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SECOND DRAFT ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) REPORT FOR THE DEVELOPMENT OF 150MW SOLAR PHOTOVOLTAIC POWER PLANT WITH BATTERY ENERGY STORAGE SYSTEM IN ANSA KDAM VILLAGE, SNA ANSA COMMUNE, KRAKOR DISTRICT, PURSAT PROVINCE, CAMBODIA

Project Owner:

SCHNEITEC BEYON CO., LTD.

Address: building#36, 1st Floor, Room#3, Street 352, Sangkat Beoung Kengkang 1, Khan Beoung Keng Kang, Phnom Penh

Consulting Firm:

E&A CONSULTANT CO., LTD.

Address: #69, Street 111, Sangkat Boeung Prolet, Khan 7 Makara, Phnom Penh, Cambodia
Tel: (+855) 23 212 124
Email: info@e-aconsultant.com

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LIST OF ABBREVIATIONS

Abbreviations		Full Word
AC	:	Alternating Current
BESS	:	Battery Energy Storage System
BOO	:	Build Own Operate
CBA	:	Cost and Benefit Analysis
CMAA	:	Cambodian Mine Action and Victim Assistance Authority
DC	:	Direct Current
DK-CFR	:	Damnak Kranh Community Fish Refuge
EDC		Electricite Du Cambodge
EPC	:	Engineering, Procurement, and Construction
ESS	:	Energy Storage System
ESH	:	Environmental Health and Safety
ESMP	:	Environmental and Social Management Plan
ESMS	:	Environmental and Social Management System
ERC	:	Electricity Authority of Cambodia
ERWs	:	Explosive Remnants of War
EPC	:	Energy Performance Certificate
EMP	:	Environmental Management Plan
ESIA	:	Environmental and Social Impact Assessment
FGD	:	Focus Group Discussion
GWh	:	Gigawatt hours
GPS	:	Global Positioning System
GIS	:	Geographic Information System
GHGs	:	Greenhouse Gases
GDP	:	Gross Domestic Product
GRM	:	Grievance Redress Mechanism
IFC	:	International Finance Corporation
ILO	:	International Labour Organization
IUCN	:	International Union for Conservation of Nature
IRR	:	Internal Rate of Return
JICA	:	Japan International Cooperation Agency

kWh	:	Kilowatt-hour
kVA	:	kilovolt-amps
kV	:	Kilovolt
mg/l	:	Milligram per litre
MME	:	Ministry of Mines and Energy
MoAFF	:	Ministry of Agriculture, Forestry, and Fisheries
MoLMUPC	:	Ministry of Land Management, Urban Planning, and Construction
MoLVT	:	Ministry of Labour and Vocational Training
MoWRAM	:	Ministry of Water Resource and Meteorology
MW	:	Megawatt
MoE	:	Ministry of Environment
NTS	:	Non-Technical Summary
NPV	:	Net Present Value
NSSF	:	National Social Security Fund
OESMP	:	Operational Environmental and Social Management Plan
PCS	:	Power Conversion System
PS		Performance Standard
PPA	:	Power Purchas Agreement
PPE	:	Personal Protect Equipment
PV	:	Present Value
RGC	:	Royal Government of Cambodia
SEP		Stakeholder Engagement Plan
UXO	:	Unexploded Ordnance
TWh	:	Terawatt-hour
WHO	:	World Health Organization

DOCUMENT HISTORY

Version	Writers	Review and approved by:	Date
ESIA (Draft 1)	Mr. Hay Samchan; Dr. Ou Ratanak; Mr. Thean Sengcheng; Mr. Phal Huymeng; Mr. Chhim Lychhean	Dr. Ham Kimkong	November 08, 2024
ESIA (Draft 2)	Mr. Hay Samchan; Dr. Ou Ratanak; Mr. Thean Sengcheng; Mr. Phal Huymeng; Mr. Chhim Lychhean	Dr. Ham Kimkong	December 27, 2024

NON-TECHNICAL SUMMARY

1. Introduction

Cambodia has experienced rapid economic growth in recent decades, leading to a significant increase in electricity demand. The country has relied on a mix of hydropower, coal, imported electricity, and other sources to meet this demand. However, electricity shortages and price fluctuations remain a challenge, hindering economic development. Recognizing the potential of solar energy, the Cambodian government has prioritized its development as a renewable energy source.

In line with the government strategy as stated above, SchneiTec Beyond invested in a 150 MW Solar PV Power Plant Project in Ansa Kdam Village, Sna Ansa Commune, Krakor District, Pursat Province, Cambodia. The plant is designed as a Build-Own-Operate (BOO) project, with SchneiTec Beyond responsible for its construction, ownership, and operation. This project is a significant step to increase electricity supply, contribute to economic growth, and improve energy access for citizens. The project was integrate with a 30 MWh battery storage system that will enhance grid reliability by storing excess energy generated during periods of high sunlight and releasing it during periods of peak demand or low solar generation.

To ensure environmental and social sustainability, the project is undergoing a comprehensive Environmental and Social Impact Assessment (ESIA). The ESIA aims to identify potential impacts, propose mitigation measures, and develop an Environmental and Social Management Plan (ESMP) to guide responsible project implementation. For the purpose of compliance with the Sub-decree No. 72 on Environmental Impact Assessment (EIA) Process, SchneiTec Beyond has submitted the EIA report to Cambodia's Ministry of Environment (MoE) and awaits approval from MoE.

2. Information about the Project

The 150 MW Solar PV Power Plant Project locates in Ansa Kdam and Khla Krapeu villages, Sna Ansa and Anlung Tnaut communes, Krakor District, Pursat Province, Cambodia. The project site covers 168 hectares and was chosen due to its proximity to EDC's planned infrastructure development, including a newly built substation and an existing 115kV transmission line.

This project will supply electricity to the Electricity Distribution of Cambodia (EDC) for 20 years under a Power Purchase Agreement (PPA). The project is expected to produce approximately 325 GWh of energy in the first year, with a 1% annual degradation rate.

Key project components include Solar PV area, Office, Battery storage area (BESS), Inverter, Internal roads, Drainage system, Transformer, 22kV transmission line connecting to the EDC substation. In addition, the project also utilizes existing 8 km, 6-meter-wide asphalt road constructed in 2020, shared with other villages.

The project needs a total land area of 168 hectares. This area was divided into two areas separated by local roads. This 168 hectare land was rented on September 26, 2023 from SchneiTec who is the land owner since September 2020.

During the construction phase, the project needs a total of 419 personnel (414 local staff and 5 international staff). The human resources needed during this phase encompass a range of expertise, including: Project managers, Engineers, Technicians, Consultants, Office staff, Skilled and unskilled laborers. Once the project moves into operation phase, the human resource requirement decreases to 87 local staff, with no international staff necessary.

During operation phase, this solar power plant is designed to be self-sufficient, using the generated solar energy to power its own operations. The daily energy consumption is estimated at 100 kWh, mainly used for powering the control room and essential equipment across the project site. As for water consumption, the primary usage during the operation phase is for cleaning the PV panels. It is estimated at 990 m3 per cleaning session, conducted up to three times per year during the dry season using groundwater from a well within the project boundary.

The project was also equipped with the waste management both during construction and operation phases. Construction activities generate various waste types, including concrete, metal, wood, plastic, packaging materials, and hazardous waste such as paints and oils. During construction phase, the project prioritizes waste separation, recycling, and responsible disposal. Recyclable materials are sent to recycling facilities, while non-recyclable and hazardous waste is disposed of in collaboration with the Pursat Department of Environmental and licensed waste collection agencies. In addition, a designated temporary waste storage area within the project boundary is used for waste segregation and storage.

In operation phase, there will be three main types of waste: sewage, domestic solid waste, and hazardous waste and broken solar PV panels. The project will make septic tank system with a soak-away method manages sewage from the 87 on-site staff. This system ensures wastewater is treated and absorbed into the ground, minimizing environmental impact. Domestic solid waste was estimated at 43 kg daily, and the project employs an in-house waste management system. Waste is segregated into organic, recyclable, and non-recyclable categories using labelled bins strategically placed throughout the site. The collected waste is temporarily stored in a designated area before being collected every two days by a waste collector in Krakor district.

A part from the waste above, hazardous waste and broken solar PV will be also taken care of. Potential hazardous waste includes used lubricants, oils, spent batteries, broken PV modules, and e-waste. These wastes are carefully managed and stored in secure, designated areas on- site, using leak-proof containers to prevent contamination. The project will collaborates with a Ministry of Environment-authorized hazardous waste collection agency for proper disposal and will obtain the necessary permits. In addition, the management of broken PV modules is a challenge as Cambodia lacks specific guidelines for their disposal. Until new regulations are available, damaged modules are safely stored on-site.

This 150 MW Solar PV Power Plant Project also have proactive approach to risk management, particularly focusing on potential natural disasters. The primary concern identified is the risk of lightning strikes due to the project's location. To mitigate this, the project plans to install lightning protection systems at eight strategic points: Near each transformer and control building.

The project stages and activities were planed as follow:

- Construction: Started in April 2024 and expected to be completed in 10 months
- Commercial Operation Date (COD): March 31, 2025
- Operation and Maintenance: SchneiTec Beyond, in cooperation with ScheiTec, will oversee maintenance to optimize energy yield and the system's lifespan
- Decommissioning: At the end of its useful life, the site will be rehabilitated, materials recycled or reused, and the land restored to its original state

3. Standards and Regulatory Framework and Their Applicability for this Project

An overview of the applicable standards and regulatory frameworks for a 150 MW solar power plant project being developed by SchneiTec Beyond in Pursat Province, Cambodia was mentioned in the ESIA. The legal and regulatory framework govern the project and cover both national and international requirements. Based on the IFC Performance Standards as reference framework, the project is currently classified as Category

B. This classification highlights potential limited adverse environmental and social risks that can be effectively addressed through appropriate mitigation measures. Depending on lenders Environment and Social Policy requirements and continued assessment of the Project, the Environmental and Social risk categorization and standards applicability will be updated

The preparation of draft ESIA reports for this project comply with the requirements of the international reference framework as follow:

- IFC Sustainability Framework as reference framework
- World Bank's EHS Guideline (2007) by focusing on ambient noise management, and wastewater and ambient water quality
- International Finance Corporation's Guidance Notes: Performance Standards on Environmental and Social Sustainability (2012)
- IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007)

The following are the applicability of IFC Performance Standards for this project.

No.	PS	Explanation	Applicability to this project
1	**Performance Standard 1**: Assessment and Management of Environmental and Social Risks and Impacts	PS1 seeks to evaluate SchneiTech Beyond's current social and environmental management systems and pinpoint any gaps in their operation, presence, and application of an environmental and social management plan (ESMP), a EHS policy, an organizational chart with roles and responsibilities clearly defined, risk identification and management protocols, and procedures such as grievance management and stakeholder engagement.	Yes
2	**Performance Standard 2**: Labor and Working Conditions	PS2 acknowledges that safeguarding workers' fundamental rights should go hand in hand with efforts to increase economic growth through the creation of jobs and revenue. Human resource management and policy, workers' organization, equal opportunity and nondiscrimination, layoffs, workforce protection, and occupational health and safety are among the topics covered in PS2.	Yes
3	**Performance Standard 3**: Resource Efficiency and Pollution Prevention	PS3 discusses the use of materials and resources as inputs and wastes that may have an impact on human health. The standards aims to prevent or minimize negative effects on human health and the environment by reducing or avoiding pollution from project activities; encourage more sustainable use of resources, such as water and energy; and lower greenhouse gas emissions associated with the project. Wastes, hazardous materials, emergency planning and response, greenhouse emissions, pollution prevention, resource conservation and energy efficiency, and pesticide usage and	Yes

		management are some of the major topics addressed under this PS3.	
4	**Performance Standard 4**: Community Health, Safety, and Security	This PS4 requires reasonable precautions to foresee and prevent unfavorable effects on the impacted community's health and safety during the project's duration from both normal and non-routine situations. The protection of people and property must also be done in a way that avoids or reduces risks to the impacted communities and in compliance with applicable human rights norms. This standard is applicable to the project because it requires the implementation of measures to protect the health and safety of nearby communities during construction, operation, and decommission phases.	Yes
5	**Performance Standard 5**: Land Acquisition and Involuntary Resettlement	PS5 aims to ensure that project-related land acquisition and restrictions on land use do not negatively impact the livelihoods of affected communities and individuals. The ultimate goal of PS5 is to avoid involuntary resettlement whenever possible, and when it's unavoidable, to minimize its impact and support affected persons in restoring or improving their livelihoods. This project involved in land acquisition, but SchneiTec Beyond rents the 168 ha of land for this project from SchneiTec on September 26, 2023. As stated in this report, SchneiTec (the renter) has legally owned the land since 2020. The land was acquired on willing buyer and willing seller basis before and the transaction was done before this project and this land acquisition was not intended for building this project.	No
6	**Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources	PS6 applies to projects that (i) are situated in natural, modified, and critical habitats; (ii) have the potential to affect or rely on ecosystem services that the client has direct management control over or a significant influence over; or (iii) involve the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry). PS6 recognizes the crucial role that biodiversity, ecosystem services, and the sustainable management of living natural resources play in promoting sustainable development. The goal of PS6 is to ensure that projects avoid or minimize negative impacts on biodiversity and ecosystem services and	No (To be further assessed)

		promote sustainable practices in the management of living natural resources. PS 6 is currently not applied for the project: ▪ This project is not in or will not lead to adverse impact on any Protected Areas; ▪ Impact on Damnak Kranh Fish Refuge Reservoir, since the reservoir is located 300 meters downstream from a small portion of the project site (Area 2). But, the reservoir has already been significantly modified by human activities (e.g., introduction of non-native fish species), suggesting its natural state has already been altered. ▪ The project may indirectly benefit the reservoir by increasing electricity supply and lighting, which could attract insects and improve fish food sources.	
7	**Performance Standard 7**: Indigenous Peoples	PS7 focuses on safeguarding the rights and interests of Indigenous Peoples in the context of development projects. The goal of PS7 is to foster a respectful and equitable relationship between project proponents and Affected Communities of Indigenous Peoples, ensuring that development does not come at the expense of their cultural, social, and economic well-being. The proposed location for the project and the surrounding area do not have indigenous people.	No
8	**Performance Standard 8**: Cultural Heritage	PS8 focuses on the protection and preservation of cultural heritage in the context of development projects. the goal of PS8, is to ensure that project activities do not adversely impact cultural heritage and, where appropriate, promote its preservation and equitable use. The proposed project site is not located in any report or known sensitive cultural heritage area.	No

The following is a breakdown of the rationale for the Category B classification:

- Land Acquisition and Displacement: The project does not involve any displacement of people or communities. SchneiTec Beyond is renting the land for the project from SchneiTec, which has legally owned the land since 2020. The land was acquired through willing buyer-willing seller transactions before this project was initiated.

- Ecological Impacts: The project is not situated in a protected area or any location with known significant biodiversity. While some habitat modification is expected within the project site, the overall impact on the environment is assessed during continued assessment of the Project. .
- Water Resource Use: The project will rely on groundwater for construction and operation, potentially impacting local water resources. However, the impact is considered low and can be managed through water-saving measures and careful monitoring.
- Topographical Change and Erosion: Construction will involve clearing vegetation and land leveling, potentially increasing erosion risk. However, with proper erosion control measures, this impact is expected to be limited.
- Hydrological Change: This project, along with other projects in the vicinity, could alter hydrological flows in the area. This impact is considered medium and will require flood monitoring and potential improvements to existing irrigation systems.
- Waste Management: Construction will generate some hazardous waste, requiring proper management to prevent soil and water contamination. The impact is considered low due to available waste management protocols and regulations.
- Air Quality Impacts: Construction activities will cause dust and emissions from vehicles. However, due to the project's location and the temporary nature of construction, the impact on air quality is assessed as low.
- Noise Impacts: Noise from construction and operation (mainly from vehicles and machinery) is not expected to significantly affect nearby communities because of the distance between the project site and residential areas.

4. Baseline Condition

4.1. Physical Baseline

The following are the baseline of physical resources in the AoI.

- General Geography: Pursat Province is the fourth largest province in Cambodia, located approximately 130 km north of Phnom Penh. It features diverse landscapes, including plains near the Tonle Sap Basin, the Krovanh (Cardamom) Mountains, and the 1,813m high Phnom Aural. The project is situated in Krakor, one of Pursat distrcts, about 25 km east of Pursat city. The district is known for its scenic beauty and biodiversity.
- Geology: The project area is located within the Quaternary geological period. The site's geology primarily comprises two types of rocks: Deltaic deposits and Pediments.
- Soil: Two main soil types are present within the study area: Red Yellow Podzols (84.54%), characterized by low fertility, low pH, low clay content, low nutrient content, and susceptibility to compaction; and Cultural Hydromorphic (15.46%) which is found in agricultural areas with a history of cultivation, such as rice paddies. The project site is situated entirely on Red Yellow Podzols. Soil quality analysis revealed low fertility and acidity, consistent with the characteristics of Red Yellow Podzols. This is reflected in low rice yields and limited productivity of mango plantations.
- Elevation and Slope: The project site's elevation is approximately 20 meters above sea level. The highest altitude within the study area reaches 70 meters in the mountainous southern region. In general, the project area is classified as "almost flat," with a slope of 0-3 degrees. This indicates a relatively level landscape. The broader study area exhibits a range of slopes, from almost flat to high slopes (10-30 degrees).
- Climate: Cambodia's climate is dominated by a dry season (November to April) and a rainy season (May to October). Temperatures typically range between 25°C and 35°C. Pursat Province experiences a similar tropical monsoon climate with unique features. The average annual temperature is around 27.5°C. Rainfall patterns in Pursat follow a

distinct dry season (November to April) and a rainy season (May to October). While extreme rainfall is more common in coastal areas, Pursat is experiencing a trend of increased consecutive dry days, indicating a higher risk of drought.

- Air Quality: Air quality analysis conducted near the project site showed that most parameters met Cambodian standards and WHO guidelines, except for sulphur dioxide (SO2), which exceeded the WHO standard.
- Noise: Noise levels measured at the project site generally complied with Cambodian standards but were slightly higher than IFC guidelines.
- Vibration: Vibration levels measured at the project site were found to be within the permissible limits set by the Cambodian Ministry of Environment.
- Hydrology: The project area is situated within a small catchment that feeds into the Tonle Sap Lake. Several canals and the Damnak Kranh Reservoir are key hydrological features. Water flow in the canals is seasonal, primarily during the rainy season, and is not used for domestic consumption or significant agriculture. The Damnak Kranh Reservoir, a community-managed fish refuge, serves as an importanthabitat for fish, supports local fishing activities, and plays a role in irrigation. It has a water control mechanism to release water and fish downstream when needed. It is worth noting that ScheiTec used to prepare flood risk assessment for an adjacent 90 MW solar project and the study concluded that the site is safe from riverine flooding but could be susceptible to fluvial flooding from localized rainfall. However, additional hydrological studies are planned to assess the cumulative impact of current and future solar projects on the local hydrological system, including potential flood risks.
- Surface Water Quality: Surface water quality analysis showed that most parameters met Cambodian standards for public water bodies designated for biodiversity conservation. Exceptions included elevated levels of Total Suspended Solids (TSS) in one sample, Biochemical Oxygen Demand (BOD) in two samples, Total Nitrogen (TN) in all three samples, and the presence of total coliform in all samples.
- Earthquake: Cambodia has no history of significant earthquakes, and the project area is located in a zone with low seismic risk.

4.2. Biological Baseline

The following are the baseline of biological resources in the BAoI.

- A total of 180 flora and fauna species were recorded within the 3 km assessment area, including 55 plant species, 11 mammal species, 52 bird species, 10 amphibian species, 23 reptile species, and 29 fish species. No vulnerable or endangered species were found within the project site, and their habitats are located far from the project area, minimizing the potential for direct impacts.
- Flora: No trees were found within the project site. The recorded flora species are primarily located in a riverine forest along natural canals about 1.5 km southwest of the project site. 55 timber species were recorded, including two endangered species, two vulnerable species, and four near-threatened species according to the IUCN Red List.
- Mammals: Eleven mammal species were recorded, all classified as least concern by the IUCN Red List. No endangered species were found the reported mammals are mainly found in Phum Krang Thom community forestry, located about 5 km north of the project and outside the 3 km assessment area. This area is considered the primary mammal habitat in the region. Due to significant habitat degradation and fragmentation, connectivity between the project site and Phum Krang Thom Community Forestry is limited. Human activities such as agriculture, infrastructure development, and urbanization have created a fragmented landscape, impeding wildlife movement.

- Birds: 52 bird species (50 forest birds and 16 waterbirds) were recorded. One endangered species, the green peafowl, was reported, primarily in the mango plantation around 2.5 km south of the project site. The plantation likely serves as a feeding site rather than a habitat. However, no evidence of a green peafowl habitat or flocks was found within the assessment area. Given the lack of connectivity to known habitats and the prevalence of human activities near the project site, it is unlikely that the reported green peafowl is connected to the populations in the Aural Protected Area. It is worth noting that Damnak Kranh Reservoir is the most suitable bird habitat in the survey area, followed by the Sna Ansa community forestry.
- Fish: 29 fish species were recorded, with one near-threatened species (Ompok bimaculatus) and one vulnerable species (Wallago attu) according to the IUCN Red List. Damnak Kranh Reservoir serves as the primary conservation area for fish species. The presence of Wallago attu in the reservoir should be interpreted cautiously as it was introduced to enhance fish stocks.
- Reptiles and Amphibians: 10 amphibian species and 23 reptile species were recorded, primarily inhabiting modified environments such as rice fields, ponds, canals, and the Damnak Kranh Reservoir, but, none of the recorded species are listed as threatened or endemic. The study area is a modified and degraded environment, and reports of species like the Indochinese spitting cobra, Monocellate cobra, and Burmese python could not be interpreted as indicating critical habitat within the area of influence.

4.3. Socioeconomic baseline

The following are the baseline of socioeconomic resources in the BAoI.

- Demography: The total population in the study area is 4,167 people across 1,139 households, with an average household size of 3.65 people. This is slightly lower than the national average. The population comprises Khmer people, with no ethnic minorities or Indigenous Peoples reported. Female-headed households represent 16% of the total. People with disabilities make up 0.52% of the population, and 1.6% are elderly.
- Housing and Settlement: Housing types vary, with 32% zinc roof houses, 7% houses with less than 20 galvanized fibrous cement sheets, 34% tiled roof houses, and 27% non-concrete houses. Most households are located along Road 58B and National Road 5, with approximately 14 households residing within 500 meters of the project site.
- Occupation and Income: Farming is the primary occupation for 55% of the population, followed by workers (15%), service sector employees (13%), company employees (7%), sellers (4%), civil servants (3%), and fishers (3%). Secondary occupations are common, with 43% engaged in farming, 25% in the service sector, 14% in fishing, 7% as laborers, 5% as sellers, 4% in company employment, and 2% in livestock rearing. The average annual household income is 21,400,000 Riels (approximately USD 5,350). This translates to an average per capita income of 5,350,000 Riels per year (about USD 1,337.50) or 14,861 Riels (about USD 3.72) per day. The per capita income exceeds the 2021 national poverty line of 8,908 Riels per day, indicating that the population generally lives above the poverty threshold.
- Water Consumption: There is no formal water supply network or private water supply systems in the study area. 56% of the population relies on tube wells, 34% purchase 20-liter containers of purified water, 7% harvest rainwater, and 3% use canal water. Most wells are located along National Road 5 (approximately 5 km from the project) and Road 53B (at least 1.5 km from the project), with a depth of 5-8 meters. It is worth nothing that thirteen households reside within 500 meters of the project boundaries.

- Energy Consumption: 98% of households have access to the national electricity grid. The remaining 2% rely on solar power and batteries. Firewood/charcoal is the primary cooking fuel for 65% of households, while 35% use gas.
- Road Infrastructure: Key roads in the area include National Road 5, Road 53B, and the project's access road, all of which are asphalt. Local laterite roads connect villages to each others. The project is not expected to impact existing road infrastructure.
- Public Health: The nearest health center is Sna Ansa Health Center, located approximately 6 km north of the project. Krakor District Referral Hospital is 9 km away, and Pursat Provincial Referral Hospital is 27 km away. Common health issues include colds, arthritis, typhoid fever, diarrhea, dengue fever, diabetes, gynecological problems, lung diseases, hepatitis, and high blood pressure. As their way of life, residents seek medical care at private clinics, pharmacies, health centers, or referral hospitals depending on their financial capacity and the severity of their condition.
- Education: One community kindergarten and two primary schools are located within the 3 km study area. These schools are not situated along the project's access road, minimizing potential construction-related impacts. Statistically, 37.8% of the population has completed primary education, 22.5% lower secondary education, 13.3% upper secondary education, and 7% university-level education. The literacy rate is generally high, with 17% literate and only 2.4% illiterate.
- Tourism: The Domnak Kranh Fish Community Refuge, established in 2017, serves as a local tourist attraction. It features a suspension bridge, small huts, and public benches. Visitor numbers vary, with 40-50 on weekdays, 100-150 on weekends, and up to 2,000 during national holidays.
- Cultural and Archaeological Sites: Buddhism is the predominant religion. Two Buddhist pagodas and two spirit houses are located within the 3 km radius. The project does not impact these sites.
- Mines/ERW: Krakor District, where the project is situated, has been declared an anti-personnel mine-free zone.

5. Result of stakeholder engagement and grievance mechanism

The stakeholder consultation process for the 150 MW solar power plant project in Pursat Province, Cambodia involved a variety of individuals and groups to gather feedback and address potential concerns. The consultations took place during different stages of the project, including the data collection phase and after the draft Environmental and Social Impact Assessment (ESIA) report was finalized. Here's a summary of the key stakeholders consulted, their concerns, and their requests or recommendations:

Local Authorities and Residents:

Sna Ansa Commune Chief, three village chiefs (Anso Kdam, Sna Ansa, Veal Vong), and residents from Anskdam, Sna Ansa, Veal Vong, and Saravan villages were generally supportive of the project and welcomed the job opportunities it presented. The followings are their concerns and requests:

Local authorities and residents in the Sna Ansa and Anlung Tnaut communes largely supported the project due to the job opportunities and potential for reduced migration. However, they also voiced concerns, primarily focused on infrastructure needs and access to essential services. Concerns expressed by local stakeholders are as follow:

Concern	Request
• Lack of access to clean water in certain villages.	• Prioritizing the hiring and training of local people.

• The need for improved road infrastructure. • Potential for flooding in Khla Krapeu village, possibly exacerbated by the construction of solar power projects. • The old and damage condition of Khla Krapeu Primary School.	• Investing in local infrastructure development, including roads, schools, a bridge in Sna Ansa village, and improved drainage systems in Khla Krapeu village. • Providing dustbins and solar panels in key locations such as schools and health centers. • Restoring the irrigation system. • Contribute to repaire Khla Krapeu Primary School.

Pursat Provincial Department:

Consultations with relevant provincial departments generally indicated support for the project and its contribution to the development of clean energy and job creation in the region. However, some departments raised specific concerns and offered recommendations:

- The Department of Water Resources and Meteorology expressed concern about potential impacts on the waterway system and the flow of water for irrigation downstream. They recommended that the project maintain existing waterways or develop a drainage system to ensure adequate water flow.
- The Department of Tourism raised concerns about the potential for improper waste management to negatively impact tourism, specifically at the nearby Damnak Kranh Reservoir tourist area. They suggested that the project prioritize proper waste disposal training for staff and workers and maintain strong communication with the Department of Tourism to address any tourism-related issues.
- The Department of Culture and Fine Arts, while supportive of the project, advised that there was a possibility of unearthing artifacts during the construction process. They requested that the project owner immediately notify the department of any discovered artifacts.

Grievance Mechanism

Grievance Redress Mechanism for this project was created to ensure that grievances are effectively received, evaluated, and resolved, fostering trust between the project developers and the local community. In line with this, Liaison Officer (LO) was assigned to handle all community grievances throughout the project's duration. In addition to the GRM for external stakeholders, a separate workers' grievance mechanism will be established for employees of SchneiTec Beyond and its contractors. This mechanism ensures confidentiality, allowing workers to raise concerns through:

6. Impact and mitigation measures

6.1. Impact and mitigation measures for construction phase

- Change of Topography and Erosion: Construction activities, including site clearing, grading, foundation installation, and drainage works, will directly impact the topography of the 168-hectare project area. The impact on topography will be permanent, changing the land use from agricultural to solar power generation. The proposed mitigation measures are as flow:
  - Restrict construction activities within the designated project area.
  - Restore any temporarily used property to its original state after construction.

- Clear only necessary areas for construction and preserve the original topography where possible.
- Air Quality: Air quality is expected to be affected by odor, fugitive dust, and exhaust emissions from various construction activities, material transportation, machinery operation, and waste management. Dust dispersion during construction may increase total suspended particulates (TSP) and fine particulate matter, potentially impacting human and animal health. The proposed mitigation measures are as flow:
  - Water spraying during site clearing and road construction within the project boundary.
  - Speed limits for vehicles on-site and public roads.
  - Covering trucks transporting materials to prevent dust.
  - Proper management of sand and debris piles to minimize dust.
  - Regular vehicle maintenance to control smoke emissions.
  - Appropriate waste management practices to prevent odor.
- Increase of Noise and Vibration Level: Construction activities, including site preparation, excavation, and transportation, will generate noise and vibration. The primary noise sources are construction machinery and PV installation, potentially disturbing nearby communities and wildlife. The proposed mitigation measures are as flow:
  - Limiting noise levels to less than 70 dB(A) and vibration levels to less than 65 dB(A) during work hours.
  - Switching off machinery during non-work periods.
  - Maintaining machinery to minimize noise generation.
  - Discouraging loud engine braking and excessive horn usage.
- Change of Hydrological System: The project's construction activities, including vegetation clearance, site grading, and road construction, may alter the hydrological system, particularly the existing natural canals. The proposed mitigation measures are as flow:
  - Preserving original topography where possible.
  - Collaborating with local authorities and relevant departments to monitor flood conditions and conduct additional hydrological assessments.
  - Maintaining culverts and Boas Rolok laterite road in cooperation with local authorities.
  - Designing the grading and drainage system to prevent ponding under PV panels.
  - Conducting a cumulative impact study on the hydrological system, incorporating existing and future solar power plant projects, to identify appropriate mitigation measures.
- Impact on Surface Water: Construction activities may negatively impact surface water quality through uncontrolled runoff, accidental spills of fuel or lubricants, and improper waste disposal. Erosion and sedimentation resulting from land preparation can increase total suspended solids and turbidity in downstream water bodies, potentially harming aquatic biodiversity. The proposed mitigation measures are as flow:

- Installing fencing and vegetation buffering to prevent soil erosion.
- Expediting land clearing and implementing runoff mitigation measures.
- Minimizing land clearing and preserving existing vegetation cover where possible.
- Properly managing engine oil residue to prevent spills.
- Storing solid waste in designated containers and ensuring regular collection and disposal.
- Storing liquid waste in appropriate containers and selling it off-site.
- Disposing of hazardous waste with permits from the Ministry of Environment (MoE).
- Setting up latrines with septic tanks for sewage treatment.
- Implementing measures to reduce sediment runoff in areas upstream of the Damnak Kranh Reservoir.

▪ Soil Quality: Construction activities can impact soil quality through compaction, erosion, and contamination from spills of construction materials or improper waste disposal. Heavy machinery used in site preparation and installation can compact the soil, reducing its ability to absorb water and nutrients. Clearing vegetation increases the risk of erosion, leading to topsoil loss and nutrient depletion. The proposed mitigation measures are as flow:

- Minimize soil disturbance and compaction outside designated areas.
- Establish designated access roads and limit vehicle traffic.
- Implement erosion control measures using vegetative buffers and revegetate disturbed areas with native plant species.
- Create temporary waste storage for general solid waste and hazardous waste, including broken PV panels and BESS parts.
- Regularly inspect waste storage sites for leaks.
- Properly dispose of hazardous waste with permits from the MoE.
- Conduct refueling and machinery maintenance in designated areas with closed drainage systems.
- Maintain vegetation under PV panels to prevent contamination of soil and water bodies.
- Immediately clean up accidental spills and dispose of contaminated materials properly.
- Construct a drainage system with sufficient capacity to collect rainwater and prevent erosion.

▪ Biological Resource Risk: In general, the construction activities can lead to potential effects on wildlife, particularly their behavior, breeding patterns, and susceptibility to stress due to noise from construction activities. The possible contamination of downstream waterways can exist due to inadequate surface water quality management, which could harm aquatic invertebrates, reduce oxygen levels, and potentially poison fish and other aquatic life. The proposed mitigation measures are as flow:

- Adhering to the noise level limits outlined in the "noise and vibration impact section" during site clearing, transportation, and construction activities.
- Implementing surface water quality management measures as described in the "impact on surface water quality section."
- Educating staff and workers to avoid hunting or killing animals and to collaborate with local forestry and fishery communities and/or the Pursat Provincial Department of Agriculture, Forestry and Fishery to relocate any wildlife found within the construction area back to nearby forests.
- Implementing measures to reduce sediment runoff in areas upstream of the Damnak Kranh Reservoir, including planting vegetation and creating a buffer zone.

▪ Impact on Traffic Flow and Local Infrastructure: Construction activities involve the movement of heavy machinery, materials, and personnel, potentially leading to increased traffic congestion and stress on local infrastructure, including roads. The proposed mitigation measures are as flow:

- Avoiding overloaded trucks.
- Ensuring project vehicles are well-maintained and comply with safety standards.
- Employing security personnel for traffic management.
- Repairing any road damage caused by the project.
- Providing designated parking areas for project vehicles and prohibiting parking outside the project boundary.
- Implementing a monitoring mechanism to check truck drivers' licenses, driving practices, and address community concerns.
- Educating drivers on traffic rules and responsible driving practices.

▪ Occupation and Income (Positive Impact): The project is not expected to negatively impact occupation and income for local people, particularly landowners and tenants. This is because SchneiTec Beyond leased the 168-hectare project site, which was legally acquired and unused by the landowner, SchneiTec, for several years. However, the project will create various employment opportunities during the construction phase, including: Skilled and unskilled construction workers; and jobs for local businesses providing services such as vending, transportation, and accommodation.

▪ Occupational Health and Safety: Construction activities inherently carry risks to worker health and safety, including falls, electrocution, burns, falling objects, exposure to hazardous materials, and noisy or polluted working environments. The proposed mitigation measures are as flow:

- Implementing a comprehensive Occupational Health and Safety (OHS) management plan, including emergency response procedures.
- Assessing and strengthening worker skills and experience to ensure safe work practices.
- Deploying trained engineers for on-site supervision and guidance.
- Ensuring worker contracts comply with Cambodian labor laws, particularly regarding working hours and wages.
- Implementing dust mitigation measures, such as water spraying.

- Enforcing noise and vibration mitigation measures.
- Installing clear safety signs, markings, and barriers in hazardous areas.
- Providing readily accessible fire extinguishers and other emergency equipment and training all staff in their use.
- Requiring all personnel to wear appropriate Personal Protective Equipment (PPE) and providing training in their use.
- Assigning site managers to oversee worker safety and monitor potential risks.
- Registering all workers with the National Social Security Fund (NSSF) for health insurance, workbooks, and work permits.
- Providing workers with adequate accommodation, clean water, toilets, and canteens.

▪ Community Health and Safety: The construction phase can pose various risks to community health and safety, including: Environmental changes due to construction activities, traffic accidents, infectious disease spread due to labor influx, and potential conflicts between security personnel and local communities. The proposed mitigation measures are as flow:

- Implementing existing mitigation measures for air quality, traffic, water quality, and noise.
- Maintaining a secure fenced perimeter to prevent unauthorized entry.
- Educating workers about infectious diseases and implementing policies for HIV/AIDS and COVID-19 prevention.
- Developing a Worker Code of Conduct that guides interactions between workers and the local community, including guidelines for personal relationships.
- Ensuring workers are aware of sexually transmitted diseases, HIV/AIDS, and COVID-19 and enforcing precautionary measures.
- Conducting health check-ups for all workers before recruitment.
- Training security personnel in conflict resolution.
- Engaging with communities to address safety and security concerns, raise awareness of the project's grievance mechanism, and provide updates on project activities.
- Maintaining close cooperation with local authorities to address any conflicts with communities promptly.

6.2. Impact and mitigation measures for operation phase

▪ Soil Quality: While solar power plants are generally considered environmentally friendly, their operation can negatively impact soil quality. Soil erosion is a key concern, especially in areas with heavy rainfall. Installing solar panels can disrupt natural vegetation, leaving the soil vulnerable to erosion, leading to topsoil loss, nutrient depletion, and sedimentation in nearby water bodies. The use of herbicides and pesticides to control weeds and pests around the solar panels can contaminate the soil and harm beneficial microorganisms. The long-term presence of solar panels can compact the soil, reducing its ability to absorb water and nutrients, ultimately affecting plant growth and ecosystem health. Accidental release or leakage of toxic substances from the project's operational activities, including oils, lubricants, domestic waste, sewage, and broken battery energy storage systems (BESS) components, can further contaminate the soil. The proposed mitigation measures are as flow:

- Proper waste management: Implementing a temporary waste storage area within the project boundary for general solid waste, hazardous waste (including broken PV panels and BESS parts), and ensuring safe storage, handling, and disposal procedures, particularly for hazardous waste requiring permits from the Ministry of Environment (MoE).
- Soil contamination prevention: Using designated areas with appropriate drainage systems for refueling and machinery maintenance, prohibiting pesticide and herbicide use under PV panels, and immediate cleanup and proper disposal of contaminated materials in case of accidental spills or leaks.
- Soil health maintenance: Maintaining vegetation under the PV panels to prevent soil contamination through runoff and constructing a drainage system with sufficient capacity to collect rainwater and prevent soil erosion.

▪ Surface and Groundwater Resources: The operation of solar power plants can impact both surface and groundwater resources, primarily through increased water demand for cleaning PV panels and the risk of water contamination from operational activities. While water consumption for daily use by the limited operational workforce is not a significant concern, water usage for cleaning PV panels can strain water resources, especially during the dry season. Contamination risks arise from the use of chemicals for cleaning and maintenance and the potential for accidental spills or leakage of oils, lubricants, and other hazardous materials. The project requires an estimated 2,970m3 of water per year for PV panel cleaning, conducted up to three times during the dry season using groundwater. The proposed mitigation measures are as flow:

- Water conservation: Minimizing water use for cleaning and using efficient cleaning equipment and processes.
- Alternative water sources: Exploring the feasibility of using alternative water sources to reduce reliance on groundwater.
- Groundwater monitoring: Regularly monitoring groundwater levels to ensure sustainable use and adjust water usage as needed.
- Water quality monitoring: Conducting annual groundwater quality monitoring near the project site.
- Contamination prevention: Prohibiting the use of pesticides and herbicides, ensuring proper storage, management, and disposal of hazardous waste, developing and implementing a spill response plan, and using appropriate containment measures to minimize contamination risks.
- BESS management: Implementing measures to address potential leakage from BESS, including using containers as buffers, employing thermal control systems to reduce stress on battery cells, and conducting routine inspections to identify and address potential issues.

▪ Biological Resource Impact: the project can lead to potential negative impacts on biological resources during its operation phase. The key potential impacts include: habitat loss and fragmentation, water quality changes, bird electrocution and collisions, noise and vibration disturbance, glint and glare from PV panels. The proposed mitigation measures are as flow:

- Bird deterrence: Regular checks for bird nests on solar panels and towers, the use of bird-scaring devices to prevent birds from approaching the panels, and a strict prohibition on hunting or trapping birds within the project area.
- Surface water quality protection: Continuous implementation of the measures outlined in the previous conversation to minimize runoff and prevent contamination of water bodies, including avoiding pesticide and herbicide use, managing engine oil and waste, and maintaining a proper sewage system.
- Noise and vibration control: Adhering to the noise limits established for the project to minimize disturbance to wildlife.
- Wildlife rescue and relocation: Collaborating with local forestry and fishery communities and relevant government departments to rescue and relocate any wildlife found within the project area to suitable nearby habitats.

- Occupational Health and Safety: During the operation phase, potential occupational health and safety risks for the project's workforce include electrocution from high-voltage equipment and heat stress for personnel working outdoors. The proposed mitigation measures are as flow:
  - Personal protective equipment (PPE): Providing and enforcing the use of appropriate PPE for all personnel, including visitors, entering the project site.
  - Training: Conducting regular training programs on occupational safety and health, work hazards, and standard operating procedures for all project personnel.
  - Safety signage and barriers: Installing clear and visible safety signs and barricades in hazardous areas to prevent accidents.
  - Emergency response: Equipping the site with fire extinguishers and other fire prevention equipment, and maintaining close cooperation with local emergency services for prompt response in case of accidents.
  - Worker welfare: Providing workers with suitable accommodation, clean water, canteen facilities, and ensuring their registration with the National Social Security Fund (NSSF) for health insurance and other benefits.
- Community Health and Safety: The primary social risk to the local community during the operation phase is the risk of electrocution from the high-voltage infrastructure. Other potential impacts, such as the heat island effect, noise pollution, and fire risk from the BESS, are considered less significant. However, the project acknowledges the potential impacts arising from the workforce, which is mitigated through policies and codes of conduct to minimize risks related to infectious diseases and inappropriate worker-community interactions. The project utilizes BESS, which, while generally safe, presents potential risks of fire and explosion due to thermal runaway or electrical faults. Such incidents could cause damage, injuries, air pollution, and noise disturbance. The proposed mitigation measures are as flow:
  - Security and signage: Maintaining a secure perimeter fence around the project site, installing clear warning signs about electrical hazards, and restricting unauthorized entry.

- BESS safety: Adhering to strict safety standards and industry best practices for BESS installation and operation, including using embedded ventilation systems, soundproofing, and fire suppression systems. Regular inspections and maintenance will also be conducted to address potential issues promptly.
- Worker management: Implementing an HIV/AIDS and COVID-19 policy, a worker code of conduct, and pre-employment health checks for all workers to minimize community health risks.

6.3. Impact and mitigation measures for decommission phase

- Air Quality: The decommissioning phase involves activities such as the demolition of structures, removal of solar panels, and transportation of debris, which can generate fugitive dust emissions and potentially increase air pollution levels. The proposed mitigation measures are as flow:
  - Regular watering of the access road and areas where dust generation is anticipated, particularly during dry periods.
  - Enforcing speed limits for project vehicles within the settlement area to reduce dust.
  - Erecting temporary barriers or screens around the demolition site to contain dust.
  - Covering trucks transporting demolition debris to prevent the release of dust and materials.
  - Implementing a phased dismantling approach to limit the amount of dust generated at any given time.
- Noise and Vibration: The demolition activities can generate noise and vibration from the operation of machinery and the dismantling of structures, potentially disturbing nearby communities. The proposed mitigation measures are as flow:
  - Installing temporary noise barriers around the demolition site.
  - Ensuring the use of well-maintained machinery to reduce noise levels.
  - Scheduling demolition activities during daytime hours to avoid disrupting residents during evenings and weekends.
- Soil Quality: The decommissioning process involves the removal of solar panels, foundations, and other infrastructure, potentially exposing the soil to contamination from hazardous materials, such as oils, lubricants, and remnants of PV materials. Improper handling or disposal of these materials can degrade soil quality. The proposed mitigation measures are as flow:
  - Establishing a temporary waste storage area within the project boundary for the safe collection and segregation of general waste, hazardous waste, broken PV panels, and BESS components. Broken batteries will be transported to a licensed facility for recycling, as required by the Ministry of Environment (MoE).
  - Immediately cleaning up any accidental spills of fuel, lubricants, or other hazardous materials and disposing of contaminated materials appropriately.
  - Storing broken solar panels in a secure location, preferably a warehouse, with authorization from the MoE. These panels will be sent to a recycling facility when such services become available in Cambodia.

  - Implementing a comprehensive waste management plan for the decommissioning phase, ensuring that waste is collected, assessed for recycling or reuse potential, and disposed of in an environmentally responsible manner.
- Occupation and Income: The project is expected to operate for 20 years, as per the Power Purchase Agreement. After this period, the project will undergo an economic reassessment to determine its future. If the project is terminated, approximately 87 employees will lose their jobs. The proposed mitigation measures are as flow:
  - Providing employees with at least six months' notice before the project's termination to allow sufficient time for job searching.
  - Issuing certificates of work experience to enhance the employability of affected workers.
  - Complying with the labor laws of Cambodia regarding termination benefits and other entitlements.
- Occupational Health and Safety: The decommissioning phase involves activities like dismantling structures and handling potentially hazardous materials, posing risks to workers' health and safety. Potential hazards include exposure to oils, lubricants, and PV materials, physical injuries during dismantling, and increased air pollution and noise levels. The proposed mitigation measures are as flow:
  - Providing and enforcing the use of personal protective equipment (PPE) for all workers.
  - Maintaining close cooperation with local emergency medical services for prompt response in case of accidents.
  - Conducting regular training programs on occupational safety and health procedures, focusing on the specific hazards associated with decommissioning activities.
  - Installing clear and visible safety signs and barricades in hazardous areas.
  - Ensuring the availability and accessibility of fire extinguishers and other emergency equipment.

6.4. Cumulative Impact Assessment

The key projects contributing to cumulative impacts are: (1) 30MW and 60MW Solar Power Plants: These projects, located north of the 150 MW project, contribute to the cumulative impacts on water resources, soil quality, and the hydrological system; (2) Krako-Sna Ansa Sub-station (GS-49): Operated by Electricite du Cambodge (EDC), this substation adds to the overall impact on the area's infrastructure and land use; and (3) the future Project (78 ha): While the specific type and start date are unknown, this planned project, situated south of the 150 MW project, is expected to further contribute to cumulative impacts.

These projects will lead to cumulative impacts as follow:

- Cumulative Impacts on Water Environment: The combined water demand for PV panel cleaning from all solar projects, along with other water uses, puts increased stress on groundwater resources, particularly during the dry season. In addition, the alterations to existing canals and increased runoff from multiple projects contribute to sedimentation and potential water quality issues. The proposed mitigation measures are as flow:
  - Implement water-saving measures for PV panel cleaning, including exploring dry or semi-dry cleaning methods, especially when groundwater levels are low.

  - Regularly monitor groundwater levels and adjust water usage accordingly.
  - Implement erosion control measures, such as planting vegetation and managing drainage systems, to reduce sediment runoff into water bodies.
- Cumulative Impact on Soil: Land cover changes, soil compaction from construction activities, and increased erosion from multiple projects have a significant combined impact on soil quality. The proposed mitigation measures are as flow:
  - Minimize soil disturbance during construction and implement soil compaction mitigation measures.
  - Promote revegetation in disturbed areas to restore soil quality.
  - Implement effective erosion control practices, such as using vegetative buffers and managing runoff.
- Cumulative Impact on Hydrological System: Land cover conversion, land levelling, and the development of internal road systems for each project create obstacles for natural water flow, increasing the risk of flooding. The proposed mitigation measures are as flow:
  - Maintain and improve existing natural canals to ensure effective floodwater release.
  - Conduct a comprehensive hydrological study to assess the cumulative impacts of all solar power projects in the area and identify appropriate mitigation measures.
  - Implement measures to control runoff and minimize the velocity of water flow.

7. Environmental and Social Management Plan (ESMP)

ESMP aims to address the potential impacts of the 150 MW solar power plant project, as identified in the ESIA report. The ESMP outlines practical recommendations and actions to mitigate potential negative impacts of the project, define roles, responsibilities, and implementation procedures, specify stakeholder engagement, monitoring methods, indicators, and parameters, outline monitoring frequency and plans, and estimate the costs associated with ESMP implementation. In addition, this ESMP will be based upon for the development of other essential management plans for the operational phase, such as: Operational Environmental and Social Management Plan (OESMP), Health and Safety Plan, Stakeholder Engagement Plan and others.

Organizational Structure

SchneiTec Beyond, the project owner, is headed by the CEO, while the 150 MW solar project is managed by a Project Manager (PM), supported by a project coordinator and an ESG unit. During the construction phase, SchneiTec Beyond's team oversees the SchneiTec construction team to ensure timely construction and compliance with EHS regulations. They work with a construction manager who is responsible for the site's environmental and social performance, following SchneiTec Beyond's EHS management plan. In addition, the construction manager is supported by a site manager and a site EHS unit, who supervise the EPC's work and report on the site's EHS status.

During the operation phase, a Project Management Unit (PMU) from SchneiTec will replaces the EPC team. The PMU, led by an Operation Manager and supported by an EHS team, assumes responsibility for the project's operation and reports to SchneiTec Beyond. The government monitoring bodies such as the MoE, MME, and MAFF will be involved after the project's FEIA report is approved by the MoE.

The role and responsibility of Schneitec Beyond are:

- Ensures compliance with MoE guidelines and national/international standards for all activities.
- Implements the ESMP in each project phase.
- Conducts regular monitoring, especially during construction and decommissioning.
- Collaborates with local authorities and relevant institutions for smooth project execution.

Inspection and Audit Process

SchneiTec Beyond (the project owner) will ensure adherence to the conditions outlined in the ESIA report through inspections and audits. Inspections and audits will be carried out by the main contractor (during construction), SchneiTec Beyond, and external agencies/experts as needed.

Reporting

The ESH (Environment, Social, Health) Team at SchneiTec Beyond is responsible for communication with regulatory agencies and stakeholders, ensuring it meets the required standards. The designated EHS staff manage complaints and inquiries, maintaining records in a Complaint/Enquiry Register.

The site's EHS team regularly reports inspection and audit findings, along with recommended actions, to the Site In-Charge, following SchneiTec Beyond's principles. The Site In-Charge informs the EHS department of these findings for further review. In addition, the EHS audit findings are also communicated to project staff.

Documentation

A robust documentation and record-keeping system will be implemented by SchneiTec Beyond to ensure proper recording and updating of documents according to the ESMP. Responsibilities will be assigned to ensure the ESMP documentation system is maintained. The control of documents will be achieved through access restrictions and distribution to authorized personnel.

ESMP Review

The ESMP, as a dynamic environmental and social management tool, requires periodic reviews to accommodate changes in: the organization, processes, and regulatory requirements. The Site In-Charge is responsible for amending the ESMP, in coordination with designated EHS personnel, and obtaining approval from SchneiTec Beyond's management. The revised ESMP will be distributed to all project personnel.

CHAPTER 1: INTRODUCTION

1.1 Background

Cambodia has experienced significant economic growth over the past two decades, fuelled by deep economic reforms and improved living standards. Despite the global economic challenges posed by the COVID-19 pandemic in early 2020, the Cambodian government swiftly implemented measures to combat the virus and protect economic stability. These efforts were crucial for maintaining a reasonable growth trajectory and progressing towards the ambitious 2050 National Economic Goals, which outline a specific vision for the country's development.

According to the latest Cambodian census report in 2019, the total population is 15.55 million. Compared to the 2008 census of 13.39 million, an increase of 2.15 million or 16% over the last 11 years (NIS, 2019). As stated in the census report, there were 7.57 million males, or 48.7%, while 7.98 million females, or 51.3%. Since 2010, Cambodia's gross domestic product (GDP) has grown at an average rate of 7% annually, while electricity demand has grown even faster than economic growth, averaging about 20% per year. To support this growth, Cambodia has developed many new sources of electricity. In 2012, Cambodia's electricity generation capacity was only 584 MW, but by the end of 2018, this capacity has increased more than five times, about 2,560 MW.

The electricity generation capacity of Cambodia's national grid in 2018 is 2,560 MW, with hydropower (1,330 MW or 51%), coal (505 MW or 20%), and 450 MW of imported electricity (18%), 200 MW of fuel (8%), and 75 MW (3%) of solar power plants (World Bank, 2017). In the rainy season, hydropower plants can operate at full capacity, but in the dry season these plants cannot operate fully because during that time the water flow is less than before, which is not suitable for generating electricity. The Royal Government of Cambodia clearly understands the potential of solar energy (as outlined in the Pentagonal Strategy Phase I (RGC, 2023) to help meet the growing demand for electricity and the shortage of electricity in the dry season.

However, the problem of prices and shortages of electricity sources continues to occur frequently, which is one of the key issues that have negatively affected the national economic development process (World Bank, 2017). Cambodia still relies on external power supply sources such as Thailand, Laos, and Vietnam. Although the volume of electricity imports is small (25.5%) relative to total consumption, this dependence on external sources has affected the stability of Cambodia's electricity supply.

To address Cambodia's electricity shortage, the government has prioritized the development of renewable energy sources, including solar power. SchneiTec Beyond Co., Ltd. has undertaken a significant project to construct a 150-megawatt solar power plant in Pursat province. This investment will not only increase electricity supply but also contribute to the nation's economic growth through tax revenue, job creation, and improved access to energy for citizens.

To ensure environmental and social sustainability, the project is subject to a rigorous Environmental and Social Impact Assessment (ESIA) that aligns with both IFC standards and Cambodian regulations. The ESIA report will be submitted to the Ministry of Environment for approval.

1.2 Brief about the Project

The 150 MW Solar PV Power Plant Project is a BOO project that is designed to supply electricity to the national grid. The SchneiTec Beyond will construct, own, and operate the solar power plant, ensuring that 325GWh of energy is produced in the first year at a predetermined price. This is advantageous for EDC and guarantees a more dependable and potentially less expensive electricity source for consumers.

The AC capacity of the plant will be 150MWac, and it will be constructed on a total area of 168 hectares. This project will integrate a 150 MW solar power plant with battery storage to enhance the reliability of the power grid. Extra electricity can be stored in the batteries for future use during sunny periods. This stored power can be released when sunlight is scarce or demand is high, thereby guaranteeing a more consistent and reliable electricity supply.

The project will not necessitate the construction of new access roads, as it is intended to utilize existing ones. The 22kV transmission line will be developed inside the 168 ha area to connect the solar power project to the substation which will be also located in the 168 ha land area belong to SchneiTec Beyond.

1.3 Importance of the Project

The development of the 150 MW Solar Photovoltaic Power Plant with 30 MWh BESS in Pursat, Cambodia, is a critical project for both the local community and the nation at large. With Cambodia's growing demand for energy and its reliance on various energy resources, the integration of solar energy into the national grid promises several key benefits. Solar energy is an environmentally friendly alternative to traditional energy sources, helping to reduce the country's carbon footprint and greenhouse gas emissions. Moreover, this project contributes to lowering the cost of electricity, as solar energy production, especially in a country with abundant sunlight, can be more cost-effective in the long run. In addition, embedding the BESS in this project will help mitigate intermittency and enhance grid stability. In addition, the system will help the project by storing excess solar energy that can be dispatched during periods of peak demand or low solar generation.

This project, with a capacity of 150 MW, represents a significant step toward enhancing Cambodia's renewable energy. By integrating battery storage systems, the plant will not only produce energy during daylight hours but also store it for use during peak demand periods or cloudy weather, improving grid stability and energy security. This project is expected to generate approximately 325 GWh annually, contributing significantly to the national grid's energy supply and supporting the country's economic development by providing a reliable and sustainable source of energy.

Moreover, the project will create local jobs, from construction to long-term maintenance, and promote skills development in the region. The involvement of local workers and technicians in the operation and maintenance of the solar plant ensures that the project brings long-term economic benefits to the surrounding communities. Additionally, the project's environmentally sound design, which has undergone careful feasibility studies, minimizes its impact on local ecosystems and land use.

1.4 Objective of the EIA report

The key objective of the EIA study is to assess environmental and social impact and develop environment and social management strategies to comply with the reference framework of IFC and local regulation for the project. The specific objectives are to:

- Provide a description of the proposed project which could generate impacts on the environment and society.
- Describe the baseline data of natural and social environmental resources available within the project area and conduct public consultation.
- Identify key environmental and social management issues associated with the project activities and propose appropriate mitigation and management measures/plans.

- Develop an appropriate environmental and social management plan in response to the potential impacts of the project. The ESMP will outline specific mitigation measures and monitoring activities that will be implemented as part of the broader ESMS framework.

1.5 Structure of the Report

The structure of the report is given in the table below:

Table 1: Structure of the EIA Report

Chapter	Title	Description
Chapter 1	Introduction	Introduction to the project and EIA scope and methodology adopted.
Chapter 2	Applicable legal and Regulatory Framework	Discuss the applicable environmental and social regulatory framework and its relevance for the Project.
Chapter 3	Project Description	Technical description of the project & related infrastructure and activities.
Chapter 4	Alternative analysis	Discuss alternatives selected for the project, such as location, technology, and the approach to connecting the project to the national grid. In addition, the no-project scenario is also discussed.
Chapter 5	Screening and Scoping	Discusses the project screening with respect to environmental and social risks and scoping outcome undertaken as part of the EIA process.
Chapter 6	Environmental, Ecology, and Social Baseline	Outline Environmental, Ecology and Social Baseline status in the study area of the Project.
Chapter 7	Stakeholder Engagement	Provides an overview of the stakeholder engagement activities undertaken during the EIA.
Chapter 8	Impact Assessment and Mitigation Measures	This section includes details of identified environmental impacts and associated risks due to Project activities, assessment of significance of impacts and presents mitigation measures for minimizing and / or offsetting adverse impacts identified.
Chapter 9	Environmental and Social Management Plan	Outline of the ESMP taking into account identified impacts and planned mitigation.
Chapter 10	Conclusion	Summary of impacts identified for the Project and conclusion of the study.

CHAPTER 2: APPLICABLE STANDARDS AND REGULATORY FRAMEWORK

2.1. Cambodia's legal framework

The followings are the regulatory framework relevant to solar power project development in Cambodia. The type of regulations and standards have been required by the Ministry of Environment (MoE) in the EIA report. Those regulatory farmwork include national constitution, law, sub-decree, and Praksa.

2.1.1. Constitution of the Kingdom of Cambodia (1993)

The Constitution of the Kingdom of Cambodia was promulgated by the King on 24 September 1993. The following are relevant article (The Constitution of the Kingdom of Cambodia, 1993):

Article 59: The State shall preserve and protect the environment and the balance of natural resources, by organizing a precise planning for the management, especially of the land, water, atmosphere, air, geology, ecological systems, mines, energy, petroleum and gas, rocks, sand, gems, forests and forest by-products, wildlife, fish, and aquatic resources.

2.1.2. Labor Law (1997)

The Labor Law was enacted by Royal Kram No. 0397/01 dated 13 March 1997 (RGC, 1997).

Article 229: All establishments and workplaces must always be kept clean and must maintain standards of hygiene and sanitation or generally must maintain the working conditions necessary for the health of the workers. The Ministry in Charge of Labor and other relevant ministries shall prepare a Prakas (ministerial order) to monitor the measures for enforcing this article in all establishments subject to the provisions of this Chapter, particularly regarding:

- the quality of the premises.
- cleaning.
- hygienic arrangements for the needs of personnel.
- beverages and meals.
- lodging of the personnel, if applicable.
- workstations and the seating arrangements
- ventilation and sanitation.
- individual protective instruments and work clothes.
- lighting and noise levels in the workplace.

Article 230: All establishments and workplaces must be set up to guarantee the safety of workers. Machinery, mechanisms, transmission apparatus, tools, equipment, and machines must be installed and maintained in the best possible safety conditions. Management of technical work utilizing tools, equipment, machines, or products used must be organized properly for guaranteeing the safety of workers.

Article 248: An accident is considered to be work related, regardless of the cause, if it happens to a worker working or during the working hours, whether or not the worker was at fault; it is the accident inflicted on the body of the worker or on an apprentice with or without wage, who is working in whatever capacity or whatever place for an employer or a manager of an enterprise.

Equally, accidents happening to the worker during the direct commute from his residence to the workplace and home are also considered to be work-related accidents as long as the trip was not interrupted, nor a detour made for a personal or non-work-related reason.

All occupational illness, as defined by law, shall be considered a work-related accident, and shall be remedied in the same manner.

Article 249: Managers of enterprise are liable for all work-related accidents stipulated in the Article above regardless of the personal status of each worker. The same liability applies to:

- Directors of private hospitals, but solely for the personnel they employ.
- professionals, solely for their employees.
- craft shops, only for workers other than the wife and the children of the craftsman
- property owners, only for their domestic workers
- agricultural enterprises, for their workers.

Apart from the categories expressly mentioned in the preceding paragraph, any person who engages the services of a worker for a specific, occasional work is required to make reparation for accidents that victimized the worker during the work.

Article 250: Every manager of enterprise shall manage or have someone take all appropriate measures to prevent work-related accidents.

2.1.3. Law on Land Management, Urban planning, and Construction (1994)

Article 12: Any individuals and private institutions as well as public authority are banned from conducting any constructions on the public yard-field or lands as defined hereunder:

- water reservoir and water dams.
- the reserve mining fields and the forests zones.
- the archaeological and historical resort sites.
- the gardens and public parks and development zones.
- the dirt roads reserved for the road's constructions, or the lands reserved for the roadsides, and the lands kept for the construction of rail-roads projects.
- the rivers, seas, streams, and their banks.

Article 17: No construction permit shall be issued if it is not compliance to the Master Plan and to the Land Use Plan and Construction. The construction permit shall be denied if the public security, environment, public hygiene, any construction or property which have value in archaeology, history, culture, beauty, technique or natural resources were affected by such construction. The construction permit shall be denied if there is not infrastructure or public equipment that fit to such construction.

2.1.4. Law on Water Resource Management in the Kingdom of Cambodia (2007)

The Law on Water Resource Management in the Kingdom of Cambodia was officially promulgated on June 29, 2007 (RGC, 2007).

Article 11: Every person has the right to use water resources for his/her vital human need including drinking, washing, bathing and other domestic purposes including watering for animal husbandry, fishing and the irrigation of 3 domestic gardens and orchards, in a manner that will not affect other legal right of others. amount not exceeding that necessary to The fore-mentioned uses are not subject to the licensing.

Article 20 Any person carries out drilling or digging of the wells for the professional or commercial purposes shall supply the MOWRAM with a detailed report on the drilling or digging operation, the technical specifications and other information. The utilization of the ground-waters and aquifers for the professional or commercial purposes the quantity of which exceed the level as defined in Article 11 shall be subject to licensing. The no-drilling or digging zones shall be defined in the Government Sub-decree.

Article 22: The discharge, disposal or deposit of polluting substances which are likely to deteriorate the quality of water and to endanger human, animal and plant health shall be subject to water license or authorization. The fore-mentioned polluting substances and the technical standards for handling them shall be determined by the Government Sub Decree.
In performing this Article, the MOWRAM shall consult with the concerned ministries.

2.1.5. Law on Road Traffic (2014)

The Road Traffic Law was promulgated on December 30, 2014 by the Royal Decree of 0115/001, which contains relevant provisions such as (RGC, 2014):

Article 8: Drivers of all kinds of vehicles shall implement the following measures:

- All drivers of vehicles with an engine cylinder size of 49 cc and above shall possess appropriate driving licenses relevant to the vehicle types.
- Whilst driving their vehicles, drivers shall always be precautious and in a comfortable position that allows easy and fast manipulation of the vehicles, and particularly the possibility to move without any disturbances.
- Drivers shall not be allowed to cause any unnecessary disturbance to other road users and roadside residents.
- Consumption of liquor with the alcoholic rate of 0.25 mg per liter of air or 0.50 mg per liter of blood and above shall be banned when driving.
- Vehicles with caterpillar tracks are banned from being driven directly on the roads. Such vehicles have to be transported on other vehicles with rubber tires.
- Using a cell phone without hand-free accessories whilst driving shall not be allowed.
- No passengers, goods, or other items are allowed to be loaded in way that block the driver's eyesight.
- A motorcycle may be allowed to load two adults and a child. The motorcycle driver, the passenger, and the child at three years of age and above, all shall properly wear helmets. All drivers of tri-motorcycles and motorcycles with trailers shall properly wear helmets.

Article 16: Driving speeds are defined in accordance with the following criteria:

- Driving speed definition shall be determined by a sub-decree.
- Drivers shall not be allowed to drive in an abnormally slow speed without proper reasons that interrupts other vehicles. Drivers in such a slow speed shall keep to the right to allow other drivers in a higher speed to overtake easily on the left. Any drivers, who are forced to slow down in an abnormal manner, shall alert the other drivers by using the emergency light, and shall keep driving to the rightest side of the roadway.
- Speed regulations shall not apply to any drivers of police or military convoys, delegate or senior leader processions, fire trucks, ambulances, and other vehicles equipped with siren and special light on duty.

2.1.6. Law of Fisheries (2006)

The Law on Fisheries was officially proclaimed using the Royal Decree No. 0606/011 dated May 21, 2006 (RGC, 2006).

Article 22: Disposing, discharging, dumping, or littering toxic substances (solid or liquid) in fishery domains, which were determined by law and other juridical legislations of the Kingdom of Cambodia, and Conventions or International Treaties on Environmental Poisoning, and any agreements or any activities that cause toxic or harm to aquatic animals shall be prohibited.

Article 25: Building or dumping dams/dikes across lakes, streams, affluent, rivers and digging canals, pond, holes, reservoir, natural reservoir in large scale and other new constructions or pumping that could cause disastrous damage to fishery resources in fishery domain shall be studied or evaluated by the Ministry of Agriculture Forestry and Fisheries and concerned institutions.

2.1.7. Land Law (2001)

Article 6: Only legal possession can lead to ownership. The State may also provide to natural persons or legal entities of Khmer nationality ownership over immovable property belonging to the State within the strict limits set forth in this law. All transfers or changes of the rights of ownership shall be carried out in accordance with the required general rules for sales, succession, exchange, gift or by court decision (RGC, 2001).

Article 19: Persons whose title or factual circumstances fall within the scope of article 18 of this law shall not have the right to claim compensation or reimbursement for expenses paid for the maintenance or management of immovable property that was illegally acquired.

Any illegal and intentional or fraudulent acquisition of public properties of the State or of public legal entities shall be penalized pursuant to article 259 of this law. The penalties shall be doubled where any acquisition of land from the public properties causes damage or delay to works undertaken in the general interest, in particular any acquisition of roadway reserves.

In all cases, if an offender does not cease his illegal occupation within the time limit set by the competent authority, the authority may begin the process to evict the offender from the land.

2.1.8. Electricity Law (2001)

Article 42: Each Licensee must comply with all conditions set forth in its License, the rules and regulations adopted by the Authority, and the laws of the Kingdom of Cambodia, including laws regarding environmental protection, safety, health, taxes, and electric system performance, protection and standards.

Licensees shall use the resources and provide generation, transmission, dispatch, or distribution services, as applicable, at least cost and in accordance with prudent utility practices.

In accordance with Authority regulations, each Licensee shall submit to the Authority, with a copy to the Ministry of Industry, Mines and Energy, and make available to the public:

(i) An annual summary report of Licensee's activities for the past year;

(ii) An annual work plan for the following year describing the Licensee's anticipated activities; and

(iii) Such other reports, statements, and information as the Authority by regulation, determines to be necessary and appropriate.

2.1.9. Law on Social Security Schemes for Persons defined by the Provision of the Labor Law (2002)

This law was adopted by the National Assembly on August 15, 2002 at the 8th Plenary Session 2, which the Senate approved in its entire form and in its entirety without amendment on September 5, 2002, during the 7th plenary session of the first legislature. The main articles in the proposed project are detailed below (RGC, 2002):

Article 6: Employers and workers covered by this law shall have a compulsory to pay contribution to NSSF. Terms and procedures of payment of the contribution and the entitlement of benefits shall be determined by Sub-decree on the formulation of NSSF as specified with in article 3.

Article 12: An accident is considered to be employment injury, the accident inflicted on the body of the worker, regardless of the cause, if it happens to worker working or during the working hours, whether or not the worker was fault, it is the accident inflicted on the body of the worker or an apprentice with or without wage, who is working in whatever capacity or whatever place for an employer or manager of an enterprise. Equally, accidents happening to the worker during the direct commute from his residence to the work place and home are also considered to be employment injury as long as the as the trip was not interrupted nor detour made for a personal or non-work-related reason.

2.1.10. Law on the Investment (1994), Law on Amendment to the Law on Investment of the Kingdom of Cambodia (2003)

This law is adopted by the National Assembly in Phnom Penh on August 4, 1994 during the extraordinary of the first legislature. This law has been amendment on March 24, 2003 by Royal Kram NS/RKM/0303 (RGC, 2003).

Article 18: New Investors shall be allowed to hire foreign employees provided that:

- The qualification and expertise are not available in the Kingdom of Cambodia among the Cambodian populace in the event of such hiring appropriate documentation including photocopies of the employee's passport, certificate and or degree and a curriculum vitae shall be submitted to the Council for the Development of Cambodia,
- A Letter asserting needs for hiring the foreign employees shall be required investors shall obtain an approval and a permit from the Ministry of Social Affairs, Labor, Vocational Training and Youth Rehabilitation,
- Before working for investors the foreign employee shall hold a work permit in the Kingdom of Cambodia, issued by the Ministry of Social Affairs, Labor, Vocational Training and Youth Rehabilitation.

Investors shall perform the following obligations:

- Provide adequate and consistent training to Cambodia staff,
- Promotion of Cambodia staff to senior Positions will be made over time.

2.1.11. Environment and Natural Resource Code (2023)

The purpose of the Code on Environment and Natural Resources is to provide rules for strengthening, modernizing, making consistent, and improving the management of environment protection, conservation, and restoration of natural resources in the Kingdom of Cambodia.

Article 656. Classification of development projects
The ministry responsible for environment and natural resources shall classify development projects to request the project owners to prepare the following documents.

- Full environmental impact assessment report.
- Initial environmental impact assessment report.
- Environmental protection agreements.

The types of projects required to prepare a full environmental impact assessment report, initial environmental impact assessment report, or environmental protection agreements shall be determined by legal instruments of the ministry responsible for environment and natural resources.

Article 691. Prior consultation

The public participation process shall ensure a prior consultation with stakeholders affected by the project regarding proposed impact mitigation measures based on prior and informed consultation.

For impact mitigation measures, the project owner shall:

- Determine various measures to promote livelihood and assist those affected by the projects.
- Ensure that affected stakeholders participate in resettlement planning to minimize adverse resettlement impacts and ensure that compensation for property loss has been addressed fairly, appropriately, and justly before resettlement, and impact mitigation measures shall be appropriate.

If affected local communities object to the mitigation measures proposed by the project owner, the development project shall continue. However, the project owner shall determine alternative mitigation measures or address those impacts on local communities.

Grievance procedures for affected local communities and resettlement procedures shall be determined by legal instruments of the ministry responsible for environment and natural resources.

Format and procedure for compensation for damage to the affected local communities shall be determined in an inter-ministerial Prakas between the ministry responsible for environment and natural resources and the ministries or institutions responsible for economy and finance.

Article 655. General principles of environmental impact assessment

The environmental impact assessment process shall be valid only when it is conducted in accordance with the conditions and principles of public participation as stated in Section 2 (environmental impact assessment) in Book 5 of this code.

Article 863. Effects of legal provisions

All legal instruments under the laws concerning the environment and natural resources shall be applicable until substituted by new instruments, except for any provision contrary to this Code.

3.1.1.1. Sub-Decree on Environmental Impact Assessment (1999)

Sub-Decree No 72 on the Environmental Impact Assessment Process was officially approved on 11 August 1999. Important articles in the proposed project are detailed below (RGC, 1999a):

Article 2: This sub-decree hereby applies to every proposed and ongoing project(s) and activities, either by private, joint-venture or state government, ministry institutions of which are described in the annex of this sub decree, except a special case, where a project will be approved by the Royal Government.

Article 8: A Project Owner must apply to the MoE for reviewing their full report of EIA report and pre-feasibility study, in case a project tends to cause a serious impact to the natural resources, ecosystem, health and public welfare.

Article 23: Project Owner/Responsible Person must carry out the EMP as stated in the EIA for period of 6 calendar months, commencing from the date of the MoE confirmation of their EIA report duly fulfilled the criteria of this sub-decree.

Article 26: Project Owner/Responsible Person must carry out the EMP as stated in the EIA for period of 6 calendar months, commencing from the date of the PEO confirmation of their EIA report duly fulfilled the criteria of this sub-decree.

3.1.1.2. Sub-Decree on Water Pollution Control (1999)

Sub-Decree No 27 on Water Pollution Control was officially announced on April 6, 1999. The sub-decree cites essential articles related to water pollution management, including (RGC, 1999c):

Article 6: The discharge of wastewater from any sources of pollution that is not consistent with the standards for effluent discharge as mentioned in the article 4 and article 5 of this sub-decree shall be strictly prohibited.

Article 8: The disposal of solid waste or any garbage or hazardous substances into public water areas or into public drainage system shall be strictly prohibited. The storage or disposal of solid waste or any garbage and hazardous substances that lead to the pollution of water of the public water areas shall be strictly prohibited.

Article 10: The discharge or transport of wastewater from any sources of pollution to other places for any purpose is subject to prior permit from the Ministry of Environment.

The application for this permit shall be copied to the concerned ministries or agencies.

Article 12: Permit requirement for discharge or transportation of effluent to other places as stipulated in the article 10 of this sub-decree shall apply to either the new sources of pollution project or to existing sources of pollution except any new project of pollution source that environmental impact assessment report of which has been approved may be exempt from the requirement of permit for discharge or transportation of effluent to other places.

Article 23: The owner or responsible person of the pollution sources as stipulated in the article 11 of this sub-decree shall:

a. be responsible for determining the method of the treatment and the discharge of their effluent so that it responds to the effluent standard as stipulated in the article 4 and article 5 of this sub-decree as well as the standard of pollution load as stipulated in the article 7 of this sub-decree.
b. have enough facilities and means to prevent the pollution of the public water area when there is eventual danger caused from his/her pollution source.
c. hold the responsibility for installing an equipment for measurement of flow, concentration and amount of pollutant contained in his/her effluent and also keep the result for record keeping.

3.1.1.3. Sub-Decree on Water Pollution Control (1999) and Sub-Decree on the Amendment of Article 4, Article 9, Article 11, Article 12 and Article 17 and Table Annex 2, Annex 3, Annex 4 and Annex 5 of Sub-Decree No. 27, dated 6 months. April 1999 on Water Pollution Control (2021)

Sub-Decree No. 27 was officially declared by the Royal Government of Cambodia on June 29, 2021. This sub-decree defined the standard of effluent discharge, the water quality for water biodiversity conservation and for public health protection. Please see the attached standards in Appendix 6.

3.1.1.4. Sub-Decree on Air Pollution Control and Noise Disturbance (2000)

Article 1: The purpose of this sub-decree is to protect the quality of the environment quality and public health from air pollutants and noise disturbance through monitoring, curbing and mitigating activities.

This sub-decree defined the Air quality standards, and the maximum allowable noise level, and the thresholds of gas emission standard of mobile sources (see in Appendix 6).

3.1.1.5. Sub-Decree on Solid Waste Management (1999)

Sub-decree No 36, on the management of solid waste, approved on April 27, 1999, by the Royal Government of Cambodia. Important articles in the proposed project are detailed below (RGC, 1999b):

Article 7: The disposal of waste in public sites or anywhere that is not allowed by the authorities shall be strictly prohibited.

Article 10: The importation of the household waste from abroad to the Kingdom of Cambodia shall be strictly prohibited.

Article 13: The owner of the hazardous waste shall be responsible for temporary storage of his/her waste in proper technique and in safe manner.

Article 14: The owner of the hazardous waste shall make quarterly report on his/her waste and forward it to the Ministry of Environment. The report include:

- Type and amount of the waste,
- Temporary storage method, and
- Treatment or elimination method.

Article 15: The storage, transportation and disposal of the hazardous waste shall be performed separately from the household waste which will be stipulated by the Prakas of the Ministry of Environment.

Article 21: The importation of the hazardous waste from abroad into the Kingdom of Cambodia is strictly prohibited.

Article 22: The monitoring on packing, storage, transport, recycling, incinerating, treatment and disposal of the hazardous waste is the responsibility of the Ministry of Environment.

Article 25: In the case of finding out that there is an illegal disposal or dumping of the hazardous waste without a permit from the competent institution, the Ministry of Environment in collaboration with concerned ministries, shall conduct the inspection at the places in complying with procedures as follows:

a) To present his / her identity card and mission letter while entering into the premise or any site of point source of pollution for conducting inspection and taking sample.
b) To make, at the site of inspection, the primary record and report of the inspection or sample taking with the presence of witness if necessary.
c) To inquire and require the owner or responsible person of the place to provide them with information and other relevant documents for taking statement or report and for evidence.
d) To collect and detain evidence of the offence.

See the type of hazardous waste in Appendix 6.

3.1.1.6. Prakas on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed (2015)

Sub-Decree (MoE, 2015) on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to Dispose, adopted on September 30, 2015. This sub-decree cover

Article 2: Every disposal toxic chemical, hazardous substances or hazardous waste shall be proposed to Ministry of Environment.

The sub-decree set the standards of the quantity of toxic chemicals or hazardous substances contained on hazardous waste which is allowed to be disposed in sanitary landfills, and the standards of the quantity of toxic chemicals or hazardous substances allowed in soils (see detailed in Appendix 6).

2.1.12. Sub-Decree on Construction Permit (1993)

In the Sub-decree No. 86 on the Construction Permit Approved on 19 December 1993 (RGC, 1993).

Article 2:

- All constructions in the cities or provincial towns shall be subjected to construction permits. All new constructions shall be subject to construction permits.
- Reconstruction, expansions, and floor additions of existing building shall be subjected to construction permit.

Article 7: No construction permits shall be issued if it is not compliance to the Master Plan and to the Land Use Plan if they exist and to the general land use rules if the two preceding documents do not exist. This measure shall be applied to individuals as well as to legal persons both public and private.

Article 24: PENALTIES All construction started before the issuance of the construction permits by the competent authorities shall be subject to penalties. The construction work shall be stopped immediately. Individuals who violate the order of the officials and public agents shall be subject to judicial proceedings and work equipment shall be confiscated. In the event of repeating, a petty fine shall be imposed. If the works still continue the case shall be deferred to a Court which shall issue a Court Order.

2.1.13. Sub-Decree on Establishment of Social Security Scheme "Health Care Scheme" for Persons Defined by the Provisions of the Labor Law (2016)

Sub-Decree on the Establishment of Social Security Schemes in Health Care for Persons Under the Provisions of the Labor Law, adopted on January 6, 2016 (RGC, 2016).

Article 7: Employers and workers under the provision of the law on social security scheme for persons defined by the provisions of the labor law, are obliged to pay the contribution for health care scheme to NSSF. The amount of the contribution paid by workers shall not exceed than that paid by employers. Rate of contribution for health care scheme, form and procedure of this contribution payment shall be set by Prakas from The Minister of Labor and Vocational Training with the agreement of The Minister of Economy and Finance upon the request from the Governing Body of NSSF.

2.1.14. National Strategic Plan for Green Growth 2013-2030

National policy on green development was approved of by the cabinet session on March 01, 2013. This national policy versioned to stabilize the economic development with social environmental, cultural, and sustainable use of natural resources through the adaptation and harmonization between green development and national policies. This policy aims to promote ecological wellbeing through green development, based on green economy, blue economy, environmental protection, social security systems, and national cultural identity preservation (RGC, 2013).

It also discussed some of main objectives as stated below:

- To ensure stabilization between economic development and environmental, social, and cultural conditions.

- To establish favourable conditions for green development by equity, equality, fraternity, and quality in the economic, social, and ecological systems that maintain national cultural values.
- To manage the efficiency of right preservation of water resources management and sanitation, right to receive food security and food safety, right to receive the development and forest conservation and water resources, biodiversity and sustainable of land use, renewable energy and energy efficiency, right to obtain information, knowledge and skills, and right to have the better social life and the environment condition, and right to have financial support for small, medium businesses establishment, and investment.
- To promote education and training on green development.
- To strengthen the exchange of information, knowledge, practical experience, technical skill, technology, and investments related to green employment.
- To urge green development cooperation in the framework of national and subnational regions and the world.

2.1.15. National Energy Efficiency Policy 2022-2030

The purpose of National Energy Efficiency Policy 2022-2030 is to support Cambodia's goal of becoming a high-middle-income country by 2030 and a high-income country by 2050. The Policy aims to reduce energy consumption and greenhouse gas emissions, supporting resource conservation, private sector competitiveness, and sustainable development by promoting energy efficiency in Cambodia.

The policy acknowledges the importance of renewable energy technologies in supporting Cambodia's clean energy transition and recognizes energy efficiency as a central pillar for achieving energy security and sustainability. As quoted, "… MME has been keenly looking into opportunities to maximise the adoption of renewable energy technologies and energy efficiency, which could support our country's embarking on a clean energy transition pathway while at the same time enhancing energy security".

2.1.16. The Circular Strategy on Environment 2023-2028

The Circular Strategy on Environment 2023-2028 was approved by the government to put for implementation on November 09, 2023. The Strategic Goal of the Circular Strategy on Environment 2023-2028 is to attain Clean, Green and Sustainable goals in transforming the potential of the environmental sector into the benefits of all generations of Cambodians and to enhance Cambodia's prestige on the international arena (MoE, 2023).

A. **Strategy 1 (Clean)** is a key component of this plan, focusing on pollution control and environmental management. The strategy is built upon three angles:

- Angle 1: This angle focuses on managing various forms of waste, including solid waste, liquid waste, and hazardous waste. This includes developing regulations, promoting recycling and waste reduction, and improving waste management infrastructure. It also emphasizes managing environmental quality factors like land, air, water, noise, and vibration. The strategy includes developing guidelines, establishing monitoring systems, and implementing measures to reduce pollution from various sources. Furthermore, it highlights the integration of waste management policies with decentralization efforts and the "Safe Village, Commune-Sangkat" policy to improve waste management at the local level.

- Angle 2: This angle centres on utilizing modern technology and facilities to enhance the analysis of environmental quality. The strategy prioritizes establishing laboratories with advanced equipment to assess factors such as acidity, radiation, and chemical and biological hazards. It aims to establish reliable pollution analytical systems to ensure the accuracy and reliability of environmental data. This involves developing standardized procedures, implementing quality control measures, and participating in external quality assessments. Moreover, it stresses the importance of improving service quality and staff capacity within these analytical facilities. This includes developing efficient data management systems, seeking international recognition for analysis quality, and actively seeking customer feedback to improve services.

- Angle 3: Improving Environmental Impact Assessment: This angle underscores the development of policies and regulations related to environmental impact assessments. It emphasizes conducting thorough evaluations of public and private investment projects, requiring environmental impact assessment reports and environmental protection contracts. The Ministry will classify projects based on their potential environmental impact to determine the level of assessment required. Additionally, it focuses on monitoring and evaluating the environmental impact of projects to ensure compliance. This will involve establishing working groups to oversee project implementation, collaborating with relevant departments, and ensuring the collection of environmental and social funds.

B. **Strategy 2 (Green)** is a critical element of this plan, concentrating on expanding forest cover, safeguarding protected areas, and bolstering the livelihoods of local communities. The strategy is structured around three key angles:

- Angle 1: Intensifying Tree Planting Movement: This angle centers on significantly increasing tree planting efforts throughout Cambodia. A primary objective is to distribute a minimum of one million saplings annually to the public, encouraging widespread participation in tree planting. To support this goal, the strategy proposes establishing tree nurseries at all Provincial Department of Environment centers, developing technical guidelines for nursery establishment and tree management, and designating a specific day each year as "Annual Tree Planting Day." This angle also prioritizes expanding tree planting in degraded forest areas within protected areas, aiming to achieve 60% forest cover by 2050. This involves developing reforestation plans, establishing nurseries within protected areas, and organizing tree planting initiatives on designated environmental days. Further emphasizing community involvement, the strategy advocates for promoting tree planting in communities within and surrounding protected areas. This includes developing community-specific tree planting plans, establishing nurseries within these communities, and organizing tree planting events. The strategy also encourages attracting investment in forest and non-timber forest products to promote both green cover expansion and income generation for local communities.

- Angle 2: Improving Protected Areas Management: This angle focuses on strengthening the management and conservation efforts within Cambodia's protected areas, which include national parks, wildlife sanctuaries, and other designated areas. A key priority is improving the overall management of these protected areas, encompassing various measures. These measures include revising and developing legal documents to support protected area management, continuing boundary demarcation and land registration efforts, and conducting comprehensive classifications of forests within these areas. It stresses the importance of enhancing law enforcement to curb illegal activities such as deforestation, wildlife poaching, and illegal fishing. Recognizing the ecological significance of these areas, the strategy emphasizes biodiversity conservation. This includes conducting studies to identify and catalog flora and fauna within protected areas, developing protection plans for vulnerable species, and implementing habitat restoration initiatives. Further emphasizing conservation efforts, the strategy highlights the need to strengthen mechanisms for monitoring changes in forest cover. This involves establishing robust database systems, building the capacity of technical staff to manage and verify data, and leveraging technology for monitoring and reporting purposes.

- Angle 3: Enhancing Local Communities' Livelihood: This angle emphasizes improving the livelihoods of communities residing in and around protected areas while promoting sustainable practices. A key focus is on promoting food security, improved nutrition, and community cleanliness through climate change adaptation measures and clean energy use. The strategy encourages disseminating information about climate change and its impact on communities, promoting waste management and plastic bag reduction, and implementing sustainable farming practices. Recognizing the economic potential of these areas, the strategy emphasizes improving livelihoods through ecotourism and culturally appropriate employment. This includes fostering a suitable environment for ecotourism development, building local capacity to study and develop ecotourism opportunities, and promoting responsible ecotourism practices. It advocates for diversifying income-generating activities to reduce reliance on natural resources. Beyond economic benefits, the strategy stresses strengthening the conservation of natural and cultural resources through several measures. This includes developing legal frameworks to support community protected areas and cultural heritage sites within those areas, conducting research on archeological and fossil sites, and empowering local communities with knowledge and skills related to sustainable forest management. It promotes expanding forest cover to enhance ecosystem services, economic benefits, and climate change resilience.

C. **Strategy 3 (Sustainable)** focuses on ensuring sustainability through compliance, cooperation, and coordination.

- Angle 1: Applying Compliance centers around aligning with national and international frameworks. This includes upholding the Royal Government's political program, adhering to the Pentagon Strategy Phase 1, and complying with national laws and international conventions related to the environment.
- Angle 2: Expanding Cooperation emphasizes strengthening partnerships. This involves collaborating with ministries, institutions, local authorities, development partners, and engaging the public and private sectors in environmental initiatives.

Angle 3: Strengthening Coordination focuses on improving the effectiveness of environmental efforts. This encompasses enhancing working group performance, facilitating program and project development, and bolstering monitoring and evaluation processes for environmental initiatives.

2.2. International Administrative Requirement

In addition to Cambodia's relevant laws and the various regulations set forth above, many relevant international guidelines and standards to this project are included, as described in the following sections:

2.2.1. The International Reference Framework

The ESIA reports to be prepared will comply with the requirements of the international reference framework as follow:

- IFC Sustainability Framework

World Bank's EHS Guideline (2007) by focusing on ambient noise management, and wastewater and ambient water quality

- International Finance Corporation's Guidance Notes: Performance Standards on Environmental and Social Sustainability (2012)
- IFC/World Bank EHS Guidelines for Electric Power Transmission and Distribution (2007)

2.2.2. IFC Performance Standards and Applicability for This project

2.2.2.1. IFC's Performance Standards

- **Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts**

The PS1 outlines a framework for integrating environmental and social considerations into project lifecycle management. Its primary goal is to identify, assess, and mitigate potential risks and impacts on workers, communities, and the environment. This involves implementing a mitigation hierarchy, prioritizing avoidance, minimization, and, when necessary, compensation or offsetting measures.

To achieve this, the PS1 mandates the development and implementation of an Environmental and Social Management System (ESMS). The ESMS encompasses various elements, including risk identification, organizational structure, emergency response planning, monitoring and evaluation, legal and regulatory compliance, and stakeholder engagement. By adhering to these requirements, the PS1 aims to promote sustainable project development and ensure positive social and environmental outcomes.

- **Performance Standard 2: Labour and Working Conditions**

This standard is designed to uphold fair labour practices. It mandates that clients establish and maintain positive worker-management relationships, ensuring non-discrimination, equal opportunity, and adherence to both national and international labour standards, as outlined by local and ILO. Specific concerns addressed include child and forced labour, along with the promotion of safe and healthy working conditions. The standard emphasizes the importance of recognizing and safeguarding the health and well-being of workers.

The standard's scope extends to a wide range of workers, including those directly employed by the client, contracted workers involved in core business processes, and workers within the client's supply chain. This broad coverage ensures that fair labour practices are implemented throughout the entire project lifecycle.

- **Performance Standard 3: Resource Efficiency and Pollution Prevention**

This PS seeks to reduce air, water, and land pollution that poses a local, regional, and global threat to human health and the environment. When possible, this Performance Standard encourages private sector businesses to implement these technologies and procedures. The project's use of photovoltaic technology will, at the very least, contribute to the reduction of global warming by dislodging greenhouse gas emissions that would have been produced by other fossil fuel energy sources.

- **Performance Standard 4 Community Health, Safety and Security**

This Performance Standard aims to prevent harm to the health and safety of local communities throughout the project's lifespan, both during normal operations and in case of emergencies. It also mandates an assessment of how security measures implemented to protect personnel and property could potentially impact community security, taking into account human rights principles. The Environmental and Social Impact Assessment (ESIA) evaluates potential risks and impacts on community health, safety, and security, proposing mitigation measures aligned with global industry best practices.

- **Performance Standard 5: Land Acquisition and Involuntary Resettlement**

PS5 acknowledges that communities and the people who use the land may suffer negative effects from project-related land acquisition and land use restrictions. The PS seeks to minimize negative social and economic effects or, in the event that avoidance is not feasible, to foresee and prevent physical and economic resettlement. PS 5 mandates that alternative project designs that minimize resettlement be taken into account. The responsible party must improve or restore the livelihoods and standards of living of displaced people in situations where resettlement (economically and physically) is unavoidable, provide consistent compensation in a transparent manner, and arrange for appropriate information disclosure, consultation, and the informed participation of those affected throughout the resettlement process.

- **Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources**

This Performance Standard aims to protect and conserve biodiversity. Biodiversity is "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species, and of ecosystems".

The Standard categorizes habitats into three types: modified, natural, and critical. Modified habitats are areas significantly altered by human activities, such as agricultural lands, plantations, or reclaimed coastal zones. Natural habitats, on the other hand, are areas with minimal human interference and predominantly native species. Critical habitats are a subset of modified or natural habitats and possess exceptional biodiversity value. They may include habitats of endangered species, endemic species, migratory species, or unique ecosystems. These areas are crucial for maintaining ecological balance and supporting various life forms.

- **Performance Standard 7: Indigenous Peoples**

Protecting Indigenous Peoples is the key focus of this PS. Indigenous peoples, according to the PS, are social groups that have identities different from those of the majority in their respective countries and are frequently among the most vulnerable and marginalized members of society.

The PS7 applies to communities or groups of Indigenous Peoples who maintain a collective attachment, i.e. whose identity as a group or community is linked, to distinct habitats or ancestral territories and the natural resources therein. It may also apply to communities or groups that have lost collective attachment to distinct habitats or ancestral territories in the project area, occurring within the concerned group members' lifetime, because of forced severance, conflict, government resettlement programs, dispossession of their lands, natural disasters, or incorporation of such territories into an urban area.

- **Performance Standard 8: Cultural Heritage**

As stated by PS8, cultural heritage refers to tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values. Cultural heritage also refers to unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls. In addition, cultural heritage also refers to certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

2.2.2.2. PS Applicability for This project

The following are the applicability of IFC Performance Standards for this project.

No.	PS	Explanation	Applicability to this project
1	**Performance Standard 1**: Assessment and Management of Environmental and Social Risks and Impacts	PS1 seeks to evaluate SchneiTech Beyond's current social and environmental management systems and pinpoint any gaps in their operation, presence, and application of an environmental and social management plan (ESMP), a EHS policy, an organizational chart with roles and responsibilities clearly defined, risk identification and management protocols, and procedures such as grievance management and stakeholder engagement.	Yes
2	**Performance Standard 2**: Labor and Working Conditions	PS2 acknowledges that safeguarding workers' fundamental rights should go hand in hand with efforts to increase economic growth through the creation of jobs and revenue. Human resource management and policy, workers' organization, equal opportunity and nondiscrimination, layoffs, workforce protection, and occupational health and safety are among the topics covered in PS2.	Yes
3	**Performance Standard 3**: Resource Efficiency and Pollution Prevention	PS3 discusses the use of materials and resources as inputs and wastes that may have an impact on human health. The standards aims to prevent or minimize negative effects on human health and the environment by reducing or avoiding pollution from project activities; encourage more sustainable use of resources, such as water and energy; and lower greenhouse gas emissions associated with the project. Wastes, hazardous materials, emergency planning and response, greenhouse emissions, pollution prevention, resource conservation and energy efficiency, and pesticide usage and management are some of the major topics addressed under this PS3.	Yes
4	**Performance Standard 4**: Community Health, Safety, and Security	This PS4 requires reasonable precautions to foresee and prevent unfavorable effects on the impacted community's health and safety during the project's duration from both normal and non-routine situations. The protection of people and property must also be done in a way that avoids or reduces risks to the impacted communities and in compliance with applicable human rights norms.	Yes

		This standard is applicable to the project because it requires the implementation of measures to protect the health and safety of nearby communities during construction, operation, and decommission phases. The risks and impacts of this project must be identified and assessed and corresponding mitigation measures must cover varieties of such impacts as change of ambient environmental quality (air, noise…), traffic accidents, electrocution, conflicts with security personnel, infectious diseases, sexual exploitation and abuse/sexual harassment caused by the influx of labor.	
5	**Performance Standard 5**: Land Acquisition and Involuntary Resettlement	PS5 aims to ensure that project-related land acquisition and restrictions on land use do not negatively impact the livelihoods of affected communities and individuals. The ultimate goal of PS5 is to avoid involuntary resettlement whenever possible, and when it's unavoidable, to minimize its impact and support affected persons in restoring or improving their livelihoods. This project involved in land acquisition, but SchneiTec Beyond rents the 168 ha of land for this project from SchneiTec on September 26, 2023. As stated in this report, SchneiTec (the renter) has legally owned the land since 2020. The land was acquired on willing buyer and willing seller basis before and the transaction was done before this project and this land acquisition was not intended for building this project.	No
6	**Performance Standard 6:** Biodiversity Conservation and Sustainable Management of Living Natural Resources	PS6 applies to projects that (i) are situated in natural, modified, and critical habitats; (ii) have the potential to affect or rely on ecosystem services that the client has direct management control over or a significant influence over; or (iii) involve the production of living natural resources (e.g., agriculture, animal husbandry, fisheries, forestry). PS6 recognizes the crucial role that biodiversity, ecosystem services, and the sustainable management of living natural resources play in promoting sustainable development. The goal of PS6 is to ensure that projects avoid or minimize negative impacts on biodiversity and ecosystem services and promote sustainable practices in the management of living natural resources.	No (to be further assessed)

		As explained in this report, the project site does not contain any critical habitat. The project site does not fall within any designated protected area as defined by the Royal Government of Cambodia. The nearest protected area, Aural Wildlife Sanctuary, is located approximately 30 kilometers south of the project site. This distance significantly minimizes the potential for direct impact on this protected area. Remarkably, Damnak Kranh Fish Refuge Reservoir is the key water body located around 300 meter downstream of the Area 2 (32 ha) of project site in which only PV Panel will be installed. This will significantly minimize the risk of adverse impact on the reservoir. In addition, the project is expected to benefit the reservoir by increasing electricity supply and lighting in the area. This increased illumination can attract insects, which in turn serve as a food source for fish. It is worth noticing that the Damnak Kranh Community Fish Refuge was primarily designed to increase fish stock and tourism purpose and it is a modified habitat due to significant human intervention. This reservoir have already experienced alterations due to human activities, and non-native fish species were introduced to this reservoir. The information as explained above suggests that the project's impact on this particular habitat might be less pronounced compared to a pristine natural habitat.	
7	**Performance Standard 7**: Indigenous Peoples	PS7 focuses on safeguarding the rights and interests of Indigenous Peoples in the context of development projects. The goal of PS7 is to foster a respectful and equitable relationship between project proponents and Affected Communities of Indigenous Peoples, ensuring that development does not come at the expense of their cultural, social, and economic well-being. The proposed location for the project and the surrounding area do not have indigenous people.	No
8	**Performance Standard 8**: Cultural Heritage	PS8 focuses on the protection and preservation of cultural heritage in the context of development projects. the goal of PS8, is to ensure that project activities do not adversely	No

		impact cultural heritage and, where appropriate, promote its preservation and equitable use. The proposed project site is not located in any report or known sensitive cultural heritage area.	

2.2.3. Project Category

According to IFC's Environmental and Social Review Procedure Manual, 3 key categories of the project are defined. An E&S category is assigned by basing on the risk associated with the specific sector, the probability of a development occurring, and what can be fairly determined about the environmental and social characteristics of the Project's anticipated geographical setting. The 3 categories are described in the following table:

Category	Description	Selected Category
Category A	Projects that have potential significant adverse or social risks and/or impacts that are in a diverse, irreversible or unprecedented manner.	The 150 MW solar power project is in "Category B".
Category B	Projects that have potential limited adverse environmental or social risks and/or impacts. The impacts/risk is few in number, generally site-specific, largely irreversible and can be addressed by the implementation of mitigation measures.	
Category C	Projects that have minimal or no adverse environmental or social risks and/or impacts on the surrounding environment.	

As shown in the above table, the project falls into the "Category B". Selection of Category B is based on similar reasoning:

- **Land Acquisition and Displacement**: ScheiTec Beyond. This project rents an 168 hectares land for the construction of its main infrastructure from SchneiTec on September 26, 2023. The land has been under the legal possession of SchneiTec since September 25, 202 and from that time, the land has been left unused for a couple of years. This project does not lead to conversion of any forest area and not involve physical or economic displacements.
- **Ecological Impacts**: The project's impact on habitat and species is considered minor based on ecological assessments. This project is not located in protected area or any biologically significant area. The nearest protected area is located around 30 km from the project site.
- **Water Resource Use**: The project will require water for both construction and operation. The project will use ground water for sourcing its own water demand during construction and operation. This water consumption can potentially stress water resources in the area. This impact is considered low and can be mitigated through various measures like optimizing water usage, recycling, and using dry module cleansing mechanisms.
- **Topographical change and Erosion**: this impact is restricted to the construction phase, the project will involve clearing vegetation, potentially altering water holding and erosion patterns. This impact is considered low.

- **Hydrological change**: this project, together with other nearby projects, can cumulatively affect the hydrological condition in the area. The impact can be in the form of the increase of water level and flow. The impact has been assessed as medium and can be mitigated through flood monitoring and mitigation, and improvement of existing irrigation infrastructures.
- **Waste Management**: A small portion of the waste generated during construction will be hazardous, potentially impacting soil quality if not managed properly. The impact is assessed as low due to the availability of effective waste management measures.
- **Air Quality Impacts**: Construction activities will lead to fugitive dust emissions and increased vehicular emissions. However, the short construction timeframe limits the impact on air quality, which is assessed as low. Operational air emissions are expected to be minimal.
- **Noise Impacts**: Noise levels during construction and operation are not expected to significantly impact surrounding areas. The project site is located away from the main settlements (less than 10 households located less than 500m from the project site), and construction activities are temporary. Operational noise will mainly come from occasional vehicle movement and running utilities.

2.3. Compliance Register

The following table briefly describe applicable regulatory frameworks to the project covering the construction, operation, and decommission phases. The regulatory framework as updated as of December 2024. This register is subjected to update when new regulation is issued in Cambodia.

Table 2: applicable regulations for the project

Key Issues	Application by Project Phases				Responsible Institution	Remarks for compliance requirement
	Pre-construction	Construction	Operation	Decommission		
A. Cambodia's regulations						
Constitution of the Kingdom of Cambodia (1993)	✓	✓	✓	✓	RGC	The project has the obligation to preserve and protect the environment and the balance of natural resources.
Electricity Law (2001)	X	X	✓	X	EAC	Solar power plant investor must obtain a Generation License from the Electricity Authority of Cambodia (EAC). This license grants the right to own, operate, and manage solar generation facilities for commercial purposes
Law on Land Management, Urban planning, and Construction (1994)	✓	✓	X	X	MoLMUPC	The construction of project's facilities are prohibited on designated public lands, including water reservoirs and dams, reserve mining fields and forests, archaeological and historical sites, public parks and development zones, land reserved for roads and railroads, and rivers, seas, streams, and their banks.
Law on Water Resource Management in the Kingdom of Cambodia (2007)	X	X	✓	X	MoWRAM	The project needs water usage license for ground water extraction.
National Strategic Plan for Green Growth 2013-2030	✓	✓	✓	✓	RGC	The plan outlines Cambodia's strategy for sustainable development and emphasize a "win-win" approach across various sectors, including energy. It highlights green investment in renewable energy as a core component of its green investment and green jobs creation strategy.
National Energy Efficiency Policy 2022-2030	✓	X	X	X	RGC	The policy aims to reduce energy consumption and greenhouse gas emissions. The policy primarily focuses on demand-side energy efficiency, encompassing measures applied in end-user sectors like buildings, industries, transport, and public services to reduce energy demand through efficient energy use. The policy does not cover supply-

						side energy efficiency, which applies to energy generation, transmission, and distribution. But, the policy acknowledges the importance of renewable energy technologies in supporting Cambodia's clean energy transition and recognizes energy efficiency as a central pillar for achieving energy security and sustainability.
The Circular Strategy on Environment 2023-2028	X	✓	✓	X	RGC	The strategy aims to achieve Clean, Green, and Sustainable goals, ultimately leading to a carbon-neutral economy by 2050. This solar power plant project significantly aligns with this strategy on various aspects such as green investment and development, promoting environmental quality and sustainability, protecting and enhancing natural resources, and fostering community engagement and livelihoods.
Sub-Decree on Construction Permit (1993)	✓	X	X	X	MLMUPC/Provincial Administration	The project needs to have construction permit for the construction of solar power plant project.
Law on Road Traffic (2014)	X	✓	✓	X		For transportation, the project must full comply with road traffic law, especially speed limit and make sure that all drivers have driving licese.
Land Law (2001)						
Environmental Protection						
▪ Environment and Natural Resource Code (2023) ▪ Sub-Decree on Solid Waste Management (1999) ▪ Prakas 447 on Battery Waste Management (2016) ▪ Sub-decree 16 on E-waste management (2016)	X	✓	✓	✓	MoE	The project needs hazardous waste (including batteries, PV panels, and other E-waste) disposal permit; the waste collectors must have be authorized by MoE.
Prakas 021 on Classification of Environmental Impact Assessment for Development Projects (2020)	✓	X	X	X	MoE	The project needs FEIA report to comply with Cambodia's regulation.
Sub-Decree on Air Pollution Control and Noise Disturbance (2000)	X	✓	✓	✓	MoE	This sub-decree stipulates the air quality threshold and the ambient noise levels that need to be maintained for different area: silent area, residential area, business and service areas, and light industries mixed in residential areas. For the case of this project, the used ambient noise threshold is for "business and service zone".

Sub-Decree on Water Pollution Control (1999) & Sub-Decree on Water Pollution Control (1999) and Sub-Decree on the Amendment of Article 4, Article 9, Article 11, Article 12 and Article 17 and Table Annex 2, Annex 3, Annex 4 and Annex 5 of Sub-Decree No. 27, dated 6 months. April 1999 on Water Pollution Control (2021)	X	✓	✓	✓	MoE	Waste water discharge standards is not applicable for this project, since this project does not discharge waste water. But this sub-decree state about the public water quality threshold. For baseline and monitoring purpose of this project, public water quality standard bases on the standard set in "Table 4 Levels for Water Quality Standards in Public Areas for Water Biodiversity Conservation" for public water area Type one.
Prakas on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed (2015)	X	✓	✓	X	MOE	This sub-decree provide a threshold for contaminants allowable in soil.
Law of Fisheries (2006)	X	✓	✓	✓	MoWRAM	This law stipulate about the obligation of the project to avoid disposing, discharging, dumping, or littering toxic substances (solid or liquid) in fishery domains.
Social Protection						
Labor Law (1997)	X	✓	✓	✓	MoLVT	The law mandates clean and hygienic working conditions and the standards for various aspects such as premises quality, sanitation, worker needs, and safety equipment. In addition, the law also defines work-related accidents broadly, including those occurring during work hours, during commuting, and due to occupational illnesses.
Law on Social Security Schemes for Persons defined by the Provision of the Labor Law (2002) & Sub-Decree on Establishment of Social Security Scheme "Health Care Scheme" for Persons Defined by the Provisions of the Labor Law (2016)	✓	✓	✓	✓	MoLVT	The project needs to ensure that employers and workers under the provision of the law on social security scheme for persons defined by the provisions of the labor law are covered by NSSF.
B. International Standards/guidelines						
IFC Performance Standards, 2012	✓	✓	✓	✓	SchneiTec Beyond and Lenders	This standard provide basis for developing the methodology for this ESIA report.

IFC General EHS Guidelines, 2007	X	✓	✓	✓		The project needs to follow the guideline for the implementation of the project during construction, operation and decommissioning phase.
IFC EHS Guidelines for Power Transmission and Distribution, 2007	X	✓	✓	✓		
IFC/WB Air Emissions and Ambient Air Quality Standards	X	✓	X	✓		
IFC/WB Guidelines for treated sanitary sewage discharges	X	✓	✓	✓		
IFC/WB Noise Standards1	X	✓	✓	✓		

Note: as stated in the IFC's 2012 Performance Standards on Environmental and Social Sustainability, when host country regulations differ from the levels and measures presented in the World Bank Group Environmental, Health and Safety (EHS) Guidelines, then projects are expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate, then a full and detailed justification for any proposed alternatives is needed as part of the environmental assessment. This justification should demonstrate that the chosen alternative performance level protects human health and the environment.

CHAPTER 3: PROJECT DESCRIPTION

3.1. Introduction

This section serves as a blueprint for understanding the project's interactions with both the environment and the surrounding social context. A detailed understanding of this information is crucial for conducting a thorough Environmental and Social Impact Assessment (ESIA) that can identify, assess, and mitigate potential environmental and social risks. The chapter will provide key details about the project, including its scale, location, resource consumption, waste generation, and other relevant factors necessary for evaluating its overall impact.

3.2. Type of Project

This 150 MW Solar PV Power Plant Project was organized as of Build-Own-Operate (BOO) project to provide electricity supply to the EDC for a period of 20 years and by following the Power Purchase Agreement (PPA) (see the PPA and other legal documents of the project in the Appendix).

3.3. Project's Location, Facilities, and Access Road

3.3.1. Location of the project

The 150MW Solar Photovoltaic Power Plant project will be built on an area of 168 ha in Ansa Kdam and Khla Krapeu villages, Sna Ansa and Anlung Tnaut communes, Krakor District, Pursat Province (see Map 1 and list of project's coordinates in Appendix). This 168 ha area were rented from SchneiTec who is the legal land owner on September 26, 2023 and the site clearance activities started in March 2024.

The decision to select the site for the project is to make sure that this project has close proximity to the planned infrastructure development by EDC which include substation and the 115kV transmission where the substation will connect to.

In general, the project site is approximately 30 km away from Pursat provincial town and around 11 km from Krako district centre.

The boundaries of the project site are delineated as follows:
- To the North: Adjacent to paddy field and another solar power plant project (SchneiTec Infinite and SchneiTec Sustainable)
- To the South: Adjacent to the houses and paddy field of local people
- To the East: Adjacent to the paddy field of local people
- To the West: Adjacent to Danm Nak Kranh and paddy field of local people

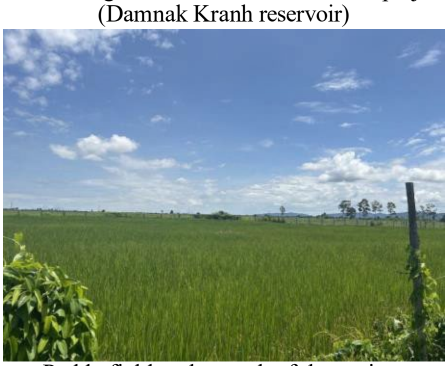
The following are the pictures of key area within the 168 ha boundary and the 3km radius:

Drone image: from the northern side of the project

Drone image: EDC's substation and paddy field at the east side of the project

Drone image: from the west side of the project (Damnak Kranh reservoir)

Houses at the south of the project



Paddy field at the south of the project

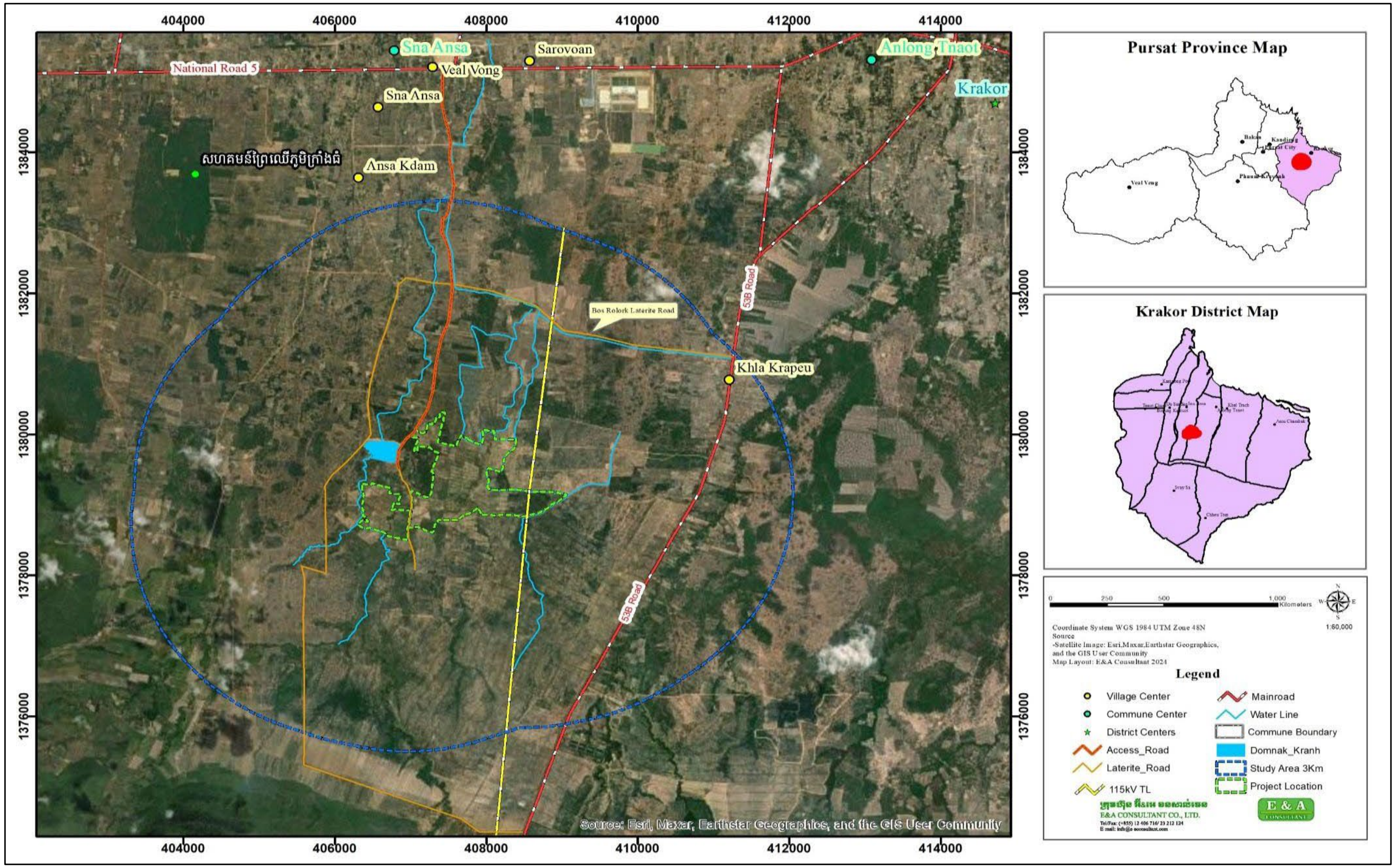
Cleared land at the waste of the project

Mango plantation at the north of the project

Paddy fields at the north of the project

Figure 1: Situation in and around the project's boundary

Map 1: project location



3.3.2. Project's Component, Existing Facilities and Associate Facilities

The project components: The project components include solar PV area, office, batter storage area (BESS), inverter, internal road, drainage system, transformer and the 22kV transmission line connecting the project to EDC's substation in the 168 ha area. This transmission line is less than 100m and are built within the 168 ha area belong to the project).

The Associate Facilities: The associate facility of this project is EDC's sub-station that is newly built on an area of 3 ha which is EDC's land. This substation is owned by EDC and consists of 22/115kV step-up transformer to increase the voltage of electrical power generated at solar power plant. As informed, the EDC's substation will connect directly to the 115kV transmission line which just cross over the project's boundary.

It is noted that the existing facilities related to this project are: access road, and the 115kV national grid. These 2 facilities were constructed before and independently from this 150MW solar power project (see map below). The access road was constructed in 2020 and the 115kV was constructed in 2021.

3.3.2.1. Access Road (existing facilities)

The figure below is the access road leading to the solar power plant project. The road, measuring 6 meters in width and extending for 8 kilometres. This road is also used by other villages living around the project. There is the presence of LV transmission line poles and paddy field along the road. This access road was made of asphalt in 2020, which is suitable for accommodating the transportation of equipment and personnel involved in the construction and operation of the solar power plant.

Figure 2: access road to the project to solar power plant project

3.3.2.2. Sub-station (newly associate facility)

A new sub-station is currently under construction on a 3-hectare land area close to the 168 ha land area for the 150MW solar power plant under the assessment. This sub-station belongs to EDC is under construction phase. As informed, the process to transfer the 3 ha land from SchneiTec to EDC is at the ministry of land management, urban planning and construction.

Figure 3: sub-station of EDC

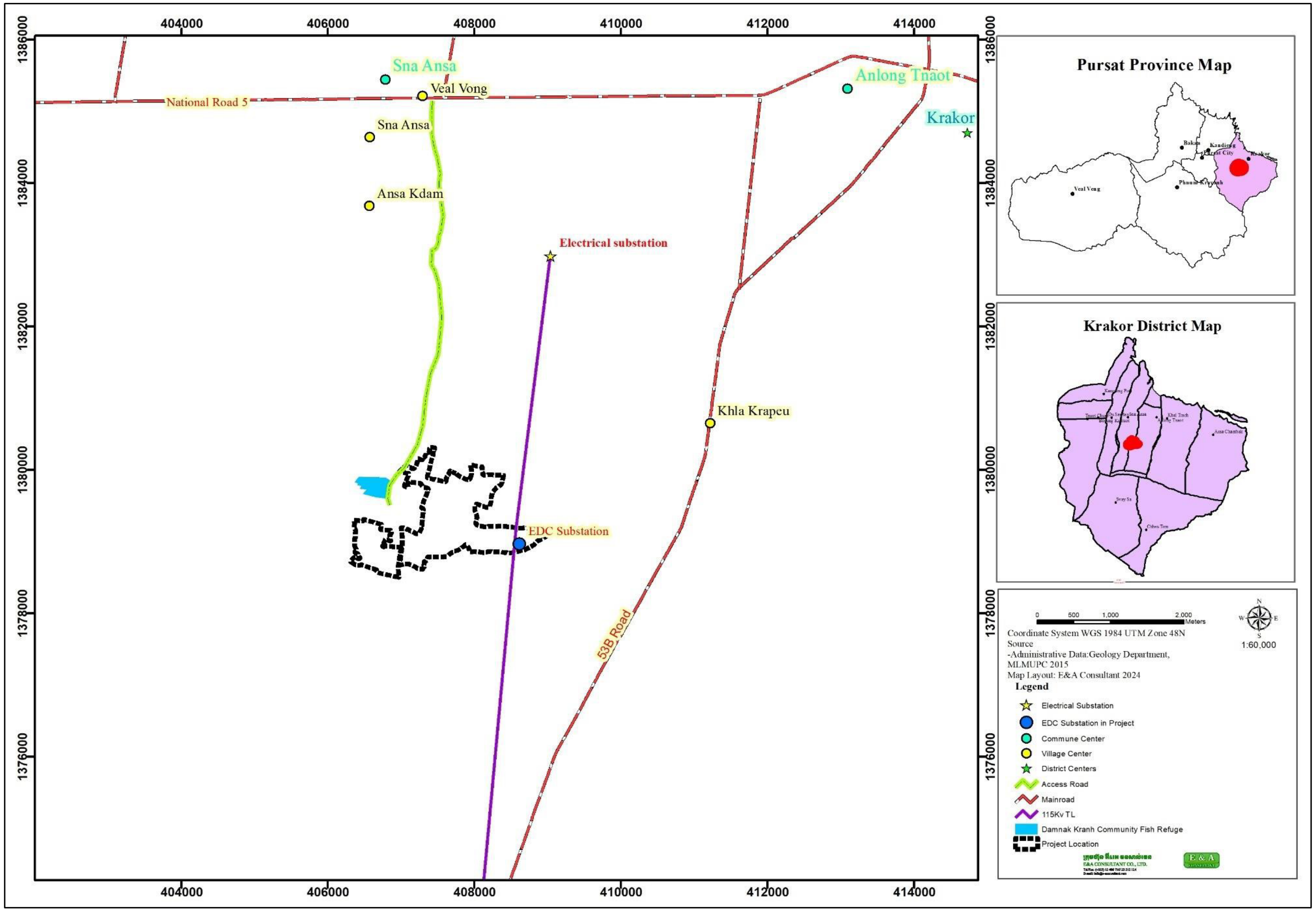
3.3.2.3. 115kV Transmission Line (existing facilities)

The 115kV transmission line, built in 2021, currently in operation at the site, belongs to EDC and plays a crucial role in transmitting energy from the existing solar projects to the national grid. This transmission line was built to connect the electricity from the southern part of the area to substation-GS49 and provide electricity to factories and other projects located along National Road 5.

This 115kV transmission line crosses over the 168 land area, facilitating energy transfer without the need for constructing additional lines. Initially developed before the commencement of the 150MW solar power project, the transmission line is fully capable of accommodating the new project. As a result, the 150 MW solar project will be connected directly to the 115kV transmission line, ensuring seamless integration with the grid and reducing infrastructure requirements.

Figure 4: the existing 115kV Transmission

Map 2: associated facilities of the project



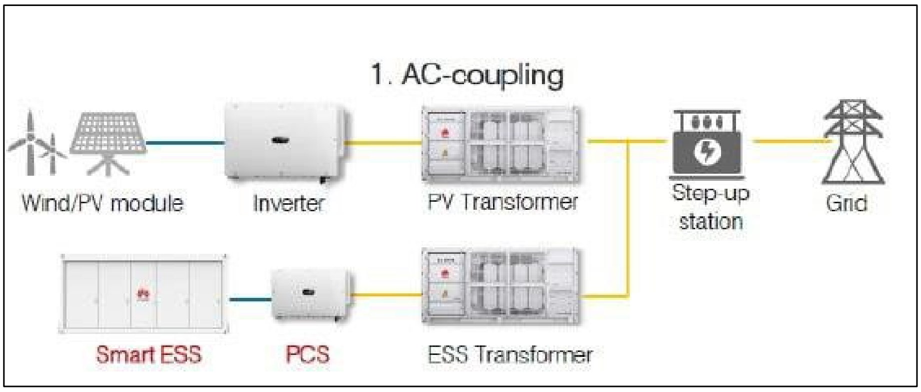
3.4. Energy production process

Solar panels play a crucial role in generating electricity from sunlight, converting it into direct current (DC) electricity. In an AC-coupled system, each solar panel string's DC output directly connects to an inverter. This device transforms the DC electricity into alternating current (AC) electricity, which matches the utility grid's voltage and frequency.

An inverter further boosts the voltage from the solar panels' DC output to a medium voltage level suitable for efficient long-distance transmission. From there, the AC electricity moves to a transformer, which elevates the voltage to an even higher level, making it suitable for transmission over extended distances on the utility grid.

In addition to solar panels and inverters, the project incorporate battery storage systems. These systems store excess solar energy generated during the day and release it back into the grid during peak demand periods. The battery storage system, or ESS, comprises components like the Smart ESS, PCS (power conversion system), and ESS transformer.

Figure 5: Diagram of an AC-coupled solar photovoltaic (PV) power plant system.



Source: SchneiTec Beyond, 2024

3.5. Plant Design

3.5.1. Structural design

Structural design is an important element to consider when developing the solar power plant project. Considering the investment, installation and maintenance costs, the project has used "Fixed Mount PV System". A fixed mount PV system is a solar power system where the solar panels are mounted on a fixed structure and typically tilted at a specific angle to optimize sunlight absorption. This type of system is relatively simple and cost-effective to install and maintain. Fixed mount systems are suitable for locations with consistent sunlight patterns and minimal shading.

3.5.2. Layout Design

As shown in the following table and figure, the land use plan for the project allocates 168 ha of land for various purposes. The largest portion, 135.33 ha, is dedicated to PV panel installation, the core component of the solar power generation system. The remaining areas are for BESS, Electricity Control and Management Building, Transformer and line route etc.

Table 3: land use plan for the project

No	Purpose of land use	Size (ha)
1	PV Panel Installation	135.33
2	BESS	0.2
3	Electricity Control and Management Building	0.0145
4	Transformer and line route	0.1734
5	Solid waste storage	0.04
6	Parking lot	1
7	Security check point	0.05
8	Other infrastructures	31
	Total	168

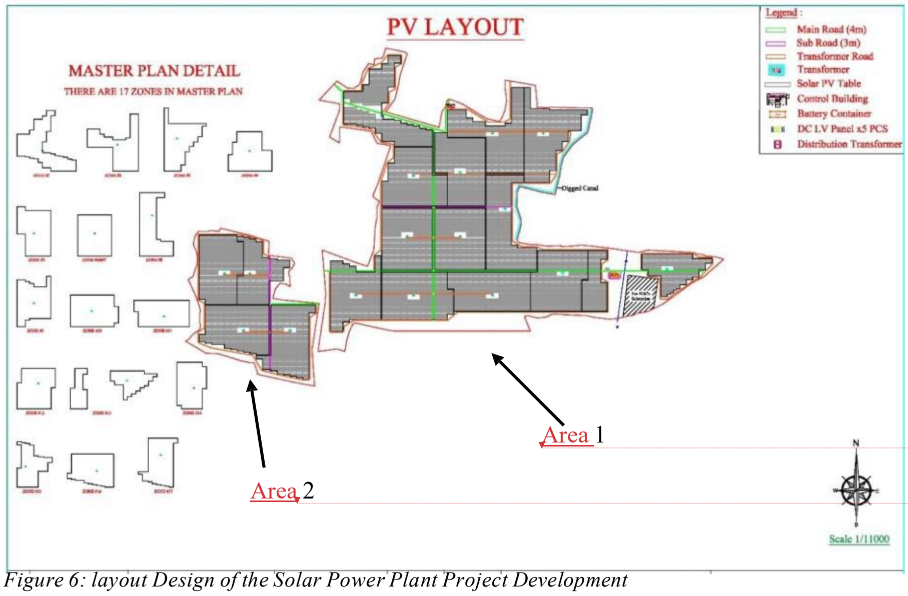


Figure 6: layout Design of the Solar Power Plant Project Development

Figure above presents the layout design of the Solar Power Plant project, that will be developed on the area of 168 Hectare in the selected site. The project site consists of 2 land areas (Area 1 and Area 2) separated by local road. Within the proposed 168 Hectare of leasing land, the solar PV power plant will be built to produce an AC capacity of 150MWac and the output power from the power plant will be connected directly to the existing substation and high voltage transmission line located in the proximity of the land.

Roads will be constructed inside the power plant to allow the construction and maintenance teams to get an easy access to the farm and PV modules. As planned, the project will construct internal laterite roads: the main road is 4m width and 3,974 meters in length, and sub-road is 3 m width and 13,112 meters in length (see the above figure). So far, these roads are all 100% completed.

In the following illustration, to technically produce the AC output energy of 150MWac that will be injected into the national grid via the interconnection point, SchneiTec Beyond will classify the design approach into layers and break down the whole Solar Power Plant project as follows:

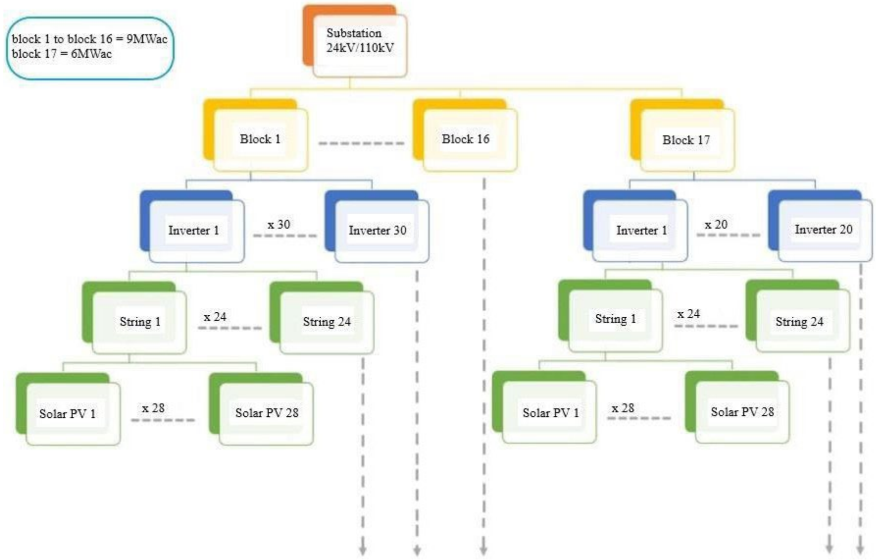


Figure 7: Flow of Main Equipment for the Construction of the 150MW Solar Farm

The Solar Power Plant project will consist of 17 building blocks, which 16 blocks is a copy of one another and each block can produce the minimum AC output power capacity of 9MWac. One of another block can produce 6MWac. Thus, 17 blocks will be connected to the substation 22kV/110kV. Thus, the project will have 332,754 solar PV panels in total.

❖ Block 9MW

- There are 16 blocks of 9MW; each block comes with 30 units of inverter
- There are 14 blocks that come with 24 strings per inverter
- There are 1 block that come with 22 strings per inverter
- There are 1 block that come with 24 strings for 2 inverters and 22 strings for 28 inverters
- In each string, there will be 28 solar PV modules connected in series

❖ Block 6MW

- The 6MW block comes with 20 units of inverter
- There are 1 block that come with 24 strings per inverter
- In each string, there will be 28 solar PV modules connected in series

3.5.3. Electrical Design

3.5.3.1. PV Electrical Design (1500Vdc)

Technically, we propose SUN2000-330KTL-H1 inverter in the Project. The rated output power is 300kw, max. Output power is 330kw, and output voltage is 800V, 3 phases. Each inverter has 6MPPTs, each MPPT has 4/5/5/4/5/5 inputs, totally 28 inputs. 28 strings of PV module in parallel are connected to one inverter's DC inputs. All inverters are connected to transformer station, before connecting to the 22kV Switchgear and finally to the national grid.

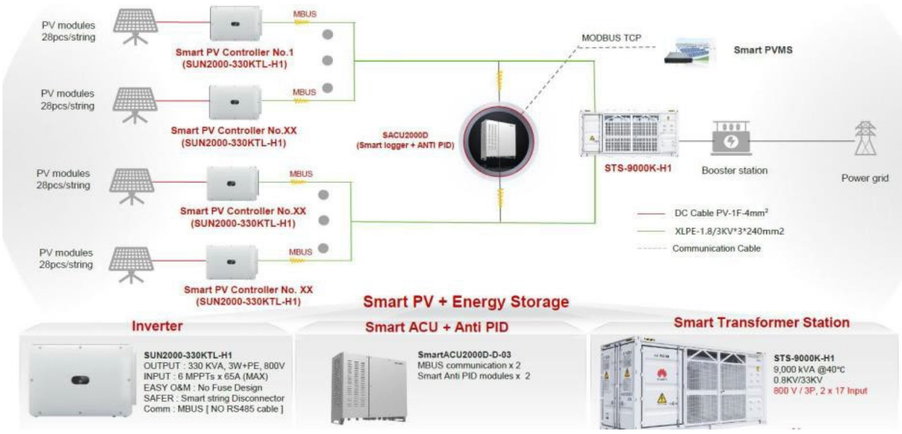


Figure 8: Electrical Flow Diagram of the 150MW Solar Power Plant

According to the table below, whole of the Solar Power Plant will produce at least 150MWac. Thus, to have 150MWac output power from the Solar Power Plant, 17 blocks will be used, resulting in an input power of 183MWdc.

Table 4: Parameters for 150MWac Solar Power Plant

Parameters for 150MWac Solar Power Plant			
Panel Power (Wp)	550	Quantity of Panel	332,754
Quantity per String	28	Quantity of Inverter	500
Power per Inverter (kWp)	369.6	DC/AC Ratio	1.22
DC Capacity (MWdc)	183	Power Factor	1.0
AC Capacity (Mwac)	150		

3.5.3.2. BESS Electrical Design (1500Vdc)

As we move toward to inject more solar power into the national grid, one needs to also think about the balancing the grid stability during energy fluctuation, generating from the renewable power sources by combining batteries with existing generation assets. Therefore, in this project, SchneiTec Beyond is going to propose the optimum solution that is able to provide an uninterrupted supply of power to maintain a stable output in all environments and conditions.

The project includes a Battery Energy Storage System (BESS) with a power capacity of 30 Mw and a storage capacity of 32.5 MWh. This system utilizes Power Conversion Systems (PCS), which efficiently manage the energy flow between the battery system and the grid, ensuring a stable power supply. The BESS is designed with power capacity of 30 MW and a storage capacity of 32.5 MWh to provide a backup time of at least 30 minutes. The BESS life time is 20-year lifespan of the project.

Battery Energy Storage Systems (BESS) is a solution that provides backup to those who want to make greater use of renewable energy, but have found renewables have not lived up to expectations due to weather-related intermittency or power grid limitations. It shows promise in mitigating many of the effects of a high penetration of non-dispatchable renewable generation (e.g. wind and solar). Amid an increased focus on the utilization and introduction of renewable energy sources, BESS compensates for the durability limitations of these sources, providing essential value for operators who need to provide a stable electricity supply while increasing and maximizing the revenue.

Benefit with energy storage system can save operational costs in powering the grid, as well as save money for electricity consumers who install energy storage in their homes and businesses, improve reliability & resilience, integrate diverse resources and reduce environmental impacts.

BESS provides key solutions for stable energy supply as follows:

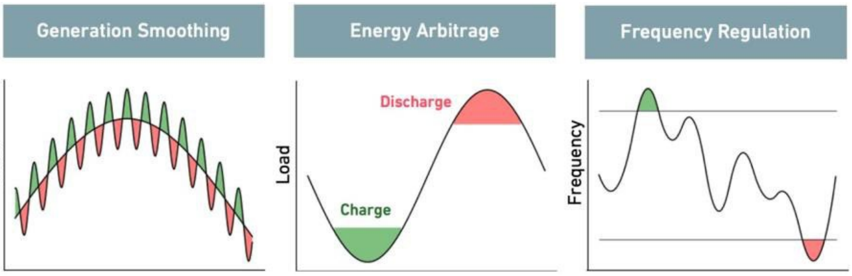


Figure 9: Key Solution for Stable

One of the popular solution for BESS is AC coupling. AC-coupled storage can turn any new or existing solar system into a battery-ready system unlike alternate DC coupled / hybrid inverter solutions. With the introduction of new high voltage batteries, AC-coupled storage has become a lower cost option to add battery storage to a solar system compared to hybrid inverters or low voltage battery storage. AC-coupling also offers a number of advantages such as flexibility for installation and also future upgrades or changes to either the solar or storage system. This means the system is better able to meet the individual needs of Solar Power Plant and can allow us to add battery storage at a lower cost. AC-coupled storage also allows us to better increase our independence from the grid saving further on electricity supply charges. This financial benefit is also increased through a more efficient operation. And with a simplified Solar Power Plant stable operation, AC-coupled storage with high voltage batteries is the smart solution for combining battery storage to the solar system.

3.5.3.3. Transformer

SchneiTec Beyond designed two transformer stations with capacity of 9000K-H1 and 6000K-H1, including one MV switchgear for protection. Thus, the entire Project system will require 21 transformers (see the following figure). Each transformer station is fully compacted in one container.

Input	
Available Inverters / PCS	SUN2000-330KTL
Maximum LV AC Inputs	30[1]
AC Power	9,000 kVA @40°C [2]
Rated Input Voltage	800 V
Max. Input Current at Nominal Voltage	2 * 3572 A
LV Main Switches	ACB (4000 A / 800 V / 3P, 2*1 pcs), MCCB (250 A / 800 V / 3P, 2*15 pcs)
Output	
Rated Output Voltage	22 kV
Frequency	50 Hz
Transformer Type	Oil-immersed, Conservator Type
Tappings	± 2 x 2.5%
Transformer Oil Type	Mineral Oil (PCB Free)
Transformer Vector Group	Dy11-y11
Minimum Peak Efficiency Index	99.548%
Transformer Load Losses	55.7 kW (+15%)
Transformer No-load Losses	7.4 kW (+15%)
Impedance(HV-LV1 or HV-LV2)	9.5% (0 ~+ 10%)@ 4500 kVA
RMU Type	SF_6 Gas Insulated
RMU Transformer Protection Modules	MV Vacuum Circuit Breaker Modules
Auxiliary Transformer	5kVA, Ii0, 800 V / 230V /127V
Protection	
Transformer Monitoring & Protection	Oil level, oil temperature, oil pressure and buchholz
Protection Degree of MV & LV Room	IP 54
Internal Arcing Fault Classification of STS	IAC A 20 kA 1s
LV Overvoltage Protection	Type I+II
General	
Dimensions (W x H x D)	6,058 x 2,896 x 2,438 mm (20' HC Container)
Weight	< 28 t
Operating Temperature Range	-25°C ~ 60°C [3]
Relative Humidity	0% ~ 95%

Input	
Available Inverters / PCS	32 * SUN2000-200KTL / SUN2000-215KTL or 30 * LUNA2000-200KTL
AC Power	6,500 kVA @40°C / 5,920 kVA @50°C [1]
Rated Input Voltage	800 V
Max. Input Current at Nominal Voltage	2 * 2482.7 A
LV Main Switches	ACB (2900 A / 800 V / 3P, 2*1 pcs), MCCB (250 A / 800 V / 3P, 2*16 pcs)
Output	
Rated Output Voltage	22 kV
Frequency	50 Hz
Transformer Type	Oil-immersed, Conservator Type
Tappings	± 2 x 2.5%
Transformer Oil Type	Mineral Oil (PCB Free)
Transformer Vector Group	Dy11-y11
Minimum Peak Efficiency Index	99.513%
Transformer Load Losses	50.1 kW
Transformer No-load Losses	5.0 kW
Impedance(HV-LV1, LV2)	8 % (0 ~ +10%) @6,500 kVA
RMU Type	SF6 Gas Insulated, 3 Units
Auxiliary Transformer	5 kVA, Dyn11, 0.8/0.4 kV
Protection	
Transformer Monitoring & Protection	Oil level, oil temperature, oil pressure and buchholz
Protection Degree of MV & LV Room	IP 54
Internal Arcing Fault RMU	IAC A 20 kA 1s
LV Overvoltage Protection	Type I+II
General	
Dimensions (W x H x D)	6,058 x 2,896 x 2,438 mm (20' HC Container)
Weight	< 22 t (48,502 lb.)
Operating Temperature Range	-25°C ~ 60°C [2] (-13°F ~ 140°F)
Relative Humidity	0% ~ 95%
Max. Operating Altitude	2,000 m (6,562 ft.)
Enclosure Color	RAL 9003

Figure 10: specification of transformer

3.5.4. Technology Selection

Choice of proven technology is significant to meet the Project's scope and produce the output energy as expected. SchneiTec Beyond has worked with a wide range of advanced technological solutions from the leading suppliers in each respective area. In accordance with the international accepted standard and practice and to ensure that the project will be running well beyond the expected stabilize and lifetime of the system, SchneiTec Beyond will make use of only premium quality materials, equipment, and advance technological solutions from our top-tier suppliers/ partners in the field.

The key breakdown of materials and components for developing the Solar Power Plant project are given as follows:

Table 5: Technical Specifications Selection for 150MW PV Solar Power Plant

No	Description	Quantity	Unit
1	Solar PV Module	332,754	Piece
2	Inverter	500	Piece
3	PV Structure	3962	Set
4	Transformer	17	Piece
5	Switchgear	20	Piece
7	Cable	1	Lot
8	Meter	38	Piece
9	Sensor	1	Lot
10	Transmission Line	1	Lot

Table 6: Technical Specifications Selection for 32.5MWh of ESS

No	Description	Quantity	Unit
1	Battery Container	16	Piece
2	DC BOX-9/5 H0	32	Piece
3	PCS	154	Piece
4	Transformer	4	Piece
5	Switchgear	3	Piece
6	Monitoring System	1	Lot
7	Cable	1	Lot
8	Meter	4	Piece
9	Sensor	1	Lot

3.5.5. Transmission Line

The overhead transmission line will be developed within the 168 ha boundary with the length of less than 100m to connect the electricity generated from the project to EDC's sub-station. The equipment supplied under this proposal shall confirm to EDC Design Standards, the latest edition of the appropriate IEC specifications or other international standards.

The following are the specification of the 22 kV transmission:

- Normal voltage Un: 22kV
- Highest system voltage Um: 24kV
- Design voltage Um: 24kV
- Standard frequency: 50Hz
- System configuration: 3 phases, 3 wires

3.5.6. Drainage system

The following figure shows that the network of drainage channels and structures for the project. The system is designed to collect and divert rainwater away from the solar panels and other infrastructure within the solar farm. As shown, the system was divided into 2 key sub-drainage areas (Area 1 and Area 2), each with its own set of channels and outlets.

Drainage system for Area 1 collect water from the project and discharge into the existing drainage to the north, while drainage in Area 2 collect rain water from the project aera and discharge into the canal which is the upstream water sources of Damnak Kranh Reservior.

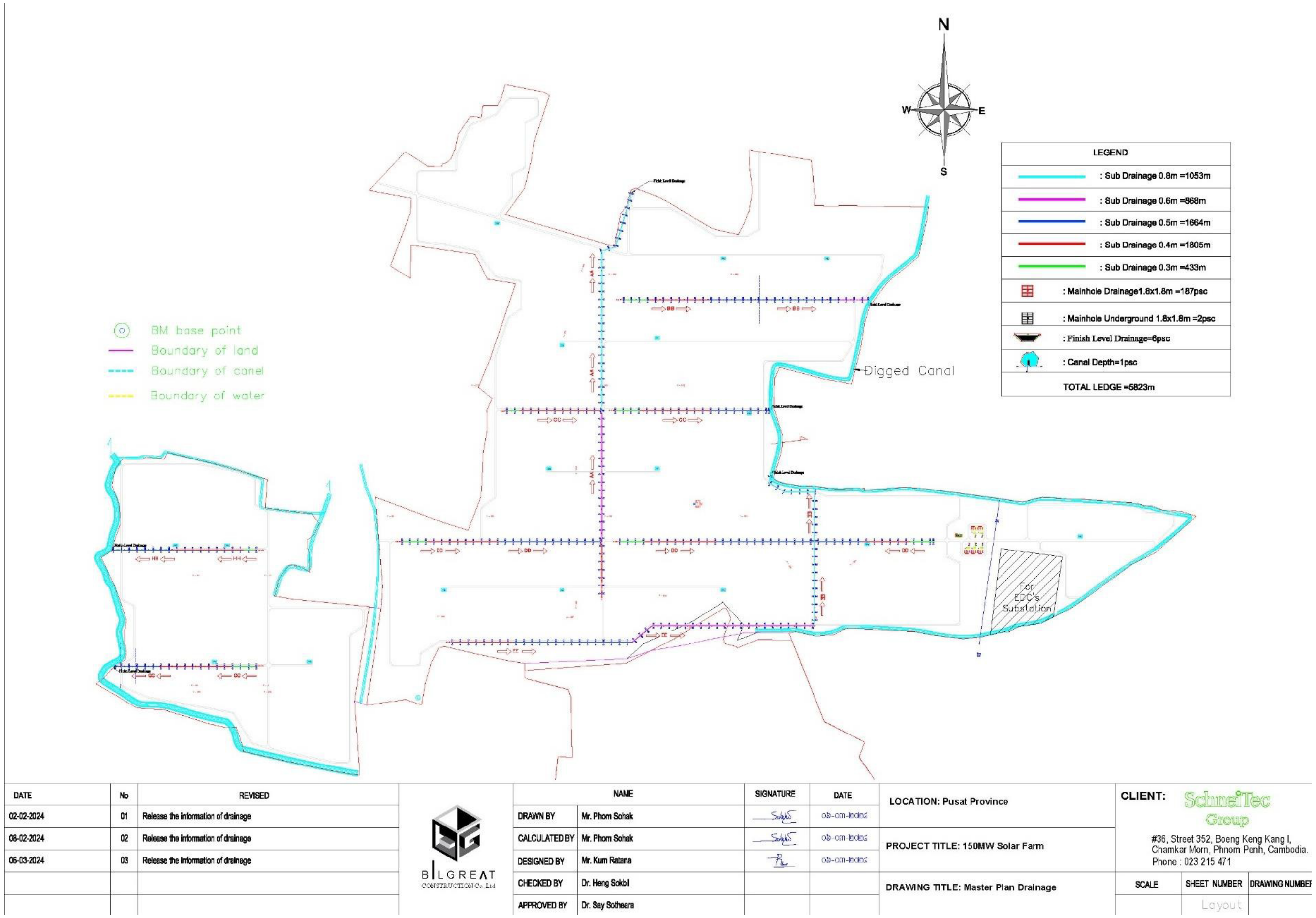


Figure 11: Drainage system for the project

3.6. Project stage and activities

3.6.1. Construction

To start the construction of this project, SchneiTec Beyond have got the construction permit from Pursat Provincial Department Office. The management of the construction phase of the solar PV project needs to be complied with or in accordance with the construction high standard and best practice. At the core of SchneiTec Beyond's EPC team and based on our previous successful experiences, our aim is to construct the solar power plant project to meet the required level of quality within the time and cost limits. During our construction period, SchneiTec Beyond also takes issues like environmental impact, and health the safety of workforce (other affected people) with great care and seriously.

As an experienced Solar Power Plant developer, SchneiTec Beyond takes a good design approach very critical. We understand that smooth and easy construction starts with a good design. Since a good design can also save a lot on maintenance costs over the next 20-25 years of the project lifetime, a lot of decisions and efforts have been consumed to make sure that the layout and design of a Solar Power Plant could comply with a high standard and get rid of common risks.

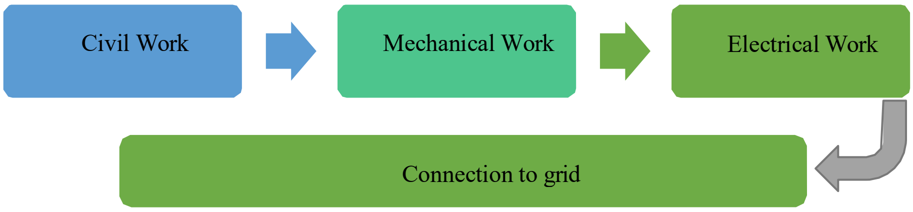


Figure 12: Flow Diagram of Construction Works Involving Different EPC Teams

The diagram above outlines the general sequence of work involved in the construction of a solar power plant. Here is a more detailed breakdown of the process:

Civil Works:

- The project conducted land preparation in a way that leads to minimal disturbance to the natural landscape. Only minor land scaping works was performed to remote rice field embankments and plots boundary while the most part of the landscape remain the same. This land clearing was done in the project's boundary (Area 1 and Area 2). Land preparation involved in adjusting the elevation of the land and diversion and elimination of canals/drainage in the area. In addition, the project also required laterite for the construction of internal road.
- Foundation Construction: Build foundations for the solar panels, inverters, and other equipment, ensuring they can withstand the weight and environmental condition.
- Internal Roads and Infrastructures: Construct internal laterite roads, pathways, 22kV line, BESS, office, drainage system, and other infrastructure necessary for construction and maintenance.
- Substation: the substation for this solar power plant will be developed by EDC within the 168 ha boundary.

Note: During civil work, particularly land clearance, the potential for negative impacts that are taken into consideration are those related to drainage, stormwater, and siltation, water ponding under PV panels, particularly given the project's large scale (168 ha) and the flat terrain with loose soils. This project can potentially impact on soil erosion and drainage patterns due to vegetation removal and the site grading, foundation work, drainage works, internal road construction, and the elimination of natural canals can alter hydrological flows in the area.

As stated in this report, SchneiTec conducted a flood risk assessment in 2019. While the assessment focused on the 90MW portion of the project, it provides valuable insights into flood risks in the area. The assessment concluded that the project site is safe from riverine flooding but identified potential risks from fluvial flooding caused by localized rainfall. The report also acknowledged the need for an on-site drainage system to manage surface runoff.

To solved the issues above, SchneiTec Beyond implements the existing measures as follows:

1. Constructed the internal drainage for the entire 168 ha project area, ensuring that it can effectively manage stormwater runoff and prevent water ponding under the PV installations. The drainage system design incorporates measures to minimize erosion and sedimentation.
2. Minimize erosion and sedimentation during construction and operation by using vegetation planting around the project and grass around PV panel has been kept and maintained.
3. Collaborating with local authorities to monitor flood conditions and implement additional mitigation measures, and working with local authorities to maintain culverts and roads affected by hydrological changes, if required.

It is worth taking noted that the effect of this hydrological change is not clearly unknown since no hydrology study to assess the flood risk by incorporating the existing and future projects in the assessment area. Therefore, the project will conduct hydrology study for cumulative impact on hydrological systemin the area. The hydrological study will incorporate the existing and future solar power plant projects to check how the identified current and future project exacerbate flood risks in nearby locations. It is expected that this hydrology study, if found that the projects increase the risk of flood in the area, will provide proper and effective mitigations for implementation.

Mechanical Works:

- Solar Panel Installation: Mount the solar panels on the prepared foundations, ensuring proper orientation and spacing for maximum solar energy capture.
- Inverters and Other Equipment: Install inverters, transformers, and other electrical equipment necessary for converting solar energy into usable electricity.

Electrical Works:

- Wiring and Cabling: Connect the solar panels, inverters, and other equipment with wiring and cabling to create a functional electrical system.
- Grid Connection: Connect the solar power plant to the electrical grid, ensuring compliance with grid codes and regulations.

3.6.2. Operation and Maintenance

The performance of the PV power plant is expected to fall during its lifetime, especially in the second and third decade of its life as modules continue to degrade and plant components age. In addition to the quality of the initial installation, a high degree of responsibility for the performance of the solar power plant project lies with the operation and maintenance (O&M).

Therefore, as the EPC and developer of the solar power plant project, SchneiTec Beyond essentially care about suitable and proper operation and maintenance of the PV plant in order to optimize energy yield and maximize the useful life of the system. Towards this goal, there is a need to ensure that the plant components function efficiently throughout the lifetime of the plant.

The operation and maintenance tasks can usually be broken down as follows:

- Scheduled or preventive maintenance requirements: SchneiTec Beyond planned in advance and aimed at preventing faults from occurring, as well as keeping the plant operating at its optimum level to supply sufficient output power to the national grid. Our regular monitoring can ensure the plant can produce the output energy as expected.
- Unscheduled maintenance requirements: this maintenance work will be carried quickly in response to failures. As such, the key parameter when considering unscheduled maintenance is diagnosis, speed of response and repair time. SchneiTec Beyond team is likely to take the shortest possible response for increasing energy yield.
- Reporting requirements: these include performance, environmental, health and safety reporting, site accessibility and availability of O&M materials or key personnel.

Addition, he project will also implement the highly efficient and smart control and command system such as supervisory control and data acquisition (SCADA), CCTV cameras for remote surveillance and reconnaissance, and smart monitoring system, to keep track of the operation of the power plant and to provide daily remote monitoring of the performance of the solar power plant project to identify when performance drops below set trigger levels.

PV panel cleaning:

PV Panel cleaning is required when dirt, dust, pollen, and other debris are accumulated over time. This buildup can significantly impact the efficiency of your solar panels, reducing their energy output. The project will do cleaning during the dry season and will be done no more than three times annually. Cleaning will be done manually by using groundwater.

3.6.3. Decommissioning

The PV power facility will be decommissioned at the end of its useful life, or alternatively, upgraded. Should the plant be decommissioned, the site will be rehabilitated to its original state. This involves removing PV panels from fixed aluminium frames, dismantling the frames, and transporting the panels to recycling facilities or reusing them at other operational sites. Electrical equipment, such as transformers, will either be repurposed for other developments or sold. Underground cable runs will be removed, and buildings like the guardhouse may be taken over by the landowner or demolished and the rubble transported to a municipal waste site. Finally, disturbed land areas will be rehabilitated and replanted with indigenous vegetation if necessary.

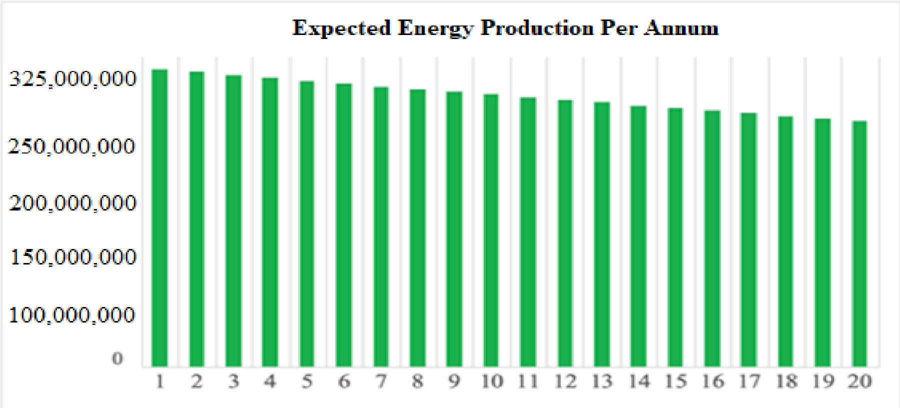
So far, in Cambodia, there is no licensed disposal site or licensed waste collector who can collect broken PV panel from the solar power plant. As recommended by MoE, the broken PV panels will be stored safely in a storage house within the boundary of the project. In addition, project will fully cooperate with the MoE, if new guidance for the broken PV panel is issued by the government.

3.7. Electricity Generation and Sale Plan

The project developed a energy yield prediction for this solar power plant project. This prediction is crucial for calculating project revenue, assessing feasibility, and attracting financing. While PV modules can have a lifespan of 25-30 years, their performance gradually degrades over time. This degradation rate is typically higher in the initial year and then stabilizes.

Based on past records and assumptions, the project is expected to produce approximately 325 GWh of energy in the first year, with a 1% annual degradation rate. To achieve this prediction, various factors are considered, including solar resource, temperature conditions, plant layout, and technical specifications. The EPC team conducts a feasibility study to explore potential loss factors affecting energy yield.

By choosing high-quality materials and advanced technology from reputable suppliers, the solar power plant aims to maximize output power. With the support of international partners, the EPC team will collaborate with local engineers and foreign experts to successfully develop the project. The goal is to produce up to 325 GWh of clean and renewable energy annually in the national grid.



Graphic 1: Expected Energy Yield Per Annum for 150MW Solar Power Plant project

3.8. Status of the Project and Implementation Milestone

The development of the solar PV power plant in Pursat province on BOO basic is expected to have a commercial operation date (COD) on March 31, 2025. The construction phase takes around 10 months, commencing from April 2024.

The followings are the detailed project milestone:

- PPA & IA Signed Date : May, 2023
- Project Commencement Date : April, 2024
- Financial Closing Date : July 16, 2024
- Testing & Commissioning Date : Feb 2025
- Commercial Operation Date (150MW) : March 31, 2025

It is noted that at the time of the assessment (October 2024), the project’s construction has been competed around 60% of the total construction work. During that time, solar PV modules has been already installed at the project site.

3.9. Land Requirement, Land Rent and Land Acquisition

3.9.1. Land requirements

The proposed 150 MW solar power project requires a land size of 168 hectares. In this 168 ha land area, there are 2 main areas of land (Area 1 and Area 2) that are close to each other but separated by local roads. Area 1 is 133 ha located east of the Damnak Kranh Fish Refuge reservoir, and Area 2 is 32 ha and located west of Damnak Kranh Fish Refuge reservoir (Figure 6). The Area 1 is allocated for such project's components as solar module installation, a site office, a control building, a stockyard, and a substation, while Area 2 is dedicated to only the installation of PV panels.

As a principle, the project plans to rent land from single privately owned agricultural land that can avoid the need to convert any forest land and the adverse impact caused by displacements. From this point of view, the project decided to rent (not to buy) the land that is legally owned by SchneiTec that is free from forest cover and land disputes.

3.9.2. History of the land use change and the land acquisition by SchneiTec (the land owner)

By 2010, the project site had semi-evergreen and deciduous forest covers (MoAFF, 2010). As informed by local authorities, these kinds of forest cover gradually disappeared in 2015 due to the conversion of land covers from its now nature to farm land (rice and mango) by local people since 2012. This means that from 2012 onward, the land is no longer in the forest over area, but privately owned by local people. As informed by local authorities and SchneiTec, before its land acquisition date, in the 168 ha land rea, there were 20 plots of lands owned by 10 land owners.

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The land acquisition from the 10 land owners was done by SchneiTec on September 25, 2020. As informed by local authorities (Sna Ansa Commune Chief and Anlong Tnaut Commune Chief), the land sale transactions were done on a basis of willing buyer willing seller. The study team cannot contact the 10 sellers, and the local authorities cannot provide contacts of those sellers since the sales transactions were done a long time ago and most of the land sellers do not have their residences in the communes or they have already moved out to live in other places or provinces. However, the local authorities confirmed that the land sale transactions were done on a voluntary basis and followed market price. The land sellers were happy to sell their lands and get the money to use for other investments rather than using the land for agricultural purposes where the land fertility is low and the agricultural yield is low.

3.9.3. Land rent process done by SchneiTec Beyond

The land rent for the project was done through three key steps, starting with (1) land identification, (2) checking the land legality and occupancy status, and (3) signing the rent contract. The primary objective of land rent is to make the rent as simple as possible by renting from one landowner who possesses the land big enough for the development of the project. As principle, the land to be rented must be privately and legally owned and free from any legal dispute. The land must be legally possessed by the landowner. All of this information was confirmed by legal document review (land titles) and site observations by SchneiTec Beyond. Only when all criteria as stated above are confirmed will SchneiTec Beyond start to prepare and sign the rent contract.

In practice, SchneiTec Beyond started to identify the land above as the potential land for the project in the first quarter of 2023. After collecting the information and decision from the management, SchneiTec Beyond decided to rent the area of 168 ha for the development of a 150 MW solar photovoltaic power plant with battery energy storage system from SchneiTec. This land is located in Ansa Kdam village, Sna Ansa commune, Krakor district, Pursat province. The rent contract between the 2 parties was on September 26, 2023, while the 168 ha of land had been legally occupied by SchneiTec since September 25, 2020, and the land has been left unused for a couple of years. After this rent contract signing, there is no more land acquisition done for the project.

3.9.4. Key sensitivities related to the 168 ha land

The project development does not involve any tribal or forest land, as the project site has been converted to agricultural land by local people in 2012. The land acquisition was legally conducted by SchneiTec, and no encroachments have been observed. While no common properties like water dams or roads were affected, three natural canals were impacted. Additionally, no cultural, historical, or religious sites were identified in the project area. The 168 hectares of land will be converted from agricultural use to accommodate the development of a 150 MW solar PV power plant.

Table 7: Key sensitivities related to land procurement for project development

Sensitivity	Detail
Tribal land	No tribal land has been procured by the project development.
Forest land	The project site does not involve any forest land. The land has been converted to agricultural land by local people in 2012 and the following year. During the land acquisition by SchneiTec, the area of 168 ha is commonly crops land.
Encroachment	No encroachment on the project land procured to date was reported or observed. The land has been procured legally by SchneiTec, and the certificate of land ownership is enclosed in Appendix.
Common property resources	No common properties like water dam, road etc. have been affected by the project. But 3 natural canals that had been effected and diverted.
Cultural heritage	No structures of cultural, historical, religious, or spiritual significance were reported to be situated in the vicinity of the project or on the land parcels that were acquired or identified for the project.
Land use change	The total land of 168 ha will be converted from agricultural lands to develop of 150MW solar PV power plant.

3.10. Human Resource Requirements

During the construction period, a total of 419 local staff, including 5 international staff, are needed. This includes project managers, engineers, technicians, consultants, office staff, and skilled and unskilled labour. For the operation period, 87 local staff are required, with no international staff needed. Overall, the project primarily relies on local labour, particularly for the operation phase.

Table 8: Human Resources of construction and operational phase

Job Position	Construction Period		Operation Period	
	Local	**International**	**Local**	**International**
Project Manager	5	0	2	0
Engineer	8	1	4	0
Technician	90	4	10	0
Consultant	1	0	1	0
Office Staff	10	0	4	0
Skilled Labor	300	0	16	0
Unskilled Labor	0	0	50	0
Sub-Total	414	5	87	0
Total	419		87	

Source: SchneiTec Beyond, 2024

3.11. Energy Consumption Requirements

The project established a temporary electrical connection to the local electricity grid to facilitate construction activities. This connection supplied a 20-ampere supply to power critical equipment, such as public lighting, office facilities, and cutting and welding machines. In the event of outages or disruptions to the primary supply, the project also prepares a 26-kilowatt generator as a backup to guarantee uninterrupted power. During operation phase, the project utilizes solar energy to power its operations, generating approximately 100 kilowatt-hours (kWh) per day. This electricity is primarily used to operate equipment in the control room and other essential equipment throughout the entire project area.

3.12. Water Consumption Requirements

During the construction phase, the project requires a maximum of 41 m^3/day to meet the general needs of staff and workers, including restroom use and other daily usage (the estimation is based on an estimated daily water consumption of 100[1] litters per person). The amount of water for construction activities like concreting is minimal since this project mostly deals with the installation of PV panels. The source of water for this construction phase is mainly from wells.

During construction phase, the volume of water required for PV cleaning in this project is approximately 990 m^3 per time[2] or approximately 2,970 m^3 per year, as estimated. The PV panel cleaning is anticipated to be conducted during the dry season and will be conducted no more than three times annually.

3.13. Wastes in Construction Phase

During the construction phase, the project generate various types of waste. Those wastes are: construction debris including concrete, metal, wood pallets, plastic wires, packaging materials like cardboard, plastic wrap, and foam. In addition, the certain hazardous waste like paints, oils, broken solar panels.

To manage construction waste, the project prepared a temporary waste storage place within the project's boundary. The project separate materials into recyclable and non-recyclable categories. Recyclable materials, such as metal and plastic, can be sent to recycling facilities by working with buyers.

[1] Water, S., & World Health Organization . (2003). Right to water

[2] The estimation is based on the requirement for PV panel cleaning of 1.5 liter per m^2.

For other non-recyclable waste and hazardous wastes, but project will work with Pursat Department of Environmental and licensed waste collection agencies for waste disposal. In addition, the project will get the permit for the disposal of hazardous wastes.

3.14. Waste in Operation Phase

3.14.1. Sewage

During the operation phase of the solar power project, sewage management will be handled through a septic tank system with a soak-away method, as the project area lacks a centralized sewage system and wastewater treatment facilities. With 87 staff members working on-site, the septic tank will be designed to handle the daily waste generated by the workforce. The soak-away system will ensure that the wastewater is properly absorbed into the ground, minimizing environmental impact. Regular maintenance of the septic tank will be crucial to prevent overflow or contamination, ensuring a sustainable and efficient waste management solution for the project.

3.14.2. Domestic solid waste

During the operation phase of the solar power project, proper domestic solid waste management is essential, especially with a workforce of 87 staff members and no formal waste collection agency in the area. This solid waste can be generated a round 43 kg per day[3].

To manage waste sustainably, the project will adopt an in-house approach for waste handling and explore collaboration with environmental authorities to ensure compliance with national regulations. Dust bins will be strategically placed in key areas within the project site, such as offices, restrooms, and common areas. Bins will be clearly labeled to encourage proper use, and the dust bins will be categorized for waste segregation: organic waste, recyclable materials (paper, plastic, metal), and non-recyclable waste.

Waste will be regularly collected from the bins and temporarily stored in a designated waste storage area within the premises. The storage area will secure and properly ventilated to avoid odor or pest issues. The project will cooperate with waste collector in Krakor district to collect domestic waste every 2 days.

3.14.3. Hazardous Waste and Broken Solar PV

During the operation phase of a solar power project, potential hazardous wastes may including used lubricants and oils, spent batteries, broken PV modules, and electrical waste (E-waste). Managing these hazardous wastes during the operation phase of the solar power project will require careful planning, as the project area lacks a hazardous waste collection agency. These waste is expected to be minimal since the solar power project does not required heavy maintenance.

Waste such as used lubricants, oils, spent batteries, and e-waste will need to be temporarily stored in secure, designated areas on-site. These materials will be segregated and stored in leak-proof containers to prevent any contamination of the environment. The project will work with the hazardous waste collection agency authorized by the Ministry of Environment to dispose of those wastes. In addition, the project will get the waste disposal permit from MoE so that these hazardous waste can be disposed through the collection agency.

For broken PV modules, since the Cambodian government has not issued specific guidelines on their disposal, the project owner will need to store the damaged modules securely until new

[3] The estimation is based on the rate of 0.5 kg solid waste per day per person.

government guidelines or innovations for re-use or recycling are introduced. In the meantime, regular inspections and maintenance of hazardous waste storage areas will be done to ensure safety and compliance with future regulations. Proactive waste management and continuous monitoring will help mitigate potential environmental risks.

3.15. Risk management

The company has considered the potential risks of natural disasters that could occur once the project commences. Specifically, to address the threat of lightning strikes in the project area, the company plans to install lightning protection systems at eight designated locations, as indicated in the accompanying image. These lightning protection devices will be strategically placed near each transformer at a height of 5.5 meters above ground level. Additionally, near the control building, lightning protection systems will be installed at a higher elevation of 16 meters above ground level. At the same time, according to the interviews with local authorities, that area never has a history of flooding but was occasional storms and thunderstorms happened during the rainy season.

CHAPTER 4: ALTERNATIVE ANALYSIS FOR THE PROJECT

4.1. Introduction

This chapter delves into the exploration and evaluation of alternatives for the proposed 150 MW Solar Power Project. The following sections describe the alternative analysis for site, technology, grid connection and the no-project scenario.

4.2. Rational for Site Selection

The proposed land for developing the Solar Power Plant project is located in Ansor Kdam Village, Sna Ansa Commune, Krakor District, Pursat province. This location has various key infrastructures (existing solar PV power plant, 150 kV transmission line, access road…) requirement for the production and transmitting electricity to national grid. As stated in the Feasibility study identified Krakor District, Pursat Province, as the ideal location (SchneiTec, 2023). The selected 168-hectare site, formerly unused agricultural land, is flat and well-suited for the project. Its proximity to major roads (National Road #5 and Road 53B), and the distance of 168 km from Phnom Penh, enhances accessibility, positioning it as a key energy development area for the province.

The utility-scale solar power plant project development in Krakor area can be considered from a technical point of view as the most effective location for a solar energy production center. The selection of the project's location was based on the following criteria:

- **Solar resource**: when considering the solar resource, we understand the higher the resource, the greater the energy yield per kWp installed. The selection of the site is to minimize any shading that will reduce the irradiation actually received by the modules. Avoiding shading is critical, as even small areas of shade may significantly impair the output of a module or string of modules. The selected area is good in terms of solar source for producing the energy as expected.
- **Available area**: the area required per kWp of installed power varies with the technology chosen. The distance between rows of modules (the pitch) required to avoid significant inter-row shading varies with the site latitude. With the 168 hectares of land, SchneiTec Beyond has chosen the site with sufficient area to allow the required power to be installed without having to reduce the pitch to levels that cause unacceptable yield loss.
- **Local climate**: with regards to the considerable weather conditions such as flooding, high wind speeds, and temperature, the efficiency of a PV power plant reduces with increasing temperature. Fortunately, in the central part of Cambodia, the average temperature ranges from 24°C in the cooler months to 35°C at the hottest time of the year, which is suitable for constructing the Solar Power Plant project.
- **Topography:** Cambodia's topography is divided into three distinct topographic regions: central plains, flat coastal areas, and the mountain ranges with high plateaus. The central plains form 75% of the country. The project site lies in the central plain area, and it is characterized by flat, low-lying land. The area is used mostly as lowland paddy fields. Unlike sloped land, excessively rocky or sandy terrain, uneven land, etc. in the mountain area that can all significantly add to the cost of installing a solar power plant, the proposed site is flat agriculture farmland with an undeveloped area, which envisions the development of the solar power plant project as much more affordable and less complicity. The feasible site SchneiTec Beyond proposed for the project will reduce a lot of additional costs for the seamless flow of the farm development.

- **Accessibility:** to lower the cost of development, operation, and long-term maintenance, the site has been principally selected closer to the main access road, so that the transportation is much simpler and security and maintenance personnel can respond quickly to any issue that might happen.
- **Land use:** the project uses renting rather than buying the land for the project. The selected 150-hectare land for rent was the former paddy field and crop plantation and had been legally owned by one landowner. By doing so, there is no risk of land conflict or forest cover clearing.
- **Risk/security factor**: the selected site is located along the national road 5 and road 53B and is in close proximity to the surrounding communities. The accessibility to the area reduces the risk and security concerns during the transportation, procurement, construction, operation and maintenance. Unlike the mountain area where there could be an endangered species that can eventually halt the development of the Solar Power Plant project, the site is free from security concerns.

4.3. Technology Selection

PV panel mounting method and embedding BESS into this project are the two key technology selections for the project. The following is the explanation for the 2 technologies:

- **Mounting Structure and Layout Design:** In utility-scale solar power projects, choosing the PV mounting structure method depends on several factors, including location, budget, and desired efficiency. In this project, fixed-mount solar PV systems are used. The reason that this project selected the fixed-mount systems lies in their simplicity, durability, and cost-effectiveness. In addition, the installation and maintenance of this mounting system are easy and generally less expensive. Moreover, this fixed-mount system fits well to the proposed location, where sunlight is less variable and there is less slope.
- **Battery Energy Storage System (BESS):** Recognizing the inherent intermittency of solar energy, the project incorporates a BESS with an AC coupling solution. This system utilizes Power Conversion Systems (PCS), which efficiently manage the energy flow between the battery system and the grid, ensuring a stable power supply. The BESS is designed with power capacity of 30 MW and a storage capacity of 32.5 MWh to provide a backup time of at least 30 minutes for the entire 20-year lifespan of the project. Embedding the BESS in this project will help mitigate intermittency and enhance grid stability. In addition, the system will help the project by storing excess solar energy that would otherwise be wasted during periods of low demand. This stored energy can then be dispatched during peak demand hours or when solar generation is insufficient, maximizing the utilization of renewable energy.

4.4. Grid Connection Alternative

Access to the grid is one of the was a key factor in site selection. The ability to connect to the existing power grid, without causing significant adverse impact on surrounding environment, was a crucial consideration in choosing the location for the project.

For this project, the 168 ha of land is close to the existing 115 kV transmission where the project will connect. The 115 kV transmission crosses over the project location and the proposed location for the substation. The EDC’s step-up substations close to the 168 ha area are under construction to ensure the connection from the project to the 115 kV transmission line. The 22kV wire will be built within the project premise and connected to the sub-station, and electricity from this sub-station will be transferred directly to the 115kV transmission line.

By doing so, there is no requirement for the construction of new 115 kV transmission lines that will cause more harm to the environment.

4.5. Alternate source for power generation

In 2018, Cambodia has a mixed electricity generation sources such as hydro, diesel and heavy fuel oil renewable energy, and coal with a total installed capacity of 2,635.49 MW (Electricity Authority of Cambodia, 2018). Hydropower emerges as the dominant source, contributing a substantial 1,329.7 MW to the total capacity. Diesel and heavy fuel oil follow with 266.82 MW, highlighting the reliance on fossil fuels for electricity generation. Renewable energy sources, although present, account for a relatively small 39.27 MW. Coal power plants contribute 551.2 MW, while 448.5 MW of electricity was imported, underscoring the country's need for additional power supply. All of sources of energy as described in the table below, non- renewable sources of energy comprise at least 31% of the total installed capacity by that year.

Table 9: source of energy in Cambodia (2028)

No.	Type of Generation	Installed Capacity (megawatts) in 2018	Proportion
1	Hydro	1,329.7	50.45%
2	Diesel and heavy fuel oil	266.82	10.12%
3	Renewable energy	39.27	1.49%
4	Coal	551.2	20.91%
5	Imported	448.5	17.02%
	Total	**2,635.49**	**100%**

Source: Electricity Authority of Cambodia (2018).

Different sources of energy lead to different greenhouse gas (GHG) emissions. Among that, fossil fuels were known to have high GHG emission intensities on a lifecycle basis. Solar power was claimed to have significantly lower GHG emissions compared to fossil fuel-based generation, alongside other renewable sources like biomass, nuclear, hydroelectric, and wind power (World Nuclear Association, 2011). The report compares the average lifecycle GHG emissions intensity for coal of 888 tCO2e/GWh, oil of 733 tCO2e/GWh, natural gas of 499 tCO2e/GWh, while solar PV was estimated to be only 85 tCO2e/GWh.

This 150 MW solar power project is expected to produce up to 325 GWh annually and be injected into the national grid. This energy-generating capacity is projected to reduce 1% annually. So, with the GHG emission rate as stated above, this project was projected to emit GHG of around 27,625 tCO2e per year. This GHG emission quantity is 5 times less than natural gas, 8 times less than oil, and 9 times less than coal.

According to Performance Standard 3 on Resource Efficiency and Pollution Prevention, the client is required to "consider alternatives and implement technically and financially feasible and cost-effective options to reduce project-related GHG emissions" during both the design and operational phases of their projects. Therefore, the development of solar power is a move on the same path as the national and international plan.

4.6. No-project scenario

Cambodia has experienced a substantial increase in electricity demand over the past decade. The peak demand in 2021 reached 2,026 MW, a significant leap from 508 MW in 2012. This rapid surge in electricity demand is primarily attributed to Cambodia's remarkable progress in electrifying its villages and developing its power system infrastructure. As stated in the Power Development Masterplan 2022-2040, Cambodia's energy demand is expected to have a significant increase over the coming years. Rapid economic and population growth are the leading factors in the increase in electricity consumption. By factoring the energy efficiency interventions, the energy demand growth is expected to be around 30 TWh by 2030, 42 TWh by 2035, and 55 TWh by 2040 (Ministry of Mines and Energy, 2022).

In the Power Development Masterplan 2022-2040, the Royal Government of Cambodia sets three main objectives, one of which directly relates to renewable energy (Ministry of Mines and Energy, 2022). In this plan, solar PV and hydropower are key renewable energy sources for Cambodia. In the selected generation plan (Scenario 4), the following installed capacity of Solar PV is expected to reach 3,155 MW, representing 29.8% of the total domestic installed capacity by 2040. It is noted that by 2022, the contribution of energy supply from solar power plant projects was around 400 MW, which accounts for around 7% of the total energy supply during that year.

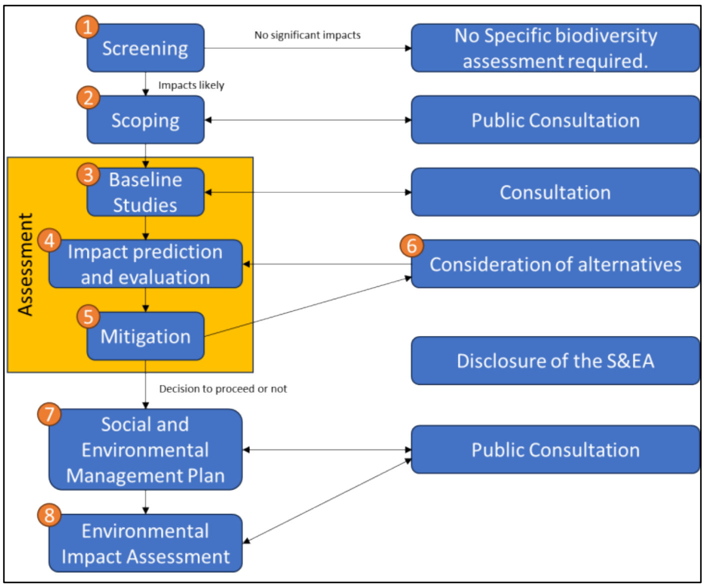
As shown above, a no-project scenario will also eliminate the economic and environmental advantages to be brought by solar power in the energy sector in Cambodia. Generally speaking, the no-project scenario will slow down the momentum of the government's efforts in increasing the shared energy contributed by the solar power project target by 2024 and the effort to solve the issue of energy shortage in the face of surging electricity demand in the coming years. This scenario is also likely to increase the dependency on other sources of energy, beside solar power, which can be more harmful to the environment. A no-project scenario is not a viable option.

CHAPTER 5: SCOPE AND METHOD OF THE ASSESSMENT

5.1. Process of EIA

The EIA methodology adheres to the overall EIA approach depicted in Figure 13. This systematic process involves predicting and assessing the potential impacts of the project on physical, biological, socio-economic, and cultural environments. Additionally, it identifies measures to avoid, minimize, mitigate, offset, or compensate for adverse impacts, and to enhance positive impacts where feasible. The subsequent stages of the EIA process are outlined as follows:

Figure 13: The EIA Process



Source: Performance Standards on Environmental and Social Sustainability (IFC, 2012)

5.2. Scoping of the Assessment

This Environmental and Social Impact Assessment (ESIA) has been prepared to address all potential environmental and social impacts associated with the construction, operation, and decommissioning phases of the solar power project as mentioned in Chapter 3.

It is noted that the scope of this ESIA report has been modified and updated based on the information provided by SchneiTec Beyond and the result of discussion between the E&A consultant and SchneiTec Beyond over the general comments for preparing the ESIA report from the lender.

5.2.1. Air of Influence (AoI)

5.2.1.1. Overview about Project's Location

The project is not in any protected area defined by the Royal Government of Cambodia. The study has done the key resource screening within the area of 50 km radius and found that despite the presence of certain ecologically important areas within this 50km radius, the project site itself is unlikely to have significant connectivity with these areas (see detail in section

6.2.2.1). The project site is located within a small catchment of a canal flowing into Beoung Tonle Sap, and these canals do not have water in the dry season and are primarily used for rainwater release and irrigation, except Damnak Kranh reservoir which is a key fish-raising area located around 300 m from the project. Land cover within the 50km radius is predominantly paddy fields, residential areas, and public infrastructure, further reducing the likelihood of connectivity with surrounding protected areas.

According to the 2010 forest cover dataset from MoAFF, the proposed project area is covered by deciduous forest and semi-evergreen forest in similar proportion (MoAFF, 2010). Later in 2015, these types of forest cover disappeared and the land use type inside the proposed land for the project is classified as annual crop land. However, there are some forest covers remain in the area around the land. Shrub lands has been observed to scatters within the aera of 4km around the project, especially the area near the waterbodies. Ever-green and deciduous forest covered still exist in the mountain area located father than 5km southwest of the project's location.

Within a 3 km area from the project's boundary, there are 1 district, 2 communes, and 3 villages (Khla Krapeu, Ansa Kdam, and Vealvong). Most people are residing far from the proposed project, especially along national road 5 (north of the project), and some people reside along road 53(B) around 1.5 to 2 km east of the project. There is no household within the 168-ha land proposed for the project. Along the access road of this project (1 km each side), there are 4 villages (Sna Ansa, Ansa Kdam, Vealvong, and Saravoan). These 4 villages will be likely affected by the project in terms of air quality change, noise and vibration, and traffic issues.

According to the 2002 dataset by JICA and the field survey, there are 3 natural canals flowing across the proposed project area (Area 1) (JICA, 2002). Among these 3 canals, 2 canals flow across the Area 1 and end at a lower elevation area (paddy field) around 7 km north of the project.

Another canal crossing the project area (Area 2[4]) flows into Danmak Kranh Lake which is around 300 m downstream of the project. In addition, there is another canal that does not flow across the project area (Area 2) but along the west border of the project's boundary and flows into Danmak Kranh Lake. The surplus water from Dannak Kranh Lake flows through an irrigation system to the north and passes through National Road 5 into Tonle Sap Lake, which is around 13km north of Damak Kranh Community Fish Refuge.

There is one lake called Damnak Kranh Community Fish Refuge (CFR) located around 300 m north of project area (Area 2). This area was claimed as a significant ecological initiative aimed at enhancing local food security and preserving biodiversity and a local tourist attraction site as well.

5.2.1.2. Defining Area of Influence (AoI)

Impacts and risks of this proposed project are analyzed in the context of the project's Area of Influence (AoI). The AoI encompasses i) the primary project site(s) and related facilities that the borrower develops or controls; ii) associated facilities that are not funded as part of the project and whose viability and existence depend exclusively on the project and whose goods or services are essential for successful operation of the project; iii) areas and communities potentially affected by cumulative impacts from further planned development of the project;

[4] The project has 2 separate lands: Area 1 and Area 2.

and iv) areas and communities potentially affected by impacts from unplanned but predictable developments caused by the project that may occur later or at a different location.

The project utilizes existing access roads (existing facilities), eliminating the need to construct new ones. This decision aligns with the project's commitment to minimizing environmental impact. However, the utilization of this road during the construction phase may pose social and environmental risks to the people living along the road. The substation (associate facility) for this project will be built close to the project's land. The project will construct a 22 kV transmission line with the length of less than 100m to connect the project to the newly built sub-station above, and the sub-station will connect directly to the 115 kV (existing facilities) national grid.

In this case, the AoI consists of such facilities as the main facilities (the PV installation area, the office and warehouse, the internal road and grid system), and the associate facility which is the newly built sub-station under EDC management. The Social Area of Influence (SAoI) is defined to be within a 3 km radius around the project and 1 km from the access road[5]. This area covers 5 villages: Sna Ansa, Khla Krapeu, Vealvong, Saravaon, and Ansa Kdam (Map 3), and the Biological Area of Influence (BAoI) of this project will cover the 3 km radius.

Defining the AoI was based on the potential extent of the project's impacts on various environmental and social aspects as explained below:

- SAoI: The SAoI focuses on the social impacts of the project on communities within a 3 km radius of the project site and 1 km from the access road. This area encompasses five villages potentially affected by changes in traffic patterns, noise levels, employment opportunities, and community health and safety. The 3 km radius is a common practice as required by local FEIA in Cambodia for assessing social impacts in infrastructure projects as it generally covers the residential areas, community facilities, and livelihoods of the population most likely to experience changes due to the project.
- BAoI: The BAoI considers the project's potential impacts on biodiversity and ecological resources within a 3 km radius. This distance is chosen because it encompasses the habitats (the remaining riverine forest) of various species identified in the area. Most importantly, this 3km area cover Damnak Kranh Reserior which is the most important habitat for species, especially aquatic resources.

5.2.2. Defining Potential Impacts of the Project

Impact identification in this ESIA report has been done by incorporating the IFC practice and the guidelines by the Ministry of Environment of Cambodia. The ESIA study began with a scoping process to identify the area potentially affected by the project, which is called the Area of Influence (AoI). Then the project is assessed on how it might interact with the environment and people in that area. Finally, potential impacts are prioritized based on their severity and relevance.

Since the project is in the construction phase during the ESIA study, the scoping process considers the impacts of project stages, which include construction, operation, and decommission. The process is to identify potential impacts by examining planned and unplanned activities during construction, operation, and decommission phases.

[5] Access road is included to assess the impact caused by traffic of the project during construction phase.

To identify potential impacts, the study uses a tool called a potential interaction matrix. This matrix lists project features and activities (potential sources of impact) down one side and environmental components (resources and receptors) across the top. Each box in the matrix represents a potential interaction between a project activity and an environmental component. The potential impact consists of 3 categories: no significant impact, indirect impact, and direct impact. Potential adverse impacts of the project during the 3 phases have been identified in the following table.

Map 3: Area of Influence

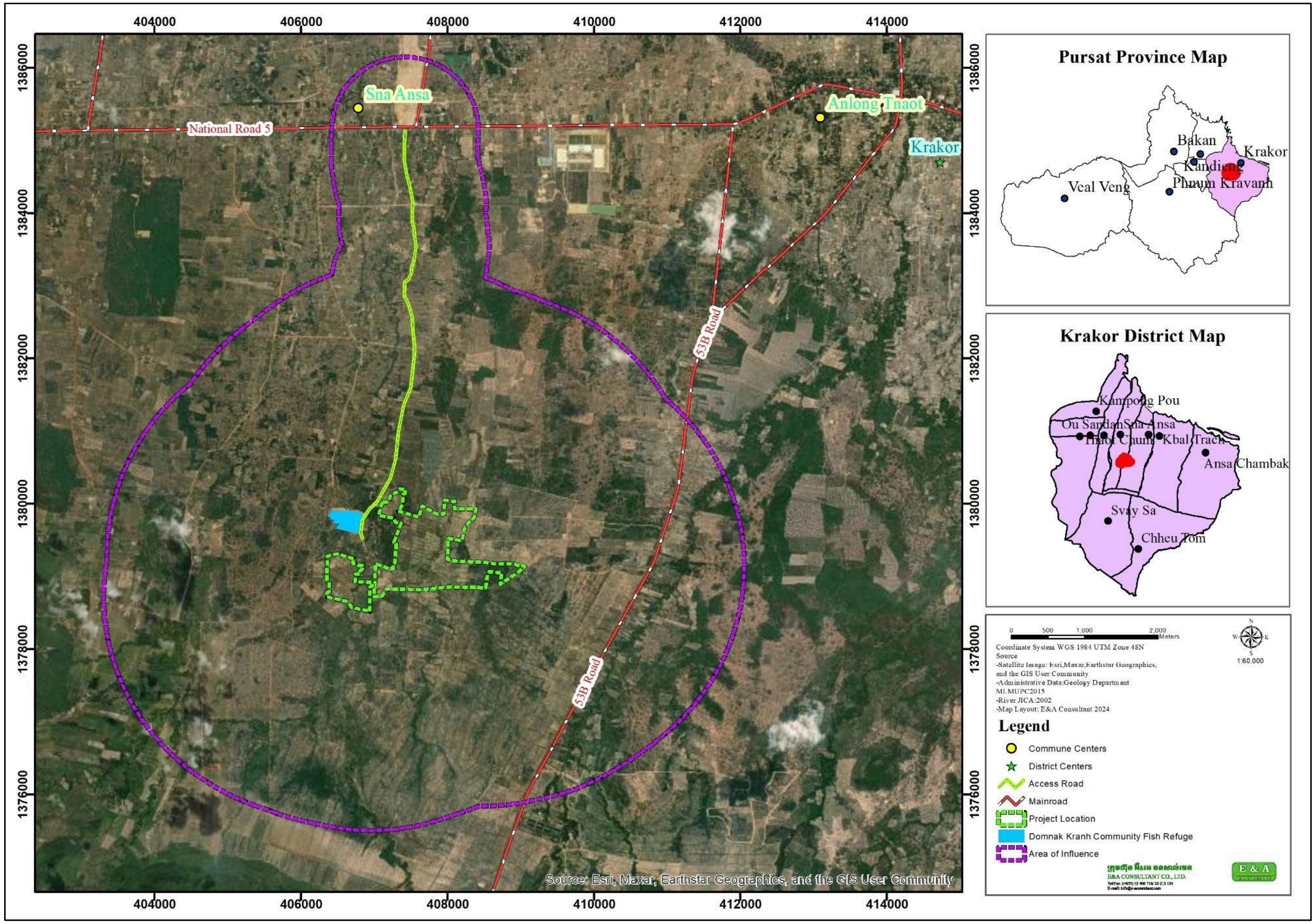


Table 10: Potential Interactions Matrix of Scoping Results

	Topography and erosion	Air quality	Noise and vibration	Hydrological system	Surface water quality/quantity	Ground water quality/quantity	Soil quality	Forest cover	Wildlife and Bird	Fish	Protected Area	Settlement	Occupation and income	Traffic and infrastructure	Land use and land ownership	Education	Occupational health and safety	Community health and safety	Tourist sites	Cultural heritage site
Construction phase																				
Mobilisation of labour and equipment																				
Clearance of vegetation, site grading, foundation and drainage works																				
Preparation of batching plant and temporary site office and camp (inside project area)																				
Internal road construction																				
Solar PV modules installation, electric wire connection, the installation of sub-station equipment																				
Management of sewage generated by workers																				
Management of construction waste and hazardous waste																				
Demobilisation of construction workforce and temporary structures																				
Movements of vehicles and machineries on access road and within the project's boundary																				
Operation phase																				
Project waste management, including broken BESS and PV panels																				
PV cleaning and maintenance activities																				

The management of broken PV and other equipment to be replaced over the project cycle							■													
Management of safety and security of the project																		■		
Decommission phase																				
Staff and worker lay-off													■							
The demolition activities and site cleaning of solar power plant		■	■														■			
Waste, BESS, and PV disposal							■											■		

Note:

□	No significant adverse impact
▒	Indirect adverse impact
■	Direct adverse impact

5.3. Assessment and Study Methodology

To provide a thorough understanding of the project's potential impacts, a detailed description of the existing physical, biological, social, socioeconomic, and cultural conditions is presented. This baseline assessment includes all resources and receptors identified during the scoping process as potentially significantly affected by the project. The primary baseline studies proposed in this section were conducted to offer a robust description of the current conditions. The methodology used in collecting and analysing both primary and secondary data is also summarized in the following sections.

5.3.1. Physical Resource Studies

C. Soil

Soil quality analysis aims to establish baseline data for soil quality in the project area. Even though PV power plants and battery energy storage systems are generally considered cleaner alternatives to traditional energy sources, they can still have potential environmental impacts, including the release of heavy metals into the soil. Likewise, the conversion of soil to solar penal field causes the disturbance on soil, potential runoff, and the change of environment under the solar panel.

The analysis of soil quality will be on such parameter as: pH, Total nitrogen (TN), Total phosphorus (TP), Potassium (K), Electric conductivity (EC), Moisture content, Calcium (Ca), Magnesium (mg), Lead (Pb), and Mercury (Hg). The last 2 parameters (Pb and Hg) were added as contaminant baseline as guided by the MoE and found to be well below the allowable concentration in soil. Soil quality studies were conducted in two locations on September 27, 2024, in location 1 under PV panel (Soil-01: X =408486, Y =1379144) and location 2 in open pace (Soil-02: X =407712, Y = 1379667) (Map 4).

The results of the analysis were compared with the standard as stated in the Appendix 2 on the hazardous pollutant concentration thresholds allowed in the soil of the Prakas #387 on the concentrations of pollutants and hazardous substances concentration allowable for disposal issued in 2015 by the Ministry of Environment.

D. Air Quality, noise and vibration

This study aims to establish baseline data for air quality in the project area. Potential air quality issues within the project area include emissions from vehicles, land clearing activities, the movement of materials, and the operation of construction machinery. One air quality analysis has been done for a period of 24 hours consecutively at a residential area (X = 406854, Y = 1379419) near project site on October 13, 2024. The air quality analysis focused concentrate on eight parameters: CO, NO2, SO2, O3, Pb, TSP, PM10, and PM2.5. The air quality analysis has been done by cooperating with the Ministry of Environment.

The following equipment were used for air quality sampling:

- Air quality parameters were measured by using OCEANUS-AQM-09 air quality monitoring system;
- Lead was measured by using Method 3500-Pb C (HNO3, HCL Digestion). Samples were digested with HNO3 and HCl and then filtered through lead-free filter paper

Baseline of noise and vibration conditions were measured at the same locations as air quality sampling for 24 hours consecutively and focusing on parameters: Leq, Lmin, Lmax, LA90, LA10. Noise levels were measured by using a Rion NL-42EX. This instrument's wide measurement range (30 dB to 130 dB) effectively captures typical ambient noise. Vibration levels were measured by using a Rion VM-55EX. Figure 6.7 shows the ambient noise and vibration levels monitoring stations.

The air, noise, and vibration sampling were conducted by 3P Environmental Solution[6]. The measured noise level is compared with local regulation (noise level for business and service area) and the World Bank's General EHS Guidelines.

Figure 14: air, noise and vibration sampling devices

E. Hydrology and flood assessment

The study of hydrology and flood risk assessment was done by ScheiTec Beyond in 2019 (SchneiTec, 2019). The objective of the study is (1)Identifying flood levels both with and without project development; (2)Proposing and testing flood protection measures, and (3)Designing an on-site drainage system. The study use four main methods: desk and site reconnaissance study, riverine flood assessment, the development of a flood and drainage model, and the design of an on-site drainage system

F. Surface Water

Surface water quality studies were conducted in three locations which are two samples inside the project area and one outside. Water collection was conducted on September 27, 2024 in Ansa Kdam and Khla Krapeu villages, Sna Ansa and Anlung Tnaut communes, Krakor District, Pursat Province. Location 1 (SW-01) Damnak Kranh reservoir (WGS 1984, X = 406655, Y = 1379909) and location 2 (SW-02) along the project area (WGS 1984, X= 405893, Y= 1378399). Location 3(SW-03) outside the project area (WGS 1984, X= 405893, Y= 1378399). Therefore, the study used water quality standards of public water type 1 for the conservation of biodiversity in water, Appendices 4 and 5 of Sub-Decree No. 103 of the Ministry of Environment. Various parameters were evaluated, including pH, Total suspended solids (TSS), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Detergent, Total Nitrogen (TN), Total Phosphorus (TP), Lead, Arsenic, Cadmium, Iron, Mercury, and Total coliform.

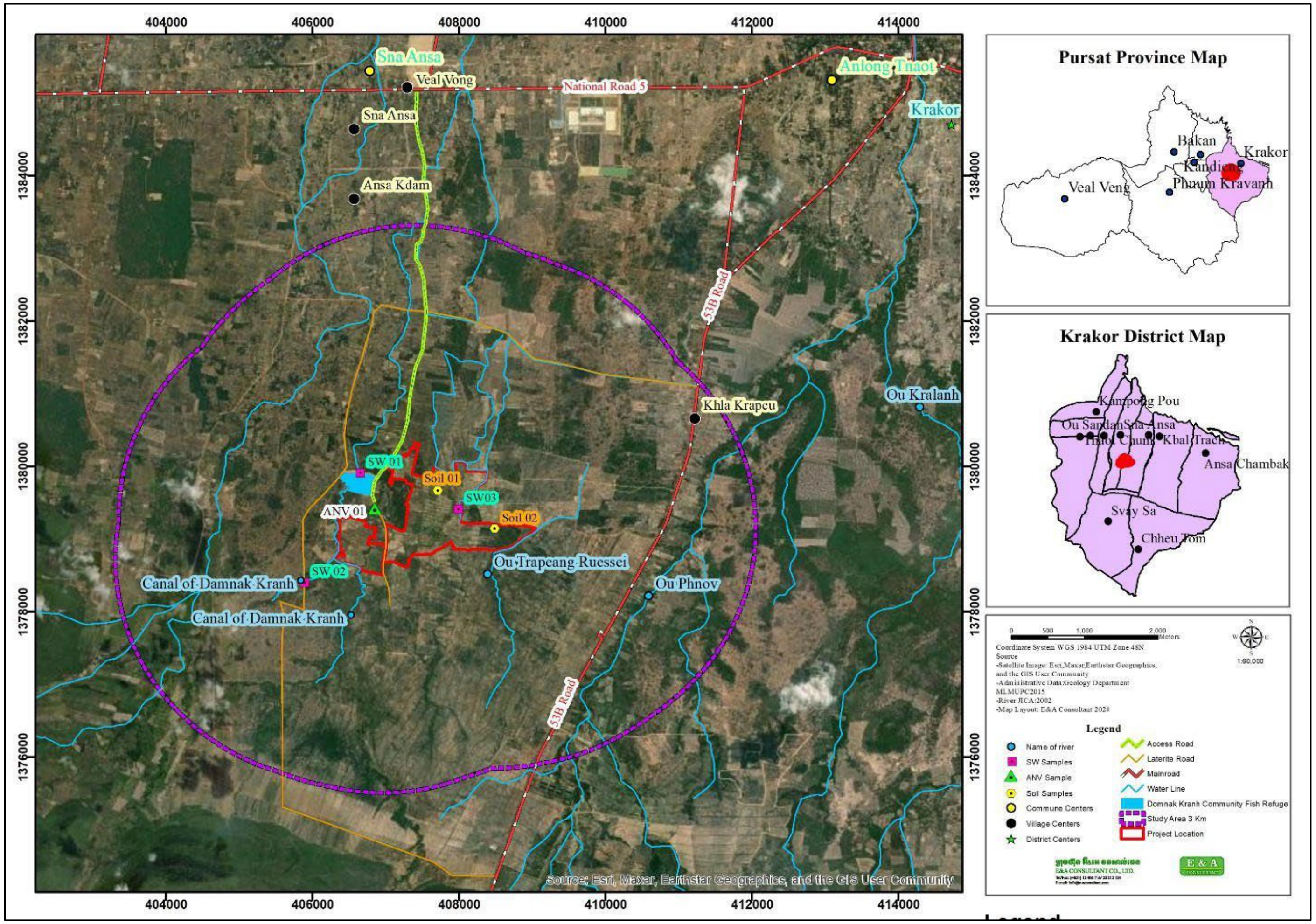
The sampling locations were chosen based on the water flow direction of the canal and the importance of receiving waterbodies. Water sampling was collected in compliance with Ministry of Environment (MOE) laboratory's guidelines. The sample was analysed at the Ministry of Environment's Laboratory Department.

The result of surface water quality study is compared the levels for water quality standards in public areas for water biodiversity conservation as stated in the 2021 Sub-Decree on Water Pollution Control (1999) and Sub-Decree on the Amendment of Article 4, Article 9, Article 11,

[6] This company has been recognized by MoE of Cambodia.

Article 12 and Article 17 and Table Annex 2, Annex 3, Annex 4 and Annex 5 of Sub-Decree No. 27, dated 6 months. April 1999 on Water Pollution Control (see the standard in Appendix).

Map 4: physical resource sampling locations



5.3.2. Biological Resource baseline

The study area for the biological study ranges for a 3 km radius from the project site boundary. During the field studies, project land has already been cleared, and most space has been filled out with PV panels and other structures. As informed, the construction was around 60% completed during that time.

The main objective of this study is to conduct a rapid biological resource assessment in the proposed areas before partial or complete conversion to the new stages of development and assess what is unique, threatened, and important to preserve, or if their removals could affect species reduction or extinction.

Given the specific characteristics of the survey site, a dry-season biodiversity study does not yield significantly different or more valuable data compared to a wet-season assessment. The dry dipterocarp forest ecosystem, with its inherent lower biodiversity compared to other forest types and the absence of significant wildlife hotspots within the assessment area, suggest that the dry season would not reveal a substantially different ecological picture. Additionally, human-induced modifications to the habitat and land cover had a significant impact on the key biodiversity. Therefore, conducting a study during the dry season when many species will be less active or absent might not provide a comprehensive understanding of the ecological conditions.

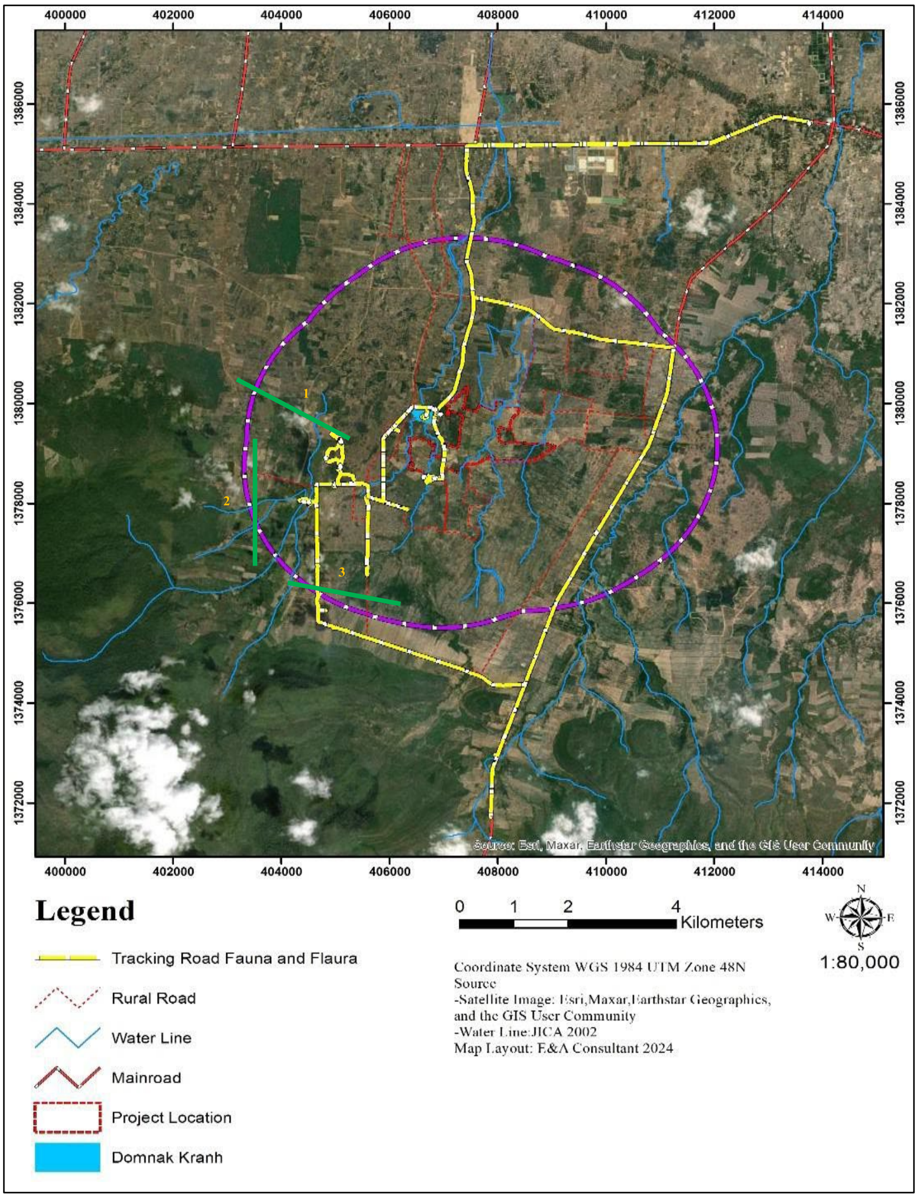
The Scope of Work (SoW) consists of the following:

- Review all relevant flora and fauna studies;
- Assess the key present and absent flora (plant) and fauna (mammals, birds, fish, reptiles, and amphibians) in project and assessment areas (3 km buffered);
- Describe any endangered species and their habitats presented in the project and the assessment area, including a reasoned argument supporting these.

The biological study use the following approaches:

- The stakeholder consultation meetings through focal group discussions with local communities and authorities were carried out to provide a sense of the biodiversity, distribution, and richness associated with the project's assessment areas of influence and verify the presence, absence, and distribution of focal species.
- The rapid assessment was to collect field data necessary for the present, absent, and distribution of flora and fauna and to identify the necessary habitat of species in the assessment and the project areas. Methods used for the respective flora and fauna were as follows: Three line transects in picture 2 across the key habitats of fauna (mammals, birds, fish, amphibians, and reptiles) site for both fauna and flora survey. Before field surveys, interviews with local people with experience with mammals, birds, fish, amphibians, and reptiles were conducted from the target sites. The field opportunistic surveys were undertaken both day and night between 26 and 27 September 2024 during the rainy season. Opportunistic searches during the day to look for diurnal species by walking along 3000 m-distance transect lines in the core areas of the proposed development polygon and along the Damnak Kranh reservoir, Ansor Kdam village, Sna Ansa commune, Krakor district, Pursat province (outside the project area), but within the buffer zone of 3 km. Night opportunistic walks for amphibians and reptiles were undertaken to look for nocturnal species among bushes in the Damnak Kranh water reservoir. The main objectives of this reservoir establishment and expansion are 1) to keep water for their rice field during the dry season, 2) to conserve key fish species, and 3) to develop ecotourism destinations.

Map 5: map of biological study



5.3.3. Socio-Economic Resource Studies

The socioeconomic survey was designed to capture the socioeconomic situation of the people within the SAoI. The population in this SAoI is 1,139 households, and the representative sample size is estimated to be 296 households.

During this survey, a systematic sample selection method was employed to ensure that all the samples selected were selected randomly in the study area. The collected data was cleaned and analyzed in Microsoft Excel.

Table 11: Total household samples of each villages for interview

Province	District	Commune	Village	Number of			
				Family	People	Female	Samples
Pursat	Krako	Sna Ansar	Sna Ansar	156	568	296	41
			Ansar Kdam	277	886	464	72
			Saravoan	126	680	232	33
			Veal Vong	248	883	422	64
		Anlong Tnaut	Khla Krapeu	332	1150	609	86
Total				1139	4167	2023	296

Source: Commune profile document, 2023

5.3.4. Stakeholder Consultation

A good environmental and social impact assessment (ESIA) requires a meaningful stakeholder consultation from start to finish. By actively engaging with relevant parties, we can gain valuable insights into their concerns and expectations. This understanding is crucial for accurately predicting and evaluating potential environmental impacts.

There were 2 rounds of stakeholder engagement; the first round is done during the data collection phase (from October 21 to October 26, 2024), and the second round is done on November 8, 2024, after issuing the draft result of the studies.

The stakeholder consultations were done by following the free, prior, and informed consent principle to achieved a meaningful consultation. The stakeholders to be consulted was requested and informed at least 1 week before consultation date and, during the first round consultation, they are provided with a brief information about the project and checklist of key questions to be discussed during the meeting. For the second round consultation, stakeholders were provided with a power presentation document of the primary finding of the ESIA.

First-Round Consultation

First-round consultation was done during the data collection phase. The goal of the initial stakeholder engagement is to establish connections with local residents and key stakeholders. We aim to introduce them to the proposed project and the environmental impact assessment process. It is noted that there are no NGOs working in the study area. The following are key stakeholders consulted:

- Local people: there were two focus group discussions (FGD) with the people from Khla Krapeu, Sna Ansa, Anso Kdam, and Saravo village (see minute and list of participants in the appendix). Representatives from the village were invited to the meeting with the consideration of gender balance.
- Commune representatives: The representative of Damnak Kranh Community Fish Refuge (CFR) was interviewed.
- Local Authorities: local authorities were consulted by using the Key Informant Interview technique. They are Anlung Thnau and Sna Ansa Commune Chiefs and Village Chiefs of Khla Krapeu, Sna Ansa, Anso Kdam, and Saravo village.

- Provincial Departments: Department of Environment; Department of Water Resources and Meteorology; Department of Agriculture, Forestry, and Fisheries; Department of Mine and Energy; and Department of Culture and Fine Art were consulted by using the Key Informant Interview (KII) technique.

Cosultation with local people at Sna Ansa Commune Office

Cosultation with local people at Khla Krapeu village

Figure 15: first round consultation with local people

Second-Round Consultation

The purpose of the second round of consultation is to (1) discuss the identified impacts and proposed mitigation measures with stakeholders, allowing for their input, and (2) provide stakeholders with the opportunity to comment on the draft results of the impact assessment report. This round consists of a key consultation meeting organized at Tbaeng Primary School (see the minute and list of participants in the Appendix).

Figure 16: second round consultation with local people

5.3.5. Impact Assessment and mitigation measure

The impact identification and assessment consist of 4 key steps including impact prediction, impact evaluation, mitigation, and residual impact evaluation as summarized in the following figure.

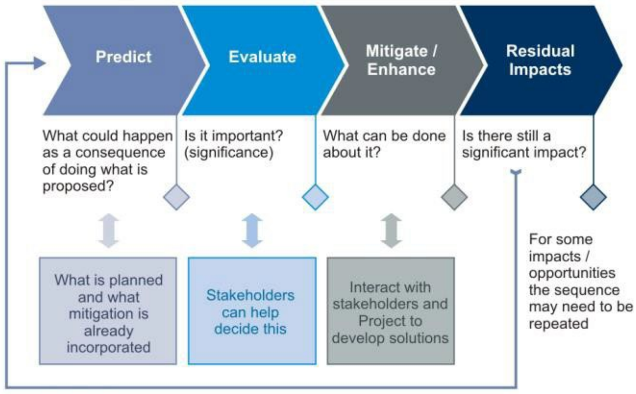


Figure 17: Impact Assessment Process

- Mitigation: To identify and develop effective measures to mitigate potential negative impacts and enhance positive impacts.
- Residual Impact Evaluation: To reassess the significance of potential impacts assuming the successful implementation of mitigation and enhancement measures.

5.3.6. Prediction of Impacts

The impact prediction is to identify and assess the potential consequences of the Project and its associated activities on various resources and receptors. Impact prediction is a systematic and objective process of identifying and assessing the potential environmental consequences of a project and its associated activities. Based on the identified interactions with the environment during the scoping phase, the impacts on various resources and receptors are carefully evaluated. The diverse nature of potential impacts necessitates the utilization of a range of prediction methods, including quantitative, semi-quantitative, and qualitative techniques.

5.3.7. Evaluation of Impacts

The impact evaluation is to evaluate the significance of the predicted impacts by considering their magnitude, likelihood of occurrence, and the sensitivity, value, and importance of the affected resource/receptor.

Upon completing the identification of potential impacts, each potential impact is comprehensively described in terms of its various relevant characteristics, including type, scale, duration, frequency, and extent. The terminology and designations employed to describe impact characteristics are presented in the following table.

Table 12: Impact Characteristic Terminology

Characteristic	Explanation	Labels
Type	A description that shows how the Project's operations and the possible impact are causally related.	Direct or Indirect
Extent	The potential impact's geographical or spatial scale, which shows the area it could affect. This could have a more extensive effect that stretches for several kilometres or more, or it could be more localized,	Local, Regional, International

	affecting only a small area surrounding the Project Footprint.	
Duration	The duration of the potential impact that could affect a resource or receptor. A short-term impact that lasts a few days or weeks can be compared to a long-term impact that lasts for years or even decades.	Temporary, Short-term, Long-term
Scale	The magnitude or extent of the potential impact on a resource or receptor. This scale can range from a localized impact affecting a small area to a widespread impact affecting a large portion of the resource or receptor.	Quantitative or qualitative description of intensity
Frequency	A measure of the repetitiveness or cyclical nature of the potential impact. This frequency can range from a one-time event to a recurring or periodic impact.	Quantitative or qualitative description of intensity

By using the impact characteristic above, the impact were assessed into 3 types as follow:

- *Direct Impacts*: Direct impacts arise from a direct interaction between the project and a resource or receptor. For instance, the occupation of a plot of land can directly impact the habitats that exist on that land.
- *Indirect Impacts*: Indirect impacts stem from subsequent interactions within the environment triggered by the direct interactions between the project and its surroundings. For example, the loss of part of a habitat due to project encroachment can indirectly affect the viability of a species population that depends on that habitat.

The likelihood of an unplanned event occurring is designated using a qualitative scale, as outlined below:

- *Unlikely*: The event is improbable but could potentially occur during normal operating conditions.
- *Possible*: The event is reasonably anticipated to happen at some point during normal operating conditions.
- *Likely*: The event is virtually certain to occur under normal operating conditions.

Following the definition of impact characteristics, the next step in the impact assessment phase involves assigning a 'magnitude' to each potential impact. Magnitude is typically determined by considering a combination of the following impact characteristics, with the specific combination tailored to the resource or receptor in question. Defining magnitude will use the following characteristics:

- Extent;
- Duration;
- Scale;
- Frequency; and
- Likelihood

Magnitude essentially quantifies the intensity of the change predicted to occur in a resource or receptor due to a potential impact. The magnitude designations themselves are universally consistent, but their definitions vary depending on the specific resource or receptor being assessed. The universal magnitude designations are:

- Positive
- Negligible

- Small
- Medium
- Large

For potential positive impacts, no specific magnitude designation beyond "positive" is assigned. It is deemed sufficient for the EIA to simply indicate that the project is expected to yield a potential positive impact without characterizing the exact degree of positive change that is likely to occur.

In the case of potential impacts arising from unplanned events, the same resource- or receptor-specific approach to determining a magnitude designation is employed. However, the likelihood factor is considered alongside the other impact characteristics when assigning a magnitude designation.

Apart from characterizing the magnitude of impact, another crucial step in impact evaluation is defining the sensitivity, vulnerability, and importance of the affected resource or receptor. Several factors need to be considered when defining the sensitivity, vulnerability, and importance of the resource or receptor, which may be physical, biological, cultural, or human. Other factors, such as legal protection, government policy, stakeholder views, and economic value, may also be considered. Similar to magnitude, the sensitivity, vulnerability, and importance designations themselves are universally consistent, but their definitions vary depending on the specific resource or receptor being assessed. The sensitivity, vulnerability, and importance designations used herein for all resources/receptors are:

- Low
- Medium
- High

After determining the magnitude of impact and the sensitivity, vulnerability, and importance of the affected resource or receptor, the significance of each impact can be assigned. Impact significance is determined using the matrix presented in the following table:

Table 13: Impact Significance

		Sensitivity/Vulnerability/Importance of Resource/Receptor		
		Low	**Medium**	**High**
Magnitude of Impact	**Negligible**	Negligible	Negligible	Negligible
	Small	Negligible	Low	Medium
	Medium	Low	Medium	High
	Large	Medium	High	High

5.3.8. Identification of Mitigation Measures

Upon determining the significance of a potential impact, the next step involves preparing the appropriate mitigation measures. There are 4 mitigation hierarchy as follow (Rio Tinto, 2004):

- *Avoidance of Impacts*: This involves modifying the project design to avoid or minimize the impact at its origin. For instance, siting or rerouting activities away from sensitive areas, restricting the working area, or altering the timing of activities can effectively reduce the impact's magnitude.
- *Reduction of adverse effects*: If avoidance or reduction is not feasible, measures can be implemented within the project site to reduce the impact. This could include installing pollution control equipment, implementing traffic controls, or constructing perimeter screening and landscaping.

- *Repair or restoration*: For unavoidable impacts that cause damage to resources (e.g., agricultural land or forestry due to access roads, work camps, or material storage areas), repair, restoration, or reinstatement measures can be implemented.
- *Compensation for adverse effect*: When other mitigation approaches are not possible or fully effective, compensation for loss, damage, and disturbance may be necessary. This could include planting to replace damaged vegetation, providing financial compensation for damaged crops, or constructing community facilities to offset the loss of fisheries access, recreation, and amenity space.

5.3.9. Residual Impact Evaluation

Following the determination and implementation of mitigation and enhancement measures, the next step in the EIA process involves assessing the residual impact significance. This assessment essentially replicates the impact assessment steps discussed earlier, but it takes into account the implementation of the proposed mitigation and enhancement measures.

5.4. Study Team and Implementation Schedule

E&A Consultant will assign of a team of 8 members toto work on the proposed project. The team was led by a project manager. The following table shows the assigned team members and their details.

Table 14: Assigned team

No	Name	Expert	Nationality	Position
1	Dr. Ham Kimkong	Development Science and ESIA Specialist	Khmer	Project Director
2	Mr. Hay Samchan	Social and ESIA specialist	Khmer	Team Leader
3	Dr. Ou Ratanak	Biodiversity Specialist	Khmer	Expert
4	Mr. Thean Sengcheng	Environmental Science and ESIA specialist	Khmer	Expert
5	Mr. Phal Huymeng	Water Resource Engineering	Khmer	Expert
6	Mr. Chhim Lychhean	Land Management and Land Administration, and GIS Specialist	Khmer	Expert
7	Mr. Kolla	Natural resource management development	Khmer	Member
8	Mr. Chea Channarith	Natural resource management development	Khmer	Member

As show in the following table, the preparation of ESIA report takes around 3 months as shown in the following table.

Table 15: study schedule

No	Activities	2024		
		Sep	Oct	Nov
1	The agreement on scope of work, document review, study design and team mobilization			
2	Field data collection, testing, and local consultation with provincial departments, local authorities and community representative in the SAoI.			

No	Activities	2024		
		Sep	Oct	Nov
3	Public consultation meeting with community representatives to show the preliminary results of the ESIA report and collect more inputs from key stakeholders.			
4	Draft ESIA report submission to project owner			

CHAPTER 6: ENVIRONMENTAL AND SOCIAL BASELINES

6.1. Introduction

This chapter presents the existing environmental and social information for baseline data of the target area that may be affected by the proposed project. The chapter documents the existing condition of physical, biological, and socioeconomic resources within a 3 km radius around the project's boundary and 1km radius along access road.

6.2. Natural Environment

6.2.1. Physical Resources

6.2.1.1. General Geography of Pursat Province

Pursat is a province located around 130 kilometres north of Phnom Penh capital, and is the 4th biggest province of Cambodia, total size of 12,692 square kilometres. It's located in the west of the country and is bordering to the North with Battambang, to the East with Tonlesap Lake, to the South with Kampong Speu and Koh Kong and to the West with Thailand. The province consists of some typical plain wet areas near the Tonle Sap Basin, covering rice fields and other agricultural plantations. Most surface area of the country is the Krovanh Mountains, or literally called "Cardamom Mountains". The highest elevation is the 1,813m high Phnom Aural in the Southeast corner of the country.

Pursat province is subdivided into six districts and one city, including Krakor where this 150 MW solar power plant project locates. Krakor District is located about 25 kilometres east of the Pursat city. It is known for its beautiful landscapes, numerous in biodiversity, including the Kampong Luong Floating Village in Tonel Sap Lake and the Cardamom Mountains. Two out of the 11 communes (5 villages) of Krakor districts were included in the assessment in this report.

6.2.1.2. Geology

Cambodia before the first century was a continent under the seabed and was covered with much continental rubble. Then, in the first century, the area was severely affected by the Cardamom Mountains and the appearance of old rocks such as granite, coal, oil, and many other metals. In the second century, the area was buried under the sea again. Debris has piled up with plants and animal fossils, forming many mountains, especially the Cardamom Mountains, Dangrek Mountains, and Northeast Plateau. In the third century, there were many young mountains and volcanic eruptions that caused the overflow of basalt and red soil on the eastern plateau. In the 4th century, many waterways, especially the Mekong River and the sea, were formed, and sediments were dumped to fill the Gulf, while the movement pushed the earth and the sea level, which created the old sediment in the mountains. In Cambodia and new sediments in the Tonle Sap Lake. Old sediments and new sediments form the central lowlands today.

According to the map below, using 2002 JICA data, the project location locates in the Quaternary. The project site was found to be covered by two types of rocks; the two main rock types identified are deltaic deposits and pediments. Deltaic deposits are sedimentary rocks formed by the deposition of sediment at the mouth of a river, while pediments are gently sloping surfaces formed by erosion.

The project area is primarily composed of pediments, with a small number of deltaic deposits. The total area of the project area is 168 hectares, of which around 123 hectares (74%) are pediments and 41 hectares (25%) are deltaic deposits.

6.2.1.3. Soil

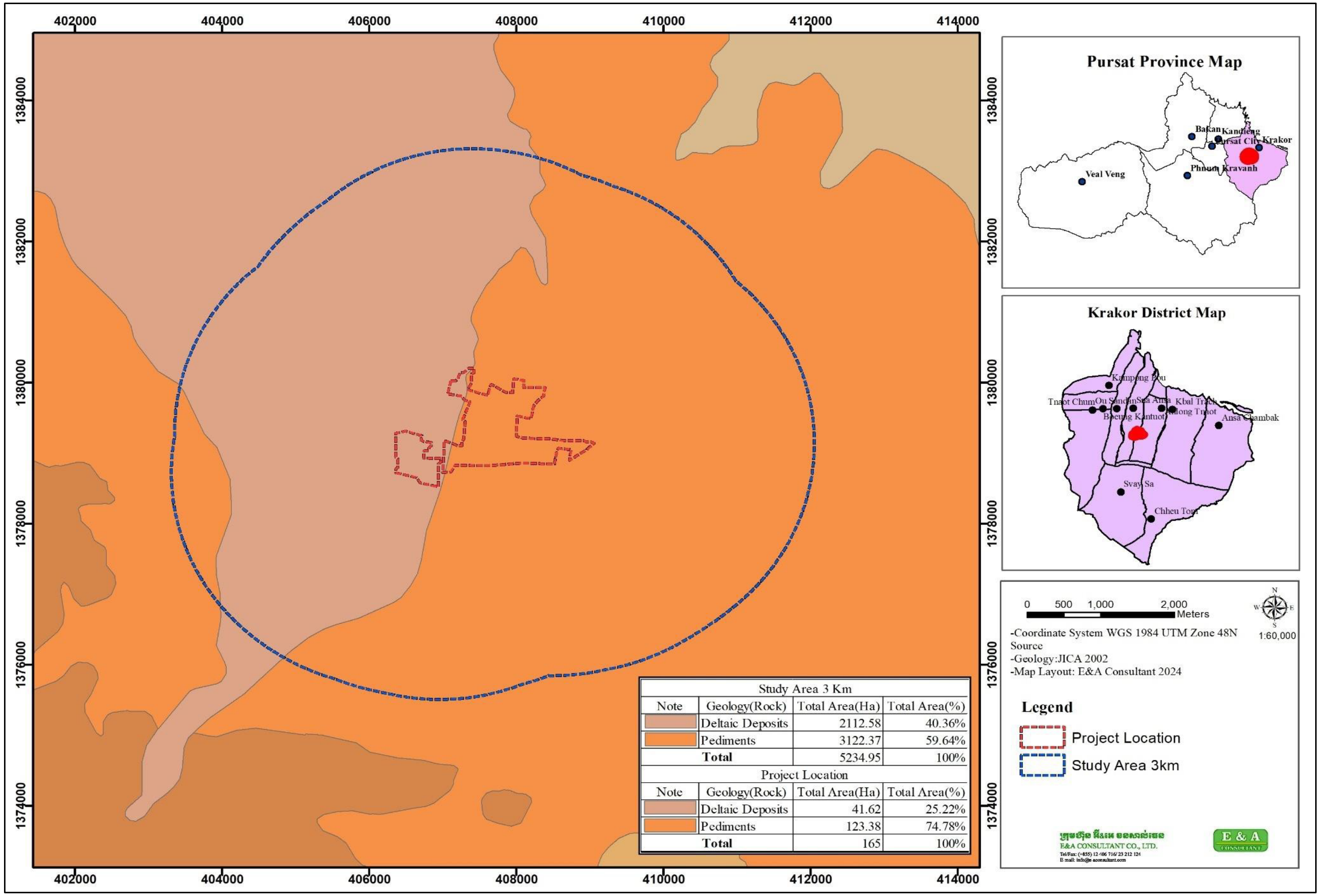
A. Soil Type

Dr. Crocker travelled across Cambodia to create a map with a scale of 1 to 1,000,000, and it was publicly published by the Ministry of Agriculture in 1963 (Crocker, Charles D, 1962). According to Dr. Croker, the Cambodia's soil is classified into 16. By using dataset from JICA, there are 2 soil types in the 3km radius study area (JICA, 2002) as explained below:

- Red Yellow podzols (84.54%): this soil type is a less fertile soil with many limitations, including low soil pH, low clay content, low aggregate stability, low nutrient content, and susceptibility to compaction.
- Cultural Hydromorphic (15.46%): this soil type has been significantly influenced by human activities, particularly in relation to water management. Cultural Hydromorphic soils can be found in agricultural areas, particularly those with a long history of cultivation, such as rice paddies, irrigated fields, and orchard lands.

It is noted that the 168 ha area for the development of this 150MW solar power plant project locates on Red Yellow podzols.

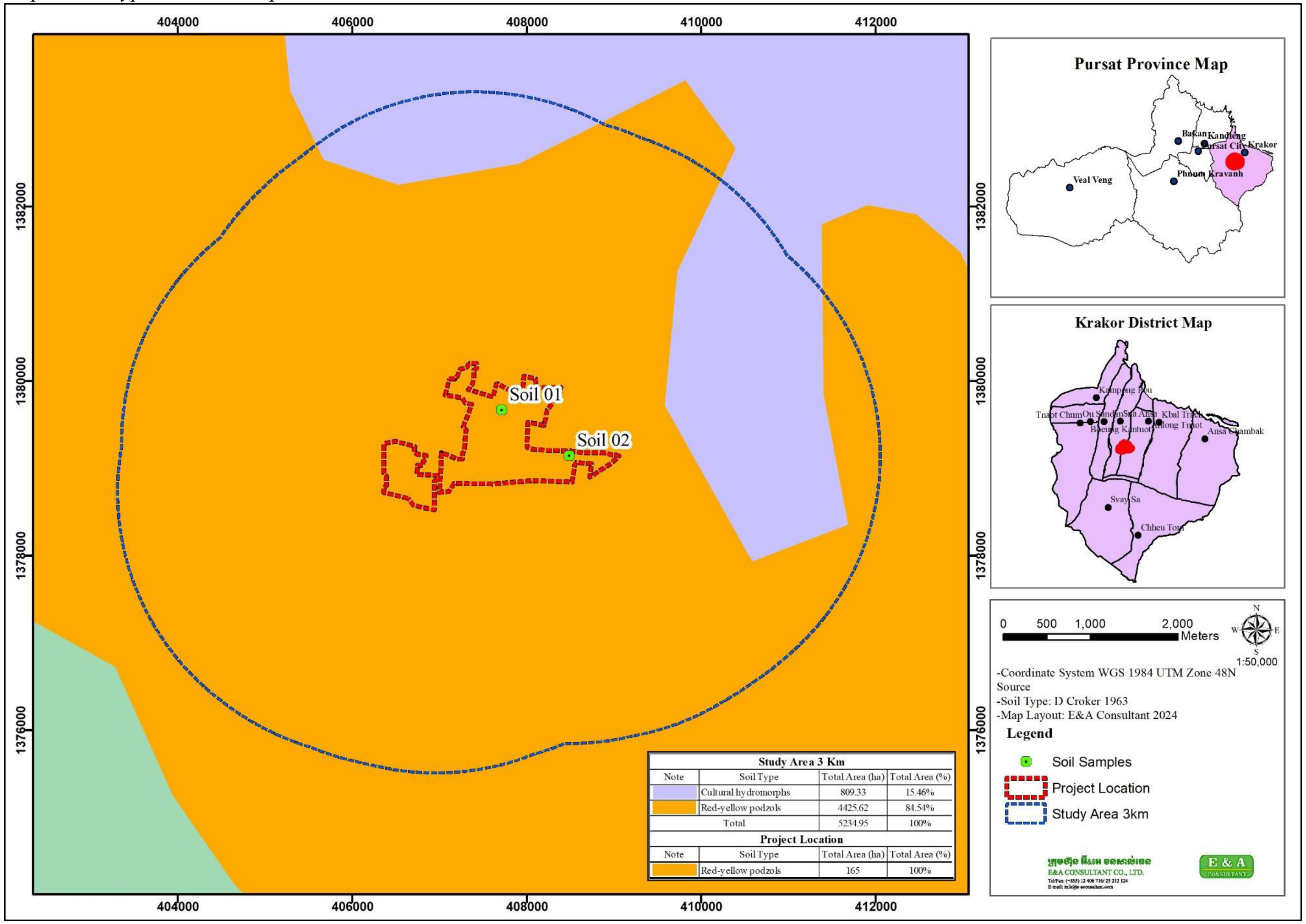
Map 6: Geology in the study area



Study Area 3 Km			
Note	Geology(Rock)	Total Area(Ha)	Total Area(%)
	Deltaic Deposits	2112.58	40.36%
	Pediments	3122.37	59.64%
	Total	5234.95	100%

Project Location			
Note	Geology(Rock)	Total Area(Ha)	Total Area(%)
	Deltaic Deposits	41.62	25.22%
	Pediments	123.38	74.78%
	Total	165	100%

Map 7: Soil Type and Soil Samples



Study Area 3 Km

Note	Soil Type	Total Area (ha)	Total Area (%)
	Cultural hydromorphs	809.33	15.46%
	Red-yellow podzols	4425.62	84.54%
Total		5234.95	100%

Project Location

Note	Soil Type	Total Area (ha)	Total Area (%)
	Red-yellow podzols	165	100%

B. Soil Quality

Red-yellow podzols soils are known for their low fertility and acidity, which can limit crop yields and quality. According to interviews with local residents, rice yields in the area are typically only 400 to 500 kilograms per hectare, while most mango plantations can hardly yield.

Soil quality studies were conducted in two locations, which were both sampled inside the project's boundary. Soil sampling was done on September 27, 2024, in location 1 (Soil-01: X =408486, Y =1379144) and location 2 (Soil-02: X =407712, Y = 1379667).

The below table shows the results of a soil quality analysis for two samples, Soil-01 and Soil-02. Various parameters were tested by focusing on soil fertilities. The last 2 parameters (Pb and Hg) were added as contaminant baseline as guided by the MoE and found to be well below the allowable concentration in soil.

Table 16: Soil quality analysis results

Nº	Parameters	Unit	Results		Testing Method	Threshold for containment in soil[7]
			Soil-01	Soil-02		
1	pH	-	5.07	5.20	AOAC 994.18	-
2	Total nitrogen (TN)	g/100g	0.01	0.01	ISO 994.18	-
3	Total phosphorus (TP)	g/100g	0.004	0.005	ISO 11261	-
4	Potassium (K)	g/100g	0.03	0.03	ISO 11263	-
5	Electric conductivity (EC)	µS/cm	27.0	28.0	ISO 17319	-
6	Moisture content	mg/100g	11.2	12.8	AOAC 17265	-
7	Calcium (Ca)	mg/100g	468	512	AOAC 935.29	-
8	Magnesium (mg)	mg/kg	49.2	53.1	AOAC 973.52	-
9	Lead (Pb)	mg/kg	2.88	3.15	ISO 110447	<85
10	Mercury (Hg)	mg/kg	0.05	0.04	ISO 12846	<0.3

Figure 18: Soil sampling activities

Soil-01 sample collecting

Soil-02 sample collecting

6.2.1.4. Elevation and Slope

A. Elevation

The map below shows the elevation in the project area within the 3 km study limit around the project site using dataset from JICA (JICA, 2002). The highest altitude of the study area is 70

[7] The Appendix 2 on the hazardous pollutant concentration thresholds allowed in the soil of the Prakas #387 on the concentrations of pollutants and hazardous substances concentration allowable for disposal issued in 2015 by the Ministry of Environment

meters above sea level. This area is in the southern part of the project which is mountainous area, while the altitude at the project site is around 20 meters above sea level.

B. Slope

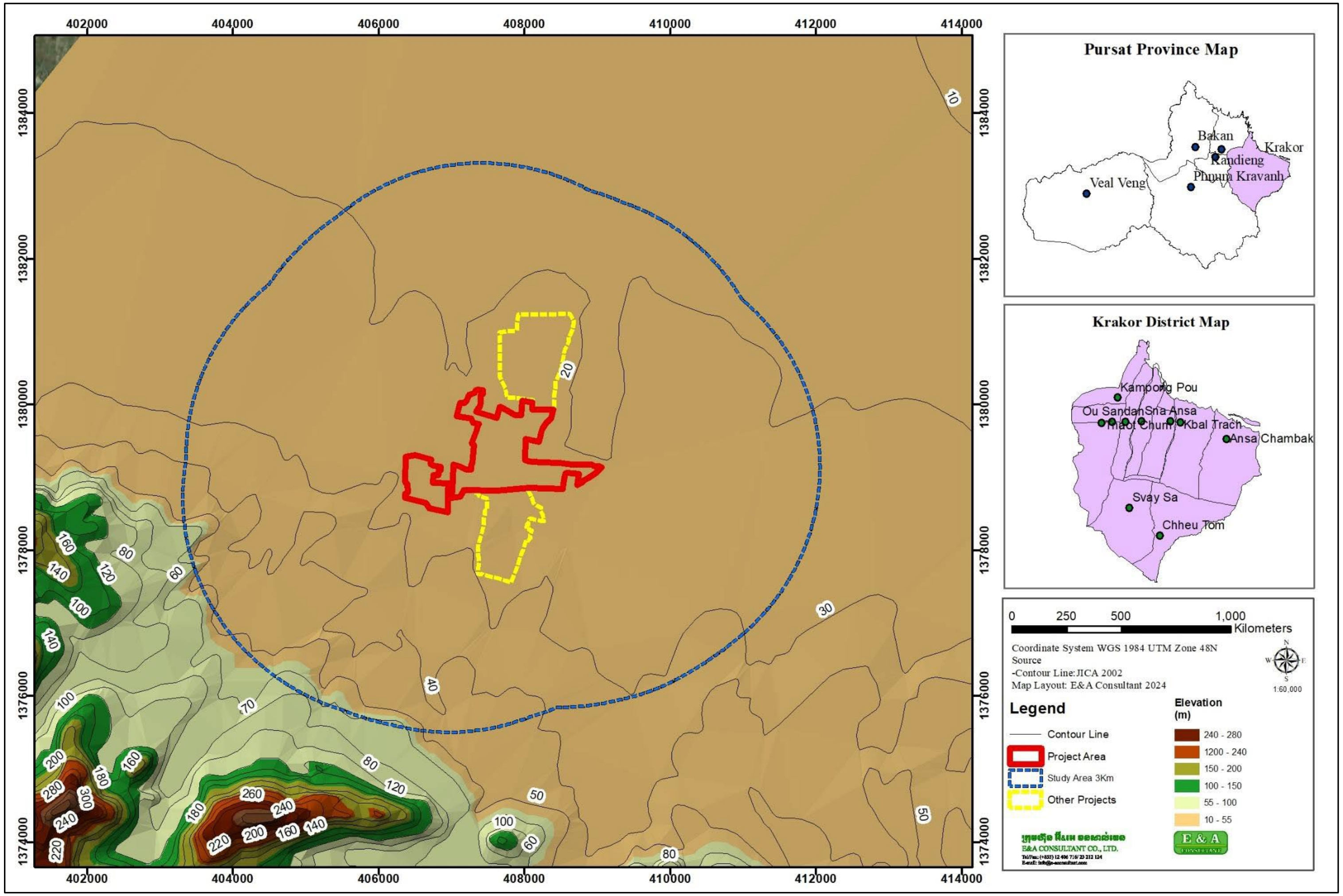
The slope ranking was done based on 2023 Aster Global Digital Elevation Model (ASTER GDEM) in Cambodia. The project had been cleared before the site survey. The project area, covering 168 hectares and the entire area falls within the almost flat category (0-3 degrees), indicating a relatively level landscape.

The study area 3km radius, spanning 5,234.95 hectares, exhibits a diverse range of slopes. The majority of the area (41.43%) is characterized as almost flat (0-3 degrees), followed by low-slope terrain (3-5 degrees) comprising 31.94% of the area. Medium slopes (5-10 degrees) account for 20.63%, while high slopes (10-30 degrees) constitute the remaining 6.00%.

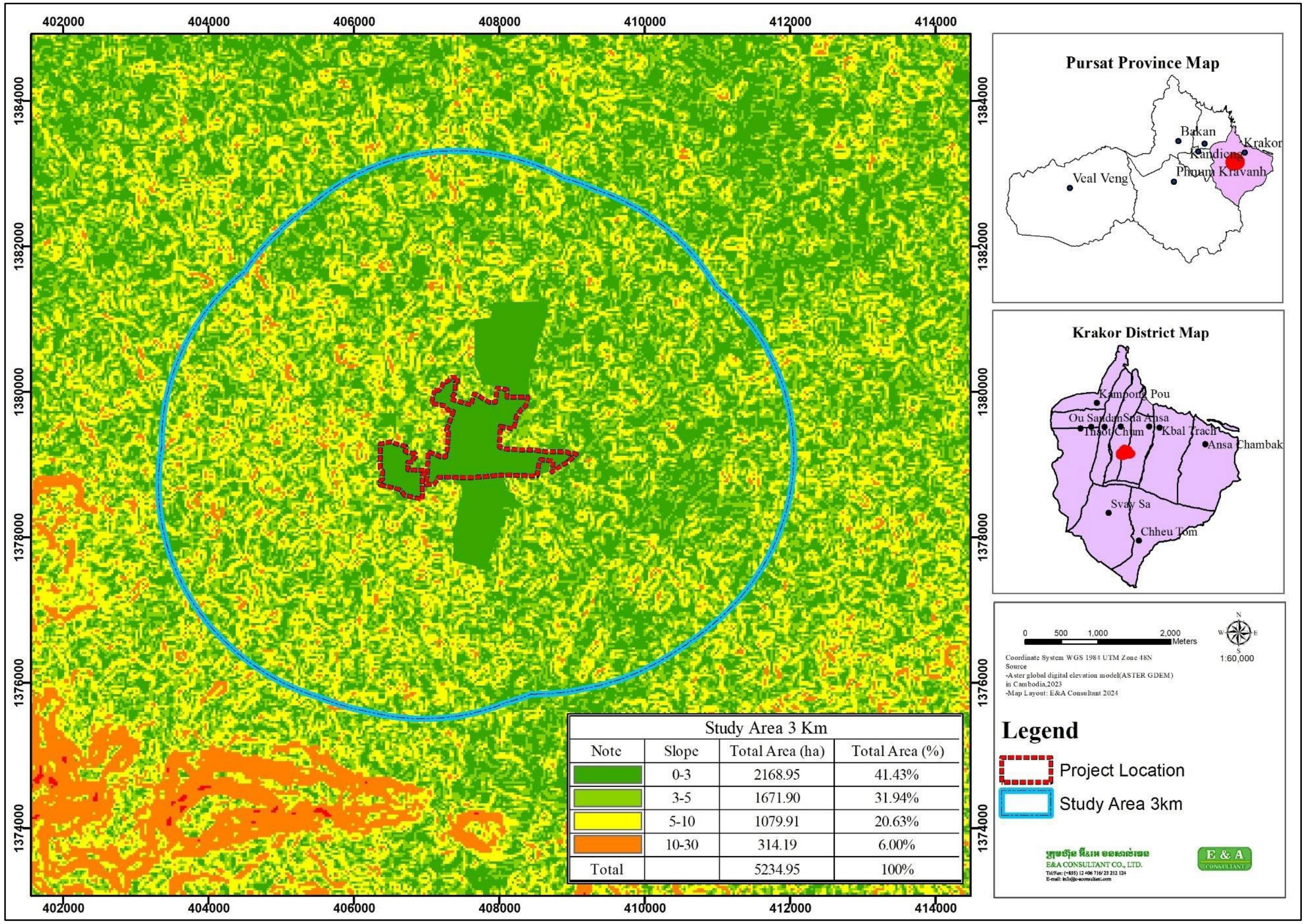
Table 17: Slope level

Study Area 3km				
No	**Slope level**	**Area (ha)**	**Area (%)**	**Remarks**
1	0 to 3 degrees	2168.95	41.43	Almost flat
2	3 to 5 degrees	1671.90	31.94	Low slope
3	5 to 10 degrees	1079.91	20.63	Medium slope
4	10 to 30 degrees	314.19	6.00	High slope
Total		5234.95	100	
Project Area (168 ha)				
No	**Slope level**	**Area (ha)**	**Area (percentage)**	
1	0 to 3 degrees	168	100	Almost flat

Map 8: Elevation map



Map 9: Slope



Study Area 3 Km

Note	Slope	Total Area (ha)	Total Area (%)
	0-3	2168.95	41.43%
	3-5	1671.90	31.94%
	5-10	1079.91	20.63%
	10-30	314.19	6.00%
Total		5234.95	100%

6.2.1.5. Climate

A. Climate in Cambodia

Cambodia's climate is characterized by two primary seasons: a dry season from November to April and a rainy season from May to October. During the dry season, temperatures range between 25°C and 35°C, with lower humidity and sunny, pleasant weather. The rainy season is influenced by the southwest monsoon, bringing high humidity and heavy rainfall, especially between June and September. During this period, average temperatures remain around 27 °C.

Cambodia's average annual temperature is approximately 27.4°C, with maximum temperatures often exceeding 32°C just before the rainy season. Rainfall varies between 1,400 mm and 2,000 mm annually, with the southeast and northwest regions receiving the heaviest rainfall. Humidity levels fluctuate throughout the year, averaging 71% in January and peaking at 85% in September, contributing to a yearly average humidity of around 78% (World Bank, 2021).

B. Climate in Pursat

Pursat province, located in western Cambodia, shares much of the country's tropical monsoon climate but also has some unique features due to its geographical location. According to Climate Data (Climate Data, 2024), over the past five years (2019-2023), the temperature in Pursat Province, Cambodia, has shown noticeable patterns. The average yearly temperature has hovered around 27.5°C (81.4°F). During the cooler months, typically from December to February, the temperature dips to an average monthly low of about 25°C (77°F). The yearly minimum temperature averages around 24°C (75°F), with the lowest recorded temperature being around 22°C (72°F). On the other hand, the hottest months, April and May, have seen temperatures soar to around 34°C (93°F).

Rainfall in Pursat Province has also exhibited distinct trends over the past five years. The average yearly rainfall stands at approximately 1,349 mm. The province experiences a dry season from November to April, characterized by minimal rainfall and occasional dry spells. In contrast, the rainy season, spanning from May to October, brings heavy rainfall, especially in September and October, which are the wettest months. The average total rainfall during these months can reach around 200 mm. While specific data on the largest amount of rainfall in a single event isn't readily available, extreme rainfall events are common during the monsoon season. The study by Pen (Pen et al., 2024) shows that Cambodia's rainfall patterns are changing, leading to a higher risk of both droughts and floods in different regions. However, extreme rainfall is more likely to occur in the coastal region of Cambodia, particularly at Koh Kong city due to frequent affects by tropical storms, which bring heavy rainfall and contribute to the intensification of extreme rainfall events. However, extreme rainfall is not likely to increase in the Tonle Sap region of Cambodia [including Pursat]. But Tonle Sap region is experiencing a trend towards increased consecutive dry days , indicating a higher risk of drought conditions.

Humidity levels in Pursat Province have remained high over the last five years, with an average annual humidity of around 80%. The wet season, from May to October, sees the greatest average monthly humidity levels, often exceeding 85%. Conversely, the dry season, from November to April, experiences the lowest average monthly humidity levels, which hover around 70%.

6.2.1.6. Air Quality

Cambodia's air quality standards are set by Sub-Decree No. 42 on Air Pollution and Noise, which sets the maximum standard levels of hazardous substances allowed in the air by parameter type and the duration of the release of those harmful substances. Air quality is an indicator of the amount of pollution that spreads through the air and can be absorbed directly into humans and animals. In addition, the pollutants in the air can also cause water and soil pollution. The increase of the use of machineries and the number of large industrial plants, such as coal-fired power plants, crude oil power plants, cement plants, etc. are the evidence on air quality which have been managed MoE to ensure that ensure development does not harm the environment, especially air quality in the Kingdom of Cambodia (Ministry of Environment, 2017).

The table below shows the results of the Air Quality Analysis (X = 406854, Y = 1379419) at the residential area near project site on October 13, 2024 . The analysis shows that the 8 air quality parameters analysed complied with the standards set by the Ministry of Environment in the Prakas No. 116 issued on April 11, 2018 on the introduction of working conditions for infrastructure and tourism development projects (Ministry of Environment, 2018). But So_2 concentration was found to be higher than the standard set in WHO's Ambient Air Quality Guideline. In genera, the air quality in the study area is in quite good condition.

Table 18: Results of air quality analysis in the study area

Nº	Parameters	Unit	Results	Local Standard	WHO Standard	Duration
1	Carbon Monoxide (CO)	mg/m³	0.8072	20	-	1 hour
2	Nitrogen Dioxide (NO2)	mg/m³	0.0897	0.1	-	24 hour
3	Sulphur dioxide (SO2)	mg/m³	0.1252	0.3	0.02	24 hour
4	Ozone (O3)	mg/m³	0.0946	0.2	-	1 hour
5	Lead (Pb)	mg/m³	-	0.005	-	24 hour
6	Total Suspended Particle (TSP)	mg/m³	0.0241	0.33	-	24 hour
7	Particle Meter 10 (PM10)	mg/m³	0.0133	0.05	0.05	24 hour
8	Particle Meter 2.5 (PM2.5)	mg/m³	0.0073	0.025	0.025	24 hour

Source: Air Quality and Noise Management Department of the Ministry of Environment 2024

Figure 19: Air quality, noise and vibration analysis activities

Source: Air Quality and Noise Management Department of the Ministry of Environment 2024

6.2.1.7. Noise

The table below shows the results of ambient noise analysis at the same time and location as air quality analysis above. The analysis shows that the average volume per hour for 24 hours measured at the project site in accordance with the permitted standards of Ministry of Environment during the morning, afternoon and evening. By comparing to the IFC noise level standard, noise is a bit higher compared to the threshold.

Table 19: Noise analysis results in the study area

Survey time		Noise Level dB(A)						
		Average	Local Standard	IFC standard	Maximum	Minimum	L10	L90
Morning	6:00 - 7:00	52.50	70	45	66.30	38.80	54.30	50.40
	7:00 - 8:00	52.50		55	67.40	38.10	53.20	50.40
	8:00 - 9:00	52.40			69.30	38.30	53.30	50.30
	9:00 - 10:00	50.60			65.30	37.10	52.80	48.90
	10:00 - 11:00	49.10			65.50	37.90	50.30	48.30
	11:00 - 12:00	51.40			73.90	39.40	53.20	47.30
	12:00 - 13:00	49.40			60.80	37.90	53.20	47.00
	13:00 - 14:00	49.70			59.90	36.20	52.90	47.90
	14:00 - 15:00	57.30			75.40	41.00	58.90	53.40
	15:00 - 16:00	48.40			60.80	36.50	53.40	46.30
	16:00 - 17:00	47.40			60.90	38.70	52.30	46.00
	17:00 - 18:00	48.90			64.40	39.30	50.40	46.30
Afternoon	18:00 - 19:00	51.70	65		66.40	39.10	52.20	45.30
	19:00 - 20:00	44.80			58.00	39.00	47.80	43.20
	20:00 - 21:00	44.50			58.00	38.10	47.30	43.20
	21:00 - 22:00	44.50			63.10	38.00	46.80	43.20
Evening	22:00 - 23:00	43.10	50	45	51.50	37.30	44.80	42.30
	23:00 - 00:00	44.00			53.10	36.00	44.90	43.00
	00:00 - 1:00	39.70			52.00	35.60	42.30	36.00
	1:00 - 2:00	39.40			50.90	35.80	41.00	36.90
	2:00 - 3:00	40.90			50.20	36.00	41.80	37.90
	3:00 - 4:00	40.90			47.20	35.90	41.40	37.30
	4:00 - 5:00	40.60			51.40	35.80	41.80	37.30
	5:00 - 6:00	50.00			61.90	36.80	51.90	45.40

Source: Air Quality and Noise Management Department of the Ministry of Environment 2024

6.2.1.8. Vibration

The table below shows the results of measuring vibration level at the same time and location as air quality analysis above. The result shows that the vibration level in each hour is in accordance with the permitted standard of the Ministry of Environment.

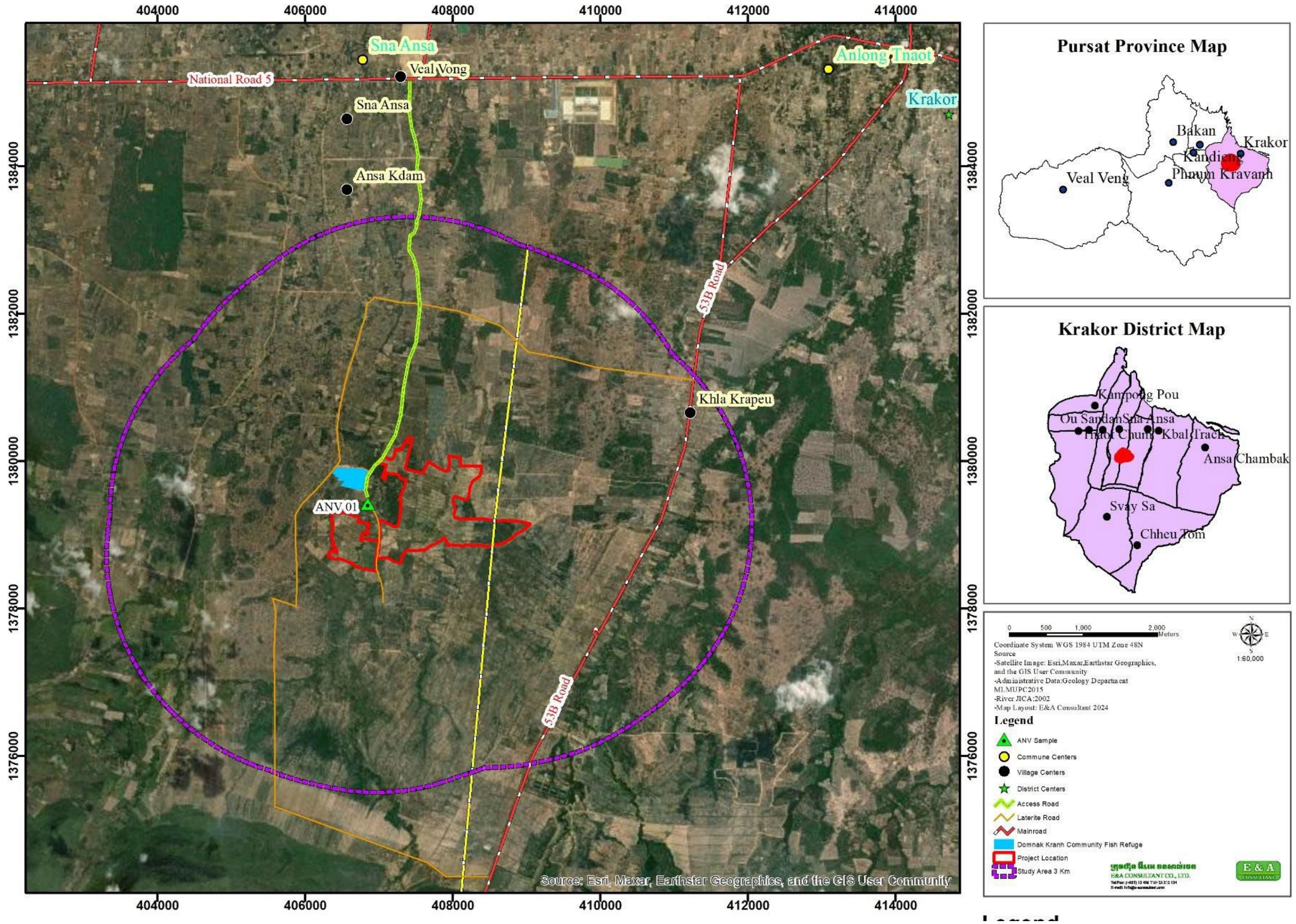
Table 20:Vibration analysis results in the study area

Survey time		Vibration Level (dB)			
		Average	Standard	Maximum	Minimum
Morning	6:00 - 7:00	24.50	65	20.3	14
	7:00 - 8:00	22.90		38.2	14.1
	8:00 - 9:00	22.70		32.8	14
	9:00 - 10:00	25.10		41.8	15.3
	10:00 - 11:00	22.30		39.9	14.6
	11:00 - 12:00	24.90		36.3	14.1
	12:00 - 13:00	21.90		42.8	14
	13:00 - 14:00	23.30		42.3	14.3
	14:00 - 15:00	21.80		34.5	14.6
	15:00 - 16:00	26.70		38.5	14.4
	16:00 - 17:00	25.80		38.2	14.4
	17:00 - 18:00	23.20		46	13.9
Afternoon	18:00 - 19:00	22.30	60	37.8	13.9
	19:00 - 20:00	22.50		42.2	14.3
	20:00 - 21:00	21.30		37.9	14.1

Survey time		Vibration Level (dB)			
		Average	Standard	Maximum	Minimum
	21:00 - 22:00	20.90		37.8	14
Evening	22:00 - 23:00	20.70	50	37.8	13.6
	23:00 - 00:00	20.80		37.3	13.7
	00:00 - 1:00	20.60		26.7	13.8
	1:00 - 2:00	20.50		39.5	13.7
	2:00 - 3:00	20.50		37	13.5
	3:00 - 4:00	20.50		24.8	13.6
	4:00 - 5:00	20.80		45.2	13.8
	5:00 - 6:00	22.10		26.8	13.7

Source: Air Quality and Noise Management Department of the Ministry of Environment 2024

Map 10: ANV Sample



6.2.1.9. Hydrology

6.2.1.9.1. General Hydrological Feature in the Area

Within the 3km radius from the project boundary, there are a couple of water bodies which are natural canals (storm water drainage) and water reservoirs. The water of those water bodies flow from the south to the north towards the Tonle Sap Lake. The canals within the assessment area has their key roles in rain water release, but not in domestic consumption by local people. In addition, the water from this canal are not significantly used for agriculture, majority of people depend on wet season rice plantation.

Those water bodies are as follow:

Ou Phnov canal

Ou Phnov canal is around 2km east and outside of the AoI. This canal is completely separated from project area by Road 58B. No water from this canal flow into the assessment area. This canal has a varying width from 3 to 5 meters and 1 to 1.5 meter deep, and originates from Phnum Prey Mountain (approximately 4 kilometres south of the project) and flows northward through the centre of Krakor district, crossing National Road 5 before joining Ou Kralanh canal and eventually emptying into the Tonle Sap River. This canal does not have water flow in dry season, which means that this canal is classified as Type 1 public water area.

Ou Trapeang Russei canal and Canal 1

According to 2002 JICA dataset, this water body is a natural canal that flow across the eastern part of the 168 ha land area of the project (Area 1). These 2 canals are kind of irrigation systems in paddy fields with the width of around 2 meter, and 1 deep. Ou Trapeang Surry and Canal 1 is 4 km and 3km long, respectively. The canal flows into the low land area (paddy field) around 3km north the project. The surplus water in this low land area is discharged through nearby irrigation to downstream canal and then into Tonle Sap lake. After land clearing by this solar projects, Ou Trapreang Russey canal and Canal 1 were diverted along the project's south boundary to the east and then to the low land area (paddy field) around 3km north of the project area (Area 1) before flowing into Tonle Sap lake. These canals does not have water flow in dry season, which means that this canal is classified as Type 1 public water area.

Hydrological System of Damnak Kranh Reservoir

Before the site clearing phase of this project, Damnak Kranh Reservoir had 2 upstream canals (canal 2 and canal 3), which are its key catchments, and the downstream canal (canal 4) for releasing surplus water into Tonle Sap Lake. But, after the land clearance by the project, Canal 2 was no longer allowed to pass through the project's area. The canal 2 was diverted to canal 3 and then flowed into Damnak Kranh Reservoir. There is no water flow in these canals during dry season, which means that this canal is classified as Type 1 public water area. These 2 canals has a width from 4-6 meters and 1 to 2 m deep. Each canal is around 3 km in length.

Damnak Kranh Reservoir

The Development and Purpose

This reservoir is named "Damnak Kranh Community Fish Refuge" (DK-CFR). This reservoir is down stream of the project area (Area 2) and does not have water flow in dry season, and is classified as Type 1 public water area. The DK-CFR was established in 2017 with the recognition from local authorities (Sna Ansa Commune). This reservoir is located around 300 m west of Area 1 of the project, and downstream of the Area 2 of the project. This reservoir is 250 meters width, 440 meters wide, and 4 meters deep.

DKs-CFR is part of a network of community-managed fish sanctuaries designed to support sustainable fishing practices and improve the livelihoods of rural communities. In addition, the reservoir is also used as irrigation for farm lands and, eventually, flows out to the Tonle Lake.

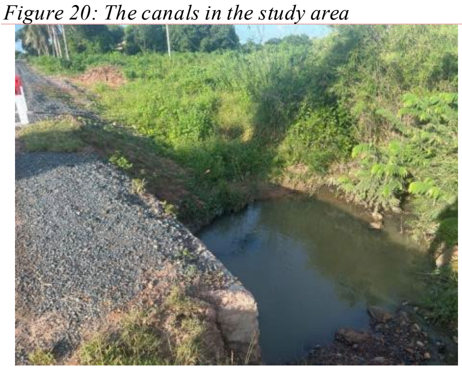
DK-CFR serves as a habitat for fish, particularly during the dry season when natural water bodies shrink, providing a sanctuary where brood fish can survive. During the wet season, these fish migrate from the refuge into surrounding rice fields and floodplains, supporting local fishing activities. The refuge has brought benefits to the surrounding local communities (Sna Ansa, Vealvong, Beng, Krang Veng, Thmei, Chiches, Svay Sor, Saravoan, and Ansor Kdam villages). The establishment of this DK-CFR has led to a notable increase in fish productivity, with communities around the refuge experiencing an average increase in fish catch of 9% between 2012 and 2015. In addition, Damnak Kranh CFR has also been a place for tourists where the community and local people can generate additional income. A small number of visitors go to visit DK-CFR at weekends, and more visitors appear at the site during national festivals like Pchum Ben or Khmer New Year.

Habitat Condition

The reservoir is a modified habit due to human interventions like excavation and introduction of non-native fish species. As reported, It was excavated several times since 2014 to expand water storage capacity. These modifications have impacted the original biodiversity, and it may not represent a truly rich or pristine ecosystem.

The primary purpose of the reservoir is to enhance fish stocks for local livelihoods and tourism. This suggest that biodiversity conservation is a secondary objective. In addition, The 29 fish species documented in the Damnak Kranh Reservoir, while seemingly diverse, are consistent with the typical fish diversity found in similar modified water bodies in the region. This suggests that the reservoir's fish diversity is not exceptionally rich compared to other comparable habitats. Particularly, the presence of Wallago attu, a vulnerable species, in this reservoir should be interpreted cautiously. This species was intentionally introduced to enhance fish stocks and may not be representative of the natural biodiversity of the reservoir.

Figure 20: The canals in the study area



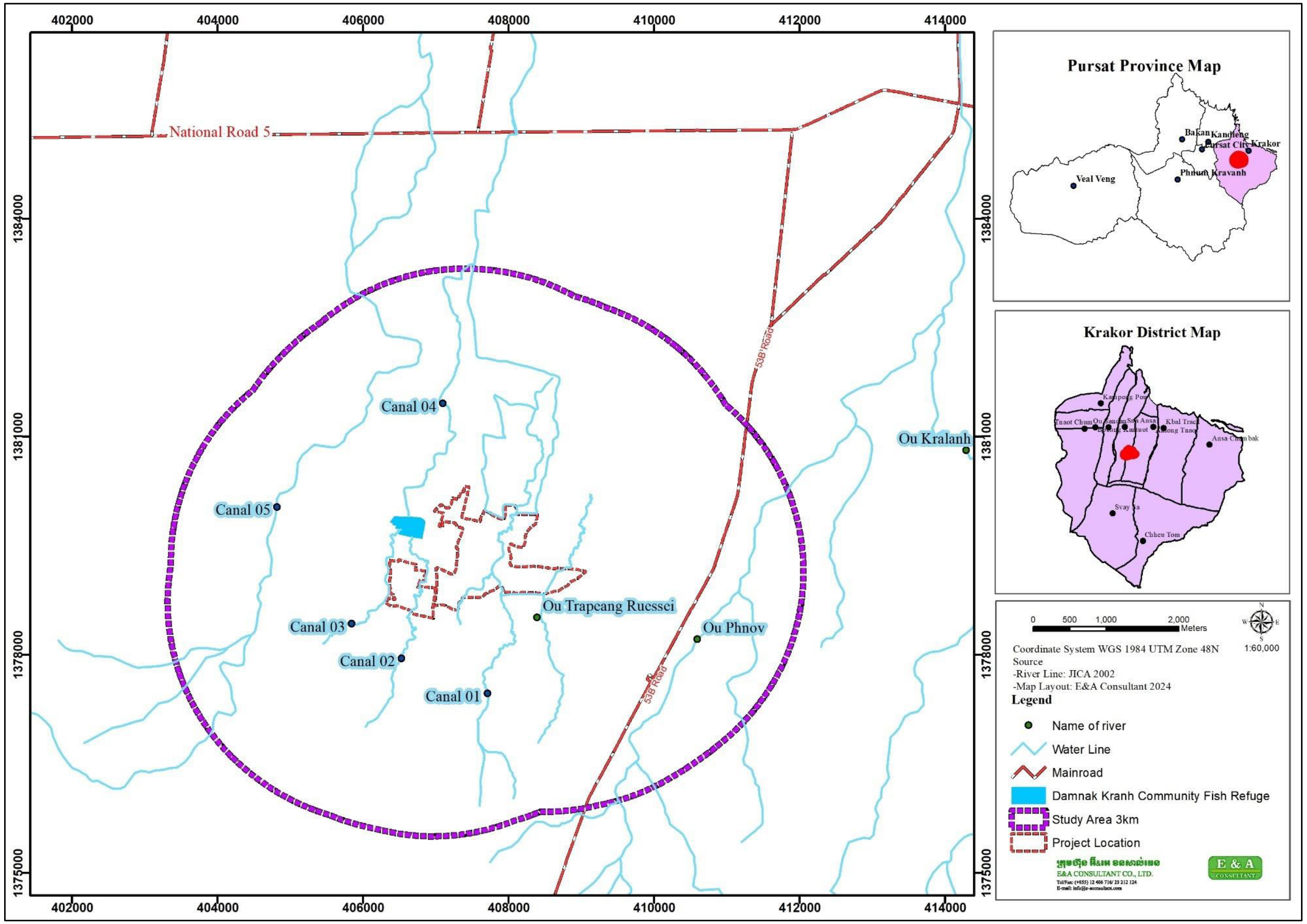
Ou Phnov

Ou Trapeang Ruessei

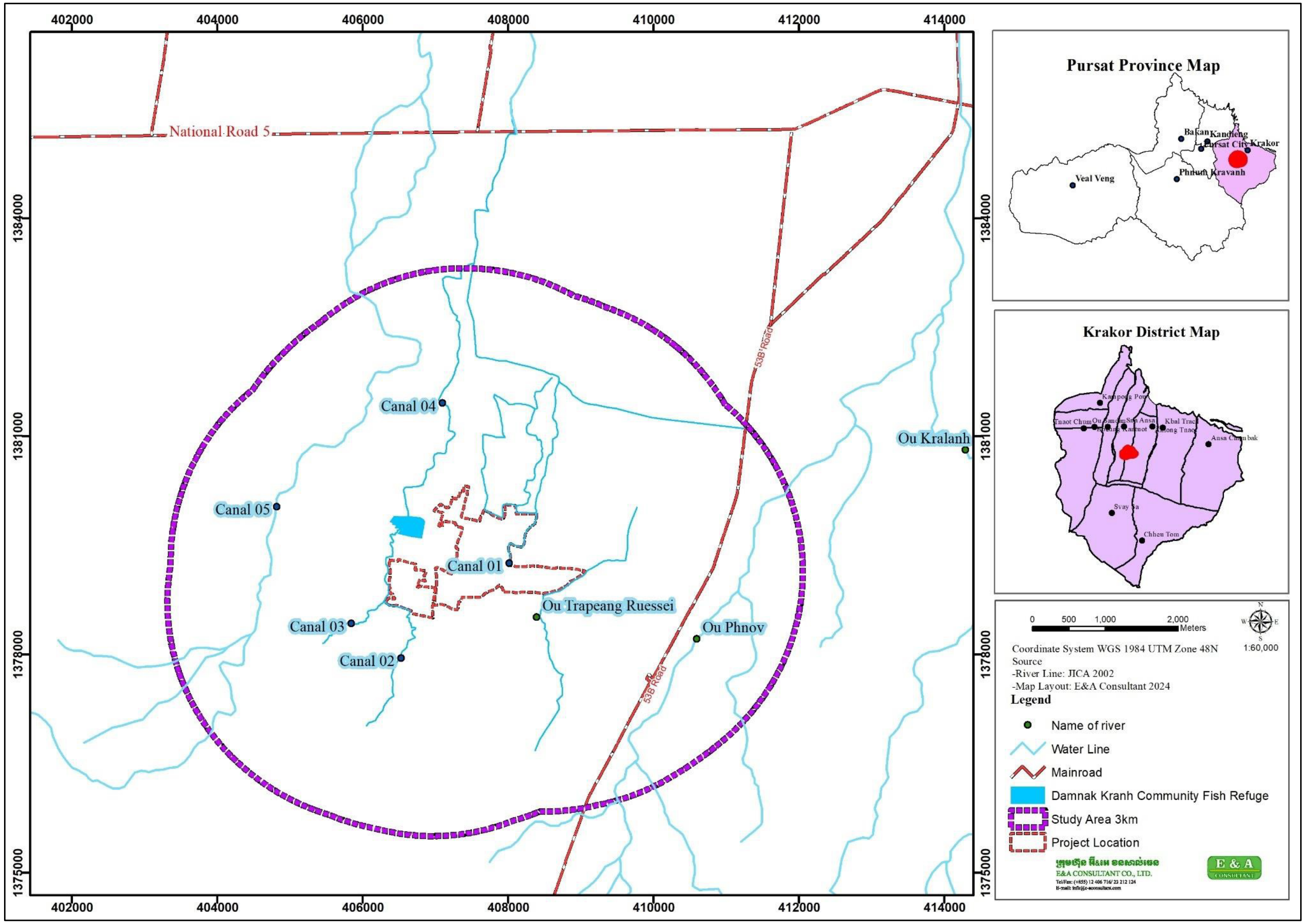
Damnak Kranh Community Fish Refuge (DK-CFR)

Source: E&A Consultant, 2024

Map 11: hydrological system (before site clearance at the project)



Map 12: hydrological system (after site clearance at the project)



6.2.1.9.2. Hydrological Assessment in the Study Area

In 2019, SchneiTec (the land owner) conducted a flood risk assessment for their solar power project located in the northern part of this 150MW solar power plant. The study focuses on assessing flood risk and for designing on-site drainage for the solar farm projects (see the following Figure). This flood risk assessment was implemented due to the vulnerability of solar systems to both riverine and localized rainfall floods. During that time, the 150MW solar power plant of SchneiTec were not developed yet.

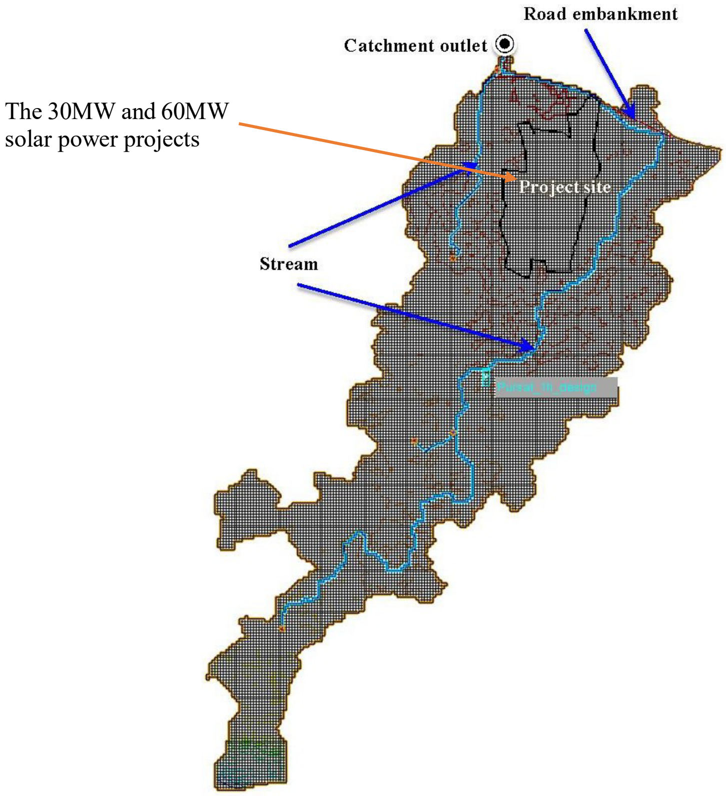


Figure 21: the assessment area of the 2019 flood risk report for the 90 MW solar power plant projects

The scope of the assessment are: (1) identifying flood levels without the proposed solar farm development; (2) proposing and testing flood protection measures, and (3) designing an on-site drainage system to minimize flood risk within the solar farm area. The study used a multi-faceted approach, combining desk studies, site reconnaissance, data collection, flood modelling, and drainage design.

The following are the key results of the assessment in scenario without the project:

1. **Riverine Flood Risk**: The project site is safe from riverine flooding of major rivers, including the Tonle Sap Lake. This conclusion is based on the analysis of flood model by using a 100-year return period, the interviews with local residents. The high elevation of the existing ground surface and the embankment of the National Road No. 5, located north of the project site, provide natural protection against riverine floods.

2. **Fluvial Flood Risk**: Fluvial flooding, driven by localized rainfall within the project site's upstream catchment, poses a potential risk to the project. By using the GSSHA model, the study revealed that the average flood depth within the project site under existing conditions (without development) was approximately 0.3 m above the existing ground surface. The flood extent primarily concentrates in the central to northern and eastern areas of the project site. A small area near the eastern boundary experiences a maximum flood depth of 0.5 m.

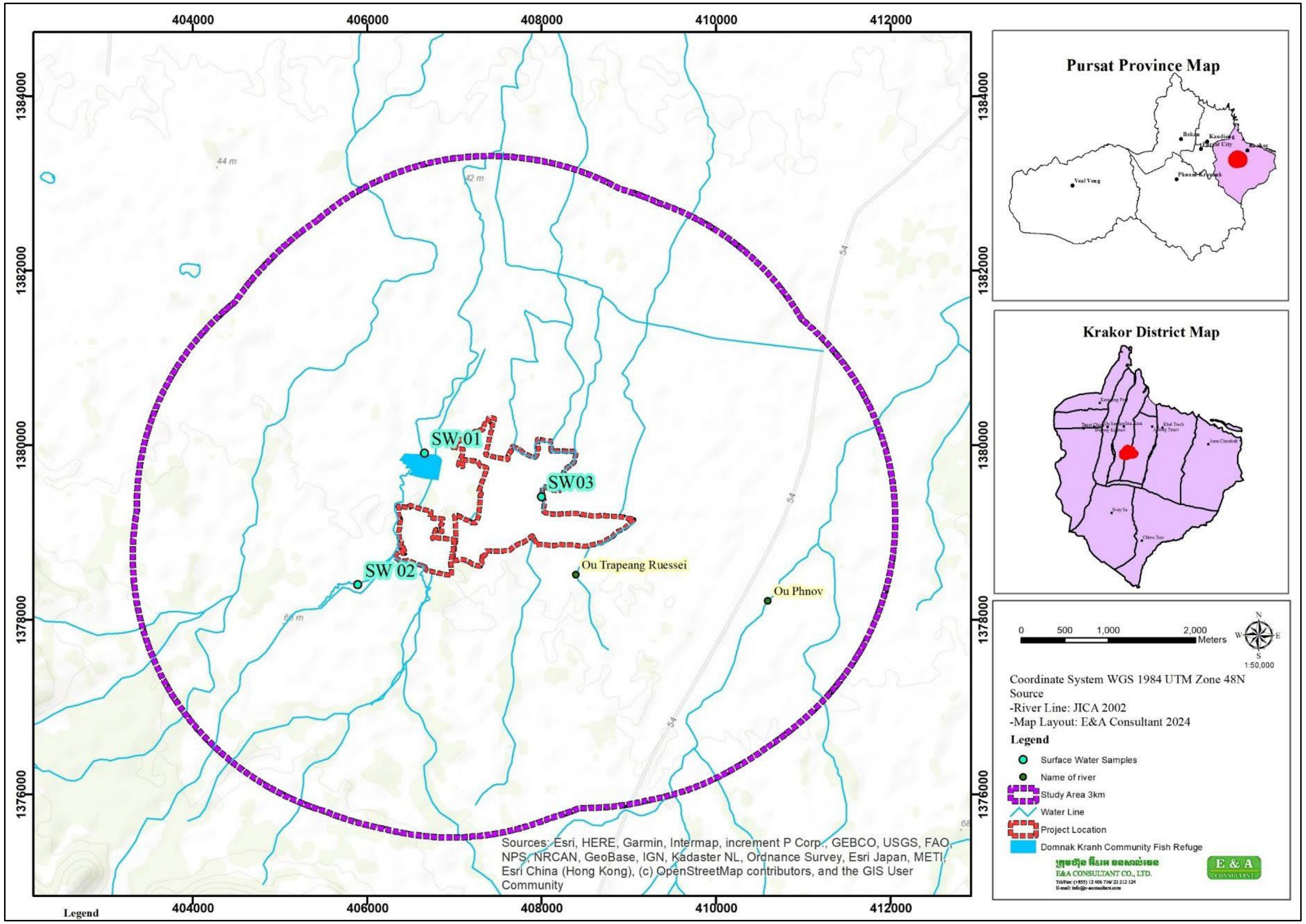
   Flood modeling considering three design rainfall scenarios at a 50-year return period (1-hour, 4-hour, and 24-hour storms) showed similar flood extents but different flood timing and magnitudes. The maximum flood depth slightly exceeds 0.5 m in some locations, particularly pits or depression areas. Flood recession takes approximately 7 hours for all three scenarios, attributed to the limited flood flow capacity of existing outlets. Surveys of flood marks and road embankments surrounding the project site confirmed that flood waters have never overtopped these structures.

It is noted that the report primarily focuses on assessing and mitigating flood risks **within the project site**, specifically the 90MW solar panel project. The primary focus of the report is on designing an on-site drainage system to efficiently manage surface runoff within the solar panel area. This system aims to collect and convey runoff to the perimeter trench, which eventually flows downstream to the north The report doesn't assess whether this drainage system might increase peak flows or flood risks downstream. However, the report also acknowledges the potential for flood impacts on surrounding areas, but doesn't have a detailed assessment of these impacts.

The report doesn't examine how the project (the 90MW solar power plant) might alter the flow patterns or flood behavior in areas downstream or adjacent to the catchment. In addition, since the report recommended backfilling, ground smoothing, and the construction of a perimeter trench and pond to mitigate flood risks within the project site, it is likely that the measures might potentially alter surface runoff patterns and affect downstream areas and increase of flood in the surrounding area. This limited scope suggests a need for further analysis to determine whether the project might inadvertently exacerbate flood risks in nearby locations.

Therefore, the project will carry out additional hydrology study to determine the cumulative impact on the local hydrological system. In order to determine how the identified current and future solar power plant projects increase the risk of flooding in surrounding areas, the hydrological study will take these projects into account. If it is discovered that the projects raise the area's risk of flooding, it is anticipated that this hydrology study will offer appropriate and practical mitigations for implementation.

Map 13: location of surface water quality sampling



6.2.1.9.3. Surface Water Quality

Surface water quality studies were conducted in three locations which are two samples inside the project area and one outside. Water collection was conducted on September 27, 2024 in Ansa Kdam and Khla Krapeu villages, Sna Ansa and Anlung Tnaut communes, Krakor District, Pursat Province. Location 1 (SW-01) Damnak Kranh reservoir (WGS 1984, X = 406655, Y = 1379909) and location 2 (SW-02) along the project area (WGS 1984, X= 405893, Y= 1378399). Location 3(SW-03) outside the project area (WGS 1984, X= 405893, Y= 1378399).Therefore, the study used water quality standards of public water type 1 for the conservation of biodiversity in water, Appendices 4 and 5 of Sub-Decree No. 103 of the Ministry of Environment.

The table below shows the water quality test results of both sites in the study area. The results of a surface water quality analysis for two samples, SW-01 and SW-02. Various parameters were evaluated, including pH, Total suspended solids (TSS), Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Oil and Grease, Detergent, Total Nitrogen (TN), Total Phosphorus (TP), Lead, Arsenic, Cadmium, Iron, Mercury, and Total coliform.

The surface water testing results for SW-01, SW-02, and SW-03 indicate that the water quality generally meets the established standards, with a few exceptions.

Total Suspended Solids (TSS) in SW-03 significantly exceeded the standard, likely due to factors like erosion, agricultural runoff, land cover change in the project and at other areas upstream of the project. Biochemical Oxygen Demand (BOD) in SW-02 and SW-03 was also elevated, suggesting organic pollution from sources such as sewage, agricultural runoff, or industrial effluents. Total Nitrogen (TN) in SW-01/02/03 exceeded the standard, potentially contributing to eutrophication. While heavy metal levels were below the standard, all samples contained elevated levels of total coliform.

Table 21: Surface water quality analysis results

º	Parameters	Unit	Result			Standard	Testing Method
			SW-01	SW-02	SW-03		
1	pH	-	**6.55**	**6.55**	**6.52**	**6.5-8.5**	AOAC 973.41
2	Total suspended solid (TSS)	mg/L	20.0	28.0	264	<100	ISO 11923
3	Dissolved oxygen (DO)	mg/L	6.60	6.70	6.60	>3	ISO 17289
4	Biochemical oxygen demand(BOD_5)	mg/L	5.00	9.00	9.00	<8	ISO5815
5	Chemical oxygen demand(COD)	mg/L	6.00	16.0	16.0	<10	ISO 6060
6	Oil and Grease	mg/L	ND	ND	ND	N/A	ISO7377-2
7	Detergent	mg/L	ND	ND	ND	N/A	ISO 1104
8	Total nitrogen(TN)	mg/L	5.60	9.90	8.80	<3	AOAC 960.52
9	Total phosphorus(TP)	mg/L	0.05	0.04	0.03	<0.25	ISO 15681
10	Lead(Pd)	mg/L	ND	ND	ND	<0.01	ISO 8518
11	Arsenic(As)	mg/L	0	0	0	<0.01	ISO 17378
12	Cadmium (Cd)	mg/L	ND	ND	ND	<0.03	ISO 5961
13	Iron(Fe)	mg/L	0.35	0.75	0.8	N/A	ISO 6332
14	Mercury(Hg)	mg/L	ND	ND	ND	<0.0005	ISO 12846
15	Total coliform	MPN/100mL	1.5 x 10^2	2.4 x 10^2	4.6 x 10^2	<1000	ISO9308-2

Note: local standards for publica water body Type 1 based on the 2021 Sub-Decree on Water Pollution ontrol (1999) and Sub-Decree on the Amendment of Article 4, Article 9, Article 11, Article 12 and Article 17 and Table Annex 2, Annex 3, Annex 4 and Annex 5 of Sub-Decree No. 27, dated 6 months. April 1999 on Water Pollution Control

Source: ACTA BIO, 2024

Figure 22: Surface water sampling collection activities

SW-01 sample collecting

Surface water sample

SW-02 sample collecting

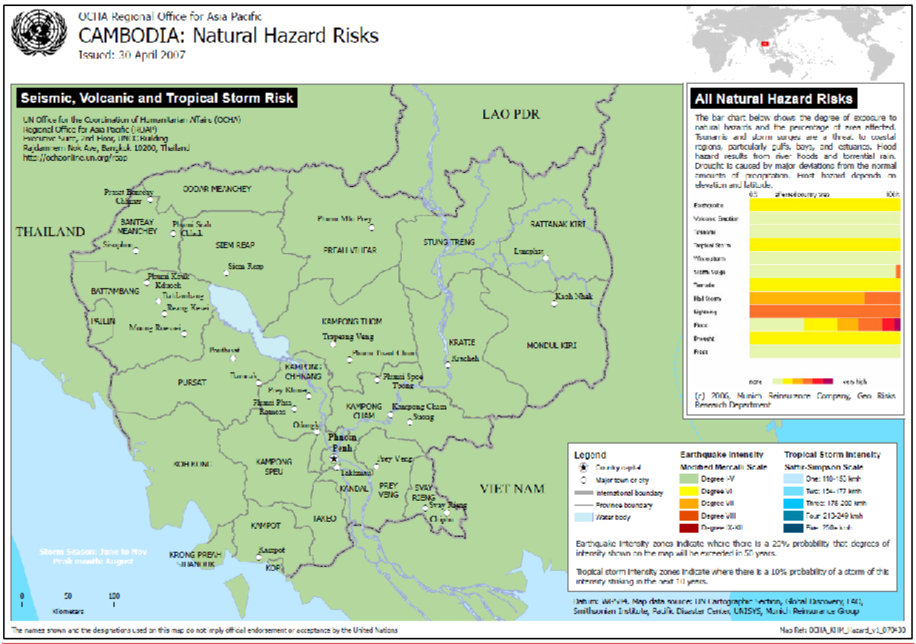
SW-03 sample collecting

Source: E&A Consultant, 2024

6.2.1.10. Earthquake

Earthquake disasters are not common in Cambodia. There is no record of significant disaster caused by earthquakes. Figure below shows the seismic and other natural hazard risks in Cambodia. The zones indicate where there is a probability of 20% that degrees of intensity shown on the map will be exceeded in 50 years (OCHA, 2007). This probability figure varies with time, i.e. it is lower for shorter periods and higher for longer periods.

Figure 23: Natural Hazard Risks of Cambodia



Source: United Nations Office for the Coordination of Humanitarian Affairs Figure 16 Natural Hazard Risk of Cambodia (Seismic, Volcanic and Tropical Storm Risk)

6.2.2. Biological Resources

6.2.2.1. Key ecological resources within 50km around the project

The biological resources screening has been done by using the available secondary data and datasets in Cambodia. This screening provides an understanding of the existing areas that are ecologically relevant to the project site and the BAoI. Within this 50-km radius, the study looks at important/sensitive areas for conservation and key habitats and their ecological values. In addition, the screening also look at key UNESCO World Heritage Site.

Table 22 and the maps below show the information about key ecological resources located within a 50-km radius of a project site. There are five protected areas: Central Cardamom, Phnom Aural, Tonle Sap, Boeng Chhmar Core Area (Ramsar), and Stung Sen Core Area (Ramsar). Notably, Tonle Sap Lake is the closest key ecological area to the project site, situated 13 km to the north (downstream of the project site). It is worth noting that that, according to Map 15, there is no key national or world heritage sites within the 50 radius.

Table 22: location of key ecological resources within 50km radius

Key Area	Description	Direction compared to project site	Distance from project site
Central Cardamom Wildlife Sanctuary	The Central Cardamom Wildlife Sanctuary stands as one of Southeast Asia's largest protected areas, spanning approximately 4,000 square kilometers. It is renowned for its exceptional biodiversity, harboring a remarkable array of wildlife including endangered species such as the Indochinese	South-west	62km

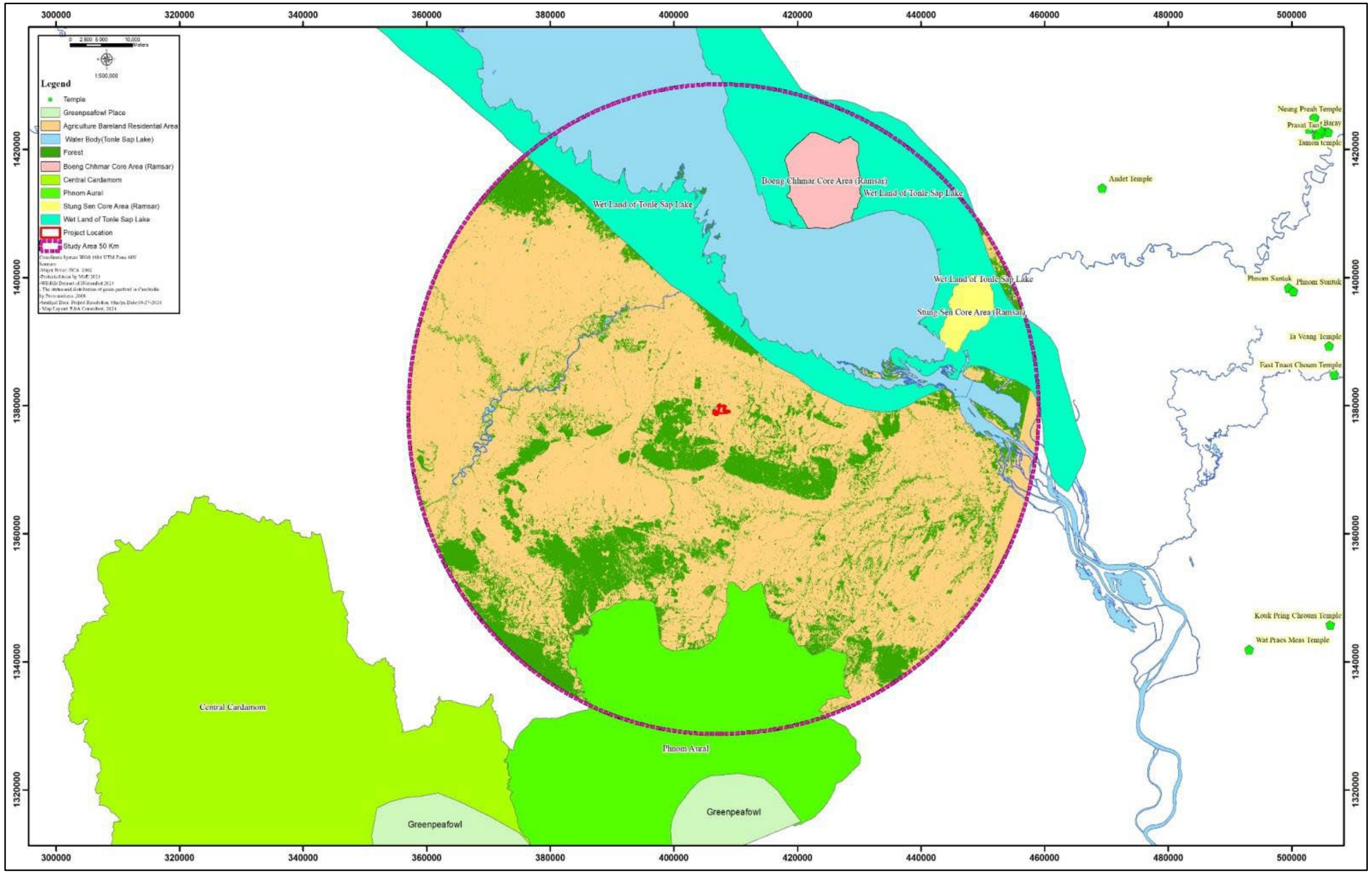
	tiger, elephant, and gibbon. The sanctuary is also home to diverse plant life, with lush tropical rainforests covering a significant portion of its landscape.		
Phnom Aural Wildlife Sanctuary	Phnom Aural Wildlife Sanctuary locate in northeastern Cambodia. The Sanctuary safeguards a substantial portion of the Eastern Plains Landscape. This landscape is characterized by its diverse ecosystems and supports a rich variety of wildlife. The sanctuary plays a crucial role in conserving this important ecological region.	South	27km
Tonle Sap Lake	Tonle Sap Lake was recognized as one of the most productive freshwater lakes globally. The lake exhibits dramatic seasonal fluctuations in water levels, creating a dynamic and unique ecosystem. This dynamic environment supports an extraordinary abundance of aquatic life and provides vital habitats for a diverse range of migratory bird species.	North	13km
Boeng Chhmar Core Area (Ramsar)	Boeng Chhmar is designated as a Ramsar site, acknowledging its international importance as a wetland ecosystem. As a Ramsar site, it is recognized for its crucial ecological functions, including flood control, water regulation, and supporting a diverse range of biodiversity.	North	32km
Stung Sen Core Area (Ramsar)	Similar to Boeng Chhmar, Stung Sen is also designated as a Ramsar site, emphasizing the significance of wetlands in this region. Like other Ramsar sites, it likely provides essential ecological services such as water filtration, flood mitigation, and habitat for a diverse array of species.	North-east	38km

According to Map 14, the project site is located within a small catchment of a canal flowing into Beoung Tonle Sap. The key canals function is to release rainwater in the area. Except for the Beoung Tonle Sap, the catchment (canals) does not have any connectivity with the southern region beyond 3 km. However, Danank Kranh reservoir, around 300 m from the project site, was found to be a key fish raising area for the community, but this reservoir has a water control mechanism where water will be released downstream when required, during which fish from the reservoir will be discharged into the downstream irrigation for livelihood support of the people in the community. The fact that the canals does not have water in dry season, and the function of these canals and Damnak Kranh Reservoir suggests that key aquatic resources exist within the 3 radius from the project site. It is unlikely that the aquatic resources form Beoung Tonle Sap reach the BAoI.

Map 14 and Map 15 show the habitats for green peafowl in Aural Wildlife Sanctuary, which is around 60 km southwest of the project. No habitat of green peafowl is found within the 50 km radius of the project site. In addition, no Green Peafowl has been recorded within the area of 50 km radius from the project site (iNaturalist, 2024). Considering these facts and the situation of land cover conversion within the 50 km radius (most lands are paddy field, residential area, and pubic infrastructures), it is unlikely that green peafowl and other key biodiversity resources, especially those in the surrounding protected areas, have the connectivity with project site.

Map 14: Key protected area within 50km Radius

Map 15: recorded biodiversity species and key area in 50km radius



6.2.2.2. Result of biological resource study within BAoI

A. Introduction

Cambodia's high diversity of forest vegetation harbor to 2038 plants (Dy 2000), 83 mammals (Francis 2008; Mensoriyun 2008), 73 small mammals (Furei, pers. comm), 600 birds (Ronson 2008; Goes et al 2015), 84 amphibians (Neang & Holden 2008), 175 reptiles (Neang, unpublished data), about 200 butterflies (Monastyrskil, et al. 2011)). The richness of biodiversity occurs in different biogeographical zones of the country. However, Cambodia's biodiversity has drastically declined from the pressure of high demand for human settlement, agricultural expansion, monoculture plantation, and development projects. In recent years many forested areas both degraded and undisturbed areas have been granted to private sectors for economic land concessions, most of which have not undergone environmental impact assessment (EIA).

The SchneiTech Beyond project is located in Sna Ansa commune, Krakor district, Pursat province covering an area of 168 ha. The project and the assessment areas are outside the key protected areas as defined by Royal Government of Cambodia (MOE, 2023). This project is near the Damnak Kranh reservoir and the Phum Krang Thom community forestry. Mammals, birds, amphibians, reptiles, and fish are important components of aquatic and terrestrial ecosystems (Brook et al. 2009; Soriyun et al. 2007; Francis 2008; Neang & Holden 2008; Utsughi et al. 2018; Setha et al. 2021). The rapid biodiversity assessments were conducted during the rainy season from September 26-27, 2024.

B. Summary of biological resources findings and general situation of the study area

A total of 180 species of flora and fauna were recorded in the assessment area (3km radius) around the project sites. Those species comprises 55 plant species, 11 mammal species, 52 bird species, 10 amphibian species, 23 reptile species, and 29 fish species (please see list of species in Appendix). All vulnerable and endangered species reported are not in the project site and will not be affected by project since its habitat (e.g. green peafowl) is far away from the project and there is no direct impact pathway that can potentially lead to the adverse impacts on those species.

Land cover (captured from west of the project)

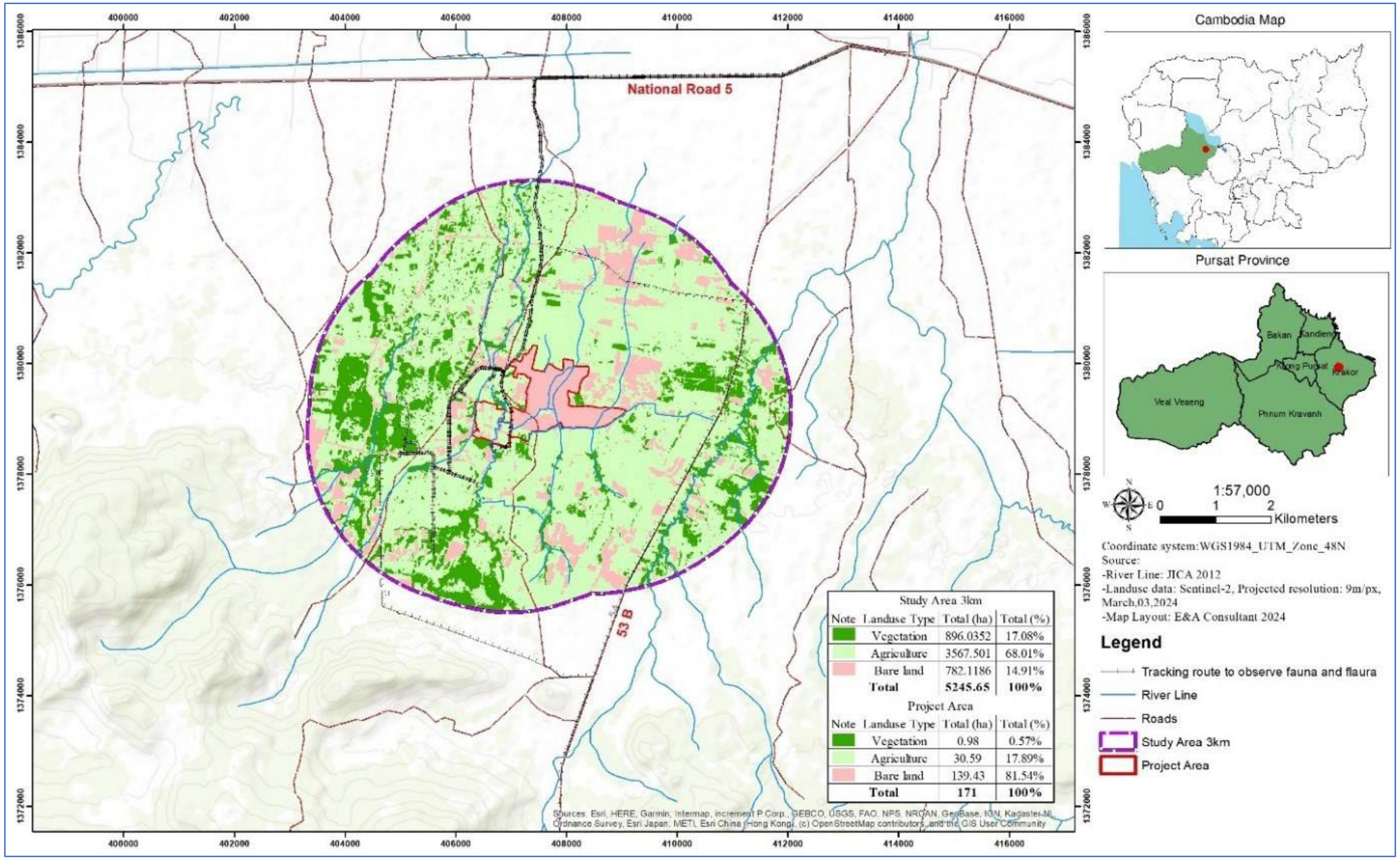
EDC sub-station and land cover east of the project

Project Zone 1 (captured from the north)

Damnak Kranh reservior

Picture 1: general overview of biological resources in and around the project site

Map 16: land cover in the BAoI



C. Flora

The random field surveys to determine the population distribution of plants in the assessment area in the 3 km buffered were undertaken through line transects, and no trees were found in this project site. 3 line transects for flora were established in wood shrubs in community forest under 3 km buffered. There were 55 timber species recorded in these lines of transects (Table 23). The flora species recorded are remaining forest cover along natural canals (riverine forest) located around 1.5 km southwest of the project site.

According to the IUCN Red List, 2 endangered species (*Pterocarpus pedatus, Pierre; Dalbergia oliveri Gamble and Prain*), 2 vulnerable species (*Dipterocapus alatus. Roxb; Dalbergia cochinchinensis Pierre*), and 4 near-threatened species were found, and 12 species of them were classified as luxury grade and grade 1 under the National List (MAFF, 2005). All of these flora species are only in small tree or seedling found at riverine forest located around 1.5 km southwest of the project site.

The main threats to flora species in this assessment area include (1) forest conversion to agriculture (this conversion had occurred since 2012), and (2) forest fire.

Table 23: Forest Survey Plots in Assessment and Project Areas

Flora	IUCN Red List						National List					Total
	EN	VU	NT	LC	DD	NE	LG	G1	G2	G3	UG	
Plants	2	2	4	14		33	6	7	3	3	36	55
Total	**2**	**2**	**4**	**14**	**0**	**33**	**6**	**7**	**3**	**3**	**36**	**55**

Note: NE: Not Evaluated, DD: Data Deficient, LC: Least Concern, NT: Near Threatened, VU: Vulnerable, EN: Endangered, CR: Critically Endangered, LG: Luxury Grade, G1: Grade 1, G2: Grade 2, G3:Grade 3, UG: Ungraded

Note: see detailed list of flora species in appendix.




Picture 2: Forest Types Of Assessment In The Project Areas Within 3 Km Buffer

D. Fauna

- **Mammals**

The random field surveys to determine the population distribution and density of mammals in the assessment area were undertaken in 3 line transects. There are 11 species of mammals have been recorded in the assessment area and no species have been identified in the project area (see Appendix), 2 species were confirmed by either sighting or signs during the rainy season and the rest are from interviews. No endangered species were recorded under the IUCN Red List in both the assessment and the project location and 11 species were recorded as least concern under the IUCN Red List and common species under the National List (Table 24).

Phum Krang Thom community forestry does not have connectivity's with the project. The proposed project, situated within a landscape characterized by significant habitat degradation and fragmentation, exhibits limited connectivity to Phum Krang Thom Community Forestry. Extensive human activities, including agriculture, transportation infrastructure, and urban development, have resulted in a fragmented landscape with isolated patches of forest. These ~~anthropogenic pressures have disrupted natural ecological processes and reduced the ability of~~ wildlife to move between habitats.

It is noted that the mountainous area located around 7 km south of the project was reported to be the key habitat for major mammals found in the study area.

Table 24: Result of Wildlife Survey Plots in Assessment and Project Areas

Fauna	IUCN Red List						National List					Total
	EN	VU	NT	LC	DD	NE	EN	Rare	Enermic	Common	NE	
Mammals				11						11		11
Birds	1			51				1		51		52
Amphibians				10							10	10
Reptiles		2		21				2		21		23
Fish		1	1	12		15					29	29
Total	**1**	**3**	**1**	**105**	**0**	**15**	**0**	**3**	**0**	**83**	**39**	**125**

Note: NE: Not Evaluated, DD: Data Deficient, LC: Least Concern, NT: Near Threatened, VU: Vulnerable, EN: Endangered, CR: Critically Endangered

- **Birds**

The random field surveys to determine the population distribution and density of birds in the assessment area were undertaken in 3 lines of the transect and the hot spot areas for birds, especially at the Damnak Kranh water reservoir and other water sources. The results show that 52 forest and water bird species were found in the assessment area (see Appendix).

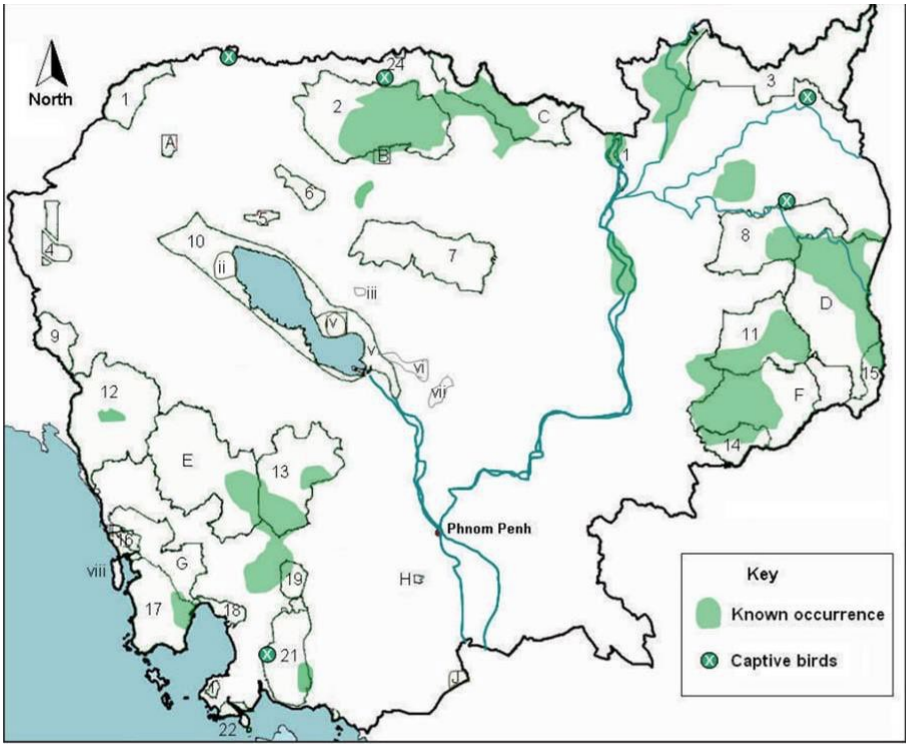
Fifty (50) species are forest birds, 16 species are waterbirds, 30 species are confirmed from sightings, and 22 species were recorded from interviews. One endangered species of green peafowl was confirmed, and the rest are least concern under the IUCN Red List and common species under the National List (Table 24).

Discussion about Key Reported Bird Species

As shown in the figure below, the habitats of green peafowl exists in Cambodia. The distribution is spread across various parts of the country. Green peafowl habitats were found in the west Aural Protected Area. Based on the map, the nearest Green Peafowl habitat to the project is around 60 km southwest of the project(Frederic Goes, 2009) . According to Inaturalist data from 2019-2024, no Green Peafowl has has been recorded within the area of 50km radius from the project site (iNaturalist, 2024).

However, during field survey, the green peafowl has been reported by local people to be present in the Mango plantation, located around 2.5 km south of the project site. The people said that they used to see one green peafowl in the dry season when mango fruit ripe. The mango plantation as stated above, located around 2.5 to 3 km south of the project site, can be one of the feeding sites but not the habitat of the green peafowl. The people have never seen more than 2 and flock of green peafowl, and there is no sign of green peafowl habitat in the assessment area. It is noted that no green peafowl has been presence was reported less than 2.5km or near to the project area, since the area are paddy field, road and residential area which contains lot of human activities, which are not suitable for the green peafowl.

This information suggest that the one green peafowl reported by the people is the only bird that present in the area. It is unlikely that the area has the connection with habitat located in Aural Protected Area.



Source: Frederic Goes, 2009

or other bird species, Damnak Kranh reservoir (see detailed of reservoir in Hydrology section) is a significant wetland, and it is the most suitable habitat for birds in the survey area, followed by the Sna Ansa community forestry managed by the local community through the Ministry of Agriculture, Forestry, and Fishery (Picture 3).

Picture 3: Wetlands And Bird Signs Of Assessment And Project Areas Within 3 Km Buffer

- **Fish**

The fish hot spot sites were carried out in the assessment area in Damnak Kranh reservoir and some streams in the survey sites (see detailed of reservoir in Hydrology section). 29 species have been recorded in the assessment sites (see Appendix). One species of *Ompok bimaculatus* was a near-threatened species, and another species of *Wallago attu* was a vulnerable species under the IUCN Red List (Table 24). The other species were Least Concern (11) and Not Evaluate (18 species). Sevan species were recorded from sightings, and the rest were from interviews. All species in the assessment areas were found Not Evaluate under the National List. Damnak Kranh Reservoir, located downstream of Area 2 of the project, is the main conservation area for fish species in the project and assessment sites. There are two threats and pressures to maintain the key species in the assessment areas, including trapping and habitat conversion (Picture 4).

It is noted that Damnak Kranh reservoir is a key habit for aquatic resources. In addition, as part of the effort to increase the fish stock, certain fish species, including the *Wallago attu, as stated above,* were released and introduced into this fish refuge.

Picture 4: Fishing Of Assessment Areas

- **Reptiles and Amphibians**

A total of 10 amphibians represented by five families and eight genera and 23 reptiles represented by 10 families and 20 genera are reported from the surveyed areas (see in Appendix). Of 33 amphibians and reptiles reported here, 10 species were confirmed by either sighting or their calls, and the rest were reported by the interviewees (Table 24). The result shows that all amphibians and reptiles are species of anthropogenic modified environment including rice fields, both natural and artificial ponds, lack, roadside puddles, canals, and Damnak Kranh water reservoir (Picture 5). These species can be found elsewhere in similar degraded habitats in Kampong Speu, Pursat, and Koh Kong (Grismer et al. 2008; Neang & Holden 2008; Stuart & Emmett, 2006). None of the findings has been listed by the IUCN Red List of threatened species listed as endemic or rare species under the National List.

Two species of Indochinese spitting cobra (*Naja siamensis*), Monocellate cobra (*Naja kaouthia*), and Burmese python (*Python bivitttatus*) were reported to occur in the assessment site. It worth noting that a Critical Habitat is not triggered because, firstly, the species is not in project's footprint and will not potentially affected by the project. Secondly, the study area is modified and degraded environment, especially the residential area, agricultural practices and so on. Thirdly, the species were reported by the local people, which does not means that their key habitat are in the AoI.

Picture 5: Amphibians And Reptiles Of Assessment And Project Areas

6.3. Socioeconomic Status

6.3.1. General Demography

There 5 villages in the SAoI which are Sna Ansa, Ansar Kdam and Veal Vong villages in Sna Ansa Commnue, and the Khla Krapeu Village in Anlong Thnoat commune. As shown in the following table, 4 villages reside along the access road of the project (1 km each side of the road), and three villages reside within 3-km radius from the project's main infrastructure. The total population under the assessment is 1,139 households or 4,167 people including 2023 females. With this statistic, the average household size is estimated to be 3.65 people per family, which is lower than the average national family size of 4.3 members. In the study area, female heads accounted for 16% of the total households. In addition, in study area 0.52% of the population consists of people with disabilities, while 1.6% are elderly.

Table 25: Total household samples of each villages for interview

Province/ District	Commune	Village	Number of			Location	
		Village	Family	People	Female	3km-radius of the main facilities	1km along access road
Pursat/ Krakor	Sna Ansar	Sna Ansar	156	568	296		✓
		Ansar Kdam	277	886	464	✓	✓
		Saravoan	126	680	232		✓
		Veal Vong	248	883	422	✓	✓
	Anlong Tnaut	Khla Krapeu	332	1150	609	✓	
Total			1139	4167	2023		

Source: Commune profile document, 2023

The people living in the assessment area are Khmer people. No ethnical minority and Indigenous People in the assessment area.

6.3.2. Local Housing and Settlement

The residents' living conditions vary based on the area and location of each village. Housing in the study area falls into four categories: zinc roof fibrous cement houses accounted for 32%, those with fewer than 20 sheets of galvanized fibrous cement for 7%, while tiled roofs made up 34% of the housing structures and non-concrete houses for 27%.

According to site observation and satellite image review, most of the household located along the Road 58B and National Road 5. The residential area of Anso Kdam located around 2km to 3km northwest of the project. As observed, there are around 14 households located less than 500m from the project (see the map below).

Figure 24: Housing types in the study area

Household surrounds the project area

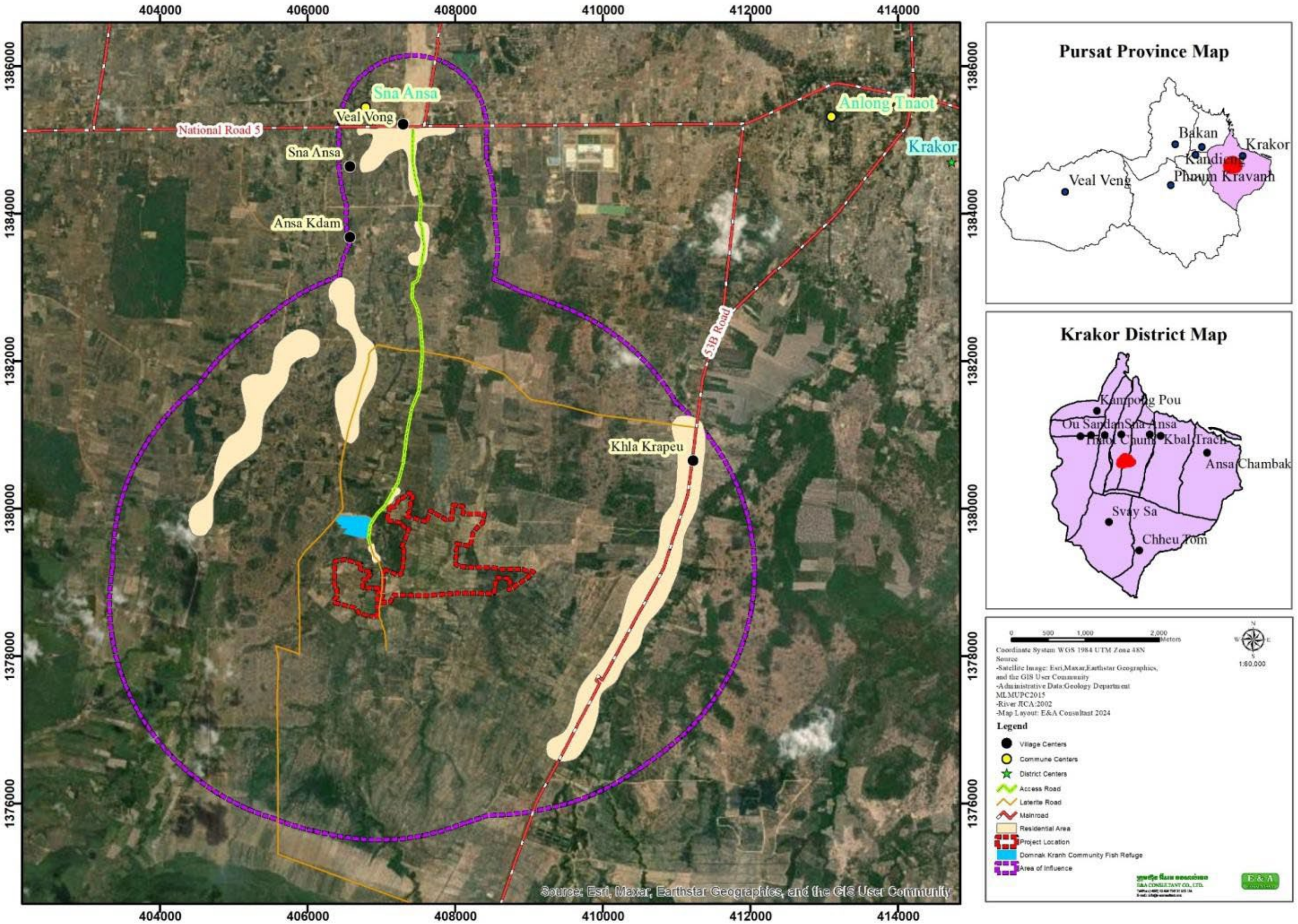
Household along the access road

Zinc-roof House

Wooden house and brick-roof

Source: E&A Consultant, 2024

Map 17 residential area in the study area



6.3.3. Occupation

Local people have a variety of jobs based on their skills and abilities to earn a living. These occupations include civil servants, farmers, vendors, and agricultural workers. The study found that the primary and secondary occupations within a study area, highlighting the various economic activities individuals are engaged in.

In terms of primary occupations, the largest portion of the population, 55%, is primarily engaged in farming, indicating that agriculture is a key economic driver. Workers, comprising 15% of the population, represent the second-largest group, followed by individuals in the service sector at 13%. Company employees account for 7%, while 4% of the population are involved in selling goods or working as merchants. Civil servants and fishers each represent 3% of the workforce.

As for secondary occupations, a significant portion of the population continues to engage in farming, with 43% listing it as their supplementary source of income. The service sector also plays a key role in secondary employment, with 25% of the population participating in service-related jobs in addition to their main work. Fishing, which is a primary occupation for a small group, becomes a secondary occupation for 14% of the population. Additionally, 7% work as laborers, 5% are sellers, and 4% are employed by companies in a secondary capacity. Civil servants do not report any secondary occupations. A small portion of the population, 2%, is involved in livestock rearing (cows, pigs, chickens, and ducks) as a secondary occupation under the "Other" category.

Table 26: List of main occupation and secondary occupation

Primary occupation	Percentage	Secondary occupation	Percentage
RCivil servants	3%	TCivil servants	0%
RCompany employees	7%	RCompany employees	4%
RService	13%	RService	25%
RFarming	55%	RFarming	43%
RFishing	3%	RFishing	14%
RSellers	4%	RSellers	5%
RWorkers	15%	RWorkers	7%
TOther	0%	ROther (livestock rearing (cows, pigs, chickens, and ducks))	2%

6.3.4. Revenue, expenditure and poverty line

The annual income of each family varies based on their labor force and occupation type. In the study area, households generally have a moderate income, allowing for a decent standard of living. Agriculture plays a significant role in providing income for families, supplemented by earnings from secondary occupations such as livestock rearing (cows, pigs, chickens, and ducks). Additionally, rice farming is undertaken once a year during the rainy season, while some individuals work as laborers (factory workers, construction workers, cassava harvesters, and sugarcane workers) during the dry season.

The study revealed that 29% of households earn between 10-20 million Riels per year, while 18% earn less than 10 million Riels per year. Furthermore, 39% of families earn between 20-30 million Riel per year, and 14% earn more than 30 million riel per year.

Each family earns an average income of 21,4000,000 riels per year, which translates to 5,350,000 riels per year per person or approximately 14,861 riels per day per person. This figure shows that the people in the study area are living above the 2021 national poverty line of 8,908 Riel/person/day (MoP, 2023).

The studies typically examine both income and expenses to check the overall well-being of a family. Despite having relatively high incomes, households in the study area also incur various expenses in their daily lives, including food, medical costs, transportation, energy for cooking, electricity, and education.

6.3.5. Water consumption

The overview of water consumption sources in the study area reveals the population's heavy reliance on certain water supply methods. Notably, no one in the area uses a formal water supply network or private water supply systems, indicating the absence of centralized or individual water infrastructure. Instead, the majority of the population depends on more localized or self-managed sources.

The most common water source is tube wells, which are used by 56% of the population. This indicates a heavy reliance on groundwater accessed through wells, which may be due to the limited availability of other water systems. A significant portion of the population, 34%, purchases 20 liters of pure water, which suggests that many people buy purified water for drinking or household use, likely as a safer or more convenient option compared to other available sources. The study found wells have been dug in the residential area which is far away from the project site. The nearest residential site is at least 1.5 km from the project site.

Other sources, such as rainfall and canal water, are used by smaller segments of the population. Only 7% of the population harvests rainwater, while 3% utilize canal water, showing a lesser dependence on surface water. Overall, the data highlights a reliance on groundwater and purchased water, with minimal formal water infrastructure in place to meet the community's needs.

Table 27: Water consumption in the study area

Water Supply Network	0 percent
Private water supply	0 percent
Tube Well	56 percent
Rainfall	7 percent
Canal water	3 percent
Other (20 liters of pure water)	34 percent

As shown in the above table, 56 percent of the households have ground water as their water sources. Most well concentrated along National Road 5 (around 5km away from the project), and Road 53B (at least 1.5km from the project). As reported, majority of the wells are shallow well with the dept of the around 5-8 meters. It is worth noting that there are 13 households who residing within a distance of 500 meters from the project's boundaries.

6.3.6. Energy consumption

Based on the study findings, approximately 98% of residents in the study area have access to national grid for their homes. However, there is 2% who live far away from electricity sources, rely on alternative power sources including solar power and batteries.

In the study area, energy consumption for cooking primarily centers on two main sources: 65% firewood/charcoal, which is commonly used due to its accessibility and lower cost, and 35% gas, which is preferred for its higher efficiency and cleaner combustion.

Figure 25: local energy facilities

Electricity Tower

Solar Pannel

6.3.7. Local Road Infrastructures

Within the 5 km radius from the project boundary, there are different roads used by local people. Among those roads, there are 3 key asphalt roads (National Road 5, Road 53B, and Project's Access Road) and the local laterite roads used by local people to travel from one village to another, e.g., people from Prey Khla village to Ansa Kdam or other villages along National Road 5 (see details of key local roads in the following map). All of the road infrastructure above are not affected by the development of the 150 MW solar power plant project.

Map 18: key local road infrastructure

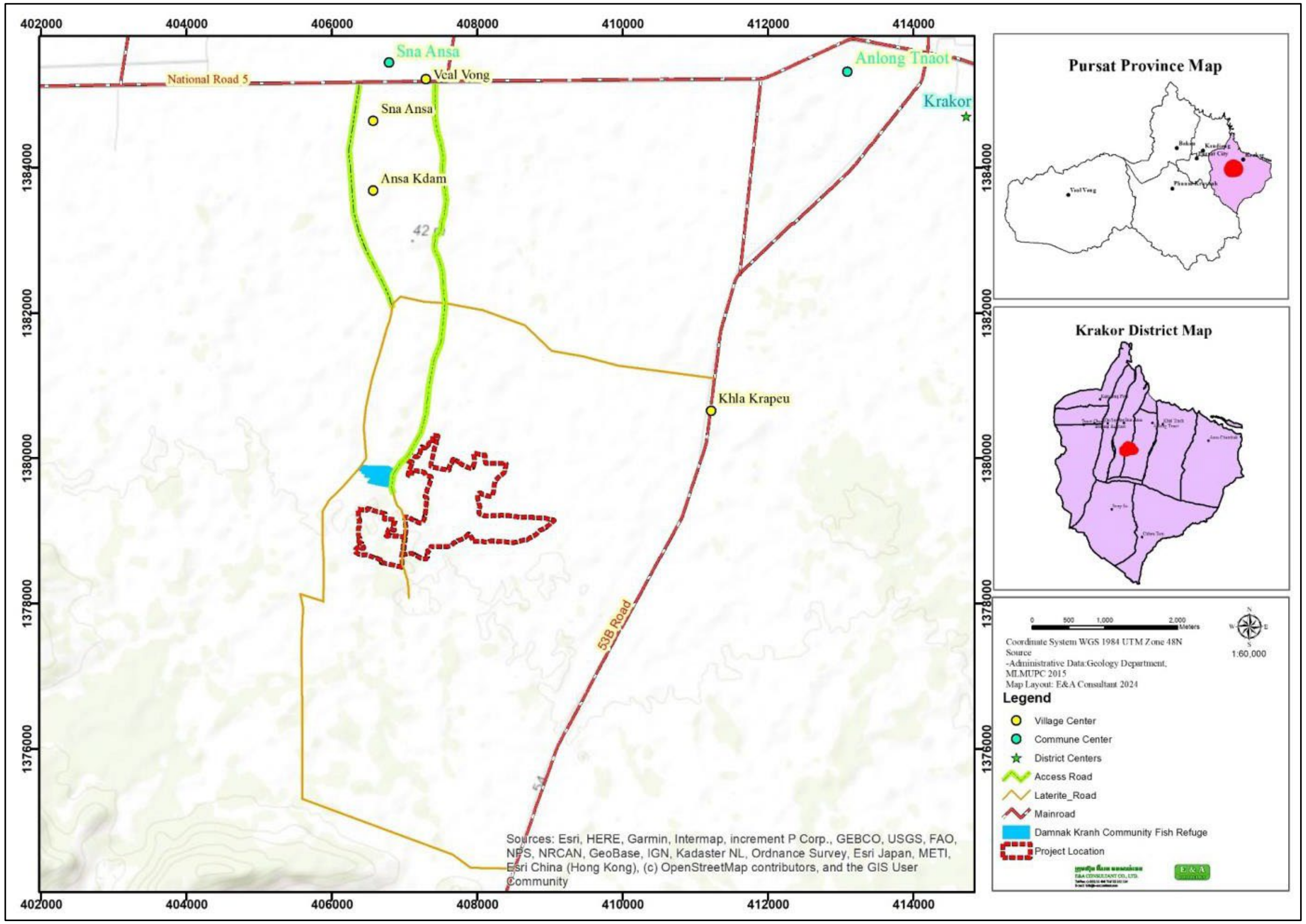


Figure 26: key public road relevant to the project


National Road 5


Project's access road


Local laterite road


Boah Rolok laterite road

6.3.8. Public Health

The nearest health center (Sna Ansa Health Center) is around 6 km north of the project. Health centers provide primary healthcare to local people, including minor injuries, diseases, and ailments, non-complicated births, and general checkups. For more serious injuries, people can go to a referral hospital (Krakor district hospital or Pursat referral hospital), where a wider range of medical services are provided, such as diagnoses, emergency care, rehabilitation services, specialized consultations, and so on.

Table 28: health facilities around project's boundary

No	Type of health facilities	Name	Distance from Project
1	Commune Health Center	Sna Ansa Commune Health Center	6 kilometers
2	District Referral Hospital	Krakor District Referral Hospital	9 kilometers
3	Provincial Referral Hospital	Pursat Provincial Referral Hospital	27 kilometers

Figure 27: health facilities around the project's boundary

Sna Ansa Commune Health Center

Krakor District Referral Hospital

The prevalent diseases among the local population include colds, arthritis, typhoid fever, diarrhea, dengue fever, diabetes, gynecological issues, lung ailments, hepatitis, and high blood pressure. Among these, the flu is the most commonly reported ailment across all age groups. Residents typically seek medical assistance at private clinics, pharmacies, health centers, or referral hospitals, depending on their financial status and the severity of their condition. Those with limited financial resources often opt for state-run health centers.

6.3.9. Education

The Royal Government of Cambodia has a vision to turn Cambodia into a high middle-income country by 2030 and a developed country by 2050. Therefore, to achieve this vision, building highly capable human resources is the key to responding to the context of globalization, regional integration and ensuring more open competition in the labour market. The Ministry of Education, Youth and Sports has a key role to play in building the capital of virtuous people to support the economic growth of families, society and the nation in its vision, building and developing quality and virtuous human resources is an important factor in all areas. To build a Cambodian society to become a prosperous society based on knowledge and basic knowledge (MoEYS, 2019).

The education sector in Pursat has developed and greatly expanded the scope of education services to meet the needs of the people. According to data from the Ministry of Education, Youth and Sports (Public Education Statistics and Indicators (2021-2022)), Pursat province has 551 schools, including 185 kindergartens, 306 primary schools, 44 secondary schools and 16 high schools.

In particular, in the 3 km study area around the project area, there is one community kindergarten and 2 primary schools, as shown in the following table. It is noted that all of these schools are not along the access road of this project, and the impact during construction phase of this project is not expected to be significant.

Table 29: schools around project's boundary

No	Type of school	Name	Distance from Project
1	Primary school	Khla Krapeu Primary school	3 kilometers
2	Primary school	Wat Tbeag Primary school	2 kilometers
3	Community kindergarten	Khla Krapeu Community kindergarten	1.5 kilometers

Figure 28: schools around the project's boundary

Sna Ansa Secondary school Wat Tbeag Primary school

In the study area, most people have attained only primary-level education, representing 37.8% of the population. Lower secondary education follows with 22.5%, while 13.3% have completed upper secondary education, and only 7% have reached university level. Literacy levels are generally good, with a small illiterate population at 2.4%. A larger portion, 17%, is literate, able to read and write, reflecting some progress in education access and literacy within the community.

6.3.10. Tourist site

Pursat is a province in the Tonle Sap region, located in the west of Cambodia, about 189 km from Phnom Penh. This province is rich in eco-tourism, natural resources and resorts. Whether it is the dry season or the rainy season, the tourist area of this province is still popular for national and international tourists. These tourist sites include Phnom 1500, Phnom Tompor, Chrak Laeang Waterfall, O'Da Waterfall, O'Som Waterfall, Kampong Luong, and especially Central Cardamom Mountains National Park.

Particularly, in the 3km radius from the project boundary, there is one tourist site named “Domnak Kranh Fish Community Refuge” which was established in 2017. In addition to its original function as fish refuge, this reservoir has been developed by adding such infrastructure as suspension bridge, small huts, and public benches, which is attractive to tourists. The number of tourist visiting the site varies. During weekday, the number of visitors is around 40 to 50 per day, weekend is around 100 to 150 per day, and during national holidays (Pchum Ben, Khmer New Year and Water Festival) the number of visitors can reach up to 2,000.

Figure 29: Domnak Kranh Fish Community Refuge

Domnak Kranh Fish Community Refuge

6.3.11. Cultural and Archaeological Sites

The Constitution of the Kingdom of Cambodia states that Buddhism is the state religion. But the general public has the right to freely believe in other religions according to their preferences. The results of interviews with people in the study area shows that the population is practicing Buddhism.

The study observed directly in the project area, interviews with local authorities and the Department of Culture and Fine Arts, and the results showed that in the project area there is no historical or archeological sites. In terms of religion, there are 2 Buddhist pagodas and 2 spirit houses within the 3km radius from the project's boundary. These sites are not effected by the project.

Table 30: cultural sites around project's boundary

No	Type of cultural site	Name	Distance from Project
1	Buddhist pagoda	Wat Tbaeng	2,000 m
2	Buddhist pagoda	Wat Sothearea Veaksakchey Ratanaram	1,800 m
3	Spirit house	Nakta Chheuteal Teur	1,500 m
4	Spirit house	Nakta Damnak Kranh	200 m

Figure 30: cultural site around the project's boundary

Nakta Chheuteal Teur (spirit house)

Damnak Kranh (Spirit House)

Wat Tbaeng

Wat Sothearea Veaksakchey Ratanaram

6.3.12. Mine/ERW

Cambodia was one of the most heavily affected countries in the world by mine and explosive remnants of war (ERWs) as a result of regional and international conflicts from the 1960s to late 1998. An estimated 4 million to 6 million landmines and other munitions were left over from the nearly three decades of war.

CMAA's reported that from 1979 to 2019, landmine and UXO explosions had killed 19,780 people and either injured or amputated 45,075 others. From 1992 to 2019, the country had cleared 1,900 square km of landmines, cluster munitions and ERWs, benefiting more than 5.3 million people. Cambodia is aiming to address all its landmine contamination by 2025. To achieve this, the projected an overall budget of 377 million US dollars (Phnom Penh Post, 2023).

In its 2023 Annual Report, the Cambodian Mine Action and Victim Assistance Authority (CMAA) declared nine provinces, including four districts in Pursat provice, as anti-personnel mine-free zones. This declaration recognizes the success of clearance operations conducted by various demining organizations, most notably the Cambodian Mine Action Centre (CMAC). The four districts in Pursat are Pursat City, Bakan, Krakor, and Kandieng (CMAC, 2023). The information about Krako district as a anti-personal mine free-zone was confirmed again by CMAC on June 22, 2023, during an event in Pursat district chaired by Minister of Mine and Energy of Cambodia (Fresh News, 2023).

CHAPTER 7: STAKEHOLDER CONSULTATION AND STAKEHOLDER ENGAGEMETN PLAN``

7.1. Introduction

To actively involve stakeholders in the ESIA report preparation process for this 150 MW solar PV power plant project, public participations have been held. Different relevant stakeholders provided insightful comments, ideas, and recommendations during these discussions. These contributions are essential for the ESIA report. The following section provides a full summary of the outcomes of the discussions that were held with locals, government officials, and representatives from public, private and civil entities who are relevant to this project.

7.2. Dissemination of The Project Information

The study conducted a thorough dissemination of project information to both the public and local authorities, encompassing a variety of topics, including the preparation of environmental and social impact assessments, design and construction plans, and project implementation activities. The objective of this dissemination was to educate stakeholders regarding the project's prospective advantages and disadvantages.

The dissemination process for this project are as follow:

- Meetings between SchneiTec Beyond and local people and local authorities during the design stage of this project since October 2023 onward; the key events for the project's information dissemination were during the feasibility study of the project, site clearance and construction, and on ad hoc basis;
- The dissemination of project's information during the field data collection phase of ESIA report preparation through provide brief document about the project and the face-to-face discussions with local people and authorities, community leader, and provincial department;
- After the draft report was finalized, a local information disclosure and public consultation meeting was conducted in September 8, 2024. Representatives from the E&A Consultant, the SchneiTec, local people and authorities.

7.3. Results of consultations with key stakeholders

7.3.1. Stakeholder consultation during the data collection phase

Stakeholder consultations were held in Sna Ansa and Anlung Tnaut communes, involving both local residents and the local authorities by using different method such as KII and FGD. The KII were conducted with various departments to gather insights and information pertinent to the project. These departments included the Department of Environment, Department of Culture and Fine Art, the Department of Mines and Energy, the Department of Agriculture Forestry and Fisheries, the Department of Water Resources and Meteorology, and the Department of Tourism.

7.3.1.1. Result of consultation with local authorities and citizens

The following is the result of consultation with local authorities relevant to the project including Sna Ansa commune office, Sna Ansa village, Anso Kdam village, Vealvong and Saravoan village, Anlong Tnout commune and Khla Krapeu village (see detailed minutes and list of participants in Appendix).

Table 31: Results of interviews with local people, local authorities and local communities

Meeting/Participants	General Information	Concerns and Suggestions
C. Consultation with local authorities		
1. Meeting with **Mr. Mok Kor**, Sna Ansa commune chief on September 26, 2024 at 10:00 AM at Sna Ansa Commune Office. The meeting was also participated by 3 village chiefs in the SAoI such as: - Mr. **Chey Phan**, Anso Kdam village chief - Mr. **Nou Tung**, Sna Ansa Village Chief - Mr. **Ro Phean**, Veal Vong village chief	**General Information about the Sna Ansa commune:** - The project acquired land that was previously used for farming, including crops like potatoes, mango, dragon fruit, sugar cane, and pumpkin. - The land in the study area have land titles since 2011. - There were 2 economic land concessions (Ratanak Visal Development, and Pheapimex) working on cassava cultivation in the study area, but they were terminated in 2017. - There is no waste collection company in the commune. - So far, there are no UXOs or flooding issues in the project area. - Infrastructure: Most people have access electricity, except for some families who are far away from National Road #5. In addition, the people cannot generally access to clean water; most people relying on 20 litter-bottled water and well water. **Information about relevant villages:** - Anso Kdam village is inside the 3km radius, north of the project, and some of the villagers reside along the access road of the project.	**Opinion and Concerns:** - Sna Ansa Commune Chief and the 3 villages chiefs supported and welcomed the Project. This project has created job opportunities for local people. - This project has provided the villagers with jobs and can help reduce migration issue. - They has no concern regarding the project. **Suggestions:** - The project should actively participate in the development of local infrastructure, such as roads and schools, to address the community's specific needs. - The project should prioritize hiring and training local people to create employment opportunities. - The company should maintain relationships with local authorities to ensure compliance with regulations and address any concerns or challenges. - The project should provide dust bins and solar panels in key locations like schools, health centres, and pagodas. This will help

	- Sna Ansa village is outside the 3km radius from the project, but some of the villagers reside along the access road of the project. - Veal Vong village is around 4km from the project; most of the people reside along National Road#5. This village is outside the 3km radius from the project, but some of the villagers reside along the access road of the project. - People in the 3 villages cannot access clean water. Most villagers use 20 litters water bottle, and well water for domestic consumption. - Most of the 3 villagers have their occupation in agriculture, vendor and factory worker.	reduce waste and promote renewable energy usage**.** - Sna Ansa commune chief and Anso Kdam village chief asked the project to help build a bridge across the stream in the village and install solar street lights in the village.
2. Meeting with **Mrs. Bin Sivala**, Anlong Tnaot commune chief On September 26, 2024 at 3:00 pm at Anlong Thnout commune	- There are still unexploded ordnance remains in his commune. - Wildlife is no longer present in the commune around the project area. - 60% of the population is engaged in farming, while others work in factories. - Land in the project area is legally traded, and there are no disputes with the company, since the land sale has been on voluntary basis and with participation from local authorities. - Land titles became available for land owners since 2012. - Only 10% of the population has access to clean water, with most relying on wells, but not in the study area. - Garbage collection is handled waste collector authorized by Krako district hall; the collected wastes are dumped in Kbal Trach commune around 10km	**Opinion and Concerns:** - The commune chief support the project; - Commune chief concern about the flooding in Kla Krapeu village in the area west of the Road#53B. The flood is partly caused by the construction of solar power projects in the rea. Recently, during heavy rain, some paddy fields west of Baoh Rolok road was flooded around 2 days, but no negative impact on rice. The flood also affect some part of the Baoh Rolok road and culverts which is newly built by the commune. **Suggestions:** - The project should help build Khla Krapeu Primary School because the school is broken and flooded; - The project should help build and develop infrastructures in the commune including improvement of local drainage.

	east of the project. This dump site is only for domestic waste. - A road called "Baoh Rolok" connects Anlong Thnout commune to Sna Ansa commune. The road is around 2km north of the project and is not affected by the project.	- The project should give priority to local people when hiring workers or staff; - The project should strengthen cooperation with the local authorities.
3. Meeting with **Mr. Seng Mop**, Khla Krapeu village chief, on September 26, 2024 at 3:00 pm at Khla Krapeu Primary School.	- Most people in Khla Krapeu reside along Road#53B which is around 1.5 km east of the project. - Most of the villagers engage in agriculture, vendor and factory workers. - There is no land issue - There is no land dispute in the study area since all land sale has been done on voluntary basis and comply with Cambodia's law.	**Opinion and Concerns:** - The village chief supports the project; this project provide villagers with jobs, and can help reduce migration. - Khla Krapeu village chief is worried that floods will occur during the rainy season caused by water from the west catchment. **Suggestions:** - The project should help repair a Khla Krapeu primary school, since the primary school is too old and get flooded in raining season. - The project should help supply clean water and help restore the irrigation system.
D. Consultation with Leader of Damnak Kranh Fish Sanctuary Community		
4. Meeting with **Mr. Hin Pen**, Leader of Damnak Kranh Fish Sanctuary Community, on September 26, 2024 at 10:00 AM at Sna Ansa Commune Office.	- Damnak Kranh Fish Sanctuary Community was established in 2017 in Ansar Kdam Village, Sna Ansa Commune, with the recognition of Pursat Fisheries Administration District and Pursat Provincial Department of Agriculture, Forestry and Fisheries. - The main objectives of establishing a fish pond include the following : ▪ To increase natural fish production in rice fields, canals and floodplains through conservation and good management of all dry season fish habitats.	**Opinion and Concerns:** - The President of Damnak Kranh Fish Sanctuary Community supports the project; - He has no concern over the project. **Suggestions :** - The project should help repair the infrastructure in the commune.

	▪ To increase access food source to poor farmers without fish ponds. - To improve food security for farmers living far from natural fishing grounds.	
E. Meeting with Local People		
5. FGD with the local people from: **Anskdam, Sna Ansa, Veal Vong, and Saravan villages** on September 26, 2024 at 2:30 pm at Sna Ansa commune office (see list of participant in Appendix).	- The land in the project area has no soil fertility, making it less productive for people to farm. - After the people sold their land to the company, they found that their livelihood was better because they took the money from the sale of the land to create another business. - The presence of the project has provided villagers with jobs and decent wages and can help reduce migration. - Most of the people are engaged in agriculture (rice farming/plantations), fishing and construction workers, and factory workers. - The project location has no ancient temples and shrines.	**Opinion and Concerns:** - The people from the 4 villages supports the project - The people do not have any concerns over the project. **Suggestions:** - The project should help develop in community such as roads, electricity, schools and hospital. - The project should prioritize hiring and training local people to create employment opportunities.
6. FGD with the people in **Khla Krapeu village**, Anlong Thnout commune on September 26, 2024 at 3:30 pm at Khla Krapeu Primary School (see list of participant in Appendix).	- The people of Khla Krapeu village who attended the FGD meeting were very supportive and welcome to this project. - The project has provided villagers with jobs and decent wages and can help reduce migration. - Most of the people in Khla Krapeu village engage in agriculture (rice farming and plantations), fishing and construction workers, and factory workers.	**Opinion and Concerns:** - People in Khla Krapeu village are concerned that floods will occur during the rainy season, because the current culvert in Boah Rolok laterite road is too small to handle the flood. **Suggestions:** - Request the project owner to help repair one Khla Krape primary school in Khla Krape village. Because the condition of the primary school today is very old and not safe for children to study in.

		- The project should prioritize hiring and training local people to create employment opportunities..

7.3.1.2. Comments and Suggestions of relevant provincial departments

The following are teh consultations held with officers in each relevant departments; this includes the Department of Environment, Department of Mines and Energy, Department of Water Resources and Meteorology, Department of Agriculture, Forestry, and Fishing, Department of Tourism, and Department of Culture and Fine Arts in Pursat.

Table 32: Comments and Suggestions of relevant departments

Meeting/Participants	General Information	Concerns and Suggestions
A. Consultation with relevant departments		
1. Meeting with **Mr. Eng Raksmey**, Acting Director of the Department of Environment, on September 27, 2024, at 8:00 AM at the Department of Environment of Pursat Province.	- Krakor district and Pursat province have no hazardous waste collection company. - In Pursat City, there is a general waste collection company called SevDilafs (Cambodia) Co. Ltd. located in Tuol Makak Village, Sangkat Roleap, Pursat City, Pursat Province. - During 2010 to 2015, there was little forest remaining in the project area with birds and also some wildlife such as wild boar and coyote.	**Opinion and Concerns:** - The Department of Environment fully supports the project and has no concerns over the project; - This project helps solve climate change issues, reduce GHG emissions, and other pollutants. **Suggestions:** - The project should cooperate well with the Pursat Provincial Department of Environment. - The project ensure that all legal documents required by the government are complete. - Reduce the use of materials that harm the environment. - The department of environment encouraged the use of renewable and clean energy.

2. Meeting with **Mr. Ros Ratha**, Deputy Director of Pursat Provincial Department of Mines and Energy On September 27, 2024 at 08:30 in the morning at the Department of Mines And Energy of Pursat Province	- In Korkor district, there will be a total of 240 MW of solar power plants are operational and in the pipeline. - In there area, there are 2 solar power plant projects: The 30 MW and 60 MW solar that are still all operational.	**Opinion and Concerns:** - The project owner well cooperated with the department and complied with the regulation properly. - The company cooperates well with the department and provides opportunities for students to visit and acknowledgment about the solar power plant project. - The department support the project, since this project is very important for Pursat province. - The project has given high priority to employment for women and local people. - The department has no concerns. **Suggestions:** - The project should continue to cooperate with the Department and abide by the regulations of the Department of Mines and Energy.
3. Meeting with **Mr. Lao Sokha**, Deputy Director of Pursat Provincial Department of Water Resources and Meteorology on September 27, 2024 at 11:00 am at Pursat Provincial Department of Water Resources and Meteorology	- In 2022, the Department of Water Resources and Meteorology of Pursat Province submitted a project proposal to the Royal Government to develop the drainage canal from Damnak Kranh Reservoir. The department has not yet received a response or approval from the Royal Government. - Damnak Kranh Reservoir is very important for the farmers more than 1,500 families, because this reservoir can store water for use in agricultural irrigation during the dry/wet season and is also a place to fish conservation. -	**Opinion and Concerns:** - The Deputy Director welcomed this project, since the project has participated in the development of Pursat province. The project contributes to the development of the country through the provision of adequate electricity. - In addition, the project provides employment opportunities for local people. - He has a concern that the project will affect the waterway system, especially, those that flow through the project area. This could affect paddy fields of local people **Suggestions:**

		- The company should maintain waterways (natural streams) or set up a drainage system (precast concrete box culverts) to make sure that the water flows are not significantly change and that the people downstream can use water for irrigation.
4. Meeting with **Mr. Hai Nora**, Director of Pursat Provincial Department of Agriculture, Forestry and Fisheries On September 27, 2024 at 2:30 pm at the Department of Agriculture, Forestry and Fisheries of Pursat Province .	- Currently, there are no forest cover in the project area, because the project area has lost its forest since 2010. - During 2010, in Krakor district, two investment companies received economic land concessions from the Royal Government: (1) Rattanak Visal Company and (2) Pheapimex Company. - In the past, there were few people in the project area doing crop plantation (rubber, cassava). Not so many people do crop plantation because the land in that area was not fertile enough. - The land of the lands of project had been bought legally from the local people; there was no encroachment or illegal ownership.	**Opinions and Concerns:** - The director of the department supported this project, because the project contributes to the development of the country through the provision of adequate electricity and create employment opportunities for local people. - The department has no concern. This project has insignificant impact on the agricultural sector. **Suggestions:** no suggestion.
5. Meeting with **Mr. Sin Thea**, Director of Pursat Provincial Department of Tourism On September 27, 2024 at 3:30 pm at Pursat Provincial Department of Tourism	- There is a small local tourist site called Damnak Kranh, where people go to visit during Khmer festival.	**Opinion and Concerns:** - Director of Department of Tourism supports project. This project contributes to the development of clean energy in Cambodia, and provides employment opportunities for local people. - In addition, this project can help the tourism sector because the project location is near the tourist area (Damnak Kranh Reservoir) - The director of the department is concerned about the management of project's waste, which can

		cause bad smells that may affect the nearby tourist area of Damnak Kranh Reservoir. **Suggestions:** - The project should have good cooperation with Department of Tourism in resolving any issues that may affect the tourist area, especially the Damnak Kranh Reservoir. - The project should train the staff and workers to take care of the garbage properly and avoid throwing it in the public, which can affect the tourists who come to visit.
6. Meeting with **Mr. Lach Phengly**, Director of Pursat Department of Culture and Fine Arts On September 27, 2024 at 11:00 AM at the Department of Culture and Fine Arts, Pursat Province.	- According to preliminary data from the department in the project area and study area, there are no shrines, sites, ancient temples, cultural properties and heritage.	**Opinion and Concerns:** - The director of the department supported this project, since this project contribute to the development of Cambodia. - In general, the department was not concern about the cultural heritage in the area, since their has been no reported case in the area. However, there might be a small change of coming across with the artifact in the area. **Suggestions:** - If the company come across with any artifacts, please notify the department to intervene. - The project owner should cooperate with the Department of Culture and Fine Arts of Pursat Province .

7.3.2. Stakeholder consultation after draft ESIA

A dissemination and consultation meeting was held on November 8, 2024, at 2:00 PM, at Tbaeng Primary School. The meeting was convened to discuss the preliminary findings of ESIA report for the project with participations from relevant local people and local authorities.

The meeting started with the presentation on the findings of ESIA report for a 150-megawatt solar power plant project in Cambodia. The presentation focus on the understanding on ESIA process, project information, results of first round consultations, environmental baselines, potential impacts during both construction, operation and decommissioning phases, as well as ESMP and the existing Grievance Mechanism used by the project.

The project team presented the findings to stakeholders, seeking feedback and addressing concerns as shown in the following section:

A. Question and Answer Session and Suggestions

1. **Question and Request from Participants:** Can the company help repair the access road in the Damnak Kranh Village (the asphalt road)?

Answer: Regarding this matter, this needs further study to clarify the situation. This is because, before the company began its operations, the road was already old, and some parts had already been damaged. Furthermore, other companies in the area have also used this road for transportation, which may have caused further damages. In the past, the project owner has managed transportation in compliance with the regulations to avoid road damage. However, if the road is damaged due to the activities of our company, the company will take measures to repair the road.

2. **Question and Request from Participants:** The section of the dirt road from the Damnak Kranh Reservoir to the south, leading to the entrance of the solar power plant project site, has been used by the company during the construction phase, and the road has been damaged. Can the company participate in repairing this road by laying laterite? The people are concerned that once the company completes the project activities, the road will remain damaged and difficult to use by local people. Therefore, the people request that the project owner company help repair the access road to the project site to make it easy to use.

Answer: The section of the road from the Damnak Kranh Reservoir to the south is a dirt road mainly used by the local people to reach the farmland located to the south of the project site. This road is prone to erosion every year due to rainfall, and because it is not built with laterite. The damage to this road was caused by transportation activities of the project and the transportation of agricultural products by local farmers (especially when transporting crops). In relation to this, the company has already repaired this dirt road once, but due to heavy rain waster, combined with the activities of residents using the road for transport and the company's transportation, the road has been damaged again.

The company has not yet responded regarding the request for repairing this road with laterite. However, if the road damage is indeed caused by the company's transportation activities, the company will take measures to resolve the issue.

3. **Question and Request from Participants:** Every development always has various impacts. Therefore, does the company have plans to manage these impacts? Please ensure that the company implements measures to manage these impacts.

Answer: The project owner company is a responsible company and operates in compliance with the laws of Cambodia. To manage the potential impacts that may arise from this project, the company has worked closely with local authorities to address any issues that may arise. The project has also developed, and is continuing to prepare, an Environmental and Social

Impact Assessment (ESIA) report for this project, which includes mitigation measures and management plans to address the potential impacts that may result from the project's activities. The company will continue to cooperate with stakeholders through the grievance redress mechanism that was presented during this meeting.

4. **Question from Participants:** If any issues arise related to this project, what should the citizens do?

Answer: As presented in this meeting, the company has established a grievance redress mechanism for citizens who are affected by any impacts. They can contact the local site officers via phone at (096 8038486), located at Ansar kdam Village, Sna Ansa Commune, Krakor District, Pursat Province. Alternatively, they can contact the Phnom Penh office at phone number (088 92 59 559), Mr. Than Vikasodanivil, ESG, or visit the project owner company's office directly.

5. **Question from Participants:** The Khla Krapeu village in Anlong Tnaot Commune has previously experienced flooding of rice fields in the southern and northern parts of the project area, especially in the area around the embankment road, due to a limited drainage system. In 2023, the water level rose significantly, causing rice fields to flood and road (embankment road) closures due to the insufficient number of drainage systems. In 2024, the around of rainwater decreased, and there were no significant floods like flood in 2023. This year's water level was lower and not a major concern. However, if the water level were to rise as in the previous year (2023), the villagers' rice fields could be flooded again. Can the company help by adding more drainage and restoring the embankments to alleviate the water issue in that area?

Answer: To address the rainwater drainage issue, the project has already established a drainage system around the project area. Therefore, this project will not affect rainwater drainage in the project area. The rainwater that falls in the project area will be drained through the water drainage system established by the company and will flow towards the north near the embankment road and into the Tonle Sap River. Regarding the flooding of rice fields in Khla Krapeu village, the company has not yet provided a response to this issue, as there is no clear evidence showing that the project has caused flooding in the Khla Krapeu village area as mentioned. However, the company will continue to collaborate with local authorities to monitor the project's situation and further assess changes in the hydrological system, implementing necessary protective measures.

B. Additional Comments from Participants:

After the Q&A session, all participants were given the opportunity to share additional comments regarding the project. The citizens raised the following points:

- Apart from concerns about flooding due to rainwater mentioned above, the residential area of Khla Krapeu village (Anlong Tnot Commune) has not experienced any negative impacts from the project, as this village (residential area) is located far from the project site.
- The citizens have never observed/catched the presence of fish species (Wallago attu) irrigation system in the area, but species like snakes, rice paddy snakes, and other types of snakes might be present outside the project area.
- The citizens stated that there is no air pollution impact, as their homes are located far from the project area.
- There were no noise disturbances or impacts on the residents' livelihoods during the construction phase of the project.
- Overall, during the construction phase, the project has not affected the water quality in the area. The water here is generally clean in the rainy season. But in some

location, even without the project, the water sources has hight TSS as they flow from the mountain areas, where agricultural land clearing may cause some sediment in the water.

- The government plans to improve the asphalt road leading to the project area (the access road to the Dâng Kranh site) in 2025 or 2026.
- The project has not caused any conflicts with the citizens. Normally, when there is development, impacts are expected in surrounding areas, but the extent of these impacts depends on how well the project is managed.
- In the five villages, about 50% of the population uses water from the local ground water well, with an average depth of 4-6 meters. During the rainy season, the citizens have enough water, but during the dry season, the well water cannot meet the needs of the population.
- This project has not encroached on citizens' land, as the company (SchneiTech Beyond) purchased land from the citizens in accordance with the law.
- All the citizens who participated in the meeting supported this 150MW solar power plant project.

7.4. Stakeholder Engagement Plan (SEP)

7.4.1. Objective and scope

The objectives of stakeholder engagement is to insure understanding, involve stakeholders in the assessment, build relationships, engage vulnerable peoples, and manage expectations. This involves open, inclusive, and transparent communication to inform stakeholders about the project, seek their input on impacts and mitigation measures, establish positive relationships, and address the concerns of vulnerable groups. The engagement process will also help to avoid creating unrealistic expectations about the project's benefits. The SEP cover different project's phase including before, during and after the ESIA report which covers the project construction (to completed soon), operation and decommission phases.

The stakeholder engagement will be free, prior, and informed consultation:

- Free: Engagement should be free from any external manipulation, coercion, or intimidation.
- Prior: Engagement should be undertaken in a timely manner, such as through the timely disclosure of relevant information.
- Informed: Engagement should be based on relevant, understandable, and accessible information that empowers stakeholders to make informed decisions.

7.4.2. The key stakeholder

The following are the key stakeholders for this project:

- **Provincial Level**: Department of Environment; Department of Water Resources and Meteorology; Department of Agriculture, Forestry, and Fisheries; Department of Mine and Energy; and Department of Culture and Fine Art were consulted by using the Key Informant Interview (KII) technique.
- Local level: Damnak Kranh Community Fish Refuge (CFR), Anlung Thnau Commune Office, Sna Ansa Commune Office, Village Chiefs of Khla Krapeu, Sna Ansa, Anso Kdam, and Saravoan.

7.4.3. Process of SEP

The engagement of stakeholders can be divided into four (4) main phases:

- ***Phase 1—Pre-ESIA Consultations***: this has been carried out by the SchneiTec Beyond during the early preparation stages of the Project which included consultation with different entities including, but not limited to, the following:
  - Ministry of Mines and Energy (MME) for agreement on investing in a renewable energy project in Cambodia
  - Electricité du Cambodge (EDC) for different matters including signing the Power Purchase Agreement
  - Local authorities and relevant provincial departments regarding the kick-start and the construction of the project.
- ***Phase 2—Consultations as part of the ESIA Study***: The ESIA team has identified stakeholders who may be directly or indirectly affected by the project or who may have an interest in providing input on the project and its potential impacts since the initiation of the ESIA (please see the result of SEP during this stage in the above section). The community's participation in meetings and consultations as part of the ESIA process has been crucial in the establishment of the ESIA's precise scope.
- ***Phase 3—ESIA Disclosure***: This process will be initiated once the Non-Technical Summary (NTS) and Stakeholder Engagement Plan (SEP), including the Grievance Mechanism, are finalized, and approved by the lenders. Following approval, these documents will be disclosed to the public, which is anticipated to occur in January 2025. The document will be made available in hard and soft copy at SchneiTec Beyond's office. Additionally, hard copies of these documents, along with the ESIA report, will be maintained at several designated locations for public access.
- ***Phase 4—Project Design and Construction, and Phase 5—Operations***: the SEP during this stage will be carried out by SchneiTec Beyond, and the assigned community liaison officer. During this phase, the ESIA report were prepared while the construction of this project was going on (around 80% completed). This SEP will be maintained by SchneiTec Beyond throughout the project's lifespan, with a particular emphasis on Design and Construction and Operations of this project. The efficacy of mitigation measures and community engagement programs will be closely monitored through stakeholder feedback. The following are the methods that will be employed to guarantee effective engagement:
  - The local community is provided with semi-annual project updates and development information, which are accessible at the office of SchneiTec Beyond in Krako office and Phnom Penh office.
  - Announcements and information for the local community on employment opportunities, social responsibility activities, etc during construction and operation of this project.

  SchneiTec Beyond is committed to furnishing the public with all pertinent information. The following documents will be available for interested and affected parties to access (in hard copies) at the local SchneiTec Beyond Office in Krako (Anso Kdam village, Sna Ansa commune, Krako district, Pursat province) and Phnom Penh Offices (building#36, 1st Floor, Room#3, Street 352, Sangkat Beoung Kengkang 1, Khan Beoung Keng Kang, Phnom Penh) by February 2025, as anticipated:

  - Environmental and Social Impact Assessment (ESIA);
  - Non-Technical Summary (NTS) of the ESIA report;
  - Stakeholder Engagement Plan (SEP) including grievance mechanism.

These documents will remain in the public domain for the duration of the project, and the SEP will be updated as necessary. The public will be able to use the grievance procedure described below and information regarding the grievance procedure will be disseminated to affected local communities and key stakeholders.

Table below provides a summary of the envisaged approach to be followed as part of the SEP which has been developed on the basis of the currently available information and analysis of the current situation as documented during the consultation session with the local community. Target stakeholder groups are Stakeholders who may be directly or indirectly benefited/affected by the project to include: Representatives of local community members and community leaders identified in collaboration with local authority, relevant institutions and unemployed women groups.

Table 33: Summary of approach within the stakeholder engagement plans

No	Action	Documents subject to discussion/ disclosure	Methods of information disclosure	Timeframe	Responsibility
1	Disclosure of documents to key local stakeholders including local people and authorities[8], and relevant Pursat provincial departments[9].	ESIA, SEP including GRM, and NTS	Hard copy to be retained at SchneiTec Beyond office in Pursat and in Phnom Penh office	- ESIA, SEP and NTS: December 2025 - SchneiTec Beyond guarantees that the most recent revised versions of these documents are accessible at its office.	SchneiTec Beyond, Liaison Officer
2	Meeting with key stakeholders or undertake group meeting when necessary with local people representatives and local authorities[10]	- SEP including GRM - Issues, challenge raised by local community and the solution done by SchneiTec Beyond.	- Hard copies posting on commune office - verbal discussion - The meeting will be done at least semi-annually or when required. - Whenever possible, such meetings should be coordinated with the local authorities and local	- GRM: ASAP during construction phase and continue the whole project's life. - Invitation to meeting shall be sent well in advance, preferably within at least one (1) weeks before the undertaking of such a meeting.	Assigned community liaison of SchneiTec Beyond, Liaison Officer

[8] Damnak Kranh Community Fish Refuge (CFR), Commune Offices (Sna Ansa and Anlung Tnaut), Village Chiefs (Khla Krapeu, and Anso Kdam)

[9] Department of Environment, Department of Water Resources and Meteorology, Department of Agriculture, Forestry, and Fisheries, and Department of Mine and Energy.

[10] Damnak Kranh Community Fish Refuge (CFR), Commune Offices (Sna Ansa and Anlung Tnaut), Village Chiefs (Khla Krapeu, and Anso Kdam)

			community and affected parties.		

7.4.4. Grievance Redress Mechanism

A Grievance Redress Mechanism (GRM) is essential in managing and addressing community concerns associated with solar power plant projects. The GRM ensures that grievances are effectively received, evaluated, and resolved, fostering trust between the project developers and the local community.

The Scope and Objective of the GRM:

This GRM will be used in both construction, operation and decommission phase of this project. The following are the key objective of GRM:

- To provide a structured process for individuals and communities to raise concerns or grievances related to the solar power plant project.
- To ensure transparency, accountability, and timely resolution of issues.
- To enhance community relations and improve project implementation through feedback.

GRM Structure:

Initially, a Liaison Officer (LO) is assigned on behalf of SchneiTec Beyond will handle all grievances received from the community throughout the project's duration. SchneiTec Beyond and its contractor(s) will accept all comments and complaints associated with the project. The following are the details of the LO:

- Full name: Mr. Bun Chamreoun
- Phone number (including Telegram): 096 8028468
- Work place: the 150MW solar power project in Anso Kdam village.

During construction, the LO will report to the Construction Manager from SchneiTec's EPC team, who in turn reports to SchneiTec Beyond's ESG team. Once operations commence, the LO assigned to the Project Management Unit (PMU) from SchneiTec will take over from the EPC team. This LO will report to the Operation Manager of the PMU and ultimately to SchneiTec Beyond.

The Liaison Officer (LO) was selected by basing on qualification that can ensure effective stakeholder engagement and grievance redress. As general best practices, LO must have (1)strong communication and interpersonal skills, especially the knowledge about local context and understand the local (Khmer language); (2) possesses problem-solving and grievance redress skills; and (3) experience in similar project in Community Liaison or similar roles

Grievance Process

The information regarding Grievance Mechanism for this project, including the complete contact information, is available at commune office. During operation phase, to east the process for grievance submission, the project will create a Grievance Box in side the project premise so that anonymous grievances can be submitted.

All comments and complaints will be responded to either verbally or in writing, according to the complainant's preferred method of communication, provided their contact details are given for submitting through grievance box as explained above. All grievances will be registered and acknowledged within 5 working days and responded to within 30 working days. Individuals who submit their comments or grievances have the right to request confidentiality of their names. Complainants also have the right to seek legal remedies in accordance with the laws and regulations of Cambodia.

SchneiTec Beyond will monitor the handling of grievances by their staff and contractor(s) to ensure they are properly addressed within the specified deadlines. SchneiTec Beyond will maintain a grievance log of all grievances, including those received and addressed by the contractor(s). Based on this log, grievance management reports will be produced and included in the annual environment and safety reports.

The grievance mechanism will be managed by a community liaison officer and will be gender-sensitive, with both male and female officers available to manage complaints. SchneiTec Beyond will ensure there is an independent, objective appeal mechanism and will inform affected communities about the grievance process during community engagement activities. The company will also regularly report to the public on the implementation of the grievance mechanism, while protecting the privacy of individuals.

Effective management of grievances is a vital component of stakeholder engagement and an important aspect of project risk management. Grievances can indicate growing stakeholder concerns, both real and perceived, and can escalate if not identified and resolved. Addressing grievances supports the development of positive relationships between the project, communities, and other stakeholders. Monitoring grievances helps identify recurrent issues or escalating conflicts and disputes.

The grievance process will follow the following key steps:

1. Avenues to lodge a grievance: Stakeholders can lodge a grievance using the following avenues: telephone hotlines, informing local authorities (Ansa Sna and Anlong Tnaut Commune Chief), or directly at the SchneiTec Beyond office in Krako district office. Grievance boxes will be located in the SchneiTec Beyond office.
2. Identification of Grievance: Grievances can be identified through personal communication with the assigned Community liaison officer by phone, letter, grievance form, during meetings, or any other route. Each grievance will be recorded on a Grievance Form and collected in a Grievance Record, kept at the SchneiTec Beyond office.
3. Acknowledgment: The grievance procedure starts with formal acknowledgment through a personal meeting, phone call, or letter, as appropriate, within 5 working days of submission. If the grievance is not well understood or if additional information is required, clarification will be sought from the complainant during this step.
4. SchneiTec Beyond and its contractors will response to Grievance. Required actions will be implemented to address the issue, and completion will be recorded on the grievance record.
5. The response will be signed off by SchneiTec Beyond’s Project Manager. This sign-off may be a signature on the grievance log or in correspondence, which will be filed with the grievance.
6. The response to the complainant will be recorded to assess whether the grievance is closed or if further action is needed.

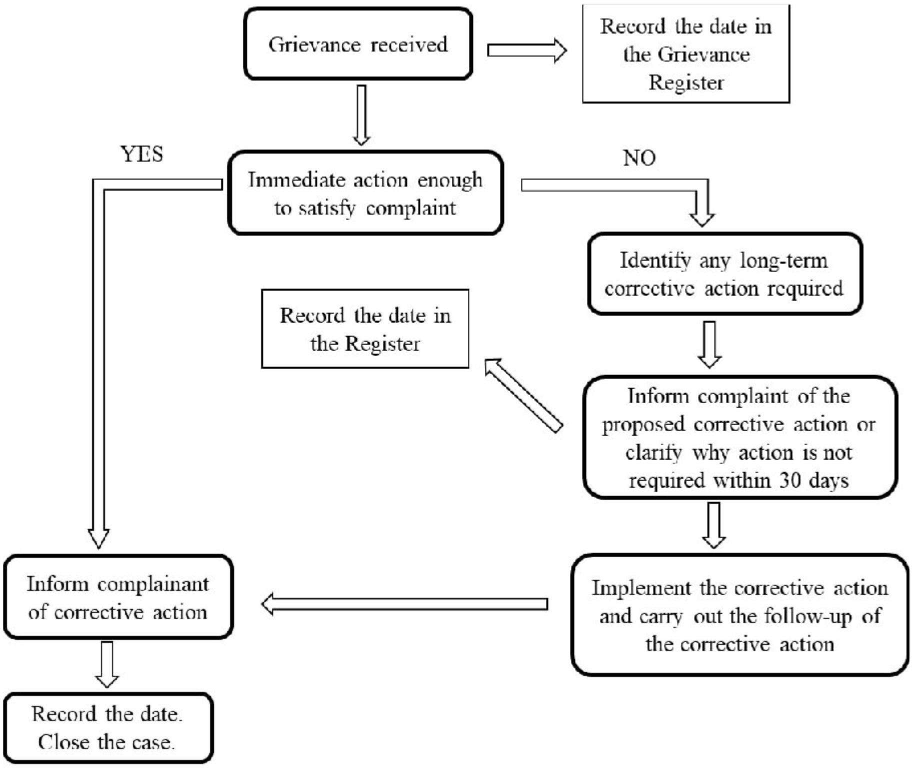


Figure 31: Grievance process

In addition to grievance by outside key stakeholders as stated above, a workers' grievance mechanism will be established for employees by SchneiTec Beyond and its contractors as a separate system. The mechanism will ensure confidentiality, allowing workers to lodge grievances through workers' representatives, unions, or independently, regardless of the nature of the complaint. Anonymous lodging will also be facilitated through grievance boxes. The Grievance Procedure will be free, open, and accessible to all, addressing comments and grievances in a fair and transparent manner. Information about the procedures, contacts, and how to access them will be readily available, including informing all workers about the Grievance Process upon joining the Project. Contact Point details will be posted on staff information boards and site information boards. The forms used in this grievance mechanism will be in Khmer language to facilitate communication with local workers. Specific details of this grievance mechanism will be established accordingly.

CHAPTER 8: IMPACT ASSESSMENT AND MITIGATION

8.1. Introduction

This chapter outlines the project's possible negative and positive impacts on socioeconomic, biological, and physical resources. The phases of design and construction, operation, and decommissioning all involve an assessment of the implications. Using the methods described in Chapter 3 of this study, the impacts have been located, assessed, and mitigations have been suggested. This chapter describes: (1) the impacts associated with each project phase; and (2) the specifics of each negative and positive impacts and the steps taken to mitigate it.

8.2. Key activities of the project

A. Design and Construction

The construction phase consists of design and construction activities. As stated in this report, the construction phase could last around 16 month starting from April, 2024. The design and construction phase of this project consists of the following key activities:

- Civil works including site preparation and cut and fill, fencing, foundation construction, internal roads and infrastructure development, and substation development (the activities under the control of EDC).
- Mechanical works including solar panel installation, inverters and other equipment installation
- Electrical Works including wiring and cabling and grid connection
- Others activities including transportation of construction materials/equipment and the commute of people in and out of the project area;
- Demobilisation of construction materials and office camp after completing the construction phase.

B. Operation Phase

This phase mainly consists of the operation of the solar power park. The key activities are as follows:

- Operations of solar power plant and relevant facilities
- PV cleaning and maintenance activities. The PV panel cleaning will use only water; no chemical substances will be used.
- Broken PV Panel and BESS management

C. Decommissioning Phase

The decommissioning phase begins when the infrastructure inside the project area is no longer allowed to be used or the project owner decides to abandon or demolish the project. In this case, the project will plan the decommissioning activities. The decommissioning phase is expected to have the following key activities:

- Reduction of project activities;
- Activities to close down or demolish physical infrastructure in the project;
- Site cleaning and environmental restoration activities at the project site;
- Activities to transport waste out of the site (including Broken PV Panel and BESS;
- Laying off of workers and staff.

8.3. Potential Impacts and Mitigation Measures

8.3.1. Potential impacts during construction phase

8.3.1.1. Potential impact on physical resources

A. Change of topography and erosion

In construction phase, topography will be directly affected by a number of project activities – primarily site clearing, site grading, foundation installation and drainage works in the project area of 168 ha.

The magnitude of the impact is **medium** since the topographical change was done on the large land area of 168 ha, but the there is no significant soil filling since the area is relative flat. The project's area is relatively flat and was previously unused land (former paddy field) and some parts are degraded mango crops. This means that the project will not need heavy site levelling (cut and fill) activities. The sensitivity of this impact is **low** since the land was not natural forest cover. No important biological resources present in the clearance area of 168 ha. The topography of the area has been changed for a long time (since 2012) before the presence of this project by local people who converted the forest cover to crops land and paddy fields.

The impact on topography will be permanent since the land will be changed from agricultural lands to solar power field. The significant of impact are rated as "**Low**".

Mitigation Measures:

- There should be no alterations made to the land use outside the project facilities;
- Construction operations ought to be limited within the allocated area;
- After construction is finished, any property utilized for temporary facilities, like a stockyard, should be restored as much as feasible; and
- The company will only clear the areas necessary for construction; if possible, the project will maintaining the original topography where no infrastructure to be built.

Residual Impact:

The residual impact on topography will remain "Low" since the change of land use will be long-term for most of the 168 ha area.

Impact	Change in Topography and Erosion in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	Limit to within project boundary.			
Frequency of impact	The impact will exist only once during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

B. Air Quality

The air quality in the study area can be affected by two major factors: Odor, fugitive dust and exhaust emission. These factors come from the following activities:

- Fugitive dust emitted from site preparation, excavation work, soil levelling, foundation work, and handling of construction materials;
- Fugitive emission from construction material transportation and other increase of traffic movement on site and on the access roads; and
- Exhaust emission from construction machineries, diesel generator and other equipment.
- The management of waste.

Dust dispersion can lead to a temporary contamination in air quality by increasing total suspended particulates (TSP) and other fine particulate matters. Exhaust emission from construction engines operation is likely to produce fine particulate matter which lead to health impacts to human and animal if inhaled in high dose. In addition, effects of odour and on aesthetic on Damnak Kranh Tourist site can occur if due to improper waste management of the project.

The magnitude of the impact is **low** since the construction of solar power plant does not required intensive use of material, equipment and machineries that can caused air pollution. The fugitive dust is likely to be from the activities within the 168 ha area only, since the access road used by this project has been already paved with asphalt. The sensitivities of the impact is also **low**. Residential areas are likely to be affected by the increase of fugitive dust and exhaust emission from machineries. However, from the site observation, there are few households located nearby project boundary. In addition, those households had also experienced many construction activities of other project in an area of 3 km from the project.

As mentioned above, the construction activities of this project can lead to direct negative impact on air quality locally for a short period of time. The impact significant for air quality in the construction phase is assessed as "**Low**".

Mitigation Measures:

- Watering where there is site clearing activity and during road construction within the project boundary.
- Limit the speed of vehicles at construction sites and on public roads in accordance with the Road Traffic Law and the sub-decree on speed limits for vehicles. In construction site, the vehicle speed should be limited to less than 15km/h;
- Trucks transporting raw materials and construction materials such as sand for the project will be covered to avoid fugitive dust.
- Properly manage sand piles, soil and debris piles to avoid airborne dust.
- Manage and maintain vehicles on a regular basis by focusing on smoke emissions from all machineries.
- Waste, especially the domestic waste, will be managed in the way to prevent odor. The project will ensure that waste are collected and store proper in the storage place and no waste, especially plastic bags used for meal packaging will not litter in and around the project's boundary.

Residual Impact:

The residual impact significant of air quality during construction period will be reduced to Negligible level after implementing the above mentioned mitigation measures.

Impact	Change in air quality in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist locally and mostly within project boundary.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

C. Increase of Noise and Vibration Level

During the construction phase, construction equipment and vehicles may generate noise to the ambient noise and vibration levels. The project's activities which likely to cause noise disturbance are listed as follow:

- Construction activities including site preparation, excavation work, soil levelling, compacting;
- PV module installation, construction equipment and filled materials transportation into project area; and
- Construction personnel and construction machineries mobilization.

The main source of noise is from construction machineries operation and PV installation. Noise can disturbances to nearby communities, as well as result in stress to wildlife, potentially impacting behaviour and breeding patterns. The transportation of project's personnel and materials, on the other hand, are unlikely to generate substantial noise, as the number of trips will be very few.

The magnitude of this impact is **low** since the construction of solar power plant does not required intensive use equipment and machineries that can caused noise and vibration pollution. The sensitivities of the impact is also **low**. From the site observation, there are few households located nearby project boundary. In addition, those households had also experienced many construction activities of other project in an area of 3 km from the project. On top of that, the proposed location is not in or nearby any projected area or the area with biodiversity significant. This means that the impact of noise and vibration on wildlife and is also considered less significant.

As mentioned above, the construction phase of this project will lead to direct negative impact on ambient noise and vibration for short-period of time and is not expected to caused significant impact on people's health and biodiversity. The impact significant of ambient noise and vibration in the construction phase is considered as "**Low**".

Mitigation measures:

- The project will limit the noise level to less than 70 dB(A) and vibration level not exceed 65 dB(A) from 6:00 am to 18:00 pm.
- During non-work periods, machinery and construction equipment that might be used occasionally should be turned off;
- If it is noticed that any particular equipment is generating too much noise then lubricating moving parts, tightening loose parts and replacing worn out components should be carried out to bring down the noise and placing such machinery far away from the households as possible;
- On-site equipment should only be operated by well-maintained machinery;
- It is necessary to discourage loud engine breaking and the minimal usage of car horns in the vicinity.

Residual Impact:

The residual impact significant of noise and vibration level during construction period will be reduced to Negligible level after implementing the above mentioned mitigation measures.

Impact	Increase of noise and vibration level in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist locally and mostly within project boundary.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

D. Change of Hydrological System

During the construction phase, hydrological system can be affected if the project does not have clear plan to protected all existing natural canals. The project's activities which likely effect hydrological system are listed as follow:

- Clearance of vegetation, site grading, foundation and drainage works
- Internal road construction
- The elimination of natural canals

The construction phase of this project can impact waterways (the canals) in a couple of ways such erosion of canal embankment by runoff, flow diversion, and the block of water flow intentionally or unintentionally. Clearing land for the project can loosen soil, making it more susceptible to erosion from rain water, while site grading and the deign of drainage system can lead to ponding under PV panels. This eroded soil can then wash into the canals, increasing sedimentation. In addition, construction activities can alter the natural drainage patterns of the land. This could lead to increased runoff of water into the canals, causing flooding or bank erosion.

So far, the project has bypassed a canal into Damnak Kranh reservoir, and no hydrological issues were reported in the area west of the project. In addition, the project has created an internal drainage system to collect all rainwater in the project and the upstream and release it into a canal that flows into the northern part of the project and into Tonle Sap Lake; by doing this, water flow pressure on Khla Krapeu village has been significantly reduce.

The magnitude of this impact is **Medium**. The project lead to the elimination of 3 canals at the eastern part and bypassing one canal (the one flowing into Damnak Kranh Reservoir) at the west of the project. In addition, the land clearing within the 168 ha area will be alter the flow and the capacity of storm water release of the existing canals. However, the effect of this hydrological change is unknown since no hydrology study to assess the flood risk by incorporating the existing and future projects in the assessment area. It is noted that a flood risk assessment report was done by SchneiTec Beyond in 2019 show that the project's area is not in the flood prone area, but effected by short and temporary rain flood, especially the paddy field nearby the irrigation systems. This report describes the same flood risk raised by local people and local authorities conducted during data collection at the site. But the flood is not serious as it flood only paddy field for a couple of days without destruction on the crops. These suggest that flood risk was elevated due to project development in area, and additional study is needed.

The sensitivity of this impact is also **medium**. From the consultation with local authorities, without considering the cumulative impact on hydrological system caused by other projects in the area, this effect of this 150 MW solar power project is not high. But with the cumulative impact consideration, this project has add up the adverse impact on water flow and level in the area. The impact significant of hydrological system in the construction phase is considered as "**medium**".

Mitigation measures:

- The project will only clear the areas necessary for construction, while maintaining the original topography where no infrastructure to be built;
- The project will, in cooperation with local authorities and Department of Water Resource and Meteorology to observe the flood condition, and will conduct additional assessment on hydrological change to prepare additional mitigation measures;
- The project will work with local authorities (Anlong Tnaut commune office) to monitor the situation of culverts and Boas Rolok laterite road and conduct maintenance if required;
- The grading and drainage system will made to ensure that no ponding under PV Penal
- The project will conduct hydrology study for cumulative impact on hydrological systemin the area. The hydrological study will incorporate the existing and future solar power plant projects to check how the identified current and future project exacerbate flood risks in nearby locations. It is expected that this hydrology study, if found that the projects increase

the risk of flood in the area, will provide proper and effective mitigations for implementation.

Residual Impact:

The residual impact significant of hydrological system change during construction period will be reduced to Negligible level after implementing the above mentioned mitigation measures.

Impact	Change of hydrological system			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term (if no effective solution)	
Scale of impact	The impact exists beyond project boundary.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

E. Impact on Surface Water

Construction activities may have potential impact on surface water quality, but not on water quantity, since the worker will not use much water (worker do not stay at the construction site; most of them are local people). The impact on water quality in construction phase can exist due to uncontrolled runoff from construction site, accidental spillage of fuel, lubricant, sewage, and other hazardous wastes.

Land preparation and construction activities could cause erosion and sedimentation, which could lead to runoff of unconsolidated sediments during heavy rainfall. The generation of sediment could be transferred to the nearby downstream water bodies, which could increase total suspended solids and turbidity in receiving waters. The spillage of fuel, lubricant, wastewater, and hazardous waste generated during construction phase can be brought to nearby area downstream of the project if no proper storage method are used. The change of surface water quality can affect the biodiversity in the water.

The magnitude of this impact is **medium**. The construction of solar power plant does not required intensive use substances that can caused significant surface water pollution; but the sediment brought by runoff should be taken into consideration since the cleared area is up to 168 hectares. Land preparation and construction activities could cause erosion and sedimentation, which could lead to runoff of unconsolidated sediments during heavy rainfall. The generation of sediment could be transferred to the nearby downstream water bodies, which could increase total suspended solids and turbidity in receiving waters.

The sensitivities of the impact is also **Medium**. The study shows that the existing canal consists of water only in rainy season, and mostly the canals are almost empty after a few week after no rain. Generally, the water in the canal is used for crop irrigation by local people but not for domestic consumption.

As mentioned above, the construction activities of this project can lead to negative impact on surface water quality for short period of time. The impact significant of surface water quality in the construction phase is considered as "**Medium**".

Mitigation Measures:

- Before conducting site clearing and filling activities in the project area, the company will prepare a fence and use vegetation buffering along the project boundary to prevent soil erosion, which affects the surface quality.
- The company speeds up land clearing activities and implements the mitigations for change of topography and runoff.
- The project will clear only the area at the area required for construction of key infrastructures like offices, substations, and battery storage, while keeping the land cover (especially grass) to grow where no clearance is required;
- The project will pay attention to the management of engine oil residue left over from change to avoid spillage or spill on the ground.
- The project will use dustbins to store solid waste and garbage generated from domestic use and cooperate with local waste collection companies with the permission of the Provincial Department of Environment to regularly transport the waste out of the project.
- All liquid waste (engine oil) will be stored in proper containers and sold out.
- All hazardous waste disposal will require the permit from MoE.
- Set up latrines with septic tanks in the project area to treat sewage generated from the daily use of staff and workers.
- For the project are (Area 2) located upstream of the Damnak Kranh Reservoir, the project will pay attention to sedimentation. The project will reduce the sediment caused by runoff by planting vegetation onsite and creating a buffer zone around the project site.

Residual Impact Significant

The residual impact significant of surface water quality has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on surface water quality in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist beyond project boundary to downstream water bodies.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

F. Soil Quality

The construction of solar power plant can lead to the impact on soil quality physically and chemically. Heavy machinery used for site preparation, panel installation, and infrastructure building can significantly compact the soil, resulting in the reduction of pore space in soil, and hindering water infiltration and root growth, and the potential increase of runoff which leads to erosion. The erosion will be also caused by clearing vegetation for the solar farm removes natural ground cover. More importantly, accidental spills of construction materials (like fuels or lubricants) can contaminate the soil, and improper disposal of construction waste can also release harmful chemicals into the soil.

The magnitude of soil quality impact is **medium**. This project involved in the clearing of land cover of 168 ha land to make away for the construction and installation of project component an associate facilities. However, the soil compact is not necessary every location in the project's boundary except the key buildings such as control room, office, BESS, internal road etc. It is worth noting that after installing the PV panels, grass will be let to grow under the PV which will help maintain the soil quality.

The sensitivity of this impact is **low**, considering the existing fertility of the soil in the area. As found in this report, soil in the study area is less fertile. Most crop plantation like mango does not yield properly and the field of paddy field is only around 0.5 ton of rice of hectare.

Therefore, during construction phase, soil quality can negatively affected; however, the impact significant on soil quality in operation phase is considered as **Low**.

Mitigation Measures:

- The project minimize the area of disturbance and avoid compacting the soil outside the designated area.
- The project establish designated access roads and limit vehicle traffic to minimize soil compaction.
- The project implement erosion control measures by using vegetative buffers. In addition, after construction, revegetate the disturbed areas with native plant species to restore soil, where possible.
- The project will create a temporary waste storage inside the project's boundary. This storage will be used for general solid waste and hazardous waste, including the broken PV panel and broken BESS parts.
- Waste storage sites in the project should be regularly and properly check to prevent any leakage into the site soil. Procedure for transferring, storing and disposal of hazardous wastes should be properly implemented to prevent accidental leakage. In addition, hazardous waste disposal will require the permit from MoE.
- Refuelling and machinery maintenance should be undertaken in a designated with appropriate closed drainage system;
- Maintain vegetations under the PV panels to avoid contamination on soil, natural canals and the Damnak Kranh K Lake through runoff.
- In case of accidental spillage or leaks (i.e. of fuel or lubricants), the contaminated soil shall be cleaned up immediately, and contaminated rags or other material shall be disposed of properly; and
- The drainage system should be constructed technically with suitable capacity to collect rainwater in the project to preventing erosion and run-off.

Residual Impact

The residual impact significant of soil quality will be reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on soil quality in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project.			
Frequency of impact	The impact likely to exist in construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.1.2. Biological Resource Risk

Wildlife is indirectly affected by the project through the increase of noise level and the change of water quality due to the following project activities during construction:

- Land preparation activities by converting empty lands to construction site;
- PV module installation activities which cause noise disturbance; and
- Spillage and leakage of liquid waste and hazardous waste to the nearby natural water bodies.

The increase of noise from construction equipment may lead to the stress on wildlife, impacting their ability to detect predators and communicate with each other, and navigate their environment. Noise can also disrupt wildlife behaviours like breeding, feeding, and migration. Birds may abandon nests, and animals may become more reclusive, making them more vulnerable to predation. In addition, without efficient surface water quality management, downstream waterways can be contaminated. This leads to the impact on aquatic invertebrates, reduce oxygen levels in the water, and harm fish. If the water is polluted by oil, lubricants or hazardous materials fish and other aquatic resources can be poisoned.

The magnitude of this impact is **low**. During the field survey, the project area have been all cleared by converting empty land into the construction site and most parts of the area have been installed with solar PV, and it is noted that the area had been converted from forest cover to agricultural land since 2012. The cleared land is prone to sediment increase if no proper mitigations are in place. The increase sediment in Area 2 can change the water quality Damnak Kranh Reservoir and effect the biodiversity.

The sensitive of this impact is also **Medium**. Flora, mammals, bird and reptile will not be directly affected by the project since there is no sign of habitat remained in the project area before and after the clearance inside the project, and there is no direct impact pathway to the biodiversity resources. However, aquatic resources in Damnak Kranh Reservior can be affected if there exists sediment increase through runoff in the upstream canals. But, it is worth noting that the proposed area for the project is not new in the area. There have been several development projects around AoI such has 60 MW solar power plant of SchneiTe Sustainable, the 30MW solar power plant of SchneiTec Infinite, and Electronic Assembly Plant of SchneiTec Chint. There is no significant wildlife has been observed within the 168 ha area except some common bird species under the solar PV and on the existing electricity grid line. The study found certain wildlife species has been found within 3 km around the project boundary. Those species are (please see details of key species in 6.2.2.2):

- There were 55 timber species recorded. In the IUCN Red List, 2 endangered species, 2 vulnerable species, and 4 near-threatened species were found and 12 species of them were classified as luxury grade and grade 1 under the National List.
- There are 11 species of mammals recorded. But no endangered species were recorded under the IUCN Red List in both the assessment and 11 species were recorded as least concern under the IUCN Red List and common species under the National List.
- 52 forest and water bird species were found. 50 species are forest birds16 species are waterbirds, 30 species are confirmed from sightings and 22 species were recorded from interviews. One endangered species of green peafowl was con-firmed and the rest are Least Concern under the IUCN Red List and common species under the National List. Damnak Kranh water reservoir is a significant wetland in the assess-ment site, and it is the most suitable habitat for birds in the survey area followed by the Sna Ansa community forestry.
- 29 species have been recorded. One species of Ompok bimaculatus was a near-threatened species and another species of Wallago attu was a vulnerable species under the IUCN Red

List. The other species were Least Concern (11) and Not Evaluate (18 species). Damnak Kranh reservoir is the main conservation area for fish species in the project and assessment sites.

- 10 amphibians and 23 reptiles are reported from the surveyed areas. All amphibians and reptiles are species of anthropogenic modified environment including rice fields, both natural and artificial ponds, lack, roadside puddles, canals, and Damnak Kranh reservoir. None of the findings has been listed by the IUCN Red List of threatened species listed as endemic or rare species under the National List. But, two species of Indochinese spitting cobra (Naja siamensis), Monocellate cobra (Naja kaouthia), and Burmese python (Python bivitttatus) were reported to occur in the assessment site.

The construction activities of this project can lead to negative impact on biodiversity resources. However, the duration of impact is in a short period of time. The impact significant of biodiversity resources in the construction phase is considered as "**Medium**".

Mitigation Measures:

- The project will maintain noise level as mentioned in the "noise and vibration impact section". The noise control attention will be put on site clearing, and transportation, construction activities.
- The project will implement surface water quality management as stated in the "impact on surface water quality section".
- The project educates and make sure that staff/workers not to hunt or kill animals if they find in the project area.
- If any wildlife found in the construction area, the project will work with Phum Krang Thom Forestry Community and Damnak Kranh Fish Refuge Community and/or with Pursat Provincial Department of Agriculture, Forestry and Fishery to release it back to nearby forest.
- For the project are (Area 2) located upstream of the Damnak Kranh Reservoir, the project will pay attention to sedimentation. The project will reduce the sediment caused by runoff by planting vegetation onsite and creating a buffer zone around the project site.

Residual Impact:

The residual impact significant of biodiversity resources will be reduced to Negligible level after implementing the above mention mitigation measures.

Impact	Impact on biodiversity resources in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist locally and mostly within the project boundary.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.1.3. Socioeconomic Resources

A. Impact on traffic flow and local infrastructure

The construction of a 150 MW solar power plant project can adversely impact local traffic conditions and local infrastructures. The project will require movement of heavy machinery, construction materials, and increased personnel movement, leading to congestion or destruction on nearby roads. The transportation of large equipment and materials may necessitate temporary road closures or traffic rerouting, causing delays for commuters and businesses. Additionally, the influx of construction workers can increase traffic volume during peak commuting hours.

The magnitude of impact is **Medium**. In general, the project will not involved in large scale soil transportation for filling in in the area. The project use cut and fill method since the area is relatively flat. The key transportation is during the PV installation when the project need to important the material by truck of less than 20 around per day.

The sensitive of this impact is **low**, since there is little traffic on the access road to this project. There are only few houses and no school along the access road, an increase in traffic volume is generally not expected to cause congestion and does post great risk on traffic accident and the destruction of road.

It is predicted that the impact on traffic flow and local infrastructure is "**Low**".

Mitigation Measures:

- Avoid overloaded transport, especially trucks carrying equipment and machineries.
- All project vehicles will comply with the project safety standards and be in good working condition, in particular, they will undergo frequent and thorough technical inspections;
- The project will hire security personnel to facilitate traffic in front of the project site.
- Any road damage directly caused by the project will be repaired by the project.
- The project will have proper parking lots for their vehicles and trucks. The project will not allow trucks to park along the road or any place outside the project boundary without approval from the local authority.
- The project will develop a mechanism to regularly check and monitor the trucks and truck drivers at the entrance of the Project to ensure (1) truck drivers have licenses; (2) truck drivers drive responsibly; (3) address potential concerns raised by local communities regarding traffic and transportation.
- Educate drivers to obey the rules of the road, such as speed limits, obey all traffic signs and avoid alcoholic drink when driving.

Residual Impact

The residual impact significant of traffic will be reduced to Negligible level after implementing the above mentioned mitigation measures.

Impact	Impact on traffic and local infrastructure in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist on the transportation route used by the project especially the asphalt access road.			
Frequency of impact	The impact will exist only once during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

B. Occupation and Income (positive impact)

The project does not have adverse impact on the occupation and income of local people, especially land owners and land tenants. SchneiTec is the owner of the 168 ha of land designated for this project. On September 26, 2023, SchneiTec Beyond leased the aforementioned project site from SchneiTec, the landowner. The 168 ha of land were legally occupied by SchneiTec since September 25, 2020, and have been left unused for a couple of years. Therefore, this solar power project of SchneiTec Beyond did not result in adverse impact caused by land acquisition.

But, the development of the 150 MW Solar Photovoltaic Power Plant in Pursat, Cambodia, is a significant project with various benefits. It promotes renewable energy, reduces carbon emissions, lowers electricity costs, improves grid stability, and creates jobs. The construction of a solar power plant can be an economic driver for local communities, creating job opportunities and increase income generation. During the construction stages of the project, local people can benefit from a range of employment opportunities such as:

- Construction Workers in the form of skill and non-skill workers
- Jobs for local businesses such as local vendors, transportation, and accommodation for those who work related to the project, and other potential supply chain

C. Occupational Health and Safety

OHS risks may be elevated by the construction phases of this project, which encompass excavation, site preparation, structural erection, and finishing work.

The risks associated with construction activities include the following: falling from high surfaces such as roofs, scaffolding, and ladders; being electrocuted or burned by fire, electrical wiring, and equipment; being struck by falling objects like tools, machinery, or debris; being exposed to hazardous materials such as asbestos, lead, silica dust, and chemicals; and experiencing contaminated environments such as noisy workplaces and poor air quality. Furthermore, the safety of the construction workers may be affected.

The magnitude of this impact is **Low**, as the construction of a solar power plant does not necessitate the intensive use of materials, equipment, or machinery, nor does it necessitate work in high positions that could pose a significant risk. The sensitivities of the impact is also **medium**. This project hire a total number of 419 (419 are Cambodia workforce and mostly are local living in the surrounding villages) that most of them are local people that might not be skilful in standard construction work.

During the building phase, the adverse impact on occupational health and safety is rated as "**medium**."

Mitigation Measures:

- The project will implement an OHS management plan for the construction phase; this plan will also include the emergency response plan to address potential emergencies;
- To ensure that the work is completed on site in accordance with safety standards, the abilities and experiences of each employee / worker will be considered and strengthened.
- On-site engineers with the necessary training and experience will be present at the construction site to oversee and provide guidance on how staff and workers are carrying out construction activities.
- Employee / worker contracts will comply with labour standards, particularly working hours and salary levels will be in accordance with Cambodian labour law.
- The project will regularly spray water on the construction site of the project, to mitigate dust.
- The project will implement the noise and vibration mitigation measures.
- At locations where there could be workplace hazards, the project will install signs, markings, and barriers in accordance with occupational safety standards. The signs and barriers will be made to be seen while in use (during both the day and night), and they will be taken down once the hazards are mitigated.

- Fire extinguishers, and other emergency equipment, will be installed in a practical spot that is simple to use and see. These fire extinguishers will also be regularly inspected to ensure they are functional. Every member of the staff will receive training on how to use fire extinguishers and how to rescue in the event of a fire, locate a full port, and other related topics.
- All personnel / engineers who enter the construction site are required to wear Personal Protective Equipment (PPE) and be trained in the use of those personal protective equipment.
- Each site needs a minimum of one site manager to oversee the workers' adherence to safety rules and to monitor any potential risks.
- In accordance with the type of staff or workers, all employees and workers will be registered with the National Social Security Fund (NSSF), which provides insurance for workers' health, workbooks, and work permits.
- Accommodation in structures under the structure under construction is not allowed, and the project will provide adequate clean water, toilets and canteens for staff and workers, both regular and medical staff.

Residual Impact:

The residual impact significant of occupational health and safety will be reduced to Negligible level after implementing the above mention mitigation measures.

Impact	Impact on occupational health and safety in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within the project boundary and with the workers of the project.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

D. Community Health and Safety

The health and safety of the local community can be adversely affected during the construction phase by factors such as polluted air quality, noise disturbance, water quality traffic accidents, conflict, conflict, infectious diseases, sexual exploitation and abuse/sexual harassment caused by the labour influx. The potential sources of social impact and impacts to community health and safety during the construction phase are as follows:

- Change in environment condition due to the project's construction activities mainly include site preparation, site levelling, operation machineries, etc.;
- Risk in traffic accident due to the project's vehicle movement on the existing local access road;
- Infectious disease arising due to the influx of labour (construction personnel), and
- The risk of conflicts between security personnel and local communities.

The magnitude of the impact is **Medium**. The impact of traffic, noise, air quality are rated as low as stated in the above section. The project site and the sub-station construction site have been fenced and the entrance is monitored by security guard to prevent unauthorized access. The risk on the local community in term of cultural conflict and infectious disease is low, since the majority of hired work forces are local Khmer people. However, the risk of sexual exploitation and abuse/sexual harassment caused by the labour influx is the concern. The sensitivity of this impact also considered as **low** since most of the hired work workforce are local people from nearby villages.

The impacts on community health and safety are both direct and indirect, but will occur in a short period of time. The impact significant to community health and safety during construction phase is assessed as **Low**.

Mitigation Measures:

- Implement the mitigation for air quality, traffic, water quality and noise
- The project site should be completely fenced at all times to prohibit unauthorized entry;
- The project or contractor should educate its workers about infectious diseases and their symptoms;
- The project develop and implement an HIV/AIDS and COVID19 policy for all workers related to the Project, including the development of the information document that address factual health issues as well as behaviour change issues around the transmission and infection of HIV/AIDS and COVID19. Most, importantly, the project will make sure that the EPC Contractor implement this policy.
- The project develop the Worker Code of Conduct that includes the guidance on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities.
- The project should be made aware about the sexually transmitted disease and HIV/AIDs and COVID19; the implementation of precautions and guidelines on COVID19 is compulsory its staff and worker.
- The health check-up of all migrant workers should be conducted prior recruitment;
- The project's security personnel will be properly educated regarding to the conflict solving with the local communities;
- The project will engagement with communities about the project's impacts on community safety and security, awareness raising concerning the project grievance mechanism, as outlined in the Stakeholder Engagement Plan (SEP) and GRM;
- Keep inform and regularly cooperate with local authorities to solve for any conflict with communities.

Residual Impact

The residual impact significant of community health and safety will be reduced to Negligible level after implementing the above mention mitigation measures.

Impact	Impact on community health and safety in construction phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within the SAoI.			
Frequency of impact	The impact will exist only during the construction phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.2. Potential Impacts during Operation Phase

8.3.2.1. Physical Resources

A. Soil Quality

While solar power plants are generally considered environmentally friendly, their operation can still have some negative impacts on soil quality. One significant issue is soil erosion, particularly in areas with heavy rainfall. The installation of solar panels can disrupt the natural vegetation cover, leaving the soil exposed to erosion. This can lead to loss of topsoil, nutrient depletion, and sedimentation in nearby water bodies. Additionally, the use of herbicides and pesticides to control weeds and pests around the solar panels can contaminate the soil and harm beneficial microorganisms. Furthermore, the long-term presence of solar panels can compact the soil, reducing its ability to absorb water and nutrients, which can negatively affect plant growth and ecosystem health.

In addition, soil environment impact can occur operating condition through an accidental release or leakage of toxic substances and/or any sewage, and the management of broken BESS. The potential activities which may cause impact including oil, lubricant, domestic solid waste from site office including disposal of food waste, plastic waste, glass waste, etc., and the sewage from the site office.

The magnitude of this impact is **medium**. Even though the no significant waste and hazardous waste, as stated above, will be will be generated, some small amount of broken BESS might be removed from the system that needs to be managed properly. In addition, around 80% of the 168 land will be covered or at receive less sun light during operation phase of this project. The soil's capacity to absorb water and nutrients may be diminished as a result of the long-term presence of solar panels, which can have a detrimental impact on the health of the ecosystem and the growth of plants. The sensitivity of this impact is **low**. As report the soil in the study area is less fertile. Most crop plantation like mango does not yield properly and the field of paddy field is only around 0.5 ton of rice of hectare.

Therefore, during operation phase, soil quality can negatively affected; however, the impact significant on soil quality in operation phase is considered as **Low**.

Mitigation Measures:

- The project will create a temporary waste storage inside the project's boundary. This storage will be used for general solid waste and hazardous waste, including the broken PV panel and broken BESS parts.
- Waste storage sites in the project should be regularly and properly check to prevent any leakage into the site soil. Procedure for transferring, storing and disposal of hazardous wastes should be properly implemented to prevent accidental leakage. In addition, hazardous waste disposal will require the permit from MoE.
- All waste substances should keep register in Material Safety Data Sheets (MSDS) in order to keep as reference. Refuelling and machinery maintenance should be undertaken in a designated with appropriate closed drainage system;
- The control of vegetation under the PV panels will be operated by using vegetation cutting machine. Any pesticide and herbicide use for the control of vegetation under the PV panels are prohibited to avoid contamination on soil, natural canals and the Damnak Kranh K Lake through runoff.
- In case of accidental spillage or leaks (i.e. of fuel or lubricants), the contaminated soil shall be cleaned up immediately, and contaminated rags or other material shall be disposed of properly; and
- The drainage system should be constructed technically with suitable capacity to collect rainwater in the project to preventing erosion and run-off.

Residual Impact

The residual impact significant of soil quality will be reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on soil quality in operation phase	

Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project.			
Frequency of impact	The impact will be rarely in operational phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

B. Surface and Ground Water Resources

The operation of solar power plants can have several adverse impacts on surface and groundwater resources. These impacts arise from key activities such as the increase of water demand, the water contamination. This solar power plants require water for cleaning PV Panels. This can put stress on surface and ground water during dry season if consumed in large amount. In addition, water can be also affected if being contaminated due to improper handling, accidental spills, or leakage of these chemicals can lead to the contamination of surface water bodies. Water volume consumed by daily consumption is not the concern since the maximum number workforce during operation is only 87. However, the water for cleaning should be considered.

The magnitude of this impact is considered as **Medium** in term of water quantity and water quality. As estimated, the volume of water quired for PV cleaning for this project is around 990m3 per time or around 2,970m3 per year. The PV panel cleaning is expected to be implemented during dry season and will be done at most 3 times per year. The sensitivity of this impact is low. During operation phase, the risk of electrolyte leakage from the BESS is possible. The accidental leakage of electrolytes can contaminate soil and water bodies, harming ecosystems and potentially posing health risks.

The sensitivity of this impact is considered **low** since the people do not use water for paddy field or crop in dry season. People cultivate paddy field only in wet season; this means that water was not a major source for agricultural activities. In addition, even though local people use well for domestic conduction, their well is far away from the potential aquifer to be used by the project.

The overall significant impact on water resource and quality in operation phase is therefore considered as **Low**.

Mitigation Measures:

- The cleaning of solar PV will be held in case necessary in order to reduce water consumption.
- To ensure water efficiency, the cleaning of solar panels shall use equipment and process to be further described in the O&M manual from the supplier.
- To implement water efficiency, dry cleaning method shall be conducted when groundwater has been decreased.
- Monitor groundwater levels regularly to track any changes and adjust water usage accordingly.
- The project will conduct ground water quality monitor in the vicinity of the project annually.
- Check the feasibility of using alternative water sources to reduce reliance on groundwater.
- The control of vegetation under the PV panels will be operated by using vegetation cutting machine. Any pesticide and herbicide use for the control of vegetation under the PV panels are prohibited;

- All hazardous waste and material should be properly stored, managed and checked, and the disposal of this waste will require the permit from MoE.
- The project will develop and implement a spill response plan that outlines immediate actions to contain and clean up any chemical spills, minimizing the risk of groundwater contamination. This plan will also include training for personnel on spill response procedures.
- In case of accident/spillage, the contaminated soil should be immediately collected and stored as hazardous waste;
- Regular inspections on waste storage area should be applied to ensure there are no leakages or leakage to the ground;
- The project should maintain spill kits/equipment, and posted spill procedures;
- The project should keep a register for all hazardous substances on site and relevant Material Safety Data Sheets (MSDS) readily accessible for reference;
- The project will pay attention to leakage from BESS. The BESS are storage in the containers which can be used as buffer if any minor leakage occurs. The BESS is also equipped with thermal control to reduce pressure and stress on the battery cells. In addition, the project will conduct routine inspections to identify and address any signs of damage or degradation.

Residual Impact Significant

The residual impact significant of water resource and quality has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on surface and ground water resource and quality in operation phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise and in the AOI.			
Frequency of impact	The impact will be rarely in operational phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.2.2. Biological resource Impact

The operation phase of a solar power plant can have adverse impacts on wildlife. These impacts are caused by the habitat loss, change of water quality, the electrocution of avian species, and the disturbance due to the increase of noise, and glint and glare caused by PV panels.

The biological resource survey found the following (see details of key species in 6.2.2.2):

- There were 55 timber species recorded. In the IUCN Red List, 2 endangered species, 2 vulnerable species, and 4 near-threatened species were found and 12 species of them were classified as luxury grade and grade 1 under the National List.
- There are 11 species of mammals recorded. But no endangered species were recorded under the IUCN Red List in both the assessment and 11 species were recorded as least concern under the IUCN Red List and common species under the National List.
- 52 forest and water bird species were found. 50 species are forest birds16 species are waterbirds, 30 species are confirmed from sightings and 22 species were recorded from

interviews. One endangered species of green peafowl was con-firmed and the rest are Least Concern under the IUCN Red List and common species under the National List. Damnak Kranh reservoir is a significant wetland in the assess-ment site, and it is the most suitable habitat for birds in the survey area followed by the Sna Ansa community forestry.

- 29 species have been recorded. One species of Ompok bimaculatus was a near-threatened species and another species of Wallago attu was a vulnerable species under the IUCN Red List. The other species were Least Concern (11) and Not Evaluate (18 species). Damnak Kranh reservoir is the main conservation area for fish species in the project and assessment sites.
- 10 amphibians and 23 reptiles are reported from the surveyed areas. All amphibians and reptiles are species of anthropogenic modified environment including rice fields, both natural and artificial ponds, lack, roadside puddles, canals, and Damnak Kranh reservoir. None of the findings has been listed by the IUCN Red List of threatened species listed as endemic or rare species under the National List. But, two species of Indochinese spitting cobra (Naja siamensis), Monocellate cobra (Naja kaouthia), and Burmese python (Python bivitttatus) were reported to occur in the assessment site.

For this project, the magnitude of the impact on biodiversity resources is **low**. The project does not lead to any significant habitat loss, since the land has been converted into agricultural for the present of this project. However, some birds can be vulnerable to solar power plants. Some birds may collide with solar panels, mistaking them for water bodies, which can lead to electrocution, injury or death. In addition, the noise from this project as well as the noise accumulated by other nearby project and human activities can also disturbance wildlife as well. In terms of surface water quality, for upstream canals of Damnak Kranh Reservoir, increase of sediment is not expected since no more land clearing activities as in operation phase. In addition, the project area upstream of Damank Kranh Reservoir (Area 2) will used for installing the PV panels which significantly reduce the risk of surface water pollution. Further more, there can be the effect of glint and glare from PV Panels; however, PV panels are made to absorb sunlight rather than reflect it, due to its anti-reflective coating. Accordingly, they are not extremely reflective than water body or ordinary glass. As the sun continues to move, there may be brief moments of sparkle and glare during sunrise and/or sunset.

The sensitivities of this impact on biodiversity resources is **Medium**. The project will not directly impact wildlife, as there is no evidence of habitat remaining in the project area prior to and following the clearance within the project. However, aquatic resources in Damnak Kranh Reservoir will be affected if surface water pollution exists in its 2 upstream canals. In addition, it is worth noting that the proposed project area is not a new addition to the region. In the vicinity of AoI, there have been numerous development projects, including the 60 MW solar power plant of SchneiTe Sustainable, the 30MW solar power plant of SchneiTec Infinite, and the Electronic Assembly Plant of SchneiTec Chint. Some common bird species have been observed under the solar PV and on the existing electricity grid line, but no significant wildlife has been observed within the 168 ha area. The research revealed that specific wildlife species were discovered within a three-kilometer radius of the project's boundary.

Except common bird species, there is no endangered species exists in the boundary of the project. Hence, there is no major significant concern over the potential impact on the biodiversity resources during operation phase. The significant impact on biodiversity is considered as **Medium**.

Mitigation Measures:

- Regular check on the solar module or holes in the towers to avoid nesting by any of birds;
- The project should install or equip any bird scaring devices (e.g. moving cloths or scare tools) to prevent and chase birds from venturing close to solar modules; and

- Any hunting or trapping birds in the project area are prohibited.
- If any wildlife found in the project site, the project will work with Phum Krang Thom Forestry Community and Damnak Kranh Fish Refuge Community and/or with Pursat Provincial Department of Agriculture, Forestry and Fishery to release it back to nearby forest.
- The project will limit the noise level to less than 70 dB(A) and vibration level not exceed 65 dB(A) from 6:00 am to 18:00 pm.
- On-site equipment should only be operated by well-maintained machinery;
- The project will protect surface water quality through avoiding the use of pesticide and herbicides, the management of engine oil residue left over from change to avoid spillage or spill on the ground, the management of daily wastes and sewage
- The project will maintain noise level as mentioned in the

Residual Impact

The residual impact significant of biological resource has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on biodiversity resources in operation phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will mostly exist within in the premise of the project.			
Frequency of impact	The impact will be rarely in operational phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.2.3. Key Social Risks

8.3.2.3.1. Occupational health and safety

In operation phase, project's Occupational Safety and Health is possible to be impacted due to the such key activities as electrocution and heat stress for worker who work in the field. As stated in the F/S report, the O&M team consists of on-site technicians who are responsible for conducting routine inspections, preventive maintenance tasks, troubleshooting, and repairs; the engineers and specialists to provide technical expertise, overseeing complex repairs, and analysing performance data; and the remote monitoring team who monitoring systems to track plant performance, identify potential issues, and coordinate on-site responses.

The magnitude of this impact is **low** since the installed technology and solar power plant project is not among the highly dangerous projects, and the O&M works are not required to be performed on a daily basis. The sensitivity of this impact is also **low**. In operation phase, the project will require only 87 persons who are Manager, Engineer, Technician, Advisor, Office Staff, Technical Staff/worker. Those people will be qualified for their jobs.

Therefore, the impact significant on Occupational Safety and Health in operation phase is assessed to be "**Low**".

Mitigation Measures:

- Personnel protective equipment (PPEs) should be regularly provided;
- All visitors entering the site should be required to wear the basic PPE requirement such as hard hats, safety shoes or safety boots, proper working gloves, face shields, safety glass, etc., at all times inside the project;

- Provide regular training to workers about Occupational Safety and Health and standard of procedures to ensure that all project's personnel are trained adequately in terms of work safety, work hazards, and technical performance in the workplace;
- Appropriate safety standard signs and barricades in hazardous areas with visible at all times should be well equipped, and be removed or covered promptly when those hazardous areas no longer exist;
- Fire extinguishers and other fire prevention equipment will be installed at flammable spots; and
- Provide workers and staff with appropriate accommodation, clean water, and canteen. All workers and staff shall have an employment register (both Khmer and foreign workers) and register at the Social Security Fund to have access to health insurance.

Residual Impact

The residual impact significant has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on occupational health and safety in operation phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project and with the workers and employees of the project.			
Frequency of impact	The impact will be rarely in operational phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.2.3.2. Community health and safety

The operation phase of a solar power plant project can have adverse impacts on community health and safety through one key factory which is the risk of electrocution. The other factor (heat island effect, noise pollution, fire risk) are considered less significant.

However, the impact caused by the influx of labour and the use of BESS in the system should be managed properly. During operation, the health and safety of the local community can be adversely affected through infectious diseases, sexual exploitation and abuse/sexual harassment caused by the labour influx.

In addition, this project uses BESS which can adversely affect the community health and safety.

Fire and explosion of the BESS is one of the key concern of BESS resulting from thermal runaway or other factors like electrical faults, that can cause significant damage, injuries, and environmental harm. The fire or thermal runaway, if exist, can also lead to air pollution through releasing harmful gases and particulate matter into the air, and potentially causing respiratory problems. In addition, BESS systems can generate noise pollution, which can disturb nearby residents. The magnitude of this impact considered as **Medium**.

In line with this, the sensitivity of the impact is also **low**. The local community's health and safety are unlikely to be adversely affected by the polluted air quality or noise disturbance during the operation phase, as there are no activities that would result in such an impact during operation phase. Nevertheless, the electrical safety of the solar power park project is at risk. High-voltage electricity is utilized by solar parks. However, the health and safety risks associated with solar power park project are relatively low compared to other forms of energy production.

The impacts on community health and safety are direct adverse impact and can last for a long period of time. The impact significant to community health and safety during operation phase is assessed as "**Low**".

Mitigation Measures:

- Fencing and proper signage are important to prevent people and animals from coming into contact with electrical wires.
- The project will prohibit unauthorized entry;
- The project will install electricity risk warning sign on the fence around the project to avoid trespassing over to the power farm.
- The project will strictly adhere to safety standards and follow industry best practices and regulatory guidelines for BESS. This include embedded ventilation systems, noise reduction (sound proof), and fire suppression system.
- The project will conduct inspections and maintenance regularly to identify and address any potential issues as early as possible.
- The project develop and implement an HIV/AIDS and COVID19 policy for all workers related to the Project
- The project develop the Worker Code of Conduct that includes the guidance on worker-worker interactions, worker-community interactions and development of personal relationships with members of the local communities.

Residual Impact

The residual impact significant of community health and safety will be reduced to Negligible level after implementing the above mention mitigation measures.

Impact	Impact on community health and safety in operation phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within the project premise.			
Frequency of impact	The impact will exist for the whole project life cycle.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.3. Adverse Impacts during Decommissioning Phase

8.3.3.1. Physical Resources

A. Air Quality Environment

In the decommission phase, the air quality is expected to be impacted by the following project activities: fugitive dust emission from demolition activities, demolition waste transportation, and solar panel handling; fugitive dust emission from project transportation; and an increase in traffic movement on the site and on the approach roads.

The air quality can be affected by the movement of vehicles into and out of the project area, as well as fugitive dust emission from demolition activities and demolition waste transportation. These activities will result in an increase in total suspended particulates (TSP) and other fine particulate matter. The health effects of fine particulate matter on human and animal receptors can be caused by the exhaust emission from demolition engines when inhaled in large quantities.

The magnitude of this impact is **low**. The demolition of solar power plant will last a short period of time and does not required intensive use of material, equipment and machineries that can caused air pollution. The fugitive dust is likely to be from the activities within the 168 ha area only, since the access road used by this project has been already paved with asphalt.

The sensitivities of the impact is also **low**. The rise in fugitive dust and exhaust emissions from machinery is expected to have an impact on residential areas. Nevertheless, the site observation indicates that there are only a few households situated in close proximity to the project boundary. Furthermore, the households in question had also been subjected to numerous activities associated with other projects in a three-kilometer radius of the project. Therefore, during decommission phase, air quality can be negatively impacted; however, the impact is only temporary during the decommission phase only. The impact significant is considered as "**Low**".

Mitigation Measures:

- Water should be sprayed on the access road that the project uses and where dust is present on a regular basis, particularly during the dry season.
- The settlement area should be traversed at a maximum speed of 40 km/h by the project's vehicles.
- Erect temporary barriers, fences, or fabric screens around the demolition site to prevent dust from spreading to nearby areas, especially in windy conditions.
- Cover trucks carrying demolition debris with tarps to prevent dust and materials from being released during transport.
- Gradually dismantle the plant in phases rather than conducting all demolition at once. This limits the amount of dust and emissions produced at any one time and makes pollution easier to manage.

Residual Impact

The residual impact significant has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on air quality in decommission phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project and last for a short period of time.			
Frequency of impact	The impact will be rarely, and exist only temporary during the decommission phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

B. Noise and Vibration Level

The demolition of a solar power plant can generate significant noise and vibration, which can impact workers and local communities. The activities that can cause noise and vibration are the operation of heavy machinery, dismantling of structures, and transportation of debris.

However, the magnitude of this impact is **low**, since the demolition of solar power plant will last a short period of time and does not required intensive use of material, equipment and machineries that can caused loud noise and high vibration. The removal material are mainly the PV panel which are small and lightweight. The sensitivities of the impact is also **low**. It is anticipated that residential areas will be affected by the increase in noise and vibration caused by machinery. However, the site observation suggests that there are only a handful of households located in close proximity to the project boundary. Additionally, the households in question had been the subject of numerous activities associated with other projects within a three-kilometer radius of the project. Therefore, during decommission phase, noise and vibration can be negatively impacted; however, the impact is only temporary during the decommission phase only. The impact significant is considered as "**Low**".

Mitigation Measures:

- Installing temporary noise barriers, such as sound-absorbing walls or screens, around the demolition site can help reduce noise transmission to nearby communities.
- Well-maintained machinery and equipment tend to operate more quietly, reducing overall noise levels.
- Scheduling demolition activities during less disruptive hours (e.g., during the day and avoiding evenings and weekends) can minimize noise disturbance to local communities.

Residual Impact

The residual impact significant has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on noise and vibration in decommission phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project and last for a short period of time.			
Frequency of impact	The impact will be rarely, and exist only temporary during the decommission phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

C. Soil Quality

The soil environment in decommission phase is likely to be impacted through the following project activities such as the removal of PV modules; the storage of PV panel and demolition materials; and hazardous waste management including unused oil, lubricant, piece of solar panel handling. The site soils may be at risk of contamination as a result of the improper removal of PV panels or any pieces of PV modules that are left on the ground, as well as other hazardous waste. The quality of the soil on the site may be negatively impacted in the long term if hazardous waste, particularly fuel and oil waste, is not properly removed from the wastewater handling site. Nevertheless, the project area will be the sole location where PV removal and foundation demolition will be conducted, while the other nearby paddy fields will remain unaffected.

The magnitude of this impact is **medium**. Even though the possibility of soil contamination during decommissioning phase is low though leakage from machinery and transportation vehicles and during collection of remaining oil/ lubricants, the management broken or expired BESS and broken PV panel must be taken into consideration. It is noted that, so far, Cambodia has not any efficient deal with broken PV panel. The sensitivity of this impact is also **low**. The potential adverse impact as mention above will occur only in the premise of the project, and the decommissioning phase is anticipated to last for a short period of time. Therefore, the overall significant impact on soil is rated as "**Low**".

Mitigation Measures:

- The project will create a temporary waste storage inside the project's boundary. This storage will be used for general solid waste and hazardous waste, including the broken PV panel and broken BESS parts. The broken batteries will be transported out for recycling by waste collection agency permitted by MOE.
- In case of accidental spillage or leaks (i.e. of fuel or lubricants), the contaminated soil shall be cleaned up immediately, and contaminated rags or other material shall be disposed of properly;
- The broken solar panels will be kept at the safety place or in a warehouse with authorization by Ministry of Environment and will be sent to recycle factory when recycling is available in Cambodia;
- The decommissioning of the solar plant will be carried out as planned.
- The amount of waste produced during the decommissioning phase will be substantial. The waste will be collected, stored, and disposed of in a manner that is appropriate. The waste will be assessed for its potential for recycling, reuse, or scrapping, and disposed of accordingly.

Residual Impact

The residual impact significant has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on soil in decommission phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project and with the workers and employees of the project.			
Frequency of impact	The impact will be rarely, and exist only temporary during the decommission phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.3.3.2. Key social impacts

D. Occupation and income

The operation of this project is assumed to be implemented for a period of 20 years, as per the Power Purchase Agreement (PPA) between SchneiTec Beyond and Electricite du Cambodge (EDC). The project will undergo an economic reassessment to ascertain whether it should be continued or terminated after 20 years.

The magnitude of this impact is **low** because there are approximately 87 employees who will lose their jobs if the project is terminated. The sensitivity of this impact is also **low**. It is expected that after years of working with the project, the employee/workers will be able to upgrade their skill and knowledge to find better job in similar projects. Therefore, the overall significant impact of the loss of occupation and income is rated as **Low**.

Mitigation measures

- The company will inform the workers and post at least 6 months before the project is completed so that the workers know and have enough time to find new jobs.
- The company will issues a certificate of work experience to make it easier to find a job.
- Based on the labour law of the Kingdom of Cambodia, when the project is completed, the company must comply with the terms and conditions of the contract between the parties.

Residual Impact

The residual impact significant has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on occupation and income in decommission phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project and with the workers and employees of the project.			
Frequency of impact	The impact will be exist only temporary during the decommission phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

E. Occupational Health and Safety

During the decommissioning phase of a solar power project, potential adverse impacts on occupational health and safety of the workforce may arise from exposure to hazardous materials such as oils, lubricants, and remnants of photovoltaic (PV) materials; physical injuries during dismantling. In addition, the increased emissions of air pollution and noise level caused by demolition activities may posse harm to project's personnel.

In the decommission phase, the magnitude of this impact is **low** since the dismantling activities last for a short period of time and the solar power project is not involved in eliminating high buildings, which are more difficult and more dangerous. The sensitivity of this impact is also **low** since majority of the demolition will occur only in the boundary of the project and only the workforce involved in this activities or exposed to risk. Therefore, the impact significant to occupational safety and health during decommission phase is assessed as "**Low**".

Mitigation Measures:

- Personnel protective equipment (PPEs) should be regularly provided;
- Keep cooperate with Pursat provincial referral hospital to immediately respond to any accident;
- Provide regular training to workers about Occupational Safety and Health and standard of procedures to ensure that all project's personnel are trained adequately in terms of work safety, work hazards, and technical performance in the workplace;
- Appropriate safety standard signs and barricades in hazardous areas with visible at all times should be well equipped, and be removed or covered promptly when those hazardous areas no longer exist; and
- Fire extinguishers and other fire prevention equipment will be installed at flammable spots.

Residual Impact

The residual impact significant has been reduced to Negligible after implementing the above mention mitigation measures.

Impact	Impact on occupational health and safety in decommission phase			
Nature of impact	Negative		Positive	
Extent of impact	Direct	Indirect	Induced	
Duration of impact	Temporary	Short-term	Long-term	
Scale of impact	The impact will exist within in the premise of the project and with the workers and employees of the project.			
Frequency of impact	The impact will exist only temporary during the decommission phase.			
Magnitude of impact	Low	Medium	High	
Receptor/Resource Sensitivity	Low	Medium	High	
Impact Significance	Low	Medium	High	
Residual impact	Negligible	Low	Medium	High

8.4. Cumulative Impact Assessment

Cumulative impacts are impacts that result from the incremental impact on areas or resources used or directly impacted by the Project, from other existing, planned or reasonably defined developments at the time the risks and impacts identification process is conducted. According to IFC, cumulative impacts are "those that result from successive, incremental, and/or combined effects of an action, project, or activity when added to other existing, planned and/or reasonably anticipated future ones" (IFC, 2012).

Cumulative impacts summarized in this section refer to the additional impacts that may be caused by other developments or activities in the vicinity of the project area that, when added to the impacts of the proposed project, combine to cause a greater impact. Such impacts may arise due to overlap or temporal overlap.

For this project, the several projects and practice in the area will contribute to the increase of the impact on social and environmental resources in the area. Those projects are (see the map below):

- 30MW Solar Power Plant of ScheiTec Infinite, 60MW Solar Power Plant of ScheiTec Infinite, and SchneiTec Chint Factory with a total land area of around 98 ha;
- EDC's Krako-Sna Ansa Sub-station (GS-49)
- The land (already cleared) for new coming project with a total land area of around 78 ha. This area is in the south and next to the 168 ha land area rent by SchneiTec Beyond. The area will be used for development of project, but the type of the project and start date are not available.

8.4.1. CI on Water Environment

As mentioned earlier in this report, water requirement is minimal during the construction phase for this project, but during operation phase, the water requirement for PV panel cleaning should be considered. In addition, impact on surface water around the project site can be cumulatively affected due to additional alterations of the existing canals that will slowly filled up or shallow them with gradual sediments different various project as explained in the above section.

As estimated, the volume of water quired for PV cleaning for this project is around 990m^3 per time or around 2,970m^3 per year and the cleaning will done 3 times per year during dry season. The source of water will be from ground water. Considering cumulative impact caused by other project especially the nearby 30MW and 60MW solar power plants north of the project, then the magnitude of this impact is considered as medium in term of water quantity and water quality.

The sensitivity of this impact is deemed medium. Even though the population does not utilize water for growing crops or paddy fields during the dry season and the fact that water was not a significant source of water for agricultural activities, considering cumulative effect, more local wells for domestic purposes can be affected. However, the impact on ground water is likely to be less significant since the majority of the wells of local people are shallow with the depth from 5-8 meters.

The overall significant impact on water resource and quality is considered as medium.

Mitigation

- The project should implement the mitigation as stated in the impact of surface and ground water in operation phase;
- Monitor ground water quantity and should use alternative PV Panel cleaning method like dry cleaning and semi-dry cleaning for module cleaning, if face the shortage of ground water sources, or when community or department of water resources and meteorology report any ground water issue in the area;
- The project will implementation soil erosion control mitigation measures such as planting low vegetation in and around the project area,
- The project prepare and manage drainage systems to minimize runoff velocity and prevent channelling of water into canals.

Impact	Cumulative impact on water environment		
Nature of impact	Negative		Positive
Extent of impact	Direct	Indirect	Induced
Duration of impact	Temporary	Short-term	Long-term
Scale of impact	The impact can extend beyond the project's boundary.		
Frequency of impact	The impact will exist only temporary during the decommission phase.		
Magnitude of impact	Low	Medium	High
Receptor/Resource Sensitivity	Low	Medium	High
Impact Significance	Low	Medium	High

8.4.2. CI on Soil

The cumulative impact on the soil environment is significant and multifaceted, primarily influenced by the land cover change, soil structure alteration, and potential erosion and runoff in the area.

The magnitude of the impact is high since larger area of the land will be affected considering the activities and potential adverse impacts on soil caused by other projects and activities. However, the sensitivity of this impact is low. As report the soil in the study area is less fertile. Most crop plantation like mango does not yield properly and the field of paddy field is only around 0.5 ton of rice of hectare. The overall significant impact on soil is considered as medium.

Mitigation

- The project should implement the mitigation as stated in the impact on soil quality in operation phase;

Impact	Cumulative impact on soil environment		
Nature of impact	Negative		Positive
Extent of impact	Direct	Indirect	Induced
Duration of impact	Temporary	Short-term	Long-term
Scale of impact	The impact can extend beyond the project's boundary.		
Frequency of impact	The impact will exist only temporary during the decommission phase.		
Magnitude of impact	Low	Medium	High

Receptor/Resource Sensitivity	Low	Medium	High
Impact Significance	Low	Medium	High

8.4.3. Change of Hydrological System

Land cover conversion, land levelling and the development of internal road system of each project in the study area are the obstacle of water flow in the area. The hydrological system is affected if the project does not have clear plan to protected and improve the existing natural canals to ensure effective flood water release in the area.

The magnitude of this impact is High. The construction of this 150MW solar power plant project has led to the increase of water flow barrier that had already been affected by the previous project such as 30MW and 60MW solar power project downstream of this project. Additionally, this project resulted in the bypassing of one canal (the one that flows into Damnak Kranh Reservoir) in the western part of the project and the elimination of three at the eastern part. The impact on hydrological change is beyond the potential right of water level in the area, but can also cause relevant canals to become shallow due to gradual sediments different various projects. As shown in this report, this project, including others within the assessment area, involves land cover clearance, ground smoothing, and the construction of internal roads which increase the risk of run off and flood in the surrounding area.

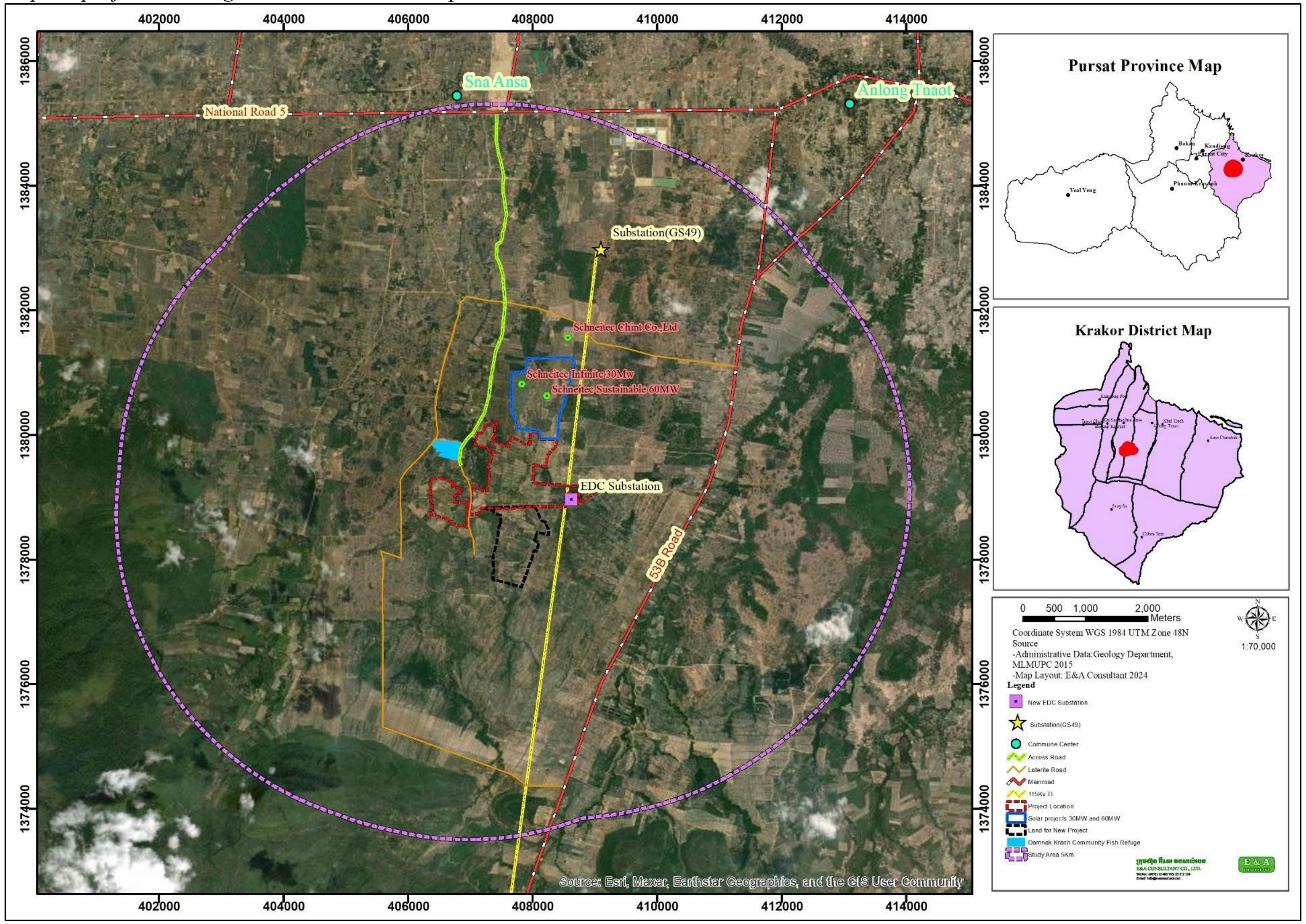
The sensitivity of this impact is medium. From the consultation with local authorities, the cumulative impact on hydrological system caused by different projects in the area has raised the water flow and level slightly affected the newly built culvert along local road (Boas Rolok road) and submerge paddy field to 2 days the longest; but the flood does not effect the paddy. The impact significant of hydrological system is considered as "High".

Mitigation

- The project should implement the mitigation as stated in the impact on hydrological system in construction phase and in operation phase
- The project will conduct hydrology study for cumulative impact on hydrological systemin the area. The hydrological study will incorporate the existing and future solar power plant projects to check how the identified current and future project exacerbate flood risks in nearby locations. It is expected that this hydrology study, if found that the projects increase the risk of flood in the area, will provide proper and effective mitigations for implementation.

Impact	Cumulative impact on soil environment		
Nature of impact	Negative		Positive
Extent of impact	Direct	Indirect	Induced
Duration of impact	Temporary	Short-term	Long-term
Scale of impact	The impact can extend beyond the project's boundary.		
Frequency of impact	The impact will exist only temporary during the decommission phase.		
Magnitude of impact	Low	Medium	High
Receptor/Resource Sensitivity	Low	Medium	High
Impact Significance	Low	Medium	High

Map 19: projects that might lead to cumulative impacts



CHAPTER 9: ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

9.1. Introduction

This chapter delineates the Environmental and Social Management Plans (ESMP) that will be implemented to mitigate, optimize, or compensate the potential impacts of the project that were identified in Chapter 8 of this report. The ESMP contains practical recommendations to mitigate the potential negative impacts that may be caused by the proposed project, in addition to reflecting the requirements, responsibilities, and implementation. The ESMP will specify the project's pertinent stakeholders, monitoring methods, indicators, and essential parameters that necessitate monitoring, as well as the frequency and plan of monitoring activities. Additionally, it will estimate all expenses necessary for the implementation of this ESMP.

This is the Environmental and Social Management and Monitoring Plan designed for the project as the result of the impact assessment as stated in this report. Based on this ESMP, the project will develop ESMS which describes the requirements for the preparation of other standalone Management Plans required for the operational phase such as Operational Environmental and Social Management Plan (OESMP), Health and Safety Plan, Stakeholder Engagement Plan and Extremal Grievance Mechanism and so on.

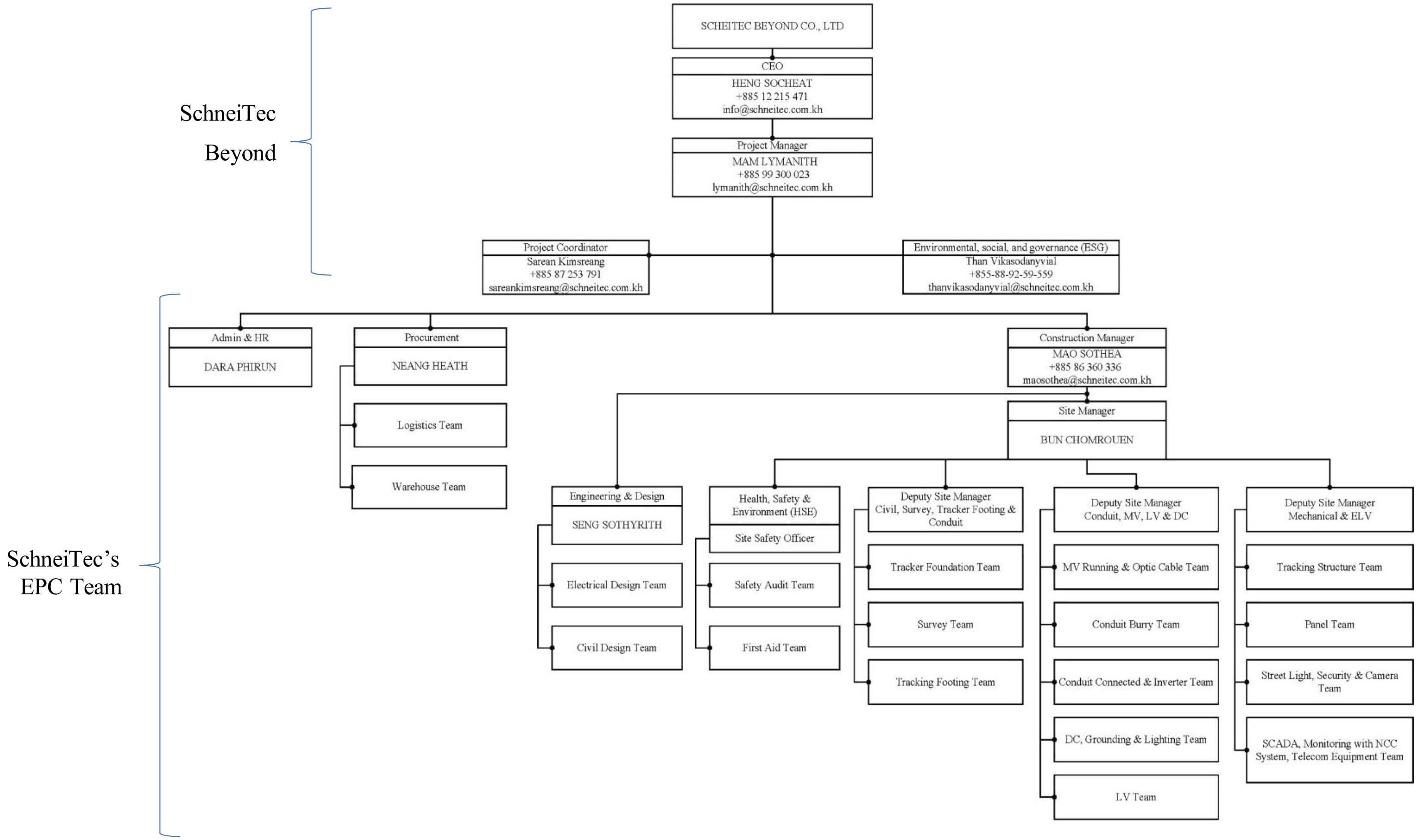
9.2. Organizational Structure of SchneiTec Beyond

9.2.1. Organizational Structure

SchneiTec Beyond is headed by the CEO. The company’s 150 MW solar power project is managed by a project manager (PM), who was supported by a project coordinator and an ESG unit. For this 150 MW solar power project, SchneiTec Beyond’s team will manage the SchneiTec construction team to ensure that the construction is done on time and complies with EHS regulations.

As shown in the following diagram, during the construction phase, SchneiTec Beyond works with the construction manager, who is responsible for managing the environment and social performance of the site, in compliance with SchneiTech Beyond’s EHS management plan. The construction manager will be supported by the site manager and the site's EHS unit, who are responsible for overseeing EPC's work progress and reporting the overall EHS status of the site. During the operation phase, the Project Management Unit (PMU) from SchneiTec will replace the EPC team. This PMU will be led by the Operation Manager, supported by EHS, and is responsible for and reports to SchneiTec Beyond.

Diagram 1: Organizational Chart of SchneiTech Beyond



9.2.2. Institution involved in ESMP implementation

In implementing the ESMP, there are 2 key institutions: responsible institution and monitoring institution. A project owner (SchneiTec Beyond) is the responsible institution, and EPC constructor (SchneiTec). The Ministry of Environment (MoE) including other relevant institutions and local authorities will get involved in the ESMP after the local EIA report for the project is approved by MoE. *It is noted that, when the FESIA report of this project is prepared and approved by MoE, then the inspection unit as stated in the ESMP of this FESIA will be integrated into this Environmental and Social Management and Monitoring Plan.*

SchneiTec Beyond has prepared institutional management structure with well-defined role responsibility of each sections in order to ensure for the effectively implementation of the propose mitigation measures in each phase of the project. SchneiTec Beyond's management structure is shown in the diagram below.

9.2.2.1. Role and Responsibility of SchneiTec Beyond

SchneiTec Beyond will ensure that all its activities, which potentially pose any negative impacts on natural environment resources, and socio-economic resources will comply with the MoE's guidelines and other national and international standards. SchneiTec Beyond ensures that this ESMP will be implemented regularly to monitor in each project phase, especially during the construction and decommission phase of the project.

The project owner and/or its contractors will response for mitigation measures implementation particularly on monitoring activities in each project's phase. Furthermore, the company will keep collaboration with local authorities, and relevant institutions at the national and sub-national level, to guarantee that the project's activities are implemented smoothly and successfully. The project owner will respond as follows:

- Implement ESMP in each phase of the project;
- Ensure that all project activities are carried out in accordance with relevant national laws, regulations, and guidelines;
- Ensure that all project's employee is given a training on environmental protection in order to urge their daily works in accordance with environmental protection regulation;
- Reflect the results of the EMP's implementation and modification of the mitigation measures, which are listed in Chapter 8, in order to enhance environmental protection;
- Cooperate with contractor to get the construction successfully and safety;
- Strictly monitors the implementation of the ESMP on all project activities, to ensure that the environment condition in and surrounding the project area is being protected, and
- Maintain regular relationships with relevant stakeholders and local authorities, especially respond to each concern and complaints which may pose accidentally.

9.2.2.2. EPC Contractor's Role and Responsibility

SchneiTec Beyond has selected a main contractor for the construction. The awarded contractors require to have Environment, Health and Safety (HSE) Unit. The HSE Unit takes the overall responsibility for co-ordination of the actions required for environment and social management and mitigation measure and for monitoring the progress of the propose environmental and social management (ESMP) plan for the project. However, ultimate responsibility for implementing the provision of the ESMP will lies with SchneiTec Beyond.

In general, the HSE department shall perform the following activities:

- Preparation of required documents on environmental and social management;

- Ensuring availability of resources and appropriate institutional arrangements for implantation of ESMP;
- Compliance of SchneiTec Beyond's role and Cambodia regulatory requirements;
- Carrying out environmental audits;
- Identify unsafe acts and condition and suggest remedies;
- Develop safety culture and comply with company's HSE policy and standard requirement;
- Implementation of the health and safety measures;
- Collection of the statistics of health of workers;
- Providing support during routine medical check-ups of workers;
- Awareness and implementing safety programs;
- Provision of job specific instruction training;
- Encourage and enforce the use of PPE's'
- Educate all employees for the use of PPE's and Safe practices;
- Direct, coordinate and orient the safety activities;
- Promulgate the spread of policy, objectives, rules and/or regulations;
- Performa thorough investigation of all accidents and review the recommendations to avoid any repetition;
- Monitoring the progress of implementation of ESMP; and
- Reviewing and updating the ESMP as and when required for its effective implementation.

9.3. Inspection, Monitoring and Audit

The efficacy of the ESMP will be enhanced through the inspection and monitoring of the environmental impacts of the Project activities. SchneiTec Beyond will guarantee that the conditions outlined in this ESIA report are adhered to through the inspection and auditing process. The main contractor (during the construction phase), SchneiTec Beyond, and external agencies/experts will conduct the inspections and audits. It is imperative that the entire inspection and auditing process be documented. The site in-charge is responsible for implementing the inspection and audit findings.

The monitoring activities also involved representatives from local authorities (Sna Ansa and Alung Tnaut communes). In addition, after the local FEIA report is approved by MoE, government's monitoring bodies such as MoE, MME, and MAFF will also get involved in the process.

9.3.1. Report and Documentation

For external reporting and communication, the ESH Team at SchneiTec Beyond is accountable for ensuring that communication with regulatory agencies and stakeholders is conducted in accordance with the requirement. The delegated staff of EHS are responsible for the proper handling of all complaints and enquiries, and records should be maintained in a Complaint/Enquiry Register.

Internally, the EHS team at the site will regularly provide the site In-Charge with inspection and audit findings, as well as their recommended actions, in accordance with SchneiTec Beyond's principle. The EHS department will be informed of the EHS findings by the Site In-Charge for further consideration. The EHS audit findings are also to be communicated to the project staff. The following are being implemented to ensure that the staff and management are in constant communication regarding the performance of the EHS.

9.3.2. Documentation

Documentation is a critical component of the ESMP's implementation. SchneiTec Beyond will implement a documentation and record-keeping system to guarantee the recording and updating of documents in accordance with the ESMP. Relevant personnel must be assigned responsibilities to ensure the maintenance of the ESMP documentation system and the control of documents through access and distribution to identified personnel. This can be achieved through the following:

9.3.3. ESMP Review

The ESMP functions as an environmental and social management tool that necessitates periodic review to accommodate modifications in the organization, process, or regulatory requirements. The Site in charge will be responsible for making the amendments to the ESMP and seeking approval from the SchneiTech Beyond's management in coordination with personnel delegated EHS following a review. The revised ESMP will be distributed to all project personnel.

9.4. Training and Capacity Building Program

The full participation of the project's personnel is necessary to guarantee the smooth and effective implementation of the ESMP. In order to provide the project's personnel with the necessary knowledge and concepts related to environmental issues, they will undergo skills training on environmental protection. This training will be beneficial in the execution of the project's activities.

The training programs are designed to ensure the sustainability of the project's business. In other words, it is to generate human resources that are fully capable of completing both technical and environmental responsibilities. This training program will focus on:

- Training on the results of environmental and social impact assessment (ESIA) reports;
- Environmental awareness;
- Training on the strengthening of management and monitoring.
- Awareness of potential risks from the Project activities

9.5. Environmental and Social Management and Monitoring Plan

Table 34: Environmental and social management and monitoring plan

Environmental Resources	Project Activities[11]	Mitigation Measures	Means of verification for mitigation implementation	Frequency	Reporting requirement	Responsibility		Estimated cost (per year)/required resources
1. Construction phase								
1.1. Physical impact								
Change of topography and erosion	▪ Site clearing: Removing vegetation and debris from the project area. ▪ Site grading: Levelling the ground (cut & fill) to prepare for construction. ▪ Foundation installation: Building the foundation for the solar power plants. ▪ Drainage works: Installing drainage systems to cover the whole project site to prevent flooding.	▪ No land clearing outside project facilities. ▪ Construction within allocated area only. ▪ Minimal clearing, maintain original topography where possible.	Site inspection	▪ Monthly	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.
		▪ Restore temporary facilities after construction.	Site inspection	▪ Within 2 weeks after the construction site is closed				
Air Quality	▪ Site preparation, excavation work, soil levelling, foundation work ▪ Handling of construction materials and waste (odor and littering) ▪ Construction material transportation ▪ Increased traffic movement ▪ Operation of construction machinery ▪ Use of diesel generators and other equipment	▪ Water areas with site clearing activity and road construction. ▪ Limit vehicle speed on construction sites and public roads. Construction site speed limit: < 15 km/h. ▪ Cover trucks transporting materials to prevent dust. ▪ Manage sand, soil, and debris piles. ▪ Maintain vehicles to reduce smoke emissions. ▪ Manage waste to prevent odor and avoid littering inside and outside the project.	Site inspection and observation	▪ Monthly	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The Grievance Redress Officers of this project will be working on consultation with key stakeholders.
			Consultation with local community especially those living near project boundary and along access road	▪ Semi-annually				
Noise and Vibration Level	▪ Clearing the land ▪ Levelling the ground ▪ Excavating ▪ PV module installation ▪ Construction equipment and material transportation	▪ Machinery and equipment should be turned off during non-working hours. ▪ If equipment is excessively noisy, maintain and lubricate it, replace worn parts, and	Inspection at the site and consultation with household nearby the project.	▪ Monthly	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.

[11] See details of this mitigation measure in Chapter 8

	▪ Construction Personnel movement	position it away from residences. ▪ Only well-maintained on-site equipment should be used. ▪ Minimize loud engine braking and car horn usage in the area.						
		▪ Ambient noise levels will be below 55 dB(A) from 07:00-22:00; 45 dB(A) from 22:00-07:00, and vibrations below 65 dB(A) during working hours (6:00 AM to 6:00 PM).	Noise and vibration analysis by following the parameters and location as stated in Chapter 6.	▪ Once during construction phase	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		USD 850
Change of Hydrological System	▪ Removing vegetation can increase soil erosion and alter drainage patterns. ▪ Site Grading and Foundation Work ▪ Drainage Works ▪ Internal Road Construction ▪ Elimination of Natural Canals	▪ Only necessary areas will be cleared for construction, preserving the original topography where possible. ▪ The project will collaborate with local authorities to monitor flood conditions and implement additional mitigation measures if needed. ▪ The project will work with local authorities to maintain culverts and roads as required. ▪ The grading and drainage system will made to ensure that no ponding under PV Panels. ▪ Conduct hydrology study for cumulative impact on hydrological systemin the area by incorporating the existing and future solar power plant projects to identified current and future project exacerbate flood risks.	Inspection water level and flow during rain event at the Boah Rolok laterite road. The inspection will be participated Anlung Tnaut commune office	▪ Monthly and more frequent when heavy rain is noticed during wet season	Assigned flood monitoring team report to SchneiTec Beyond	▪ SchneiTec Beyond ▪ SchneiTec		-
Surface Water Quality	▪ Land Preparation ▪ Construction Activities ▪ Fuel and Lubricant Storage and Handling ▪ Wastewater and Hazardous Waste Management	▪ Fence the project boundary to prevent soil erosion. ▪ Planting vegetation onsite and creating a buffer zone around the project site.	Inspection in the project boundary	▪ Monthly	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.

		▪ Runoff from the project side (Area 2) that leads to the increase in sediment	▪ Expedite land clearing and implement measures to address topography changes and runoff. ▪ Clear only the necessary areas for key infrastructure, preserving existing land cover. ▪ Properly manage engine oil to avoid spills. ▪ Use dustbins for solid waste, cooperate with local waste collection services, and dispose of liquid waste (engine oil) responsibly. ▪ Install latrines with septic tanks to treat sewage.						
			▪ Assess surface water quality	Conduct the surface water quality analysis by focusing on key parameters and sampling locations as stated Table 21 in Chapter 6 of this report.	▪ Semi-annually (the test should capture the water quality in wet and dry seasons)	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		USD 700
Soil Quality	▪ Soil Compaction ▪ Erosion ▪ Waste and chemical Contamination		▪ Minimize soil disturbance by ▪ Limiting construction areas and vehicle traffic access ▪ Implementing erosion control measures like vegetative buffers. ▪ Revegetating disturbed areas with native plants ▪ Temporary waste storage with proper checks will be established. ▪ Refueling and maintenance will occur in designated areas with closed drainage. ▪ Vegetation will be maintained under panels to minimize runoff. ▪ Spills will be cleaned up immediately	Inspection in the project boundary	▪ Semi-annually	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.

		▪ A drainage system will be constructed to prevent erosion and runoff.						
1.2. Biological Resources								
Key Biological resources	▪ Land preparation ▪ PV module installation ▪ Accidental release of liquid waste and hazardous materials into nearby water bodies. ▪ Runoff from the project side (Area 2) that leads to the increase in sediment	▪ Maintain noise levels as specified. Focus on controlling noise during site clearing, transportation, and construction activities. ▪ Implement water quality management measures as outlined in the "impact on surface water quality section." ▪ Planting vegetation onsite and creating a buffer zone around the project site.	▪ See in noise and vibration, and water quality section	▪ See in noise and vibration, and water quality section	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.
		▪ Educate staff to avoid harming wildlife. ▪ Work with local communities and authorities to release any wildlife found on the site back into a suitable habitat.	▪ Training or meeting records ▪ Site inspection by experts	▪ Quarterly				
1.3. Key Socio-economic Risk								
Impact on traffic and local infrastructure	▪ Transportation of heavy machinery, laterite for internal road construction, and construction materials ▪ Increased personnel movement	▪ Ensure all project vehicles are in good condition and undergo regular inspections. ▪ Hire security personnel to manage traffic, repair road damage, and provide designated parking areas. ▪ Implement a system to check driver licenses and vehicle conditions at the project entrance.	Site inspection	▪ Monthly	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.
		▪ Educate drivers on traffic rules, responsible driving, and avoiding alcohol consumption while driving. ▪ Address community concerns about traffic and transportation.	Inspect the record of meeting with communities, training or meeting record of the project					

Occupational Health and Safety	▪ Construction activities (site preparation, structural erection, building construction) that can lead to several occupational health and safety (OHS) risks for workers.	▪ Implement an OHS management plan, including an emergency response plan. ▪ Have experienced engineers oversee construction activities. ▪ Install clear safety signs and barriers in hazardous areas. ▪ Provide and maintain fire extinguishers and other emergency equipment. ▪ Require workers to wear PPE and provide training on its use. ▪ Assign site managers to oversee safety compliance. ▪ Register workers with the National Social Security Fund. ▪ Adhere to Cambodian labour laws regarding working hours and wages. ▪ Ensure staff are trained and qualified for their roles.	Site inspection	▪ Monthly	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.
		▪ Implement measures to reduce noise and vibration. ▪ Regularly spray water on the construction site.	See in noise and vibration, and water quality section	See in noise and vibration, and water quality section				-
Community Health and Safety	▪ Site preparation and levelling ▪ Machinery operation ▪ Vehicle Traffic ▪ Influx of construction personnel ▪ The risk of disagreements or conflicts between security personnel and local communities.	▪ Implement mitigation measures for air quality, traffic, water quality, and noise.	See in air, noise, vibration, traffic sections.	See in air, noise, vibration, traffic sections.	SchneiTec report to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ SchneiTec		The cost are included in EPC contract.
		▪ Erect complete fence around the 168 ha of land to prevent unauthorized entry. ▪ Conduct health check-ups for all migrant workers before recruitment. ▪ Train security personnel on conflict resolution with local communities.	Site inspection	▪ Monthly				
		▪ Educate workers about infectious diseases, STDs, HIV/AIDS, and COVID-19. the implementation of precautions and guidelines		▪ Daily				

		on COVID19 is compulsory its staff and worker.						
		▪ Engage with communities about project impacts, grievance mechanisms (SEP and GRM), and keep local authorities informed.		▪ Semi-annually				The Grievance Redress Officers of this project will be working on consultation with key stakeholders.
2. Operation phase								
2.1. Key physical impacts								
Soil Quality	▪ Disruption of vegetation cover can lead to soil erosion, nutrient loss, and water sedimentation. ▪ Use of herbicides and pesticides can contaminate the soil and harm beneficial organisms. ▪ Long-term presence of solar panels can compact the soil, reducing its water-holding capacity. ▪ Accidental release of toxic substances or sewage can contaminate the soil. ▪ Improper disposal of solid waste, including food waste, plastic, and glass, can impact soil quality.	▪ Waste storage sites should be regularly checked for leaks. Hazardous waste transfer, storage, and disposal should follow proper procedures. All waste substances should be registered in MSDS. Refuelling and maintenance should be done in designated areas with closed drainage. ▪ Vegetation under PV panels will be controlled using cutting machines. Pesticides and herbicides are prohibited. ▪ In case of accidental spills, contaminated soil and materials should be cleaned up and disposed of properly. ▪ Avoid using herbicides and pesticides in the maintenance of the vegetation and the cleaning of the PV modules which can contaminate the soil and be transported with the runoff to harm beneficial organisms in the natural canals and the Damnak Kranh Lake.	▪ Site inspection	Monthly	PMU reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ PMU[12]		The cost are included in PMU contract.
			▪ Conduct soil quality testing by focusing on parameters and location as stated Table 16 in Chapter 6.	Semi-annually				USD 600

[12] SchneiTec Beyond will hires PMU to manage the operation for the duration of 20 years.

Surface and Ground Water Resources	▪ Increased water demand for cleaning PV panels, especially during dry seasons. ▪ Risk of water contamination from improper chemical handling or accidental spills. ▪ Water consumption for daily use by a limited workforce (87 people) is not a major concern. ▪ Risk of leakage from the BESS	▪ Use vegetation cutting machines to control vegetation under solar panels. Avoid using pesticides and herbicides. ▪ Properly store, manage, and dispose of all hazardous waste and materials. ▪ Have spill kits and procedures in place. Immediately collect and store contaminated soil as hazardous waste. ▪ Maintain a register of hazardous substances and MSDS. ▪ Develop chemical spill response plan ▪ The BESS are storage in the containers to prevent leakage, and equipped with thermal control. ▪ Conduct routine inspections at BESS to identify and address any signs of damage or degradation.	Site inspection	Monthly	PMU reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ PMU		The cost are included in PMU contract.
		▪ Clean solar panels as needed to minimize water usage. Use efficient cleaning methods and equipment. ▪ Implement dry cleaning methods during periods of low groundwater levels. ▪ Monitor groundwater levels and explore alternative water sources.	Site inspection by focusing on the water consumption record and water extraction record from the wells.					
		▪ Ground water quality analysis will be done.	Sampling and laboratory analysis. The ground water analysis will be done by focusing on the parameters and standard as stated in Appendix 6 (e)	Annually	PMU reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ PMU		350 USD

2.2. Biological Resources								
Key biodiversity	▪ Changes in water quality. ▪ Birds may collide with solar panels, leading to electrocution or injury. ▪ Increased noise levels can disturb wildlife and their behaviour.	▪ Regularly inspect solar modules and towers, install bird deterrents, and prohibit hunting or trapping. ▪ Release any found wildlife to nearby forests in collaboration with local communities and authorities. ▪ Avoid using pesticides and herbicides, properly manage engine oil, and dispose of waste and sewage responsibly.	Site inspection	Monthly	PMU reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ PMU		The cost are included in PMU contract.
		▪ Maintain noise levels below 70 dB(A) and vibrations below 65 dB(A) during working hours. Use only well-maintained machinery.	Noise level measurement	Semi-annually				USD 1700
2.3. Key Socio-economic Risk								
Occupational health and safety	▪ Electrocution and heat stress for field workers	▪ Regularly provide necessary PPE to all personnel and enforce the use of basic PPE (hard hats, safety shoes, gloves, etc.) for all site visitors. ▪ Ensure proper safety signage and barricades in hazardous areas. ▪ Install fire extinguishers and other fire prevention equipment. ▪ Provide adequate accommodation, clean water, and canteen facilities. Ensure all workers are registered and have access to health insurance.	Site inspection	Monthly	PMU reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ PMU		The cost are included in PMU contract.
		▪ Provide regular safety training to all personnel.	Site inspection by focusing on safety training records	Semi-annually				HR department of PMU will prepare the training schedule and the cost will be included.

Community health and safety	▪ Electrocution risk. ▪ Noise pollution, and fire risk. ▪ Fire and explosion of the BESS ▪ Air pollution caused by thermal runway ▪ Noise pollution	▪ Fencing and proper signage are important to prevent people and animals from coming into contact with electrical wires. ▪ The project will prohibit unauthorized entry; ▪ The project will install electricity risk warning sign on the fence around the project to avoid trespassing over to the power farm. ▪ Adhere to safety standards and follow industry best practices and regulatory guidelines for BESS. This includes embedded ventilation systems, noise reduction (sound proof), and fire suppression system. ▪ Conduct inspections and maintenance regularly to identify and address any potential issues as early as possible.	Site inspection	Monthly	PMU reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ PMU		The cost are included in PMU contract.
3. Decommission phase								
3.1. Key physical impact								
Air Quality Environment	▪ Fugitive dust from demolition activities and waste transportation. ▪ Increased traffic from construction and demolition activities. ▪ Elevated levels of TSP and fine particulate matter. ▪ Potential health risks from inhaling particulate matter, especially from demolition engine exhaust.	▪ Spray water on access roads to control dust, especially during dry seasons. ▪ Limit vehicle speed to 40 km/h within the settlement area. ▪ Use barriers, fences, or screens to control dust from demolition sites, especially in windy conditions. ▪ Cover trucks carrying demolition debris to prevent dust and material release during transport.	Site inspection	Monthly	Constructor reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ Contractor[13]		The cost are included in Demolition contract.

[13] Decommissioning will be done by Contractor to be hired by SchneiTec Beyond

		▪ Gradually dismantle the plant in phases to minimize dust and emissions at any given time.						
Noise and Vibration Level	▪ Operation of heavy equipment can cause noise and vibration. ▪ Moving debris can also contribute to noise and vibration.	▪ Install sound-absorbing barriers around the demolition site. ▪ Maintain machinery and equipment to reduce noise. ▪ Schedule demolition activities during less disruptive hours.	Site inspection	Monthly	Constructor reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ Contractor		The cost are included in Demolition contract.
Soil Quality	▪ Disassembling and removing solar panels from the site. ▪ Storing removed PV panels and demolition materials. ▪ Handling and disposing of hazardous waste like unused oil, lubricants, and solar panel pieces.	▪ Immediate cleanup of any spills or leaks of fuel or lubricants. ▪ Safe storage of broken panels and eventual recycling when available. ▪ Planned decommissioning of the solar plant. ▪ Proper collection, storage, and disposal of waste generated during decommissioning, considering recycling, reuse, or scrapping options.	Site inspection	Monthly	Constructor reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ Contractor		The cost are included in Demolition contract.
3.2. Key socio-economic risk								
Occupation and income	▪ Lay-off of staff and workers	▪ The company will inform workers at least 6 months before project completion. ▪ The company will issue certificates to aid job searches. ▪ The company will comply with labour laws and contractual agreements upon project completion.	Site inspection	Monthly	Constructor reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ Contractor		The cost are included in Demolition contract.
Occupational Health and Safety	▪ Contact with oils, lubricants, and remnants of PV materials. ▪ Risk of injuries during dismantling activities. ▪ Increased levels of air pollution and noise due to demolition activities.	▪ Regularly provide necessary PPE to workers. ▪ Cooperate with Pursat Provincial Referral Hospital for immediate accident response. ▪ Install and maintain safety signs and barricades in hazardous areas. ▪ Install fire extinguishers and other fire prevention	Site inspection	Monthly	Constructor reports to SchneiTec Bedyond	▪ SchneiTec Beyond ▪ Contractor		The cost are included in Demolition contract.

		equipment in flammable areas.						
		▪ Regularly train workers on OSH and standard procedures.	Site inspection by focusing on OSH meeting or training records					

9.6. Environmental, Health and Safety Management

9.6.1. Environmental Policy

SchneiTec Beyond is dedicated to leading the renewable energy sector. The business is committed to reducing any adverse environmental effects connected to every stage of its project operations by:

- Assessing its environmental impact and establishing goals for continuous improvement;
- aiming to surpass all environmental laws in Cambodia that are relevant to the business's operations;
- putting in place a training program for employees to increase their knowledge of environmental issues and soliciting their assistance in enhancing the business's environmental performance; and
- interacting and cooperating with contractors and subcontractors to enhance environmental management.

9.6.2. Occupational Safety and Health

SchneiTec Beyond is dedicated to ensuring high standards of occupational safety and health. The well-being of employees is a top priority, which includes fostering awareness of health and safety, providing training and professional development opportunities, and offering employee savings and share ownership plans.

- SchneiTec Beyond's staff are provided with the information, instruction, training, and supervision necessary to ensure safe working conditions.
- Compliance with Cambodian legal requirements regarding safety management and performance are maintained.
- Adequate measures are in place to prevent work-related injuries and ensure the occupational health of all project personnel.
- Personal Protective Equipment (PPE) is provided and utilized during all phases of the project.
- Procedures for monitoring and reviewing safety performance, as well as implementing corrective actions, are established and operational.

9.6.3. Public Health and Safety

SchneiTec Beyond is committed to ensuring high standards of public health and safety for the surrounding community. The primary safety concern of the project is the risk of electric shock. To address this issue, the project has implemented the following measures:

- Management of Project Access Area: Access to the project site is restricted to authorized staff/workers and responsible personnel. Security personnel are deployed 24/7 to prevent unauthorized entry into the project area.
- Community Engagement: SchneiTec Beyond will engage with local communities surrounding the project area to raise awareness about safety issues. Education and outreach efforts will be conducted to inform residents about potential hazards and safety protocols.
- All electrical equipment in the project area and the national safety standards. Regular monitoring activities ensure compliance with safety regulations and conditions in the project area.

- Hazard Markers and Safety Signage: Hazard markers will be placed at access entry points and gates to alert individuals to potential dangers and safety protocols.
- Construction of Safety Fence: A metal mesh safety fence will be completely constructed around the entire project area to enhance safety and security measures.

9.6.4. Personal Protective Equipment (PPE)

The construction of a site is a physically demanding endeavour. These activities are frequently susceptible to accidents, risks, and potential hazards to the safety of the workers involved in a construction project. However, the primary objective is to ensure the safety of all individuals who are employed in a construction environment. In addition to the necessity of structural safety, it is imperative to prioritize environmental protection in the workplace. At all costs and at any given moment, it is imperative that each worker's PPE or Personal Protective Equipment be strictly enforced on the site. In order to comply with the PPE standard, it is necessary for each worker to wear appropriate construction attire that will reduce or at least prevent and safeguard them from the safety risks. This will enable the implementation of the Health and Safety Management Policy throughout the construction process.

Here are the lists of PPE in construction that every construction personnel should observe:

1. Head protection / safety helmets: In construction worksite, there is a higher chance of possible head injury due to falling debris and other related accidents. Site Engineers and all construction personnel involved in site activities should wear a safety helmet or hard hat before entering the work site and it should be wear at all times. The safety helmets/hard hat shall meet the specifications contained in the technical guidelines issued by the Specialize Department in accordance to international standards. Safety helmets/hard hats should be inspected by the safety officer to ensure that it is safe and reliable to use.
2. Foot protection / safety shoes Safety: shoes should be worn by all of the construction personnel at the worksite to protect their feet for possible injuries. The safety shoes to be used shall be determined according to potential hazards and according to the nature of work. It shall comply with the safety standard and specification. For worksite safety shoes with steel toe cap covering and steel sole should be considered, although an equivalent material is also acceptable as long as it follows the safety standards.
3. Protective clothing / reflected vests: Every construction personnel should wear adequate and suitable protective clothing to protect them from possible hazard due to weather changes, electricity, impacts, and other risks. For Site Engineers a reflected vest is recommended to maintain visibility when doing site inspections and other site activities.
4. Eyes and face protections Construction: employees shall be provided with eye and face protection equipment when their job had a potential risk of exposing the eyes and face from hazard. They are the machines operators, welder, bar bender etc. Those workers whose vision requires the use of medical spectacles shall be protected by eyeglasses with protected lenses, goggles that can be worn without disturbing their work activity
5. Hand protection: All personnel handling rough, sharp and excessive coarse material such as reinforcement bars, rods, pre-cast concrete, toxic, electric and hot materials shall be protected by safety gloves. The material of these hand protections shall be suitable against the hazard of doing such activities. Site employees shall be protected by the different type of gloves according to their job description. For example, chrome leather gloves should be used when handling sandblasting and other materials. Gloves

that are made of fabrics are used for handling rough materials. Insulated rubber gloves should be used by electricians

6. Hearing protection: In the event that noise levels in worksite are too much to handle, ear protected gear are also needed by the site personnel. Ear protected hazard inserted into the ear in the form of a headset, foam earplug and earmuffs shall be in accordance with international safety standards. Plain cotton to be placed in the ear just to block construction noise is prohibited to use
7. Safety belts / safety harness: Site employees working at an elevated level to about 2 meter or more shall be provided by safety harness or belts to protect them from accidental fall. Anchorage point of the safety harness shall be placed above the head of the worker and not less than 5 meters from the ground level. This point should be strong enough to carry a force of not less than 2,275kg. The material should be made of nylon or equivalent to at least 1cm thick. The hooks attached should be fitted with a double locking device that can be open only by pressing the two parts at the same time for safety purposes.

9.6.5. Waste Management Plan

9.6.5.1. Objectives

The construction and operation of the proposed project will generate various type of mostly solid wastes which will need appropriate and properly collection, transportation, primary treatment, and disposal.

Therefore, to serve the purpose, a Waste Management Plan has been formulated to demonstrate:

- Inventory of waste in different type of categories like garbage, rubbish, hazardous, waste etc.;
- Maintain the site in a clean and tidy state to reduce the attraction of pest species, impacts on the local environment and negative impacts on visual amenity; and
- The suggestion of options for waste handling and disposal during construction and operation phase of the project.

9.6.5.2. Scope

This plan shall be applicable to the SchneiTec Beyond's contractor engaged in the construction phase of this project. The elements of the plan will be directly implemented by the contractors hired by the SchneiTec Beyond. The plan also identifies the individuals currently assigned to the various roles designated in this plan.

9.6.5.3. Roles and Responsibilities

SchneiTec Beyond's awarded construction contractor will be required to have site supervisor and environmental, health and safety (EHS). The roles and responsibilities are descript and follow:

A. The responsibility of site supervisor of contractor

- Management of onsite waste generation associated with construction works to help avoid excessive generation where practicable;
- Maintaining of all records of waste type which are construction waste and debris, hazardous waste;
- Management of Buy Back Agreements for the damage solar panels with the Manufacturers.

B. Responsibilities of EHS Manager of Contractor

- Demarcation of area within the module area for keeping of segregated wastes;
- Labelling and containing hazardous wastes like used oil;
- Maintaining of receipts for hazardous waste management records;
- Notifying the Site Supervisor of any activity that may generate a large amount of waste to allow appropriate controls to be put in place to manage waste generated; and
- Ensure safe transportation of defunct solar panels as per specified procedures.

9.6.5.4. Waste Types and Quantities Generated

All wastes generated from the project will be categorized as either non-hazardous or hazardous as following.

9.6.5.4.1. Construction Phase

The waste will generate from construction activities like site clearing, levelling etc. Other categories of waste will be produced daily and comprise of the following:

- Scrap metal;
- Soil waste;
- Food waste from kitchen premises of labour camps;
- Construction debris; and
- Sewage from temporary toilets;

The construction phase will require the use of hazardous materials such as diesel or petrol to cater the fuel equipment and vehicles and maintain equipment. The following hazardous wastes will also be produced from construction activities.

- Oily rags;
- Used oil and oil filters - from generators or vehicle maintenance; and
- Scrap and packaging materials.

9.6.5.4.2. Operation Phase

Operations and maintenance of the PV power facility are not expected to generate any significant amount of waste. PV panels, array enclosures, and inverter/transformer enclosures will not produce waste during operation except the following:

- Defunct solar panels;
- Broken solar panels generated during cleaning and other maintenance activities;
- Fuel requirements like greasing, transformer oil etc.
- Used oil; and
- Oily rags.

9.6.5.5. Waste Handling, Management, and Disposal

A. Construction Phase

All wastes produced from the project activities on site will be temporarily stored in designated waste storage areas. All wastes that cannot be reused or recycled will be collected by waste contractors authorized by local authorities and/or MoE, and transferred to an appropriately licensed waste management facility for treatment and disposal.

Following steps will be taken to manage the waste generated during construction phase:

- Fuel waste will be stored on-site in temporary aboveground storage tanks and will be stored in a locked container within a fenced and secure temporary staging area;
- Trucks and construction vehicles will be serviced off-site;

- The damage PV panel will be required to send back to the Manufacturers;
- All concrete mixing be undertaken on impermeable plastic lining to prevent contamination of the soils and surrounding areas;
- Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation;
- The use, storage, transport and disposal of hazardous materials used for the project will be carried out in accordance with all applicable regulations;
- All hazardous waste to be disposed of off to government approved vendors;
- Material Safety Data Sheets for all applicable materials present on site will be readily available to onsite personnel and it will be translated into Khmer;
- All construction debris will be placed in appropriate on-site storage containers and periodically disposed of by a licensed waste contractor;
- Empty fuel containers will also be stored at a secured area designated for scrap and sold to authorized vendors. All packaging material will also be collected at the storage area and sold to scrap dealers.
- The construction contractor will remove refuse collected from the designated waste storage areas at the site at least once a week, and
- The project will prepare proper toilets and septic tanks to treat the sewage by using soak-away method.

B. Operation Phase

All wastes produced from the operation activities will be temporarily stored in designated waste storage areas. Wastes that cannot be reused or recycled will be collected by approved waste contractors and transferred to an appropriately licensed waste management facility for disposal and/or store in the project area.

Following measures to be taken for management of waste:

- Fuel waste will be stored on-site in temporary with the storage tanks within a fenced and secure temporary staging area;
- Food waste and other refuse are to be adequately deposited in sealable containers and removed from the kitchen frequently to avoid accumulation;
- The use, storage, transport and disposal of hazardous materials used for the project will be carried out in accordance with all applicable regulations;
- All hazardous waste to be disposed of off to government approved vendors;
- A designated area needs to be demarcated within the module premises for storage of defunct and broken solar panels with restricted access and on impervious surface;
- All used oil is required to send off to government approved vendors and recyclers;
- Material Safety Data Sheets for all applicable materials present on site will be readily available to onsite personnel and will be translated into Khmer language;
- Defunct solar panels or damage of PV panel will be stored in the designed warehouse within the project area with properly and regularly control measure. Noted that Cambodia has no PV panel recycling factory as well as regulation for managing and recycling the PV panel yet.
- The project will prepare proper toilets and septic tanks to treat the sewage by using soak-away method.

9.6.6. Framework for Emergency Preparedness and Response Plan (EPRP)

The main goal of creating an Emergency Preparedness and Response Plan (EPRP) framework is to launch rescue and relief efforts right away and to stabilize the mitigation process as soon as feasible.

The following are the primary elements of a response strategy based on such a mechanism:

- Identification and declaration of potential emergencies;
- Signal/warning mechanism;
- Activities and their levels;
- Command and control structure;
- Each designated authority's specific roles and responsibilities in order to accomplish the activation as per response time;
- Emergency procedures;
- Alternate plan & contingency measures; and
- Coordination with External parties.

9.6.6.1. Identification of Emergency

Identifying every risk and hazard connected to every activity that could cause an emergency and planning the course of action to be followed either before or after the emergency occurs. The dangerous locations and operations during the building and operation stages are listed in this section. The following is a list of potential crises that could occur during the project as a result of these risks.

Hazardous areas

d. Fuel storage areas
e. Kitchen premises in labor camps
f. Electrical installations – improper laying of cables
g. Scaffolds
h. Confined spaces

During project operations, there will be potentially dangerous locations and activities, such as a storage place for damaged panels and hazardous trash like spent oil and greasy rags.

An emergency

The following are the potential emergency scenarios that have been identified for the project

Fire and explosion

- Leakage of fuel storage areas;
- Short-circuit at campsite / project site;

Mechanical and electrical hazards

- Structural collapse;
- Accidentally dropped object;
- Loss of stability, and
- Electrocution.

Occupational hazards

- Outbreak of disease (like Covid-19) / illness;
- Handling of chemicals;

- Accidents due to vehicles movement; and
- Vandalism

9.6.6.2. Emergency Declaration

Level 1 (Minor Emergency)

All events with no escalation potential and which can be controlled and contained by the action of Safety Officer at the site will be considered as Level 1. In such cases of local alert, EHS Manager of EPC will be notified only. Some typical incidents are:
- Vehicle collision (involving no loss of life);
- Equipment damage;
- Medical evacuation (not very serious cases); and
- Minor fire

Level 2 (Serious Emergency)

All events with escalation potential, depending on the effectiveness of the local response will be considered as Level 2. These incidents may impact the entire construction activity/ project operations or have cascading effect. For such type of incidents, Site Supervisor of EPC will take the lead. Some typical incidents are:
- Substantial security incident / vandalism
- Structure collapse;
- Minor flooding;
- Serious damage to structures;
- Substantial fire; and
- Cultural conflict.

Level 3 (Major Emergency)

The crisis that requires assistance from external resources in order to save lives, minimize damage and to bring the abnormal situation back under control is Level 3 emergencies. These incidents have the potential to impact beyond the project footprints and affect the community. In such cases appropriate Government / regulatory authorities. Some typical Level 3 incidents are:
- Major fire / explosion;
- Fatality;
- Flooding;

Personnel on site will know that a Major Emergency has been declared if the site fire alarm siren and /or the local fire alarm systems are activated. The Emergency Siren Modes will be demonstrated and shared with all workers to identify with them. Level 2 and level 3 will be declared using emergency siren and evacuation shall be done

9.6.6.3. Emergency Equipment's

The following points should be implemented to tackle emergency situations:
- Onsite emergency equipment's such as first aid boxes, firefighting equipment, PPEs etc. shall be maintained at project site;
- The adequacy and availability of emergency equipment shall be assessed at periodic intervals by the EHS Manage of Engineering, Procurement and Construction (EPC);
- Inventory and locations of respective emergency equipment's shall be displayed a project office building, construction areas and other work areas;

It is to be ensured that the staff of developer is trained on the usage of each type of emergency equipment.

First Aid Boxes

First aid boxes shall be provided at identified locations throughout the plant premises. A first aid box shall contain, but not limited to the following articles:

- Cotton wool
- Sterile gauze
- Antiseptic lotion
- Box of adhesive dressing (Plasters) for small wounds
- Blunt-ended scissors
- Tweezers for removing splinters
- Triangular bandages (for making a sling or emergency bandage)
- Safety pins
- Sterile eye dressings
- Crepe bandages
- Aspirin/ Paracetamol tablets
- Skin creams for treating burns
- Anti-histamine cream for insect bites and stings

Fire Fighting Equipment's

During the construction phase, fire extinguishers and sand buckets will be provided at critical areas such as fuel storage area, waste storage area, labour camps, kitchens, first aid centre, areas with electrical installations and project office.

Provision of Personal Protective Equipment's

Onsite workers and the team deployed by respective EPC should be provided with an adequate number of personal protective equipment's (PPEs) to deal with emergency situations. The PPEs shall be stored at the designated Emergency Control Centre in the plant premises and will be easily accessible during times of emergency. Training of proper use of PPEs shall be provided to all working personnel on a periodic basis.

Assembly Areas

- Considering the area of the plant, three Sub-Assembly Zones and one Main Assembly Zone should be identified and finalized. The assembly zones shall be marked accordingly and employees will be mandated to gather at the zones during emergencies;
- In cases of minor emergencies when evacuation is not required, the employees/ workers and contractors shall gather at the Sub Assembly Zones nearest to their working area.

In case the facility is to be evacuated, assembly from sub-assembly zones is undertaken at Main Assembly Area where the final headcount is undertaken and finally workers can be routed to evacuate the premises.

The following codes of sirens will be followed during emergencies:

No	Sirens	Indicates	Authority
1	120 seconds continuous Whelming Sound	ON-SITE EMERGENCY (ALERT) for evaluation	EHS Manager
2	30 + 30 + 30 seconds Sound with an interval of 5 seconds	EMERGENCY CONTROLLED	EHS Manager

Below points shall be noted during the prevalence of emergency situation:

- Emergency siren to be sounded only if required.
- All staff shall be prior informed of the use of emergency sirens during mock drills.

- All employees in areas other than affected to continue work unless disaster siren is blown.
- No worker will leave the emergency spot unless 'all clear' siren blown.

9.6.6.4. Coordination with External Agencies

During emergency situations, Safety Officer and EHS Manager of EPC shall form the Emergency Control Centre (ECC). Safety Officer shall coordinate with the following departments:

- Fire brigade;
- Police department;
- Hospitals/Ambulance Services;
- Utility departments (electricity and water);
- Local Authorities and District Administration

9.6.6.5. Emergency Respond Team

The Emergency Response Team (ERT) will be set up immediately for the construction phase and the same will be revised for the commencement of plant operations. Each personnel identified as part of the ERT shall be designated specific roles and responsibilities for handling emergency situations.

The ERT at the operating site under its control will have the following role:

- Control the emergency and render the facility premises safe by the application of local resources; and
- Support the local response effort by coordinating additional equipment, personnel, and other external resources for the direct response effort.

The ERT will comprise of the following personnel:

- Site Supervisor;
- EHS Team;
- Employee/Workers

9.6.6.6. Respond Procedures

Effective command and control start with a clear definition of the overall command and control structure, and description of the duties of key personnel with specific responsibilities for emergency response. The control of emergencies will consider the minimum number of persons required to provide an adequate response to emergencies.

All emergencies occurring as a result of project activities shall be managed according to the following order of priorities:

- Preservation of Life (self, team, community);
- Protection of the Environment;
- Protection or Property/assets; and
- Preservation of Evidence.

9.6.6.7. Reporting and Documentation

The following aspects need to be communicated for the emergency reporting:

- While witnessing or receiving notification of an emergency, as much information as possible should be taken and/or conveyed to the relevant emergency activation authority;
- Where possible, all information should be logged in written form with time and date included and provided to EHS Manager of EPC Contractor;

- Personnel working on the site may, at any time, be exposed to an emergency which could take many forms, for example (but not limited to):
- Injuries and/or fatalities
- Fires and/or explosions
- Extreme weather
- When an emergency occurs, an appropriate and prompt response is required, providing precise action to control, correct and return the site to a safe condition.
- Timely action will also be required to protect people, the environment, and property from damage;
- All near misses and unsafe acts will be written in logbooks / reported in the 'Near miss, unsafe acts, hazards and sub-standard conditions report' and verbally communicated to the concerned Site Supervisor within a reasonable time. All accidents and incidents will be immediately reported to the EHS Manager, and requisite forms completed.

CHAPTER 10: CONCLUSION

The environmental and social impact assessment was conducted to assess the effects of the 150 MW solar power project. The administrative framework identified herein, which encompasses pertinent national legislative requirements and international guidelines, has been adhered to in developing the impact assessment.

Impacts Assessed in this ESIA Report

This ESIA report focuses on interactions between the project activities and various resources / receptors that could result in significant impacts within the boundary of the project and within the 3 km radius of the project and the area of 1km along the access road. Table below presents the outcome of the comprehensive assessment of identified impacts as a result of the various phase of the project.

As stated in the table bellow, 11 adverse impacts during the construction phase, 5 impacts in construction phase and 5 impacts in decommission phase. The adverse impacts after mitigation was rated as "Negligible", except the impact on "Change of topography and erosion", the residual impact of which is rated asl low.

In addition, the Environmental and Social Management Plan (ESMP), SEP and Emergency Respond Framework have been prepared help SchneiTec Beyond to make sure that the mitigations will be implemented effectively and comply with national/state regulation framework as well as to meet IFC Performance Standard requirements.

Impact Description	Impact nature	Significance of Impact	
Construction phase		Before mitigation	After mitigation
Change of topography and erosion	Negative	Low	Low
Air Quality	Negative	Low	Negligible
Noise and Vibration	Negative	Low	Negligible
Hydrological System	Negative	Medium	Negligible
Surface Water Quality	Negative	Medium	Negligible
Soil quality	Negative	Low	Negligible
Biological Resource Risk	Negative	Low	Negligible
Traffic and local infrastructure	Negative	Low	Negligible
Occupation and Income of local people	positive	-	Negligible
Occupational Health and Safety	Negative	Medium	Negligible
Community Health and Safety	Negative	Low	Negligible
Operation phase			
Soil Quality	Negative	Low	Negligible
Surface and Ground Water Resources	Negative	Low	Negligible
Biological resource Impact	Negative	Medium	Negligible
Occupational health and safety	Negative	Low	Negligible
Community health and safety	Negative	Low	Negligible
Operation phase			
Air Quality Environment	Negative	Low	Negligible
Noise and Vibration Level	Negative	Low	Negligible
Soil Quality	Negative	Low	Negligible
Occupation and income for local people	Negative	Low	Negligible
Community Health and Safety	Negative	Low	Negligible

REFERENCE

Climate Data. (2024). *Climate Data: Climate-Pursat* [Dataset]. Source: https://en.climate-data.org/asia/cambodia/pursat/pursat-48838/?form=MG0AV3

CMAC. (2023). *Annual Report 2023-Cambodian Mine Action Center.*

Crocker, Charles D. (1962). *The general soil map of the Kingdom of Cambodia and the exploratory survey of the soils of Cambodi.*

Electricity Authority of Cambodia. (2018). *Annual Report 2018.*

Frederic Goes. (2009). *The status and distribution of green peafowl Pavo muticus in Cambodia.*

Fresh News. (2023, June 22). *Mine Authority declares Pursat Municipality, Bakan District, Krakor District and Kandeang District in Pursat Province as demining districts.* https://freshnewsasia.com/index.php/en/localnews/296623-2023-06-22-09-52-25.html

IFC. (2012). *Performance Standards on Environmental and Social Sustainability.*

iNaturalist. (2024). *Observation* [Dataset]. https://www.inaturalist.org/observations

JICA. (2002). *The Study on the Establishment of GIS Base Data for the Kingdom of Cambodia.*

Ministry of Environment. (2017). *2017 Environmental work summary report and next work target.*

Ministry of Environment. (2018). *Prakas No. 116 issued on April 11, 2018 on the introduction of working conditions for infrastructure and tourism development projects.*

Ministry of Mines and Energy. (2022). *Power Development Masterplan 2022-2040.*

MoAFF. (2010). *Forest Cover* [Dataset].

MoE. (2015). *Prakas on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed (2015).*

MoE. (2023, November 9). *The Circular Strategy on Environment 2023-2028.*

MoEYS. (2019). *Cambodia's Education 2030 Roadmap Sustainable Development.*

MoP. (2023). *The last result of the 2022 national socioeconomic census of the Kingdom of Cambodia.*

NIS. (2019). *2019 General Population Census of Cambodia.*

OCHA. (2007). *Cambodia: Natural Hazard Risk* [Map].

Pen, S., Rad, S., Ban, L., Brang, S., Nuth, P., & Liao, L. (2024). An Analysis of Extreme Rainfall Events in Cambodia. *Atmosphere*, *15*(8), 1017. https://doi.org/10.3390/atmos15081017

Phnom Penh Post. (2023). *Kampong Chhnang officially declared landmine-free.* https://www.phnompenhpost.com/national/kampong-chhnang-officially-declared-landmine-free

RGC. (1993). *Sub-Decree on Construction Permit.*

RGC. (1997). *Labor Law.*

RGC. (1999a). *Sub-Decree on Environmental Impact Assessment.*

RGC. (1999b). *Sub-Decree on Solid Waste Management.*

RGC. (1999c). *Sub-Decree on Water Pollution Control.*

RGC. (2001). *Land Law.*

RGC. (2002). *Law on Social Security Schemes for Persons defined by the Provision of the Labor Law.*

RGC. (2003). *Law on the Investment, Law on Amendment to the Law on Investment of the Kingdom of Cambodia.*

RGC. (2006). *Law of Fisheries.*

RGC. (2007). *Law on Water Resource Management in the Kingdom of Cambodia.*

RGC. (2013). *National Strategic Plan for Green Development 2013-2030.*

RGC. (2014). *Law on Road Traffic.*

RGC. (2016). *Sub-Decree on Establishment of Social Security Scheme "Health Care Scheme" for Persons Defined by the Provisions of the Labor Law*.

RGC. (2023). *Pentagonal Strategy—Phase I*.

Rio Tinto. (2004). *Sustaining a Natural Balance: A Practical Guide to Integrating Biodiversity into Rio Tinto's Operational Activities*.

SchneiTec. (2019). *ENGINEERING REPORT OF FLOOD RISK ASSESSMENT AND ON-SITE DRAINAGE DESIGN*.

SchneiTec. (2023). *Development of 150MW Solar Photovoltaic Power Plant with Battery Storage System in Pursat, Cambodia*.

The Constitution of the Kingdom of Cambodia. (1993). *The Constitution of the Kingdom of Cambodia*.

World Bank. (2017). *ambodia Economic Update: Cambodia Climbing Up the Manufacturing Value Chain*.

World Bank. (2021). *Climate Change Knowlege Portal*. https://climateknowledgeportal.worldbank.org/country/cambodia/climate-data-historical?form=MG0AV3

World Nuclear Association. (2011). *Comparison of Lifecycle Greenhouse Gas Emissions of Various Electricity Generation Sources*.

APPENDIX

Appendix 1: Information and documents of the project owner

1. Coordinates of the project boundary

Projected Coordinate System WGS 1984 UTM Zone 48N											
No	X	Y	No	X	Y	No	X	Y	No	X	Y
1	407070	1380070	201	408334	1379780	401	407148	1378670	601	406456	1378680
2	407072	1380070	202	408315	1379760	402	407136	1378680	602	406452	1378680
3	407077	1380060	203	408300	1379750	403	407116	1378680	603	406446	1378670
4	407082	1380060	204	408287	1379740	404	407099	1378690	604	406436	1378670
5	407090	1380050	205	408258	1379680	405	407077	1378690	605	406428	1378670
6	407105	1380040	206	408272	1379720	406	407042	1378690	606	406420	1378670
7	407118	1380030	207	408261	1379710	407	407017	1378680	607	406404	1378670
8	407130	1380030	208	408252	1379690	408	407000	1378680	608	406390	1378670
9	407137	1380030	209	408243	1379670	409	406985	1378680	609	406379	1378680
10	407142	1380020	210	408234	1379650	410	406980	1378680	610	406369	1378680
11	407148	1380020	211	408232	1379630	411	406979	1378690	611	406355	1378690
12	407154	1380020	212	408229	1379610	412	406982	1378720	612	406337	1378700
13	407164	1380020	213	408227	1379590	413	406988	1378760	613	406325	1378710
14	407170	1380020	214	408225	1379570	414	406998	1378840	614	406314	1378720
15	407174	1380020	215	408222	1379550	415	407011	1378920	615	406309	1378720
16	407178	1380020	216	408217	1379520	416	407014	1379060	616	406309	1378730
17	407182	1380030	217	408209	1379500	417	407003	1379170	617	406312	1378730
18	407184	1380030	218	408206	1379490	418	407000	1379180	618	406315	1378730
19	407188	1380030	219	408199	1379480	419	406998	1379190	619	406320	1378740
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21	407196	1380040	221	408175	1379480	421	407010	1379200	621	406327	1378750
22	407200	1380060	222	408162	1379480	422	407028	1379190	622	406332	1378750
23	407206	1380070	223	408149	1379480	423	407077	1379170	623	406339	1378760
24	407212	1380080	224	408132	1379490	424	407098	1379170	624	406343	1378770
25	407214	1380090	225	408120	1379490	425	407113	1379160	625	406351	1378770
26	407217	1380100	226	408106	1379500	426	407130	1379150	626	406355	1378780
27	407218	1380110	227	408092	1379500	427	407148	1379140	627	406360	1378780
28	407220	1380120	228	408076	1379510	428	407164	1379130	628	406365	1378780
29	407221	1380130	229	408065	1379510	429	407178	1379120	629	406370	1378780
30	407222	1380130	230	408053	1379520	430	407189	1379120	630	406376	1378780
31	407223	1380140	231	408040	1379520	431	407199	1379110	631	406380	1378780
32	407225	1380150	232	408026	1379520	432	407209	1379110	632	406386	1378780
33	407228	1380160	233	408017	1379520	433	407219	1379110	633	406390	1378780
34	407232	1380160	234	408011	1379510	434	407231	1379110	634	406393	1378770
35	407243	1380160	235	408006	1379490	435	407241	1379110	635	406397	1378770
36	407253	1380150	236	408004	1379460	436	407245	1379120	636	406401	1378770
37	407264	1380140	237	408004	1379450	437	407250	1379120	637	406404	1378770
38	407272	1380140	238	408005	1379440	438	407254	1379130	638	406408	1378760
39	407281	1380140	239	408008	1379420	439	407259	1379140	639	406413	1378760
40	407286	1380140	240	408022	1379380	440	407262	1379150	640	406418	1378760
41	407283	1380150	241	408028	1379370	441	407267	1379160	641	406426	1378760
42	407283	1380160	242	408031	1379350	442	407271	1379170	642	406429	1378760
43	407285	1380170	243	408034	1379340	443	407276	1379200	643	406436	1378770

44	407288	1380180	244	408030	1379320	444	407281	1379220	644	406437	1378770
45	407294	1380180	245	408026	1379310	445	407282	1379240	645	406435	1378770
46	407311	1380170	246	408023	1379290	446	407282	1379270	646	406432	1378780
47	407318	1380180	247	408021	1379280	447	407288	1379290	647	406429	1378780
48	407324	1380180	248	408019	1379260	448	407288	1379320	648	406424	1378790
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50	407334	1380210	250	408025	1379240	450	407297	1379410	650	406418	1378800
51	407337	1380220	251	408032	1379230	451	407298	1379430	651	406415	1378810
52	407341	1380240	252	408042	1379230	452	407302	1379440	652	406413	1378820
53	407346	1380250	253	408059	1379220	453	407304	1379450	653	406411	1378830
54	407352	1380250	254	408084	1379220	454	407300	1379460	654	406407	1378830
55	407358	1380250	255	408099	1379210	455	407291	1379460	655	406403	1378830
56	407362	1380250	256	408123	1379210	456	407279	1379470	656	406399	1378840
57	407372	1380240	257	408150	1379210	457	407277	1379480	657	406395	1378840
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59	407381	1380250	259	408227	1379210	459	407303	1379560	659	406384	1378840
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61	407385	1380250	261	408292	1379220	461	407334	1379630	661	406375	1378840
62	407388	1380260	262	408309	1379210	462	407343	1379650	662	406374	1378850
63	407387	1380270	263	408334	1379220	463	407352	1379680	663	406371	1378860
64	407388	1380280	264	408344	1379220	464	407357	1379690	664	406371	1378870
65	407386	1380280	265	408360	1379220	465	407364	1379720	665	406374	1378870
66	407386	1380290	266	408386	1379220	466	407366	1379740	666	406378	1378870
67	407389	1380310	267	408410	1379220	467	407354	1379750	667	406382	1378880
68	407392	1380320	268	408446	1379210	468	407335	1379750	668	406386	1378880
69	407396	1380320	269	408478	1379210	469	407313	1379760	669	406389	1378890
70	407402	1380320	270	408516	1379200	470	407301	1379760	670	406387	1378890
71	407413	1380320	271	408552	1379190	471	407295	1379760	671	406385	1378900
72	407430	1380310	272	408590	1379190	472	407290	1379770	672	406381	1378900
73	407444	1380310	273	408609	1379190	473	407285	1379780	673	406377	1378910
74	407454	1380310	274	408621	1379190	474	407282	1379790	674	406374	1378910
75	407457	1380310	275	408637	1379190	475	407275	1379790	675	406370	1378930
76	407456	1380300	276	408651	1379190	476	407272	1379800	676	406367	1378940
77	407455	1380290	277	408670	1379190	477	407269	1379810	677	406365	1378950
78	407447	1380270	278	408689	1379190	478	407264	1379810	678	406365	1378960
79	407439	1380260	279	408706	1379190	479	407259	1379810	679	406363	1378980
80	407434	1380230	280	408722	1379190	480	407245	1379820	680	406363	1378990
81	407430	1380220	281	408749	1379190	481	407236	1379820	681	406362	1379010
82	407430	1380220	282	408775	1379190	482	407228	1379820	682	406363	1379030
83	407437	1380210	283	408796	1379190	483	407221	1379820	683	406366	1379040
84	407435	1380200	284	408817	1379190	484	407215	1379820	684	406370	1379050
85	407423	1380170	285	408835	1379180	485	407211	1379820	685	406373	1379060
86	407413	1380150	286	408852	1379180	486	407203	1379820	686	406374	1379070
87	407400	1380090	287	408869	1379180	487	407196	1379820	687	406373	1379090
88	407383	1380010	288	408884	1379180	488	407188	1379820	688	406373	1379110
89	407370	1379960	289	408898	1379180	489	407182	1379830	689	406377	1379120

90	407361	1379920	290	408915	1379180	490	407171	1379830	690	406381	1379130
91	407360	1379910	291	408929	1379180	491	407160	1379830	691	406381	1379140
92	407359	1379900	292	408945	1379170	492	407144	1379830	692	406380	1379150
93	407361	1379890	293	408962	1379170	493	407134	1379830	693	406378	1379150
94	407373	1379890	294	408996	1379160	494	407123	1379830	694	406375	1379160
95	407391	1379880	295	409024	1379160	495	407114	1379830	695	406373	1379170
96	407405	1379880	296	409046	1379150	496	407109	1379830	696	406369	1379180
97	407438	1379870	297	409054	1379150	497	407101	1379830	697	406365	1379180
98	407460	1379870	298	409051	1379140	498	407094	1379830	698	406362	1379190
99	407475	1379860	299	409044	1379130	499	407092	1379830	699	406360	1379200
100	407491	1379860	300	409031	1379120	500	407093	1379830	700	406358	1379210
101	407501	1379860	301	409013	1379110	501	407093	1379820	701	406360	1379210
102	407514	1379850	302	408998	1379090	502	407093	1379810	702	406361	1379230
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104	407540	1379850	304	408944	1379050	504	407090	1379790	704	406364	1379260
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106	407560	1379840	306	408902	1379030	506	407092	1379780	706	406363	1379270
107	407570	1379840	307	408884	1379020	507	407093	1379770	707	406360	1379280
108	407588	1379840	308	408863	1379010	508	407093	1379760	708	406358	1379290
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111	407611	1379850	311	408785	1378940	511	407086	1379760	711	406356	1379300
112	407612	1379860	312	408750	1378920	512	407077	1379760	712	406363	1379300
113	407614	1379870	313	408719	1378900	513	407072	1379760	713	406369	1379300
114	407618	1379890	314	408686	1378880	514	407065	1379770	714	406376	1379300
115	407621	1379900	315	408658	1378880	515	407058	1379770	715	406385	1379300
116	407626	1379910	316	408630	1378870	516	407051	1379770	716	406400	1379300
117	407635	1379920	317	408599	1378860	517	407046	1379770	717	406410	1379300
118	407640	1379920	318	408566	1378860	518	407046	1379780	718	406422	1379290
119	407647	1379940	319	408536	1378850	519	407049	1379790	719	406435	1379290
120	407650	1379950	320	408505	1378840	520	407052	1379800	720	406446	1379290
121	407654	1379960	321	408476	1378840	521	407056	1379810	721	406458	1379290
122	407660	1379970	322	408413	1378850	522	407062	1379830	722	406465	1379290
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124	407668	1379990	324	408361	1378860	524	407071	1379860	724	406481	1379290
125	407675	1379980	325	408343	1378860	525	407076	1379870	725	406483	1379300
126	407685	1379980	326	408322	1378860	526	407081	1379880	726	406484	1379300
127	407693	1379970	327	408289	1378860	527	407087	1379890	727	406486	1379310
128	407705	1379970	328	408259	1378860	528	407092	1379910	728	406491	1379310
129	407711	1379970	329	408238	1378860	529	407094	1379910	729	406499	1379310
130	407719	1379960	330	408227	1378860	530	407096	1379920	730	406528	1379300
131	407727	1379960	331	408216	1378860	531	407097	1379930	731	406575	1379280
132	407737	1379950	332	408201	1378860	532	407098	1379950	732	406628	1379270
133	407749	1379950	333	408186	1378860	533	407097	1379950	733	406679	1379260
134	407757	1379940	334	408174	1378860	534	407088	1379950	734	406717	1379240
135	407765	1379930	335	408163	1378850	535	407073	1379960	735	406730	1379240

136	407778	1379920	336	408148	1378850	536	407054	1379960	736	406729	1379220
137	407794	1379910	337	408136	1378850	537	407027	1379960	737	406725	1379210
138	407808	1379910	338	408121	1378850	538	407010	1379970	738	406721	1379190
139	407828	1379900	339	408111	1378850	539	406995	1379970	739	406718	1379170
140	407870	1379880	340	408096	1378850	540	406981	1379980	740	406719	1379170
141	407886	1379870	341	408081	1378850	541	406986	1379990	741	406722	1379170
142	407905	1379870	342	408047	1378860	542	406992	1379990	742	406728	1379170
143	407921	1379870	343	408001	1378860	543	407000	1380000	743	406752	1379160
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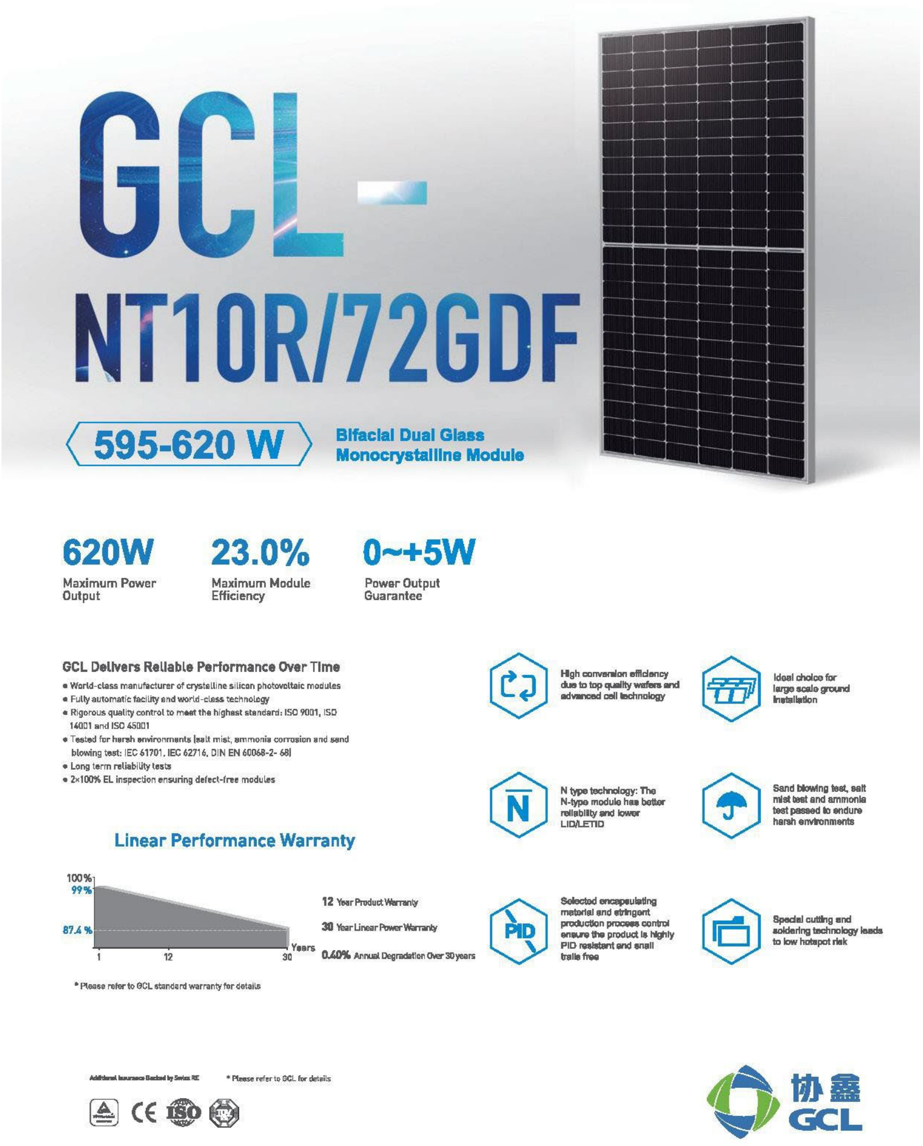
151	407951	1379920	351	407910	1378920	551	406997	1378920	751	406861	1379110
152	407955	1379930	352	407899	1378940	552	406996	1378910	752	406854	1379100
153	407957	1379940	353	407891	1378960	553	406996	1378900	753	406848	1379100
154	407958	1379960	354	407883	1378960	554	406995	1378890	754	406843	1379090
155	407959	1379980	355	407869	1378950	555	406995	1378890	755	406842	1379090
156	407958	1379990	356	407855	1378930	556	406994	1378880	756	406843	1379080
157	407956	1380000	357	407832	1378920	557	406993	1378870	757	406848	1379070
158	407953	1380020	358	407810	1378900	558	406991	1378860	758	406849	1379070
159	407952	1380040	359	407779	1378890	559	406990	1378850	759	406850	1379050
160	407950	1380050	360	407751	1378870	560	406989	1378850	760	406851	1379040
161	407948	1380060	361	407728	1378870	561	406981	1378800	761	406853	1379020
162	407950	1380060	362	407707	1378850	562	406978	1378780	762	406857	1379010
163	407955	1380070	363	407684	1378840	563	406976	1378760	763	406856	1379010
164	407961	1380070	364	407671	1378830	564	406974	1378750	764	406852	1379010
165	407972	1380070	365	407656	1378820	565	406967	1378720	765	406842	1379010
166	407983	1380060	366	407630	1378800	566	406962	1378690	766	406832	1379020
167	407995	1380060	367	407605	1378790	567	406959	1378670	767	406823	1379020
168	408012	1380060	368	407576	1378790	568	406958	1378650	768	406816	1379020
169	408026	1380060	369	407543	1378790	569	406959	1378630	769	406805	1379030
170	408042	1380050	370	407510	1378790	570	406960	1378610	770	406797	1379030
171	408071	1380050	371	407472	1378790	571	406962	1378590	771	406790	1379030
172	408085	1380050	372	407431	1378790	572	406963	1378580	772	406785	1379030
173	408098	1380050	373	407401	1378790	573	406964	1378550	773	406781	1379030
174	408105	1380040	374	407380	1378790	574	406965	1378530	774	406777	1379010
175	408105	1380010	375	407366	1378790	575	406966	1378520	775	406771	1379000
176	408108	1379960	376	407359	1378780	576	406967	1378520	776	406766	1378990
177	408109	1379950	377	407353	1378750	577	406968	1378510	777	406766	1378980
178	408110	1379940	378	407338	1378730	578	406966	1378500	778	406766	1378970
179	408118	1379930	379	407322	1378730	579	406963	1378500	779	406767	1378960
180	408127	1379930	380	407317	1378720	580	406952	1378510	780	406769	1378950
181	408153	1379930	381	407315	1378720	581	406932	1378510	781	406763	1378950

182	408182	1379930	382	407316	1378710	582	406906	1378520	782	406752	1378950
183	408219	1379930	383	407314	1378700	583	406882	1378520	783	406746	1378940
184	408266	1379930	384	407311	1378690	584	406853	1378530	784	406750	1378930
185	408323	1379930	385	407311	1378680	585	406806	1378540	785	406762	1378930
186	408381	1379930	386	407314	1378670	586	406716	1378560	786	406771	1378930
187	408391	1379930	387	407315	1378660	587	406681	1378570	787	406786	1378940
188	408393	1379930	388	407312	1378650	588	406668	1378580	788	406804	1378940
189	408393	1379920	389	407307	1378640	589	406665	1378590	789	406833	1378940
190	408393	1379910	390	407302	1378630	590	406662	1378600	790	406860	1378930
191	408392	1379900	391	407298	1378620	591	406658	1378610	791	406887	1378930
192	408391	1379890	392	407295	1378620	592	406650	1378610	792	406904	1378930
193	408389	1379880	393	407287	1378610	593	406626	1378620	793	406921	1378930
194	408385	1379870	394	407275	1378620	594	406612	1378620	794	406937	1378930
195	408380	1379860	395	407262	1378620	595	406596	1378630	795	406951	1378920
196	408377	1379840	396	407247	1378620	596	406576	1378640	796	406967	1378920
197	408375	1379820	397	407229	1378630	597	406552	1378640	797	406979	1378920
198	408372	1379800	398	407208	1378640	598	406522	1378660	798	406990	1378920
199	408359	1379790	399	407189	1378650	599	406491	1378670			
200	408345	1379780	400	407171	1378660	600	406466	1378680			

2. Specifications of equipment for the project



Bifacial Dual Glass Monocrystalline Module | GCL-NT10R/72GDF | 595-620 W

Electrical Specification (STC*)

Maximum Power	Pmax(W)	595	600	605	610	615	620
Maximum Power Voltage	Vmp(V)	43.15	43.35	43.56	43.75	43.95	44.15
Maximum Power Current	Imp(A)	13.79	13.84	13.89	13.95	14.00	14.05
Open Circuit Voltage	Voc(V)	51.44	51.60	51.75	51.90	52.05	52.20
Short Circuit Current	Isc(A)	14.50	14.55	14.60	14.65	14.70	14.75
Module Efficiency	(%)	22.0	22.2	22.4	22.6	22.8	23.0
Power Output Tolerance	(W)	0~+5					

* Irradiance 1000W/m², Cell Temperature 25°C, Air Mass 1.5

Electrical Specification (NMOT*)

Maximum Power	Pmax (W)	448.7	452.2	455.7	459.2	462.8	466.4
Maximum Power Voltage	Vmp (V)	40.42	40.59	40.76	40.93	41.10	41.27
Maximum Power Current	Imp (A)	11.10	11.14	11.18	11.22	11.26	11.30
Open Circuit Voltage	Voc(V)	48.50	48.64	48.78	48.92	49.06	49.20
Short Circuit Current	Isc (A)	11.70	11.74	11.78	11.82	11.86	11.90

* Irradiance 800W/m², Ambient Temperature 20°C, Wind Speed 1m/s

Electrical characteristics with different power bin (reference to 10% Irradiance ratio)

Maximum Power	Pmax (W)	642.5	648.1	653.4	659.3	664.5	669.8
Maximum Power Voltage	Vmp (V)	43.15	43.35	43.56	43.75	43.95	44.15
Maximum Power Current	Imp (A)	14.89	14.95	15.00	15.07	15.12	15.17
Open Circuit Voltage	Voc(V)	51.44	51.60	51.75	51.90	52.05	52.20
Short Circuit Current	Isc (A)	15.66	15.71	15.77	15.82	15.88	15.93
Irradiance ratio (rear/front)		10%					

Mechanical Data

Number of Cells	144 Cells (6×24)
Dimensions of Module L*W*H (mm)	2382×1134×30mm (93.78×44.65×1.18 inches)
Weight (kg)	33 kg
Front Side Glass	2.0mm (0.08 inches), Anti-Reflection Coating
Back Side Glass	2.0mm (0.08 inches), Heat Strengthened Glass
Frame	Silver, anodized aluminium alloy
Cable	4.0mm², Portrait: +400/-200mm length can be customized
Number of diodes	3
Wind/ Snow Load	2400Pa/ 5400Pa*
Connector	MC Compatible
Bifaciality	80±5%

* For more details please check the installation manual of GCLSI

Temperature Ratings

Nominal Module Operating Temperature(NMOT)	45±2°C
Temperature Coefficient of Isc	+0.045%/°C
Temperature Coefficient of Voc	-0.25%/°C
Temperature Coefficient of PMAX	-0.29%/°C

Packaging Configuration

Module per box	36 pieces
Module per 40' container	720 pieces

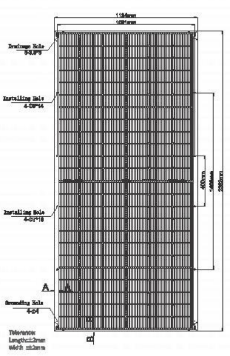
Maximum Ratings

Operational Temperature	-40~+85°C
Maximum System Voltage	1500V DC
Max Series Fuse Rating	30A

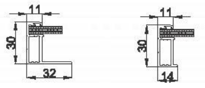
Optional

Connector:	☐ Original MC4

Module Dimension



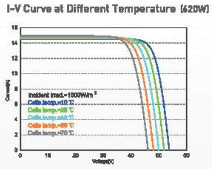
Back View



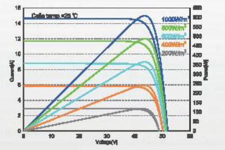
Long Frame A-A

Short Frame B-B

I-V Curve at Different Temperature (620W)



I-V/P-V Curve at Different Irradiation (620W)



CAUTION: READ INSTALLATION MANUAL BEFORE USING THE PRODUCT

Contact Us for More Information

website: www.gclsi.com email: gclsisales@gclsi.com

Bringing Green Power To Life

GCL/XXJC/2-MKT-188-G3

LUNA2000-2.0MWH-1H0/2H0

Smart String ESS

More Energy **Optimal Design** **Simple O&M** **Safe & Reliable**

Battery Container	
DC Rated Voltage	1,200 V
DC Max. Voltage	1,500 V
Nominal Energy Capacity	2,064 kWh
Rated Power	344 kW * 6
Container Configuration (W x H x D)	6,058 x 2,896 x 2,438 mm
Container Weight	≤ 30 t
Operation Temperature Range	-30°C ~ 55°C
Storage Temperature Range	-40°C ~ 60°C
Operation Humidity Range	0 ~ 100% (Without Condensation)
Max. Operating Altitude	4,000 m
Cooling Method	Smart Air Cooling
Fire Extinguishing	FM-200
Communication Interface	Ethernet / SFP
Communication Protocol	Modbus TCP
Protection Degree	IP55
Certificates (more available upon request)	
Environment	RoHS6
Safety & Electrical	IEC62619, IEC62109, IEC62933, UN3536, etc.

DCBOX-9/5-H0

DC LV Panel

Electrical	
Max. Input Voltage	1,500 V
Nominal Input Voltage	1,200 V
Max. Branch Current for Battery Rack Side	321 A
Max. Branch Current for PCS Side	193 A
Number of DC Circuit Breaker	14
Max. Input Number of Battery Rack	9
Max. Input Number of PCS	5
Max. Convergence Capacity	5 x 193 A
Protection	
DC Surge Protection	Optional
DC Overcurrent Protection	Yes
Environment	
Operating Temperature Range	-30°C ~ 60°C
Relative Humidity	0 ~ 100%
Max. Operating Altitude	4,000 m
General	
Cable Entries	Top in for PCS & Bottom in for Battery Rack
Dimensions (W x H x D)	2,040 x 1,415 x 975 mm
Weight (Without Smart PCS)	≤ 750 kg
DC Connector / AC Connector	OT Terminal
Protection Degree	IP55
Installation Options	Grounding

LUNA2000-200KTL-H0

Smart PCS

Max. Efficiency 99%

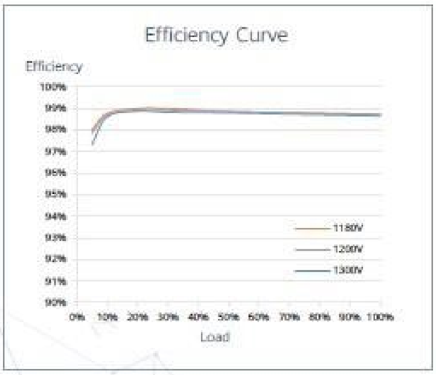
Modular Design

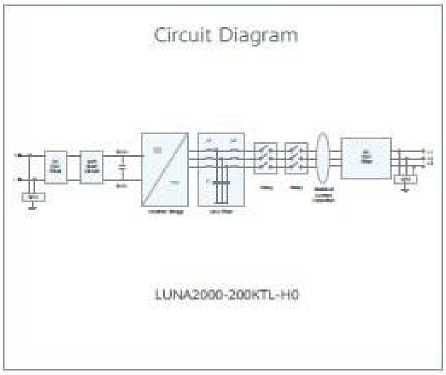
IP66 Protection

Surge Arresters for DC & AC

Ethernet Communication

Smart Grid Algorithm





Input	
Available Inverters / PCS	SUN2000-330KTL
Maximum LV AC Inputs	30[1]
AC Power	9,000 kVA @40°C [2]
Rated Input Voltage	800 V
Max. Input Current at Nominal Voltage	2 * 3572 A
LV Main Switches	ACB (4000 A / 800 V / 3P, 2*1 pcs), MCCB (250 A / 800 V / 3P, 2*15 pcs)
Output	
Rated Output Voltage	22 kV
Frequency	50 Hz
Transformer Type	Oil-immersed, Conservator Type
Tappings	± 2 x 2.5%
Transformer Oil Type	Mineral Oil (PCB Free)
Transformer Vector Group	Dy11-y11
Minimum Peak Efficiency Index	99.548%
Transformer Load Losses	55.7 kW (+15%)
Transformer No-load Losses	7.4 kW (+15%)
Impedance(HV-LV1 or HV-LV2)	9.5% (0 ~+ 10%)@ 4500 kVA
RMU Type	SF_6 Gas Insulated
RMU Transformer Protection Modules	MV Vacuum Circuit Breaker Modules
Auxiliary Transformer	5kVA, Ii0, 800 V / 230V /127V
Protection	
Transformer Monitoring & Protection	Oil level, oil temperature, oil pressure and buchholz
Protection Degree of MV & LV Room	IP 54
Internal Arcing Fault Classification of STS	IAC A 20 kA 1s
LV Overvoltage Protection	Type I+II
General	
Dimensions (W x H x D)	6,058 x 2,896 x 2,438 mm (20' HC Container)
Weight	< 28 t
Operating Temperature Range	-25°C ~ 60°C [3]
Relative Humidity	0% ~ 95%

Appendix 2: Physical Resource Analysis Results

2.1. Results of Surface Water Analysis

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N. 14A, St. 185, Sangkat Tumnubtoek, Khan Boeng Keng Kang, Phnom Penh, Cambodia. Tel.: 012 531000

IAS ACCREDITED Testing Laboratory TL-1107

Ref.: AI2024-0402-1

RESULT OF ANALYSIS

Organization / company	**E & A Consultant Co., Ltd.** Tel.: 096 3457425
Address	E: 406655 , N: 1379909
Type of sample	Surface Water (SW01)
Sample submitted date	27 September, 2024
Date of testing performance	27 September, 2024

N	Parameter	Unit	Standard for Protected public water area II	Testing Result	Testing Method
1	pH	-	5.5 – 9	6.55	AOAC 973.41
2	Total suspended solid (TSS)*	mg / L	< 100	20.0	ISO 11923
3	Dissolved oxygen (DO)*	mg / L	N/A	6.60	ISO 17289
4	Biochemical oxygen demand (BOD_5)*	mg / L	< 60	5.00	ISO 5815
5	Chemical oxygen demand (COD)*	mg / L	< 120	6.00	ISO 6060
6	Oil and Grease*	mg / L	< 10	Not detected (< 0.2)	ISO 7377-2
7	Detergent*	mg / L	< 10	Not detected (< 0.2)	ISO 1104
8	Total nitrogen (TN)*	mg / L	< 40	5.60	AOAC 960.52
9	Total phosphorus (TP)*	mg / L	< 6	0.05	ISO 15681
10	Lead (Pb)*	mg / L	< 0.3	Not detected (< 0.005)	ISO 8518
11	Arsenic (As)*	mg / L	< 0.1	0	ISO 17378
12	Cadmium (Cd)*	mg / L	< 0.1	Not detected (< 0.002)	ISO 5961
13	Iron (Fe)*	mg / L	< 5	0.35	ISO 6332
14	Mercury (Hg)*	mg / L	< 0.01	Not detected (< 0.001)	ISO 12846
15	Total coliform	MPN / 100 mL	N/A	1.5×10^2	ISO 9308-2

* are not covered by the scope of the accreditation.

Phnom Penh, 4 October, 2024
Director

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ACTA BIO CO., LTD.
N. 14A, St. 185, Sangkat Tumnubtoek,
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Cambodia. Tel.: 012 531000

IAS ACCREDITED Testing Laboratory
TL-1107

Ref.: AI2024-0402-2

RESULT OF ANALYSIS

Organization / company	**E & A Consultant Co., Ltd.** Tel.: 096 3457425
Address	E: 405893 , N: 1378399
Type of sample	Surface Water (SW02)
Sample submitted date	27 September, 2024
Date of testing performance	27 September, 2024

N	Parameter	Unit	Standard for Protected public water area II	Testing Result	Testing Method
1	pH	-	5.5 – 9	6.48	AOAC 973.41
2	Total suspended solid (TSS)*	mg / L	< 100	28.0	ISO 11923
3	Dissolved oxygen (DO)*	mg / L	N/A	6.70	ISO 17289
4	Biochemical oxygen demand (BOD_5)*	mg / L	< 60	9.00	ISO 5815
5	Chemical oxygen demand (COD)*	mg / L	< 120	16.0	ISO 6060
6	Oil and Grease*	mg / L	< 10	Not detected (< 0.2)	ISO 7377-2
7	Detergent*	mg / L	< 10	Not detected (< 0.2)	ISO 1104
8	Total nitrogen (TN)*	mg / L	< 40	9.90	AOAC 960.52
9	Total phosphorus (TP)*	mg / L	< 6	0.04	ISO 15681
10	Lead (Pb)*	mg / L	< 0.3	Not detected (< 0.005)	ISO 8518
11	Arsenic (As)*	mg / L	< 0.1	0	ISO 17378
12	Cadmium (Cd)*	mg / L	< 0.1	Not detected (< 0.002)	ISO 5961
13	Iron (Fe)*	mg / L	< 5	0.75	ISO 6332
14	Mercury (Hg)*	mg / L	< 0.01	Not detected (< 0.001)	ISO 12846
15	Total coliform	MPN / 100 mL	N/A	2.4×10^2	ISO 9308-2

* are not covered by the scope of the accreditation.

Phnom Penh, 4 October, 2024
Director

ACTA BIO CO., LTD
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DR. DAVIN UY

ACTA BIO CO., LTD.
N. 14A, St. 185, Sangkat Tumnubtoek,
Khan Boeng Keng Kang, Phnom Penh,
Cambodia. Tel.: 012 531000

IAS ACCREDITED Testing Laboratory
TL-1107

Ref.: AI2024-0402-3

RESULT OF ANALYSIS

Organization / company	**E & A Consultant Co., Ltd.** Tel.: 096 3457425
Address	E: 407996, N: 1379409
Type of sample	Surface Water (SW03)
Sample submitted date	27 September, 2024
Date of testing performance	27 September, 2024

N	Parameter	Unit	Standard for Protected public water area II	Testing Result	Testing Method
1	pH	-	5.5 – 9	6.52	AOAC 973.41
2	Total suspended solid (TSS)*	mg / L	< 100	264	ISO 11923
3	Dissolved oxygen (DO)*	mg / L	N/A	6.60	ISO 17289
4	Biochemical oxygen demand (BOD_5)*	mg / L	< 60	9.00	ISO 5815
5	Chemical oxygen demand (COD)*	mg / L	< 120	16.0	ISO 6060
6	Oil and Grease*	mg / L	< 10	Not detected (< 0.2)	ISO 7377-2
7	Detergent*	mg / L	< 10	Not detected (< 0.2)	ISO 1104
8	Total nitrogen (TN)*	mg / L	< 40	8.80	AOAC 960.52
9	Total phosphorus (TP)*	mg / L	< 6	0.03	ISO 15681
10	Lead (Pb)*	mg / L	< 0.3	Not detected (< 0.005)	ISO 8518
11	Arsenic (As)*	mg / L	< 0.1	0	ISO 17378
12	Cadmium (Cd)*	mg / L	< 0.1	Not detected (< 0.002)	ISO 5961
13	Iron (Fe)*	mg / L	< 5	0.80	ISO 6332
14	Mercury (Hg)*	mg / L	< 0.01	Not detected (< 0.001)	ISO 12846
15	Total coliform	MPN / 100 mL	N/A	4.6×10^2	ISO 9308-2

* are not covered by the scope of the accreditation.

Phnom Penh, 4 October, 2024
Director

ACTA BIO CO., LTD. KINGDOM OF CAMBODIA

DR. DAVIN UY

2.2. Results of Soil Analysis

ACTA BIO®

ACTA BIO CO., LTD.
N. 14A, St. 185, Sangkat Tumnubtoek,
Khan Boeng Keng Kang, Phnom Penh, Cambodia
E-mail: Davinuy@gmail.com
Tel: 012 531000

Ref.: TS2024-0811-1

RESULT OF ANALYSIS

Organization / company	**E & A Consultant Co., Ltd.** Tel.: 096 3457425
Address of sample	E: 408486 N: 1379144
Type of sample	Soil No. 01
Sample submitted date	27 September, 2024
Date of testing performance	27 September, 2024

N	Parameter	Unit	Testing Result	Testing Methods
1	pH	-	5.07	AOAC 994.18
2	Total nitrogen (TN)	g/100g	0.01	ISO 11261
3	Total phosphorus (TP)	g/100g	0.004	ISO 11263
4	Potassium (K)	g/100g	0.03	ISO 17319
5	Electric conductivity (EC)	µS/cm	27.0	ISO 17265
6	Moisture content	g/100g	11.2	AOAC 935.29
7	Calcium (Ca)	mg/100g	468	AOAC 973.52
8	Magnesium (Mg)	mg/100g	49.2	AOAC 973.52
9	Lead (Pb)	mg/Kg	2.88	ISO 110447
10	Mercury (Hg)	mg/Kg	0.05	ISO 12846

Phnom Penh, 4 October, 2024
Director

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N. 14A, St. 185, Sangkat Tumnubtoek,
Khan Boeng Keng Kang, Phnom Penh, Cambodia
E-mail: Davinuy@gmail.com
Tel: 012 531000

Ref.: TS2024-0811-2

RESULT OF ANALYSIS

Organization / company	**E & A Consultant Co., Ltd.** Tel.: 096 3457425
Address of sample	E: 407712 , N: 1379667
Type of sample	Soil No. 02
Sample submitted date	27 September, 2024
Date of testing performance	27 September, 2024

N	Parameter	Unit	Testing Result	Testing Methods
1	pH	-	5.20	AOAC 994.18
2	Total nitrogen (TN)	g/100g	0.01	ISO 11261
3	Total phosphorus (TP)	g/100g	0.005	ISO 11263
4	Potassium (K)	g/100g	0.03	ISO 17319
5	Electric conductivity (EC)	µS/cm	28.0	ISO 17265
6	Moisture content	g/100g	12.8	AOAC 935.29
7	Calcium (Ca)	mg/100g	512	AOAC 973.52
8	Magnesium (Mg)	mg/100g	53.1	AOAC 973.52
9	Lead (Pb)	mg/Kg	3.15	ISO 110447
10	Mercury (Hg)	mg/Kg	0.04	ISO 12846

Phnom Penh, 4 October, 2024
Director

ACTA BIO CO., LTD
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DR. DAVIN UY

2.3. Results Air test

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

3ភី-អ៊ិនវ៉ាយរ៉ិនម៉ិនថល ស៊ីលូសិន ឯ.ក
លេខ៖ ....0183..../24....-3P

រាជធានីភ្នំពេញ ថ្ងៃទី៣១ ខែតុលា ឆ្នាំ២០២៤

លទ្ធផលពិនិត្យគុណភាពខ្យល់

ម្ចាស់គម្រោង៖ SCHNEITEC BEYOND CO., LTD

ប្រភេទគម្រោង៖ គម្រោងផលិតថាមពលអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ

អាសយដ្ឋានចុះពិនិត្យ៖ ភូមិអន្សក្តាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ទីតាំងត្រួតពិនិត្យ៖ នៅក្នុងតំបន់លំនៅដ្ឋាន ក្បែរទីតាំងគម្រោង, UTM: 48P 0406629 & 1381123

ថ្ងៃចុះត្រួតពិនិត្យ៖ ថ្ងៃទី១៣ ខែតុលា ឆ្នាំ២០២៤

ប៉ារ៉ាម៉ែត្រ Parameter	ខ្នាត Unit	លទ្ធផល Result	បទដ្ឋាន Standard	វិធីសាស្ត្រវិភាគ Method
Carbon Monoxide (CO)	mg/m^3	0.807	20	OCEANUS-AQM-09, Air Quality Monitor System
Nitrogen Dioxide (NO_2)	mg/m^3	0.089	0.1	OCEANUS-AQM-09, Air Quality Monitor System
Sulphur Dioxide (SO_2)	mg/m^3	0.125	0.3	OCEANUS-AQM-09, Air Quality Monitor System
Ozone (O_3)	mg/m^3	0.094	0.2	OCEANUS-AQM-09, Air Quality Monitor System
Lead (Pb)	mg/m^3	ND	0.005	CPSC-CH-E1002-08.3, (HNO3 Digestion)
Dust (TSP)	mg/m^3	0.024	0.33	OCEANUS-AQM-09, Air Quality Monitor System
Dust (PM10)	mg/m^3	0.013	0.05	OCEANUS-AQM-09, Air Quality Monitor System
Dust (PM2.5)	mg/m^3	0.007	0.025	OCEANUS-AQM-09, Air Quality Monitor System

ស្តង់ដារ៖ - យោងអនុក្រឹត្យលេខ ៤២ អនក្រ.បក ចុះថ្ងៃទី១០ ខែកក្កដា ឆ្នាំ២០០០ ស្តីពីការត្រួតពិនិត្យការបំពុលខ្យល់ និងការរំខានដោយសំឡេង

- យោងប្រកាសលេខ ១១៦ ប្រក.បស្ក ចុះថ្ងៃទី១១ ខែមេសា ឆ្នាំ២០១៨ ស្តីពីការដាក់ឱ្យប្រើប្រាស់គំរូលក្ខខណ្ឌការងារ សម្រាប់គម្រោងបង្កើតរោងចក្រ និងសិប្បកម្ម

ប្រធានក្រុមប្រឹក្សាភិបាល

ព្រះរាជាណាចក្រកម្ពុជា
ក្រុមហ៊ុន
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3P-ENVIRONMENTAL SOLUTIONS
CO., LTD.
KINGDOM OF CAMBODIA

LEANG LORNMONTHANY

អាសយដ្ឋាន៖ ផ្ទះលេខ២១០ ផ្លូវ៤៥៨T ក្រុម៥ ភូមិត្នោតជ្រុំ៥ សង្កាត់បឹងទំពុន២ ខណ្ឌមានជ័យ រាជធានីភ្នំពេញ
ទូរស័ព្ទ៖ 086 698 788/ អ៊ីម៉ែល៖ leanglornmonthany@gmail.com

2.4. Results Noise test

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

3ភី-អ៊ិនវ៉ាយរ៉ុនម៉ិនថល សឹលូសិន ឯ.ក
លេខ៖ ...0184.../.24...-3P

រាជធានីភ្នំពេញ ថ្ងៃទី៣១ ខែតុលា ឆ្នាំ២០២៤

លទ្ធផលពិនិត្យកម្រិតសំឡេង

ម្ចាស់គម្រោង៖ SCHNEITEC BEYOND CO., LTD

ប្រភេទគម្រោង៖ គម្រោងផលិតថាមពលអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ

អាសយដ្ឋានចុះពិនិត្យ៖ ភូមិអន្សោក្លាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ទីតាំងត្រួតពិនិត្យ៖ នៅក្នុងតំបន់លំនៅដ្ឋាន ក្បែរទីតាំងគម្រោង, UTM: 48P 0406629 & 1381123

ថ្ងៃចុះត្រួតពិនិត្យ៖ ថ្ងៃទី១៣ ខែតុលា ឆ្នាំ២០២៤

No	Survey Period	Noise Level dB(A)				Remarks
		LAeq	Standard	Lmax	Lmin	
1	6:00 - 7:00	52.50	70	66.30	38.80	
2	7:00 - 8:00	52.50		67.40	38.10	
3	8:00 - 9:00	52.40		69.30	38.30	
4	9:00 - 10:00	50.60		65.30	37.10	
5	10:00 - 11:00	49.10		65.50	37.90	
6	11:00 - 12:00	51.40		73.90	39.40	
7	12:00 - 13:00	49.40		60.80	37.90	
8	13:00 - 14:00	49.70		59.90	36.20	
9	14:00 - 15:00	57.30		75.40	41.00	
10	15:00 - 16:00	48.40		60.80	36.50	
11	16:00 - 17:00	47.40		60.90	38.70	
12	17:00 - 18:00	48.90		64.40	39.30	
13	18:00 - 19:00	51.70	65	66.40	39.10	
14	19:00 - 20:00	44.80		58.00	39.00	
15	20:00 - 21:00	44.50		58.00	38.10	
16	21:00 - 22:00	44.50		63.10	38.00	
17	22:00 - 23:00	43.10	50	51.50	37.30	
18	23:00 - 00:00	44.00		53.10	36.00	
19	00:00 - 1:00	39.70		52.00	35.60	
20	1:00 - 2:00	39.40		50.90	35.80	
21	2:00 - 3:00	40.90		50.20	36.00	
22	3:00 - 4:00	40.90		47.20	35.90	
23	4:00 - 5:00	40.60		51.40	35.80	
24	5:00 - 6:00	50.00		61.90	36.80	
24 hours Average		47.24		60.57	37.62	

ស្តង់ដារ៖ - យោងអនុក្រឹត្យលេខ ៤២ អនក្រ.បក ចុះថ្ងៃទី១០ ខែកក្កដា ឆ្នាំ២០០០ ស្តីពីការត្រួតពិនិត្យការបំពុលខ្យល់ និងការរំខានដោយសំឡេង

- ឧបករណ៍វាស់កម្រិតសំឡេងប្រភេទ RION NL- 42EX

ប្រធានក្រុមប្រឹក្សាភិបាល

3P-ENVIRONMENTAL SOLUTIONS
CO., LTD.
KINGDOM OF CAMBODIA

LEANG LORNMONTHANY

អាសយដ្ឋាន៖ ផ្ទះលេខ២១០ ផ្លូវ៤៥BT ក្រុម៥ ភូមិត្នោតជ្រុំ៥ សង្កាត់បឹងទំពុន២ ខណ្ឌមានជ័យ រាជធានីភ្នំពេញ
ទូរស័ព្ទ៖ 086 698 788/ អ៊ីម៉ែល៖ leanglornmonthany@gmail.com

2.5. Results Vibration test

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

3ភី-អ៊ិនវ៉ាយរ៉ិនម៉ិនថល សឹលូសិន ឯ.ក
លេខ៖ ...0185.../24...-3P

រាជធានីភ្នំពេញ ថ្ងៃទី៣១ ខែ តុលា ឆ្នាំ២០២៤

លទ្ធផលពិនិត្យកម្រិតរំញ័រ

ម្ចាស់គម្រោង៖ SCHNEITEC BEYOND CO., LTD

ប្រភេទគម្រោង៖ គម្រោងផលិតថាមពលអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ

អាសយដ្ឋានចុះពិនិត្យ៖ ភូមិអន្សងក្តាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ទីតាំងត្រួតពិនិត្យ៖ នៅក្នុងតំបន់លំនៅដ្ឋាន ក្បែរទីតាំងគម្រោង, UTM: 48P 0406629 & 1381123

ថ្ងៃចុះត្រួតពិនិត្យ៖ ថ្ងៃទី១៣ ខែតុលា ឆ្នាំ២០២៤

No	Survey Period	Vibration Level dB				Remarks
		LAeq	Standard	Lmax	Lmin	
1	6:00 - 7:00	24.50		42.90	16.10	
2	7:00 - 8:00	22.90		40.10	16.00	
3	8:00 - 9:00	22.70		39.80	14.80	
4	9:00 - 10:00	25.10		39.60	15.40	
5	10:00 - 11:00	22.30		41.30	16.20	
6	11:00 - 12:00	24.90	65	36.90	15.70	
7	12:00 - 13:00	21.90		41.30	15.10	
8	13:00 - 14:00	23.30		38.30	16.10	
9	14:00 - 15:00	21.80		40.00	15.40	
10	15:00 - 16:00	26.70		41.10	15.00	
11	16:00 - 17:00	25.80		29.80	15.70	
12	17:00 - 18:00	23.20		44.60	15.90	
13	18:00 - 19:00	22.30		40.40	15.80	
14	19:00 - 20:00	22.50		45.20	15.80	
15	20:00 - 21:00	21.30		32.50	15.60	
16	21:00 - 22:00	20.90		24.10	15.40	
17	22:00 - 23:00	20.70		24.30	15.60	
18	23:00 - 00:00	20.80	60	23.40	15.20	
19	00:00 - 1:00	20.60		23.70	15.30	
20	1:00 - 2:00	20.50		23.20	15.30	
21	2:00 - 3:00	20.50		30.10	15.30	
22	3:00 - 4:00	20.50		27.80	15.60	
23	4:00 - 5:00	20.80		33.40	15.70	
24	5:00 - 6:00	22.10		32.70	16.00	
24 hours Average		**22.44**		**34.85**	**15.58**	

ស្តង់ដារ៖ - យោងប្រកាសលេខ ១១៦ ប្រក.បស្ថ ចុះថ្ងៃទី១១ ខែមេសា ឆ្នាំ២០១៨ ស្តីពីការដាក់ឱ្យប្រើប្រាស់គំរូលក្ខខណ្ឌការងារ សម្រាប់គម្រោងរោងចក្រ សិប្បកម្ម

- ឧបករណ៍វាស់កម្រិតរំញ័រប្រភេទ RION VM 55EX

ប្រធានក្រុមប្រឹក្សាភិបាល

ព្រះរាជាណាចក្រកម្ពុជា
ក្រុមហ៊ុន
3ភី-អ៊ិនវ៉ាយរ៉ិនម៉ិនថល សឹលូសិន ឯ.ក
3P-ENVIRONMENTAL SOLUTIONS CO., LTD.
KINGDOM OF CAMBODIA

LEANG LORNMONTHANY

អាសយដ្ឋាន៖ ផ្ទះលេខ២១០ ផ្លូវ៤៥៥T ក្រុម៥ ភូមិត្នោតជ្រុំ៥ សង្កាត់បឹងទំពុន២ ខណ្ឌមានជ័យ រាជធានីភ្នំពេញ
ទូរស័ព្ទ៖ 086 698 788/ អ៊ីម៉ែល៖ leanglornmonthany@gmail.com

Appendix 3: Household questionnaire

កម្រងសំណួរសម្ភាសន៍គ្រួសារ

កម្រងសំណួរសម្ភាសន៍គ្រួសារសម្រាប់សិក្សាស្ថានភាពសេដ្ឋកិច្ចសង្គម
របស់ប្រជាជនដែលមានការពាក់ព័ន្ធនឹងគម្រោងអភិវឌ្ឍស្ថានីយផលិតអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ
អនុភាព ១៥០មេហ្គាវ៉ាត់

លេខកូដសំណួរ៖	ឈ្មោះអ្នកសម្ភាស៖		កាលបរិច្ឆេទ៖ ....
ភូមិ៖	ឃុំ៖..........	ស្រុក៖	ខេត្ត៖......................

1. ព័ត៌មានទូទៅអំពីប្រជាសាស្ត្រនិងសាសនា

1.1. ឈ្មោះអ្នកផ្តល់សម្ភាស៖ ....អាយុ៖.. .... ភេទ៖ □ ១. ប្រុស □ ២.ស្រី

1.2. តើអ្នកជាមេគ្រួសារ ?□ ១. បាទ/ចាស□២. ទេ (បើទេ ភេទនៃមេគ្រួសារ □១. ប្រុស □ ២. ស្រី)

1.3. កម្រិតអប់រំ៖ □១.មិនចេះអក្សរ □២. ចេះអក្សរ □៣.បឋមសិក្សា □៤.អនុវិទ្យាល័យ □៥.វិទ្យាល័យ □៦. បរិញ្ញាបត្រ □៧. បណ្តុះបណ្តាលវិជ្ជាជីវៈ □៨.ផ្សេងៗ ....

1.4. ជនជាតិរបស់មេគ្រួសារ៖ □ ១. ខ្មែរ □២. ខ្មែរអ៊ីស្លាម □៣. ថៃ □៤. វៀតណាម □៥.ផ្សេងៗ.....

1.5. សាសនា មេគ្រួសារ □១.ព្រះពុទ្ធសាសនា □២.សាសនាគ្រីស្ត □៣.សាសនាអ៊ីស្លាម □៤.ផ្សេងៗ

1.6. តើអ្នករស់នៅទីនេះរយៈពេលប៉ុន្មានឆ្នាំហើយ? □ ១. ជាស្រុកកំណើត □២.<១ឆ្នាំ □៣.ពី១-៥ឆ្នាំ □ ៤. ពី៥-១០ឆ្នាំ □ ៥. >១០ឆ្នាំ

1.7. មូលហេតុនៃការចាកចេញពីស្រុកកំណើត?
□ ១.មកតាមគ្រួសារ □ ២. គ្មានមុខរបរ □៣.ផ្សេងៗ...................................។

2. ស្ថានភាពសេដ្ឋកិច្ច

<u>ក. ចំណូលចំណាយ</u>

2.1. តើក្នុងគ្រួសាររបស់អ្នកមានសមាជិកប៉ុន្មាននាក់? ....នាក់ ស្រី៖..............នាក់

2.2. តើនៅក្នុងគ្រួសាររបស់អ្នកមានមុខរបរអ្វីខ្លះ?

ប្រភេទមុខរបរ	ចម្បង	បន្ទាប់បន្សំ	ចំណូល ប្រចាំ ថ្ងៃ (៛)	ចំណូល ប្រចាំ ខែ (៛)	ចំណូល ប្រចាំ ឆ្នាំ (៛)
១. នេសាទ	□	□			
២. ចិញ្ចឹមសត្វ	□	□			
៣. លក់ដូរ និងជំនួញ	□	□			
៤. ជាងជួសជុល	□	□			
៥. ដឹកជញ្ជូន	□	□			

ប្រភេទមុខរបរ	ចម្បង	បន្ទាប់បន្សំ	ចំណូល ប្រចាំ ថ្ងៃ (៛)	ចំណូល ប្រចាំ ខែ (៛)	ចំណូល ប្រចាំ ឆ្នាំ (៛)
៦. កម្មករសំណង់	☐	☐			
៧. កម្មកររោងចក្រ	☐	☐			
៨. បុគ្គលិកអង្គការ	☐	☐			
៩. បុគ្គលិកក្រុមហ៊ុនឯកជន	☐	☐			
១០. មន្ត្រីរាជការ	☐	☐			
១១. ធ្វើស្រែ-ចម្ការ	☐	☐			
១២. បំរើការងារក្នុងវិស័យសិប្បកម្មៈ	☐	☐			
សរុប					

2.3. ចំណាយប្រចាំគ្រួសារ

អត្ថាធិប្បាយ	ការចំណាយ ប្រចាំថ្ងៃ (៛)	ការចំណាយ ប្រចាំខែ (៛)	ការចំណាយ ប្រចាំឆ្នាំ (៛)
☐ ១. ថ្លៃម្ហូបអាហារប្រចាំថ្ងៃ			
☐ ២. សម្រាប់យានយន្តធ្វើដំណើរ/សាំង			
☐ ៣. ថ្លៃភ្លើងអគ្គិសនី			
☐ ៤. ថ្លៃហ្គាស			
☐ ៥. ថ្លៃអុស/ធ្យូង			
☐ ៦. ទឹកប្រើប្រាស់			
☐ ៧. ការសិក្សាអប់រំ			
☐ ៨. សុខភាព (ថ្នាំពេទ្យ ជាដើម)			
☐ ៩. ពិធីបុណ្យ (ពិធីការ បុណ្យ)			
☐ ១០. សំលៀកបំពាក់			
☐ ១១. សងបំណុល			
☐ ១២. ផ្សេងៗ......................			
សរុប			

ខ. ព័ត៌មានលម្អិតអំពីការចិញ្ចឹមសត្វ (ប្រសិនបើការចិញ្ចឹមសត្វជាប្រភពចំណូលរបស់អ្នកផ្តល់សម្ភាស)

2.4. តើគ្រួសាររបស់អ្នកមានចិញ្ចឹមសត្វសម្រាប់លក់ដូរដែរឬទេ? □១. មាន □២. គ្មាន

ប្រភេទសត្វ	ចំនួន (ក្បាល)	ចំនួនលក់ (៛/ឆ្នាំ)	តម្លៃ/ឯង (៛/ឯង)	ចំណាយ/ឆ្នាំ (៛/ឆ្នាំ)
□១. គោ				
□២. ជ្រូក				
□៣. មាន់				
□៤. ទា				
□៥. ពពែ				
□៦. ត្រី				
□៧. ផ្សេងៗ				
តម្លៃសរុប			៛	៛

គ. ព័ត៌មានលម្អិតអំពីការនេសាទ

១ តើអ្នកជាសមាជិកសហគមន៍នេសាទ? .... ចូលពីឆ្នាំណា?.......................						
២ ទីតាំងនេសាទ?						
៣ ចំនួននៃការចេញនេសាទប្រចាំខែ?						
៤ គោលបំណង?						
៥ ព័ត៌មានពីការនេសាទ						
ប្រភេទផល នេសាទ	**ចំនួន ដង/ខែ**	**ទិន្នផល/ ម្តង**	**ទិន្នផល/ ឆ្នាំ**	**តម្លៃទីផ្សារ (រៀល)**	**ចំណាយផ្សេងៗសរុប/ឆ្នាំ (រៀល**	**ចំណូល/ឆ្នាំ (រៀល)**
					សរុបរួម	

3. លំនៅដ្ឋាន ការកាន់កាប់ដីធ្លី និងទ្រព្យសម្បត្តិ

<u>ក. លំនៅដ្ឋាន និងការកាន់កាប់ដីធ្លី</u>

3.1. តើគ្រួសាររបស់អ្នកមានដីធ្លីកាន់កាប់ដែរឬទេ ?□ ១.មិនមាន □ ២.មាន

3.1.1. តើគ្រួសាររបស់អ្នកមានឯកសារកម្មសិទ្ធិដីធ្លីដែរឬទេ ? □ ១.មិនមាន □ ២.មាន

3.1.2. បើមាន តើឯកសារកម្មសិទ្ធិប្រភេទអ្វី? □១.ប្លង់រឹង □២.ប័ណ្ណកម្មសិទ្ធិ□៣.ផ្សេង

3.2. ប្រភេទផ្ទះ (សូមធ្វើការអង្កេត) □១.ផ្ទះដំបូលប្រក់ស្លឹកស្បូវ □២.ផ្ទះដំបូលប្រក់ស័ង្កសីស៊ីប្រូស៊ីម៉ងត៍ □៣.ផ្ទះដំបូលប្រក់ក្បឿង □ ៤.ផ្ទះថ្មមិនមែនបេតុង □ ៥.ផ្ទះថ្មល្វែង □៦.ផ្ទះភូមិគ្រឹះ(វីឡា) □៧. ផ្សេងៗ ....

3.3. តើដីលំនៅដ្ឋានមានទំហំប៉ុន្មានហិកតា..

<u>ខ. ទ្រព្យសម្បត្តិក្នុងគ្រួសារ</u>

តើគ្រួសារអ្នកមានទ្រព្យសម្បត្តិអ្វីខ្លះ ?

ប្រភេទ	ចំនួន	ប្រភេទ	ចំនួន
□ ១. ឡាន		□ ៨. ទូរទស្សន៍	
□ ២. ម៉ូតូ		□ ៩. ទូរស័ព្ទដៃ	
□ ៣. កង់		□ ១០. កុំព្យូទ័រ	
□ ៤. ម៉ាស៊ីនភ្លើង		□ ១១. គោយន្ត	
□ ៥.ម៉ាញ៉េម៉ាស៊ីនចាក់ស៊ីឌី /VCD		□ ១២. ត្រាក់ទ័រ	
□ ៦. ម៉ាស៊ីន/ម៉ូទ័របូមទឹក		□ ១៣.ទូក ទំហំ (.................)	
□ ៧. រទេះគោ		□ ១៤.ផ្សេងៗ	

4. ហេដ្ឋារចនាសម្ព័ន្ធ និងសេវាកម្មក្នុងតំបន់

<u>ក. បញ្ហាសុខភាព</u>

4.1. តើគ្រួសាររបស់អ្នកធ្លាប់មានជំងឺដែរឬទេ ក្នុងរយៈពេល ១ឆ្នាំចុងក្រោយនេះ ?

□១.ធ្លាប់ □២.មិនធ្លាប់ (បើមិនធ្លាប់ សូមរំលងទៅសំណួរទី៤.៣)

4.2. តើគ្រួសាររបស់អ្នកធ្លាប់មានជំងឺអ្វីខ្លះក្នុងរយៈពេល ១ឆ្នាំចុងក្រោយនេះ ?

**លេខកូដ៖ ១. ធ្ងន់ធ្ងរជាងមុន២.នៅដដែល ៣.ប្រសើរជាងមុនឬជាសះស្បើយ៤.ផ្សេងៗ .....*

***លេខកូដ៖ ១. មណ្ឌលសុខភាព (ឈ្មោះ ....) ២.មន្ទីរពេទ្យបង្អែក (ឈ្មោះ ....)*
៣.ពេទ្យ/គ្លីនិចឯកជន ៤.ទិញថ្នាំញ៉ាំខ្លួនឯង ៥.គ្រូខ្មែរ ៦.ផ្សេងៗ ....

ប្រភេទជំងឺ	ស្ថានភាពជំងឺនៅ ពេលបច្ចុប្បន្ន*	កន្លែងព្យាបាល**
□១. ជំងឺរាគមួល/រាគគ្មានខ្សោះជាតិទឹក		
□២. ជំងឺអាសន្នរោគ		
□៣. ជំងឺកាមរោគ		
□៤. ជំងឺគ្រុនឈាម		

ប្រភេទជំងឺ	ស្ថានភាពជំងឺនៅ ពេលបច្ចុប្បន្ន*	កន្លែងព្យាបាល**
□៥. ជំងឺពងបែកនៅដៃ-ជើង-មាត់		
□៦. ជំងឺរលាកថ្លើមប្រភេទ A		
□៧. ជំងឺរលាកថ្លើមប្រភេទ B		
□៨. ជំងឺរលាកថ្លើមប្រភេទ C		
□៩. ជំងឺអេដស៍		
□១០. ជំងឺគ្រុនចាញ់		
□១១. ជំងឺផ្តាសសាយ		
□១២. ជំងឺគ្រុនពោះវៀន		
□១៣. ជំងឺរបេង		
□១៤. ជំងឺទឹកនោមផ្អែម		
□១៥. ជំងឺកង្វះអាហាររូបត្ថម្ភ		
□១៦. ជំងឺលើសសម្ពាធឈាម		
□១៧. របួសដោយគ្រោះថ្នាក់ចរាចរណ៍មានប៉ះទង្គិចក្បាល		
□១៨. ជំងឺវិកលចរិត		
□១៩. ជំងឺនានាផ្នែករោគស្ត្រី		
□២០. ជំងឺរលាកផ្លូវដង្ហើមខាងលើ (រលាកសួត ឬរលាកទងសួត)		
□២១.ជំងឺរលាកផ្លូវដង្ហើមខាងក្រោម (ជំងឺហឺត ទឹកស្រោមសួត)		
□២២. ជំងឺនានាទាក់ទងនឹងស្បែក............		
□២៣. ជំងឺផ្នែកភ្នែក.		
□២៤. ជំងឺសន្លាក់ដៃជើង		
□២៥. គ្រុនស្វិតដៃជើង		
□២៦. ផ្សេងៗ		

ខ. ការប្រើប្រាស់ទឹកនិងអនាម័យ

4.3. តើប្រភពទឹកណាខ្លះដែលអ្នកអាចយកមកប្រើប្រាស់ជាប្រចាំថ្ងៃបាន?

****លេខកូដ៖ ១. សម្រាប់ផឹក ២. សម្រាប់ងូត ៣.សម្រាប់លាងសម្អាត ៤.សម្រាប់ការងារកសិកម្ម***

៥.សម្រាប់ការងារសិប្បកម្ម   ៦.ផ្សេង ....

***លេខកូដ៖ ១. ល្អ (គ្មានក្លិន ថ្លា ...) ២.មិនល្អ (ទឹកក្រហម ហេតុអ្វី)*

ប្រភពទឹក	គោលបំណងនៃការប្រើប្រាស់ទឹក*	លក្ខណៈគុណភាពទឹក**
□១.ពីរោងចក្រទឹកក្នុងតំបន់(ទឹក		
□២.ទឹកសុទ្ធ		
□៣.ស្រះ/ត្រពាំង		
□៤.អណ្តូងស្នប់(ជម្រៅ		
□៥.អណ្តូងលូ		
□៦.ទឹកភ្លៀង		
□៧.ផ្សេងៗ..............................		

តើលោកអ្នកបរិភោគទឹកអ្វី? □១.ទឹកឆ្អិន □២.ទឹកឆៅ □៣.ទឹកចម្រោះ □៤. ផ្សេងៗ ....

4.4. បើបរិភោគទឹកមិនទាន់ដាំ ហេតុអ្វី? □១. ទម្លាប់ □២. គ្មានពេលដាំ □៣.ស្អាតស្រាប់ □៤. គ្មានថវិកា □៥. ផ្សេងៗ ....

4.5. តើគ្រួសារលោកអ្នកមានបង្គន់អនាម័យដែរឬទេ? □១. មាន □២. គ្មាន

4.5.1. បើមាន តើបង្គន់របស់គ្រួសារអ្នក ជាបង្គន់ប្រភេទអ្វី? □១. បង្គន់ចាក់ទឹក □២. បង្គន់ចាក់ផេះ □៣. ផ្សេងៗ....................

4.5.2. បើគ្មាន តើលោកអ្នកបន្ទោរបង់នៅឯណា?

□១.បង្គន់អ្នកជិតខាង □២. គម្ពោតព្រៃ □៣.វាលស្រែ □៤. ផ្សេងៗ..................

<u>គ. ការប្រើប្រាស់ថាមពល</u>

4.6. តើគ្រួសារអ្នកប្រើប្រាស់អគ្គិសនីមានប្រភពមកពីណា? □១. អគ្គិសនីកម្ពុជា(រដ្ឋ) □២.ឯកជន □៣.អាគុយ □៤.ម៉ាស៊ីនភ្លើងខ្លួនឯង □៥. ថាមពលបន្ទះសូឡា □៦.ឡជីវឧស្ម័ន □៧.ផ្សេងៗ............

4.7. តម្លៃថាមពលអគ្គិសនី........................... រៀលក្នុងមួយគីឡូវ៉ាត់ម៉ោង

4.8. ផលវិបាកនៃការប្រើប្រាស់ថាមពលអគ្គិសនី

....

4.9. តើសហគមន៍របស់អ្នកមានសេវាកម្មប្រមូលសំរាមដែរឬទេ? □ ១.មិនមាន □ ២.មាន

4.10. តើអ្នកត្រូវចំណាយយ៉ាងដូចម្តេចចំពោះសេវាកម្មនេះ?

....

4.11. បើគ្មាន តើអ្នក និងសហគមន៍របស់អ្នកទុកដាក់សំណល់រឹងដោយរបៀបណា?

□១.ដុតចោល □២.កប់ចោល □៣.បោះចោលពាសវាលពាសកាល

□៤.ផ្សេងៗ.........................

5. ទស្សនៈនិងការយល់ឃើញរបស់ប្រជាជន

5.1. តើក្នុងតំបន់ដែលអ្នករស់នៅមានបញ្ហាបរិស្ថានអ្វីខ្លះ? ☐១. ការបំពុលទឹក ☐២.ការបំពុលខ្យល់
☐៣. បញ្ហាក្លិនស្អុយ ☐៥. បញ្ហាសំណល់រឹង ☐៦. ផ្សេងៗ.........

5.2. តើអ្នកបានដឹងអំពីព័ត៌មានដំណើរការរបស់គម្រោងដែរឬទេ ? ☐១.ដឹង ☐២.មិនដឹង

5.3. តើអ្នកមានដីនៅក្បែរគម្រោងនេះដែរឬទេ? ☐១. មាន ☐២. មិនមាន (រំលងទៅសំណួរទី ៦.៤)

5.4. តើអ្នកមានការព្រួយបារម្ភអ្វីខ្លះទាក់ទងទៅនឹងដំណើរការរបស់គម្រោងនេះ?
☐១.មាន☐២.មិនមាន
បើមាន តើបញ្ហាអ្វីខ្លះដែលអ្នកព្រួយបារម្ភ?

☐១. ប៉ះពាល់ដីធ្លី ☐២. រំខានដោយសំឡេង ឬរំញ័រ ☐៣. ការបំពុលខ្យល់
☐៤. ការទុកដាក់សំណល់រឹង ☐៥. ការស្ទះ/សណ្តាប់ធ្នាប់ចរាចរណ៍ ☐៦. ផ្សេងៗ............

5.5. តើអ្នកគិតថាគម្រោងនេះនឹងផ្តល់អត្ថប្រយោជន៍ដល់គ្រួសារអ្នក ឬសហគមន៍ដែរឬទេ?
☐១.មានប្រយោជន៍ ☐២. គ្មានប្រយោជន៍ ☐៣. មិនដឹង
បើមាន តើគម្រោងនេះបានផ្តល់នូវអត្ថប្រយោជន៍អ្វីខ្លះ?

☐១.បង្កើតការងារដល់សហគមន៍ ☐២.ការសាងសង់ផ្លូវធ្វើដំណើរ ☐៣.បង្កើនតម្លៃអចលនទ្រព្យ
☐៤.ជួយស្តារប្រព័ន្ធលូ ☐៥.បង្កើនភ្ញៀវទេសចរណ៍ ☐៦.ជួយអភិវឌ្ឍន៍សេដ្ឋកិច្ចជាតិ
☐៧.ផ្សេងៗ...........................

សូមលេខទំនាក់ទំនងបើមាន៖...........................

Appendix 4: Minute of consultations with stakeholders

4.1. Meeting minute: Pursat Provincial Department of Environment

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ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក
ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្ដាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]

ទីកន្លែង៖ [illegible]

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 8:30 [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ទំព័រទី1

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- [illegible]
[illegible]
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ទំព័រទី២

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E-mail: info@e-aconsultant.com

បញ្ជីវត្តមាន

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 8:30 [illegible]

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	[illegible]	[illegible]	[illegible]	016675676		
២	[illegible]	[illegible]	[illegible]	E&A	015657595		
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ថ្ងៃទី៖ 24.09.2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

4.2. Meeting minute: Pursat Provincial Department of Mine and Energy

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Tel/Fax: (+855) 12 406 716/ 23 212 124
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ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក
ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្លាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]
ទីកន្លែង៖ [illegible]
កាលបរិច្ឆេទ៖ ថ្ងៃទី [illegible] ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ទំព័រទី1

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ទំព័រទី២

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E&A CONSULTANT CO., LTD
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E-mail: info@e-aconsultant.com

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី ២៧ ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ៨:៣០ នាទីព្រឹក

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប	[illegible]	[illegible]	092468700	[illegible]	
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ថ្ងៃទី៖ 27.09.2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖.....................................

4.3. Meeting minute: Pursat Provincial Department of Water Resources and Meteorology

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ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក

ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្តាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]

ទីកន្លែង៖ មន្ទីរធនធានទឹក និងឧតុនិយម ខេត្តពោធិ៍សាត់

កាលបរិច្ឆេទ៖ ថ្ងៃទី ២៦ ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ៨:៣០ នាទីព្រឹក

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

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ទំព័រទី1

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ទំព័រទី2

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 10:00 [illegible]

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
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ថ្ងៃទី៖ 27..09..2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

4.4. Meeting minute: Pursat Provincial Department of Agriculture, Forestry and Fisheries

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ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក

ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្តាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]

ទីកន្លែង៖ [illegible]

កាលបរិច្ឆេទ៖ ថ្ងៃទី [illegible] ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ទំព័រទី1

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[illegible]
[illegible]

[illegible]

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E & A
Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: [illegible]

បញ្ជីវត្តមាន

សម្រាប់គម្រោងអភិវឌ្ឍន៍ស្ថានីយផលិតអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ អានុភាព១៥០មេហ្គាវ៉ាត់

របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 2:30 រសៀល

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប្រុស	[illegible]	[illegible]	011291469	[signature]	
២	[illegible]	[illegible]	[illegible]	[illegible]	092304065	[signature]	
៣	[illegible]	[illegible]	[illegible]	[illegible]	012691857	[signature]	
៤	[illegible]	[illegible]	[illegible]	[illegible]	093607778	[signature]	
៥	[illegible]	ប្រុស	[illegible]	[illegible]	069446622	[signature]	
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រៀបចំដោយ

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ថ្ងៃទី៖ 2[illegible].09.2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

4.5. Meeting minute: Pursat Provincial Department of Tourism

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ការរៀបចំរបាយការណ៍វាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន និងសង្គម សម្រាប់គម្រោងអភិវឌ្ឍស្ថានីយផលិតអគ្គិសនីដើរ

ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក

ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្តាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]

ទីកន្លែង៖ [illegible]

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 3:30 [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

– [illegible]

– [illegible]

– [illegible]

– [illegible]

– [illegible]

– [illegible]

+ [illegible]

– [illegible]

+ [illegible]

– [illegible]

ទំព័រទី1

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Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: info@e-aconsultant.com

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[illegible]

[illegible]

[illegible]

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Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: info@e-aconsultant.com

បញ្ជីវត្តមាន

សម្រាប់គម្រោងអភិវឌ្ឍន៍ស្ថានីយផលិតអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ អានុភាព១៥០មេហ្គាវ៉ាត់

របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 3:00 [illegible]

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប្រុស	[illegible]	[illegible]	012856485		
២	[illegible]	ស្រី	ប្រជាពលរដ្ឋ	[illegible]	089706257		
៣	[illegible]	ប្រុស	ប្រជាពលរដ្ឋ	[illegible]	012336656		
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រៀបចំដោយ

[illegible]

ថ្ងៃទី៖ 27..09..2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖.....................................

4.6. Meeting minute: Pursat Provincial Department of Culture and Fine Arts

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ឈ្មោះ៖ [illegible] តួនាទី [illegible]

ទីកន្លែង៖ [illegible]

កាលបរិច្ឆេទ៖ ថ្ងៃទី ២៧ ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 11:00 [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ទំព័រទី1

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Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: info@e-aconsultant.com

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[illegible]

[illegible]

ទំព័រទី២

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E-mail: info@e-aconsultant.com

បញ្ជីវត្តមាន

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី...27...... ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ....១១ : ០០ នាទីព្រឹក

ទីកន្លែង៖ ...មន្ទីរវប្បធម៌ និងវិចិត្រសិល្បៈ ខេត្ត[illegible].............

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប	[illegible]	[illegible]	012955778		
២	[illegible]	ប	[illegible]	វប្បធម៌	012059543		
៣	[illegible]	ប	[illegible]	វប្បធម៌	089706047		
៤	[illegible]	ប	[illegible]	វប្បធម៌	0966685086		
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រៀបចំដោយ

[illegible]

ថ្ងៃទី៖ ..24..09..2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

4.7. Meeting minute: Damnak Kranh Fish Refuge Community

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Tel/Fax: (+855) 12 406 716/ 23 212 124
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កំណត់ហេតុស្ដីពី

ការរៀបចំវិច្ឆាយការណ៍វាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន និងសង្គម សម្រាប់គម្រោងអភិវឌ្ឍស្ថានីយផលិតអគ្គិសនីដើរ
ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក
ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្តាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]
ទីកន្លែង៖ [illegible]
កាលបរិច្ឆេទ៖ ថ្ងៃទី ២៦ ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 10:00 [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

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+ សំណូមពរ

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ទំព័រទី2

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Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: info@e-aconsultant.com

បញ្ជីវត្តមាន

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី 27 ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 8:00នាទីព្រឹក

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប	[illegible]	[illegible]	078951163	[illegible]	
២	[illegible]	ប	[illegible]	[illegible]	012543227	[illegible]	
៣	[illegible]	ប	[illegible]	[illegible]	012590887	[illegible]	
៤	[illegible]	ប	[illegible]	[illegible]	0882912995/	[illegible]	
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[illegible]

ថ្ងៃទី៖ 27.09.2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

4.8. Meeting minute: Alung Tnaut Commune Office

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ការរៀបចំវេទិកាផ្សព្វផ្សាយការណ៍វាយតម្លៃហេតុប៉ះពាល់បរិស្ថាន និងសង្គម សម្រាប់គម្រោងអភិវឌ្ឍស្ថានីយផលិតអគ្គិសនីដើរ

ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក

ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្ដាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

ឈ្មោះ៖ [illegible] តួនាទី [illegible]

ទីកន្លែង៖ [illegible]

កាលបរិច្ឆេទ៖ ថ្ងៃទី ២៦ ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ 3:30 [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ទំព័រទី1

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[illegible]

[illegible]

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E-mail: info@eaconsultant.com

បញ្ជីវត្តមាន

សម្រាប់គម្រោងអភិវឌ្ឍន៍ស្ថានីយផលិតអគ្គិសនីដោយថាមពលពន្លឺព្រះអាទិត្យ អានុភាព១៥០មេហ្គាវ៉ាត់

របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន់ ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី...២៦...... ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ....០៣..:០០ នាទីរសៀល

ទីកន្លែង៖ សាលាឃុំ [illegible]...............................

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ស	[illegible]	[illegible]	017952539	Bi	
២	[illegible]	ប	[illegible]	[illegible]	017315998	[illegible]	
៣	[illegible]	ស	[illegible]	[illegible]	089951753	[illegible]	
៤	[illegible]	ស	[illegible]	[illegible]	0973163823	[illegible]	
៥	[illegible]	ប	[illegible]	[illegible]	012394178	[illegible]	
៦							
៧							
៨							
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រៀបចំដោយ

Suard
[illegible]

ថ្ងៃទី៖ ..26....09....2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖.....................................

4.9. Meeting minute: Sna Asa Commune and relevant villages

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កិច្ចប្រជុំពិគ្រោះយោបល់ជាមួយអាជ្ញាធរមូលដ្ឋាន៖ ឃុំស្នាអន្សា

ទីកន្លែង៖ សាលាឃុំស្នាអន្សា

កាលបរិច្ឆេទ៖ ថ្ងៃទី [illegible] ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ១០ : ០០ នាទីព្រឹក

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ក. លោក [illegible]

ខ. លោក [illegible]

គ. លោក [illegible]

ឃ. លោក [illegible]

[illegible]

+ [illegible]

- [illegible]

- [illegible]

- [illegible] 2011

- [illegible] 2017

- [illegible]

- [illegible]

ទំព័រទី1

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[illegible]

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\+ សំណូមពរ ៖

\- គម្រោងមានគួរតែផ្តល់ឱកាសដល់ពលករក្នុងការងារចិញ្ចឹមជីវិតដល់ប្រជាជន សហគមន៍ក្នុងមូលដ្ឋាន ទប់ស្កាត់ការចំណាកស្រុក ដើម្បីដោះស្រាយនូវ តម្រូវការចាំបាច់របស់សហគមន៍

\- គម្រោងមានគួរតែផ្តល់អាទិភាពដល់ការប្រើប្រាស់សម្ភារសាងសង់ និង ការផ្គត់ផ្គង់សេវាកម្មពីប្រជាជនក្នុងមូលដ្ឋានដើម្បីបង្កើតនូវឱកាសការងារ

\- ក្រុមហ៊ុនគួរតែភ្ជាប់ទំនាក់ទំនងជាមួយអាជ្ញាធរ និងប្រជាជនក្នុងមូលដ្ឋានដើម្បី ធានាបាននូវការអនុលោមតាមបទប្បញ្ញត្តិ និងដោះស្រាយរាល់ កង្វល់ ឬបញ្ហាប្រឈមនានា

\- សូមគម្រោងមានវិធានការកាត់បន្ថយនូវធូលី សំលេង និងរំញ័រ នៅតាម ទីតាំងសំខាន់ៗ ដូចជាសាលារៀន មណ្ឌលសុខភាព និងវត្តអារាម ជាដើម ឬការផ្តល់បណ្តុះបណ្តាលដល់បុគ្គលិក ផ្សេងៗ និងបានវិធានការលើកកម្ពស់ការប្រុងប្រយ័ត្នពេលបើកបរ ដោយល្បឿនលឿនព្រោះអាចមានគ្រោះថ្នាក់

\- មេឃុំ ចៅសង្កាត់ និងមេភូមិ ត្រៀមខ្លួនជួយសម្របសម្រួលជាមួយគម្រោងឱ្យ យោបល់ និងចូលរួមក្នុងការងារក្នុងភូមិ និងតំបន់ ដើម្បីសុវត្ថិភាព នៅតាមផ្លូវនៅក្នុងភូមិ

អ្នកផ្តល់យោបល់

ទំព័រទី៣

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី...26...... ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ...10:00 [illegible]...........

ទីកន្លែង៖ ...[illegible]...........

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	[illegible]	[illegible]	[illegible]	078951163	[signature]	
២	[illegible]	ប	[illegible]	[illegible]	012823784	[signature]	
៣	[illegible]	ប	[illegible]	[illegible]	089768828	[signature]	
៤	[illegible]	ស	[illegible]	ឃុំ	012590887	[signature]	
៥	ផល ហ៊ុយម៉េង	ប	មន្ត្រីគម្រោង	E&A	015652595	[signature]	
៦	[illegible]	ប	មេភូមិ	[illegible]	012543227	[signature]	
៧	[illegible]	ប	[illegible]	[illegible]	0882032057	[signature]	
៨	[illegible]	ប	[illegible]	[illegible]	092420734	[signature]	
៩	[illegible]	[illegible]	[illegible]	[illegible]	017509946	[signature]	
១០	[illegible]	[illegible]	មេភូមិ	[illegible]	0882572409	[signature]	
១១							
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រៀបចំដោយ

ផល ហ៊ុយម៉េង

ថ្ងៃទី៖ 26.09.2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

4.10. Meeting minute: FGD with relevant villages in Sna Ansa commune

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ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក

ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្សរក្លាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

កិច្ចប្រជុំពិគ្រោះយោបល់ជាមួយប្រជាជន៖ [illegible]

ទីកន្លែង៖ [illegible]

កាលបរិច្ឆេទ៖ ថ្ងៃទី [illegible] ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ [illegible]

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

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[illegible]
[illegible]
[illegible]
[illegible]

[illegible]

ទំព័រទី2

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Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: [illegible]

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របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី...២៦......ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ....០២...:..០០.នាទី.រសៀល

ទីកន្លែង៖ ..[illegible]...

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ស	[illegible]	[illegible]			
២	[illegible]	〃	〃	[illegible]			
៣	[illegible]	〃	〃	〃			
៤	[illegible]	〃	〃	〃			
៥	[illegible]	〃	〃	〃			
៦	[illegible]	〃	〃	〃			
៧	[illegible]	〃	〃	〃			
៨	[illegible]	〃	〃	〃			
៩	[illegible]	〃	〃	〃			
១០	[illegible]	ប	[illegible]	[illegible]			
១១	[illegible]	ប	[illegible]	[illegible]			
១២	[illegible]	ស	[illegible]	[illegible]			
១៣	[illegible]	ស	[illegible]	[illegible]			
១៤	[illegible]	ស	[illegible]	[illegible]	092431923		
១៥	[illegible]	ស	[illegible]	[illegible]			
១៦	[illegible]	ស	[illegible]	[illegible]			
១៧	[illegible]	ស	[illegible]	[illegible]			
១៨	[illegible]	ប	[illegible]	[illegible]			
១៩							
២០							

រៀបចំដោយ

[illegible]

ថ្ងៃទី៖ 26 .09. 2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖.....................................

4.11. Meeting minute: FGD with Khla Krapeu village in Anlung Tnaut commune

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ដោយថាមពលពន្លឺព្រះអាទិត្យ អនុភាព ១៥០មេហ្គាវ៉ាត់ របស់ក្រុមហ៊ុនស្នេថេក ប៊ីយ៉ន ឯ.ក
ស្ថិតក្នុងភូមិសាស្ត្រ ភូមិអន្លង់ក្រាម ឃុំស្នាអន្សា ស្រុកក្រគរ ខេត្តពោធិ៍សាត់

កិច្ចប្រជុំពិគ្រោះយោបល់ជាមួយប្រជាជន៖ [illegible]
ទីកន្លែង៖ [illegible]
កាលបរិច្ឆេទ៖ ថ្ងៃទី ...២៤...... ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ....[illegible].....

ខ្លឹមសារនៃកិច្ចប្រជុំមានដូចតទៅ៖

[illegible]

ទំព័រទី1

ក្រុមហ៊ុន អ៊ី&អេ ខនសាល់ធេន
E&A CONSULTANT CO., LTD.
Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: info@e-aconsultant.com

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[illegible]
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[illegible]
[illegible]

[illegible]

ទំព័រទី2

E & A CONSULTANT

Tel/Fax: (+855) 12 406 716/ 23 212 124
E-mail: [illegible]

បញ្ជីវត្តមាន

សម្រាប់គម្រោងអភិវឌ្ឍន៍ស្ថានីយផលិតអគ្គិសនីដើរដោយថាមពលពន្លឺព្រះអាទិត្យ អានុភាព១៥០មេហ្គាវ៉ាត់

របស់ក្រុមហ៊ុន ស្នេថេក ប៊ីយ៉ន ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី......26......ខែកញ្ញា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ....03:30 នាទីរសៀល

ទីកន្លែង៖ ..សាលាបឋមសិក្សាខ្លាក្រពើ..

ល.រ	ឈ្មោះ	ភេទ	តួនាទី	ស្ថាប័ន	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប្រុស	ប្រជាជន	ខ្លាក្រពើ	097341283		
២	[illegible]	ស្រី	ប្រជាជន	ខ្លាក្រពើ			
៣	[illegible]	ស្រី	ប្រជាជន	ខ្លាក្រពើ			
៤	ខាន់ សុខនី	ស្រី	ប្រជាជន	ខ្លាក្រពើ			
៥	និល [illegible]	ស្រី	ប្រជាជន	ខ្លាក្រពើ			
៦	[illegible]	ប្រុស	ប្រជាជន	ខ្លាក្រពើ			
៧	ឧន ចាន់ណា	ស្រី	ប្រជាជន	ខ្លាក្រពើ			
៨	[illegible]	ស្រី	ប្រជាជន	ខ្លាក្រពើ			
៩	[illegible]	ប្រុស	ប្រជាជន	ខ្លាក្រពើ			
១០	សឿន ប៊ូរ	ប្រុស	ប្រជាជន	ខ្លាក្រពើ			
១១	លី វណ្ណា	ប្រុស	ប្រជាជន	ខ្លាក្រពើ	0884256573		
១២							
១៣							
១៤							
១៥							
១៦							
១៧							
១៨							
១៩							
២០							

រៀបចំដោយ

ចលហ៊ុយម៉េង

ថ្ងៃទី៖ ..26.09.2024

អនុញ្ញាតដោយ

ថ្ងៃទី៖......................................

4.12. Dissemination and consultation meeting with local people (after draft ESIA)

ព្រះរាជាណាចក្រកម្ពុជា

ជាតិ សាសនា

ព្រះមហាក្សត្រ

៚៚៚✧៙៙៙

របាយការណ៍

ស្តីពីកិច្ចប្រជុំផ្សព្វផ្សាយនិងពិគ្រោះយោបល់ជាសាធារណៈជាមួយសហគមន៍មូលដ្ឋាន

ស្តីពីសេចក្តីព្រាងរបាយការណ៍វាយតម្លៃផលប៉ះពាល់បរិស្ថាន និងសង្គម (ESIA) សម្រាប់គម្រោងអភិវឌ្ឍរោងចក្រថាមពលពន្លឺព្រះអាទិត្យ ១៥០មេហ្គាវ៉ាត់ ជាមួយនឹងប្រព័ន្ធផ្ទុកថាមពល១៥០មេហ្គាវ៉ាត់ម៉ោង និងខ្សែបញ្ជូនតង់ស្យុងខ្ពស់ ២៣០គីឡូវ៉ុល ប្រវែង ១៦៨ គីឡូម៉ែត្រ របស់ក្រុមហ៊ុន អេឌីប ឯ.ក

ដែលធ្វើឡើងនៅទីតាំងសាលាឃុំ ភូមិអនលក់ ឃុំសាលា អនា ស្រុកត្រាំកក់ ខេត្តតាកែវ ព្រះរាជាណាចក្រកម្ពុជា

នៅថ្ងៃទី... ក្រុមការងារ ... បានរៀបចំកិច្ចប្រជុំផ្សព្វផ្សាយនិងពិគ្រោះយោបល់ជាសាធារណៈជាមួយសហគមន៍មូលដ្ឋាន ស្តីពីសេចក្តីព្រាងរបាយការណ៍វាយតម្លៃផលប៉ះពាល់បរិស្ថាន និងសង្គម (ESIA) សម្រាប់គម្រោងអភិវឌ្ឍរោងចក្រថាមពលពន្លឺព្រះអាទិត្យ ១៥០មេហ្គាវ៉ាត់ ជាមួយនឹងប្រព័ន្ធផ្ទុកថាមពល ១៥០មេហ្គាវ៉ាត់ម៉ោង និងខ្សែបញ្ជូន ... ១៦៨ គីឡូម៉ែត្រ ... ដែលធ្វើឡើងនៅទីតាំង ... ។

កិច្ចប្រជុំនេះ ... ដឹកនាំដោយ ... តំណាងអាជ្ញាធរមូលដ្ឋាន និងតំណាងសហគមន៍ (...) និងតំណាងក្រុមហ៊ុន ... ចំនួន ៥ ... និងចំនួនពីរ ... អ្នកចូលរួមកិច្ចប្រជុំសរុបចំនួន ៣៨នាក់ (...)។

ខាងក្រោមនេះ គឺជាលទ្ធផលនៃកិច្ចប្រជុំ៖

វ. ការបង្ហាញពីលទ្ធផលនៃសេចក្តីព្រាងរបាយការណ៍វាយតម្លៃផលប៉ះពាល់បរិស្ថាន និងសង្គម (ESIA)

កិច្ចប្រជុំ ... ក្រុមការងារ ... ESIA។ ការធ្វើបទបង្ហាញ ... សេចក្តីព្រាងរបាយការណ៍វាយតម្លៃផលប៉ះពាល់បរិស្ថាន និងសង្គម ... ១៥០មេហ្គាវ៉ាត់ ... ជាតិ និងអន្តរជាតិ រួមមាន IFC ជាដើម។ ... ។

បទបង្ហាញ ... ជាដើម។

របាយការណ៍ ESIA ដែលរៀបចំឡើងនិងពិនិត្យលើគម្រោង បន្ទាប់ពី ដែលអាចកើតមាន និងក្រុមប្រឹក្សា ... ប៉ះពាល់ទាំងនោះ ក្នុងដំណាក់កាលសាងសង់ និងប្រតិបត្តិការ និងនៅ ... នូវវិធានការកាត់បន្ថយ ... ប៉ះពាល់នីមួយៗ។ គម្រោង ប៉ះពាល់ក្នុងដំណាក់កាលសាងសង់រួម នៃការផ្លែ ... ណា នដី និងការហូរច្រោះ គុណភាព ខ្យល់ ... និងក្របខ័ណ្ឌ ... គុណភាពទឹកក្រោមដី ប្រព័ន្ធអេកូឡូស៊ី ធនធានជីវសាស្ត្រ ... និងការដឹកជញ្ជូន ... សុខភាពនិងសុវត្ថិភាពការងារ សុខភាពនិងសុវត្ថិភាពសហគមន៍។ គម្រោងប៉ះពាល់ក្នុងដំណាក់កាលប្រតិបត្តិការរួម នៃ គុណភាពដី គុណភាពទឹកក្រោមដី ធនធានជីវសាស្ត្រ សុខភាពនិង សុវត្ថិភាពការងារ

សុខភាពនិង សុវត្ថិភាព សហគមន៍។

... ចាំបាច់ ... យន្តការដោះស្រាយបណ្តឹងតវ៉ា (GRM)។ ... GRM នឹងដោះស្រាយបញ្ហា សហគមន៍ប្រកបដោយ ... និងតម្លាភាព។ ... និងទីតាំង ... និងទីសាធារណៈ ... ជាមួយនឹងព័ត៌មានទំនាក់ទំនង ប្រសិនបើមានអ្នកចូលរួមទាំងអស់ នីតិវិធីរាយការណ៍អំពីបញ្ហាផ្សេងៗ ដែលអាចកើតមាន ... ក្នុងសហគមន៍។

... សំណួរនិងចម្លើយ និងសំណើ

១. សំណួរនិង ... អ្នកចូលរួម៖ ប្រសិនបើ ... មានអាជីវកម្ម ... ដីរបស់ខ្ញុំ ... ?

ចម្លើយ៖ ទាក់ទងនឹងសំណួរនោះ ... ក្នុងដំណាក់កាលសាងសង់ ... និង ... ហើយ។ ... សំណង ... ដែលអាច ... ដើម្បី ... ។ ... នៅ ... ដើម្បីដោះស្រាយនៅលើដីនោះ។

២. សំណួរនិង ... អ្នកចូលរួម៖ ... នៅខាងជើង ... ក្នុងដំណាក់កាល ... ប្រសិនបើ ... ដែលត្រូវ ... ?

ចម្លើយ៖ ... ដីដែល ... ទឹក ... ដូចនោះ ... ការដឹកជញ្ជូន ... (ផ្លូវ ...)។ ... ដូច្នោះ ... ជាមួយនឹង ... ដីនោះ ... ការដឹកជញ្ជូន ... ទៀត។

ប្អូកហ នក្សំព ៅង់ទន់ នការវ័ៃយបបទក្យទងវៅនឹង ភពរ៉ា នក ារដ្ឋ ជ លផុំៃវនោះ វដ្ឋយប្កាលប្ត ប្អូហក បានទេ។ ប៉ោ ខនក ប្បូ នវបីផុវែនកពិបជា នក ារ ចុវដុបយស ារឧបក ារដ្ឋកំរជញ្ជូនរប ប្រសុកហ នខកនវនា ៈ ប្អូកនឹង នវិធាន ការក្យនក ារវដុប បុស ាយបញ្ហា។

៣. ៅង់ណួរនិង ៅង់ណួកពររប អន្តុលប្តូកៈ ៅល់ការអភិវឌ្ឍន៍ខបងខប នផ ុលប ៉ោព ាល់វផុវេង ៗ។ ដូច្នោះ វបីប្អូកហ ន ន ខផ្អុការក្យ នក ារប ុគប់ប ុគងវ ៅវលីផុលប ៉ោព ាល់ ទ ៅង់វនោរទេ? តម្រុករ៉ាហ ន នវិធ ានក ារប ុគប់ប ុគងវលីផ ុលប ៉ោព ាល់ ទ ៅង វន ោះផុង។

ចម្លើយៈ ប្អូកហ ន ច ងជាប្អូកហ នខដល នការទទួលៃ ប្បូវ និងជាប្អូកហ នខដល នការវររព ច ាប់ ម្អូប្បូទ ក្យក ៨ ា។ វដ្ឋីកៃប្អូប់ប្អូងវហប ប ៉ោព ាល់ខដល អ ាចុបង ៅ ងប្បុយគរ៉ា ងវនោះ គរប ុ ងនវជីវការ ហការ ជាកួយអាជា ា ធរកូលដ្ឋា ន ៅ ៅ ងជិប ន វដ្ឋីកៃវដោះប្រាយបញ្ហា នានា ខដលអាចក្យីប នវ វហើយគរប ុ ងននិង ក្យាំព ងវបចុ ៅនូវរ យក ារណ៍ ាយបុកវែហប ប ៉ោព ាល់ប វិសា ា ននិងសងគ ប ុ ប់គរប ុ ងវនោះ ខដលរូកបញ្ចូ ច លនូវវិធានការ កាប់បនាយ និងបានទ ៀបចំខផ្អុការក្យ នក ារប ុគប់ប ុគងវលីផុលប ៉ោព ាល់ ទ ៅង វន ខដលអាចក្យីប នវ ងប្បុយស ា ក្យកមុខពររប ន ង។ ប្អូកហ ននឹងបនត ហក ារជ ាកួយអន្ទា ាកព៍ន្ធជនរទៀប ក ាករយ ៈយនក ារវដុបបុស ាយបណ្ដឹង សាទក្យងលប ុបូវ រ នបងុហ ាញវៅក្យនបទបងុហ ាញវនោះ។

៤. ៅង់ណួរអន្តុលប្តូកៈ ប្បូ នវបីរ៉ុប នបញ្ហា ជាយផ្អូវហប ណាក្ខយព ាព័ន្ធនឹងគរប ុ ងវនោះ វបីប្បូជាពលរដ្ឋប្អូវជីវដូចកេច?

ចម្លើយៈ ដូច ុ នបង្ហា ញក្យ នបទបងុហា វនោះ ប្អូកហ ន នក ារររៀបចុ ៅនូវយនក ារវដុបបុស ាយបណ្ដឹង ងបវ ៅ ប ុ ប់ ប ុបជ ាជនខដលទទួលរងនូវផ ុលប ៉ោព ាល់ណាកួយ វដុបយពួក្យគអ ាចុ ទក្យទងវ ៅក ាន់ករ៉ាន្ទីកូលដុឋានការដ្ឋា នកាករយៈវលៃ ទូរ ័ពទ(096 8038486) ខដល នអា យដ្ឋា ន: ភូកិអន ាក ត ភ យ ៅសន អនា ប ុ ក្យបុក្យគរ វៃ បគា ាធីស ាប់ និងអាចុ ទក្យទងកក្យក ាន់ក ារិ ាល័យកនសាំវពញក ាករយ ៈវលៃ ទូរ 088 92 59 559 វលាក្យ ថុន់ វិការ ដ្ឋនីវីល ESG ប្អូអាប្អូ ក្យកាន់ទីកា ាំងប្អូកហន ច ន ង ផុលទល់។

៥. ៅង់ណួរនិង ៅង់ណួកពររប អន្តុលប្តូកៈ ភូកិខា ៃ ប្អូវពីមួយ ៅអនដៃវត ានប ជាៃ ប់ នទីក្យលិច្ចប ុ វៅទីកា ាំងខាងបៃូបនិង ខាងជើងជាប់នគរប ុ ង ជាពិវ ជាប់នផុវៃរបីរលក្យ វដុបយស ារឧបប ុបព័ន្ធជា ំ ដោះទឹក្យ នច ាំនួនបិទ។ វៅក្យនឆ ុន ាំ២០២៣ ក្យក ពា ទឹក នការវក្សីនវ ៃ ៉ បណ ៈផលឱ្យជន់លិច្ចប ុ និងដូច ុ ផុវៃ (ផុវៃវ រលក្យ) វដុបយស ារឧបប ុបព័ន្ធបូរ នច ាំនួន បិទ្ទ ៅអាច្រាំ ដុប ទឹក្យ រនប ុគប់ប ុ រន់។ វៅក្យ ន ឆ ុន ាំ២០២៤ ក្យក ព ទឹក្យ នការងយច ុ ៈ វហើយកិន នក ារលិចុលង់ដូចុឆ ុនាំ ២០២៣វ ីយ។ ទឹក្យក្យ នឆ ុនាំវនោះបូច្ចិនជាបញ្ហា ប្បូឈកខាៃ ៅង់វ ីយប ៉ោនកប្បូ នវបីទីក្យជល់ដូចុឆ ុនាំក ន (ឆ ុនាំ២០២៣) ខប ុ ប្បូជាជនអាចុ្លិច្ចប្ប ូ ីន។ វបីប្អូកហ នអាចួយបខនាកលូវ និងជួយសាត វប្បូឡាយ វដ្ឋីកៃវ៉ា ដោះទឹក្យវៅក្យ នប ៅបន់វន ារ ន វទ?

ចម្លើយៈ វដ្ឋីកៃវដោះប្រាយបញ្ហា ម្អូការវ៉ា ដោះទឹក្យកៃៀង គរប ុ ង រ នវររៀបចុ ៅប ុបព័ន្ធលឡ ាយលូវវ ៅរ៉ា ននិង ជ ៅវិញទី កា ាំងគរប ុ ងប្បូច ៅល់អ ់ហើយ។ ដូវច្ន ះ គរប ុ ងវនរនឹងកិនវធីឱ្យប ៉ោព ាល់ដល់ក ាររវ ំ ដោះទឹក្យកៃៀងវៅក្យ នប ៅបន់គរប ុ ង វ ី យ។ ទឹក្យវកៃៀងខដលជាៃ ក្យក្យ នប ៅបន់គរប ុ ងនឹងប្អូវវ៉ា ដោះវដ្ឋយប្បូឡាយទឹក្យខដលប្អូកហ ន រ នវររៀបចុ ៅ និងបងូ ាវៅខាងវជើង ខផុៃវផុវៃវ រលក្យនិងច ាក្យចូលវ ៅវទនវៃស ាប។ វដ្ឋយខ ក្យ ព ាព័ន្ធនឹងក ារលិចុលប ុ វៅក្យ នភូកិខ ៅៃ ប្អូវពី ប្អូកហ នកិន ទទន់អាចុ្ទីៃយបបវៅនឹងច ៅង់ណ ច្នោះ វីយ វដ្ឋយវហប ដ្ឋ កិនទទន់ នក ត ាងចុ ា ំ លា ចុនវបីគរប ុ ងវនោះ ពិបជា រ នវធីឱ្យ នបញ្ហា លិច្ចប ុ វៅក្យ នប ៅបន់មុនភូកិខ ៅៃ ប្អូវពីដូចុ នប ញ្ចហក្យខាងវលើវ ីយ។ ប៉ោ ខនក ប្អូកហ នក្យនឹងបនតហ ការជាកួយអាជា ា ធរកូលដ្ឋា នវដ្ឋីកៃវជីវការ វងាបវកិលសា ា នក្ខកគរប ុ ង និងវជីវការវាយបម្អូបខនាកវៅវលីការខប្បូប្អូលម្អូ ប ុបព័ន្ធផលស ា ត និងវររៀបចុ ៅវិធ ានក ារក ារព ារជ ាចុ ៅ រ ចុ ំ។

គ. ម្តិហោរល់រជនាម្រស់អារចូលរួម

វបុកាយពីបញផ់រគគាំណួរច្ចកីៃយ អន្ទច្ចូលរួកទាំងអ ុប្បូវ **រ**នវបីគ្ទិរកា វដីភីៃបវញច ញទូវកបិរោបល់ បខនាក ជារួកចុាំវពាោះគវបុ ង។ បុបជាជន**រ**នវលីក្ស ងដូចខាងវបុកាគះ

- វបុៅពីបញ្ហា កាវបុពួយ**រ**វកច្ឆាំវពាោះកាវលិចបុ វវតុបយទឹក្សកម្ញៀងខាងវលី ភូកិខាៃ ប្បូវពី(យ ាំអន ងៃវត ាន្ម)គិន នវង នូវកាវបាំោរោះពាល់ជាអវិជជនវវ្គួយគវបុ ងវទ វបុពាលាះភូកិវនលាះ(បាំបន់វ) លវៅឆុៃយពីទីគាាំងគវបុ ង។
- ប្បជាជនគិនខជលប្បទោះវឃិញវបគនប្បី ណាកយ នវៅក្សន្ឋបាំបន់វនៃរវទ បាំោខនស្សវកទព ៃ ន់ព ត្ផុ ដាំបូក្ស និងព ផ្តុវទ អាចុ នវៅវបុៅជាំបន់គវបុ ង។
- ប្បជាជនបង្ហាញច្ចួ គិន នជុលបាំោរោះពាល់វគុរ័បវ វ វ្គួយសារការប៉ាពលរ៍ៃលរ់ វីយ វវ្គួយសារផ្ទោះរប ុំ ប្បជាជន ាបវៅឆុៃយពីជាំបន់គវបុ ង។
- ប្បជាជនបង្ហាញច្ចួ គិនបាំោរោះពាល់វតុបយបញ្ហា ាំវ ង/វញ្ញាំ រ័វដល់ការ វេ បុបជាពលរដ្ឋ វីយក្សន្ឋ ដាំណាក់ កាលសាង ង់គវបុ ង។
- ជាអួក ក្សន្ឋដាំណាក់កាលសាង ង់វនោះ គិន នជុលបាំោពាល់ដល់គណក្ខុតទឹក្សទ។ ទឹក្សវនោះជាំបន់វនោះ ជាទូវៅ នកុដពលភ្ញៀងរ័ៃ ។វបីវទជា**រ**នវបគវបុ ងក្សប្បូគពទឹក្សទាំងវនាោះវៅខប ន កុដពលក្តូខដរវប្គោះ ទឹក្សវៅទីវនាលាះហូរកក្សពីបាំបន់គន្ធាំ ខដលវៅទីវនាោះ នការកាប៉ោនជីវជីវចុ ារនិងនាំ ឱ្យទឹក្សលក្ខូ។
- វៅឆុនាំ២០២៥ ឬ២០២៦ រដ្ឋា គិរល នខជុនកាវខក្សលកន្ទូ វីវវៅ ូវចុូលជាំបន់គវបុ ង (ផ្លូវចូលវៅក្ស ន្ឋបាំបន់ ដាំណាក់ប្តាញ់)។
- គវបុ ងខដលគិន នជវ ោះជាក្ខួយប្បជាជនវ វីយ។ជាធកមា កាលណាខដល នការអភិវឌ្ឍន៍វលីគវបុ ង ណាក្ខួយ ជុលបាំោរោះពាល់គីខបងខបវក្ស័ប នដល់ជាំបន់ខដលវៅខក្សវវនាោះវហីយ បិច្ចប្បុវិនគឺអាបុ យលីកវ ប្តប់ប្តងវប ចាំគវបុ ង។
- វៅក្សន្ឋភូគិទាំង៥ នអ ណ្ដ**រ**ទឹក្សបុបីប**រ** ណជា ៥០% បាំៅណាោះ ម្មប្បជាជនក្សន្ឋភូគិ វតុបយអណ្ដង ងទឹក្ស ទាំងវនាោះ នវបុៅជាកជយក ៤-៦ ខក ាំបៃ ប ។ វៅរដូវ ា ប្បជាពលរដ្ឋាក្សន្ឋភូគិវបុបីបុ**រ** ទឹក្សអណ្ដ**រ**ជនក្សប់ បុ**រ**ន់ វវ្គួយខ ក្សវៅវដូវបុ**រ**ាំងវិញ ទឹក្សអ ណ្ដូគ ងគិនអាចុជុ**ន់ជុ**ន់ដល់កាវវបុបីបុ**រ** ម វុបជាពលរដ្ឋា**រ**នគប់ ប្រន់វទ។
- គវបុ ងវនោះគិន នការវវាំលាភជាំពានវលីដីធីៃប បុបជាពលរដ្ឋ វីយវប្គោះប្បកហនវន (SchneiTech Bedyond) វនទិញដី ពីបុបជាពលរដ្ឋបីកបុបូវកាកចុ ាប់។
- ប្បជាពលរដ្ឋខដលចូលរួកទាំងទាំងអ ាំ **រ**ន**រ**ាំទរវៅវលីគវ ងបវងីបវោងចុបុក្សជុលិបវបុគវៀងអគិគ

នីវនោះ។ អន្ទជីវផ្លាំណាប់វហប

Cw

វលាក្ស ជា ចាន់ណារិទធ

រញ្ជីឈ្មោះអារចូលរួម

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

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សម្រាប់គម្រោងការអភិវឌ្ឍន៍រោងចក្រថាមពលពន្លឺព្រះអាទិត្យ ១៥០មេហ្កាវ៉ាត់ ជាមួយនឹងប្រព័ន្ធផ្ទុកថាមពល លើផ្ទៃដីទំហំ១៦៥(មួយរយហុកសិបប្រាំ) ហិកតា របស់ក្រុមហ៊ុន ស្អេថេក ប៊ីយ៉ន់ ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី 04 ខែវិច្ឆិកា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ២ [illegible]

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	ភូមិ	តួនាទី/មុខរបរ	ស្ថានប័ន/អង្គភាព	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ស		មេឃុំ	[illegible]	017952539	B.i	
២	[illegible]	ប		[illegible]	[illegible]	048954163	Hun	
៣	[illegible]	ប		ជំទប់ទី១	[illegible]	089768873	[illegible]	
៤	[illegible]	ប		មេភូមិ	[illegible]	092427394	[illegible]	
៥	[illegible]	ប		មេភូមិ	[illegible]	0882572109	Han	
៦	[illegible]	ប	[illegible]	[illegible]		092957985	[illegible]	
៧	[illegible]	ស		មេភូមិ	[illegible]	017509946	[illegible]	
៨	[illegible]	ប		មេភូមិ	[illegible]	088203205[illegible]	[illegible]	
៩	[illegible]	ស			SNTB	070277167	[illegible]	
១០	[illegible]	ស			SNTB	093890183	[illegible]	
១១	[illegible]	ប		[illegible]	E & A	012923489	[illegible]	
១២	[illegible]	ប		[illegible]	E & A	015657595	[illegible]	
១៣	[illegible]	ប		[illegible]	E & A	0979920699	[illegible]	
១៤	[illegible]	ប		[illegible]	E & A	092804406	[illegible]	
១៥	[illegible]	ស	[illegible]	កសិករ		—	[illegible]	
១៦	[illegible]	ស	[illegible]	កសិករ		012623613	[illegible]	
១៧	[illegible]	ប	[illegible]	កសិករ		060895866	[illegible]	
១៨	[illegible]	ប	[illegible]	កសិករ		—	[illegible]	
១៩	[illegible]	ប	[illegible]	កសិករ		—	[illegible]	
២០	[illegible]	ស	[illegible]	កសិករ		097993324	[illegible]	

រៀបចំដោយ

[illegible]

ថ្ងៃទី៖ 04 [illegible] ២០២៤

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

ព្រះរាជាណាចក្រកម្ពុជា
ជាតិ សាសនា ព្រះមហាក្សត្រ

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សម្រាប់គម្រោងការអភិវឌ្ឍន៍រោងចក្រថាមពលពន្លឺព្រះអាទិត្យ ១៥០មេហ្គាវ៉ាត់ ជាមួយនឹងប្រព័ន្ធផ្ទុកថាមពល លើផ្ទៃដីទំហំ១៦៥(មួយរយហុកសិបប្រាំ) ហិកតា របស់ក្រុមហ៊ុន ស្មេថេក ប៊ីយ៉ន់ ឯ.ក

កាលបរិច្ឆេទ៖ ថ្ងៃទី ០៥ ខែវិច្ឆិកា ឆ្នាំ២០២៤ វេលាម៉ោង៖ ២ រសៀល

ទីកន្លែង៖ [illegible]

ល.រ	ឈ្មោះ	ភេទ	ភូមិ	តួនាទី/មុខរបរ	ស្ថានប័ន/អង្គភាព	លេខទូរស័ព្ទ	ហត្ថលេខា	ផ្សេងៗ
១	[illegible]	ប	[illegible]	កសិករ		—		
២	[illegible]	ស	[illegible]	កសិករ		0716485756		
៣	[illegible]	ស	[illegible]	កសិករ		—		
៤	[illegible]	ស	[illegible]	កសិករ		—		
៥	[illegible]	ស	[illegible]	កសិករ		—		
៦	[illegible]	ស	[illegible]	កសិករ		—		
៧	[illegible]	ស	[illegible]	កសិករ		—		
៨	[illegible]	ស	[illegible]	កសិករ		0886153409		
៩	[illegible]	ប	[illegible]	កសិករ		0882752199		
១០	[illegible]	ប	[illegible]	កសិករ		0972373667		
១១	[illegible]	ប	[illegible]	កសិករ		0968027704		
១២	[illegible]	ស	[illegible]	[illegible]		071430315		
១៣	[illegible]	ស	[illegible]	កសិករ		0972914251		
១៤	[illegible]	ស	[illegible]	កសិករ		—		
១៥	[illegible]	ស	[illegible]	កសិករ		088866451		
១៦	[illegible]	ប	[illegible]	កសិករ		092724910		
១៧	[illegible]	ស	[illegible]	កសិករ		0885563697		
១៨	[illegible]	ស	[illegible]	កសិករ		0976789242		
១៩								
២០								

រៀបចំដោយ

[illegible]

ថ្ងៃទី៖ ០៥ ខែ វិច្ឆិកា ឆ្នាំ ២០២៤

អនុញ្ញាតដោយ

ថ្ងៃទី៖ ....

សរម្មភារសិកា◌ា សាលាវិហាព្រះហោរល់

Appendix 5: List of Flora and Fauna List of Species (3 km Buffer)

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
1. Plants					
1	Tra Yueng	*Diospyros helferi, C.B.Clarke*	NE	LG	Sighting
2	Thnong	*Pterocarpus pedatus, Pierre*	EN	LG	Sighting
3	Neang Noun	*Dalbergia oliveri Gamble and Prain*	EN	LG	Sighting
4	Phchek	*Shora obtuse, Woll.*	NT	G1	Sighting
5	Tbeng	*Dipterocapus obtusifolius, Teysm*	NT	G2	Sighting
6	Pchek	*Shorea obtusa, Woll*	NT	G1	Sighting
7	Klong	*Dipterocarpus tuberculatus, Roxb*	NT	G2	Sighting
8	Krokoh	*Sindora cochinchinensis, Baill.*	LC	G1	Sighting
9	Trasek	*Peltophorum ferrugineum, Benth.*	NE	G1	Sighting
10	Popel	*Shorea roxburgshii, G.Don.*	NE	G1	Sighting
11	Cheuteal Teuk	*Dipterocapus alatus. Roxb*	VU	G2	Sighting
12	Trach	*Cratoxylon prunifolium, Dyer*	NE	G3	Sighting
13	Kroeul	*Gluta laccifera (Pierre) Ding Hou*	LC	LG	Sighting
14	Chres	*Albizia lebbeck (L.) Benth*	LC	LG	Sighting
15	Kranhung	*Dalbergia cochinchinensis Pierre*	VU	LG	Sighting
16	Chlik	*Terminalia alata, F. Heyne ex Roth*	NE	G1	Sighting
17	Sralao	*Lagerstroemia calyculata*	NE	G1	Sighting
18	Lngeang	*Cratoxylon prunifolium, Dyer*	NE	G3	Sighting
19	Kandoal	*Careya sphoerica, Pierre*	NE	G3	Sighting
20	Kdol	*Sarcocephalus cordatus, Mig*	NE	UG	Sighting
21	Kantout Prey	*Phyllanthus emblica*	LC	UG	Sighting
22	Leang Chey	*Buchanania reticulata*	NE	UG	Sighting
23	Nhor Prey	*Morinda tomentosa*	NE	UG	Sighting
24	Tro-moung	*Garcinia schomburgkiana*	NE	UG	Sighting
25	Trabek Prey	*Lagerstroemia floribunda*	NE	UG	Sighting
26	Vor yong	*Chukrasia tabularis, Ant. Juss.*	LC	UG	Sighting
27	Sangke	*Combretum quadrangulare, Kurz.*	NE	UG	Sighting
28	Sdao	*Azadirachta indica*	LC	UG	Sighting
29	Krosaing	*Citrus lucida (Scheff.) Mabb.*	LC	UG	Sighting
30	Ro Kar	*Bombax ceiba or Bombax, malabaricum*	LC	UG	Sighting

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
1. Plants					
31	Tro Moung	*Garcinia Cochinchinensis (Lour.) Choisy*	NE	UG	Sighting
32	Snay	Streblus asper Lour	LC	UG	Sighting
33	Raing toek	*Barringtonia acutangula (L.) Gaertn.*	NE	UG	Sighting
34	Chrey	*Ficus rumphii Blume*	NE	UG	Sighting
35	Voa Tmeitrey	*Ichnocarpus frutescens*	NE	UG	Sighting
36	Rei Teuk	*Homonoia riparia Lour*	LC	UG	Sighting
37	Bay Kdaing	Leea thorelii Gagnep.	NE	UG	Sighting
38	Dang keap kdam	Antidesma cochinchinensis	NE	UG	Sighting
39	Angkea sil	*Ochna harmandii Lecomte*	NE	UG	Sighting
40	Krouch prey	*Atalantia citroides*	NE	UG	Sighting
41	Khleng por	*Bauhinia pulla Craib*	NE	UG	Sighting
42	Cham reak	*Albizia lebbekoides*	LC	UG	Sighting
43	Cheung kou	*Bauhinia acuminata L.*	NE	UG	Sighting
44	Tkov	*Anthocephalus Chinencis*	NE	UG	Sighting
45	Toumpung	*Croton Jufra Euphorbiaceae*	NE	UG	Sighting
46	Sampor	*Artocarpus sampor Gagnep.*	NE	UG	Sighting
47	Thmear	*Acacia intsii*	NE	UG	Sighting
48	Pongror	*Sapindus mukorossi*	NE	UG	Sighting
49	Popul bay	*litsea glutinosa*	LC	UG	Sighting
50	Mok chneang	*Pus-sucking ointement*	NE	UG	Sighting
51	Mo-kak prey	Spondias pinnata	NE	UG	Sighting
52	Hai-san	Cassia garettiana Craib	NE	UG	Sighting
53	Char	Butea monosperma	NE	UG	Sighting
54	Chambok	Irvingia malayana	LC	UG	Sighting
55	Talat	Canarium album	LC	UG	Sighting

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
2. Mammals					
1	Berdmore's Squirrel	*Menetes berdmorei*	LC	Common	Sighting
2	Siamese Hare	*Lepus peguensis*	LC	Common	Scate
3	Chinese Bamboo Rats	*Rhizomys sinessis*	LC	Common	Interview
4	Indomalayan Bamboo Rat	*Rhizomys sumatrensis*	LC	Common	Interview
5	Mainland Leopard Cat	*Prionailurus bengalensis*	LC	Common	Interview
6	Small Asian Mongoose	*Herpestes Javanicus*	LC	Common	Interview
7	Crab-eating Mongoose	*Herpestes urva*	LC	Common	Interview
8	Northern Treeshrew	*Tupaia belangeri*	LC	Common	Interview
9	Pallas's Squirrel	*Callosciurus erythraeus*	LC	Common	Interview
10	Phayre's Flying Squirrel	*Hylopetes phayrei*	LC	Common	Interview
11	Common Palm Civet	*Paradoxurus hermaphroditus*	LC	Common	Track

Note: NE: Not Evaluated, DD: Data Deficient, LC: Least Concern, NT: Near Threatened, VU: Vulnerable, EN: Endangered, CR: Critically Endangered, LG: Luxury Grade, G1: Grade 1, G2: Grade 2, G3:Grade 3, UG: Ungraded

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
3. Birds					
1	Green Peafowl	*Pavo muticus*	EN	Rare	Interview
2	Red Junglefowl	*Gallus gallus*	LC	Common	Sighting
3	Chinese Francolin	*Francolinus pintadeanus*	LC	Common	Interview
4	Blue-troated Bee-eater	*Merops viridis*	LC	Common	Sighting
5	Cotton Pygmy Goose	*Nettapus coromandelianus*	LC	Common	Sighting
6	Lesser Whistling Duck	*Dendrocygna javanica*	LC	Common	Sighting
7	Red-collared Dove	*Streptopelia tranquebarica*	LC	Common	Sighting
8	Spotted Dove	*Spilopelia chinensis*	LC	Common	Sighting
9	Zebra Dove	*Geopelia striata*	LC	Common	Sighting
10	Asian Palm Swift	*Cypsiurus balasiensis*	LC	Common	Sighting
11	Greater Coucal	*Centropus sinensis*	LC	Common	Sighting
12	Asian Palm Swift	*Cypsiurus balasiensis*	LC	Common	Sighting
13	Germain's Swiftlet	*Aerodramus germani*	LC	Common	Sighting
14	Green-billed Malkoha	*Phaenicophaeus tristis*	LC	Common	Sighting
15	Red billed Blue Magpie	*Urocissa erythroryncha*	LC	Common	Sighting
16	Plaintive Cuckoo	*Cacomantis merulinus*	LC	Common	Sighting
17	Black-backed Swamphen	*Porphyrio indicus*	LC	Common	Sighting
18	Watercock	*Gallicrex cinerea*	LC	Common	Interview
19	Cattle Egret	*Bubulcus ibis*	LC	Common	Interview
20	Intermediate Egret	*Ardea intermedia*	LC	Common	Sighting
21	Little Egret	*Egretta garzetta*	LC	Common	Sighting
22	Yellow Bittern	*Ixobrychus sinensi*	LC	Common	Sighting
23	Red-wattled Lapwing	*Vanellus indicus*	LC	Common	Sighting
24	Common Snipe	*Gallinago gallinago*	LC	Common	Sighting
25	Asian Barred Owlet	*Glaucidium cuculoides*	LC	Common	Sighting
26	Black-shouldered Kite	*Elanus axillaris*	LC	Common	Interview
27	Blue-tailed Bee-eater	*Merops philippinus*	LC	Common	Interview
28	Little Green Bee-eater	*Merops orientalis*	LC	Common	Sighting
29	Indian Roller	*Coracias benghalensis*	LC	Common	Sighting
30	Collared Kingfisher	*Todiramphus chloris*	LC	Common	Interview

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
3. Birds					
31	Common Kingfisher	*Alcedo atthis*	LC	Common	Sighting
32	Racket-tailed Treepie	*Crypsirina temia*	LC	Common	Interview
33	Large billed Crow	*Corvus macrorhynchos*	LC	Common	Interview
34	Common Tailorbird	*Orthotomus sutorius*	LC	Common	Interview
35	Plain Prinia	*Prinia inornata*	LC	Common	Interview
36	Yellow-bellied Prinia	*Prinia flaviventris*	LC	Common	Interview
37	Zitting Cisticola	Cisticola juncidis	LC	Common	Interview
38	Striated Grassbird	*Megalurus palustris*	LC	Common	Interview
39	Barn Swallow	*Hirundo rustica*	LC	Common	Interview
40	Asian House Martin	*Delichon dasypus*	LC	Common	Sighting
41	Streak-eared Bulbul	*Pycnonotus blanfordi*	LC	Common	Sighting
42	Black collared Starling	*Gracupica nigricollis*	LC	Common	Sighting
43	Brown-throated Sunbird	*Anthreptes malacensis*	LC	Common	Interview
44	Olive-backed Sunbird	*Cinnyris jugularis*	LC	Common	Interview
45	Baya Weaver	*Ploceus philippinus*	LC	Common	Interview
46	Streaked Weaver	*Ploceus manyar*	LC	Common	Interview
47	Eurasian Tree Sparrow	*Passer montanus*	LC	Common	Interview
48	Striated Grassbird	*Hirundo rustica*	LC	Common	Sighting
49	Plain-backed Sparrow	*Passer flaveolus*	LC	Common	Interview
50	Paddyfield Pipit	Anthus rufulus	LC	Common	Interview
51	Yellow Wagtail	*Motacilla tschutschensis*	LC	Common	Sighting
52	House Sparrow	*Passer domesticus*	LC	Common	Sighting

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
4. Fish					
1	Trey Slat	*Notopterus notopterus*	LC	NE	Interview
2	Trey Ach Kok	*Dangila spilopleura*	NE	NE	Sighting
3	Trey Riel Tob	*Henicorhynchus siamensis*	NE	NE	Interview
4	Trey Chhpin	*Bobodes gonionotus*	NE	NE	Sighting
5	Trey Chrakaing	*Bobodes altus*	NE	NE	Interview
6	Sickle Fin Barb	*Puntioplites falcifer*	LC	NE	Sighting
7	Trey Srawka Kdam	*Osteochilus microcephalus*	LC	NE	Interview
8	Trey Ampil Tum	*Systomus orphoides*	NE	NE	Interview
9	Blue Botia	*Botia modesta*	LC	NE	Sighting
10	Trey Ruschek	*Acantopsis sp*	NE	NE	Sighting
11	Trey Andaing Roueng	*Clarias batrachus*	LC	NE	Sighting
12	Congaturi Halfbeak	*Hyporhamphus limbatus*	LC	NE	Interview
13	Yellow catfish	*Hemibagrus nemurus*	LC	NE	Interview
14	Asian Red Tailed Catfish	*Hemibagrus wyckioides*	LC	NE	Interview
15	Trey Kanchos Kdaung	*Mystus rhegme*	NE	NE	Interview
16	Trey Ta Aun	*Heterobagrus bocorti*	NE	NE	Interview
17	Trey Kromorm	*Ompok hypophthalmus*	LC	NE	Interview
18	Trey Po	*Ompok bimaculatus*	NT	NE	Interview
19	Trey Pra	*Pangasius larnaudiei*	NE	NE	Sighting
20	Trey Sanday	*Pangasius Sp.*	NE	NE	Interview
21	Trey Kes	*Wallago attu*	VU	NE	Interview
22	Trey Kchoeung	*Micronema apogon*	NE	NE	Interview
23	Trey Chhlonh Chhnoht	*Mastacemblus sp.*	NE	NE	Interview
24	Trey Kanchanh Chras Touch	*Micrognathus siamensis*	NE	NE	Interview
25	Indian Glassy Fish	*Pseudambassis notatus*	LC	NE	Interview
26	Trey Kawmphleanh Phluk	*Trichogaster trichopterus*	NE	NE	Interview
27	Trey Kroem Tun Sai	*Trichogaster Microlepis*	NE	NE	Interview
28	Pygmy gourami	*Trichopsis pumila*	LC	NE	Interview
29	Marbled Goby	Oxyeleotris marmorata	LC	NE	Interview

No.	English/Khmer name	Scientific name	IUCN status	National List	Evidence
5. Amphibiants					
1	Common Asian toad	*Duttaphrynus melanostictus*	LC	NE	Sighting
2	Painted Burrowing Frog	*Kaloula pulchra*	LC	NE	Interview
3	Heymon's narrow-mouthed frog	*Microhyla heymonsi*	LC	NE	Interview
4	Ornate narrow-mouthed frog	*Microhyla mukhlesuri*	LC	NE	Sighting
5	Black spot narrowed mouth frog	*Microhyla erythropoda*	LC	NE	Sighting
6	Beautiful narrowed mouthed frog	*Microhyla pulchra*	LC	NE	Sighting
7	Rugulose frog	*Hoplobatrachus rugulosus*	LC	NE	Sighting
8	Red-eared frog	*Hylaran erythraea*	LC	NE	Sighting
9	Long-toed frog	*Hylaran macrodacftyla*	LC	NE	Sighting
10	Common tree frog	*Polypedates megacephalus*	LC	NE	Sighting
6. Reptiles					
1	Indochinese spitting cobra	*Naja siamensis*	VU	Rare	Interview
2	Monocellate cobra	*Naja kaouthia*	LC	Rare	Interview
3	Burmese Python	*Python molurus bivittatus*	VU	Common	Interview
4	Indochinese water dragon	*Physignathus cocincinus*	LC	Common	Interview
5	Variable crested lizard	*Calotes versicolor*	LC	Common	Interview
6	Tokay gecko	*Gekko gecko*	LC	Common	Interview
7	Common house gecko	*Hemidactylus frenatus*	LC	Common	Interview
8	Three dorsal keeled skink	*Eutropis multifaciata*	LC	Common	Interview
9	Bengal monitor	*Varanus bengalensis*	LC	Common	Interview
10	Water monitor	*Vananus salvator*	LC	Common	Interview
11	Common mock viper	*Psammodynastes pulverulentus*	LC	Common	Sighting
12	Inornate kukri snake	*Oligodon taeniata*	LC	Common	Sighting
13	Common rat snake	*Ptyas korros*	LC	Common	Interview
14	Reticulated Python	*Python reticulatus*	LC	Common	Interview
15	Common Blind Snake	*Ramphotyphlops braminus*	LC	Common	Interview
16	Diards's Blind Snake	*Typhlops diardi*	LC	Common	Interview
17	Body banded rat snake	*Ptyas mucosa*	LC	Common	Interview
18	Speckle bellied keeled back snake	*Rhabdophis chrysargos*	LC	Common	Interview
19	Red-tailed Pipe Snake	*Cylindrophis ruffus*	LC	Common	Interview
20	Yellow spotted water snake	*Fowlea flavipunctatus*	LC	Common	Interview
21	Rain bow water snake	*Enhydris enhydris*	LC	Common	Interview
22	Malayan pit viper	*Calosellasma rhodostoma*	LC	Common	Interview
23	Reticulate python	*Malayopython reticulatus*	LC	Common	Interview

Appendix 6: standards

a. **The standards of effluent, Water Quality in Public Areas for Biodiversity Conservation and for Public Health Protection as defined in Sub-Decree on Water Pollution Control (1999) and Sub-Decree on the Amendment of Article 4, Article 9, Article 11, Article 12 and Article 17 and Table Annex 2, Annex 3, Annex 4 and Annex 5 of Sub-Decree No. 27, dated 6 months. April 1999 on Water Pollution Control (2021)**

Table 2 Liquid Discharge Standards Level

No	Parameters	Unit	Local Standard (Amount of pollutants Permit for Discharging)			WBG's Standard[14]
			Public Water Type 1	Public Water Type 2	Sewage System Connecting to Wastewater Treatment Plant	
1	Temperature	^0C	<40	<40	<45	–
2	Colour	mg/Pt/l	<50	<150	<300	–
3	TSS	mg/	<50	<100	<200	50
4	pH		6-9	5,5-9	5-9	6-9
5	BOD_5	mg/l	<30	<60	<200	30
6	COD ($Cr_2O_7^{-2}$)	mg/l	<60	<120	<300	120
7	Oil& grease	mg/l	<5	<10	<30	10
8	Detergent	mg/l	<5	<10	<30	–
9	NH_3 as N	mg/l	<7	<10	<30	–
10	No_3^{-1} as N	mg/l	<10	<20	–	–
11	Cl_2	mg/l	<1	<2	–	–
12	Cl^-	mg/l	<500	<1000	–	–
13	PO_4^{-3}	mg/l	<2	<5	–	–
14	T-N	mg/l	<20	<40	–	10
15	T-P	mg/l	<4	<6	–	2
16	H_2S	mg/l	<0,2	<0,5	<1	–
17	Mn	mg/l	<1	<3	<5	–
18	B	mg/l	<1	<2,5	<5	–
19	Ba	mg/l	<2	<5	<7	–
20	CN^{-1}	mg/l	<0,1	<0,2	<1	–
21	CN	mg/l	<1	<1,5	<2	–
22	As	mg/l	<0,05	<0,1	<0,5	–
23	Fe	mg/l	<1	<5	<20	–
24	Pb	mg/l	<0,1	<0,3	<0,5	–
25	Zn	mg/l	<2	<5	<10	–
26	Cu	mg/l	<1	<2	<5	–

[14] World Bank Group (WBG) General EHS Guidelines should also be applied for the wastewater/sewage water discharges.

27	Cr^{+6}	mg/l	<0,05	<0,1	<0,5	–
28	Cd	mg/l	<0,05	<0,1	<0,5	–
29	Ni	mg/l	<0,2	<0,5	<2	–
30	Se	mg/l	<0,02	<0,5	<2	–
31	Hg	mg/l	<0,05	<0,01	<0,05	–
32	C_6H_6O	mg/l	<0,5	<1	<5	–
33	Total Coliform	MNP/100ml				400

Note: Type 1 public water area: refers to closed water sources, such as ponds, ponds, lakes, lowlands, including canals, streams, and streams that do not flow during the dry season.

Type 2 public water area: refers to open water sources such as the sea, Tonle Peam, including canals, canals, streams, which have water flow in the dry season.

- *(-): No price limit*
- *(1): In the case of discharge of liquid waste or water used for cooling of machinery, the volume of more than 5,000 cubic meters per day, the discharge water temperature can be allowed at 50 0C above the receiving water temperature at the distance. 500 meters from the bank or exit point.*

Table 4 Levels for Water Quality Standards in Public Areas for Water Biodiversity Conservation

No	Parameter	Unit	Standard		
			Public water area type 1	Public water area type 2	Ocean
1	pH		6,5-8,5	6,5-8,5	7,0-8,3
2	Dissolved oxygen (DO)	mg/l	>3	>4	>4
3	BOD_5	mg/l	<8	<6	-
4	COD_{Mn}	mg/l	<10	<8	$<8^{(1)}$
5	Suspended solids (TSS)	mg/l	<100	<100	<80
6	Salinity	mg/l	<1000	<1000	-
7	NO_3^{-1} as N	mg/l	<2,4	< 1,2	<0,06
8	Total Nitrogen	mg/l	<3	<2	<2
9	Total Phosphorus	mg/l	<0,25	<0,15	<0,09
10	Oil & grease	mg/l	-	-	<0,14

Note:

Type 1 public water area: refers to closed water sources, such as ponds, lakes, lowlands, including canals, streams, and rivers that do not flow in the dry season.

Type 2 public water area: refers to open water sources such as the sea, Tonle Peam, including canals, canals, streams, which have water flow in the dry season.

- *(-): No price limit*
- *(1): Refers to oxygen demand in the form of potassium, manganese, alkaline COD (CH).*

Levels of Public Area Water Quality Standards for Public Health Protection

Nº	Parameter	Unit	Standard	**CODE (CAS No.)**
1	Carbon tetrachloride	µg/l	<4	(56-23-5)
2	Hexachloro-benzene	µg/l	<0,03	(118-74-1)
3	DDT	µg/l	<1	(50-29-3)
4	Endrin	µg/l	<0,01	(72-2-8)
5	Diedrin	µg/l	<0,01	(60-57-1)

6	Aldrin	µg/l	<0,005	(309-00-2)
7	Isodrin	µg/l	<0,005	(465-73-6)
8	Perchloroethylene	µg/l	<10	(127-18-4)
9	Hexachlorobutadiene	µg/l	<0,01	(87-68-3)
10	Chorofrom	µg/l	<300	(67-66-3)
11	1,2 Trichloroethylene	µg/l	<40	(156-59-2)
12	Trichloroethylene	µg/l	<10	(79-01-6)
13	Trichlorobenzene	µg/l	<0,4	(120-82-1)
14	Hexachloroethylene	µg/l	<0,05	(58-89-9)
15	Benzene	µg/l	<10	(71-43-2)
16	Tetrachloroethylene	µg/l	<3	(7440-43-9)
17	Cadmium	µg/l	<0,5	(7439-97-6)
18	Total mercury	µg/l	Cannot find	–
19	Organic mercury	µg/l	<10	(7439-92-1)
20	Lead	µg/l	<50	(18540-29-9)
21	Chromium, valent 6	µg/l	<10	(7440-38-2)
22	Arsenic	µg/l	<10	(7782-49-2)
23	Selenium	µg/l	Cannot find	(1336-36-3)
24	Polychlorobioheny1	µg/l	<5	(57-12-5)
25	Cyanide	µg/l	<20	(75-09-2)
26	Total coliform	µg/l	<1000	–

Note:
CAS No refers to the Chemical Abstract Service Number.
• (-) Unlimited code

b. Standard for air quality, noise and vibration level of the Sub-Decree on Air Pollution Control and Noise Disturbance (2000)

Appendix 1: Air quality standards

Parameter	For an hour Average mg/m^3	For 8h Average mg/m^3	For 24h Average mg/m^3	For a year Average mg/m^3
Carbon monoxide (CO)	40	20	-	-
Nitrogen dioxide (No)	0.3	-	0.1	-
Sulfur dioxide (SO_2)	0.5	-	0.3	0.1
Ozone (O_2)	0.2	-	-	-
Lead (Pb)	-	-	0.005	-
Total Suspended Particulate (TSP)	-	-	0.33	0.1

Notice:

- This standard setting applies for general air quality assessment and air pollution monitoring.
- Methods of air quality analysis will be determined by the Ministry of Environment
- SP = Total Suspended Particulate
- The standard of PM_{10} and $PM_{2.5}$ follows the Prakas No. 116 issued on April 11, 2018 on the introduction of working conditions for infrastructure and tourism development projects.

Annex 6: maximum allowable noise level in public and residential areas

N^0	Location	Period		
		06:00 to 18:00	18:00 to 22:00	22:00 – 06:00
1	Silent area: - Hospital - Library - School - Kindergarten	45	40	35
2	Residential area: - Hotel - Flat villa	60	50	45
3	Business and service areas	70	65	50
4	Light industries mixed in residential areas	75	70	50

Remark: This standard setting applies for volume control from any source or activity that has been recorded in the public area and residential area.

Annex 4: Gas Emission Standard of Mobile Source

No	Kind of Vehicle	Kind of Fuel	Level of Emission				
			CO%		HC(PPM)	Dark Fume (%)	
			A	B	A	B	
1	Motorcycle contain 2 stroke combustion	Petrol	4,5	4	10,000	3000	
2	Motorcycle contain 4 stroke combustion	Petrol	4,5	4	10,000	2400	
3	All kinds of vehicles	Petrol	4,5	4	1200	800	
4	All kinds of vehicles	Diesel					50

c. Standards of the quantity of toxic chemicals or hazardous substances contained on hazardous waste which is allowed to be disposed in sanitary landfills, and standards of the quantity of toxic chemicals or hazardous substances allowed in soils as stated in the Prakas on the Launch of Standards of the Quantity of Toxins or Hazardous Substances Allowed to be Disposed (2015)

Annex 1: Standards of the quantity of toxic chemicals or hazardous substances contained on hazardous waste which is allowed to be disposed in sanitary landfills.

No.	Chemical Name	Unit (mg/kg of dry waste)	Maximum Condensation of Toxic Chemicals in waste
1	Arsenic and its compounds (As)	mg/kg	<40
2	Cadmium and its compounds (Cd)	mg/kg	<5.0
3	Chromium and its compound (Cr) +6	mg/kg	<380
4	Copper and its compounds (Cu)	mg/kg	< 190
5	Lead and its compounds (Pb)	mg/kg	< 420
6	Mercury and its compounds (Hg)	mg/kg	<10
7	Molybdenum and its compound (Mo)	mg/kg	<57
8	Nickel and its compound (Ni)	mg/kg	<75
9	Selenium and its compound (Se)	mg/kg	< 100
10	Zinc and its compounds (Zn)	mg/kg	<500
11	Cyanide and its compound (CN)	mg/kg	<50
12	Fluorine and its compounds (F)	mg/kg	<400
13	Manganese and its compounds (Mn)	mg/kg	<500

No.	Chemical Name	Unit (mg/kg of dry waste)	Maximum Condensation of Toxic Chemicals in waste
14	Benzene (C6H6)	mg/kg	<1.0
15	Toluene (C6H5CH3)	mg/kg	<130
16	Ethy1 Benzene (C6H5CH2CH3)	mg/kg	<50
17	Xylene (C6H4C2H6)	mg/kg	<25
18	Phenol (C6H60)	mg/kg	< 40
19	Cresol (CH3C6H40H)	mg/kg	< 5.0
20	Styrene (C6H5CH=CH2)	mg/kg	< 100
21	Polyhydroxyalkanoates (All of 10 kinds of PHA)	mg/kg	< 40
22	Naphthalene (C10H8)	mg/kg	< 40
23	Phenanthrene (C14H10)	mg/kg	< 40
24	Anthracene (C14H10)	mg/kg	< 40
25	Fluranthene (C16H10)	mg/kg	< 40
26	Benz(a) anthracene (C18H12)	mg/kg	< 40
27	Chr sene (C18H12)	mg/kg	< 40
28	Benzo(k) fluoranthene (C20H12)	mg/kg	< 40
29	Benzopyrene (C20H12)	mg/kg	< 40
30	Benzo(ghi) pyrene (C22H12)	mg/kg	< 40
31	Indeno(1 2 3 —cd) pyrene (C22H12)	mg/kg	< 40
32	Dichloromethane (CH2CL2)	mg/kg	< 10
33	Trichloromethane (CHC13)	mg/kg	< 10
34	Carbon Tetrachloride (CC14)	mg/kg	< 1.0
35	Tetracholoeth lene (C12C=CC12)	mg/kg	< 60
36	1.1 -dichloroethane (C2H4C12)	mg/kg	< 40
37	1.2-dichloroethane (ClCH2-CH2Cl)	mg/kg	<15
38	Vinyl Chloride (C2H3Cl)	mg/kg	<4.0
39	1.1.1-trichloroethane (CH3CCl3)	mg/kg	<0.1
40	1.1.2-dichloroethane (C2H3Cl3)	mg/kg	<15
41	Chlorobenzene (C6H5Cl)	mg/kg	<10
42	Chlorophenol (C6H5ClO)	mg/kg	<30
43	Chloronaphthalene (C10H7Cl)	mg/kg	<10
44	Polychlorobiphenyls (PCBs)	mg/kg	<1.0
45	Dioxins and Fluorans (TCDDs/Fs)	mg/kg	<1.0
46	Dichloropropane (CH3CHCLCH2Cl)	mg/kg	<2.0
47	Dichlorodiphenyltrichloroethane	mg/kg	<4.0
48	Aldrin (C12H8Cl6)	mg/kg	<4.0
49	Dieltrin (C12H8Cl6O)	mg/kg	<4.0
50	Endrin (C12H8Cl6O)	mg/kg	<4.0
51	Hexachlorocyclohexane (CHC compounds)	mg/kg	<2.0
52	Carbaryl (C12H11NO2)	mg/kg	<5.0
53	Carbofuran (C12H15NO3)	mg/kg	<2.0
54	Atrazine (C8H14ClN5)	mg/kg	<6.0
55	Chlordecone (C10Cl10O)	mg/kg	<4.0
56	Heptachlor (C10H5Cl7)	mg/kg	<4.0
57	Heptachlor Epoxide (C10H5Cl7)	mg/kg	<4.0
58	Endosulfan (C9H6Cl6O3S)	mg/kg	<4.0
59	Chlordecone (C10Cl10O)	mg/kg	<4.0
60	Organic tin and its compounds (C-Sn)	mg/kg	<2.5
61	Natural oil	mg/kg	<5000
62	Pyridine (C5H5N)	mg/kg	<0.5
63	Tetrahydrofuran (C4H8O)	mg/kg	<2.0

No.	Chemical Name	Unit (mg/kg of dry waste)	Maximum Condensation of Toxic Chemicals in waste
64	Monoethylene glycol (C2H6O2)	mg/kg	<100
65	Diethylene glycol (C4H10O3)	mg/kg	< 270
66	Acrylonitrile (C3H3N)	mg/kg	< 0.1
67	Formaldeh de (CHO)	mg/kg	< 0.1
68	Methanol (CH30H)	mg/kg	<30
69	Butanol (C4H90H)	mg/kg	<30
70	1.2 butyl acetate (C6H1202)	mg/kg	< 200
71	Tri bromoform (CHBr3)	mg/kg	<75
72	Ethyl acetate (C4H802)	mg/kg	<75
73	Isopropyl alcohol (C3H7OH)	mg/kg	< 220

Note: Every disposal of chemical waste or hazardous substances as stipulated in the above annexes out of sites determined by the ministry and competent institutions shall be absolutely prohibited and deemed as the infringement of law.

Annex 2: Standards of the quantity of toxic chemicals or hazardous substances allowed in soils.

No	**Chemical Name**	**Unit (mg/ kg of dry waste)**	**Maximum Condensation of Toxic Chemicals Allowed in Soils**
1	Arsenic and its compounds (As)	mg/kg	< 15
2	Barium and it compounds (Ba)	mg/kg	< 160
3	Cadmium and its compounds (Cd)	mg/kg	< 0.8
4	Chromium and its compounds $(Cr)^{+6}$	mg/kg	< 100
5	Copper and its compounds (Cu)	mg/kg	< 125
6	Lead and its compounds (Pb)	mg/kg	< 85
7	Mercury and its compounds (Hg)	mg/kg	< 0.3
8	Molybdenum and its compounds (Mo)	mg/kg	< 3.0
9	Nickel and its compounds (Ni)	mg/kg	< 35
10	Selenium and its compounds (Se)	mg/kg	< 0.7
11	Zinc and its compounds (Zn)	mg/kg	< 140
12	Manganese and its compounds (Mn)	mg/kg	< 300
13	Cobalt (Co)	mg/kg	< 9
14	Antimony (Sb)	mg/kg	< 3
15	Beryllium (Be)	mg/kg	< 1.1
16	Silver (Ag)	mg/kg	< 1.1
17	Thorium (Th)	mg/kg	< 1
18	Vanadium (V)	mg/kg	< 42
19	Free cyanide (CN)	mg/kg	< 1
20	Bromine (Br)	mg/kg	< 20
21	Fluorine and its compounds (F)	mg/kg	< 400
22	Benzene (C_6H_6)	mg/kg	< 0.01
23	Toluene ($C_6H_5CH_3$)	mg/kg	< 0.01
24	Ethyl Benzene ($C_6H_5CH_2CH_3$)	mg/kg	< 0.03
25	Xylene ($C_6H_4C_2H_6$)	mg/kg	< 0.1
26	Phenol (C_6H_6O)	mg/kg	< 0.05

27	Styrene ($C_6H_5CH{=}CH_2$)	mg/kg	< 0.3
28	Polyhydroxyalkanoates (All of 10 kinds of PHA)	mg/kg	< 1
29	Naphthalene ($C_{10}H_8$)	mg/kg	< 1
30	Phenanthrene ($C_{14}H_{10}$)	mg/kg	< 1
31	Anthracene ($C_{14}H_{10}$)	mg/kg	< 1
32	Fluoranthene ($C_{16}H_{10}$)	mg/kg	< 1
33	Benz(a)anthracene ($C_{18}H_{12}$)	mg/kg	< 1
34	Chrysene ($C_{18}H_{12}$)	mg/kg	< 1
35	Benzo(k)fluoranthene ($C_{20}H_{12}$)	mg/kg	< 1
36	Benzopyrene ($C_{20}H_{12}$)	mg/kg	< 1
37	Benzo(ghi)pyrene ($C_{22}H_{12}$)	mg/kg	< 1
38	Indeno(1 2 3-cd)pyrene ($C_{22}H_{12}$)	mg/kg	< 1
39	Dichloromethane (CH_2Cl_2)	mg/kg	< 0.4
40	Trichloromethane ($CHCl_3$)	mg/kg	< 0.02
41	Carbon Tetrachloride (CCl_4)	mg/kg	< 0.4
42	Trichloroethylene (C_2HCl_3)	mg/kg	< 0.1
43	Tetracholoethylene ($Cl_2C{=}CCl_2$)	mg/kg	< 0.002
44	1,1-dichloroethane ($C_2H_4Cl_2$)	mg/kg	< 0.02
45	1,2-dichloroethane ($ClCH_2$-CH_2Cl)	mg/kg	< 0.02
46	Vinyl Chloride (C_2H_3Cl)	mg/kg	< 0.01
47	1,1,1-trichloroethane (CH_3CCl_3)	mg/kg	< 0.07
48	1,1,2-dichloroethane ($C_2H_3Cl_3$)	mg/kg	< 0.4
49	Chlorobenzene (C_6H_5Cl)	mg/kg	< 0.03
50	Chlorophenol (C_6H_5ClO)	mg/kg	< 0.01
51	Chloronaphthalene ($C_{10}H_7Cl$)	mg/kg	< 0.01
52	Dioxins and Fluorans (TCDDs/Fs)	mg/kg	< 5
53	Dichloropropane ($CH_3CHClCH_2Cl$)	mg/kg	< 0.002
54	Polychlorobiphenyls (PCBs)	mg/kg	< 0.02
55	dichlorodiphenyltrichloroethane (DDT/DDD/DDE)	mg/kg	< 0.001
56	Aldrin ($C_{12}H_8Cl_6$)	mg/kg	< 0.00006
57	Dieltrin ($C_{12}H_8Cl_6O$)	mg/kg	< 0.0005
58	Endrin ($C_{12}H_8Cl_6O$)	mg/kg	< 0.00004
59	Hexachlorocyclohexane (CHC compounds)	mg/kg	< 0.002
60	Alpha-hexachlorocyclohexane (α-HCH)	mg/kg	< 0.003
61	Beta-hexachlorocyclohexane (β-HCH)	mg/kg	< 0.009
62	Gamma-hexachlorocyclohexane (ϒ-HCH)	mg/kg	< 0.0005
63	Carbaryl ($C_{12}H_{11}NO_2$)	mg/kg	< 0.005
64	Carbofuran ($C_{12}H_{15}NO_3$)	mg/kg	< 0.02
65	Atrazine ($C_8H_{14}ClN_5$)	mg/kg	< 0.02
66	Chlordecone ($C_{10}Cl_{10}O$)	mg/kg	< 0.02
67	Heptachlor ($C_{10}H_5Cl_7$)	mg/kg	< 0.02
68	Heptachlor Epoxide ($C_{10}H_5Cl_7$)	mg/kg	< 0.02
69	Endosulfan ($C_9H_6Cl_6O_3S$)	mg/kg	< 0.02
70	Chlordecone ($C_{10}Cl_{10}O$)	mg/kg	< 0.02
71	Organic tin and it compounds (C-Sn)	mg/kg	< 0.02

72	Natural oil (Mineral oil)	mg/kg	< 0.1
73	Pyridine (C_5H_5N)	mg/kg	< 50
74	Tetrahydrofuran (C_4H_8O)	mg/kg	< 0.1
75	Monoethylene glycol ($C_2H_6O_2$)	mg/kg	< 0.1
76	Diethylene glycol ($C_4H_{10}O_3$)	mg/kg	< 0.1
77	Acrylonitrile (C_3H_3N)	mg/kg	< 0.01
78	Formaldehyde (CH_2O)	mg/kg	< 0.01
79	Methanol (CH_3OH)	mg/kg	< 0.1
80	Butanol (C_4H_9OH)	mg/kg	< 0.01
81	1,2 butyl acetate ($C_6H_{12}O_2$)	mg/kg	< 0.01
82	Tribromoform ($CHBr_3$)	mg/kg	< 0.2
83	Ethyl acetate ($C_4H_8O_2$)	mg/kg	< 0.2
84	Isopropyl alcohol (C_3H_7OH)	mg/kg	< 0.2

d. Type of the hazardous waste as stated in Sub-Decree on Solid Waste Management (1999)

Annex: Type of the hazardous waste

1. Fibrous and clothing wastes from textile and garment industry
2. Paper waste from paper-mill industry
3. Sludge waste from factory wastewater treatment and product manufacturing processes
4. Combustion residues from coal-fired power plants
5. Plastics waste from production or use of plasticizers
6. PCB waste from use of PCB contained in discarded air conditioners, TVs, and microwaves
7. Rubber waste from production or use of resins and latex
8. Oil waste from oil refinery, use of lubrication oils, washing oils
9. Acid waste
10. Alkalis waste
11. Metal waste and their compounds:

Zinc (Zn)
Copper (Cu)
Nickel (Ni)
Lead (Pb)
Selenium (Se)
Arsenic (As)
Antimony (Sb)
Titanium (Ti)
Tin (Sn)
Barium (Ba)
Beryllium (Be)
Uranium (U)
Vanadium (V)
Cobalt (Co)
Tellurium (Te)
Silver (Ag)

12. Soot and dust waste from incineration facilities, treating exhaust gas
13. wastes from used or discarded electricity lamp
14. Wastes from production or use of battery
15. Wastes from production and use of paints, lacquers, and pigments
16. Wastes from production and use of inks and dyes
17. Explosive wastes
18. Infectious diseases wastes
19. Agriculture drugs wastes
20. Ashes from incinerators
21. Wastes from expired products
22. Wastes from production and use of film
23. Waste from treatment of polluted soil
24. Waste from production of drugs and medicines, and expired drugs
25. Organic fluorine wastes
26. Cyanide wastes
27. Asbestos wastes
28. Phenols wastes (C_6H_5OH)
29. Ethers wastes ($R\text{-}COO\text{-}R_1$)
30. Wastes from production and use of solvents
31. Wastes from production and use of dioxin and furan
32. Radioactive wastes
33. Wastes produced as a result of treating above item 1-32.

e. Standards for groundwater quality

No	parameter	Units	Standard
1	Acids and Bases(pH)	-	6.5-8.5
2	Turbidity	NTU	5
3	Electrical Conductivity (EC)	NTU	500-1500
4	Total Dissolved Solids (TDS)	mg/L	800
5	Total Hardness (as $CaCO_3$)	mg/L	300
6	Chloride (Cl^-)	mg/L	250
7	Fluoride (F)	mg/L	1.5
8	Nitrate (NO_3)	mg/L	50
9	Sulfate (SO_4)	mg/L	250
10	Iron (Fe)	mg/L	0.3
11	Arsenic (As)	mg/L	0.05
12	Mercury (Hg)	mg/L	0.001
13	Chromium (Cr)	mg/L	0.05
14	Manganese (Mn)	mg/L	0.1
15	Aluminum (Al)	mg/L	0.2
16	Benzene (C_6H_6)	mg/L	0.01
17	Dichloromethane (CH_2Cl_2)	mg/L	-
18	Cadmium (Cd)	mg/L	0.003
19	(Total Coliform)	MPN/100ml	0
20	E.coli (E-Coli)	MPN/100ml	0

Noted: Groundwater quality standard from Prakas No. 116 on the use of working conditions model for the project to establish factories and handicrafts issued by the Ministry of Environment in 2018.