Black-winged Cuckooshrike	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout parts of India, the Himalayas, southern Asia and eastern China. The EOO for this species is 8,190,000km2. There is an estimated 10,000 – 100,000 individuals in China.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
61	AVES	*Pericrocotus divaricatus*	Ashy Minivet	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Shrubland	This species is found throughout eastern Asia, parts of Southeast Asia and southern Asia. Its EOO is 3,110,000km2. There is not global population estimate for this species yet, however, the species has been described as fairly common.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
62	AVES	*Pericrocotus ethologus*	Long-tailed Minivet	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found in Thailand, India, Vietnam. EOO is 10,100,000km2. The population trend is decreasing	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.095821, 108.376112
63	AVES	*Dicrurus leucophaeus*	Ashy Drongo	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Artificial/Terrestrial, Savanna, Forest	This species is found throughout southern Asia and parts of Southeast Asia. The EOO for this species is 21,200,000km2. The global population has not yet been quantified, however, there is an estimated 10,000-100,000 breeding pairs in China.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.494617, 108.068771
64	AVES	*Monticola gularis*	White-throated Rock-thrush	LC	N/A	NO	FALSE	FALSE	TRUE	Rocky areas (eg. inland cliffs, mountain peaks), Forest, Shrubland	This species is found in north eastern Asia, parts of China and parts of Southeast Asia. The species spends the non-breeding season in Vietnam. The EOO is 3,270,000 km2. The global population is not yet quantified, however, considered stable.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.448, 108.064
65	AVES	*Monticola solitarius*	Blue Rock-thrush	LC	N/A	NO	FALSE	FALSE	TRUE	Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Shrubland, Artificial/Terrestrial	This species is scattered throughout north Africa, southern Asia, Southeast Asia, southern Europe and parts of eastern Asia. Its EOO is 66,600,000km2. The global population of mature individuals is estimated at 1,000,000 – 3,999,999	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.473, 108.066

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
66	AVES	*Turdus obscurus*	Eyebrowed Thrush	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	This migratory species is found in Europe, Central Asia, Africa and South East Asia. The breeding population is found within Mongolia; Russian Federation (Central Asian Russia) The EOO is estimated to be 6,690,000 km2. The population is unknown and the population trend is considered to be unknown	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426
67	AVES	*Muscicapa sibirica*	Dark-sided Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland	This species utilises north-eastern Asia, the Himalayas and parts of Southeast Asia. It is considered extant to Vietnam. It has an EOO of 19,600,000km2. The global population has not been estimated but considered stable. The Chinese population is estimated at 10,000-100,000 breeding pairs.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
68	AVES	*Muscicapa ferruginea*	Ferruginous Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	This species utilises Bhutan, India, Myanmar, Nepal, Chian, Vietnam, Laos, Thailand, Indonesia, Malaysia, Philippines and Singapore. It is considered a resident of Vietnam. It has an EOO of 30,600,000km2. The global population has not been estimated but considered decreasing. The Chinese population is estimated at 54000000-83999999 breeding pairs.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4614, 108.059
69	AVES	*Ficedula mugimaki*	Mugimaki Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Shrubland	This species is found in north central Asia (e.g. Mongolia) and parts of Southeast Asia. The species spends the non-breeding season in Vietnam. The EOO for this species is 7,500,000km2. The global population has not yet been quantified, although China is estimated to contain 100 – 100,000 breeding pairs.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.883416, 108.407028
70	AVES	*Eumyias thalassinus*	Verditer Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout most of southern Asia and parts of Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 13,300,000km2. The global population is unknown, however, considered common within its range.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.895139, 108.412
71	AVES	*Agropsar sturninus*	Purple-backed Starling	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Artificial/Terrestrial	This migratory species occurs in a variety of habitat types including grassland and forest. It occurs in countries such as Cambodia, China and Vietnam during the non-breeding season. In the breeding season the species is known to occur in Korea and Mongolia. The EOO is 4,430,000km2. The global population is unknown, while national population estimates include: c.100-100,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.881903, 108.411522

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
72	AVES	*Delichon dasypus*	Asian House Martin	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Rocky areas (eg. inland cliffs, mountain peaks), Artificial/Terrestrial	This species is found in parts of eastern Asia and southern Asia and also Southeast Asia. Its EOO is16,500,000km2. The global population is increasing. National population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Taiwan; c.10,000-100,000 breeding pairs, c.1,000-10,000 individuals on migration and < c.1,000 wintering individuals in Japan and c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Russia	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0422, 108.428
73	AVES	*Locustella lanceolata*	Lanceolated Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Aquatic & Marine, Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	This species is chiefly found in eastern and northern Asia but is also found in northern Europe and southern Asia. Its EOO is17,600,000km2. The global population of mature individuals is estimated at 600,000 – 1,200,000.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
74	AVES	*Acrocephalus bistrigiceps*	Black-browed Reed-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Grassland, Artificial/Aquatic & Marine	This species is found throughout Japan, eastern China, eastern Mongolia, Korea and Southeast Asia. The EOO is 6,510,000km2. The global population has not been quantified but considered stable.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9498, 108.449
75	AVES	*Phylloscopus schwarzi*	Radde's Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Wetlands (inland), Forest, Shrubland	This species is found in throughout eastern Asia and parts of Southeast Asia. The species is extant to Vietnam. The EOO for this species is 6,190,000km2. The global population is unquantified, however, it it stable population	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.5581, 108.08
76	AVES	*Phylloscopus inornatus*	Yellow-browed Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	This species is continuously found throughout northern, central and eastern Asia and parts of southern Asia. This species is extant to Vietnam. The EOO is 15,600,000km2. The global population has not yet been quantified, however, the population is considered stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381
77	AVES	*Phylloscopus tenellipes*	Pale-legged Leaf-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Habitat type Forest, Shrubland, Artificial/Terrestrial	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 1,560,000km2.The populationtrend is stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.8833, 108.434

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
78	AVES	*Dendronanthus indicus*	Forest Wagtail	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout most of eastern and Southeast Asia and southwest India. The EOO is 7,080,0000km2. The global population size has not been quantified, but the species is reported to be locally common, while national population estimates include: c.100-10,000 breeding pairs and < c.1,000 individuals on migration in China; < c.50 individuals on migration and < c.50 wintering individuals in Taiwan; c.100-10,000 breeding pairs and < c.1,000 individuals on migration in Korea and c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Russia	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9423, 108.408
79	AVES	*Motacilla alba*	White Wagtail	LC	N/A	NO	FALSE	FALSE	TRUE	Marine Intertidal, Artificial/Terrestrial, Grassland, Wetlands (inland), Desert	This species is found throughout all of Eurasia and in parts of north Africa. Its EOO is 37,800,000km2. The global population of mature individuals has been estimated at 135,000,000-221,000,000	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.8882, 108.424
80	AVES	*Motacilla cinerea*	Grey Wagtail	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Aquatic & Marine, Wetlands (inland), Artificial/Terrestrial, Grassland	This widespread species is distributed throughout most of Europe, parts of north and eastern Africa, the Middle East, very large areas of central northern Asia, southern Asia, Southeast Asia and eastern Asia. Its EOO is 60,700,000km2. The number of mature individuals is estimated at 5,000,000 – 19,999,999	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.823962, 108.334688
81	AVES	*Anthus hodgsoni*	Olive-backed Pipit	LC	N/A	NO	FALSE	FALSE	TRUE	Rocky areas (eg. inland cliffs, mountain peaks), Forest, Grassland, Shrubland, Artificial/Terrestrial	This species is found throughout most of northern Asia, eastern Asia and southern Asia. The species is extant to Vietnam. Its EOO is 29,200,000km2. The global population is not yet quantified, although considered stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426
82	AVES	*Chloris sinica*	Oriental Greenfinch	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Artificial/Terrestrial, Shrubland	The Oriental greenfinch is found throughout eastern Asia. Its EOO is 15,000,000km2. The global population has not yet been quantified, although it is estimated that 10,000-100,000 breeding pairs inhabit China during migration[64].	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.5827, 109.03
83	AVES	*Emberiza fucata*	Chestnut-eared Bunting	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Artificial/Terrestrial, Wetlands (inland), Grassland	This species is found along eastern Asia and within the Himalayas region. Its EOO is 15,600,000km2. The global population size has not been quantified, but the species is reported to be common to locally common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.5783, 108.085

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
84	AVES	*Caprimulgus jotaka*	Grey Nightjar	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Rocky areas (eg. inland cliffs, mountain peaks), Shrubland	This migratory species occurs in forest, rocky areas (inland cliffs, mountain peaks) and shrub land habitat types. It resides in Bangladesh, Bhutan, China, Hong Kong, India, Malaysia, Myanmar, Nepal and Pakistan. This species breeds in Korea, Japan, Mongolia and Vietnam. The EOO is 17,700,000km2. The global population is unknown and is stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
85	AVES	*Hierococcyx sparverioides*	Large Hawk-cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout southern and eastern China, the Himalayas, southern India, Thailand, Myanmar, Cambodia, Vietnam, Laos, Malaysia and Indonesia. The species actively breeds in Vietnam. The EOO is 9,890,000km2. The global population has not yet been quantified, although considered stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4436, 108.072
86	AVES	*Otus sunia*	Oriental Scops-owl	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Shrubland, Forest	This migratory species occurs in shrub land and forest habitat types. This species is continuously found throughout eastern Asia, most of southern Asia and parts of Southeast Asia. The species winters in Vietnam, and species distribution includes Project area. The species uses but is not limited to Korea, China, India and Japan during the breeding season. The EOO is 22,200,000km2. The global population size has not been quantified, but the species is reported to be very abundant regionally, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; < c.1,000 individuals on migration in Taiwan; c.100-100,000 breeding pairs and c.50-10,000 individuals on migration in Korea; c.100-100,000 breeding pairs and c.50-10,000 individuals on migration in Japan and c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Russia	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.1024, 108.36
87	AVES	*Buteo japonicus*	Japanese Buzzard	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Forest, Shrubland, Grassland	This migratory species is known from Southeast Asia, central Asia and Micronesia. The EOO is 10,600,000km2. Due to recent taxonomic splits, the population size of this species is unknown. The population trend is also unknown	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9163, 108.434
88	AVES	*Phylloscopus soror*	Alström's Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 1,290,000 km2.The populationtrend is decreasing.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
89	AVES	*Acrocephalus orientalis*	Oriental Reed-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Savanna, Shrubland, Grassland	This migratory species is found throughout Southeast Asia, Japan, eastern China, eastern Mongolia and Korea. This species EOO is 8,170,000km2. The population is not yet quantified, although considered to be decreasing	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.3428, 108.897
90	AVES	*Hierococcyx nisicolor*	Whistling Hawk-cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found continuously throughout Vietnam, Laos, Thailand, Cambodia and parts of China, India, Bhutan, Nepal, Malaysia and Indonesia. The species is a resident of Vietnam. The EOO for this species is 3,980,000km2. The global population size has not been quantified, but the species is reported to be uncommon to rare throughout its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
91	AVES	*Ficedula albicilla*	Red-throated Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is foundin Thailand, Myanmar, China, Rusia, IndiaVietnam. The EOO for this species is 14,400,000 km2.The population trend is stable	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.041708, 108.426478
92	AVES	*Schoenipar us klossi*	Black-crowned Fulvetta	LC	N/A	NO	FALSE	TRUE	FALSE	Shrubland, Forest	This species occurs in understorey of broadleaved evergreen forest, secondary growth, and forest edge at 50-2,100 m altitude. It is found in Vietnam with an EOO of 10,200km2. The global population size has not been quantified, but the species is described as fairly common within its tiny range	Because the habitat within the EAAA1 is different habitat that species occur (broadleaved evergreen forest), it is unlikely that the EAAA1 contains a number of individuals meeting the thresholds of Criterion 2	N/A	12.0465, 108.434
93	AVES	*Dicrurus hottentottus*	Hair-crested Drongo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found throughout southern Asia and parts of Southeast Asia. The EOO for this species is 22,300,000km2. The global population has not yet been quantified	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.541988, 108.070018
94	AVES	*Hypothymis azurea*	Black-naped Monarch	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Forest, Artificial/Terrestrial	This species is found throughout most of India, the Himalayas and Southeast Asia. The EOO for this species is 19,800,000km2. The global population has not yet been quantified, although there is an estimated 10,000-100,000 breeding pairs in Taiwan	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
95	AVES	*Cyanoptila cyanomelana*	Blue-and-white Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The Blue-and-white flycatcher is found in parts of eastern Asia (eastern China, Korea, and Japan) and parts of Southeast Asia. It has an EOO of 3,290,000 km2. The global population is not yet quantified, China contains 10,000 – 100,000 breeding pairs.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.5581, 108.08

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
96	AVES	*Anthus richardi*	Richard's Pipit	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Artificial/Terrestrial	This migratory species is distributed throughout central and eastern Asia.. Its EOO is 16,000,000km2. The global population has not yet been quantified, although considered to be between 90,000-120,000 mature individuals.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.0645, 108.428
97	AVES	*Motacilla tschutschensis*	Eastern Yellow Wagtail	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine, Shrubland, Grassland	This species is found in Thailand, Myanmar, Indonesia, China, Vietnam. The EOO for this species is 15,900,000 km2.The populationtrend is estimated approximately 50000000-150000000 mature individuals	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9482, 108.448
98	AVES	*Hypsipetes leucocephalus*	Black Bulbul	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Forest, Grassland	This species is found throughout most of the Himalayas and most of Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 8,830,000km2. The global population has not yet been quantified, although there is an estimated 100,000-1,000,000 breeding pairs in Taiwan	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.883601, 108.419755
99	AVES	*Phylloscopus plumbeitarsus*	Two-barred Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Wetlands (inland), Artificial/Terrestrial	The species is found throughout north eastern Asia and parts of southern Asia. The species uses Vietnam during the breeding season. The EOO for this species is 6,290,000km2. The global population has not yet been quantified, although the species has been considered common or locally common in north east China.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0843, 108.378
100	AVES	*Otus spilocephalus*	Mountain Scops-owl	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common in places (Konig *et al*. 1999), while national population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
101	AVES	*Glaucidium brodiei*	Collared Owlet	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be common to fairly common throughout most of its range (del Hoyo *et al*. 1999), while national population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan (Brazil 2009).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.473, 108.066
102	AVES	*Glaucidium cuculoides*	Asian Barred Owlet	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be common over most of its range (del Hoyo *et al*. 1999), while the population in China has been estimated at c.10,000-100,000 breeding pairs (Brazil 2009).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.8882, 108.424

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
103	AVES	*Treron seimundi*	Yellow-vented Green-pigeon	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be uncommon to frequent (del Hoyo et al. 1997).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
104	AVES	*Treron sphenurus*	Wedge-tailed Green-pigeon	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be common to uncommon (del Hoyo et al. 1997).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.879, 108.426
105	AVES	*Myophonus caeruleus*	Blue Whistling-thrush	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be common but thinly spread (Clement and Hathway 2000), while national population sizes have been estimated at c.100-100,000 breeding pairs in China and c.100-10,000 breeding pairs in Taiwan (Brazil 2009).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.891666, 108.436919
106	AVES	*Parus monticolus*	Green-backed Tit	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be fairly common to common (Harrap and Quinn 1996), while the population in Taiwan has been estimated at c.10,000-100,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.041221, 108.427991
107	AVES	*Machlolophus spilonotus*	Yellow-cheeked Tit	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be from common (various localities in China) to scarce and local in the eastern Himalayas (Harrap and Quinn 1996), while the population in China has been estimated at c.100-10,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.100809, 108.359323
108	AVES	*Sylviparus modestus*	Yellow-browed Tit	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common to fairly common in most of its range (del Hoyo *et al*. 2007). The population in China has been estimated at c.100-100,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
109	AVES	*Hirundo smithii*	Wire-tailed Swallow	LC	N/A	NO	FALSE	FALSE	TRUE	Savanna, Grassland, Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine	The global population size has not been quantified, but the species is reported to be common in Africa, common in Pakistan and locally common in India	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9498, 108.449
110	AVES	*Ixos mcclellandii*	Mountain Bulbul	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as generally common throughout its range, although rare or possibly extinct in Bangladesh (del Hoyo *et al*. 2005). The population in China has been estimated at c.100-10,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0843, 108.378
111	AVES	*Prinia polychroa*	Brown Prinia	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Grassland, Artificial/ Terrestrial	The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381
112	AVES	*Prinia hodgsonii*	Grey-breasted Prinia	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as locally common over most of its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381
113	AVES	*Tesia cyaniventer*	Grey-bellied Tesia	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland)	The global population size has not been quantified, but the species is reported to be locally common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.044608, 108.43008
114	AVES	*Phylloscopus maculipennis*	Ashy-throated Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be locally common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0803, 108.501

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
115	AVES	*Phylloscopus intermedius*	White-spectacled Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be locally common (Baker 1997), while the population in China has been estimated at c.100-10,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0429, 108.4295
116	AVES	*Phylloscopus poliogenys*	Grey-cheeked Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be locally common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9216, 108.3683
117	AVES	*Phylloscopus castaniceps*	Chestnut-crowned Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be locally common (Baker 1997), while the population in China has been estimated at c.100-10,000 breeding pairs, c.50-1,000 individuals on migration and c.50-1,000 wintering individuals	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0465, 108.434
118	AVES	*Pnoepyga pusilla*	Pygmy Cupwing	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is described as frequent in Nepal, fairly widespread at low densities in Bhutan and fairly common in India (del Hoyo *et al*. 2007), while the population in China has been estimated at c.100-100,000 breeding pairs	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381
119	AVES	*Abroscopus superciliaris*	Yellow-bellied Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, but the species is reported to be locally fairly common to uncommon	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.4527, 108.068
120	AVES	*Phylloscopus ogilviegranti*	Kloss's Leaf-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	This species has a large range extending across south-east China, Vietnam, Laos, Cambodia, Thailand, and possibly north-east Myanmar	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.0465, 108.434

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
121	AVES	*Phylloscopus reguloides*	Blyth's Leaf-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	This species has a large range, extending from north-west India to southern Viet Nam. The global population size has not been quantified, but the species is described as common and widespread in most of its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.1037, 108.365
122	AVES	*Certhia manipurensis*	Manipur Treecreeper	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The population size of this species has not been quantified; it is considered very rare to common.	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.037807, 108.42531
123	AVES	*Pericrocotus solaris*	Grey-chinned Minivet	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as generally common throughout its range but scarce in Nepal (del Hoyo et al. 2005). National population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	12.1024, 108.36
124	AVES	*Tephrodornis virgatus*	Large Woodshrike	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland	The global population size has not been quantified, but the species is described as generally uncommon, although locally common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.882237, 108.425186
125	AVES	*Rhipidura albicollis*	White-throated Fantail	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.8833, 108.434
126	AVES	*Prinia superciliaris*	Hill Prinia	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Grassland, Artificial/ Terrestrial	The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.9362, 108.381
127	AVES	*Hemixos flavala*	Ashy Bulbul	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as scarce to locally common	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.87796, 108.407715

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
128	AVES	*Pycnonotus flavescens*	Flavescent Bulbul	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as locally abundant throughout much of its range	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.933885, 108.377617
129	AVES	*Ardea alba*	Great White Egret	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Wetlands (inland), Marine Intertidal, Artificial/Aquatic & Marine	The species typically breeds in colonies of tens, hundreds or even a thousand pairs. he timing of the breeding season varies geographically (del Hoyo et al. 1992) although temperate breeders tend to nest in the spring and summer (e.g. April to July) and tropical breeders nest in the part of the rain cycle when food becomes maximally available (this may be during the rains or in the dry season).	Though this species was found in 50km radius from the Project, considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	11.94, 108.441
130	AVES	*Carpococcyx renauldi*	Coral-billed Ground-cuckoo	VU	N/A	NO	TRUE	FALSE	FALSE	Forest, Shrubland	The species restricted to Cambodia, Laos, Vietnam and Thailand. Throughout most of its range (Cambodia, Laos, Vietnam), the population is likely small and extremely patchily distributed as a consequence of population declines caused by increased levels of hunting. The global population size has not been quantified, but the species is reported to be uncommon. The species is heavily threatened by the rapid expansion of industrial drift-fence cable snaring, which is taking place since the early 2000s.	The distribution ranges encompasses Ninh Thuan, however this is a ground dwelling species that prefers lowland forest, scrub and dense secondary growth. The absence of records from the project area reflects the lack of suitable habitat and it is highly unlikely the EAAA1, even where it intersects with more suitable habitat in the forest areas would support more than 0.5% of the population, or that there would be connectivity with the project site.	N/A	N/A
131	AVES	*Clanga clanga*	Greater Spotted Eagle	VU	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Shrubland, Artificial/Aquatic & Marine, Grassland	This species is found throughout western Asia, central Asia, parts of eastern and southern Asia, a few isolated parts of Europe and Africa.The global population is considered estimated at 3300-8800 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 18,100,000 km2. The preferred habitat types for this species is inland wetlands, marine intertidal, grassland and rocky areas. This specice is not mentioned in Vietnam Redlist.	No individual was recorded from the EAAA1 either by survey or during literature review. It is a rare migrant in Vietnam with no recent records in the region listed on eBird. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
132	AVES	*Zapornia paykullii*	Band-bellied Crake	NT OR LR/NT	N/A	NO	FALSE	FALSE	TRUE	Marine Neritic, Marine Intertidal	It occurs on passage and/or in winter in North Korea, South Korea, China (Inner Mongolia, Shandong and southwards to southern China, including Hong Kong (China)), central Thailand, Vietnam. However there have been very few south east Asian records in recent years and very little information is available from the assumed wintering areas. Its status and winter distribution urgently require investigation. The global population size has not been quantified, although national population estimates include: c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in China. It is threatened by the intensification of agriculture, industrial development and other forms of habitat destruction.	There were no records of this species, either during survey or in the literature review. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
133	AVES	*Nettapus coromandelianus*	Cotton Pygmy-goose	LC	EN	NO	TRUE	FALSE	TRUE	Wetlands (inland)	This species is distributed throughout southern Asia, parts of Southeast Asia and northern New Guinea and eastern Australia. It has an EOO of 33,800,000km2. The global population has been estimated at 130,000 – 1,100,000 individuals	There were no records of this species, either during survey or in the literature review. Considering the very large EOO in comparison to the proportionally small Project EAAA1, thus the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	N/A
134	AVES	*Halcyon coromanda*	Ruddy Kingfisher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Wetlands (inland)	This species is found throughout most of Southeast Asia and Korea and Japan. The EOO is 22,100,000km2. The global population size has not been quantified, but the species is reported to be widespread but generally rare and uncommon	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
135	AVES	Ardea intermedia	Intermediate Egret	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	The global population has not been quantified owing to recent taxonomic splits. Despite the fact that the population trend appears to be decreasing, the decline is not believed to be sufficiently rapid to approach the thresholds for Vulnerable under the population trend criterion	There were no records of this species, either during survey or in the literature review. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
136	AVES	*Spilopelia chinensis*	Eastern Spotted Dove	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Artificial/Terrestrial	The global population size has not been quantified, but the species is described as very common throughout almost all of its range	There were no records of this species, either during survey or in the literature review. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
137	AVES	*Himantopus himantopus*	Black-winged Stilt	LC	N/A	NO	FALSE	FALSE	TRUE	Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	Northern populations of this species make long-distance migratory movements, travelling southwards to their wintering grounds between August and November and returning to their breeding areas between March and April (Hayman et al. 1986). In more temperate regions the species is sedentary or only locally dispersive however	There were no records of this species, either during survey or in the literature review. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
138	AVES	*Myophonus caeruleus*	Blue Whistling-thrush	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Artificial/Terrestrial	The estimated EOO is 18600000 km2. The population size is unknown.	There were no records of this species, either during survey or in the literature review. Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
139	AVES	*Dicrurus annectens*	Crow-billed Drongo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Savanna, Shrubland	This species is found throughout parts of Southeast Asia and the Himalayas. The EOO for this species is 2,760,000km2. The global population has not yet been quantified, although considered locally frequent throughout the Indian subcontinent	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
140	AVES	*Pericrocotus roseus*	Rosy Minivet	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species is found in throughout the Himalayas, eastern India and parts of Southeast Asia. The species is extant to Vietnam. The EOO for this species is 3,630,000km2. The global population is unquantified, however, considered decreasing.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
141	AVES	*Gyps bengalensis*	White-rumped Vulture	CR	CR	NO	TRUE	FALSE	TRUE	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is native to India, Banladesh, Myanmar, Thailand, Cambodia. This species possibly extict in Vietnam. The global population is considered estimated at 2500 - 9999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 7,370,000 km2. Threats: The non-steroidal anti-inflammatory drug (NSAID) diclofenac, used to treat domestic livestock, has been identified as the cause of mortality. Vultures are exposed to diclofenac and other NSAIDs through scavenging on the carcasses of largely cattle and buffalo that had been treated prior to death; Other likely contributory factors in South Asia are demise of large ungulate populations and improvements in animal husbandry resulting in a lack of available carcasses for vultures (Anon 2003, 2005), as well as the impact of poisoning events as an accidental consequence of local hunting and fishing practises (Clements et al. 2013).	Presumed extinct in Vietnam.	N/A	N/A
142	AVES	*Sarcogyps calvus*	Red-headed Vulture	CR	N/A	NO	TRUE	FALSE	FALSE	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is native to India, Myanmar, Cambodia. This species possibly extict in Vietnam (previously regular in central regions, but now only occasional wanderers from the Cambodian population). Given its rarity in South-East Asia it is unlikely that more than a few hundred individuals remain there, while the total population seems unlikely to exceed 10,000 mature individuals given the patchiness of its distribution across India. Its Estimated Extent of Occurrence (EOO) is estimated at 5,230,000 km2. Threats: The disappearance of vultures from Asia is linked to a suite of factors: notably the demise of wild ungulates, the intensification of agriculture, increased sophistication of waste disposal techniques, direct persecution and disease. However, rapid declines since the turn of the 21st century are believed to have been driven by the pharmaceutical NSAID diclofenac used to treat livestock, which has proven highly toxic to vultures. .	Presumed extinct in Vietnam.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
143	AVES	*Emberiza aureola*	Yellow-breasted Bunting	CR	N/A	NO	TRUE	FALSE	TRUE	Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	This species once bred across the northern Palaearctic from Finland, Belarus and Ukraine in the west, through Kazakhstan, China and Mongolia, to far eastern Russia, Korea and northern Japan. However,it is now thought to have potentially completely disappeared from Finland, Belarus, Ukraine and large parts of Russia. It winters in a relatively small region in South and South-East Asia, including Vietnam. It winters in large flocks in cultivated areas, rice fields and grasslands, preferring scrubby dry-water rice fields for foraging and reedbeds for roosting. A study found it appeared in Van Long Wetland Nature Reserve in Ninh Binh. Threat: the decline is likely to be driven by excessive trapping at migration and, in particular, wintering sites.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, thus the species does not meet thresholds of Criterion 1 and 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
144	AVES	*Rheinardia ocellata*	Crested Argus	EN	N/A	NO	TRUE	FALSE	FALSE	Forest	Rheinardia ocellata is endemic to South-East Asia. The nominate subspecies R. o. ocellata occurs along the Annamite mountain chain in central and southern Vietnam and neighbouring eastern Laos, between the Nghe An province and the Da Lat Plateau in southern Vietnam. In Laos and Vietnam, it is resident in primary and secondary evergreen forest from sea-level up to 1,500 m, and from 1,700-1,900 m on the Da Lat Plateau. Ongoing deforestation, both within and outside protected areas, decreases the amount of suitable habitat for the species.	Distribution in IUCN does not overlap with the Project Area, and it only occurs in forest above 1500m	N/A	N/A
145	AVES	*Pavo muticus*	Green Peafowl	EN	EN	NO	TRUE	FALSE	FALSE	Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is native to Myanmar, Vietnam. The global population is considered estimated at 10,000-19,999 mature individuals. The Green Peafowl is found throughout Southeast Asia. n Vietnam, the species was formerly widespread virtually throughout, being locally numerous even as recently as the late 1970s/early 1980s, but numbers have been much reduced by habitat loss (McGowan et al. 1998). The main population is now thought to lie in the southcentral region, with the Yok Don and Cat Tien National Parks thought to contain the most important populations. The species has an EOO of 4,590,000km2. The species uses a range of forest, savannah, shrub land, grassland and pastureland habitats. The species favours areas with water access and minimal human interference. Widespread hunting for meat and feathers, and	Distribution in IUCN does not overlap with the Project Area. The population is mainly found in Cat Tien National Park, and favours areas having minimal human interference.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
											collection of eggs and chicks, combined with habitat modification and human disturbance, has caused a catastrophic decline throughout much of the species's range.			
146	AVES	*Sterna acuticauda*	Black-bellied Tern	EN	N/A	NO	TRUE	FALSE	FALSE	Wetlands (inland)	This species is native to India and posibly extinct in Vietnam. he global population is considered estimated at 6700 - 17000 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 4,490,000 km2. It is found on large rivers (usually breeding on sandpits and islands) and marshes, occasionally on smaller pools and ditches, in lowlands (but not on the coast), up to 730 m. There is lack of information relate to distribution range. Threats include the destruction of breeding habitat (islands and sandspits in larger rivers are increasingly cultivated), the collection of eggs for food, illegal fishing in protected areas. overfishing and the flooding of nests, often caused by dams. Increased disturbance and over-harvesting of wetland products are blamed for the recent complete disappearance of the breeding population within Chitwan National Park (Nepal).	The species is possibly extinct in Viet Nam, and it prefers particular wetlands habitat absent from the EAAA1.	N/A	N/A
147	AVES	*Lonchura oryzivora*	Java Sparrow	EN	N/A	NO	TRUE	FALSE	FALSE	Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is a native endemic of the islands of Java, Bali, and probably Madura, Indonesia, although it has been widely introduced, with feral populations now established in many parts of the world. This species is introduced in coastal area of Southeast Asia, in which is Vietnam. It may regularly occur in significant numbers at one or more sites in Vietnam, but for which such sites have not yet been identified, especially the anthropogenic habitats in central and southern Vietnam. It can now be difficult to find, particularly on Java. The global population is considered estimated at 1000 - 2499 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 148,000 km2. Trapping for the domestic and international cagebird trade has probably been occurring for centuries, peaking in the 1960s and 1970s, and is the main cause of the decline.	The species was introduced into Viet Nam, and is a non-native.	N/A	N/A
148	AVES	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	VU	N/A	NO	TRUE	FALSE	FALSE	Forest, Savanna	A Mekong basin endemic, known from the lower basin in the delta in southern Cambodia and Viet Nam (Roberts 2008) to northern Cambodia (Vidthayanon et al. 2008). Based on remote sensing and population density data, the global population has been estimated to number 26,000-550,000 individuals. It is threatened by habitat destruction, particularly the felling of old-growth forest, though it may persist in heavily	Although their distribution range encompasses Ninh Thuan, the species mainly live in forest, while the EAAA1 does not support that kind of habitat.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
											logged forests at lower densities. Estimated densities for the species in Himalayan foothill forests of northwest India range between 0.5 per km2 and 1.0 per km2. Its presence range includes Ninh Thuan.			
149	AVES	*Otus lettia*	Collared Scops-owl	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be widespread and locally common	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
150	AVES	*Pteruthius aeralatus*	White-browed Shrike-babbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland	The global population size has not been quantified, but the species is described as the commonest shrike-babbler (del Hoyo et al. 2007), while the population in China has been estimated at c.10,000-100,000 breeding pairs	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
151	AVES	*Phylloscopus borealoides*	Sakhalin Leaf-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The global population size has not been quantified, though national population estimates include: < c.50 individuals on migration in Korea;c.100-100,000 breeding pairs and c.50-10,000 individuals on migration in Japan and c.100-100,000 breeding pairs and c.50-10,000 individuals on migration in Russia	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
152	AVES	*Hemitesia pallidipes*	Pale-footed Bush-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Grassland	The global population size has not been quantified, but the species is reported to be fairly common and locally abundant	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
153	AVES	*Phyllergates cucullatus*	Mountain Tailorbird	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Wetlands (inland), Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be locally common	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
154	AVES	*Delichon lagopodum*	Eastern House Martin	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna, Artificial/Terrestrial	The EOO for this species is 12,600,000 km2. The global population has not quantified but considered decreasing	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
155	AVES	*Terpsiphone incei*	Chinese Paradise-flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Shrubland	This species is found throughout eastern Asia and parts of Southeast Asia. The species uses Vietnam during the non-breeding season. The EOO for this species is 6,060,000km2. The global population has not yet been quantified, but considered stable.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
156	AVES	*Terpsiphone affinis*	Oriental Paradise-flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Shrubland	This species is found throughout Southeast Asia and the eastern parts of Himalayas. The species is a resident of Vietnam. The EOO for this species is 6,060,000km2. The global population has not yet been quantified, but considered stable.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
157	AVES	*Surniculus dicruroides*	Fork-tailed Drongo-cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	This species is found throughout parts of the Indian subcontinent and Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 9,710,000km2. The global population has not yet been quantified, but considered declining.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
158	AVES	*Spilopelia chinensis*	Eastern Spotted Dove	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Artificial/Terrestrial	This species is found in Thailand, Myanmar, Indonesia, China, Vietnam. The EOO for this species is 16,800,000 km2.The populationtrend is increasing	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
159	AVES	*Cuculus saturatus*	Oriental Cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 35,300,000 km2.The population is estimated approximately 5000000-14999999 mature individuals	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
160	AVES	*Ceyx erithaca*	Oriental Dwarf-kingfisher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial, Wetlands (inland)	This species is found throughout Southeast Asia and parts of India and Sri Lanka. The EOO for this species is 14,600,000 km2. The global population has been described as scarce and declining. Habitats of significance include dry and moist lowland tropical/subtropical forests.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
161	AVES	*Muscicapa dauurica*	Asian Brown Flycatcher	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artificial/Terrestrial	This species utilises north-eastern Asia, southern Asia and Southeast Asia. It is considered a resident of Vietnam. It has an EOO of 37,700,000km2. The global population has not been estimated but considered stable. The Chinese population is estimated at 10,000-100,000 breeding pairs	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
162	AVES	*Calliope calliope*	Siberian Rubythroat	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Shrubland, Artificial/Aquatic & Marine, Artificial/Terrestrial	This migratory species is found throughout eastern, central and southern Asia. Its EOO is 10,100,000km2. The global population has not been estimated. Although there is an estimated 10,000 – 100,000 breeding pairs in China.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
163	AVES	*Larvivora cyane*	Siberian Blue Robin	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Forest, Artificial/Terrestrial	This species utilises parts of central, eastern Asia and Southeast Asia. Its EOO is 21,500,000km2. Global population has not yet been quantified, although, there is an estimated 10,000-100,000 breeding pairs in Korea	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
164	AVES	*Saxicola torquatus*	Common Stonechat	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Wetlands (inland), Shrubland, Artificial/Terrestrial, Grassland	This migratory species occurs in forest, desert, inland wetlands, grassland habitat types. This widespread species is found throughout most of Asia, most of Europe and parts of Africa. This species winters in Vietnam, and species distribution includes the Project area. This species uses but is not limited to Korea, Germany, Serbia and Ukraine during the breeding season. Its EOO is 113,000,000km2. The global population of mature individuals is estimated at 55,000,000-94,999,999	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
165	AVES	*Locustella tacsanowskia*	Chinese Grasshopper-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Artificial/Aquatic & Marine, Forest, Grassland	This species is found along southern and eastern Asia. The EOO for this species is 7,070,000km2. The global population has not yet been quantified, however, there is an estimated <100,000 individuals within China	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
166	AVES	*Arundinax aedon*	Thick-billed Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Grassland, Shrubland	This species is found throughout eastern Asia and parts of southern Asia. The species spends the non-breeding season in Vietnam. This species EOO is 7,180,000km2. The global population is not considered stable, however, it is considered common in Southeast Asia (during non-breeding season)	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
167	AVES	*Phylloscopus coronatus*	Eastern Crowned Warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland	This species is found throughout eastern Asia and parts of South East Asia. The EOO for this species is 7,330,000km2. There is an estimated 10,000 – 100,000 breeding pairs within China.	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
168	AVES	*Zapornia fusca*	Ruddy-breasted Crake	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland	This migratory species breeds in Korea, Democratic People's Republic of; Korea, Republic of; Philippines; Russian Federation (Eastern Asian Russia); Singapore . The EOO is estimated to be 31,400,000km2. The population is unknown and the population trend is considered to be unknown	Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
169	AVES	*Gallicrex cinerea*	Watercock	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Wetlands (inland), Artificial/Aquatic & Marine	This species is continuously distributed throughout most of eastern and southern Asia (including Southeast Asia).This species distribution includes Vietnam, and includes the Project area. This species utilises Korea during the breeding season. This species EOO is 22,600,000km2. The global population size has not been quantified, though national population estimates include: c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in China; < c.100,000 breeding pairs and < c.1,000 individuals on migration in Taiwan; c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Korea and < c.50 individuals on migration in Japan	Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
170	AVES	*Gorsachius melanolophus*	Malay Night-heron	LC	N/A	NO	FALSE	FALSE	TRUE	Artificial/Terrestrial, Artificial/Aquatic & Marine, Wetlands (inland)	This species is scattered throughout southern Asia and Southeast Asia. The EOO for this species is 10,400,000km2. The global population has been estimated at 1,300-13,000 mature individuals	Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
171	AVES	*Pitta moluccensis*	Blue-winged Pitta	LC	N/A	NO	FALSE	FALSE	TRUE	Shrubland, Artificial/Terrestrial, Forest	This species is found in throughout parts of Southeast Asia. The species is extant to Vietnam. The EOO for this species is 1,790,000km2. The global population is unquantified, however, it is considered fairly common	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
172	AVES	*Hydrophasianus chirurgus*	Pheasant-tailed Jacana	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland)	This species is found in coastal area. The species has an EOO of 19,700,000km2.The global population is unknow but the population trend is decreasing	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
173	AVES	*Locustella mandelli*	Russet Grasshopper-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	This species has a large range, occurring in parts of north-eastern India, Bhutan, China, Myanmar, Thailand, Laos and Vietnam. The global population size has not been quantified, but the species is described as quite numerous in north-eastern India, common in parts of China and locally common in South-East Asia	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
174	AVES	*Siva cyanouroptera*	Blue-winged Minla	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
175	AVES	*Phylloscopus intensior*	White-tailed Leaf-warbler	LC	N/A	NO	FALSE	FALSE	TRUE	Forest	The species has a moderately large range extending across eastern Myanmar, northern Thailand, southern China and north-western Lao PDR and Viet Nam	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
176	AVES	*Psittacula finschii*	Grey-headed Parakeet	NT OR LR/NT	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland)	The species is widespread in the Chao Phraya in Thailand, and the middle and lower Mekong in Thailand (Lao PDR, Cambodia and Viet Nam; Kottelat and Ng 2000) including tributaries (e.g., the Xe Bang Fai (Kottelat 2001), and the Mun River in eastern Thailand).	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
177	AVES	*Hierococcyx hyperythrus*	Northern Hawk-cuckoo	LC	N/A	NO	FALSE	FALSE	TRUE	Forest, Artifical/Terrestrial	This species is found throughout coastal eastern China and a few parts of Southeast Asia. The EOO for this species is 6,580,000km2. The global population has not yet been assessed, although is considered stable	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A
178	AVES	*Anas crecca*	Common Teal	LC	N/A	NO	FALSE	FALSE	TRUE	Wetlands (inland)	This migratory species is widely distributed throughout the northern hemisphere. The EOO is 48,200,0000km2. The global population is estimated at 6,600,000 – 7,700,000 individuals	There were no records of this species, either during survey or in the literature review. . Considering the very large EOO in comparison to the proportionally small Project EAAA1, the species does not meet thresholds of Criterion 3. Therefore, it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
179	MAMMALIA	*Hipposideros griffini*	Griffin's Leaf-nosed Bat	NT	N/A	Not a candidate	FALSE	FALSE	FALSE	Forest, Caves and Subterranean Habitats (non-aquatic)	The distribution of this species ranges from northern to southern Vietnam in three remarkably disjunct areas, including: the undisturbed forests in the limestone karst of Cat Ba National Park, secondary forests in a mountainous area in Chu Mom Ray in central Vietnam (Thong et al. 2012), and lowland forests in Cat Tien in southern Vietnam (Thong 2012). Little is known about the population size of this species, but it is likely that the population is declining due to disturbance of tourism and habitat changes	The Extent of Occurrence (EOO) of this species currently has not been fully assessed. As consultation with Dr Neil Furey,it is considered that the EOO of this species is larger than 50,000km2. Therefore, Griffin's Leaf-nosed Bat appears not to be potential candidate species under Criterion 2. There is no information about the population size of this species on a global context. However, four individuals were captured in Cat Ba National Park, two individuals from Chu Mom Ray National Park, and several individuals from Cat Tien National Park (Thong, 2012). Based on unpublished data, less than 30 individuals inhabit a cave in Cat Tien National Park. According to GBIF data, there was no observation of Griffin's Leaf–nosed Bat within 50km radius. Notwithstanding, the live trapping and acoustic survey recorded the presence of this species within the Project area and Nui Chua National Park which is 2km to the East of the Project. The species was recorded within the project area during both acoustic sampling and live trapping sessions. It's foraging strategy is assumed to be relatively low risk, feeding on insects in semi-cluttered environments and gaps. Screened out as a critical habitat species as unlikely to meet threshold criteria for endemic or restricted range species.	Live sampling, Acoustic	N/A
180	MAMMALIA	*Murina harpioloides*	Dalat Tube-nosed Bat	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	*Murina harpiolodes* is only known from one location on the Dalat Plateau in Viet Nam (Lam Dong Province), where it occurs from 1,400 to 1,800 m asl (Kruskop 2013, Son et al. 2015). There is possibility, that this bat also inhabits forested areas at same elevations in neighbouring provinces Dak Lak and Khanh Hoa. The population of Murina harpiolodes is unknown, but is thought to be declining as over 30% of its forested habitat has been lost. Forest loss and degradation are the main threats to this species, with more than 30% of the species' known range on the Bi Dup – Nui Ba National Park (Lam Dong Province) being affected.	The mammal only lives in forest habitat, where it was found is far away from the Project area and little is known about its population.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/ Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
181	MAMMALIA	*Hypsugo dolichodon*	Long-toothed Pipistrelle	DD	N/A	NO	FALSE	TRUE	FALSE	Forest, Caves and Subterranean Habitats (non-aquatic)	The known distribution of this species is limited to Laos and southern Vietnam. The species is known from only about 20 specimens from four countries and seven localities. All of the Vietnamese specimens came from Cat Tien National Park. One specimen was collected near the headquarters of the Park, close to the Dong Nai River. The species is at least partly a cave-dweller, hence the disturbance of its roosting sites may be a threat	Only specimens found in Cat Tien Natioanal Park, which is very far away from the Project.	N/A	N/A

Table D. 2 Candidate species within the EAAA1

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
1	AMPHIBIA	*Rhacophorus vampyrus*	Vampire Flying Frog	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is known to occur between 1,470 and 2,004 m asl within two protected areas in southern Viet Nam: Bidoup-Nui Ba National Park, Lac Duong District, Lam Dong Province (Rowley et al. 2010) and Ta Dung Nature reserve, Dak Glong District, Dak Nong Province (Rowley et al. 2012). The species is likely to have occurred more widely in the past, prior to habitat loss and fragmentation in the area. The area of its range, which is taken as a proxy for extent of occurrence, is estimated to be 2,082 km^2. Contraction and degradation of suitable habitat are therefore threats to its survival and are ongoing even within protected areas of its range in the form of established aquaculture, agriculture (primarily coffee), road development, and harvest of both timber and non-timber forest products.	The species occur in two protected areas that is far away from the Project.	N/A	N/A
2	AMPHIBIA	*Theloderma palliatum*	Cloaked Moss Frog	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is currently known only from a single locality at 1,625 m Asl within Bidoup-Nui Ba National Park, Lac Duong District, Lam Dong Province, Viet Nam (Rowley et al. 2011). It is possible that further surveys in adjacent similarly forested areas both north into Dac Lac Province and east into Khanh Hoa Province may serve to expand the species' known range, however endemism is a common characteristic of the fauna of the Langbian Plateau (Orlov 2005, Rowley et al. 2011). Very little is known of the population size and trends of this species. Only three individuals were recorded during twenty surveys carried out between 2008–2010 at the type locality Degradation of wet,dense montaine rainforest will pose a threat to this species.	The species have a low EOO, the locations where it has been recorded was far from the Project location. Plus, It is an amphibian living in forest, while the EAAA does not support any forest, wetlands or freshwater systems.	N/A	N/A
3	AMPHIBIA	*Hylarana montivaga*	N/A	EN	N/A	NO	TRUE	TRUE	FALSE	Forest, Wetlands (inland)	This species is associated with forest and has mostly been observed adjacent to streams. It reproduces in the dry season and breeding appears to be concentrated around December and January . The species is an explosive breeder; aggregations of up to 100 individuals have been observed during the breeding season. Much of the habitat throughout this species' range is degraded by ongoing forest loss associated with agriculture and aquaculture and it has been observed breeding in moderately to highly disturbed habitats. Records of the species in Tam Dao, northern Viet NamRecords of the species in Tam Dao, northern Viet Nam. here is also a record of the species from Gia Lai Province in Viet Nam, however given the biogeography this area (the Kon Tum Plateau), an isolated observation on its southern edge appears unlikely.	The species prefers forest and wetlands, the kinds of habitats that the EAAA does not have. Historical records were found in locations far away from Ninh Thuan province.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
4	AMPHIBIA	*Rhacophorus calcaneus*	Vietnam Flying Frog	EN	N/A	NO	TRUE	TRUE	FALSE	Forest, Wetlands (inland)	This species is currently known only from approximately 1,300–2,000 m asl in Lam Dong, Dak Lak and Khanh Hoa Provinces in the Central Highlands of Viet Nam (Orlov et al. 2008, Le 2011, Orlov et al. 2012, J. Rowley unpubl. data). This species' extent of occurrence (EOO) is 4,138 km2, which consists of five threat-defined locations. Little is known about the size and trends of this species' population except that it has been detected in relatively few surveys. This species is likely threatened by collection from the wild to meet high demand from the international pet trade, as is the case for similarly attractive frog species from the region	The species have a low EOO, the locations where it has been recorded was far from the Project location. No suitable habitat within the EAAA.	N/A	N/A
5	AMPHIBIA	*Microhyla pulchella*	Pretty Narrow-Mouth Frog	EN	N/A	NO	TRUE	TRUE	FALSE	Forest, Wetlands (inland)	This species is known only from 1,490–2,048 m asl in south-central Viet Nam from Bidoup-Nui Ba National Park, Lam Dong Province (Poyarkov et al. 2014), and Chu Yang Sin National Park, Dak Lak Province (N. Poyarkov unpubl. data). .Habitat loss due to ongoing deforestation for logging and the production of coffee, potatoes and corn is ongoing in parts of this species' range and has been identified as a considerable threat for this species	The species have a low EOO, the locations where it has been recorded was far from the Project location. No suitable habitat within the EAAA..	N/A	N/A
6	AMPHIBIA	*Raorchestes gryllus*	N/A	VU	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is known from its type locality in Lang Bian Mountain, as well as adjacent mountain systems in Dak Lak, Lam Dong and Ninh Thuan provinces in Viet Nam (Orlov et al. 2012, J. Rowley pers. comm. 2015). Recent surveys also reported the species in Ta Dung Nature Reserve, Dak Nong province, Viet Nam (D. Tran pers. comm. 2015, D. Le pers. comm. 2015). Due to human population growth and increasing demand for agricultural and timber products, the loss of montane forest habitat is ongoing and expected to increase throughout central Viet Nam (Nguyen 2011, Meyfroidt et al. 2013).	The species have a low EOO, the locations where it has been recorded was far from the Project location. No suitable habitat within the EAAA.	N/A	N/A
7	AMPHIBIA	*Microhyla annamensis*	Vietnam Rice Frog	VU	N/A	NO	TRUE	TRUE	FALSE	Forest, Wetlands (inland)	It is found in Cambodia, Laos, Thailand, and Vietnam. Its natural habitats are subtropical or tropical moist lowland forests, subtropical or tropical moist montane forests, swamps, and intermittent freshwater marshes. Very little is known about the size of this species' population and it has been detected in few surveys. Habitat loss and degradation due to rapidly expanding agriculture is an ongoing threat to biodiversity throughout Southeast Asia	Little information is known about its whereabouts. No suitable habitat within the EAAA.	N/A	N/A
8	AMPHIBIA	*Leptobrachium leucops*	N/A	VU	N/A	NO	FALSE	TRUE	FALSE	Forest, Wetlands (inland)	This species is found in Lam Dong. EOO is less than 50,000 km2. This species is associated with montane evergreen cloud forest.	The species have a low EOO, the locations where it has been recorded was far from the Project location. No suitable habitat within the EAAA..	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
9	AMPHIBIA	*Kalophrynus honbaensis*	N/A	VU	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is known only from 1,500 m Asl on Hon Ba Mountain in Hon Ba Nature Reserve, Cam Lam District, Khanh Hoa Province, Viet Nam (Vassilieva et al. 2014). The true range of this species and its elevational limits are unknown. However work in the adjacent and relatively well-studied Phuoc Binh Nature Reserve and Bi Doup-Nui Ba National Park have not revealed its presence, indicating the possibility of low dispersal and endemism to Hon Ba Mountain. As such, the species' estimated extent of occurrence (EOO) is 14 km2 and its range is thought to represent only one threat-defined location, from which dispersal is probably not likely; thus the species is very restricted geographically.This species is known only from 1,500 m Asl on Hon Ba Mountain in Hon Ba Nature Reserve, Cam Lam District, Khanh Hoa Province, Viet Nam (Vassilieva et al. 2014).	The species have a low EOO, the locations where it has been recorded was far from the Project location No suitable habitat within the EAAA.	N/A	N/A
10	AMPHIBIA	*Microhyla arboricola*	Tree-dwelling Narrow-Mouth Frog	VU	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is known from 1,000–1,550 m Asl in Dak Lak and Khanh Hoa Provinces, south-central Viet Nam (Poyarkov et al. 2014). These are unlikely to represent the actual limits of the species' range as similar habitat and elevations to those in its known localities occur in adjacent parts of the Vietnamese Mountains including northern Lam Dong and Ninh Thuan Provinces, and southwestern Dak Nong Province. Little is known about the size and trends of this species' population except that eight adults from Dak Lak, and five adults, 12 larvae and several egg clutches from Khanh Hoa were collected for the description of the species. This species is threatened by habitat loss due to the effects of logging and the encroachment of other anthropogenic processes within its range.	The species have a low EOO, small population and the locations where it has been recorded was far from the Project location No suitable habitat within the EAAA.	N/A	N/A
11	AMPHIBIA	*Microhyla pineticola*	Pine Narrow-Mouth Frog	VU	N/A	NO	TRUE	TRUE	FALSE	Forest, Wetlands (inland)	This specie is found in Lam Dong. The population treng is decreasing. This specie is not mentioned in Vitenam Redlist. This is a terrestrial montane species and is associated with mixed tropical forest as well as dry pine forest with an herbaceous understory (Poyarkov et al. 2014). The EOO is 11908 km2	The species have a low EOO, the locations where it has been recorded was far from the Project location. No suitable habitat within the EAAA.	N/A	N/A
12	AMPHIBIA	*Microhyla fusca*	Brown Rice Frog	DD	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is known only from the type locality, Da Lat on Lang Bian Plateau, Viet Nam. It has not been found since the original description in 1943, although the type locality is easily accessible for survey work.	The species have a low EOO, and no record of presence was found since 1943. The locations where it has been recorded was far from the Project location..	N/A	N/A
13	AMPHIBIA	*Theloderma laeve*	N/A	DD	N/A	NO	FALSE	TRUE	FALSE	Wetlands (inland)	This species is known only from Sui Kat, in the Lang Bian plateau in southern Viet Nam, where it was collected at 1,000m asl. It is known only from a single specimen collected in 1918 and it has not been recorded since, so there is no information regarding its population status.	The species have a low EOO, the locations where it has been recorded was far from the Project location.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
14	REPTILIA	*Dixonius aaronbaueri*	Bauer Leaf-toed Gecko	LC	N/A	NO	FALSE	TRUE	FALSE	Forest, Artificial/Terrestrial	Bauer's Leaf-toed Gecko has a bold dark canthal stripe terminating at back of head (occiput), patternless yellowish-orange back and tail; supranasals in distinct contact; 8–9 supralabials, with supralabials six or seven in midorbital position; 18–19 ventral scale rows at midbody; males with 5 precloacal pores (Van, N. T., & Ziegler, T., 2009). This species is found in open areas in multiple habitats, often in coastal areas and sometimes in plantations. It has been recorded close to a permanent stream in lowland forests. This semi-arid climate is affected by strong winds from the East Sea in wet season, usually from October onwards (Van, N. T., & Ziegler, T., 2009). It has also been found on sandy ground among fallen leaves in a mango plantation Mangifera indica in an area of elevated sand dunes surrounded with low, shrub vegetation, and near rotting logs and a freshwater pond (Geissler, P.,, Krohn, A. R.,, & Rennert, D., 2011). This species is endemic in Vietnam (vncreatures, n.d.). The estimated Extent of Occurrence (EOO) of Bauer's Leaf-toed Gecko is estimated to be approximately 40km2. However, this species was found in wide ranges of geography, thus the EOO is possible to extend larger. The presence of this species was known for the Nui Chua National Park, Ninh Thuan Province (Van, 2009). Additionally, photographs were taken of one individual captured on March 2011 on a mango plantation at the foot of the coastal dunes near Mui Ne (10o58'45.3''N, 108o20'23.4"E) (Geissler, P.,, Krohn, A. R.,, & Rennert, D., 2011). This species was found in Phu Quy Island which is 85km of the southeast of the Project area (Botov, A., Phung, T. M., Nguyen, T. Q., Bauer, A. M., Brennan, I. G., & Ziegler, T., 2015). According to GBIF, its occurrence was recorded within 120km radius from the Project area, in similar habitat with the Project area.	Though IUCN data indicates the species's EOO is smaller than 50km2, based on ERM's experience, this species may be common with large EOO. Therefore, this species is unlikely to be potential candidate under Criterion 1 or 2	N/A	N/A
15	REPTILIA	*Crocodylus siamensis*	Siamese Crocodile	CR	CR	NO	TRUE	FALSE	FALSE	Wetlands (inland)	In Viet Nam, wild populations are possibly extirpated. Historically present in southern Viet Nam (Cuc 1994, Cao and Jenkins 1998); wild populations possibly extirpated. Surveys over the past two decades have failed to detect crocodiles in sites they were reported to occur (Platt and Tri 2000, Stuart et al. 2002) except one site, Ha Lam Lake (Phu Yen Province), where at least two individuals were present in 2005 (Nguyen et al. 2005). A single reintroduced population is at Cat Tien National Park (Polet 2006, Murphy et al. 2004), where breeding occurs (J. Thorbjarnarson in litt. July 2009, Pahl 2012).	High chances of being extinct, historial records of presence are far away from Ninh Thuan, and the species also need Freshwater habitats that the EAAA does not support. The EAAA is unlikely to meet the threshold of Criterion 1 thus it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
16	REPTILIA	*Indotestudo elongata*	Elongated Tortoise	CR	EN	NO	TRUE	FALSE	FALSE	Forest, Shrubland	Subpopulations in Lao PDR and Viet Nam and Cambodia have since been severely depleted and possibly locally extirpated. However, a record of this species were found in Binh Dinh province, which is about 250km from Ninh Thuan province. (biotaxa.org/hn/article/view/7934/11041)	Historial records of presence are far away from Ninh Thuan. The EAAA is unlikely to meet the threshold of Criterion 1 thus it is unlikely to trigger CHA	N/A	N/A
17	REPTILIA	*Cuora picturata*	Southern Viet Nam Box Turtle	CR	EN	NO	TRUE	TRUE	FALSE	Forest	Cuora picturata is apparently restricted to the eastern slopes of the Langbian Plateau, being known only from Khanh Hoa and southern Phu Yen provinces of southern Viet Nam (Ly et al. 2011, Struijk and Blanck 2016, Blanck et al. 2016). It might also occur in eastern Dac Lac and northern Ninh Thuan provinces. By analogy with the biogeography of better-surveyed syntopic primates, Ly et al. (2011) postulated group inhabits three discrete, disjunct hill forest areas, of which the range of C. picturata matches that of the Yellow-cheeked Gibbon (Hylobates gabriellae) and Black-shanked Douc Langur (Pygathrix nigripes) in being restricted to the eastern slopes of the Langbian Plateau. This region covers an area of less than 250 x 100 km (25,000 sq. km). The population density of Cuora picturata is considered to be low. Ly et al. (2011) survyed within 15 days using three trained hunting dogs and encountered eight turtles; another survey in May 2012 in Deo Ca - Hon Nua Speual Use Forest, using 5 dogs, found one turtle within a week. **The overall extent of occurrence (EOO) of C. picturata is less than 25,000 sq. km**, of which much is likely unsuitable as a result of being below or above suitable altitude, as well as large areas of suitable habitat at suitable elevation having been converted to agricultural purposes. The remaining area with suitable habitat (area of occupancy) for the species (AOO) is only about 3,000 km². **The estimated density is less than one C. picturata per sq. km The global surviving wild population is probably below 25,000 individuals, likely no more than 3,000–10,000 at best.** The primary threat to Cuora picturata is collection for trade.	The species occurs in northern Ninh Thuan province but with a quite relatively large EOO, the species can occur within the Project area and within the EAAA. However, since it prefers Forest habitat, while the EAAA mostly is modified habitat. The EAAA is unlikely to meet the threshold of Criterion 1 and Criterion 2 thus it is unlikely to trigger CHA	N/A	N/A
18	REPTILIA	*Cyrtodactylus caovansungi*	N/A	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is currently known only from the type locality: Nui Chua National Park, Ninh Thuan Province, in southern Viet Nam, at 400 m asl. (Orlov et al. 2007, Nguyen et al. 2009, Das 2010). The species is likely to be widespread within the national park, where it has been found on different slopes of the mountain, implying an extent of occurrence in excess of 200 km2. he population is declining in response to ongoing habitat degradation and loss. The habitat within this species' range is significantly threatened by conversion to cashew and pineapple	The species only lives in forests and unlikely to occur in the EAAA,	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
											plantations, and illegal harvesting of timber and forest products.			
19	REPTILIA	*Ophiophagus hannah*	King Cobra	VU	CR	No	TRUE	FALSE	FALSE	Habitat type Wetlands (inland), Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine, Shrubland, Grassland	This species is native in Nepal, Indonesia, India, Cambodia, Vietnam. The EOO is unknown (quite large) for this species but is considered stable. The species can be found to 2000m in altitude. This speice is not mentioned in Vietnam Red List. Near streams in dense or open forest, bamboo thickets, adjacent agricultural areas, and dense mangrove swamps.	The species occur in Ca NA, Ninh Thuan and has a quite large EOO. It can tolerate shrub-land habitat, which the EAAA also supports. However, the EOO is large in comparison with the project area, therefore, it has low chance that the study area meet the threshold for criterion 1. The study area does not contain critical habitat supporting this species.	N/A	N/A
20	REPTILIA	*Python bivittatus*	Burmese Python	VU	N/A	NO	TRUE	TRUE	FALSE	Wetlands (inland), Forest, Wetlands, Caves and Subterranean Habitats, Dessert	The species is recorded from the Chao Phraya and Bangpakong basins in Thailand and Mekong basin in Thailand, Cambodia, and Viet Nam (Can Tho market in the Mekong delta). Described from a specimen collected from Prachinburi market, Bangpakong basin, Thailand. In Cambodia, there are records from the Tonle Sap lake and river; in Thailand, records include Prachinburi, Ayutthaya, and Uthai Thani markets. The Burmese Python is a widely distributed species found throughout Southeast Asia, with evidence of extensive and widespread population declines. Neither generation length nor the scale of declines throughout this snake's global range are well-known, however, it has been listed as Critically Endangered in two major areas within its range due to localized declines greater than 80% over a ten-year period, and exhibits apparently high but unquantified rates of decline throughout its distribution. This snake is conservatively estimated to have declined by at least 30% over the past ten years across its global range as a result of over-harvesting for a variety of uses, to some extent compounded by the effects of habitat loss, and with the drivers of this decline not having ceased	The EAAA does not support forest and wetlands.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
21	REPTILIA	*Naja siamensis*	Black And White Spitting Cobra	VU	N/A	NO	TRUE	FALSE	FALSE	Wetlands (inland)	This species has a very wide distribution throughout mainland southeast Asia, with an extent of occurrence of over 800,000 km2 that encompasses Cambodia, southern Laos, central and all of southern Vietnam, northern Thailand and eastern Myanmar. There is no detailed population information available for this species, but snake hunters in the region of U Minh Thuong National Park, Viet Nam, report that the species has become much rarer (Stuart 2004). the species estimated to have declined by more than 50% over 10 years (Dang et al 2007) in Vietnam. Like other cobras, this species is heavily harvested in Vietnam, Cambodia, and Lao PDR where it is used for traditional Chinese medicine,	The species live in wetlands habitat that the EAAA does not support.	N/A	N/A
22	REPTILIA	*Physignathus cocincinus*	Chinese Water Dragon	VU	VU	NO	TRUE	FALSE	FALSE	Forest, Wetlands (inland)	This species occurs throughout Lao PDR, Cambodia and Viet Nam in appropriate habitat. Harvesting of this easily-captured species - primarily for food, but also for the international pet trade - constitute serious threats. This species is locally abundant, although it is subject to ongoing declines as a result of harvesting of both adults and eggs for food, and juveniles for the international pet trade, as well as declines in habitat quality in parts of the range. he first population-level mark-recapture survey of this species, across 14 stream transects in Thua Thien Hue Province in 2016 and 2017, found that the population appeared stable in two of three districts in this province over this short period but that the population size in this area may have been as low as 232-250 individuals in 2017.	The EAAA does not support forest and wetlands.	N/A	Phan Son Commune, Kiem Lam Sa Mai Ranger Station, Dai Ninh Hydropower Plant, 207 m elevation
23	REPTILIA	*Cyrtodactylus bidoupimontis*	Bidoup Benta-toed Gecko	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is endemic to Vietnam, where it has been recorded in Hon Ba Nature Reserve, Khanh Hoa. There are not considered to be any threats to this species, which occurs entirely within well-protected areas.Province, and Bi Doup-Nui Ba National Park, Da Chai Commune, province of Lam Dong	Where it was found is far away from the Project, and it only lives in forest, which the EAAA does not support.	N/A	N/A
24	REPTILIA	*Cyrtodactylus phuocbinhensis*	N/A	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is only known from the type locality in Phuoc Binh National Park, Ninh Thuan Province, Vietnam. here do not appear to be any threats to this species within the National Park.	Where it was found is far away from the Project, and it only lives in forest, which the EAAA does not support.	N/A	N/A
25	REPTILIA	*Cyrtodactylus yangbayensis*	Yangbay Bent-toed Gecko	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is known from Hon Ba Nature Reserve and Yang Bay Waterfall (an unprotected tourist area) in the Khanh Hoa province of southern Vietnam. Two gravid females have been recorded, each of them with two eggs. The subpopulation in Yang Bay near the waterfall may be subject to distutbance by tourists, but the remainder of the population is not.	Where it was found is far away from the Project, and it only lives in forest, which the EAAA does not support.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
26	REPTILIA	*Gekko canaensis*	Cà Nà□ Marbled Gecko	LC	N/A	NO	FALSE	TRUE	FALSE	Rocky areas	This species is known from Cà Ná Cape in the Vĩnh Tan Commune, Tuy Phong District, Binh Thuan Province (Ngo and Gamble 2011) , and adjacent areas in Ninh Thuan Province (N.S. Nguyen pers. comm. 2017) in southern Vietnam	Where it was found is far away from the Project, and it only lives in forest, which the EAAA does not support.	N/A	N/A
27	REPTILIA	*Varanus salvator*	Common Water Monitor	LC	EN	NO	TRUE	FALSE	FALSE	Wetlands (inland), Artificial/Aquatic & Marine	EN in Vietnam Redllist. This specie is found in India, Myanmar, Indonesia, Vietnam. This species is semi-aquatic and opportunistic and inhabits a variety of natural habitats, such as primary forests and mangrove swamps (Gaulke and Horn 2004, Weijola 2010). The presence of man does not deter these monitors from areas with human disturbance (Gaulke et al. 1999), as they have been reported to thrive in agricultural areas (e.g., rice, oil palm) and even cities with canal systems (e.g. in Sri Lanka, where they are not or hardly disturbed, hunted and prosecuted by man; M. Gaulke pers. comm.) and second-growth forest (S. Sweet pers. comm.). Furthermore, their aquatic habits provide them with a measure of safety (E. Pianka pers. comm.), and their generalist diet may provide added ecological plasticity to this species (Somaweera and Somaweera 2009). Recent work has shown that the species is absent from northeastern Myanmar, northern and northeastern Thailand, all but coastal Cambodia, and all of Laos except for the ranges on the Vietnam border (Cota et al. 2009); it is also absent from northwestern Vietnam. The main threat to this species comes from hunting, as the skin of this species is used in the leather trade, its meat is eaten, and its fat is used in traditional medicine.	The species only lives in wetlands that the EAAA does not support.	N/A	N/A
28	REPTILIA	*Leiolepis guttata*	Spotted Butterfly Lizard	DD	N/A	NO	FALSE	TRUE	FALSE	Marine Coastal/Supratidal	This species seems to be restricted to coastal habitats and specimens have been found in sand dunes along a road and basking on the sides of the road (Geissler et al. 2011). Its natural extent of occurrence and area of occupancy are consequently unclear, although measurement of the southern coastal sand area where it occurs in Ba Ria-Vung Tau, Binh Thuan, Ninh Thuan and Khanh Hoa Provinces suggests the area of occupancy may exceed 2,000 km2 (N.S. Nguyen unpubl. data).	The EAAA does not support marine coastal habitat.	N/A	N/A
29	REPTILIA	*Cyrtodactylus irregularis*	Irregular Bow-fingered Gecko	DD	N/A	No	FALSE	TRUE	FALSE	N/A	This species is endemic to Vietnam, where it is known from the type locality of Ta Nung Commune, One subpopulation has been reported from the Bidoup-Nuiba National Park. Other members of the Cyrtodactylus irregularis group appear to be at least somewhat reliant on primary forest and have generally been found in protected areas (Luu et al. 2017). The presence of a breeding population of the new species in a coffee farm may suggest this species group is more adaptable than previously recognized (Luu et al. 2017).	Not recorded and preferred habitat, primary forest, not present..	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
30	REPTILIA	*Oligodon macrurus*	Angel's Kukri Snake	DD	N/A	NO	FALSE	TRUE	FALSE	N/A	This species is known only from Viet Nam, where it occurs in a restricted area between Khanh Hoa and Ninh Thuan Provinces. Based on the coastal location of the known localities, it is presumed to occur below 200 m asl. No population status information is currently available for this species, which is known only from historical records at two localities.	The distribution range does not cover Ninh Thuan province	N/A	N/A
31	REPTILIA	*Dibamus smithi*	Smith's Blind Skink	DD	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is endemic to Vietnam and is only known from Da Ban on the Lang Bian Plateau, Da Lat, Lam Dong Province, and Nha Trang in Khanh Hoa Province. This fossorial species inhabits primary montane forests, and can also be found in secondary or disturbed forest.	The species only lives in forest and is unlikely to occur in the EAAA.	N/A	N/A
32	REPTILIA	*Gekko grossmanni*	N/A	DD	N/A	NO	FALSE	TRUE	FALSE	Forest	This nocturnal and presumably arboreal species (Das 2010) has been found living in the monsoon evergreen forests of Hon Ba Nature Reserve, where according to Ngo and Chan (2010) it occurs in sympatry with C. yangbayensis. In captivity, the diet consists of insects and other arthropods (Das 2010). Clutches comprise 2 eggs; the incubation period lasts 84-85 days and hatchlings measure 29-30 mm (Das 2010). This species is found on rocky outcrops during the day (N.S. Nguyen pers. comm. 2017).	The species only lives in forest and is unlikely to occur in the EAAA..	N/A	N/A
33	REPTILIA	*Oligodon moricei*	Morice's Kukri Snake	DD	N/A	NO	FALSE	TRUE	FALSE	N/A	This species is presently known only from the type locality, Nha Trang, Khanh Hoa Province, South Viet Nam	The distribution range does not cover Ninh Thuan province	N/A	N/A
34	MAMMALIA	*Pygathrix nigripes*	Black-shanked Douc Langur	CR	EN	NO	TRUE	FALSE	FALSE	Artificial/Terrestrial, Forest	EN in Vietnam Redlist. This specie is found Lam Dong, Binh Phuoc, Dak Lak These animals are predominantly arboreal but may occasionally come to the ground. They are found in evergreen, semi-evergreen and semi-evergreen-mixed deciduous forest mosaics, as well as in coastal dry forest. It seems that species of this genus can adapt to relatively heavily disturbed forest (Nadler et al. 2003). Diet is apparently variable by site, being mainly composed of leaves with differing levels of supplementation with seeds, fruits and flowers (Hoang Minh Duc and Baxter 2006; Rawson 2006). Behavioral characteristics of this species make it easy to hunt (Nadler et al. 2003). The largest population in Viet Nam may be in Nui Chua National Park (Ninh Thuan Province), which is estimated at 500-700 individuals (Hoang Minh Duc and Ly Ngoc Sam 2005). The only other known population estimate comes from the Nam Cat Tien sector of Cat Tien NP (Dong Nai, Binh Phuoc and Lam Dong Provinces) and is estimated at 109 individuals (Phan Duy Thuc et al. 2005). In southern Viet Nam, this species survives in a large number of small, isolated forest fragments, in comparison with the situation with the red-shanked doucs in the north, where the species is not able to persist in small forest fragments.	Nui Chua is adjacent to the Project location, and contains the largest population in Vietnam. However the species prefers forest habitat and most of the EAAA is modifed habiat. The EAAA is unlikely to meet the threshold of Criterion 1 thus it is unlikely to trigger CHA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
35	MAMMALIA	*Muntiacus vuquangensis*	Large-antlered Muntjac	CR	VU	NO	TRUE	FALSE	FALSE	Artificial/Terrestrial, Forest	The large-antlered Muntjac is chiefly located in Vietnam but also found in Cambodia and Laos. There are no accurate global estimates. There have been very few records of this species in Vietnam since the 1990's despite targeted camera trapping. The species is restricted to subtropical/tropical moist lowland and montane forest.	Restricted in tropical forest, and chances are already extinct in Viet Nam. The EAAA is unlikely to meet the threshold of Criterion 1 thus it is unlikely to trigger CHA	N/A	N/A
36	MAMMALIA	*Panthera pardus ssp. delacouri*	Indochinese Leopard	CR	CR	NO	TRUE	FALSE	FALSE	Forest, Shrubland, Artificial/Terrestrial	The Indochinese Leopard once ranged widely across Southeast Asia and southeastern China (Nowell and Jackson 1996), but now occurs in only a small fraction (about 2%–6%) of its historical distribution (i.e. range prior to 1900).There are no known viable Leopard populations remaining in Viet Nam, and this species is now likely to have been extirpated from the country (Rostro-García et al. 2016). From 1995 to 2013, there were no photographs of Leopard from camera-trapping studies in the country, including those in the largest and best protected areas (Rostro-García et al. 2016). The last published record of Leopard from Viet Nam was probably from the early 2000s in Yok Don National Park, in central Viet Nam (Eames et al. 2004), which might have been transient Leopard originating from the adjacent population in eastern Cambodia. It is doubtful that Leopard still occurs as a resident in Viet Nam given high levels of hunting and snaring there, which have devastated populations of smaller cat species in the country (Willcox et al. 2014). Following the IUCN Red List Guidelines (IUCN Standards and Petitions Subcommittee 2017), we estimated the total population in 2019 to be 114–1,130 individuals, including 77–766 mature individuals, based on the current extant range (i.e., possibly extant range was not included in the total population size) given within 'Distribution'. In Huai Kha Khaeng Wildlife Sanctuary (Thailand), home ranges varied from 27–56 km² for males and 11–41 km² for females (Rabinowitz 1989, Simcharoen et al.2008). In Kaeng Krachan National Park, home ranges were 17–18 km² for two males and 9 km² for one female (Grassman 1999). Poaching for the illegal wildlife trade is likely to be the greatest factor contributing to the decline of the Indochinese Leopard.	The species is extinct in Viet Nam.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
37	MAMMALIA	*Chrotogale owstoni*	Owston's Civet	EN	N/A	NO	TRUE	FALSE	FALSE	Artificial/Terrestrial, Forest, Shrubland	This cryptic mammal is found in parts of southern China, Laos and Vietnam. An EOO has not been calculated for this species. Moist lowland and montane tropical/subtropical forest are considered important for this species, however, it can to a degree utilise shrub land and heavily degraded former forest habitat too. The species is scarcely observed due to its cryptic nature, therefore, there are no accurate global population estimates. Owston's Civet Chrotogale owstoni was recently recorded twice in Chu Yang Sin National Park, Dak Lak province, Vietnam: in 2002 (dead animal recovered from a poacher's snare-line) and 2009 (field sighting). Habitat loss, degradation and fragmentation have affected large areas of Owston's Civet range (Schreiber et al. 1989), particularly in Viet Nam.	The species is mostly found in Northern mountain rangers in Vietnam, however, there are some records in the Middle region, e.g. in Chu Yang Sin National Park. The species can tolerate modified habitats. No records in Ninh Thuan was found based on desktop study, The EAAA is unlikely to meet the threshold of Criterion 1 thus it is unlikely to trigger CHA	N/A	N/A
38	MAMMALIA	*Bos javanicus*	Banteng	EN	N/A	NO	TRUE	FALSE	TRUE	Forest, Grassland	This species is in Thailand, Cambodia, Viet Nam, and Lao PDR, Banteng occurs (or occurred) in open mainly deciduous forest with glades, parklands, and dense forest patches; In Viet Nam, the species probably now occurs in only a few protected areas. Recorded in Ninh Son district in Ninh Thuan and Nui Ba National Park in the 1900s, but a study in 2009 has declared it being extinct in these two locations. The major threats to Banteng throughout its range are hunting and increasing loss of habitat. In Viet Nam and Lao PDR where the rate of lowland forest loss is also accelerating habitat loss is primarily a concern for the future viability of national populations, the species having been hunted out of forests long before they are cleared.	Likely extinct in Viet Nam (although historical records found in Ninh Thuan), the species is unliklely to appear in EAAA.	N/A	N/A
39	MAMMALIA	*Nomascus gabriellae*	Red-cheeked Gibbon	EN	EN	NO	TRUE	FALSE	FALSE	Forest	EN in Vietnam Redlist. This species is found Lam Dong, Dong Nai, Kon Tum. This species is found in tall evergreen and semi-evergreen forest (Geissman et al. 2000), although it probably ranges into other forest types (like mixed bamboo and woodland forest) adjacent to these, and may also occur in riverine and gallery forest associations. Among six provinces from Thua Thien Hue (central Viet Nam) to Thanh Hoa (southern part of north Viet Nam), Dak Rong Nature Reserve (Quang Tri province, central Viet Nam) was identified as one locality with the highest gibbon density, with an estimated density of only 0.06 groups/km2 (Nguyen Manh Ha et al. 2005). Estimated population densities in Cambodia range from 0.00 to 3.73 groups/km2 (n = 15), with an average of 1.47 groups/km2 (Traeholt et al. 2005). Like other gibbons, yellow-cheeked crested gibbons	Its distribution ranges does not overlap with the EAAA. It ranges in forest habitats, which the EAAA does not cover.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
											are arboreal and diurnal. Average group size is on the order 3-5 individuals. This species is identified as restricted-range species complying with IUCN but EOO is larger than 50,000 km2			
40	MAMMALIA	*Trachypithecus germaini*	Indochinese Silvered Langur	EN	N/A	NO	TRUE	FALSE	FALSE	Forest, Rocky areas	This species is found throughout Cambodia, Laos, Myanmar, Thailand and Vietnam. This is primarily a lowland species, with a preference for evergreen and semi-evergreen, mixed deciduous, riverine and gallery forest. Records in hilly areas or at higher elevations are few. The EOO is unknown for this species. The number of mature individuals is unknown, however, considered to be decreasing. There are no population estimates available for this species throughout its entire geographic range. It has been recorded from Phu Quoc National Park (Viet Nam), and probably still occurs in Cat Tien National Park (Viet Nam), Tran et al. (2017) recorded the species different habitats within three provinces in the Mekong delta region, the semi-evergreen forest at the Seven Mountains of An Giang province, the mangrove forest in Ngoc Hien and Nam Can districts, Melaleuca forest in U Minh Ha National Park of Ca Mau province, the limestone forest at Kien Luong Karst Area and semi-evergreen and evergreen forests at Phu Quoc National Park of Kien Giang province.**The estimate the total population of the langur in Viet Nam to be 362–406 individual**s, with the largest population found in the Kien Luong Karst Area (**223 individuals**). Another potentially viable population in Viet Nam is confirmed on Phu Quoc Island with estimated 31-44 individuals. Major threats to this species include habitat loss due to land use, hunting, use in traditional medicine, and collection for the pet trade.	No records near Ninh Thuan province was found, and most of the populations in Kien Luong, far away from Ninh Thuan province.	N/A	N/A
41	MAMMALIA	*Viverra megaspila*	Large-spotted Civet	EN	VU	NO	TRUE	FALSE	FALSE	Forest, Artificial/Terrestrial, Shrubland, Wetlands (inland)	The Large-spotted Civet is found throughout Cambodia, Laos, Malaysia, Myanmar, Thailand, **Vietnam and likely extinct in southern Vietnam** and China. This speices is found in Ke Go-Khe Net Lowlands and Cat Tien National Park. Large-spotted Civet is now evidently very rare in Viet Nam and is probably very close to national extinction if not gone already. Dry and moist lowland forests are considered important to Within suitable altitude and terrain, the species has been recorded in a number of different habitats: natural habitats assigned directly by observers include evergreen forest, semi-evergreen forest, mixed deciduous forest, deciduous dipterocarp forest, Melaleuca-dominated swamp-forest, shrubland, wetlands and grassland. According to Vietnamese information, it is defined as endangered species which is of significance for conservation in Quang Tri Province (2007).	The Species is likely to be extinct in southern Vietnam and only be found in northern Natioanal Parks	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
42	MAMMALIA	*Nycticebus pygmaeus*	Pygmy Slow Loris	EN	EN	NO	TRUE	FALSE	FALSE	Artificial/Terrestrial, Forest	This species is found east of the Mekong River in eastern Cambodia, southernmost China, Laos, and Vietnam (Streicher, 2004). In Vietnam, Pygmy Slow Loris utilises a variety of different habitats, from semi evergreen forest, forest on limestone, to secondary forests and bamboo plantations. According to IUCN**Invalid source specified.**, the EOO of this species is estimated at approximately 482,000 km^2. There is no peer-reviewed information about the population size of this species on a global context. Additionally, the limitation of population information in Cambodia, southernmost China and Laos also constrained the understanding of the Pygmy Slow Loris population size. In Vietnam, Pygmy Slow Loris' population was estimated to be about 600 – 700 individuals (Huynh, 1998). According to GBIF data, there was no observation of Pygmy Slow Loris in Vietnam in the last 50 years. The closest specimen of this species was recorded approximately 74 km away from the Project Area in Thua Thien – Hue province (Harvard University M, 2020).	EAAA lacks suitable habitat to support this species..	N/A	N/A
43	MAMMALIA	*Panthera tigris*	Tiger	EN	CR	NO	TRUE	FALSE	FALSE	Forest, Shrubland, Grassland	In 1998, the global Tiger population was estimated at 5,000 to 7,000 Tigers. A comparison of these population estimates of the 1990s to similar current ones suggests a decline of about 50% (taking the upper bound of 7,000 as the number of mature individuals in 1993, using a precautionary approach, declining to approximately 3,500 in 2014), but differences in methodologies and accuracy make such comparisons uncertain. Over the past 100 years Tigers have disappeared from southwest and central Asia, from two Indonesian islands (Java and Bali) and from large areas of Southeast and Eastern Asia. An extensive review of scientific literature as well as correspondence with Tiger scientists and protected area managers resulted in the identification of just 42 source sites totalling approximately 90,000 km². In Vietnam, in the last decaded, about 27-50 tigers are only recorded in Protected Areas: Muong Nhe, Pu Mat, Vu Quang, Chu Mom Ray, Song thanh, Yok Don. Poaching for illegal trade in high-value Tiger products including skins, bones, meat and tonics is a primary threat to Tigers, which has led to their recent disappearance from broad areas of otherwise suitable habitat, and continues at unsustainable rates.	The species is nearly extinct in Vietnam and can only found in some national parks. The closet national park is Nui Chua has not recorded their presence. Therefore, it is unlikely to appear in the Project EAAA.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
44	MAMMALIA	*Arctonyx collaris*	Greater Hog Badger	VU	N/A	NO	TRUE	FALSE	TRUE	Wetlands (inland)	The species is known from the Mekong (lower), Chao Phraya and Bangpakong river drainages.	No individual was found within the EAAA and its proximity during field survey and literature review even though the habitat is possible to be utilized by these species. Considering the very large EOO in comparison to the proportionally small Project EAAA, thus the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	N/A
45	MAMMALIA	*Ursus thibetanus*	Asiatic Black Bear	VU	EN	NO	TRUE	FALSE	FALSE	Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	Asiatic Black Bears occupy a variety of forested habitats, both broad-leaved and coniferous, from near sea level to an elevation of 4,300 m. The distribution of the Asiatic Black Bear roughly coincides with forest distribution in southern and eastern Asia (FAO 2010), Largest populations occur in China (government estimate: ~28,000; Gong and Harris 2006), Japan (government estimate: 12,000-19,000, with much wider confidence intervals; Ministry of the Environment 2011), India (5,000-7,000; Sathyakumar and Choudhury 2007), and Russia (5,000-7,000; Aramilev 2006). Countries with the smallest total numbers of Asiatic Black Bears are Iran (~100-200) and South Korea. All other countries report probable declining numbers (no report from Democratic People's Republic of Korea). The most severe declines, estimated at >60% in the past 30 years, were reported in Viet Nam and Bangladesh.	The species range in various habitats, records of presence are found in Ninh Thuan. It could potentially utilise EAAA habitat but not regularly or in numbers that would trigger critical habitat	N/A	N/A
46	MAMMALIA	*Macaca leonina*	Northern Pig-tailed Macaque	VU	VU	NO	TRUE	FALSE	FALSE	Forest	This species occur in central and southern Viet Nam (historical records in in Nghe An province, but there is uncertainty whether the species was ever found in the northern province). The species is widely distributed and common in large forest blocks remaining in southern and central Lao PDR, but it is much scarcer in northern Lao PDR and Viet Nam. Habitat disturbances affecting the future survival of this species include: selective logging; timber and firewood collection for making charcoal; building roads, dams, power lines; and deliberately setting fires.	The species lives in forest and is unlikely to appear within the EAAA.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
47	MAMMALIA	*Arctictis binturong*	Binturong	VU	EN	NO	TRUE	FALSE	FALSE	Forest, Artificial/Terrestrial	EN in Vietnam Redlist. This speicie is found in Nepan, Myanmar, China, Thailand, Laos, Cambodia and Vietnam. Binturong is primarily arboreal, but does descend to the ground; in fact the number of camera-trap photographs of this species across its range reveals a level of ground activity higher than had previously been unexpected for this species. Also, the species has been caught in baited live traps set on the ground (Grassman et al. 2005, Chutipong et al. 2014). The species is heavy and ponderous (adults can reach over 20 kg), and where more agile arboreal animal species could leap between trees, it must descend to the ground to go from one tree to another (Than Zaw et al. 2008). Although the species is mostly arboreal, it is detectable using camera-traps, and relatively intensive post-1999 field surveys that have used this method in suitable habitat in protected areas have produced few or no records of this species.	The species is possibly extinct in Viet Nam based on IUCN.	N/A	N/A
48	MAMMALIA	*Bos gaurus*	Gaur	VU	EN	NO	TRUE	FALSE	FALSE	Forest, Artificial/Terrestrial	EN in Vietnam Redlist. This species is found Ninh thuan, Dong Nai, Binh Duong, Tay Ninh, Dak Lak, Gia Lai, Kon tum. The EOO is quite large. The population is estimated approximately 6,000-21,000 mature individuals. This species was found in Phuoc Binh Nature Reserve an in Ma Noi forest in Ninh Thuan.	The species may occur in atrificial/terrestrial habitat, and presences were recorded in Ninh Thuan province. But the EOO is quire large, it is unlikely to trigger critical habitat crtierion 1	N/A	N/A
49	MAMMALIA	*Helarctos malayanus*	Sun Bear	VU	N/A	NO	TRUE	FALSE	FALSE	Forest, Shrubland, Artificial/Terrestrial	Sun Bears are a forest-dependent species, favouring interior mature and/or heterogeneously structured primary forests (Augeri 2005). There are two ecologically distinct categories of tropical forest that comprise their natural range, distinguished by differences in climate, phenology, and floristic composition: seasonal evergreen and deciduous forest in the mainland (north of the Isthmus of Kra) and aseasonal evergreen rainforest in Malaysia, Sumatra and Borneo. The historic range of this species (within 500 years) extended across much of Southeast Asia, from Borneo and Sumatra north to at least Yunnan Province, China.	It is unlikely to appear within the EAAA as it prefers forest habitats.	N/A	N/A
50	MAMMALIA	*Macaca arctoides*	Stump-tailed Macaque	VU	VU	NO	TRUE	FALSE	FALSE	forest	This specie is found in Vietnam, Cambodia, Myanmar, Vietnam. VU in Vietnam Redlist. This species has in Vietnam a wide habitat range from tropical evergreen forest to semi-deciduous, deciduous forest and limestone forest. Listed as Vulnerable as due to reduction in the past and projected decline by at least 30% over the coming 30 years (three generations) due primarily to hunting and continued rates of habitat loss (mainly as a result of logging and timber extraction). It is recorded in Phuoc Binh National park.	The species live in forest and is unlikely to appear within the EAAA	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
51	MAMMALIA	*Macaca fascicularis*	Nicobar Crab-eating Macaque	VU	LR	No	TRUE	FALSE	TRUE	Wetlands (inland)	Found in the Mekong basin; in Viet Nam, Cambodia, Lao PDR, and Thailand, and in the Chao Phraya, Nan and Mae Khlong, Tachin and Bangpakong rivers in Thailand. It is also recorded from Indonesia and Malaysia.	No individual was found within the EAAA and its proximity during field survey and literature review even though the habitat is possible to be utilized by these species. Considering the very large EOO in comparison to the proportionally small Project EAAA, thus the species does not meet thresholds of Criterions. Therefore, it is unlikely to trigger CHA	N/A	N/A
52	MAMMALIA	*Neofelis nebulosa*	Clouded Leopard	VU	N/A	NO	TRUE	FALSE	TRUE	forest,shrubland	The Clouded Leopard is found from the Himalayan foothills in Nepal through mainland Southeast Asia into China (Nowell and Jackson 1996). The Clouded Leopard historically had a wide distribution in China, south of the Yangtze, but recent records are few, habitat is fast disappearing, illegal hunting of this species has been prolific and its current distribution in China is poorly known. Clouded Leopards prefer closed forest (Grassman et al. 2005, Austin et al. 2007), and their habitat in Southeast Asia is undergoing the world's fastest deforestation rate (1.2-1.3% a year since 1990: FAO 2007).	No suitable habitat.	N/A	N/A
53	MAMMALIA	*Panthera pardus*	Leopard	VU	CR	NO	TRUE	FALSE	FALSE	Forest, Desert, Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna, Shrubland	CR in Vietnam Redlist. This specie is found in Lai Chau, Bac Kan, Quang Tri, Thua Thien - Hue, Lam Dong. The leopard has the widest habitat tolerance of any Old World felid, ranging from rainforest to desert. In Africa, they are most successful in woodland, grassland savanna and forest but also occur widely in mountain habitats, coastal scrub, swampy areas, shrubland, semi-desert and desert. They range from sea level to as much as 4,600 m on Mt Kenya (Hunter et al. in press). In Southwest and Central Asia, leopards formerly occupied a range of habitats, but now are confined chiefly to the more remote montane and rugged foothill areas. Through India and Southeast Asia, Leopard are found in all forest types, from tropical rainforest to the temperate deciduous and alpine coniferous (up to 5,200 m in the Himalaya), and also occur in dry scrub and grasslands (Nowell and Jackson 1996).	The species lives in forest and is unlikely to appear within the EAAA,	N/A	N/A
54	MAMMALIA	*Rusa unicolor*	Sambar	VU	N/A	NO	TRUE	FALSE	TRUE	Forest, Savanna, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	This species is found in the Mekong basin in China (Yunnan Province), Lao PDR, Thailand, Cambodia, and Viet Nam, and the Chao Phraya and Mae Khlong basins in Thailand. Usually found in clear, flowing waters over a variety of substrates. Occurs in medium to large-sized rivers and moves out onto the floodplain during high water. Migrates up the Mekong River from the Tonle Sap to southern Lao PDR between November and February (Baird et al. 2003).	No individual was found within the EAAA and its proximity during field survey and literature review even though the habitat is possible to be utilized by these species. Considering the very large EOO in comparison to the proportionally small Project EAAA, thus the species does not meet thresholds of	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
												Criterions. Therefore, it is unlikely to trigger CHA		
55	MAMMALIA	*Rattus osgoodi*	Osgood's Vietnamese Rat	LC	N/A	NO	FALSE	TRUE	FALSE	Forest, Shrubland, Grassland, Artificial/Terrestrial	This species is found in a wide variety of primary and secondary montane habitats. Musser and Newcomb (1985) note that they "suspect that this species is terrestrial and lives in grass and dense shrubbery providing good cover that may occur either along forest margins or scattered through forest with an open canopy. Thick scrub cover adjacent to agricultural fields may also be good habitat".	This species is considered to be common.The restricted-range species occur in an area about 20km off the Project. It is unlikely to appear within the EAAA.	N/A	N/A
56	MAMMALIA	*Leopoldamys milleti*	Millet's Leopoldamys	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is restricted to the Langbian highlands of the Dà Lat region of southern Viet Nam. Species distribution limits remain unresolved. It is known only from a handful of museum specimens, but is presumed to relatively common in its highland range. Listed as Least Concern because it is widespread throughout its highland range in the Langbian highlands, there are currently no known major threats to this species, and it is present in several protected areas.	This restricted-range species occur n the Da Lat mountains, but it is found to live in forest only. This species is considered to be common.	N/A	N/A
57	MAMMALIA	*Belomys pearsonii*	Hairy-footed Flying Squirrel	DD	CR	No	TRUE	FALSE	FALSE	Forest	The population abundance of this species is poorly known, however, it is believed to be significantly declining, or at least very rare, in some areas. In Southeast Asia, there are recorded from Myanmar, Thailand, Lao PDR, Viet Nam and possibly Cambodia although there are no records from this country and South Asia, it is threatened by shifting (jhum) cultivation, forest fires, monoculture plantations and hunting for local consumption.	The species' distribution range in IUCN does not include Ninh Thuan province.	N/A	N/A
58	MAMMALIA	*Euroscaptor parvidens*	Small-toothed Mole	DD	N/A	No	FALSE	TRUE	FALSE	Forest	E. parvidens is known from three widely separated sites: the Di Linh Plateau (type locality) in Lam Dong Province, southern Viet Nam; Rakho in Bac Kan Province, northern Viet Nam; and southern Yunnan, China, near the border with Viet Nam (Smith et al. 2008). Various specimens have been found across Vietnam suggesting that this species almost certainly occurs more widely.	The species' distribution range in IUCN does not include Ninh Thuan province.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
59	MAMMALIA	*Tragulus versicolor*	Silver-backed Chevrotain	DD	N/A	No	FALSE	TRUE	FALSE	Forest, Artificial/Terrestrial	Surveys (if possible combined with those for other poorly known and regionally endemic mammals) in the Southern Annamites and southern portions of the Central Annamites (in Viet Nam, Cambodia and Lao PDR) at a range of altitudes and in various habitats are urgently required to document the species's range, status, and habitat and altitudinal preferences, using appropriate methods such as camera-trapping and specimen collection.	The species' distribution range in IUCN does not include Ninh Thuan province	N/A	N/A
60	MAMMALIA	*Crocidura zaitsevi*	Mikhail Zaitsev's Shrew	DD	N/A	No	FALSE	TRUE	FALSE	Forest	This species is found in central and southern Viet Nam in a wide elevation range, from Ngoc Linh Mountain, Kon Tum Province (Jenkins et al. 2007), and in Phong Nha, Ke Bang Bational Park and in three localities in southern Viet Nam: Bi Doup, Nui Ba National Park; Hon Ba Mountain, Khanh Hoa Province; and Chu Yang Sin National Park (Abramov et al. 2013).	This species is considred to be common. The species' distribution range in IUCN does not include Ninh Thuan province.	N/A	N/A
61	MAGNOLIOPSIDA	*Hopea cordata*	Sao hinh tim	CR	DD	NO	TRUE	TRUE	FALSE	Forest - Subtropical/Tropical Dry	This species is endemic to a very small area on the coast in southern Viet Nam in Cam Ranh (Khanh Hoa). The EOO is estimated to be well less than 100 km2, area of occupancy (AOO) is considered to be slightly larger than 10 km2. Population is likely to be significantly under 250 individuals and only one sub-population of the species is known. In 2003, 100 saplings were known at Cam Ranh (Khanh Hoa) (Nghia 2003). It is unlikely to be present in other areas. The number of mature individuals of this species is in decline.	Unlikley to be present in other areas outside of Cam Ranh, EOO is small so not likely to appear in the Project EAAA. Plus, it only lives in forest.	N/A	N/A
62	MAGNOLIOPSIDA	*Shorea falcata*	Chai la cong	CR	CR	NO	TRUE	TRUE	FALSE	Forest - Dry lowland	It is endemic to the south coast of Viet Nam, where it is found in three locations of two provinces (Khanh Hoa and Phu Yen). In Khanh Hoa the species is present in two sites - Cam Hai Dong and My Ca communes in the district of Khanh Hoa (Nguyen 2000) and in Phu Yen the species is known from Song Cau commune (total three subpopulations are found). In Cam Hai Dong, seven individual trees remained in 2000 (Nguyen 2000) and only six trees were present in Xuan Hoa. In 2005, there were still pure stands of this tree in Mi Ca commune, around 100 ha in size (Nguyen 2005); However a survey conducted in 2017 showed this subpopulation had been mostly destroyed by tourist resort development (H.N. Nguyen pers. comm. 2018). Overall population size is not anticipated to be greater than 250 and regeneration at each site is considered poor. The species exhibits low regeneration and fruit yield in some of its sites. Fruit is set between September and October in Khanh Hoa and in July in Phu Yen Province (Nguyen 2005). The species will have a small area of occupancy (AOO), which we currently cannot estimate and extent of occurrence (EOO) is not predicted to exceed 5,000 km2 based on the distance between these two cities.	Low disperson capabilities, presence records are quite far from Ninh Thuan.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
63	MAGNOLIOPSIDA	*Polyspora gioii*	N/A	CR	N/A	NO	TRUE	TRUE	FALSE	Forest	Polyspora gioii is a small tree endemic to a single location in the Hòn Bà Nature Reserve, in southern Viet Nam. Its population consist of fewer than 50 mature individuals. It also has a restricted range, with an extent of occurrence (EOO) of less than 100 km2. The population was partially destroyed by the construction of a road from the base to the summit of Hon Ba Mountain (Luu et al. 2015). The species has low EOO and is only found within Hon Ba Nature Reserve, which is about 40km away from the Project location => The species is 'Unlikely' to appear in EAAA.	The species has low EOO and only found within Hon Ba Nature Reserve, which is about 40km away from the Project location.	N/A	N/A
64	MAGNOLIOPSIDA	*Beilschmiedia macrocarpa*	N/A	CR	N/A	NO	TRUE	TRUE	FALSE	Forest	This tree species is only known from one collection from the Massif du Hon-ba in the province of Nha-Trang in Vietnam. There is no information about the population size and trend of this species. it grows in forest between 1,000 – 1,500 m altitude.	The species has low EOO and only found within Hon Ba Nature Reserve, which is about 40km away from the Project location.	N/A	N/A
65	MAGNOLIOPSIDA	*Camellia fleuryi*	N/A	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	Camellia fleuryi is found at Hon Ba Massif near Dien Khanh, Khanh Hoa, near the city of Nha Trang in Vietnam. No recent collection of the species is known. At least two sites in the vicinity of the city of Nha Trang have been visited so far without finding the species (Orel pers. comm.). If still present, the species is likely to be confined to the Hon Ba Nature Reserve (about 190 km²) and at fewer than five locations.	The species has low EOO and only found within Hon Ba Nature Reserve, which is about 40km away from the Project location.	N/A	N/A
66	MAGNOLIOPSIDA	*Hopea ferrea*	N/A	EN	EN	NO	TRUE	FALSE	FALSE	Forest, Shrubland, Artificial/Terrestrial	This species is native to Indochina where it is found in Cambodia, Lao PDR, Viet Nam, Thailand, Peninsular Malaysia. It is cultivated within Singapore. This species has a wide distribution but population is scattered and the species is considered uncommon. The estimated EOO is 8,500,000 km2. The estimated population is unknown. The species is not well represent in ex situ collection but is found in some protected areas. Further ex situ collections of this species should be made and the species habitat protected.. Recorded in Binh Chau Phuoc Buu Reserve, Ta Dung Nature Reseve, Ca Na (Ninh Thuan).	The species occur in Ca NA, Ninh Thuan and has a quite large EOO. it can tolerate shrubland habitat, which the EAAA also supports. The EOO is large in comparison with the project area, therefore, it is unlikley that study area meet the threshold for critreion 1. The study area does not contain critical habitat supoprting this species.	N/A	N/A
67	MAGNOLIOPSIDA	*Dipterocarpus intricatus*	N/A	EN	N/A	NO	TRUE	FALSE	FALSE	Forest	This is a relatively widespread and common species. It is mostly restricted to dry deciduous forest, lowland to sandstone slope. However there has been between a 30 and 50% population reduction in the last three generations (300 years) due to the expansion of agricultural areas and exploitation for timber. The species is continuing to decline but at a lower rate, threatened by habitat loss. It is found at elevation <700m.	The species is restricted to deciduous forest which the EAAA does not have, and distribution is not found in Ninh Thuan province. The species has low EOO and only found within Nui Ba National Park, which is about 40km away from the Project location. It lives in forest which the EAAA does not support.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
68	MAGNOLIOPSIDA	*Magnolia bidoupensis*	N/A	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	Magnolia bidoupensis is found only in Bidoup-Nuiba National Park, Lam Dong Province, south Viet Nam. The estimated extent of occurrence (EOO), based on the area of the national park where this species is found, is 700 km2. However, the actual EOO is likely to be smaller than this. Bidoup Nuiba National Park has reported encroachment, logging and fire as possible threats to the area.	The species has low EOO and only found within Nui Ba National Park, which is about 40km away from the Project location. Suitable habitat is not present.	N/A	N/A
69	MAGNOLIOPSIDA	*Hopea odorata*	N/A	VU	N/A	NO	TRUE	FALSE	FALSE	Forest	This species is native to southern Asia and Indochina. It is found within Bangladesh, Myanmar, Thailand, Cambodia, Lao PDR, Viet Nam, Peninsular Malaysia and in India on the Andaman Islands and West Bengal. verall, the population is currently in decline. It has undergone a 30–50% population reduction in the last three generations (+300 years) due to clearance of forest habitat for expanding agriculture and local exploitation of the species for its timber. Population decline is likely to continue into the future but at a unknown rate. It is recorded in Phuoc Binh National park. This species is used for its timber.	Distribution range does not encompass Ninh Thuan province. The species has low EOO and only found within Nui Ba National Park, which is about 40km away from the Project location. It lives in forest whicj the EAAA does not support.	N/A	N/A
70	MAGNOLIOPSIDA	*Dipterocarpus alatus*	N/A	VU	N/A	NO	TRUE	FALSE	FALSE	forest	This tree is native to Sri Lanka, India (W Bengal, Andaman Islands), Bangladesh, Myanmar, Thailand, Lao PDR, Cambodia and southern Viet Nam. It possibly occurs in northern peninsular Malaysia. The species is found from 100 to 700 m asl and it has an estimated extent of occurrence (EOO) of over 2 million km^2. The main threats for the species are deforestation for agriculture, commercial tapping of resin and exploitation for timber	Distribution range does not encompass Ninh Thuan province.	N/A	N/A
71	MAGNOLIOPSIDA	*Oenanthe javanica*	Water Dropwort	LC	N/A	NO	FALSE	TRUE	FALSE	Wetlands (inland), Artificial/Aquatic & Marine	The species occurs over a very wide area and although the habitats in which it occurs are often threatened by drainage, forest clearance, logging, poor watershed management and development, it is unlikely to become extinct in the short term and so is assessed as Least Concern.	It is a common species unlikely to trigger CH.	N/A	N/A
72	MAGNOLIOPSIDA	*Cladopus fallax*	N/A	DD	N/A	NO	FALSE	TRUE	FALSE	Wetlands (inland)	This species has only been recorded from one locality southern Viet Nam and another one in southeastern Thailand.0	Distribution range does not encompass Ninh Thuan province.	N/A	N/A
73	MAGNOLIOPSIDA	*Hydrobryum minutale*	N/A	DD	N/A	NO	FALSE	TRUE	FALSE	wetlands (inland)	The species has only been recorded from Dalat in Lam Dong Province, southern Viet Nam	Distribution range does not encompass Ninh Thuan province.	N/A	N/A
74	MAGNOLIOPSIDA	*Limnophila polyantha*	Om nhieu hoa	DD	N/A	NO	FALSE	TRUE	FALSE	Wetlands (inland)	The species occurs within a restricted area in Sikkim and West Bengal in eastern India, Myanmar and north-eastern Thailand, and Vietnam. The species is more strictly aquatic than most members of the genus, typically occurring in ponds or lakes, where it grows as an emergent or floating on the water. 1,200-1,300 m alt.	The species live in wetlands habitat that the EAAA does not support.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
75	MAGNOLIOPSIDA	*Pistacia weinmanniifolia*	N/A	DD	N/A	NO	FALSE	TRUE	FALSE	Forest, Rocky areas	Pistacia weinmannifolia is native to southern and southeast regions of China (Guangxi, Guizhou, Sichuan, Xizang and Yunnan) except for a small number of subpopulations recorded in Viet Nam and Myanmar This species suffers ongoing habitat loss from the development of modern agriculture in the Chinese provinces of Guangxi, Guizhou and south Yunnan.	Distribution range does not encompass Ninh Thuan province.	N/A	N/A
76	LILIOPSIDA	*Zingiber yersinii*	N/A	CR	N/A	NO	TRUE	FALSE	FALSE	Forest	This species is only known from the type locality in southern Viet Nam and, although it is in Hon Ba nature reserve, the population is very small (about 40 mature individuals) and this species is expected to be found in adjacent areas (particularly from Bidoup Núi Bà National Park) as exploration of the area progresses. The type locality is close to the main camp where all the botanists and other researchers stay, so it occurs in the area most disturbed and collected. The area is being planted up with various ornamental plants and there are longer term plans to build a tourist resort here.	The species has low EOO and only found within Hon Ba Nature Reserve, which is about 40km away from the Project location. The EAAA is unlikely to meet the threshold of Criterion 1 thus it is unlikely to trigger CHA	N/A	N/A
77	LILIOPSIDA	*Curcuma vitellina*	N/A	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	This species is known from five localities in high central to central Viet Nam. Recorded from Pongour Waterfall in Lam Dong Province; Chu Yang Sin National Park, Dak Lak Province; Khanh Vinh District and Hon Ba Nature Reserve, Khanh Hoa Province; and Gia Bac Pass, Binh Thuan Province. This species is estimated to have a small range with an extent of occurrence of 4,508 km2 and area of occupancy of 20 km2	Small range of EOO and historical records are found in locations far away to Project location. The species has low EOO and only found within Nui Ba National Park, which is about 40km away from the Project location. It lives in forest while the EAAA does not support.	N/A	Pongour waterfall
78	LILIOPSIDA	*Siliquamomum oreodoxa*	N/A	EN	N/A	NO	TRUE	TRUE	FALSE	Forest	This species was described based on a collection from Bidoup Nui Ba National Park in Lam Dong Province, Viet Nam. It also occurs in Hon Ba Nature Reserve (J. Leong-Skornickova pers. obs.). The extent of occurrence is estimated to be smaller than 1,500 km². Is locally common at the newly found site (over 1,000 mature individuals, whereas the plants at the type locality numbered less than 50 mature individuals). Habitat destruction is the only threat.	The species has low EOO and only found within Hon Ba Nature Reserve, which is about 40km away from the Project location. The species has low EOO and only found within Nui Ba National Park, which is about 40km away from the Project location. It lives in forest while the EAAA does not support.	N/A	Cam Lam Distr., Hon Ba NR
79	LILIOPSIDA	*Monochoria vaginalis*	Pickerel Weed	LC	N/A	NO	FALSE	TRUE	FALSE	Wetlands (inland), Artificial/Aquatic & Marine	This species is widely distributed throughout southeast Asia, from the Mae Klong and Chao Phraya basins in Thailand, the Mekong basin, to both slopes of the Malay Peninsula and to Indonesia (Java (Citarum (Tjitarum) River, Parongkalong, Preanger Province), central Sumatra (Tan and Ng 2000) and Kalimantan, western Borneo (Roberts 1989). Range extends in Indochina to the Mekong delta in Viet Nam (Khoa and Huong 1993).	It is a common species that will not trigger CH.	N/A	N/A

No.	Class	Scientific Name	Common Name	IUCN	Vietnam Red Data Book	CH Screening results	Criterion 1 (Critically endangered/ Endangered)	Criterion 2 (Endemic and/ or restricted range)	Criterion 3 (Migratory/Congregatory)	Habitat	Species Information	Justification	Found using (sampling method)	Recorded within 50km radius of the Project (GBIF Coordinate)
80	LILIOPSIDA	*Hornstedtia sanhan*	N/A	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This is a widespread species in Viet Nam, it is present in a number of protected areas and is under no threat, hence it is assessed as Least Concern. There are no major threats to this species.	It is a common species that will not trigger CH.	N/A	N/A
81	LILIOPSIDA	*Newmania cristata*	N/A	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	So far collected only in the type locality in Núi Chúa National Park, central Viet Nam where it is known from a number of subpopulations. There are no threats to this species. This part of the park is seldom visited by tourists so human activity is minimal.	It only occurs in forest.	N/A	N/A
82	LILIOPSIDA	*Conamomum rubidum*	N/A	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This species was described based on a collection from Bidoup Nui Ba National Park in Lam Dong Province, Viet Nam. It is now known from to additional localities in high central Viet Nam: Hon Ba Nature Reserve and Chu Yang Sin National Park (J. Leong-Skornickova pers. obs.). The extent of occurrence is estimated at 338 km². All of the known subpopulations are within protected areas and there are no significant threats.	Where it iis found is far away from the Project, it has small EOO and only occurs in forest habitas.	N/A	N/A
83	LILIOPSIDA	*Zingiber discolor*	N/A	LC	N/A	NO	FALSE	TRUE	FALSE	Forest	This species is endemic to southern Viet Nam. Apart from the type locality at Hòn Bà Nature Reserve, this species has also been observed in forests in Lâm Đồng Province, Bảo Lâm district (Nuraliev 830, photographic record of flowering material seen), which is distanced c. 200 km (air distance) from Hòn Bà mountain. It is expected that this species will be reported from other localities in the future. There is selective logging taking place at one of the localities, but this has minimal impact on this species.	It occurs in Hon Ba Nature Reserve and only in forests.	N/A	N/A
84	LILIOPSIDA	*Curcuma arida*	N/A	LC	N/A	NO	FALSE	TRUE	FALSE	Forest,Shrublamd	So far known only from the Núi Chúa National Park, southern Viet Nam. There are no known threats to this species.	The diistribution range does not coincide with the Project.	N/A	N/A
85	LILIOPSIDA	*Ranalisma rostrata*	Mui vang	DD	N/A	NO	FALSE	TRUE	FALSE	Forest	The species has been recorded from southern China (Hunan, Jiangxi, Zhejiang), Peninsular Malaysia (Batu Caves, outside Kuala Lumpur, and considered extirpated; Kiew 2005) and Viet Nam. There is no readily available information on its status in Viet Nam.	Distribution range does not encompass Ninh Thuan province.	N/A	N/A

APPENDIX E LIST OF RESPONDENTS

List of Respondents Social – Economic Baseline

List of Respondent For Household Survey

1	LH-01	Chamalé Thanh	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
2	LH-02	Patur Xá Phóng	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
3	LH-03	Katơr Điện	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
4	LH-04	Pi Năng Hải	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
5	LH-05	Kator Long	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
6	LH-06	Jắk Thanh Thương	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
7	LH-07	Kator Thị Phiếu	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
8	LH-08	Emaxít Thị Xanh	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
9	LH-09	Katơr Phơn	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
10	LH-10	Emaxít Đào	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
11	LH-11	Jắk Dớ	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
12	LH-12	Emaxít Vanh	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
13	LH-13	Chamaléa Sinh	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
14	LH-14	Chamalé Phân	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
15	LH-15	Chamale Đôi	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
16	LH-16	Trương Ngọc Lễ	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
17	LH-17	Emasik A	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
18	LH-18	Katơr Huệ	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
19	LH-19	Amaxit Đen	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
20	LH-20	Emaxít Thân	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
21	LH-21	Patâu Xá Đức	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
22	LH-22	Măng Lẹn	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
23	LH-23	Emaxit Huấn	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
24	LH-24	Katơr Lượm	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
25	LH-25	Kator Thị Tín	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
26	LH-26	Patâu Xá Thị Mí	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
27	LH-27	Chamalé Năng	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
28	LH-28	Emaxít En	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
29	LH-29	Tapur Du	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
30	LH-30	Katơr Núi	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
31	LH-31	Emaxít Thị Đinh	Female	Bà Râu 1	Lợi Hải	Thuận Bắc

1	LH-01	Chamalé Thanh	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
32	LH-32	Tala Kết	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
33	LH-33	Kator Du	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
34	LH-34	Katơr Ni	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
35	LH-35	Katơr Đất	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
36	LH-36	Katơr Đức	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
37	LH-37	Katơr Khương	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
38	LH-38	Bơ Năng Hai	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
39	LH-39	Tapur Xuyến	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
40	LH-40	Mang Kít	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
41	LH-41	Katơr Tân	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
42	LH-42	Kator Thị Khô	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
43	LH-43	Kator Hấy	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
44	LH-44	Chamaléa Vớ	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
45	LH-45	Eamaxit Bóng	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
46	LH-46	Kator Con	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
47	LH-47	Ta Pô Thị Dung	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
48	LH-48	Tain Khá	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
49	LH-49	Charao Bố	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
50	LH-50	Chamalea Pha	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
51	LH-51	Katơr Lố	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
52	LH-52	Chamaléa Sơn	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
53	LH-53	Amaxít Cú	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
54	LH-54	Tain Vương	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
55	LH-55	Tapô Liên	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
56	LH-56	Jeắk Lú	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
57	LH-57	Chamaléa Thị Nhi	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
58	LH-58	Cha Rao Cú	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
59	LH-59	Emaxít Thị Dinh	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
60	LH-60	Kator Vấn	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
61	LH-61	Kator Khăm	Female	Bà Râu 1	Lợi Hải	Thuận Bắc
62	LH-62	Chamaléa Niếu	Male	Bà Râu 1	Lợi Hải	Thuận Bắc

1	LH-01	Chamalé Thanh	Male	Bà Râu 1	Lợi Hải	Thuận Bắc
63	LH-63	Katơr Ôn	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
64	LH-64	Katơr Thị Phí	Female	Bà Râu 2	Lợi Hải	Thuận Bắc
65	LH-65	Charao Thị Né	Female	Bà Râu 2	Lợi Hải	Thuận Bắc
66	LH-66	Chamalea Hiển	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
67	LH-67	Chamalea Lại	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
68	LH-68	Katơr Thị Khương	Female	Bà Râu 2	Lợi Hải	Thuận Bắc
69	LH-69	Katơr Xê	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
70	LH-70	Chamalé Điệu	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
71	LH-71	Katơr Thị Qua	Female	Bà Râu 2	Lợi Hải	Thuận Bắc
72	LH-72	Patâu Xá Linh	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
73	LH-73	Katơr Thế	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
74	LH-74	Katơr Tiêu	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
75	LH-75	Charao Xin	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
76	LH-76	Jeak Ngang	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
77	LH-77	Katơr Chánh	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
78	LH-78	Katơr Dân	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
79	LH-79	Chorao Thị Lớn	Female	Bà Râu 2	Lợi Hải	Thuận Bắc
80	LH-80	Eamaxit Toàn	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
81	LH-81	Cha Rao Et	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
82	LH-82	Katơr Phước	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
83	LH-83	Chamalêa Hoài	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
84	LH-84	Katơr Khê	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
85	LH-85	Tà Pur Mùi	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
86	LH-86	Katơr Thành Đổi	Male	Bà Râu 2	Lợi Hải	Thuận Bắc
87	LH-87	Tapô Đức	Male	Suối Đá	Lợi Hải	Thuận Bắc
88	LH-88	Chamalea Thị Bưởi	Female	Suối Đá	Lợi Hải	Thuận Bắc
89	LH-89	Pinăng Quấn	Male	Suối Đá	Lợi Hải	Thuận Bắc
90	LH-90	Pater Xá Thị Nhờ	Female	Suối Đá	Lợi Hải	Thuận Bắc

List of respondents for FGD

No.	Full name	Age	Occupation	Gender
Women group				
1	Eamaxít Thị Minh	25	Day labourer	Female
2	Patâu xá Thị Ước	23	Day labourer	Female
3	Katơr Thị Hiền	21	Day labourer	Female
4	Chamalea Thị Mấn	38	Unemployed	Female
5	Ka tơr Thị Sỹ	27	Day labourer	Female
6	Eamaxít Thị Sở	61	Housewife	Female
7	Jeắk Thị Đen	26	Day labourer	Female
8	Emaxít Thị Minh	32	Unemployed	Female
9	Taing Thị Bí	35	Unemployed	Female
10	Jeắk Thị Phượng	27	Day labourer	Female
Vulnerable group				
1	Eaxít Lú	65	Day labourer	Female
2	Katơr Thị Loan	27	Handcraft	Female
3	Katơr Thị Nai	25	Handcraft	Female
4	Chamalea Lơn	67	Farmer	Male
5	Jeắk Thị Vứ	60	Unemployed	Female
6	Amaxít Thị Đi	63	Handcraft	Female
7	Nguyễn Thị Tốt	64	Farmer	Female
8	Katơr Ngọc	23	Day labourer	Male
9	Katơr Thị Nhít	21	Handcraft	Female
10	Chamalea Thị Quyết	37	Handcraft	Female
11	Chamalea Thị Kiểu	32	Handcraft	Female
General Group				
1	Lê Hữu Phú	45	Nationnal Front	Male
2	Jeăk Khi	36	Veterans Union	Male
3	Nguyễn Hữu Hợp	42	Farmer Union	Male
4	Eamaxit Thị Tin	38	Women Union	Female
5	Kator Thị Quanh	37	People’s Assembly	Female

No.	Full name	Age	Occupation	Gender
6	Chamalea Thiên	30	Youth Union	Male
Farmers Group 1				
1	Chamalea Thị Ngọc Linh	39	Farmer	Female
2	Jeăk Thị Hồng Châu	34	Farmer	Female
3	Ama xít Huấn	47	Farmer	Male
4	Earít Chiêu	50	Farmer	Male
5	Mang Kích	44	Farmer	Male
6	Chamalea Minh Thắng	58	Farmer	Male
7	Earít Thẩn	41	Farmer	Male
8	Katơr Phôi	33	Farmer	Male
9	Taing Phúc	19	Farmer	Male
10	Katơr Vẫn	33	Farmer	Male
11	Katơr Sơn	29	Farmer	Male
12	Katơr Ba	47	Farmer	Male
13	Jeăk Bâu	37	Farmer	Male
14	Chamalea Thị Manh	37	Farmer	Male
15	Katơr Thị Phen	38	Farmer	Male
Farmers Group 2				
1	Katơr Hoài	28	Farmer	Female
2	Katơr Thị Bí	48	Farmer	Female
3	Katơr Thị Minh	42	Farmer	Female
4	Katơr Ní	30	Farmer	Male
5	Chao rao Thị Út	30	Farmer	Female
6	Katơr Thị Hương	46	Farmer	Female
7	Charao Thị Phi	33	Farmer	Female
8	Katơr Thị Lễ	29	Farmer	Female
9	Charao Thị Mít	27	Farmer	Female
10	Charao Thị Bảy	26	Farmer	Female
11	Chamalea Sang	32	Farmer	Male
12	Katơr Vân	32	Farmer	Female

No.	Full name	Age	Occupation	Gender
13	Katơr Phương	24	Farmer	Male
14	Chamalea Ấn	32	Farmer	Male
Cham people group				
1	Katơr Soanh	70	Farmer	Male
2	Kator In	67	Farmer	Male
3	Emaxit Thị Đanh	59	Farmer	Female
4	Chamalea Thị Nghinh	36	Farmer	Female
5	Kator Thị Canh	36	Farmer	Female
6	Emaxit Thị Nhiên	34	Farmer	Female
7	Kator Lơn	56	Farmer	Male
8	Chamalea Đoản	32	Farmer	Male

APPENDIX F PHOTO LOG

PHOTO LOG LOI HAI 2
HOUSEHOLD SURVEY

Focus Group Discussion

ERM has over 160 offices across the following countries and territories worldwide

Argentina
Australia
Belgium
Brazil
Canada
Chile
China
Colombia
France
Germany
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
Myanmar
The Netherlands
New Zealand
Norway
Panama
Peru
Poland
Portugal
Puerto Rico
Romania
Russia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Taiwan
Thailand
UAE
UK
US
Vietnam

ERM Vietnam
3rd Floor, Saigon Finance Centre
09 Dinh Tien Hoang, Dakao Ward
District 1, Ho Chi Minh City
Vietnam

T: +84 28 3914 7800
F: +84 28 3914 7801

www.erm.com

The business of sustainability

ERM