

Draft Environment and Social Impact Assessment

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Lao PDR: Monsoon Wind Power Project Part 9: Main Report

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Monsoon Wind Power Project, Sekong and Attapeu Provinces, Lao PDR

Environmental and Social Impact
Assessment

29 April 2022

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8.5 Social Impact Assessment

The assessment of potential social impacts arising as a result of the Project are outlined in the following sections. The social impact assessment is based on the methodology provided in **Chapter 5**.

8.5.1 Scope of Social Impact Assessment

Scoping determines which impacts are likely to be significant and should become the main focus of the impact assessment. A scoping exercise was carried out early in the ESIA process, which helped to outline the potential impacts associated with the Project. The identified potential impacts formed the basis of the social baseline study and impact assessment. The scoping outcomes are summarised in **Table 8.50**. The scoping summary does not intend to capture all potential social impacts of the Project, but key potential impacts to be examined during the social impact assessment.

The social impact assessment seeks to assess the potential social impacts from Project-related activities on sensitive receptors. The social impact assessment expands on scoping outcomes, and takes into consideration:

- The concerns and feedback received during the ESIA stakeholder engagement and baseline collection activities (refer to **Chapter 6**), and
- The socio-economic characteristics of the affected villagers, particularly their vulnerability, their needs and challenges, as captured under the Social Baseline chapter (refer to **Section 7.5**).

Table 8.50: Social Impact Scoping

Project Activities	Project Phase	Potential Social Impacts	Receptors	Location
Construction and operation of the Project	Construction Operation	Economic Opportunities <ul style="list-style-type: none"> ■ Local Employment and Training ■ Increased Access to Agricultural Land/Forest 	Affected villagers	All villages in the Aol
Turbine site, Access road, Internal TL 35kV, 115kV, Sub 500kV, TL500kV	Construction Operation	Economic Displacement and Impacts to Livelihoods <ul style="list-style-type: none"> ■ Loss of Agricultural Land ■ Loss of NTFP Collection 	Affected villagers	Sekong Province: <ul style="list-style-type: none"> ■ Dak Tiem ■ Dak Yang ■ Dak Yen ■ Xiengluang ■ Dak Terb ■ Tongmueang ■ Dak Dor ■ Dak Rant ■ Dak Bong ■ Dak Cheung ■ Tongxieng ■ Dak Muan ■ Ngon Don ■ Dak Ta-ok Noi Attapeu Province: <ul style="list-style-type: none"> ■ Dak Nong ■ Dak Samor
Vehicle movements from the delivery of materials and use of infrastructure and machinery,	Construction	Impacts to Community Health and Safety <ul style="list-style-type: none"> ■ Infrastructure and Machinery ■ Vehicle Movements ■ Security ■ Potential Spread of Diseases 	Affected villagers Workforce	All villages in the Aol

Project Activities	Project Phase	Potential Social Impacts	Receptors	Location
associated with construction activities				
Construction of the Project	Construction	Impacts Associated with Influx <ul style="list-style-type: none"> ■ Labour and Working Conditions ■ Transactional Sex ■ Community Dynamics and Gender-Based Violence ■ Public Infrastructure and Resources 	Affected villagers Workforce	Location of workers camp
Operation of the Project	Operation	Impacts on Local Amenity: <ul style="list-style-type: none"> ■ Noise ■ Landscape and Visual Disruptions ■ Shadow Flicker 	Affected villagers	All villages in the Aol
Construction of the Project	Construction	Impact on Ethnic Groups <ul style="list-style-type: none"> ■ Erosion of Ethnic Culture 	Affected villagers	All villages in the Aol
Construction of the Project	Construction	Impact on Cultural Heritage (Tangible and Intangible) <ul style="list-style-type: none"> ■ Access / impacts to the Sacred Forest 	Affected villagers	All villages in the Aol

The following will be undertaken as part of the social impact assessment for each potential social impact:

- Description of the potential social impact, including:
 - The geographical extent of the potential social impacts;
 - Relevant Project phase (e.g. pre-construction, construction, operations); and
 - Potentially affected receptors.
- Identification of existing controls that have been developed and implemented.
- Assessment of the significance of the social impact.
- Development of additional mitigation and management measures, and associated monitoring measures.
- Assessment of residual social impact significance.
- Gender analysis and mainstreaming measures.

8.5.2 Impacts on Economic Opportunities

The development of a project typically generates economic opportunities for the local community. Potential economic opportunities for the Dak Cheung and Sanxay Districts are outlined in the following sections.

8.5.2.1 Potential Impacts

Local Employment and Training

An average of 700 workers (per day) are required during the construction phase (peak workforce requirement is 1,400 workers per day). In the construction phase, 150 positions are available for unskilled workers, 350 positions are available for semi-skilled workers, and 500 positions available for skilled workers. While it is currently unclear as to whether the 350 semi-skilled and 500 skilled workers would be sourced from the villages within the Aol, it is highlighted that there are training opportunities available to enable some villagers work in these positions.

A total of 53 workers will be required for the operations phase, of which 20 will be based locally. Eight of these workers will be migrants (i.e. project manager, site and administrative manager, equipment manager, operation manager, safety manager, chef), who will immigrate to the local area.

Baseline data identifies that over 1,664 people are in the active labour force. Of the active labour force, approximately 360 people are in unpaid (working on family farms) or temporary work (e.g. on hydropower projects or coffee plantations). Some local males have trades such as blacksmithing. On this basis, it is expected that there is capacity for villagers within the Aol to be employed in unskilled work, and perhaps some semi-skilled work, for the Project.

In addition to direct employment, there may be indirect employment opportunities. For instance, the Project or workers may require short-term accommodation, or the purchase goods and services from local businesses. The increased demand may result in an associated increase in employment.

Stakeholder engagement with villagers from both the Dak Cheung and Sanxay Districts identified that they have a positive sentiment about the Project, are looking forward to anticipated benefits, most notably in the form of employment. Villagers recognise that employment opportunities associated with the construction phase are temporary, in line with the temporary nature of construction. There is also an expectation that training opportunities will be provided as part of the Project. Villagers are particularly interested in training opportunities for youths as it is the view that the youth population needs opportunities for employment.

Increased Access to Agricultural Land/Forest

Access roads will be constructed to connect the Project with the National Highway No. 16 and internal Project access roads to wind turbines, transmission lines, and other infrastructure, in the Dak Cheung and Sanxay Districts. While the development of these access roads will result in the acquisition of some agricultural land (assessed separately in **Section 8.5.3**), according to the Project's Concession Agreement, all access roads developed by the Project are supposed to be made available for villagers to use. These new roads have the potential to provide access to new areas that were previously inaccessible. The new areas may provide opportunities for villagers to establish new farms to support their land-based livelihoods.

To ensure access to these new areas are in line with local customs and restrictions, and government requirements, further consultation and studies may need to be undertaken. Further consultation will reveal whether there are areas that particular villagers may access (e.g. only women, only elders, etc.). These opportunities may be tempered by the presence of biodiversity (refer to impact assessment of impacts to areas with high biodiversity value in **Section 8.4.3** in that there is a potential that the new areas will be areas of high biodiversity value, which may need to be confirmed via ecological field surveys. Nonetheless, IEAD will work together with the government to restrict access to high biodiversity areas, as outlined in **Chapter 7**.

8.5.2.2 Existing Controls

As the Project has not commenced, there are no existing benefit enhancement measures.

8.5.2.3 Significance of Impacts

Methodology for Assessment of Impact Significance

The potential economic opportunities are assessed in accordance with the criteria set out in **Table 8.51** and **Table 8.52**.

Table 8.51: Social Impact Magnitude Criteria

Magnitude	Definition
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the Aol and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Early evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community
Positive	In the case of positive impacts, it is generally recommended that no magnitude be assigned, unless there is ample data to support a more robust characterisation. It is usually sufficient to indicate that there will be a positive impact, without characterising the exact degree of positive change likely to occur.

Table 8.52: Social Impact Sensitivity Criteria

Sensitivity	Definition
Low	Villagers have low vulnerability/sensitivity; consequently has a high ability to adapt to changes brought by the project
Medium	Some, but few areas of vulnerability/sensitivity; retaining an ability to at least adapt in part to change brought by the project
High	Profound or multiple levels of vulnerability/vulnerability/sensitivity that undermine the ability to adapt to changes brought by the project

Receptor Sensitivity and Impact Magnitude

The affected villagers are considered to have **medium** sensitivity, as they will be able to participate in decision-making through stakeholder engagement.

The impact magnitude is **positive** as economic opportunities allow affected villagers to improve their livelihoods.

Impact Significance

Based on the above, the impact significance of economic opportunities manifested through local employment, training opportunities, and increased access to new agricultural land has a **positive** impact significance.

8.5.2.4 Additional Mitigation, Management, and Monitoring Measures

Local Employment and Training

A Local Content and Influx Management Plan will be prepared to maximise the local employment and training opportunities afforded to the affected villagers. The Local Content and Influx Management Plan will be implemented by the nominated EPC Contractor, and will include:

- The responsibilities and management practices associated with the management of labour during construction and operation of the Project.
- A hiring policy that reinforces the Project's preference to employ local workers and undertake procurement from local businesses, where possible. The policy will be a tiered system where the hiring preference will be as follows:
 1. Villagers from within the Aol;
 2. Villagers from the Dak Cheung District or Sanxay District; and

3. Villagers from the Sekong Province or Attapeu Province.
- A training program targeting skills required for affected villagers to participate in unskilled, and potentially semi-skilled, work for the Project.
 - A communications strategy to notify affected villagers of employment and procurement opportunities in advance. This will enable villagers and businesses to be prepared for the application process (e.g. contracting requirements, assistance with application, etc.). The communications strategy will be supported by the SEP.

Community Development Plan

A Community Development Plan (CDP) which incorporates the Ethnic Group Development Plan (due to the fact that the majority of the affected villagers are ethnic minorities) will be prepared to guide the implementation of suitable programs to support affected villagers. In the first instance, the CDP will investigate existing community development initiatives that may be already implemented and/or planned by the government, NGOs, and other organisations. The CDP will suggest collaboration with these organisations or enhance existing programs whenever feasible, which will:

- Reduce duplication of programs and resources;
- Increase likelihood of success; and
- Promotes larger scale and longevity of the program(s).

Derived from the community risks and opportunities, existing community development programs and the Project's 'thriving community' priorities, potential programs that will be investigated in the CDP include:

- **Rural electrification:** The Proponent has delivered a number of successful renewable energy projects. Although the Project will not supply electricity to Laos, the Proponent has committed to providing a means of reliable and affordable electricity to the affected villages. As part of the CDP, the details of implementation will be determined (e.g. provision of household solar power systems). This would further the Lao Government's Renewable Energy Development Strategy by increasing the renewable energy share. Priority will be given to the households affected by the Project's land acquisition, then poor households within the Project's affected communities, and finally the entire the affected villages if possible.
- **Agriculture and husbandry training:** There are a number of existing agriculture and husbandry programs which will be investigated, such as:
 - IFAD Program supporting agriculture, providing training on weaving for women, and rearing livestock; and
 - Department of Agriculture and Forestry (2021) training on how to prepare soil for coffee plantation (part of the Greater Sub-Region Biodiversity Conservation Corridors Project).

The CDP will be supported by the SEP, to ensure the key development opportunities are driven by the community's needs and opportunities, and the community members are aware of the Project benefits and how they can participate.

Ideally, the overlapping of community development priorities and interest between the community, local government and institutions, and the Project would form the strategic community development programs for the CDP.

The CDP will include a set of criteria to be considered for the selection and prioritisation of programs. While the criteria will be refined further, they generally relate to:

- Budget and timeframe constraints;
- Practicality and potential partners to execute the program successfully;

- Potential unintended consequences from the program;
- If there is opportunity for gender mainstreaming; and
- If there will be disproportionate benefits to a certain group and the potential for the vulnerable groups to not benefit from the CDP initiatives.

In addition to this, the CDP will include, but will not be limited to:

- Context review results – internal and external;
- Results of the community needs assessment and resources analysis;
- A description of the priority elements and why these were selected as priority elements;
- An overview of stakeholder engagement activities for CDP prioritisation, and design and implementation of CDP projects;
- Identification of potential partners and partnership strategies;
- A monitoring and evaluation framework for the CDP;
- The budget and human resources requirements for implementation of the CDP; and
- An implementation plan / schedule.

Increased Access

The management of increased access within the Dak Cheung and Sanxay Districts, and restriction to high biodiversity areas, will be managed via the Construction and Environmental Management Plan (CEMP).

The SEP will be paramount in informing affected villagers of areas able to be accessed, and any conditions of access.

8.5.2.5 Residual Impact Significance

The residual impact significance of the impact of economic opportunities for affected villagers remains **Positive (Table 8.53)**.

The Project will provide various economic opportunities, particularly in the form of employment. Not only will there be direct employment, but there will be indirect employment in businesses that support the Project and its workers. Additionally, increased access to agricultural land/forest will contribute toward economic growth in the villages in the AoI. The Project will also implement a CDP is to identify opportunities to improve the prospects of communities affected by the Project activities, independent of the Project presence, so the benefits will be felt long beyond the life of the Project.

Table 8.53: Economic Opportunities Impact Assessment

Significance of Impact			
Potential Impact	Economic opportunities for affected villagers		
Project Phase	Pre-Construction	Construction	Operation
Impact Nature	Negative	Positive	Neutral
	Opportunities for employment and other economic benefits from the Project.		
Impact Type	Direct	Indirect	Induced
	Economic benefits will be directly provided by IEAD to affected villagers.		
	Temporary	Short-term	Long-term
			Permanent

Significance of Impact

Impact Duration	Some economic benefits may be temporary, such as employment and training opportunities during the construction phase, while some will be long-term such as employment opportunities, increased access to agricultural land, and through the implementation of the CDP projects such as rural electrification, increased agricultural skills, women micro-credit scheme, and health and nutritional programs.				
Impact Extent	Local	Regional		International	
	The economic benefits will be limited to the villages within the Aol.				
Impact Scale	The economic benefits will be limited to the villages within the Aol.				
Frequency	The economic benefits will vary depending on the phase of the Project, and will be experienced in both the construction and operation phases.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	The impact of economic opportunities for affected villagers is positive.				
Receptor Sensitivity	Low	Medium		High	
	Affected villagers are able to participate in decision-making on the CDP priorities and directly receive the economic benefits provided.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is positive .				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	
Residual Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is positive .				

8.5.3 Economic Displacement and Impacts to Livelihoods

Economic displacement and impact to livelihoods are inextricably linked concepts. Economic displacement is defined by the United Nations Development Programme (UNDP) (2020b) as the restriction (partially or fully) of individuals or communities to land or resources that are important to their means of livelihood or economic wellbeing. Livelihoods comprise the capabilities, assets and activities required for a means of living (IRP & UNDP-India, n.d.). Economic displacement therefore is likely to have an impact on livelihoods.

Potential economic displacement and impacts to livelihoods associated with the Project, are described in the following sections.

8.5.3.1 Potential Impacts

The majority of Project affected households live a subsistent livelihood which relies heavily on land and other natural resources around them. The main form of land-based livelihoods are agricultural activities (e.g. farming, rearing livestock, etc.) and NTFP collection. The Project impacts on each of the land-based livelihoods are discussed separately, below.

Loss of Agricultural Land

Agricultural land will be acquired to accommodate wind turbines, access roads, and the internal 35 and 115kV transmission line (refer to **Figure 8.58**). In the Sekong Province, the Project will need to acquire a total of 4.89 ha (three households in one village) permanently (affecting 107 households). In addition, an area of 123.10 ha will be used temporarily during construction (135 households in 12 villages). There are 104 households in 14 villages that have their land impacted both permanently and temporarily.

In the Attapeu Province, a total of 0.51 ha will be permanently acquired (affecting six households in Dak Samor Village). In addition, an area of 1.97 ha (affecting one household in Dak Nong Village) will be used temporarily during construction. A summary of affected agricultural land is provided in **Table 8.54**. The affected land was recorded as being used as primary and supplementary sources of livelihood.

The acquisition of land currently used for agricultural purposes will lead to economic displacement, since the land will be (permanently or temporarily) removed from its agricultural use, and unable to generate income for landowners and users. In this sense, the loss of agricultural land will cause economic displacement and impact on livelihoods. Whilst some households will be temporarily impacted, it is highlighted that during this period, the impact on livelihoods will experience a similar impact to those households experiencing permanent acquisition.

Figure 8.58: Agricultural Land Removal

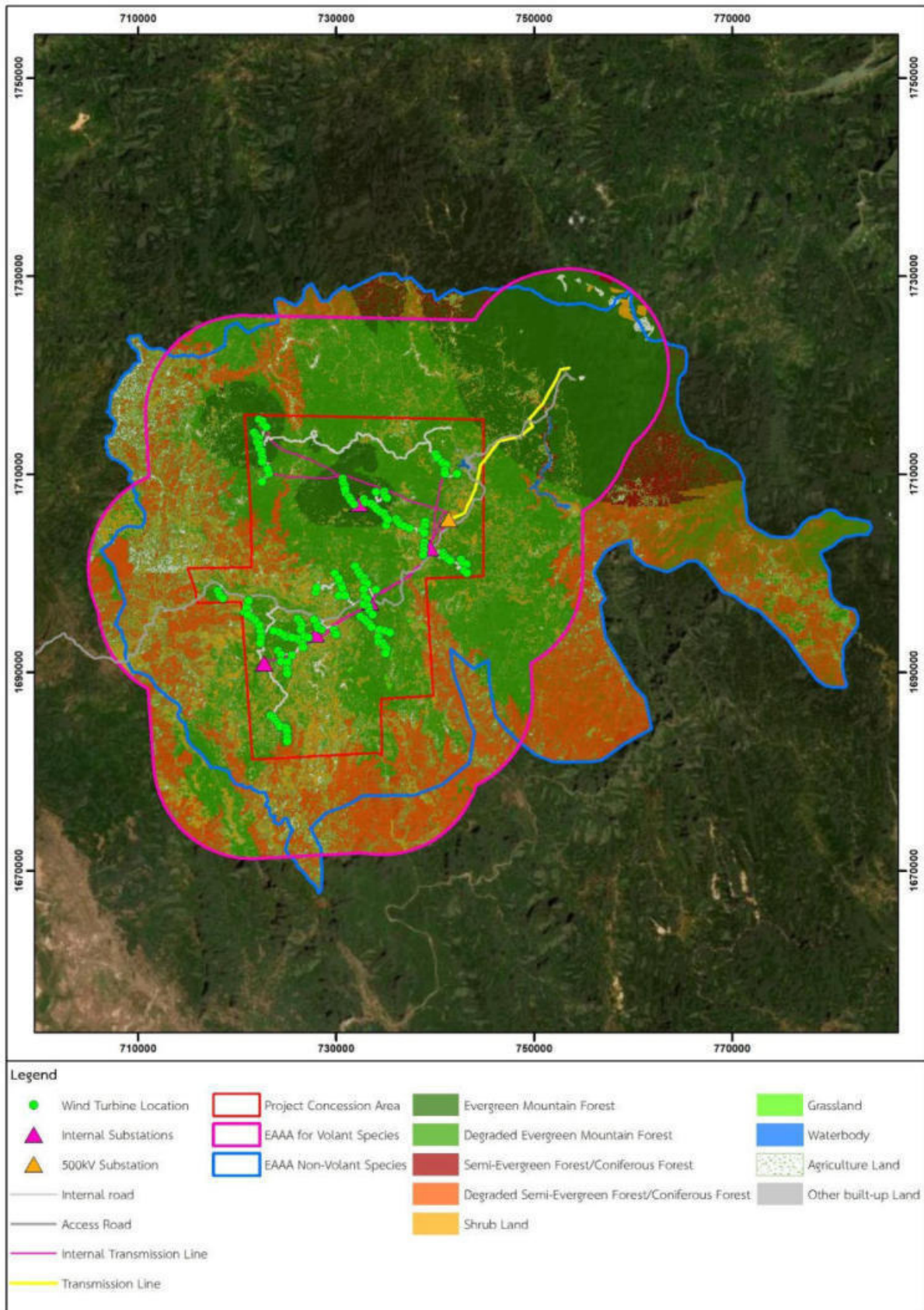


Table 8.54: Loss of Agricultural Land

Location	Project Activity	Produce	Affected Area (ha)		Affected HHs (No.)			Total Affect HHs (No.)	Livelihood Type (Main or Supplementary)
			Permanent	Temp.	Permanent	Permanent & Temp.	Temp.		
Dak Tiem	Turbine site, Access Road	Coffee, Rice, Old Farm ¹¹⁵	1.17	2.94	3	17	2	22	Both
Dak Yang	Turbine site, Access Road	Coffee, Rice, Old Farm	1.68	3.59	0	10	1	11	Both
Dak Yen	Turbine site, Access Road	Coffee, Old Farm	0.41	1.06	0	4	2	6	Both
Xieng Luang	Internal TL 115kV	Rice, Cassava	0.16	1.16	0	5	1	6	Both
Dak Terb	Turbine site, Access Road, Internal TL 115kV	Coffee, Cassava, Rice, Old Farm	0.12	4.24	0	8	16	24	Both
Tong Muang	Internal TL 115kV	Cassava, Rice	0.40	0.90	0	3	0	3	Both
Dak Dor	Internal TL 115kV	Coffee, Cassava, Rice, Old Farm	0.05	11.44	0	10	18	28	Both
Dak Ran	Turbine site, Access road, Internal TL 115kV, Sub 500kV	Coffee, Cassava, Rice, Old Farm	0.12	14.29	0	11	13	24	Both
Dak Bong	Internal TL 115kV, 35kV, TL500kV	Coffee, Cassava, Rice, Old Farm	0.20	37.77	0	15	33	48	Both
Dak Cheung	Access road	Coffee, Cassava, Rice, Old Farm	0.18	0.41	0	1	0	1	Both

¹¹⁵ Old farm refers to farms that were previously (but are not currently being) worked on. The owners still retain ownership of the land, and may return to cultivate the land in the next 4-5 years.

Location	Project Activity	Produce	Affected Area (ha)		Affected HHs (No.)			Total Affect HHs (No.)	Livelihood Type (Main or Supplementary)
			Permanent	Temp.	Permanent	Permanent & Temp.	Temp.		
Tong Xieng	Access road	Coffee, Cassava, Rice, Old Farm	0.22	0.48	0	7	0	7	Both
Dak Muan	TL500kV	Coffee, Cassava, Rice, Old Farm	0.04	19.81	0	4	26	30	Both
Ngon Don	TL500kV	Coffee, Cassava, Rice, Old Farm	0.12	23.46	0	8	22	30	Both
Dak Ta-ok Noi	TL500kV	Old Farm	0.02	1.55	0	1	1	2	Both
		Total Sekong Province	4.89	123.10	3	104	135	242	
Dak Nong	Internal TL 115kV	Old Farm	0.00	0.33	0	0	1	1	Both
Dak Samor	Access road	Coffee, Cassava, Rice, Old Farm	0.51	1.64	0	6	0	6	Both
		Total Attapeu Province	0.51	1.97	0	6	1	7	
		Grand Total Area	5.40	125.07	3	110	136	246	

In the Project area, land use arrangements for agricultural purposes is made via formal land use certificates, or an informal traditional booking system (refer to **Chapter 7**). In the case of formal land ownership, buildings/structures constructed on the land are not recognised on a land title or land use certificate (Conventus Law, 2018).

The distribution of landownership between men and women varied across villages in the AoI. While most affected villagers identified that men and women have equal ownership of land, the land use certificate may state both names or the man's name only.

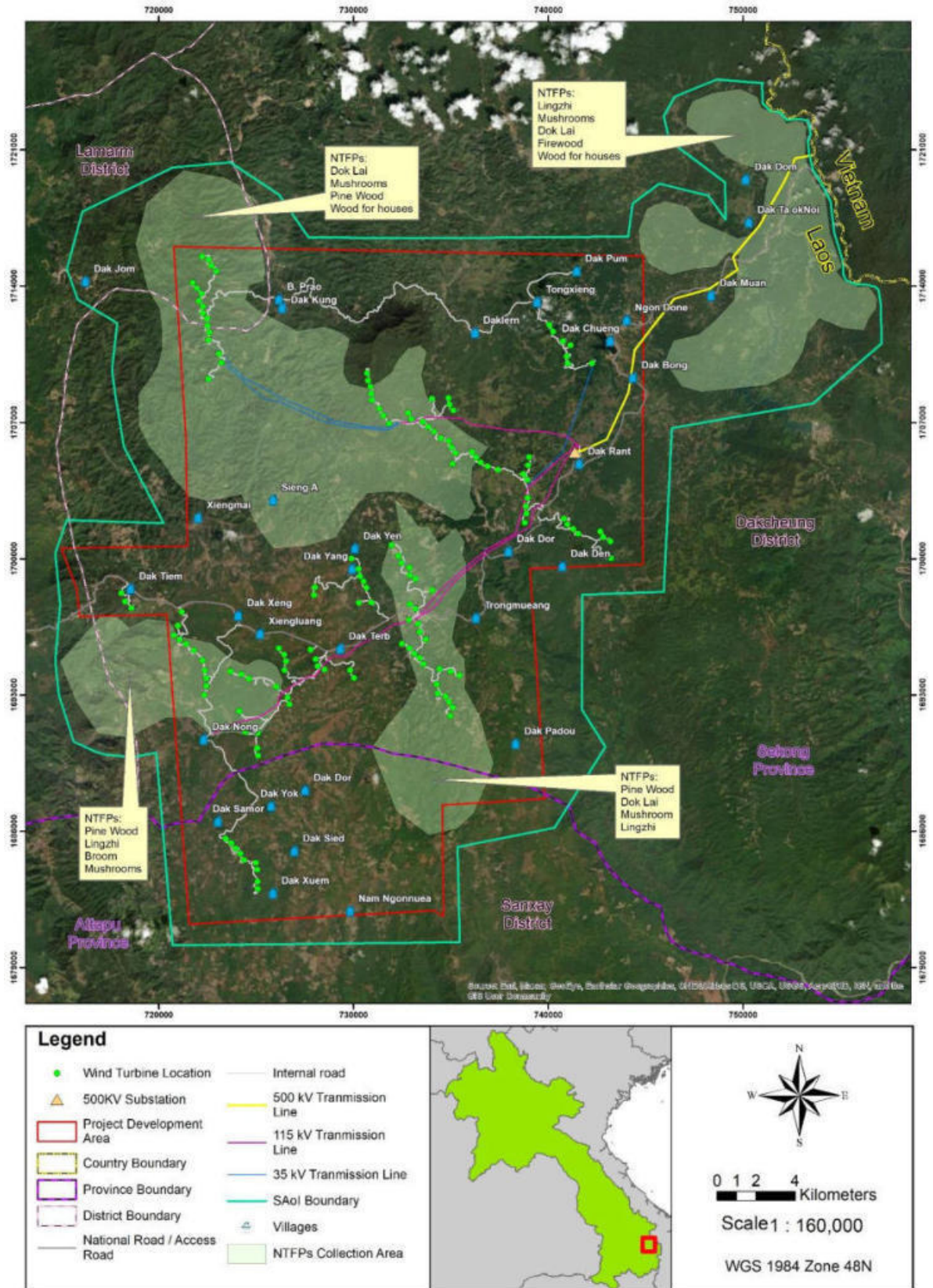
Through stakeholder engagement (refer to **Chapter 6**), affected households have indicated that they are worried that they will not be reasonably compensated for the loss of agricultural land, and they have a preference for cash compensation. The affected villagers' concern is principally related to the limited availability of land suitable for rice cultivation, due to the mountainous terrain of the region.

NTFP Collection

Social surveys undertaken confirmed that affected villagers, generally women, collect NTFP from the nearby forests (refer to **Chapter 7**). Affected villagers are dependent on the collection of NTFP to supplement their livelihoods (e.g. Dok lai, Ling zhi), and other household uses (e.g. firewood, wood for houses, sticks to make brooms). **Figure 8.59** depicts the areas where NTFP are collected.

In the Sekong Province, 108.25 ha of forest will be permanently removed, and 421.00 ha will be temporarily acquired, affecting a total of 1,752 households. In the Attapeu Province, a total of 44.80 ha of forest will be permanently removed, and 18.98 ha will be temporarily acquired, affecting 355 households. A summary of the impact on NTFP collection is provided in **Table 8.55**.

Figure 8.59: NTFP Collection Areas



Source: Site visit conducted by Innogreen, November – December 2021

Table 8.55: Impact on NTFP Collection

Location	Project Activity	Produce	Affected Area (ha)		Affected HHs (No.)	Livelihood Type
			Permanent	Temp.		
Dak Tiem	Access road	Mushroom, firewood, wood for houses	8.97	17.08	144	Supplementary
Xiengluang	Access road, Transmission line	Firewood, wood for houses	16.86	59.13	97	Supplementary
Dak Terb	Access road, Transmission line	Mushroom, firewood, wood for houses	6.29	28.44	149	Supplementary
Dak Yang	Access road	Mushroom, firewood, wood for houses	2.58	4.78	58	Supplementary
Dak Yen	Access road	Mushroom, firewood, wood for houses	5.44	10.61	117	Supplementary
Trongmueang	Access road, Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi	12.65	54.89	55	Supplementary
Dak Dor	Transmission line	Mushroom, firewood, wood for houses	0.03	9.27	100	Supplementary
Dak Den	Access road	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi	7.88	14.99	78	Supplementary
Dak Rant	Access road, Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi	19.33	67.95	63	Supplementary
Sieng A	Access road	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	7.23	15.37	32	Supplementary
Dak Jom	Access road	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	4.00	6.80	202	Supplementary
Dak Kung	Access road, Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	4.00	12.58	40	Supplementary
Daklern	Access road, Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi	4.69	36.45	38	Supplementary
Tongxieng	Access road	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi	1.68	4.00	45	Supplementary
Dak Cheung	Access road, Transmission line	Mushroom, firewood, wood for houses	6.30	13.53	204	Supplementary
Dak Bong	Transmission line	Mushroom, firewood, wood for houses	0.07	11.48	54	Supplementary
Nong Don	Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	0.01	2.25	107	Supplementary
Dak Muan	Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	0.04	3.46	67	Supplementary

Location	Project Activity	Produce	Affected Area (ha)		Affected HHs (No.)	Livelihood Type
			Permanent	Temp.		
Dak Ta-ok Noi	Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	0.06	17.81	46	Supplementary
Dak Dom	Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	0.14	30.12	56	Supplementary
Total Sekong			108.25	421.00	1,752	
Dak Nong	Transmission line	Mushroom, firewood, wood for houses, Dok laiy, Ling zhi, Brooms	1.40	0.01	72	Supplementary
Dak Samor	Access road		8.68	3.52	83	Supplementary
Dak Yok	Access road		2.35	1.27	58	Supplementary
Dak Padou	Access road		11.96	5.24	66	Supplementary
Dak Xuem	Access road		20.42	8.94	76	Supplementary
Total Attapeu			44.80	18.98	355	
Grand Total			153.05	439.98	2,107	

Affected villagers revealed that they were concerned about the clearing of and restricted access to the forest, as they would lose sources of food and firewood. NTFP collection remains an important source of livelihood as these products have high value and are able to be sold to buyers from nearby cities and Vietnam.

It is highlighted that the proposed permanent and temporary clearing of forest has been kept to a minimum, and comprises less than 1% of the total Project area. The number of affected households was determined based on the number of households who collect NTFP within the areas identified in **Figure 8.2**. The area of forest will be cleared will, amongst other things, allow for access roads to be laid. As stated in **Section 8.5.2.1**, the access roads will provide greater access to other areas of the forest that the affected villagers may currently be unable to access, or have difficulty accessing. As such, while there are 2,107 households affected by the clearing of forest, the Project will not remove the ability for NTFP collection.

The biodiversity aspect of NTFP collection (ecosystem services) impacts will be covered within the biodiversity section (refer to **Section 8.4**), as appropriate.

8.5.3.2 Existing Controls

The Project layout (including access road and transmission line routes) has been optimised to avoid physical displacement of villagers. Agricultural land and access to NTFP were also considered in the design process, and while unable to be avoided, the Project has minimised the magnitude of land acquisition and resettlement.

8.5.3.3 Significance of Impacts

Methodology for Assessment of Impact Significance

The potential economic displacement and impacts to livelihoods are assessed in accordance with the criteria set out in **Table 8.56** and **Table 8.57**.

Table 8.56: Social Impact Magnitude Criteria

Magnitude	Definition
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the AoI and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Early evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community
Positive	In the case of positive impacts, it is generally recommended that no magnitude be assigned, unless there is ample data to support a more robust characterisation. It is usually sufficient to indicate that there will be a positive impact, without characterising the exact degree of positive change likely to occur.

Table 8.57: Social Impact Sensitivity Criteria

Sensitivity	Definition
Low	Villagers have low vulnerability/sensitivity; consequently has a high ability to adapt to changes brought by the project
Medium	Some, but few areas of vulnerability/sensitivity; retaining an ability to at least adapt in part to change brought by the project
High	Profound or multiple levels of vulnerability/vulnerability/sensitivity that undermine the ability to adapt to changes brought by the project

Receptor Sensitivity

The affected villagers are considered to have **medium** sensitivity. This is due to their dependence on land-based livelihoods, namely agricultural practices and NTFP collection. Primarily, these land-based livelihoods are for the purpose of subsistence. Given the rural locality, it is difficult to participate in other sources of livelihood (e.g. not many wage-based or enterprise-based livelihood opportunities in or close to the villages in the AoI). However, the Project will provide opportunities to participate in livelihood restoration mechanisms that will seek to restore the affected villagers' livelihoods to a minimum of existing levels, if not better.

Impact Magnitude

Given the number of households permanently and temporarily affected by economic displacement and impacts to livelihoods, the impact magnitude is considered to be **large**.

Impact Significance

As a result, the impact significance is designated as **major**.

8.5.3.4 Additional Mitigation, Management, and Monitoring Measures

IEAD recognises that Project-related activities resulting in land acquisition can have adverse impacts on communities.

As such, a Resettlement Plan will be developed in response to the Project causing economic displacement and impacts to livelihoods. The Resettlement Plan will be prepared in consultation with the Government of Laos, and will define persons entitled to compensation, principles of compensation, methods of valuing affected assets, resettlement process and tools, grievance process, institutional arrangement for resettlement planning and implementation.

The following principles will guide the development of the Resettlement Plan:

- Provide a set of clear and transparent standards for compensation that will be applied consistently to all affected villagers.
- Compensation will be provided for loss of assets at full replacement cost (i.e. market value plus transaction costs (for instance registration and taxes)), and provide assistance to help affected villagers to improve, or at least restore their livelihoods.
- While reasonable efforts will be undertaken by the Project to identify land availability and options for replacement land, given the challenges in securing replacement land (refer to *Section 8.5.3.1*), particularly for rice farms, this may not be feasible.
- If replacement land options are not viable, other compensation measures may be investigated such as cash compensation for the value of the replacement land. It is a common practice in the region for resettlement compensation; however experience and lessons learned across the world show that there are often consequences of providing cash compensation, and this is especially the case for Indigenous peoples and other marginalised groups due to their limited transaction experience. Accordingly, if cash compensation is offered, the Project will:
 - Assess recipient's ability and financial literacy to use cash to restore their standard of living. If required, the Project should provide financial literacy classes to raise awareness on the use of compensation money.
 - Provide incentives for affected households to purchase land (e.g. additional 10% of total land compensation amount if replacement land is purchased within six months, and provide assistance in identifying suitable replacement land).
 - Consider depositing cash compensation into a joint bank account under the name of both husband and wife.
 - Seek to provide cash compensation as instalments over time, which provides the opportunity for recipients to develop improved financial management skills.
- Activities are planned and implemented with meaningful consultation, and the informed participation of those affected.
- All payments including compensation for loss of land, assets, structures, trees, etc. will be made to affected households prior to physical possession.
- Lack of formal legal rights to assets lost will not deprive affected villagers from receiving compensation and payments for non-land assets and entitlements.
- Livelihood planning should provide special assistance to women, minorities, and vulnerable groups who may be disadvantaged in securing alternative livelihoods.
- The customs and traditions, as well as the religious practices of all affected households, will be respected and protected.
- A timely, effective and accessible Grievance Redress Mechanism will be established to manage issues and grievances related to resettlement.

8.5.3.5 Residual Impact Significance

The additional mitigation measures proposed will lower the residual impact magnitude to **medium**, however the impact significance remains as **moderate**.

Table 8.58: Economic Displacement Impact Assessment

Significance of Impact				
Potential Impact	Economic displacement and impacts to livelihoods from removal of agricultural land and forest (affecting NTFP collection).			
Project Phase	Pre-Construction	Construction	Operation	
Impact Nature	Negative	Positive	Neutral	
	Economic displacement and impacts to livelihoods will cause negative impact on affected villagers.			
Impact Type	Direct	Indirect	Induced	
	The Project will cause direct impact as removal of agricultural land and forest is required as part of the Project footprint.			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	The removal of agricultural land and forest has temporary and permanent implications.			
Impact Extent	Local	Regional	International	
	The impact is limited to the villages in the Aol where land is required.			
Impact Scale	The impact is limited to the villages in the Aol where land is required.			
Frequency	The impact will occur once (i.e. Permanent acquisition of agricultural land and forest will only occur once for the area required).			
Impact Magnitude	Positive	Negligible	Small	Medium
	Due to the large number of households permanently and temporarily affected by economic displacement and impacts to livelihoods, the magnitude is large.			
Receptor Sensitivity	Low	Medium	High	
	The affected villagers have a medium sensitivity, due to their dependence on land-based livelihoods. However they will be provided with opportunities to participate in resettlement planning and livelihood restoration mechanisms.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is moderate being mitigated by Resettlement Plan and Livelihood Restoration Program to ensure compensation is at full replacement cost, and livelihoods of those affected are restored, preferably, improved.			
Residual Impact Magnitude	Positive	Negligible	Small	Medium
Residual Magnitude Significance	Negligible	Minor	Moderate	Major

8.5.4 Impacts on Community Health and Safety

The Project has the potential to cause various community health and safety issues, in particular during the construction phase, as detailed in the below sections.

8.5.4.1 Potential Impacts

Infrastructure and Machinery

The presence of an active construction site, including the installation of new infrastructure and movement of large machinery, can lead to accidents and injuries if not managed appropriately. The presence of hazards around construction sites and laydown areas can create a range of safety issues, for villagers, or curious onlookers. These include:

- Villagers being struck by machinery, causing injury.

- Noise, vibration and dust resulting from general construction activities, which can cause disruptions in daily life and / or health impacts.
 - An increase in noise may interrupt sleep or cause other disruptions to community activities. Notably, disruptions associated with noise (such as sleep disruptions) have been linked to increases in depression and anxiety.
 - Increased vibration may also have an impact on buildings and other structures (e.g. causing cracks) if nearby to construction activities.
 - Excessive dust may be generated from the movement of dirt and machinery. This dust may exacerbate the effects of respiratory diseases (e.g. asthma, upper respiratory infections).
 - Vibration from the use of machines may cause cracks of foundations and buildings.

It is noted that community health and safety impacts associated with infrastructure and machinery is limited to the construction phase, as infrastructure will be secured and construction machinery removed upon completion of construction.

Vehicle Movements

There will be a range of Project-related vehicles movements, including vehicles delivering materials and workers to and from the Project site. These movements have the potential to contribute to or be the root cause of accidents, particularly given there will be a higher number of heavy vehicles in the area. Specifically, the Project will undertake the delivery of workers and materials over an eight-month period involving a maximum total of 90 transport movements per day, as summarised in **Table 8.59**.

Table 8.59: Project Vehicle Movements, Construction

Vehicle Type	Vehicle Movements (Times Per Day)	Purpose of Movement
Truck Bus	15	Construction materials Workers
Truck	50	Wind turbine components
Truck	25	Machines
Total	90	

Source: EIA, 2020

Given its rural locality, there are low volumes of traffic currently present in the villages in the AoI. A traffic survey undertaken in September 2020 identified a total of 203 vehicle movements per day towards Dak Cheung District, of which 16 vehicles (8%) were trucks, and 179 vehicle movements towards Sekong District, of which 11 (6%) were trucks. This data is summarised in **Table 8.60**.

Table 8.60: Traffic Survey, September 2020

Vehicle Type	Vehicles Travelling Towards Dak Cheung District (Per Day)		Vehicles Travelling Towards Sekong District (Per Day)	
	No.	%	No.	%
Two-Wheel Vehicle (Bicycle, Motorcycle, agricultural vehicle)	140	68.97	127	70.95
Car, Jeep, Pick-up	41	20.20	36	20.11
Small bus or Passenger vehicle (14 seats)	6	2.96	5	2.79
Truck (Light, Heavy of all types)	16	7.88	11	6.15
Total	203	100	179	100

Source: EIA, 2020

The total baseline truck and bus movements amounts to 38 vehicle movements per day. The Project will cause the number of truck and bus movements to triple. Villagers may not be accustomed to the hazards and risks presented by numerous heavy vehicles and machines (e.g. heavy vehicles require large stopping distances, there are blind spots / low visibility of pedestrians, etc.) and may inadvertently be involved in an incident.

The potential health and safety impact associated with transport movements will be limited to the construction phase, given that there will not be deliveries of material during the operation phase, and a limited operational workforce (53 people) will need to commute to the site for maintenance or other activities.

Security

The Project will require security for the duration of the construction phase, as the Proponent has previously experienced theft of construction materials (e.g. copper wire, power supply, lighting protection, etc.). The number of security personnel required will be confirmed as part of detailed Project planning.

If conflict arises between the Project and villagers, there is potential for security personal, as has been seen in other large-scale developments, to use excessive force, which in turn can pose a risk, including a risk to human rights.

Potential Spread of Diseases

The Project will employ a range of people during construction and operation. There is potential for the workforce to introduce and/or increase the rate of spread of diseases in the Project area. This may occur as a result of waste management practices, or from the spread of diseases brought in by workers. Flu/cold/fever and diarrhoea are common diseases occurring in the villages in the Aol .

Another factor that will influence the prevalence and rates of diseases is the creation of vector habitat during construction and potentially operation. Standing water (i.e. vector habitat) can be created in a variety of ways, such as alterations to drainage patterns during earth moving activities and establishment of trenches (which can fill with water during rainy periods). Vector habitat is of particular note in a locations such as Laos, where heavy rainfall occurs during the wet season creating large areas of standing water. This could be exacerbated by the Project , for example if trenches fill with water during the wet season. This could increase the prevalence of vector borne diseases, such as malaria, which has affected some villagers in the Aol.

Associated with the increase in transactional sex (discussed above), there is also a potential for rates of sexually transmitted infections to increase, including human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS).

FGDs and KIs revealed that villagers were most concerned about the spread of COVID-19, and did not identify concerns with the spread of other diseases. Nonetheless, the spread of any diseases may place additional pressure on health infrastructure, discussed below.

8.5.4.2 Existing Controls

- A Community Health and Safety Management Plan: Sets out the agreed controls and mitigation measures to protect the health and safety villagers in the AoI. This includes provisions for:
 - Fencing and/or security to prevent community members from accessing the construction site;
 - Identifying and being aware of traffic hazards involving villagers;
 - Requirements for construction workers to notify villager heads of key construction activities such as:
 - Deliveries of wind turbines and other large objects;
 - High volumes of truck movements; and
 - Activities potentially causing noise, vibrations and/or dust.
 - Potential presence of UXO

Potential Spread of Diseases

- It is understood that villagers in the AoI have received COVID-19 vaccinations from the Government of Lao PDR.

8.5.4.3 Significance of Impacts

This section assesses the significance of impact on community health and safety from construction activities. It is noted that the sensitivity and magnitude criteria for community health and safety differs from the impact assessment methodology (**Chapter 5**), as described below.

Methodology for Assessment of Impact Significance

Community health and safety is assessed in accordance with the criteria set out in **Table 8.61** and **Table 8.62**.

Table 8.61: Sensitivity Assessment Criteria for the Impact on Community Health and Safety

Sensitivity Criteria	Contributing Criteria
Low	Communities with sufficient coping strategy who feel little or no challenge to their wellbeing as a result of project activities. They may share resources with the project occasionally and broadly understand the hazards associated with project components.
Medium	Communities with some coping strategy and some vulnerabilities, who are classed as less sensitive than the high sensitivity group. They are likely to experience temporary inconvenience as a result of changes in environmental or social determinants of health. They may share resources occasionally with the project. The communities express some concerns and anxieties of the impact of the project on their wellbeing. They have some, but far from complete, understanding of the technical hazards associated with project components.
High	Community groups who are very vulnerable because they have high sensitivity to the impacts of the project and very limited coping strategies. The technical hazards of a project component may be unfamiliar and poorly understood by a community; and this could increase sensitivity.

Table 8.62: Criteria for Impact Magnitude for Assessment of Impact on Community Health and Safety

Magnitude	Criteria
Negligible	Project does not impact on environmental, health and safety issues to the surrounding community as the project implements good international industry practices and environmental, health, safety guidelines, following national law/regulations on Environmental, Health and Safety as well as other Recognised internationally sources.
Small	Project will impact on community health, safety and security within villages in the Aol.
Medium	Project will impact on community health, safety and security at regional level.
Large	Project impacts on community health, safety and security at a national level.

Receptor Sensitivity and Impact Magnitude

Construction activities occurring in the vicinity of the villages in the Aol will expose villagers to new impacts, and has the potential to exacerbate existing risks (e.g. traffic). There is a limited ability for villagers to influence construction activities that may cause health and safety impacts, and as the Project will change the baseline environment (albeit for a limited amount of time, during the construction phase only), the villagers have a **high** sensitivity.

The impact on community health and safety from construction activities is **small**, as the impacts are limited to the villages in the Aol.

Impact Significance

As such, the impact significance is assessed to be **moderate**.

8.5.4.4 Additional Mitigation, Management, and Monitoring Measures

Other environmental management plans such as the Traffic Management Plan, Air Quality Management Plan, and Noise and Vibration Management Plan will be prepared to support the CEMP. Refer to the environmental impact assessment sessions for an outline of content to will be included in these management plans.

In addition, the following will be prepared to manage potential impacts on community health and safety:

- **SEP:** The SEP will describe how Project stakeholders will be engaged throughout the Project lifecycle. The SEP will establish a systematic approach to stakeholder engagement that will help the Project build and maintain a constructive relationship with stakeholders. It will also ensure that Project information on environmental and social risks and impacts is disclosed to stakeholders in a timely, understandable, accessible and appropriate manner and format. An example of a program to be implemented as part of the SEP is a community environmental and safety awareness program, which seeks to enable villagers to understand and identify construction risks, and how to stay safe. The program will include the following topics:
 - Activities that cause disruption such as air, dust, traffic and noise impacts.
 - Road safety, especially for children.
 - Workers code of conduct, worker's health and safety plan.
 - Security management.
 - Emergency preparedness and response.
 - Activities that cause other adverse environmental and social impacts.

- **Grievance Redress Mechanism (within the SEP):** A grievance mechanism will be established as part of the SEP to provide villagers with an accessible and inclusive means to raise issues and grievances, and allow the Project to respond to and manage such grievances.
- **Local Content and Influx Management Plan:** In addition to the aspects outlined in **Section 8.5.2.4**, the Local Content Plan will include:
 - A Workers Code of Conduct, which identifies behavioural standards and cultural awareness requirements for all workers to comply with.
 - A Security Code of Conduct, which will require security personnel to have specific training relating to the use of force, such as avoiding the use of force where possible and in accordance with national regulations where necessary). Security personnel will be prohibited from engaging in armed conflict, or violence towards villagers (including sexual abuse or gender-based violence).
- **Occupational Health and Safety Management Plan:** Sets forth the agreed controls and mitigation measures to protect the health and safety of workers. This will include:
 - Screening of migrant workers prior to entering Laos to ensure they are fit to undertake their relevant tasks/roles.
 - Safety audits which will occur during the construction and operation of the Project, to ensure safety procedures are complied with.
 - Induction and Training requirements for all workers, including site-specific induction and training to highlight safety risks and mitigations, and task-specific training (e.g. complying with speed limits, etc.).
 - Measures to mitigate against the spread of COVID-19 amongst workers, and from workers to other villagers.

8.5.4.5 Residual Impact Significance

Through the implementation of the additional mitigation measures, the residual impact significance is assessed as **negligible**.

Table 8.63: Impact Assessment for Community Health and Safety

Significance of Impact					
Potential Impact	Community health and safety.				
Project Phase	Pre-Construction	Construction	Operation		
Impact Nature	Negative	Positive	Neutral		
	Accidents or injury to community members.				
Impact Type	Direct	Indirect	Induced		
	Machinery and infrastructure in a construction site are risks to community health and safety.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	The impact will occur in the construction phase.				
Impact Extent	Local	Regional	International		
	The impact is limited to the villages in the AoI.				
Impact Scale	The impact is limited to the villages in the AoI.				
Frequency	The impact is not expected to occur frequently.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large

Significance of Impact

	The impact is limited to the villages in the Aol.			
Receptor Sensitivity	Low	Medium	High	
	There is limited ability for affected villagers to influence Project construction activities that may cause health and safety impacts.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is moderate.			
Residual Receptor Sensitivity	Low	Medium	High	
Residual Impact Magnitude	Positive	Negligible	Small	Medium
Residual Impact Significance	Negligible	Minor	Moderate	Major
	Through Project information disclosure and the community environmental and safety awareness programs, affected villagers will be able to understand and identify construction risks, and be able to stay safe.			

8.5.5 Impacts Associated with Influx

Influx or in-migration relates to the movement of people to a Project area in anticipation of, or in response to, economic opportunities associated with a project. This includes direct employment by the project (e.g. construction worker, supplier of materials, etc.) as well as indirect employment (e.g. restaurant operators who may experience higher patronage from the construction workforce requiring them to employ more people, etc.).

The workforce requirements for the Project are stipulated in **Chapter 3**, it is anticipated that approximately 400 directly employed workers will move to a village in the Aol during the construction phase. This does not include the workers' families (if applicable), or any other people who may move to the local area to seek economic benefits associated with the Project.

There are a number of negative impacts of influx, such as increased risks to community health and safety, increased transboundary movements, and increased pressure on infrastructure and resources. These will be discussed in the sections, below.

8.5.5.1 Potential Impacts

Labour and Working Conditions

There are a number of fundamental principles and rights at work that apply to all workers, and these are reflected in international standards (e.g. the International Labour Organisation (ILO) Declaration on Fundamental Principles and Rights at Work and the Universal Declaration of Human Rights). Without appropriate safeguards in place, a range of potential impacts can arise, including discrimination within the workplace, mistreatment of migrant labour or other vulnerable groups, and the use of forced labour¹¹⁶ (including bonded labour¹¹⁷), or child labour¹¹⁸. Additionally, workers' mistreatment may extend to:

- Poor condition of workers' accommodation (e.g. poor hygiene standards, lack of privacy, etc.); and/or

¹¹⁶ Forced labour is defined as "all work or service which is exacted from any person under the menace of any penalty and for which the said person has not offered himself voluntarily" (ILO, n.d.a)

¹¹⁷ Bonded labour (or debt bondage) is a form of forced labour in which workers are forced to work in order to pay off their on debts or inherited debts (ILO, n.d.b)

¹¹⁸ The ILO (n.d.c) defines 'child labour' as the work that is mentally, physically, socially or morally dangerous and harmful to children, and/or interferes with their schooling.

- Undue exposure to occupational health and safety risks that lead to or increase the risk of serious injury or death (e.g. lack of training/qualification, inadequate personal protective equipment (PPE), etc.).

Given that 40% of households are identified as vulnerable households, there is a potential for these villagers to be unknowingly engaged in forced labour situations in an effort to increase their income.

Migrant workers may also be vulnerable, depending on their individual socio-economic status. As with local workers, migrant workers may also be unknowingly engaged in forced labour or arrive in Laos with failed expectations of living and working conditions.

In the Lao PDR, the Government has sought to prevent mistreatment of local and migrant workers through the ratification of international conventions and the establishment of local legislation, such as the Labour Law.

Transactional Sex

The increased population due to the presence of a construction workforce, typically made up of males working away from home, may attract sex workers to the local area. Female villagers who are vulnerable may also seek to capitalise on the availability of disposable income of construction workers, and may seek out transactional sex (IFC, 2009). Notably, villagers did not raise the prevalence of sex workers as an existing issue within the villages in the AoI (refer to stakeholder engagement outcomes in **Chapter 6**).

It is noted that the majority (approximately 60% or 600 people) of workers required during the construction phase will be locals. The small proportion of workers from outside the area (approximately 40% or 400 people) will decrease the risk of human trafficking and transactional sex occurring. In addition, workforce behaviours will be bounded by a Workers' Code of Conduct.

Community Dynamics and Gender-Based Violence

The in-migration of workers may change community dynamics and may be part of villagers' concerns that outsiders may deceive women and children (according to FGDs with women groups). It is anticipated that the nominated EPC Contractor will be a Chinese company and may hire Chinese workers for the Project. Given that the majority of the affected villagers are part of an ethnic group, comprising Triang, Yae and Katu peoples, it is likely that Chinese workers will have different customs and traditions to the ethnic groups that will reside in the Project area. These cultural differences have the potential to cause friction in the community, especially if local customs and traditions are not respected by workers. The potential erosion of ethnic culture is assessed separately, in **Section 8.5.7.1**.

Gender-based violence, that is defined as "harmful acts directed at an individual or a group of individuals based on their gender" (UN Women, 2020) has the potential to occur. Gender-based violence may take many forms, including (but not limited to) domestic violence, sexual violence, human trafficking (refer above). Despite this, it is noted that villagers did not raise gender-based violence as a concern as they have been equipped with how to identify gender-based violence and resources to contact should this occur. However, this should be viewed with a precautionary approach due to the acceptance of the society regarding traditional roles of men and women, domestic violence may be underreported or not fully understood by victims.

Public Infrastructure and Resources

The Project has the potential to impact on public infrastructure and resources, particularly relating to an increased demand on local hospital and health care facilities, as described below.

During the construction phase, there will be a temporary increase in the local population from workers (estimated peak workforce of 400 people) (refer to **Table 3.6**). The increased population has a potential to have an impact on public infrastructure, including hospitals and health care facilities.

Through KIIs and FGDs, community members voiced concerns of an increased workforce on hospital and health care facilities. Community members are concerned that the increased demands from the construction workforce may jeopardise their access and level of care available. Villagers most commonly visit healthcare centres (10 of 23 villages in the Aol have healthcare centres) or community hospitals (one in Dak Cheung District, and one in Sanxay District), however the commute to these facilities may encounter barriers to travel for instance there may be poor road conditions or villagers lack a means of transportation (refer to **Section 7.5**). Villagers therefore consider the healthcare facilities as insufficient to address their current needs.

The increased population residing in the villages in the Aol will also place pressure on resources such as electricity, water (drinking and sanitation), and food supply. The increased demand may result in shortages, which has the potential to increase the price of resources, and in turn can make it challenging for villagers from to access resources due to the inflated prices.

As the operation phase does not involve a large workforce (i.e. 40 workers), it is not anticipated that Project operations will contribute to additional impacts on public infrastructure.

8.5.5.2 Existing Controls

Labour and Working Conditions

- A number of legislative requirements exist to protect local and migrant workers, which all employers must comply with.

Community Dynamics and Gender-Based Violence

- Gender-based violence is not currently occurring within the villages in the Aol, however this may be due to the acceptance in the society regarding the traditional roles of men and women. As such, there is a potential for the gender-based violence to be underreported or misinterpreted by villagers. The government and NGOs have engaged with villagers regarding gender-based violence and gender equality to raise awareness and equip them with resources.

Public Infrastructure and Resources

- The EPC Contractor plans to have a healthcare facility at each camp which includes a nurse/doctor to treat workers directly whenever possible. This will reduce pressure on the local healthcare facilities. The healthcare workers will be recruited from outside the Aol to avoid impacting existing providers.

8.5.5.3 Significance of Impacts

Methodology for Assessment of Impact Significance

Community health and safety is assessed in accordance with the criteria set out in **Table 8.61** and **Table 8.62**.

Receptor Sensitivity and Impact Magnitude

The villagers have a **medium** sensitivity, with some ability to adapt to changes brought about by influx. This includes, education on gender-based violence, being inoculated with the COVID-19 vaccination. Further, the close-knit nature of the villagers allows them to support one another if there is pressure on infrastructure and resources.

The impact of the impact of influx is **small**, as the impacts are limited to the villages in the Aol.

Impact Significance

Based on this, the impact significance is assessed to be **minor**.

8.5.5.4 Additional Mitigation, Management, and Monitoring Measures

The nominated EPC Contractor will be required by the Proponent to meet minimum labour standards, so as to ensure workers are treated fairly. Additionally, a number of policies and management plans will be implemented in response to impacts associated with influx, namely:

■ **Local Content and Influx Management Plan:**

- A preference for the recruitment and engagement of local workers and local businesses will be stipulated within this plan (refer to **Section 8.5.2.4**)
- Establish a formal recruitment process with clear hiring preferences to discourage people from outside of the Project area coming to seek for employment opportunities with the Project.
- Early communication of the recruitment process and positions available to non-locals so they have time to prepare, train (if necessary) and apply.
- Set out the responsibilities and management practices associated with the management of labour during construction and operation of the Project. This will include the Workers Code of Conduct, which identifies behavioural standards and cultural awareness requirements for all workers (including security personnel) to comply with (refer to **Section 8.5.4.4**).

■ **Workers' Camp Management Plan:** The operation of the workers' accommodation facility will be governed by the Workers' Camp Management Plan, and will include aspects such as details of the services and facilities available, hygiene standards, and healthcare provision for Project workers. The audit requirements of the accommodation facilities will also be outlined.

■ **Community Health and Safety Management Plan:** Sets out the agreed controls and mitigation measures to protect the health and safety of villages in the Aol, such as the establishment of a community health baseline prior to the commencement of the Project, recruitment of local nurse/s or doctor/s to support the local health care needs. Doctors and/or nurses will be hired to be stationed for the Project. The healthcare workers will be recruited from outside the Aol to avoid impacting existing providers

■ **Occupational Health and Safety Management Plan:** Sets forth the agreed controls and mitigation measures to protect the health and safety of workers, including induction and training requirements (refer to **Section 8.5.4.4**).

■ **Emergency Preparedness and Response Plan:** Outlines the measures to respond to unplanned events or emergencies that may result in injury or death.

■ **SEP:** The methodology and timing of stakeholder communication, including a community environmental and safety awareness program will be included in the SEP (refer to **Section 8.5.4.4**), to support the aforementioned management plans.

8.5.5.5 Residual Impact Significance

Through the additional mitigation measures proposed, the residual impact magnitude is reduced to **small**, with a corresponding reduction in the residual magnitude significance to **minor** (**Table 8.64**).

Table 8.64: Worker Influx Impact Assessment

Significance of Impact				
Potential Impact	Impacts associated with construction workers.			
Project Phase	Pre-Construction	Construction	Operation	
Impact Nature	Negative	Positive	Neutral	
	The potential impacts are negative.			
Impact Type	Direct	Indirect	Induced	
	The impact will be indirect, as a result of an increased, migrant population.			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	The impacts are likely to be experienced during the construction phase only, with the majority of workers in the operation phase being locally based.			
Impact Extent	Local	Regional	International	
	The impact is limited to the villages in the Aol.			
Impact Scale	The impact is limited to the villages in the Aol.			
Frequency	The impact is not expected to occur frequently, and is limited to the construction phase.			
Impact Magnitude	Positive	Negligible	Small	Medium
	The impact is limited to the villages in the Aol.			
Receptor Sensitivity	Low	Medium	High	
	The villagers have a medium sensitivity, with some ability to adapt to impacts.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is minor.			
Residual Impact Magnitude	Positive	Negligible	Small	Medium
Residual Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is reduced following the implementation of additional mitigation measures.			

8.5.6 Impacts of Wind Farm Operation on Local Amenity

Amenity is the term to describe a location's pleasing attributes or character. Amenity may comprise aspects such as landscape character, air quality, and/or the amount of noise the area is exposed to. This section presents various aspects of the Project that may result in disturbance to the local amenity during its 25 year operational period.

8.5.6.1 Potential Impacts

Noise (Operation)

Although the wind turbines selected for the Project have been designed to operate as quietly as possible, low frequency noises may still be audible to affected villagers. Ambient noise monitoring was undertaken (refer to the noise baseline in **Chapter 7**), which found that operational noise levels generally complied with the WBG criteria; exceedances during night time (22:00-7:00).

A noise impact assessment was conducted in accordance with the guidelines and standards mentioned in **Section 8.3.5**, and found that predicted noise levels from operation of the wind farm comply with the daytime noise criteria, however is exceeded at some residential receptors during the night time.

The noise impact assessment (refer to **Section 8.3.5.2**) proposes that wind turbines nearest to R52 and R53 operate on a different operation mode and some WTGs will need to relocate at distances of more than 1 km away from R52 and approximately 800 m from R53 in order to meet WBG standard limit. With additional mitigation proposed at Receptor R52 and R53, the residual impact significance is reduced to Moderate.

Landscape and Visual

The existing landscape and visual amenity is described as a rural, mountainous area, with villages in the Aol surrounded by forest and agricultural land (refer to the baseline landscape values and visual amenity in **Chapter 7**). Due to the height and placement of wind turbines, visual impacts are likely to occur, as the wind turbines are likely to disrupt the rural landscape.

A landscape and visual assessment was conducted to determine the visual influence of the wind turbines on the landscape. Although the impact assessment found that there is a high likelihood of the wind turbines being visible, it is noted that the assessment was based on the topography of the landscape and did not consider potential shielding due to vegetation. This is evidenced in the photomontages provided in the visual impact assessment (refer to **Section 8.3.7**).

Although different ethnic groups have slightly different beliefs, cultures, traditions; they did not express different use or views on the landscape. Through the KIIs with village heads and FGDs with ethnic groups, concerns regarding landscape and visual change impacts on their belief, rituals, etc., were not identified. Their main concerns were mostly related to land acquisition impacts, noise, and safety from the wind turbines.

A Restoration Management Plan will be prepared that will include replanting indigenous species, and landscaping and rehabilitation of construction yards to minimise impacts to the landscape, upon completion of construction.

Shadow Flicker

A shadow flicker assessment was undertaken to determine the potential extent of shadow flicker impacts resulting from the operation of the wind turbines. Shadow flicker may cause annoyance to villagers and livestock. The findings of the shadow flicker modelling (refer to **Section 8.3.8**) identified potential impacts to 12 clusters of potentially affected villagers, which may experience varying levels of impact, depending on the individual.

8.5.6.2 Existing Controls

The Project layout has been optimised so as to minimise impacts to affected villagers, as well as biodiversity.

8.5.6.3 Significance of Impacts

The potential impacts of wind farm operation on local amenity are assessed in accordance with the criteria set out in **Table 8.65** and **Table 8.66**.

Table 8.65: Social Impact Magnitude Criteria

Magnitude	Definition
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the Aol and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Early evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.

Magnitude	Definition
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community
Positive	In the case of positive impacts, it is generally recommended that no magnitude be assigned, unless there is ample data to support a more robust characterisation. It is usually sufficient to indicate that there will be a positive impact, without characterising the exact degree of positive change likely to occur.

Table 8.66: Social Impact Sensitivity Criteria

Sensitivity	Definition
Low	Villagers have low vulnerability/sensitivity; consequently has a high ability to adapt to changes brought by the project
Medium	Some, but few areas of vulnerability/sensitivity; retaining an ability to at least adapt in part to change brought by the project
High	Profound or multiple levels of vulnerability/vulnerability/sensitivity that undermine the ability to adapt to changes brought by the project

Receptor Sensitivity and Impact Magnitude

The affected villagers are considered to have **high** sensitivity, as they have a limited ability to adapt to the impacts and/or influence the locations of wind turbines causing impacts to their amenity.

The impact magnitude is considered to be **small-medium**. There will be a perceptible difference from baseline conditions as a result of the combination of factors affecting amenity, for the duration of the operation of the wind farm. However, it is noted that the impact to amenity will not be felt by all villagers in the AoI; rather, a select group/area, aligning with particular aspects of amenity as discussed above, which is reflected in the varied magnitude

Impact Significance

Based on the above, the impact significance is assessed as **moderate-major**.

8.5.6.4 Additional Mitigation, Management, and Monitoring Measures

Environmental impact management plans will be prepared for the Project that will contain mitigation measures for noise, landscape and visual, and shadow flicker impacts. These include the CEMP and noise and vibration management plan. Of note, environmental impact mitigation measures that may contribute to the mitigation of impacts of wind farm operation on local amenity include:

- Wind turbines surrounding R52 and R53 will not operate at night time, or under a different, quieter, mode or not at all during the night time.
- Regular noise monitoring will be undertaken, particularly during the night time.
- Locate laydown areas, construction camps and access roads in existing disturbed or areas cleared of vegetation.
- Prepare a restoration management plan that includes the replanting of indigenous species, and landscaping and rehabilitation of construction yards.
- Minimise night lighting to the extent possible while maintaining safety.
- Investigate means for natural, and architectural/structural screening, at locations where affected villagers may experience over 30 hours per year and 30 minutes per day of shadow flicker impact.

It is important to communicate the impacts and proposed mitigations, which will be guided by the SEP:

- **SEP:** As previously outlined, the SEP will describe how Project stakeholders will be engaged, throughout the Project lifecycle. Specifically relating to the impacts of wind farm operation on local amenity, stakeholder engagement will be undertaken to inform affected villagers of the potential noise, landscape and visual, and shadow flicker impacts and their mitigation measures. Any households directly impacted by shadow flickers will be consulted on its potential impacts and mitigation measures. The SEP will also contain a grievance redress mechanism to allow affected villagers' feedback to be communicated to the Project and resolved.

A CDP will also be prepared so that villagers receive the maximum benefits from the Project.

8.5.6.5 Residual Impact Significance

Through the additional mitigation measures proposed, the residual impact magnitude is reduced to **negligible-small**, with a corresponding reduction in the residual magnitude significance to **negligible-moderate** (*Table 8.67*).

Table 8.67: Local Amenity Impact Assessment

Significance of Impact					
Potential Impact	Impacts of Wind Farm Operation on Local Amenity				
Project Phase	Pre-Construction	Construction	Operation		
Impact Nature	Negative	Positive	Neutral		
	The operation of the wind farm will result in negative impacts.				
Impact Type	Direct	Indirect	Induced		
	Direct impacts will be produced.				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	The impacts will be experienced for the duration of the Project.				
Impact Extent	Local	Regional	International		
	The impacts are limited to the villages in the Aol.				
Impact Scale	The impacts are limited to the villages in the Aol.				
Frequency	The impacts will occur continuously, throughout the duration of the operation of the wind farm.				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	There is a perceptible difference from baseline conditions, affecting some villagers.				
Receptor Sensitivity	Low	Medium	High		
	Villagers in the Aol have a limited ability to adapt to the impacts and/or influence the locations of wind turbines causing impacts to their amenity.				
Impact Significance	Negligible	Minor	Moderate	Major	
	The impact significance is major.				
Residual Impact Magnitude	Positive	Negligible	Small	Medium	
Residual Magnitude Significance	Negligible	Minor	Moderate	Major	

8.5.7 Impact on Ethnic Groups

Laos is an ethnically diverse society which favours the use of the term “ethnic groups” over the use of the term “Indigenous” (IFAD, 2012). While the Government of Lao PDR officially recognises ethno-linguistic categorisation of ethnic groups, the previously used geographic categorisation continues to be used by the people throughout Laos (IFAD, 2012; Schlemmer, 2017).

As a whole, the population of the villages in the Aol is dominated by the Triang ethnic group (89%), with other ethnic groups residing in the villages being Yae (4%), Katu (4%), and other ethnic groups (2%) (mainly Ha Luk). The Triang, Yae, Katu and Ha Luk ethnic groups all belong to the Mon-Khmer linguistic group or the Lao Theung geographic group. About 1% of villagers belong to the Lao ethnic group, which is part of the Lao-Tai linguistic group or the Lao Loum geographic group. The Lao Loum geographic group contains the most number of tribes; approximately 70% of the Laos population identifies as being part of the Lao Loum, and it is generally considered to be better “better off” than other ethnic groups (IFAD, 2013). This may be the reason why only ethnic groups that are part of the Lao Theung and Lao Soung are considered as ‘ethnic groups’ within Laos (IFAD, 2012). On this basis, the assessment will focus on the Triang, Yae, Katu, and Ha Luk ethnic groups.

The ADB (2013) provides guidance for the identification of Indigenous Peoples, which is a term “used in a generic sense to refer to a distinct, vulnerable, social and cultural group possessing the following four characteristics to varying degrees:

- (1) self-identification as members of a distinct indigenous cultural group and recognition of this identity by others;
- (2) collective attachment to geographically distinct habitats or ancestral territories in the project area and to the natural resources in these habitats and territories;
- (3) customary, cultural, economic, social, or political institutions that are separate from those of the dominant society and culture; and
- (4) a distinct language, often different from the official language of the country or region.”

The guidance highlights that groups need to be “both distinct and vulnerable” to trigger application of the term Indigenous Peoples. Distinctiveness may be defined with the four characteristics, above, while vulnerability is determined by assessing economic, social, political, demographic and environmental factors.

The ethnic groups located in the villages in the Aol were assessed against the distinct (four characteristics) and vulnerable definitions to confirm whether the ethnic groups may be considered as Indigenous Peoples for the purpose of the ESIA. This assessment is provided in **Table 8.68**.

Table 8.68: ADB Indigenous Peoples Characteristics

Characteristics of Indigenous Peoples	Ethnic Group			
	Triang (Taliang)	Yae (Yaeh / Yae')	Katu	Ha Luk (Ha Hak)
1. Distinct				
(i) Self-identification as members of a distinct indigenous cultural group and recognition of this identity by others	Yes, as confirmed during the social baseline research through secondary and primary sources	Yes, as confirmed during the social baseline research through secondary and primary sources	Yes, as confirmed during the social baseline research through secondary and primary sources	Yes, as confirmed during the social baseline research through secondary and primary sources
(ii) Collective attachment to geographically distinct habitats or ancestral	It is common for Triang peoples to be located in the	It is common for Yae peoples to be located in the	It is common for Katu peoples to be located in the	It is common for Ha Luk peoples to be located in the

Characteristics of Indigenous Peoples	Ethnic Group			
	Triang (Taliang)	Yae (Yaeh / Yae')	Katu	Ha Luk (Ha Hak)
territories in the project area and to the natural resources in these habitats and territories	<p>highlands (IFAD, 2012). They usually settle in geographies that are favourable for agricultural production (e.g. coffee, cassava, and rice), such as areas with hills with rivers flowing through, and flat areas along the river.</p> <p>Triang peoples have been found to have settled in Dak Cheung, Tha Taeng and La Marm Districts of the Sekong Province, Sanxay and Samakkee Xai District of Attapeu Province, and Pak Xong District of Champasak Province (Department of Ethnic Affairs, 2015a). Villagers have indicated that their ancestors have been in this area for a long time, although the exact duration is unknown.</p>	<p>highlands (IFAD, 2012). They usually settle in geographies that are favourable for agricultural production (e.g. coffee, cassava, and rice), such as areas with hills with rivers flowing through, and flat areas along the river.</p> <p>Yae peoples have been found to have settled in the Dak Cheung District of Sekong Province, and Sanxay District of Attapeu Province (Department of Ethnic Affairs, 2015c).</p>	<p>highlands (IFAD, 2012) They usually settle in geographies that are favourable for agricultural production (e.g. coffee, cassava, and rice), such as areas with hills with rivers flowing through, and flat areas along the river.</p> <p>Katu peoples have been found to have settled in Kalim, Dak Cheung, and Tang Districts of Sekong Province, Lao-gnarm and Salavan Districts of Salavan Province, and Pakxong and Bachiengchalernsuk Districts of Champasak Province (Department of Ethnic Affairs, 2015b).</p>	<p>highlands (IFAD, 2012) They usually settle in geographies that are favourable for agricultural production (e.g. coffee, cassava, and rice), such as areas with hills with rivers flowing through, and flat areas along the river.</p> <p>Ha Luk peoples have been found to have settled in Lao-gnarm district of Salavan Province, Lamarm and Ta Taeng Districts of Sekong Province, Pakxong District of Champasak Province, and Sanxay and Samakkee Xai District of Attapeu Province. (Department of Ethnic Affairs, 2015d).</p>
(iii) Customary, cultural, economic, social, or political institutions that are separate from those of the dominant society and culture	<p>Yes, as confirmed during the social baseline research, such as:</p> <ul style="list-style-type: none"> ■ There is a regime based on the law, similar to other areas. ■ There are festivals with slightly different traditions and beliefs. ■ There are distinct traditional 	<p>Yes, as confirmed during the social baseline research, such as:</p> <ul style="list-style-type: none"> ■ There is a regime based on the law, similar to other areas. ■ There are festivals with slightly different traditions and beliefs. ■ There are distinct traditional 	<p>Yes, as confirmed during the social baseline research, such as:</p> <ul style="list-style-type: none"> ■ There is a regime based on the law, similar to other areas. ■ There are festivals with slightly different traditions and beliefs. ■ There are distinct traditional costumes for males and females. 	<p>Yes, as confirmed during the social baseline research, such as:</p> <ul style="list-style-type: none"> ■ There is a regime based on the law, similar to other areas. ■ There are festivals with slightly different traditions and beliefs. ■ There are distinct traditional costumes for males and females.

Characteristics of Indigenous Peoples	Ethnic Group			
	Triang (Taliang)	Yae (Yaeh / Yae')	Katu	Ha Luk (Ha Hak)
	costumes for males and females.	costumes for males and females.		
(iv) A distinct language, often different from the official language of the country or region	Yes, Triang peoples have a specific spoken language, similar to the Ha Hak and Yae ethnic groups, and is categorised as a Mon-Khmer language. Most Triang peoples speak the Triang language but use Lao language for writing (Department of Ethnic Affairs, 2015a).	Yes, Yae peoples have a specific spoken language, similar to Triang, Ha Hak and Katu ethnic groups, and is categorised as a Mon-Khmer language. Most Yae peoples speak the Yae language but use Lao language for writing (Department of Ethnic Affairs, 2015c).	Yes, Katu or Kaluem is spoken (Luangthongkum, 2010). Katu is categorised as a Mon-Khmer language. Most Katu peoples speak the Katu language but use the Lao language for writing (Department of Ethnic Affairs, 2015b).	Yes, Ha Luk peoples have specific spoken language, similar to Triang, Yae and Katu ethnic groups, and is categorised as a Mon-Khmer language. Most Ha Luk peoples speak the Ha Luk (Ha Hak) language but use Lao language for writing. (Department of Ethnic Affairs, 2015d).

2. Vulnerable

In general, the most vulnerable ethnic groups have very few assets, are geographically isolated (mostly in the highlands), and face language and cultural barriers.

An assessment of each ethnic group's vulnerability is below.

(i) Current status	<ul style="list-style-type: none"> ■ As a whole, the Triang, Yae, Kata and Ha Luk peoples are well integrated into mainstream Laos society, except for the older generation who often do not speak or understand Lao language well. ■ However they are vulnerable due to: <ul style="list-style-type: none"> • Their economic status (nearly half of the surveyed population live below the national poverty line, which is much lower than the World Bank standard); and ■ Their location, which is geographically isolated, makes it difficult for them to access political, economic and social opportunities. 			
(ii) Project impacts	Social impacts will not disproportionately affect the Triang ethnic group alone.	Social impacts will not disproportionately affect the Yae ethnic group alone.	Social impacts will not disproportionately affect the Katu ethnic group alone.	Social impacts will not disproportionately affect the Ha Luk ethnic group alone.

Although villagers retain their ethnic identity, such as speaking in the language of their ethnic group, it was observed that villagers of all ethnic groups are well integrated into mainstream Laos society. This was evidenced by clothing and housing styles, and it is noted that apart from some of the elderly population, most villagers are able to understand Lao, and are able to use written Lao. Additionally, through FGDs and KIIs with villagers, it is understood that villagers live harmoniously. For instance, villagers celebrate ceremonies together, and no current or historical conflicts were identified. Despite the level of integration, villagers in the Aol retain their ethnic identity, which meets the definition of distinctiveness.

With respect to vulnerability, the social baseline analysis found that the 40% of the population of the affected villages is considered to be vulnerable but the vulnerable population is not focussed on one particular ethnic group. However, there are anti-discrimination laws in Laos that prohibit discrimination against ethnic groups. Villagers indicated that they do not experience discrimination based on ethnicity, and therefore are not more vulnerable within the region for this reason.

It is difficult to unequivocally determine whether the Triang, Yae, Katu and Ha Luk ethnic groups meet the ADB definition of “distinct and vulnerable” Indigenous Peoples, as shown in **Table 8.68** and further considerations above. This Project therefore takes a precautionary approach in considering these ethnic groups as Indigenous Peoples.

8.5.7.1 Potential Impacts

Social Impacts Assessed Previously

Despite recognition that the Triang, Yae, Katu, and Ha Luk ethnic groups are Indigenous Peoples, it is considered that the impact assessments undertaken in **Sections 8.5.2 – 8.5.6** have adequately captured the specific concerns relating to Indigenous Peoples, since the overwhelming majority of the population of affected villagers comprises people from ethnic groups. Accordingly, no additional assessment is required for these impacts, relating to Indigenous Peoples.

Erosion of Ethnic Culture

There is a potential, however, for the workers coming into the area to negatively influence existing customs and religious practices undertaken by the ethnic groups; the result of which could be an erosion or loss of ethnic culture. The loss of ethnic culture may occur if migrant workers and other outsiders are not respectful of or understand the various customs and religious practices, such as boundaries placed on areas that may only be accessed by women or men. A common mitigation against the loss of ethnic culture, is promoting cultural awareness amongst workers as part of the induction process, encouraging workers to participate in cultural practices, and providing workers who are villagers from the AoI with time off for religious or cultural festivities.

This potential impact is concerned primarily with the construction phase, as this is when workers and other related people are likely to move to the villages in the AoI (refer to impacts associated with influx in **Section 8.5.5**). Only a small workforce (40 people) will remain in the operation phase.

8.5.7.2 Existing Controls

The Project places a strong emphasis on respecting the cultures and customs of the villagers, and has been participating in various rituals as part of granting access and permission to undertake technical studies to support the ESIA. This will be formalised as part of a management plan to apply to all workers.

8.5.7.3 Significance of Impacts

The significance of impact assessments undertaken in **Sections 8.5.2–8.5.6** remain unchanged. This section assesses the significance of the loss of ethnic culture.

Methodology for Assessment of Impact Significance

The potential economic displacement and impacts to livelihoods are assessed in accordance with the criteria set out in Table 8.69 and Table 8.70.

Table 8.69: Social Impact Magnitude Criteria

Magnitude	Definition
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the AoI and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Early evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.

Magnitude	Definition
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community
Positive	In the case of positive impacts, it is generally recommended that no magnitude be assigned, unless there is ample data to support a more robust characterisation. It is usually sufficient to indicate that there will be a positive impact, without characterising the exact degree of positive change likely to occur.

Table 8.70: Social Impact Sensitivity Criteria

Sensitivity	Definition
Low	Villagers have low vulnerability/sensitivity; consequently has a high ability to adapt to changes brought by the project
Medium	Some, but few areas of vulnerability/sensitivity; retaining an ability to at least adapt in part to change brought by the project
High	Profound or multiple levels of vulnerability/vulnerability/sensitivity that undermine the ability to adapt to changes brought by the project

Receptor Sensitivity and Impact Magnitude

The affected villagers have a **high** sensitivity, as they are unable to influence the influx of workers and other people to the area.

The magnitude is **small**, due to the workforce comprising 400 people (approximately 2% of the population of the villages in the Aol).

Impact Significance

The impact significance is therefore assessed to be **moderate**.

8.5.7.4 Additional Mitigation, Management, and Monitoring Measures

In addition to the management plans specified in previous impact assessment sections, The CDP will be prepared and incorporate aspects of a traditional Ethnic Group Development Plan, due to the overlap of the two management plans, given that the majority of the affected villagers belong to an ethnic group / are considered to be Indigenous Peoples. A SEP will also be prepared to support the CDP. These plans seek to:

- Promote ethnic cultures through Project activities in collaboration with the Project affected communities;
- Implement development programs to improve the livelihoods of ethnic groups (refer to **Section 8.5.6.1**) including providing ethnic women with economic development opportunities;
- Implement measures to remove obstacles for ethnic minorities to participate in Project activities and decision-making, including impact mitigation and benefits; and
- Provide a grievance redress mechanism and appeal process for the Project-affected persons that is culturally appropriate.

The Local Content and Influx Management Plan will include the Workers Code of Conduct that will include cultural awareness requirements for all workers (refer to **Section 8.5.4.4**).

8.5.7.5 Residual Impact Significance

Through the implementation of the additional mitigation measures, the magnitude is reduced to **negligible** as the migrant workforce will have cultural awareness training, and result in a **negligible** residual magnitude significance (**Table 8.71**).

Table 8.71: Ethnic Groups Impact Assessment

Significance of Impact				
Potential Impact	Impact on Ethnic Groups (Erosion of Ethnic Culture)			
Project Phase	Pre-Construction	Construction	Operation	
Impact Nature	Negative	Positive	Neutral	
	Erosion of ethnic culture is a negative impact.			
Impact Type	Direct	Indirect	Induced	
	Indirect impact will be produced from the migrant workforce.			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	The impacts are limited to the construction phase.			
Impact Extent	Local	Regional	International	
	The impacts are limited to the villages in the Aol.			
Impact Scale	The impacts are limited to the villages in the Aol.			
Frequency	The impacts will occur infrequently.			
Impact Magnitude	Positive	Negligible	Small	Medium Large
	The magnitude is small, as the migrant workforce comprises 400 people.			
Receptor Sensitivity	Low	Medium	High	
	The affected villagers have a high sensitivity as they are unable to influence the influx of workers.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is moderate.			
Residual Impact Magnitude	Positive	Negligible	Small	Medium
Residual Magnitude Significance	Negligible	Minor	Moderate	Major

8.5.8 Impact on Cultural Heritage (Tangible and Intangible)

Through the baseline analysis, it is understood that there are sacred areas, such as cemeteries, observed in all surveyed villages in the Aol. However, these cultural sites of local significance will not be impacted by the Project construction and operation.

This section discusses the potential impact of the Project on a ‘sacred forest’ which may trigger the Indigenous Peoples Safeguards consent requirement (2009) in relation to potential impacts on “cultural resources that Indigenous Peoples own, use, occupy, or claim as an ancestral domain or asset”.

8.5.8.1 Potential Impacts

As mentioned in **Section 7.5.3.1**, there are areas of sacred forest within the footprint. The following sacred forests (cemeteries) overlap with the Project:

- a. Paxar Dak Terb01 overlaps with 115 kv TL
- b. Paxar Dak Terb02 overlaps with WH1050 and WH1060 and internal road

- c. Paxar Dakbong overlaps with 500 kV TL
- d. Paxar Dak Den overlaps with internal road from wH059 to WH061

As with other sacred areas, villagers do not typically enter this sacred forest. In this instance, villagers fear angering the ghost and/or receiving punishment as the ghost can make people feel ill. People who want to enter the forest need to consult with the village heads. A ritual must be performed in accordance with the local customs that includes animal sacrifice, in order to gain the ghost’s permission to enter the sacred forest. This belief and ritual ceremony are commonly practised in the region.

For the Phou Koungking, although this is not officially classified as “sacred forest” there is Potential Intangible Cultural Heritage associated with this mountain area (as reported during the field studies). Phou Koungking overlap with WH0250, WH0260, WH0270, WH0280 and WH029. Phou Koungking is classified as Protected Forest, managed by the Provincial Government. It is noted that this forest is also designated as a protected forest to protect area’s watersheds. Any potential ecological impact of the Project on the sacred forest is assessed in **Section 8.4**, accordingly,

8.5.8.2 Existing Controls

The Project places a strong emphasis on respecting the cultures and customs of the villagers, and has been participating in various rituals as part of granting access and permission to undertake technical studies to support the ESIA. This will be formalised as part of a management plan to apply to all workers. The Project has also sought to minimise any impact to cultural heritage through the optimisation of the Project layout.

8.5.8.3 Significance of Impact

Methodology for the Assessment of Impact Significance

Impact on cultural heritage is assessed in accordance with the magnitude criteria in **Table 8.72** and sensitivity criteria in **Table 8.73**.

Table 8.72: Social Impact Magnitude Criteria

Magnitude	Definition
Large	Change dominates over baseline conditions. Affects the majority of the area or population in the AoI and/or persists over many years. The impact may be experienced over a regional or national area.
Medium	Early evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of medium duration. Frequency may be occasional and impact may potentially be regional in scale.
Small	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.
Negligible	Change remains within the range commonly experienced within the household or community
Positive	In the case of positive impacts, it is generally recommended that no magnitude be assigned, unless there is ample data to support a more robust characterisation. It is usually sufficient to indicate that there will be a positive impact, without characterising the exact degree of positive change likely to occur.

Table 8.73: Social Impact Sensitivity Criteria

Sensitivity	Definition
Low	Villagers have low vulnerability/sensitivity; consequently has a high ability to adapt to changes brought by the project
Medium	Some, but few areas of vulnerability/sensitivity; retaining an ability to at least adapt in part to change brought by the project

High	Profound or multiple levels of vulnerability/vulnerability/sensitivity that undermine the ability to adapt to changes brought by the project
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Receptors Sensitivity and Impact Magnitude

Receptors have a **medium** sensitivity, as the Project has been proactive in seeking feedback from villagers on the location of wind turbines so as to avoid cultural heritage. However, some wind turbines may remain within the sacred forest.

The magnitude of the impact is **medium**, regarding potential impact to the sacred forests, given that the impact will occur for the duration of the operation of the wind farm.

8.5.8.4 Additional Mitigation, Management, and Monitoring Measures

A cultural heritage management plan will be prepared to guide the workers on the protection of cultural heritage sites, structures and values that may be impacted by the Project. In the first instance, the cultural heritage protocol will require:

- Further consultation with the villagers who reside close to the sacred forest to ensure the communities have a good understanding of Project activities and potential impacts on the sacred forest;
- Consultation with village leaders, and elders on ceremonies and rituals to be undertaken to seek permission from the ghost to enter the forest for construction and ongoing maintenance purposes;
- Seek permission from the village leaders, elders and the broader community to enter and utilise the sacred forest areas that overlap with the Project footprint. Document the consent process and the consent itself, taking a precautionary approach, to address the potential for ADB Indigenous People Safeguards to be triggered in terms of consent for Project impacts on IP cultural resources.

The cultural heritage protocol will be supported by various plans such as the SEP which provides stakeholder engagement strategies and activities throughout the Project lifecycle (refer to **Section 8.5.4.4**). The CEMP will also outline requirements for the EPC Contractors to notify the community relations team prior to entering the sacred forest to ensure appropriate notification and rituals are taken place prior to start of work.

In addition, the CEMP will also include a chance finds protocol that will guide workers in the event that potential cultural heritage is encountered.

To ensure workers are aware of the cultural heritage sensitivities and the various protocols in place, the Workers Code of Conduct will contain a statement requiring workers to respect cultural heritage and adhere to all protocols and management plans.

8.5.8.5 Residual Impact Significance

Through further consultation and confirmation of the rituals/ceremonies required, the impact magnitude will be reduced to **small**. This will in turn result in the residual magnitude significance of **minor** (**Table 8.74**).

Table 8.74: Cultural Heritage Impact Assessment

Significance of Impact			
Potential Impact	Impact on Cultural Heritage (Tangible and Intangible)		
Project Phase	Pre-Construction	Construction	Operation
Impact Nature	Negative	Positive	Neutral
	The impact is negative.		

Significance of Impact

Impact Type	Direct	Indirect	Induced	
	The Project will directly impact on intangible cultural heritage.			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	The impact will remain throughout the operations phase.			
Impact Extent	Local	Regional	International	
	The impact is limited to the villages in the Aol.			
Impact Scale	The impact is limited to the villages in the Aol.			
Frequency	The impact will be sustained over the operations phase.			
Impact Magnitude	Positive	Negligible	Small	Medium
	The magnitude will is considered to be medium , being limited to the sacred forest.			
Receptor Sensitivity	Low	Medium	High	
	The receptors have a medium sensitivity.			
Impact Significance	Negligible	Minor	Moderate	Major
	The impact significance is moderate.			
Residual Impact Magnitude	Positive	Negligible	Small	Medium
Residual Magnitude Significance	Negligible	Minor	Moderate	Major

8.5.9 Vulnerable Households/Groups

8.5.10 Summary of Gender Impacts and Mainstreaming Measures

The gender disaggregated socio-economic profile is presented in **Chapter 7**. From this, it can be seen that women are well represented across the affected villages. For instance, in both the Dak Cheung and Sanxay Districts, women have taken on leadership positions including village heads and village board members. FGDs and site visit observations have also confirmed that gender-based violence is not a prevalent issue, and villagers have been equipped with knowledge to identify and manage such situations (refer to **Section 8.5.5.1**).

Despite this, there are a number of aspects of improvement, namely:

- **Education:** The rate of education for males outpaces that of females, for instance, 59% of females have no formal educational attainment, 40% of females have attained university level educational qualifications. There is a near equal split of females and males who have obtained basic schooling, secondary schooling and vocational training. It was reported that the lack of economic resources and work were the main reasons for females discontinuing study.
- **Livelihood:** Female-headed households, and in particular where households are predominantly or wholly comprised of females, are more likely to experience food deficiency due to lower agricultural productivity (associated with smaller agricultural land and lack of male labour). While agricultural activities are allocated equally between females and males, women generally have the additional responsibility of household chores (e.g. cooking, cleaning, etc.) and childcare.
- **Healthcare:** Through FGDs with women's groups, insufficient healthcare was identified. Specifically, there are insufficient stocks of medicines, and lack of healthcare personnel.

Through the social impact assessment above (**Sections 8.5.2-8.5.7**) there is a potential for the following impacts to disproportionately impact women. These potential impacts and their respective mitigation measures are summarised in **Table 8.75**.

Table 8.75: Summary of Gender Impacts and Mitigation asures

Potential Social Impacts	Gender-Specific Impacts	Gender-Specific Mitigation Measures
<p>Economic Opportunities (Section 8.5.3)</p> <ul style="list-style-type: none"> ■ Local Employment and Training ■ Increased Access to Agricultural Land/Forest 	<ul style="list-style-type: none"> ■ The Project will seek to provide equal opportunities to access employment and training opportunities. ■ The Project will support women’s economic development to capitalise on the potential new agricultural areas and/or forest. 	<p>Local Content and Influx Management Plan:</p> <ul style="list-style-type: none"> ■ Ensure the hiring process is fair and equitable for women. ■ Ensure women and men are able to participate in training programs targeting skills required to participate in the Project workforce. <p>CDP:</p> <ul style="list-style-type: none"> ■ Investigate potential programs, such as IFAD Programme supporting women in agriculture, providing training on weaving for women, and rearing livestock
<p>Economic Displacement and Impacts to Livelihoods (Section 8.5.3)</p> <ul style="list-style-type: none"> ■ Loss of Agricultural Land ■ Loss of NTFP Collection 	<ul style="list-style-type: none"> ■ The loss of agricultural land (permanent or temporary) may further decrease the size of land for female-headed households (which typically have smaller landholdings). ■ As the collection of NTFPs is typically undertaken by women, the loss of forest would also impact upon the amount of NTFP available for women. ■ This may further impact upon livelihood security of women. ■ The impacts of economic displacement can disproportionately affect women, as their unique role in the household means they may have more difficulties coping with the familial disruption that resettlement can cause than their male counterparts. This is particularly the case if resettlement-related engagement efforts do not effectively enable women’s meaningful participation throughout the resettlement process. 	<p>Resettlement Plan:</p> <ul style="list-style-type: none"> ■ It is critical to mainstream gender considerations into all components of resettlement planning, including engagement processes. Gender-specific consultation during the preparation of the Resettlement Plan will be undertaken, to integrate the unique needs and perspectives of women. ■ The following additional considerations will be made for gender equity and social inclusion: <ul style="list-style-type: none"> ○ Women, and Project affected families, especially from vulnerable households will be encouraged to get involved in all resettlement activities and their effective involvement will also be ensured in all local level resettlement committees. ○ Provision of asset titles, security of tenure, establishment of bank accounts and any cash and in-kind compensation will consider the head of the household along with the spouse. ○ Additional incentives to encourage joint-account for cash compensation or replacement land in the name of women. ○ Provision of trainings focused on women as a part of livelihood restoration programs. ○ Households categorised as vulnerable for Resettlement Plan will be given priority to access livelihood restoration programs and local employment or procurement schemes put in place by the Project.
<p>Impacts to Community Health and Safety from Construction Activities (Section 8.5.4)</p> <ul style="list-style-type: none"> ■ Infrastructure and Machinery ■ Vehicle Movements ■ Security 	<ul style="list-style-type: none"> ■ Construction activities will not necessarily result in gender-specific impacts, however it is prudent that women are equally made aware of potential construction risks. 	<p>SEP:</p> <ul style="list-style-type: none"> ■ Gender-specific consultation should be undertaken to determine the best method to deliver the community environmental and safety awareness to women. For instance, consultation with village women in order to determine the appropriate time/period to undertake group discussions or visits.

Potential Social Impacts	Gender-Specific Impacts	Gender-Specific Mitigation Measures
<p>Impacts Associated with Influx (Section 8.5.5)</p> <ul style="list-style-type: none"> ■ Labour and Working Conditions ■ Transactional Sex ■ Community Dynamics and Gender-Based Violence ■ Potential Spread of Diseases ■ Public Infrastructure and Resources 	<ul style="list-style-type: none"> ■ It is likely that the construction workforce will be predominantly comprised of male workers. Some of these workers will be migrant workers. ■ The occurrence of transactional sex may increase, which may in turn lead to the spread of diseases, such as sexually transmitted diseases. As noted earlier, there is an existing lack of healthcare provisions and workers. ■ Migrant workers may have different customs and traditions to the villagers belonging to the various ethnic groups. This may result in a change in community dynamics and/or gender-based violence against women. 	<p>Local Content and Influx Management Plan</p> <ul style="list-style-type: none"> ■ Establish and enforce a WCC, which will have strict guidelines for worker interactions with local women, and fellow female workers. ■ Provide skills training to women to maximise the potential for local hiring. <p>Community Health and Safety Management Plan</p> <ul style="list-style-type: none"> ■ Conduct an awareness campaign on HIV/AIDS and sexually transmitted diseases (STDs) focusing on targeted groups such as transport workers and adolescents. ■ Conduct an awareness campaign on nutrition and promotion of a healthy life-style (in conjunction with the reproductive health and nutrition program within the CDP). ■ Conduct a waste-management and sanitation awareness campaign for preventing vector-borne diseases. ■ Supplement awareness campaigns on gender-based violence to ensure women are aware of how and where to report and provide support to facilitate the process.
<p>Impacts of Wind Farm Operation on Local Amenity (Section 8.5.6)</p> <ul style="list-style-type: none"> ■ Noise ■ Landscape and Visual ■ Shadow Flicker 	<p>No gender-specific impacts.</p>	<p>N/A</p>
<p>Impact on Ethnic Groups (Section 8.5.7)</p> <ul style="list-style-type: none"> ■ Erosion of Ethnic Culture 	<ul style="list-style-type: none"> ■ There is the potential for migrant workers to negatively influence customs and religious practices that may have gender-specific boundaries/rules. ■ For instance, women and outsiders are strictly forbidden from entering the Salakuan (sacred house). 	<p>CDP</p> <ul style="list-style-type: none"> ■ Ethnic culture will be promoted so that workers are aware of potential gender-specific cultural considerations. ■ Provide support for documentation and preservation of traditional knowledge on herbs and its benefits/usage, skills, and indigenous crafts passed through women (e.g., hand knitting mats, bamboo baskets, and woven woollen carpets). ■ Set up a women's cooperative to promote indigenous crafts.
<p>Impact on Cultural Heritage (Tangible and Intangible) Section 8.5.8)</p> <ul style="list-style-type: none"> ■ Sacred Forest 	<p>No gender-specific impacts.</p>	<p>N/A</p>

8.6 Climate Change Risk and Impact Assessment

8.6.1 Impacts on Climate Change

The Project will generate electricity with installed capacity of approximately 600 MW and electricity generation capacity of 1,707 GWh/year from wind energy. This will contribute to a significant increase in electricity generated from renewable energy in Lao PDR, which could lead to a decrease in importation of fossil fuels that would have been needed in the absence of the Project. Subsequently, this Project is expected to reduce the anthropogenic emission of greenhouse gases (GHGs), particularly carbon dioxide (CO₂) which is one of the major causes of man-induced global warming.

The scope of this study covers a quantitative assessment of the GHG emissions from the Project using available information and assumptions, and a comparison of emissions from the Project to Lao energy sector's GHG emission portfolio.

8.6.1.1 Potential Impacts

Based on the ESIA dated 2020, GHG emissions during **pre-construction phase** is related to clearing of forest and agricultural land for the construction of the Project. Vegetation contains large amounts of carbon. When it is cleared, it releases much of that carbon in the form of heat trapping gases, primarily carbon dioxide (CO₂), which warms the atmosphere.¹¹⁹

The main sources of GHGs **during the construction phase** are:

- construction machinery and equipment in various activities such as clearance and levelling of the construction area,
- running transport vehicles to and from the Project area,
- construction of tower bases, and
- construction of access road etc.

Based on information provided by IEAD, electricity will be purchased from the grid for the Site office, workers' camps, batching and crushing plants, etc. during construction phase. There is no plan for self-consumption of electricity from the Wind farm during construction.

During **operation phase**, the electricity production of the wind farm will not emit GHGs as it is a form of renewable energy and there is no involvement of fuel combustion in energy production process. Therefore, any self-consumption of produced electricity will not produce emissions and is not included in project scope for GHG emissions. Furthermore, the Project will reduce dependency on electricity from combustion of fossil fuel such as coal and natural gas, therefore the Project will help Lao PDR reduce the emission of GHGs, which is discussed in **Section 8.3.4.3**. However, based on information provided by IEAD, fuel will be needed to operate on site generators and for operating vehicles. Electricity will be purchased from the Lao grid for operation and maintenance (O&M) of accommodation and warehouse. There is a plan for self-consumption of the electricity generated from the wind power during the operation phase, and diesel generators are to be used for backup when electricity generated from the wind farm is not available.

¹¹⁹ Land Clearing & Climate Change: Risks & Opportunities in the Sunshine State. Retrieved from: <https://www.climatecouncil.org.au/uploads/c1e786d5d0fe4c4bc1b91fc200cbaec8.pdf>

Table 8.76: Project Scope and Activity by Emission Source during Construction and Operation

Phase	Source Class	Scope 1 and Scope 2 Emission
Pre-Construction	Land use conversion	<ul style="list-style-type: none"> Land clearance and preparation which result in conversion of forest to developed land
Construction	Stationary combustion	<ul style="list-style-type: none"> Generators (diesel)
	Mobile combustion	<ul style="list-style-type: none"> 50-80 machines and equipment for land preparation and construction activities such as cranes, backhoe, bulldozers, etc. 20-50 vehicles
	Electricity	<ul style="list-style-type: none"> Purchased electricity from Lao grid
Operation	Stationary combustion	<ul style="list-style-type: none"> Generators (diesel)
	Mobile combustion	<ul style="list-style-type: none"> 12 cars
	Electricity	<ul style="list-style-type: none"> Self-consumption and Purchased electricity from Lao grid

Source: ESIA dated September 2020 and IEAD.

Note: Mobile sources is a term used to describe a wide variety of vehicles, engines, and equipment that generate air pollution and that move, or can be moved, from one place to another. It includes vehicles used on roads for transportation of passengers or freight as well as off-road vehicles, engines, and equipment used for construction, transportation, agriculture, and other purposes. By definition, other combustion sources are considered to be stationary (Stationary Combustion Guidance, WRI/WBCSD (2005))¹²⁰.

8.6.1.2 Existing Controls

Embedded/in-built controls for Project's impacts on climate change during construction included in the ESIA are:

- During construction phase, avoid burning in area clearance activities that may lead to occurrence of fire which may, in turn, lead to burning of forests;
- Land preparation and construction work to avoid cutting of trees or removal of plant species outside of the concession area;
- Ensure the maintenance of construction machinery and equipment to keep them in good conditions to ensure efficiency, as lower efficiency machineries generally emit higher CO₂.¹²¹
- Avoid emissions of CO₂ in excessive of specified standards; and
- Issue the rules to prevent staff and workers from burning waste within construction area.

Existing controls for Project's impacts on climate change during operation included in the ESIA are:

- Replant trees in the areas where land clearance and levelling works are undertaken;

¹²⁰ Calculation Tool for Direct Emission from Stationary Combustion (2015). Retrieved from: https://ghgprotocol.org/sites/default/files/Stationary_Combustion_Guidance_final_1.pdf

¹²¹ STAPPA/ALAPCO. (1999). Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options. Retrieved from: <https://www.oecd.org/environment/cc/2055676.pdf>

- Participate in the protection of forests and green areas in Dak Cheung District and Sanxay District. These forests and green areas in the two districts will help maintain the overall climate condition and meteorology in the Project area and in the localities; and
- Replantation in areas around the wind turbine towers, office building, and sub-station of the Project to allow the Project area.

8.6.1.3 Significance of Impacts

Impacts during Pre-construction Phase

The total release of GHG emissions (Scope 1)¹²² during the pre-construction phase is estimated to be **56,980 tonnes CO₂ equivalent (Table 8.78)**, accounting for 80.49 % of total GHG emission from the Project throughout the Project life (28 years).

Vegetation clearing in this area can result in a change of carbon (C) stocks from the removal of living biomass.

GHG emission of vegetation clearing is estimated based on net changes in C stocks over time. The use of C stock changes to estimate CO₂ emissions and removals, is based on the fact that changes in ecosystem C stocks are predominately (but not exclusively) through CO₂ exchange between the land surface and the atmosphere. Thus, increases in total C stocks over time are equated with a net removal of CO₂ from the atmosphere and decreases in total C stocks are equated with net emission of CO₂.¹²³ The estimation of GHG emission due to vegetation clearing is therefore assumed for Project period (25 years) – as after vegetation have been cleared, the C stocks which serve as CO₂ sequestration will be lost (equated to CO₂ emission) throughout the Project period.

The land use category is assumed to be forest land and crop land in line with IPCC categories (IPCC, 2003¹²⁴). GHG emissions from land clearance are assessed using the Equation below and the parameters summarized in **Table 8.77**.

The estimation of total GHG emission due to vegetation clearing is presented in **Table 8.78**.

Equation: Change in Biomass Carbon Stocks on Land Converted to another Land category

$$\text{Annual Change in Carbon Stocks} = A_{\text{conversion}} \times (B_{\text{after}} - B_{\text{before}}) \times \text{CF}$$

Where:

Annual change in Carbon Stocks = Annual change in carbon stocks in living biomass in land converted to 'other land'¹²⁵ (ton C/year)

$A_{\text{conversion}}$ = Area of land converted to 'other land' from some initial land use (ha/year)

B_{after} = Amount of living biomass immediately after conversion to 'other land' (tonnes d.m./ha)

B_{before} = Amount of living biomass immediately before conversion to 'other land' (tonnes d.m./ha)

CF = Carbon fraction of dry matter (default = 0.5) (tonnes C/tonnes d.m.)

¹²² The GHG Protocol classifies removal of native vegetation – emissions resulting from removal or suppression of native vegetation for other uses (land-use change) as Scope 1 Emission. Retrieved from: https://wribrasil.org.br/sites/default/files/ghg_protocolo-florestas-technicalnote.pdf

¹²³ IPCC Guidelines on Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003). Retrieved from: https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_01_Ch1_Introduction.pdf p. 1.6

¹²⁴ IPCC Guidelines on Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003). Retrieved from: https://www.ipcc-nggip.iges.or.jp/public/gpoglulucf/gpoglulucf_files/GPG_LULUCF_FULL.pdf

¹²⁵ This category includes bare soil, rock, ice, and all unmanaged land areas that do not fall into any of the other five categories (forest land, crop land, grassland, wetlands, and settlements).

To convert tons of carbon to tons of carbon dioxide equivalence, multiply by the atomic weight difference between C and CO₂ (44/12).¹²⁶

Table 8.77: Amount of Living Biomass Before and After Conversion

Description	Amount of Living Biomass (tonnes d.m./ha)
	Forest land
Before	25 ^a
After	0 ^b

a – carbon stocks in biomass for forest land for tropical and sub-tropical forests, montane dry region from Table 3A.1.3 from Chapter 3.3 of Good Practice Guidance for Land use, Land-use Changes and Forestry (IPCC, 2003)

b – default assumption of 0 was assumed when converted to other land as per Section 3.7.2.1.1.1 from Good Practice Guidance for Land use, Land-use Changes and Forestry (IPCC, 2003)

Source: IPCC 2003 Good Practice Guidance for Land use, Land-use Changes and Forestry

Table 8.78: GHG Emission from Land Clearing in the Pre-construction Phase

Phase	Description	Calculation
Pre-construction	Annual carbon stock change due to land clearing (ton C/year)	$= A_{\text{conversion}} \times (B_{\text{after}} - B_{\text{before}}) \times CF$ $= 44.4 \times (0-25) \times 0.5$ $= -555 \text{ ton C/year}$
	Annual CO ₂ emission due to loss of carbon stock (CO ₂ eq/year)	$= \text{Annual change in carbon} \times \text{conversion}$ $= 555 \times (44/12)$ $= \mathbf{2,035 \text{ CO}_2\text{eq/year}}$
	Total change in carbon stock over the Project life (25 years) (ton C)	$= \text{Annual change in carbon stock} \times 25 \text{ years}$ $= -555 \times 28$ $= -15,540 \text{ ton C}$
	Total CO ₂ emission due to loss of carbon stock over the Project life (25 years) (ton CO ₂ eq)	$= \text{Total change in carbon stock} \times \text{conversion}$ $= 13,875 \times (44/12)$ $= \mathbf{56,980 \text{ ton CO}_2\text{eq}}$

¹²⁶ IPCC Good Practice Guidance for LULUCF (2003). Retrieved from: https://www.ipcc-nggip.iges.or.jp/public/gpplulucf/gpplulucf_files/Chp3/Chp3_2_Forest_Land.pdf p. 3.51

GHG Protocol for calculation tool for forestry in Brazil. Retrieved from: https://wribrasil.org.br/sites/default/files/ghg_protocolo-florestas-technicalnote.pdf

EPA Greenhouse Gases Equivalencies Calculator - Calculations and References. Retrieved from: <https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references>

Module C-CS: Calculations for Estimating Carbon Stocks. Retrieved from: <https://winrock.org/wp-content/uploads/2018/08/Winrock-Guidance-on-calculating-carbon-stocks.pdf>

Impacts during Construction Phase

The total release of GHG emissions during construction is estimated to be **2,391.55 tonnes of CO₂ equivalent per year** or **7,174.65 CO₂ equivalent throughout** (11.35% of total emission over the Project life of 25 years) construction period (3 years) as shown in **Table 8.79**. The majority of emissions during construction phase are from the use of mobile transportation/ equipment/ machineries, followed by stationary combustion.

Table 8.79: Emissions Breakdown by Scope and Activity during Construction

Emission Scopes	Emission/year (tCO ₂ eq/year)	Total Emission during construction (3 years) (tCO ₂ eq)
Scope 1: Direct Emission		
Stationary Combustion	65.57	196.72
Mobile Combustion (equipment/machineries/vehicles)	87.98	263.93
Total Direct Emission	153.55	460.65
Scope 2: Electricity indirect GHG emissions		
Purchased electricity from the national grid	2,238	6,714
Total Emission (Scope 1 + Scope 2)	2,391.55	7,174.65

Impacts during Operation Phase

During operation phase, there would be no GHG emission from the electricity production from the wind farm. The majority of GHG emission derived from Mobile Combustion (equipment /machineries /vehicles), followed by purchased electricity and stationary combustion, respectively. The total operational lifetime of the Project by IEAD is expected to be 25 years. The total release of GHG emissions during operation is estimated to be **234.28 tonnes of CO₂ equivalent per year** or **5,857.00 CO₂ equivalent throughout** the operation period of 25 years (8.37% of total GHG emission throughout the Project life of 25 years) as shown in **Table 8.80**.

Table 8.80: Emissions Breakdown by Scope and Activity during Operation

Emission Scopes	Emission/year (tCO ₂ eq/year)	Total Emission during Operation (25 years) (tCO ₂ eq)
Scope 1: Direct Emission		
Stationary Combustion	18.00	450.00
Mobile Combustion (equipment/machineries/vehicles)	132.35	3,308.75
Total Direct Emission	150.35	3,758.75

Emission Scopes	Emission/year (tCO ₂ eq/year)	Total Emission during Operation (25 years) (tCO ₂ eq)
Scope 2: Electricity indirect GHG emissions		
Purchased electricity from the national grid	83.93	2,098.25
Total Emission (Scope 1 + Scope 2)	234.28	5,857.00

Total Emission throughout the Project Life

Table 8.81 presents an overall GHG emission breakdown by phase. The assessment of GHG emission indicates that the majority of GHG emission derives from pre-construction phase (81.39%), followed by construction (10.24%), and operation (8.37%).

Table 8.81: GHG Emission Breakdown by Phase

Phase	Scope 1 Emission (tCO ₂ eq)	Scope 2 Emission (tCO ₂ eq)	Total Emission	% of total Emission
Pre-construction (28 years)	56,980.00	NA	56,980.00	81.39%
Construction (3 years)	460.65	6,714.00	7,174.65	10.24%
Operation (25 years)	3,758.75	2,098.25	5,857.00	8.37%
Project Life (28 years)	61,199.40	8,812.25	70,011.65	100%
Annual Average (over 28 years)	2,185.69	314.72	2,500.42	NA

Methodology for Assessment of Impact Significance

Greenhouse emission falls under the following three scopes:

- **Scope 1 – Direct GHG emissions:** Direct GHG emissions occur from sources that are owned or controlled by the company, for example, emission from combustion in owned or controlled generators or vehicles, etc. Direct CO₂ emissions from combustion of biomass shall not be included in Scope 1 but reported separately.
- **Scope 2 – Electricity indirect GHG emissions:** Scope 2 accounts for GHG emissions from the generation of purchased electricity produced by a third party and consumed by the company (or Project, as in this study). Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated. In this study, only emissions from the grid are considered, therefore all Scope 2 emissions are location-based. A location-based method reflects the average emissions intensity of grids on which energy consumption occurs (using mostly grid-average emission factor data).¹²⁷ This is relevant to the site as all of the electricity purchased by

¹²⁷ GHG Protocol Scope 2 Guidance. Retrieved from: https://ghgprotocol.org/sites/default/files/Scope2_ExecSum_Final.pdf

the site will be from the national grid, and none of the electricity purchased will be directly from the supplier, which if relevant would be counted as market-based.

- **Scope 3 – Other indirect emissions:** Scope 3 is an optional reporting category that allows for treatment of all other indirect emissions that are related to the business operations of the site but where emissions occur from outside the boundary of the site, namely emissions from suppliers and customers. Scope 3 emissions are a consequence of the activities of the company, but occur from sources not owned or controlled by the company. Scope 3 emissions include some of purchased fuels, and use of sold products and services. However, according to Equator Principles, only Scope 1 and Scope 2 emissions are required to be quantified and reported publicly (on annual basis); therefore, this assessment does not cover quantification of Scope 3 emission.

Scope 1 and Scope 2 have been considered for this Project, which were quantified according to the following standards:

- GHG Protocol Corporate Accounting and Reporting Standards¹²⁸
- GHG Protocol Scope 2 Guidance¹²⁹
- 2003 IPCC Guidelines on Good Practice Guidance for Land Use, Land-Use Change and Forestry¹³⁰
- 2006 IPCC Guidelines for National GHG Inventories¹³¹
- 2010 Ministry of Natural Resources and Environment (MONRE), Lao PDR on calculation for the emission factor for electricity generation in Lao PDR¹³²
- 2020 Lao's PDR's First Biennial Update Report¹³³
- 2021 Lao PDR's Revised Nationally Determined Contribution (NDC)¹³⁴

GHGs and Their Global Warming Potentials

The global warming potential (GWP) is used to evaluate the potency of non-CO₂ GHG compared to CO₂ as a baseline. For example, methane (CH₄) is 25 times more potent than CO₂ in its global warming effect, meaning that 1 kg of CH₄ emitted is equivalent to 25 kg of CO₂ emitted. The 100 years' time horizon is used in line with GHG inventory best practices.

Although Lao PDR's First Biennial Update Report dated 24 July 2020 applied the GWP of the 1996 IPCC Second Assessment Report (SAR); however, this assessment uses the GWP sourced from the 2007 IPCC Fourth Assessment Report (AR4) as the values are more updated and more commonly adapted. Detail of GWP factors used in this assessment are shown in **Table 8.82**.

¹²⁸ GHG Protocol Corporate Accounting and Reporting Standards. Retrieved from: <https://ghgprotocol.org/standards/scope-3-standard>

¹²⁹ GHG Protocol Scope 2 Guidance. Retrieved from: https://ghgprotocol.org/scope_2_guidance

¹³⁰ IPCC Guidelines on Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003). Retrieved from: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf_files/GPG_LULUCF_FULL.pdf

¹³¹ IPCC Guidelines for National GHG Inventories (2006). Retrieved from: <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

¹³² Calculation for the emission factor for electricity generation in Lao PDR (2010). Retrieved from: <http://monre.myqnapcloud.com/2017/dndmcc/images/stories/pdf/calculation%20for%20the%20emission%20factor.pdf>

¹³³ 2020 Lao's PDR's First Biennial Update Report. Retrieved from: https://unfccc.int/sites/default/files/resource/867493251_Lao%20Peoples%20Republic-BUR1-1-Draft%20Biennial%20Update%20Report-BUR_Lao%20PDR_24July2020.pdf

¹³⁴ 2021 Lao PDR's Revised Nationally Determined Contribution (NDC). Retrieved from: [https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Lao%20People's%20Democratic%20Republic%20First/NDC%202020%20of%20Lao%20PDR%20\(English\).%2009%20April%202021%20\(1\).pdf](https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Lao%20People's%20Democratic%20Republic%20First/NDC%202020%20of%20Lao%20PDR%20(English).%2009%20April%202021%20(1).pdf)

Table 8.82: Global Warming Potentials

Industrial Designation or Common Name	Chemical Formula	Global Warming Potential for 100 years' Time Horizon from IPCC Fourth Assessment Report
Carbon Dioxide	CO ₂	1
Methane	CH ₄	25
Nitrous Oxide	N ₂ O	298

Source: 2007 IPCC Fourth Assessment Report Working Group I. Retrieved from: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html

Emission Factors

An emission factor represents an average emission rate for a given source, and is generally expressed as mass or volume of emission per source type or measure of activity related to the source.

The 2006 IPCC emission factors for stationary and mobile combustion were used for the purpose of GHG emission calculation of this report. Although the 2021 Lao PDR's NDC applied the 1996 IPCC guidelines, this report used the 2006 IPCC guideline as it provides a more updated data and is more widely adopted. **Table 8.83** provides emission factors for stationary and mobile combustion related to the Project activities and used for the purposes of this report.

Table 8.83: Emission Factors for Stationary and Mobile Combustion

Fuel	tCO ₂ /Litre	tCH ₄ /Litre	tN ₂ O/Litre
Emission factors for stationary combustion			
Diesel	2.7 x 10 ⁻³	1.09 x 10 ⁻⁷	2.19 x 10 ⁻⁸
Diesel B5	2.56 x 10 ⁻³	1.04 x 10 ⁻⁷	2.08 x 10 ⁻⁸
Emission factors for mobile combustion			
Gasoline	2.11 x 10 ⁻³	1.11 x 10 ⁻⁷	1.11 x 10 ⁻⁷
Diesel	2.70 x 10 ⁻³	1.42 x 10 ⁻⁷	1.42 x 10 ⁻⁷

Source: IPCC 2006 (converted from kg/TJ)

The 2021 Lao PDR's NDC applied the emission factor of 0.5595 tCO₂/MWh for Lao PDR national electricity grid sourced from the MONRE's calculation for the emission factor for electricity generation in Lao PDR in 2010.¹³⁵ The Viet Nam national grid emission factor is 0.8041 tCO₂/MWh in 2020 (**Table 8.84**). Therefore, an emission factor of **0.5595 tCO₂/MWh** for Lao PDR national electricity grid was used for purchased electricity for Project activities and **0.8041 tCO₂/MWh** for Vietnam emission factor is used to calculate avoided emissions as the electricity will be supplied to Vietnam.

¹³⁵ Calculation for the emission factor for electricity generation in Lao PDR (2010). Retrieved from: <http://monre.mynapcloud.com/2017/dndmcc/images/stories/pdf/calculation%20for%20the%20emission%20factor.pdf>

Table 8.84: Emission Factors for Electricity

Electricity	tCO ₂ /MWh	Source
Lao PDR national grid	0.5595	<ul style="list-style-type: none"> ■ 2021 Lao PDR's NDC¹³⁶ ■ 2010 MONRE, Lao¹³⁷
Vietnam national grid	0.8041	<ul style="list-style-type: none"> ■ 2020 Department of Climate Change - Ministry of Natural Resources and Environment, Viet Nam

GHG Emission Calculation Methods

Scope 1 GHG Emission

Scope 1 method of IPCC was selected since information regarding site specific or country specific emission factors are not available. This approach is used to estimate the GHG emission in general by analyzing the emission based on fuel consumption.

Applying Scope 1 emission estimation requires the following for each source category and fuel:

- Data on the amount of fuel combusted in the source category
- Emission factors

In general, GHG emissions based on fuel used is the product of fuel consumption and emission factors of the fuel source as demonstrated in Equation below:

$$\text{GHG Emission}_{\text{GHG, fuel}} = \text{Fuel Consumption}_{\text{fuel}} \times \text{Emission factor}_{\text{GHG, fuel}}$$

Where:

Emission_{GHG, fuel} = emission of a given GHG by type of fuel (tCO₂eq)

Fuel Consumption_{fuel} = amount of fuel combusted (litre)

Emission Factor_{GHG, fuel} = emission factors of a given GHG by type of fuel (tCO₂eq/litre) (amount (tCO₂eq) of a given GHG emitted per one unit of fuel combusted (tCO₂eq/litre))

Source: 2006 IPCC guideline for National GHG inventories; Volume 2: Energy Chapter 2

Scope 2 GHG Emission

A similar estimation method applies for Scope 2 - indirect GHG emission from purchased electricity. Data required for Scope 2 emission estimation are:

- Data on the amount of electricity consumption
- Source of electricity and emission factor of the source

Emissions assessment based on the type of electricity source (hence emission factors) and the amount of electricity consumption is illustrated in the equation below:

¹³⁶ 2021 Lao PDR's Revised Nationally Determined Contribution (NDC). Retrieved from: [https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Lao%20People's%20Democratic%20Republic%20First/NDC%202020%20of%20Lao%20PDR%20\(English\),%2009%20April%202021%20\(1\).pdf](https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Lao%20People's%20Democratic%20Republic%20First/NDC%202020%20of%20Lao%20PDR%20(English),%2009%20April%202021%20(1).pdf)

¹³⁷ Calculation for the emission factor for electricity generation in Lao PDR (2010). Retrieved from: <http://monre.mynapcloud.com/2017/dndmcc/images/stories/pdf/calculation%20for%20the%20emission%20factor.pdf>

$$\text{Emission}_{\text{GHG, electricity source}} = \text{Electricity Consumption}_{\text{electricity source}} \times \text{Emission factor}_{\text{GHG, electricity source}}$$

Where:

$\text{Emission}_{\text{GHG, electricity source}}$ = emission of a given GHG (tCO₂eq)

$\text{Electricity Consumption}_{\text{electricity source}}$ = emission factors of a given GHG by type of electricity source (tCO₂eq/MWh) (amount of GHG emitted per one unit of electricity consumed)

Emission Factor = amount of GHG emitted per one unit of electricity consumed (tCO₂eq/MWh)

Total GHG Emission

The estimate the total GHG emissions (Scope 1 and Scope 2) is the sum of Scope 1 and Scope 2 emission as equation outlined below:

$$\text{Total Emission} = \text{Scope 1 Emission (tCO}_2\text{eq)} + \text{Scope 2 emission (tCO}_2\text{eq)}$$

Avoided GHG emission

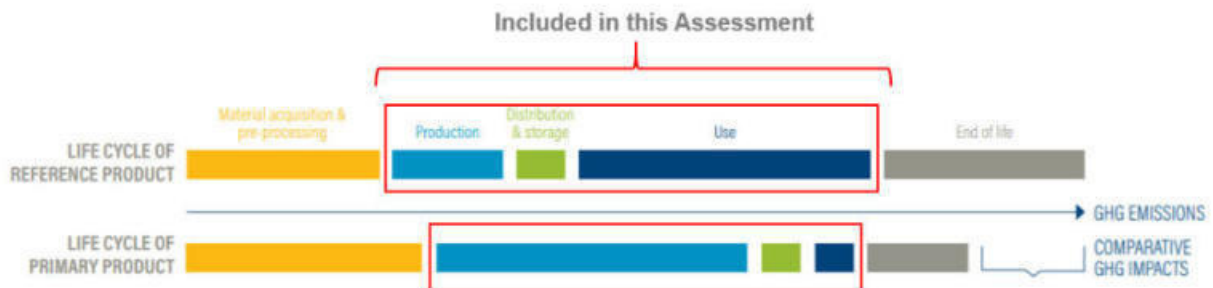
According to the GHG Protocol¹³⁸, avoided emissions are “*emission reductions that occur outside of a product’s life cycle or value chain, but as a result of the use of that product. Other terms used to describe avoided emissions include climate positive, net-positive accounting, and scope 4.*”

Based on the World Resources Institute (WRI)¹³⁹, attributional approaches generate inventories of absolute emissions and removals that are attributed to a given entity, such as a product, company, city, or nation.

Comparative impacts are estimated as the difference between the total, attributional, life-cycle GHG inventories of a company’s product (the “assessed” product) and an alternative (or “reference”) product that provides an equivalent function (**Figure 8.60**).

$$\text{Comparative GHG Impact} = \text{Life-Cycle Emissions of Reference Product} - \text{Life-Cycle Emissions of Assessed Product}$$

Figure 8.60: Calculating Comparative GHG Impacts Using the Attributional Life-Cycle Assessment (LCA) Approach



¹³⁸ <https://ghgprotocol.org/blog/do-we-need-standard-calculate-%E2%80%9Cavoided-emissions%E2%80%9D>

¹³⁹ WRI (2019). Estimating and Reporting the Comparative Emissions Impacts of Products

Source: WRI, 2019.

In this assessment, comparative GHG impact only captures comparison of GHG emissions from pre-construction, construction and operational phases of the Project, excluding of material acquisition & pre-processing, and decommissioning. The timeframe for assessment is 28 years as per the Project's lifetime.

GHG emission from the operation of national grid is *Reference Product*¹⁴⁰, while GHG emission from the Project pre-construction, construction, and operation is *Assessed Product*.

Therefore, avoided GHG emissions from the Project for this assessment are estimated as:

Avoided GHG emission =

Life-Cycle GHG emissions from national grid – Life-Cycle GHG emissions from the wind farm

Assumption and Limitation

It is noted that GHG data in this report cannot yet be used for official GHG inventory reporting¹⁴¹ until the site is operational and actual operation data would be used for a more precise GHG inventory calculation.

The GHG calculation methodology for the Project's GHG emissions has been formulated using suitable calculation methodologies sourced from the 2006 Intergovernmental Panel on Climate Change (IPCC)¹⁴². These methodologies can be replicated for the GHG inventory when the Project becomes operational. In this chapter, some assumptions made include the following:

- Equator Principles (July 2020)¹⁴³ Principle 2: Environmental and Social Assessment stated:

"GHG emissions should be calculated in line with the GHG Protocol¹⁴⁴ to allow for aggregation and comparability across Projects, organisations and jurisdictions. Clients may use national reporting methodologies if they are consistent with the GHG Protocol. The client will quantify Scope 1 and Scope 2 Emissions."

Therefore, quantification of GHG emissions for the Project considers Scope 1 (direct emissions from the facilities owned or controlled within physical Project boundary) and Scope 2 (indirect emissions associated with the off-site production of energy used by the Project), and excludes other indirect Scope 3 emissions (for definitions of scopes, please refer to the section below and GHG Protocol¹⁴⁵).

- This assessment focuses on CO₂, CH₄ and N₂O emissions because these are the most prevalent GHGs emitted from power production industry.
- The assessment covers pre-construction, construction (3 years), and operational (25 years) phases, totaling to an assessment period of 28 years.
- GHG emission during and post decommissioning has not been taken into account in this assessment, as the Project is a build-operate-transfer model and therefore will continue to be operated by the Government of Lao PDR or other entities.
- GHG emission due to vegetation clearing of the Project is assumed for the Project period of 28 years;

¹⁴⁰ Based on an assumption that the majority of GHG emission from national grid is from operational phase

¹⁴¹ Official GHG inventory reporting includes Sustainability Reporting, CDP, DJSI or other nationally relevant greenhouse reporting schemes.

¹⁴² IPCC Guidelines for National GHG Inventories (2006). Retrieved from: <https://www.ipcc-nggip.iges.or.jp/public/2006gl/>

¹⁴³ Equator Principles (July 2020). Retrieved from: <https://equator-principles.com/wp-content/uploads/2021/02/The-Equator-Principles-July-2020.pdf>

¹⁴⁴ The GHG Protocol is based on a comprehensive globally standardised framework to measure and manage greenhouse gas (GHG) emissions from operations. Available from ghgprotocol.org.

¹⁴⁵ GHG Protocol available at: ghgprotocol.org.

- It is assumed, given the nature of this renewable energy Project, that the combined Scope 1 and Scope 2 emissions of the Project are not exceeding 100,000 tonnes of CO₂ equivalent annually. Therefore, required by the Equator Principles (July 2020) an alternatives analysis evaluating lower GHG intensive alternatives and consideration of relevant Climate Transition Risks (as defined by the Task Force on Climate-Related Financial Disclosures (TCFD))¹⁴⁶ would be not be needed as the Project does not exceed this GHG emissions threshold.

8.6.1.4 Additional Mitigation, Management, and Monitoring Measures

The following mitigation measures will be put in place for the Project during **pre-construction** to reduce GHG emissions:

- The planned area for vegetation clearance plan linked to the construction works need to be clearly determined and demarcated by landmark to avoid accidental clearance. Site clearance plan should be prepared to identify areas that will be retained with natural vegetation within the Site's boundaries.
- Clearing vegetation outside of designated areas will be prohibited for Project staff, workers, all contractors and personnel engaged or associated with the Project, with sanctions, including fines and dismissal, and prosecution under the relevant laws for clearing vegetation
- The Project should consider carbon offsetting for lost vegetation to the Project forest clearing such as re-forestation in other areas.

The following measures will be put in place for the Project **during construction** to reduce GHG emissions;

- Use high fuel efficient machineries and engines, and develop and implement preventive maintenance plan for machines, and engines to ensure combustion efficiency.
- Develop vehicle maintenance plan and transport planning for construction to avoid unnecessary trips.
- Ensure that construction work is done within designated construction areas and avoid trees removal outside of construction area.
- Develop rules to prevent burning of waste within the construction area by Project workers.

The following mitigation measures will be put in place for the Project **during operation**:

- It is proposed to undertake an annual GHG inventory to monitor the GHG emissions according to the applicable requirements (i.e. ADB SPS, EP III and IFC).
- Replant trees in area where clearance and levelling work were undertaken during pre-construction and construction.

Where feasible, arrange emissions offsets, including flexible mechanisms under the United Nations Framework Convention on Climate Change (UNFCCC) and the voluntary carbon market, including reforestation, and afforestation. The Project may participate in forest protection of Dak Cheung and Sanxay districts in collaboration with relevant governmental agencies and local communities.

8.6.1.5 Residual Impact Significance

After total amount of GHG emissions of the Project life-cycle are estimated, the significance of potential impacts to GHG during pre-construction, construction and operation are assessed in the following sections.

During pre-construction, construction and operation, the Project will emit 2,035 tCO₂eq/year, 2,391.55 tCO₂eq/year and 234.27 tCO₂eq/year, respectively, which are considered insignificant compared to

¹⁴⁶ <https://www.fsb-tcdf.org/>

the country's GHG emission of 24,099,000 tCO₂eq in 2014 (approximately 0.008%, 0.01% and 0.001%, respectively). The impacts of Project's GHG emissions on climate change have been assessed as negligible for all Project phases (pre-construction, construction and operation). With additional mitigation measures adopted by the Project, the Project's impact on climate change will be further reduced.

Additionally, the Project will have positive impact on climate change by contributing to avoided GHG emission of 1,370,098.28 tCO₂eq annually, which would be 22.52% compared to the Energy sector's contribution to GHG emissions, and 3.48% compared to the net annual country emissions.

Impacts Assessment for Pre-construction Phase

The impact of the Project's impact on climate change during pre-construction phase could be assessed in accordance to the amount of impact during the pre-construction period, as provided in **Table 8.85**.

Table 8.85: Impact Assessment for Project's Impact on Climate Change during Pre-construction

Significance of Impacts					
Impacts	Potential impacts on climatic condition due to GHG emissions.				
Impact Nature	Negative	Positive	Neutral		
	Potential impacts to climate would be considered to be adverse (negative).				
Impact Type	Direct	Indirect	Induced		
	Potential impacts would likely be direct impacts through the release of emissions from fuel combustion (stationary and mobile combustion).				
Impact Duration	Temporary	Short-term	Long-term	Permanent	
	Many of the major GHGs can remain in the atmosphere for tens to hundreds of years after being released.				
Impact Extent	Local	Regional	International		
	GHGs are a global emission and may affect the global climate.				
Impact Scale	The emissions from the Project are calculated to be 2,035 tCO ₂ eq per year during pre-construction, compared to Lao PDR's GHG release of 24,099,000 tCO ₂ eq in 2014, the total GHG releases from the Project are insignificant (approximately 0.008%).				
Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Minor emissions of GHG will be emitted as a result of the Project construction, and considered insignificant emissions according applicable international standards. Magnitude is considered Negligible .				
Sensitive Receptor	Low	Medium	High		

Significance of Impacts

	The direct receptor to GHG is the global atmosphere. The greenhouse effect is enhanced by GHG emissions of anthropogenic nature. Minor emissions of GHG will be emitted as a result of the Project, and not likely to significantly change atmospheric GHG concentrations. Receptor sensitivity is rated as Low .			
Impact Significance	Negligible	Minor	Moderate	Major
	The combination of a Low resource sensitivity and Negligible impact magnitude will result in an overall Negligible potential impact.			

Impacts Assessment for Construction Phase

The impact of the Project's impact on climate change during construction phase could be assessed in accordance to the amount of impact during the construction period, as provided in **Table 8.86**.

Table 8.86: Impact Assessment for Project's Impact on Climate Change during Construction

Significance of Impacts				
Impacts	Potential impacts on climatic condition due to GHG emissions.			
Impact Nature	Negative	Positive	Neutral	
	Potential impacts to climate would be considered to be adverse (negative).			
Impact Type	Direct	Indirect	Induced	
	Potential impacts would likely be direct impacts through the release of emissions from fuel combustion (stationary and mobile combustion).			
Impact Duration	Temporary	Short-term	Long-term	
	Many of the major GHGs can remain in the atmosphere for tens to hundreds of years after being released.			
Impact Extent	Local			
	GHGs are a global emission and may affect the global climate.			
Impact Scale	The emissions from the Project are calculated to be 2,391.55 tCO ₂ eq per year during construction, compared to Lao PDR's GHG release of 24,099,000 tCO ₂ eq in 2014, the total GHG releases from the Project are insignificant (approximately 0.01%).			
Impact Magnitude	Positive	Negligible	Small	

Significance of Impacts

	Minor emissions of GHG will be emitted as a result of the Project construction, and considered insignificant emissions according to applicable international standards. Magnitude is considered Negligible .			
Sensitive Receptor	Low	Medium	High	
	The direct receptor to GHG is the global atmosphere. The greenhouse effect is enhanced by GHG emissions of anthropogenic nature. Minor emissions of GHG will be emitted as a result of the Project, and not likely to significantly change atmospheric GHG concentrations. Receptor sensitivity is rated as Low .			
Impact Significance	Negligible	Minor	Moderate	Major
	The combination of a Low resource sensitivity and Negligible impact magnitude will result in an overall Negligible potential impact.			

Impacts Assessment for Operation Phase

The impact of the Project's impact on climate change during operation phase could be assessed in accordance with the amount of impact during the operation period, as provided in **Table 8.87**.

Table 8.87: Impact Assessment for Project's Impact on Climate Change during Operation

Significance of Impacts				
Impacts	Potential impacts on climatic condition due to GHG emissions.			
Impact Nature	Negative	Positive	Neutral	
	Potential impacts to climate would be considered to be adverse (negative).			
Impact Type	Direct	Indirect	Induced	
	Potential impacts would likely be direct impacts through the release of emissions from fuel combustion (stationary and mobile combustion).			
Impact Duration	Temporary	Short-term	Long-term	Permanent
	Many of the major GHGs can remain in the atmosphere for tens to hundreds of years after being released.			
Impact Extent	Local	Regional	International	
	GHGs are a global emission and may affect the global climate.			
Impact Scale	The emissions from the Project are calculated to be 234.27 tCO ₂ eq per year during operation, compared to Lao PDR's GHG release of 24,099,000 tCO ₂ eq in 2014, the total GHG releases from the Project are insignificant (approximately 0.001%).			

Significance of Impacts

Impact Magnitude	Positive	Negligible	Small	Medium	Large
	Minor emissions of GHG will be emitted as a result of the Project construction, and considered insignificant emissions according to applicable international standards. Magnitude is considered Negligible .				
Sensitive Receptor	Low		Medium	High	
	The direct receptor to GHG is the global atmosphere. The greenhouse effect is enhanced by GHG emissions of anthropogenic nature. Minor emissions of GHG will be emitted as a result of the Project, and not likely to significantly change atmospheric GHG concentrations. Receptor sensitivity is rated as Low .				
Impact Significance	Negligible		Minor	Moderate	Major
	The combination of a Low resource sensitivity and Negligible impact magnitude will result in an overall Negligible potential impact.				

Assessment of Avoided Emission

Total avoided GHG emission of the Project throughout its life-cycle is **34,244,955.80 tCO₂eq** as shown in **Table 8.88**. This is a significant amount of avoided emissions signifying the benefit of low carbon electricity production through wind farms, however as mentioned above, the avoided emissions are used only to compare emissions between typical grid electricity production and the electricity production from the Project, and do not signify any actual GHG reduction.

Table 8.88: Estimation of Avoided GHG Emission

Scenario	Source of Emission	Years	CO ₂ eq emission (tCO ₂ e)	Rationale
GHG Emissions in baseline scenario in the absence of the Project	Electricity generation from the national grid	25	34,314,967.50	Without the wind farm, the grid will need to generate 1,707 GWh/year or 1,707,000 MWh/year. Emission factor for the Viet Nam grid is 0.8041 (tCO ₂ /MWh) (combined margin, 2020). ¹⁴⁷ Therefore, total emission of 1,707,000 (MWh) x 0.8041 (tCO ₂ /MWh) x 25 (years) would have been emitted by the electricity generation by the grid. ¹⁴⁸

¹⁴⁷ Department of Climate Change - Ministry of Natural Resources and Environment 2020.

¹⁴⁸ Based on assumption that the majority of emission is from operation phase

Scenario	Source of Emission	Years	CO ₂ eq emission (tCO ₂ e)	Rationale
GHG Emission in the Project scenario	Pre-construction	NA	56,980.00	Section 8.6.1
	Construction	3	7,174.65	Section 8.6.1
	Operation	25	5,857.00	Section 8.6.1
	Electricity generation	25	0	Wind farm is renewable energy, thus electricity production process does not emit GHGs
Avoided Emission		28	34,244,955.80 (1,223,034.14 tCO ₂ eq/year)	(GHG emission from national grid) – (GHG emission from the Project (wind farm)) over an assessment period of 28 years (pre-construction, construction and operation phases of the Project)

Result Comparison to GHG Emissions in Lao PDR

According to the draft of the First Biennial Update Report (2020)¹⁴⁹, the GHG inventories showed that the net national emissions was 24,099.98 GgCO₂eq (24,099,000 tCO₂eq) in the inventory year, 2014. Agriculture, Forestry and Other Land Use (AFOLU), especially forest remaining forest, cropland remaining cropland and lands converted to forest had a capacity to remove equivalent to about 13,000 GgCO₂eq/year (13,000,000 tCO₂eq/year). AFOLU sector had net emissions of 18,793.41 GgCO₂eq/year (18,793,410 tCO₂eq/year), which was the largest source of emissions, accounting for about 78% of the total country's GHG emissions. Second largest source of emissions was the Energy Sector, which emitted 3,729.42 GgCO₂eq/year (3,729,420 tCO₂eq/year) (15% of the country's emissions). Other IPCC sectors, industrial processes and product use (IPPU) and Waste accounted for 5% and 2% of the national emissions, respectively.

The evidence presented in this chapter indicated that the **annual GHG emission of 2,500.42 tCO₂eq** from the Project (refer to **Table 8.81**) are expected to account for approximately 0.010% of the total GHG emission produced by Lao PDR annually, and approximately 0.067% of the GHG emissions produced by the Energy Sector annually. Therefore, the Project's contribution to national and Energy Sector emission is considered **negligible**.

Moreover, the Project's contribution to **avoided GHG emission of 1,223,034.14 tCO₂eq annually** (**Table 8.88**) would be 32.79% compared to the Energy sector's contribution to GHG emissions, and 5.08% compared to the net annual country emissions. Therefore, it can be concluded that **the Project will contribute to the country's GHG emission mitigation efforts**.

¹⁴⁹ Ministry of Natural Resources and Environment (MONRE), Global environment Facility (GEF) and United Nations Environment Programme (UNEP). 2020. Draft of First Biennial Update Report. Retrieved from: https://unfccc.int/sites/default/files/resource/867493251_Lao%20Peoples%20Republic-BUR1-1-Draft%20Biennial%20Update%20Report-BUR_Lao%20PDR_24July2020.pdf