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Cambodia Airport Investment Co., Ltd

Cambodia Airport Investment Co., Ltd.

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ESIA Addendum

Cumulative Impact Assessment

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ESIA Addendum

Cumulative Impact Assessment

0730380

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1. INTRODUCTION

Cumulative impacts are generally considered as those, which are additive or interactive in nature that arise as a result of an impact from the Project interacting with an impact from another activity to create an intensified impact.

The IFC World Bank Group defines a cumulative impact as the:

"…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. Cumulative impacts are limited to those impacts generally recognised as important on the basis of scientific concerns and/or concerns from Affected Communities"[1].

The multiple and successive environmental and social impacts caused by existing activities or conditions, combined with the possible incremental impacts that could result from future proposed and/or planned Projects, can potentially generate greater cumulative impacts than would be expected in the case of a single Project (IFC, 2013). According to the IFC, the assessment and management of cumulative impacts is appropriate when there is concern that a Project or activity under consideration could contribute to generating cumulative impacts on one or more valued environmental and social component (VEC) (IFC, 2013).

IFC PS 1 requires that an environmental assessment should also address cumulative impacts. The objective of the Cumulative Impact Assessment (CIA) is to identify those environmental, social or health aspects that may not on their own constitute a significant impact but when combined with impacts from past, present, or reasonably foreseeable future Project activities or other Projects/activities may result in a larger and more significance impact.

This chapter presents the cumulative impact assessment (CIA) for the Project conducted to evaluate the potential contribution of the Project towards the cumulative impacts on the resources identified as VECs.

Following good international industry practice, this CIA follows the IFC's Good Practice Handbook—Cumulative Impact Assessment and Management: Guidance for Private Sector in Emerging Markets (the "Handbook") (IFC, 2013). The Handbook provides a methodology for identifying the most significant cumulative impacts; the methodology includes a desktop review of publicly available information and consultation with key stakeholders.

This methodology focuses on environmental and social components, referred to in the handbook as VECs, which are: (1) rated as "critical" by potential Project-affected communities and/or the scientific community; and (2) cumulatively impacted by the Project under evaluation, by other Projects, and/or by natural environmental and social external drivers (IFC, 2013). The methodology is considered consistent with the IFC Performance Standards (PS), especially PS 1 — Assessment and Management of Environmental and Social Risks and Impacts, and PS 6 — Biodiversity Conservation and Sustainable Management of Living Natural Resources (IFC, 2012).

[1] IFC World Bank Group Performance Standard 1 (IFC PS 1), January 1, 2012

1.1 OBJECTIVE

The overall objective of this CIA is to identify and assess the contribution by the Project to cumulative impacts in the Project AoI. It is based on information presented throughout prior chapters of this ESIA, information provided by CAIC, and information available in the public domain. The specific objectives are to:

- Identify VECs that could be impacted cumulatively in areas potentially affected by the Project, considering input from stakeholders through the consultation process and the scientific community;
- Identify other existing and planned Projects and external environmental and social drivers that could cumulatively impact VECs;
- Undertake a high-level assessment of potential cumulative impacts on VECs, considering the Project and the other identified existing and planned Projects and external drivers in the area; and
- Recommend a management framework for the integrated management of potential cumulative impacts.

1.2 RELEVANT GUIDELINES AND CRITERIA

To achieve these objectives and gain an understanding of the complexities of cumulative impacts, this Chapter presents a Cumulative Impact Assessment (CIA), which has been undertaken largely in accordance with international best practice guidance documents, such as:

- The European Union's "Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions" (1999);
- The Canadian Environmental Assessment Agency's "Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act" (2012); and
- The IFC's "Good Practice Handbook: Cumulative Impact Assessment and Management Guidance for the Private Sector in Emerging Markets" (2013).

2. METHODOLOGY

2.1 DEFINITIONS OF KEY TERMINOLOGY FOR THE CIA

The following are definitions for key terminology used in the CIA (IFC, 2013).

Cumulative Impact: Impacts that result from the successive, incremental, and/or combined effects of an action, Project, or activity added to other existing, planned, and/or reasonably anticipated actions, Projects, or activities. For practical reasons, the identification, assessment, and management of cumulative impacts are limited to those effects generally recognized as important on the basis of scientific concern and/or concerns of affected communities.

CIA: Process to identify and evaluate cumulative impacts.

Other Projects: Existing, planned, or reasonably expected future developments, Projects and/or activities potentially affecting VECs.

External Drivers: Sources or conditions that could affect or cause physical, biological, or social stress on VECs, such as natural environmental and social drivers, human activities, and external stressors. These can include climate change, population influx, natural disasters,

or deforestation, among others. These are typically less defined and planned than Other Projects.

VEC: Valued environmental and social components considered as important by the scientific community and/or Project-affected communities. VECs may include:

- Physical features, habitats, wildlife populations (e.g., biodiversity, water supply);
- Ecosystem services (e.g., protection from natural hazards, provision of food);
- Natural processes (e.g., water and nutrient cycles, microclimate);
- Social conditions (e.g., community health, economic conditions); and
- Cultural heritage or cultural resources aspects (e.g., archaeological, historic, or traditional sites).

VECs reflect the public and scientific community's "concern" or special interest about environmental, social, cultural, economic, or aesthetic values. VECs are considered the ultimate recipients of cumulative impacts because they tend to be at the ends of ecological pathways.

2.2 LIMITATIONS

The limitations applicable to this CIA include: (1) incomplete information about other Projects and activities (e.g., the information is not available in the public domain); (2) uncertainty with respect to the implementation of future Projects; and (3) difficulty in establishing thresholds or limits of acceptable change for VECs, and therefore the significance of cumulative impacts.

2.3 KEY STEPS

This Chapter presents a CIA in accordance with the IFC Handbook and therefore with regard to the six-step process outlined in ***Figure 2.1*** As this CIA forms part of the overall ESIA, the general conditions and VECs are already known, as are the impacts from the Project (as part of the impact assessment) and the proposed mitigation, management and monitoring measures. Given this, VECs and impacts have been quickly established, with an emphasis placed on the steps pertaining to CIA and management.

In developing the methodology for this CIA, emphasis has been placed upon following a largely qualitative approach, allowing for identification of general trends and then developing appropriate management, mitigation and monitoring measures. This is primarily due to lack of clear data or information on surrounding Projects. Given this approach, the majority of the methodology relies upon the use of professional judgements, complimented by ERM's understanding of the Project and impacts and experience with similar Projects in similar settings.

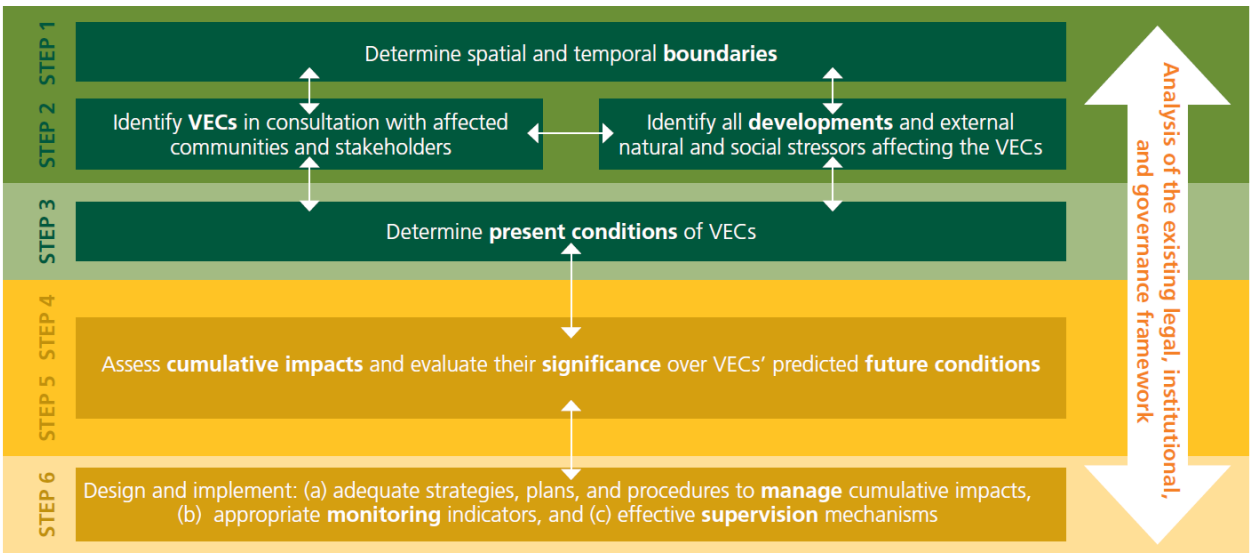

FIGURE 2.1 THE SIX STEPS FOR THE CUMULATIVE IMPACT ASSESSMENT

Source: General CIA Methodology (Source: IFC Handbook, 2013)

2.4 DETERMINATION OF SPATIAL AND TEMPORAL BOUNDARIES AND VECS

The methodology used in the setting of spatial and temporal boundaries is largely qualitative and is based upon the general "rules of thumb" suggested in Box 7 of the IFC Handbook[2]. The following factors have been established within the methodology:

- Temporal boundaries have been set based on a desktop review of available information pertaining to other proposed Projects within the area;
- ERM's understanding of the Projects currently within and proposed to be developed within the local area; and
- Geographic boundaries are a composite of the distance to the identified VECs, assessed impacts of the Project and the degree to which they may overlap with other external Projects and stressors to impact upon an identified VEC.

2.5 IDENTIFYING VECS AND THEIR PRESENT CONDITIONS

As this CIA is based on review of existing documents, the identification of VEC's is solely based on desktop work. VECs are defined as sensitive receptors within the Environmental and Social Impact Assessment (ESIA).

2.6 IDENTIFYING DEVELOPMENTS AND EXTERNAL SOCIAL STRESSORS AFFECTING VECS

External developments, also known as reasonably foreseeable future actions, are identified utilizing knowledge gained through the ESIA process (including field observations), stakeholder engagement and the interpretation of readily available external data. The outcomes of these considerations will be a simple binomial decision, i.e. the external Project is likely and therefore

[2] IFC Handbook. (2013). Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets. Retrieved from: https://www.ifc.org/wps/wcm/connect/58fb524c-3f82-462b-918f-0ca1af135334/IFC_GoodPracticeHandbook_CumulativeImpactAssessment.pdf?MOD=AJPERES&CVID=kbnYgI [Accessed September 2022]

will be included within the CIA, or no, it is unlikely and therefore will not be included within the CIA.

The second step is to determine the extent of the various impacts of these Projects. This allows for a decision to be made as to whether there is the potential for an overlap in Project impacts that could lead to measurable cumulative impacts. Key to this are the following elements:

- Identification of appropriate geographical/spatial boundaries. Where potentially interacting Projects are not located close enough, or sufficiently linked through various ecological and social processes, for relevant impacts to overlap, cumulative impacts are less likely;
- Identification of temporal boundaries. Where the schedules of various components of Projects do not overlap in time, particularly with regards to the construction phase of large Projects, cumulative impacts are less likely. Additionally, where Projects are going to be short-term, cumulative impacts will generally be of limited duration;
- Consideration of impact type. Whilst there may be no direct geographical overlap in Project boundaries, there is the possibility that their offsite impacts may directly overlap elsewhere and cause offsite cumulative impacts. Examples are sediment discharges into river systems, air pollutant emissions, and social impacts associated with overall migration influx;
- Determination of any "aggravating factors" that may be evident within a particular Project identified for inclusion within the CIA. This includes elements such as the size of the Project, environmental management performance, and the regulatory regime under which it operates; and
- Identification of potential externalities, that is a Project ability to influence (either positively or negatively) the behaviors of other operations in the area.

The other element identified as part of this scope is external natural and social stressors which are not related to a single Project or source.

2.7 IDENTIFICATION AND ASSESSMENT OF IMPACTS

Impact scoping and identification needs to be in alignment with those assessed throughout prior chapters of this ESIA and needs to include those which are recognized as important on the basis of genuine scientific concerns and the views of affected communities and other stakeholders. This allows for impacts to be appropriately grouped and added to impacts identified as likely to occur from other Projects.

A largely qualitative approach was taken for the CIA. This is to enable a focus upon identification of trends across the various Projects in the area, their temporal and spatial interactions and how these are likely to impact upon VECs. Whilst impacts arising from the Project have been defined and assessed in isolation, it can be difficult to accurately quantify cumulative impacts as there can be a high degree of uncertainty in interactions with other Projects and activities that may be occurring in the area, as well as a lack of confirmed Project information. Therefore, the impacts are to be assessed qualitatively based on the identified trends and grouped according to impact type, rather than VEC. The CIA is also based on the assumption that all assessed residual impact levels within the ESIA are achievable.

2.8 DEVELOPMENT OF MANAGEMENT, MITIGATION AND MONITORING MEASURES

Based upon identification of broad impact trends, broad scale mitigation measures will need to be developed. Generally, these are based upon:

- Effective application of, and adherence to, the mitigation hierarchy in environmental and social management of the specific contributions by the Project expected cumulative impacts. This is generally achieved through stringent implementation of the measures developed specifically for the Project; and
- Development of best efforts to engage in, enhance and/or contribute to a multi-stakeholder, collaborative approach to implementing management actions which are beyond the capacity of an individual Project proponent.

Any measures developed to address concerns identified within this CIA will take into account these general concepts.

3. SCOPING ASSESSMENT

3.1 SPATIAL BOUNDARIES

It was determined that the following is sufficient to serve as the spatial boundary of the CIA:

- The Project development area and the AoI defined for the biodiversity impact assessment (including airport site and access road);
- The Ecologically Appropriate Area of Analyses (EAAA) which was determined for the baseline biodiversity assessment and CHA to account for ecologically important/sensitive ecosystems, habitats and species that may be affected by the Project;
- The three (3) Key Biodiversity Areas within a 50 km radius of the Project area; and
- The villages in the Social Area of Influence as representative of all areas that could be indirectly affected by changes in ecosystem goods and services.

3.2 IDENTIFICATION OF OTHER PROJECTS

3.2.1 EXISTING PROJECTS

There are 13 existing Projects within the spatial boundary of the CIA. However, there was limited information available on the public domain on these Projects. ***Table 3.1*** below provides the names and locations of the Projects.

TABLE 3.1 EXISTING PROJECTS WITHIN THE SPATIAL BOUNDARY OF THE CIA

Project	Location	Status
Rock grinding	Roka Kpous Commune, Sa'ang District, about 1.5 km northeast of the Project.	Operational
Fortune Garment Factory	Roka Kpous Commune, Sa'ang District, on National Road No. 21 about 3 km northeast of the Project	Operational
Sunly Plastic Pipe Factory	Prek Koy Commune, Sa'ang District, about 5 km from the Project.	Operational
Linton Manufacturing Co., Ltd	Prek Koy Commune, Sa'ang District, about 5 km from the Project	Operational
JD and Toyosima Garment Factory	Pot Sor Commune, Bati District,about 3 km west of the Project.	Operational
Solamoda Garment Factory	Pot Sor Commune, Bati District, about 3 km west of the Project.	Operational
SC Food Processing Factory	Boeung Khyang Commune, Kandal Stoeng District	Operational
Golden Plus Textile and Garment	Boeung Khyang Commune, Kandal Stoeng District, about 4 km west of the Project	Operational
Soil Mining Project No. 1	Choung Kerb Commune, Kandal Stoeng District, about 4.5 km northwest of the Project	Operational
Soil Mining Project No. 2	Kondoak Commune, Kandal Stoeng District, about 4 km from the Project.	Operational
Soil Mining Project No. 3	Kondoak Commune, Kandal Stoeng District, about 5 km northwest of the Project.	Operational
Soil Mining Project No. 4	Kondoak Commune, Kandal Stoeng District, about 4 km to the northwest of the Project.	Operational
Soil Mining Project No. 5	Siem Reap Commune, Kandal Stoeng District, about 4.5 km northwest of the Project.	Operational

The locations of the existing Projects listed above are provided in ***Figure 3.1***.

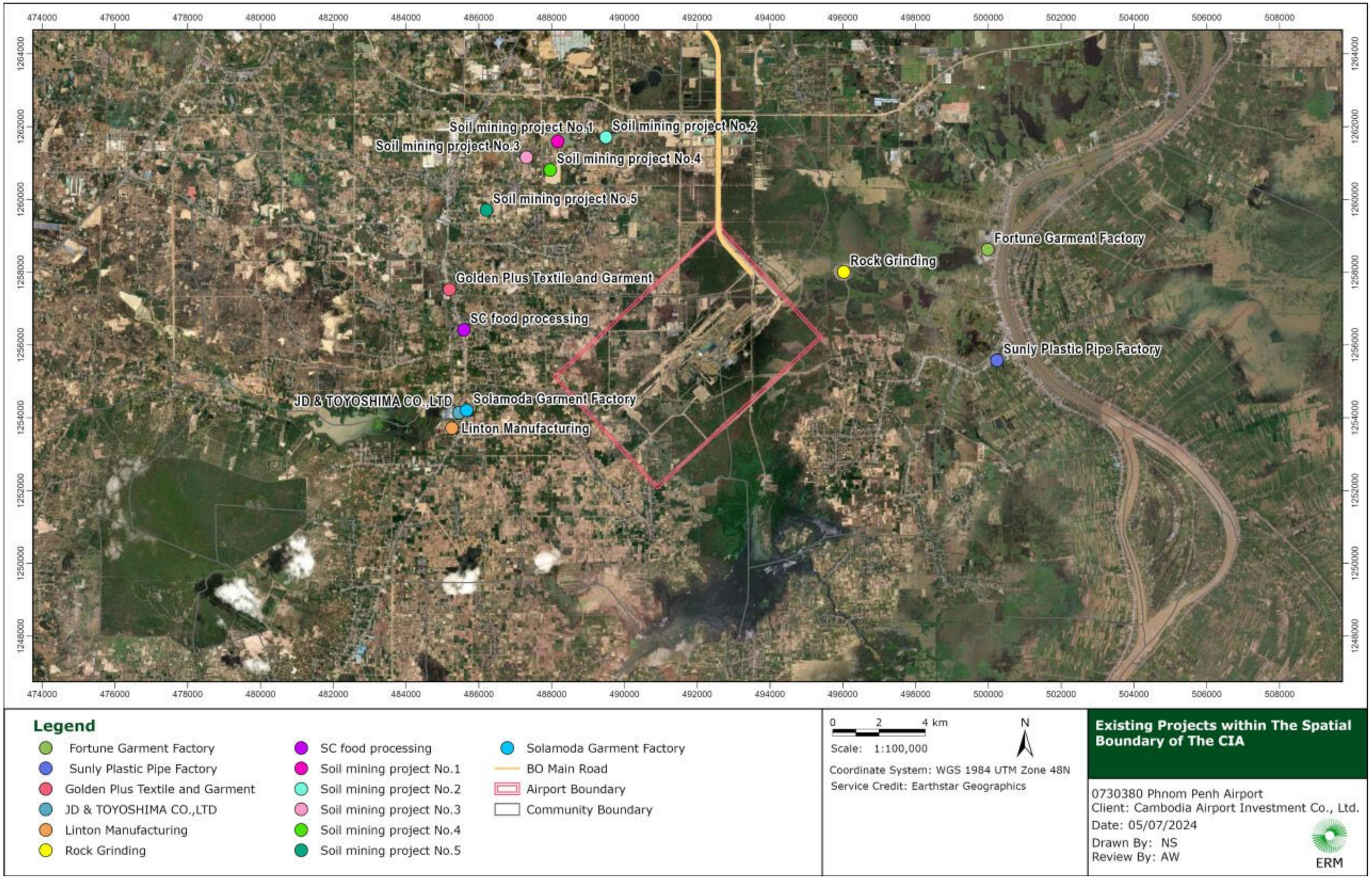

FIGURE 3.1 EXISTING PROJECTS WITHIN THE SPATIAL BOUNDARY OF THE CIA

3.2.2 FUTURE PROJECTS

Second Phase of the Airport

The second phase of the Project is not being considered for funding at this stage. However, the ESIA Addendum and the EIA both account for the expansion as the total land required for both phases have been acquired. As a result, most of the impacts associated with Phase 2 have already been accounted for. Phase 1 (up to 2030) covers 1,259 hectares, while Phase 2 covers 379 hectares. Construction for Phase 2 is expected to begin in 2030 and be completed by 2050. According to the Airport Master Plan, during Phase 2, the airport is expected to be capable of handling 20 million passengers annually (an increase from 13 million passengers annually in Phase 1).

The land use planning for each Project phase is provided in ***Figure 3.2***. Master plan layout for Phase 1 and Phase 2 are provided in ***Figure 3.3*** and ***Figure 3.4***, respectively.

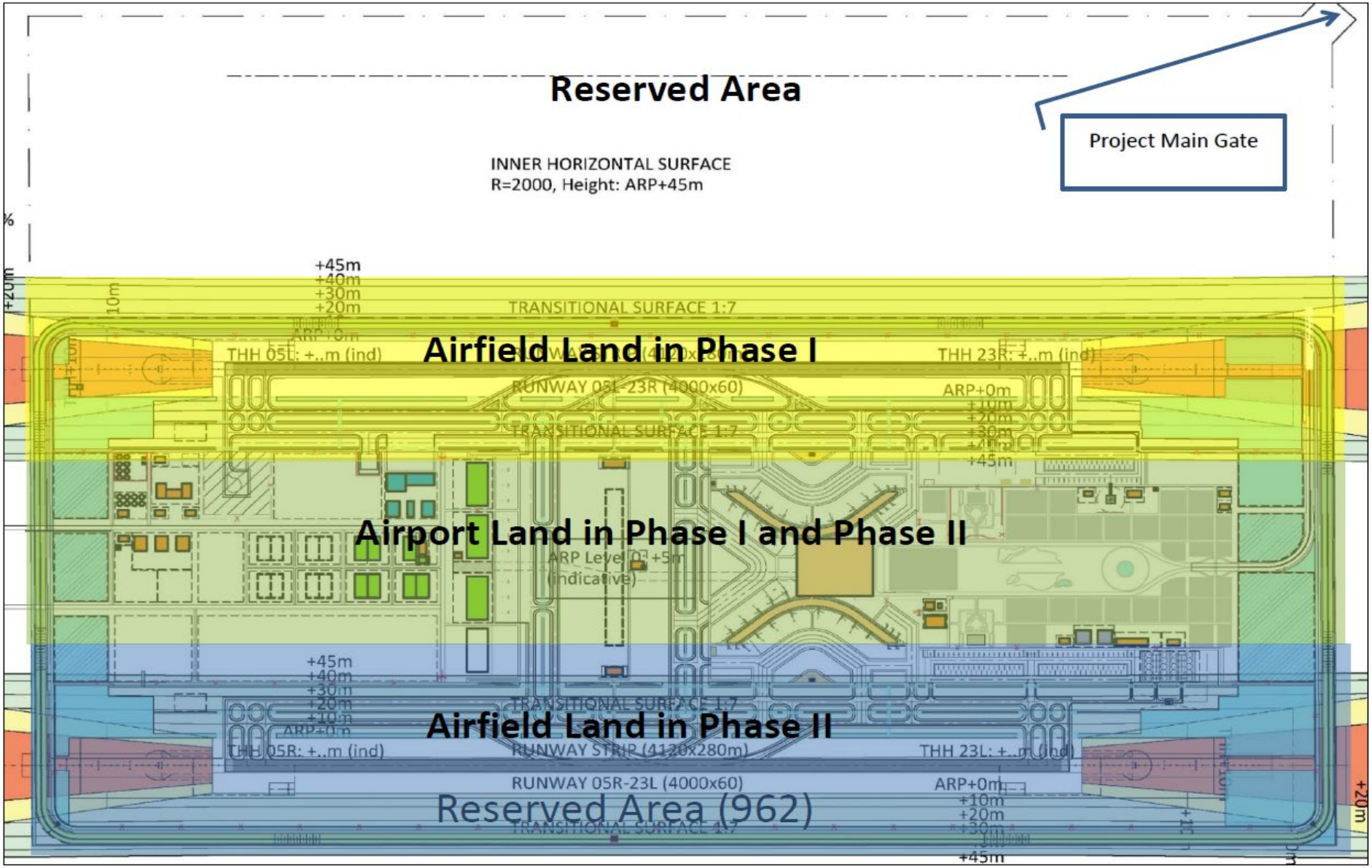

FIGURE 3.2 LAND USE PLANNING IN EACH PROJECT PHASE

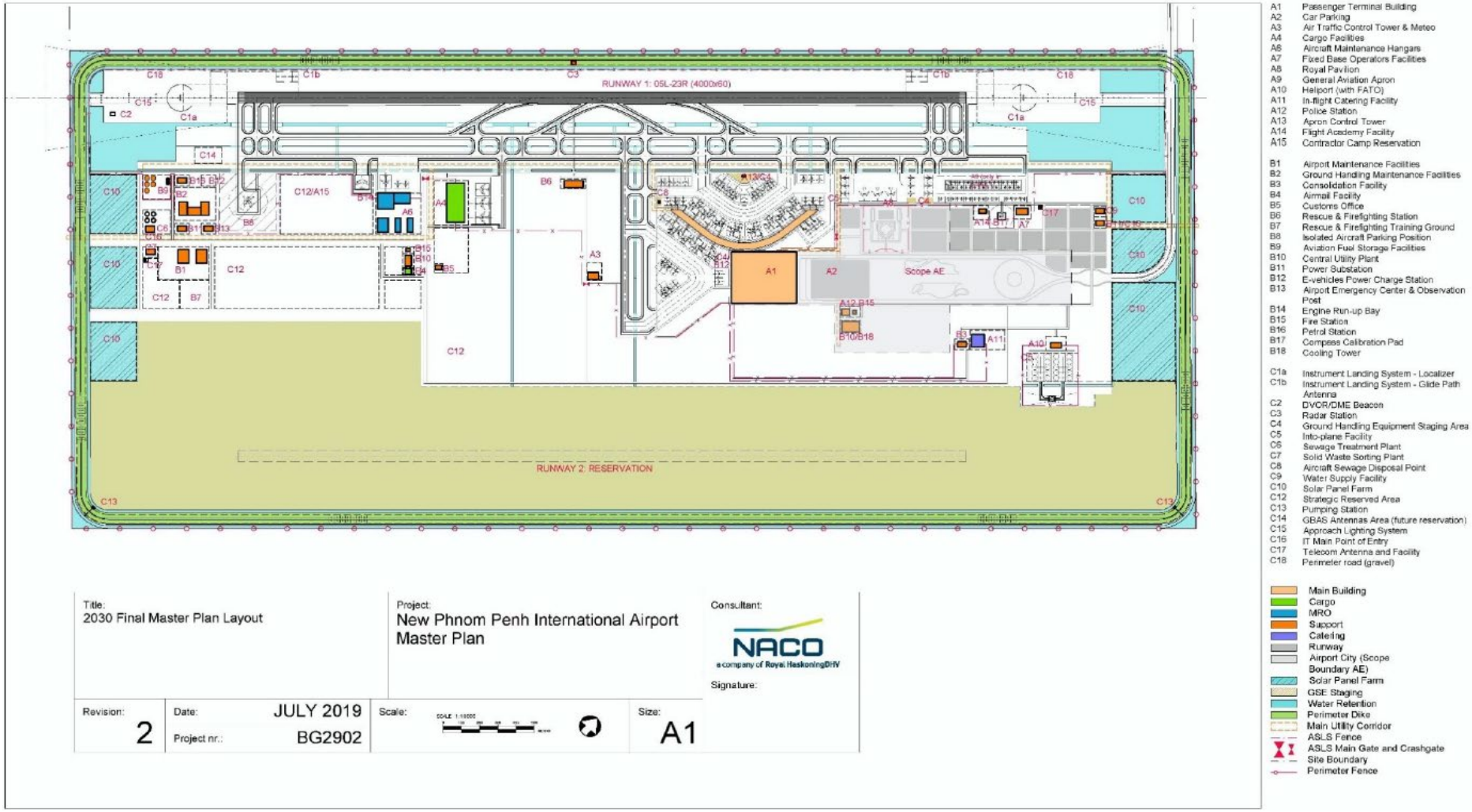

FIGURE 3.3 MASTER PLAN LAYOUT PHASE 1 (2030)

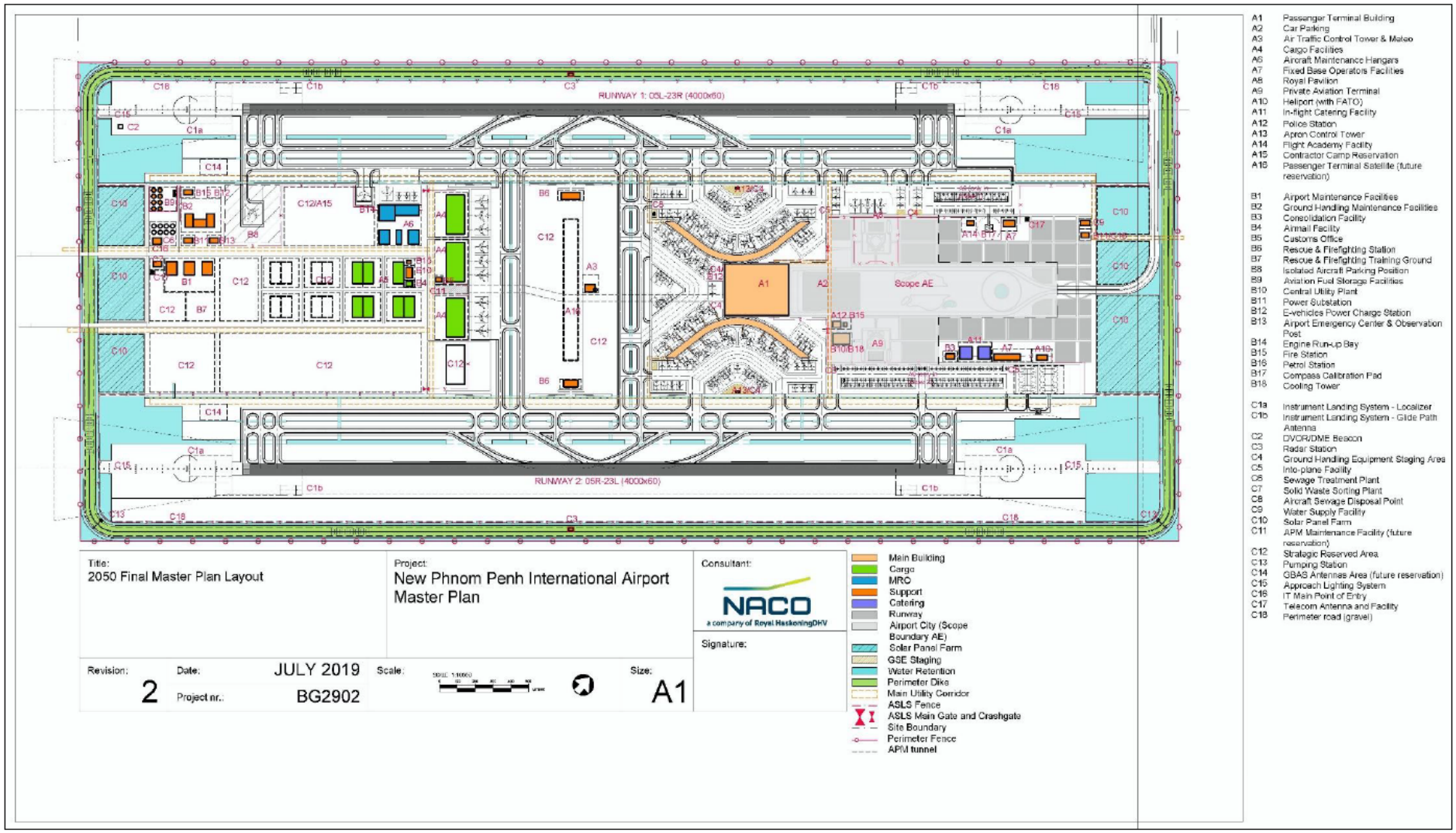

FIGURE 3.4 FINAL MASTER PLAN LAYOUT PHASE 2 (2050)

Phase 2 entails constructing a second runway and supporting taxiway system, as well as expanding existing infrastructure to accommodate the added capacity.

Airside infrastructure to be commissioned for Phase 2 (2030-2050) include:

- Runway 05R-023L
- Taxiway System
- Passenger Terminal Apron Expansion
- Cargo Apron Expansion
- Private Aviation Apron
- Airside Services Roads Expansion

Main facilities to be commissioned for Phase 2 (2030-2050) include:

- Passenger Terminal Building Pier Expansion (prepared by the AE)
- Private Aviation Terminal (prepared by the AE)
- Cargo Terminal Building Expansion
- Forwarder Facilities
- Aircraft Maintenance Facility Expansion
- Fixed Base Operator Facilities

Support facilities to be commissioned for Phase 2 (2030-2050) include:

- In-flight Catering Facilities Expansion
- Ground Support Equipment Parking Expansion
- Airport Maintenance Facilities Expansion
- Rescue and Firefighting Sub Station
- Airside Landside Gate Facilities

Utilities to be commissioned for Phase 2 (2030-2050) include:

- Power Network Expansion
- Cooling Network Expansion
- Portable Water Network Expansion
- Non Potable Water Network Expansion
- Sewage Treatment Plant Expansion
- Fuel Storage Facility Expansion
- Hydrant System Expansion

For Phase 1, the passenger terminal will be 118,000 m^2, and for Phase 2, the passenger terminal will be expanded to 320,000 m^2 with the addition of a second pier. The initial airside fire station for Phase 1 will be 19,200 m^2 and an additional station will be added later totaling 32,000 m^2 allocated for Phase 2. The initial fire station will be constructed near runway 1, the second fire station will be near runway 2. Phase 2 will also include expanding the oil terminal

(JET A-1) from 8,000 m^2 in Phase 1 to 14,000 m^2. ***Table 3.2*** below provides the summary plot size requirements.

TABLE 3.2 PLOT SIZE REQUIREMENTS

Airport Infrastructure	2030 (ha)	2050 (ha)
1. Airfield Configuration		
Runway	28.05	56.10
Taxiway	18.65	37.30
Aircraft Parking Apron	8.66	20.69
Airport Terminal Area	11.80	32.00
Warehouse Area	4.59	9.47
Subtotal (1)	**67.16**	**146.09**
2. Airport Main Facilities		
Cargo Terminals	4.30	12.78
Airmail Facilities	720	0.21
Forwarder Facilities 2nd line	3.44	10.22
MRO Facilities	4.60	5.60
Fixed Base Operator Facilities	0.42	0.96
Sub-total (2)	**12.83**	**29.77**
3. Main Airport Support Facilities		
In-flight Catering Facilities	1.92	3.21
Central GSE Staging Area	1.60	2.30
GSE Maintenance Facilities	1.88	2.48
Airport Maintenance Facilities	4.00	7.72
Rescue & Firefighting Stations	1.92	3.20
Rescue & Firefighting Training Ground	2.71	2.71
Police, Security & Customs Facilities	1.14	1.14

Airport Infrastructure	2030 (ha)	2050 (ha)
Air Traffic Control Facilities	0.90	0.90
Meteorological Station	0.58	0.58
Consolidation Centre	0.30	0.58
Sub-total (3)	**16.94**	**24.82**
Grand Total (1+2+3)	**96.93**	**200.68**
4. Other land uses such as pond, green area, road system, and other non-infrastructure area	1,541.07	1,437.32
5. Reserve area	962	962
Sub-total other land uses and reserve area	2,503.07	2,399.32
Grand Total Area of Project Site	**2,600**	**2,600**

In terms of utilities, Phase 2 will consume significantly more water and fuel than Phase 1. ***Table 3.3*** below provides water demand and supply during operation phase.

TABLE 3.3 WATER DEMAND AND SUPPLY DURING OPERATION PHASE

Water Consumption	Unit	Quantity (2030)	Quantity (2050)
1. Potable Water Supply (1)	m^3/day	1,800	3,500
2. Non-potable Water			
- Aircraft non-potable Water	m^3/day	49	97
- Home Carrier base Aircraft Cleaning	m^3/day	30	42
- Chiller Plant	m^3/day	1,008	2,568
- Irrigation Water Demand	m^3/day	401	472
Sub-total (2)	m^3/day	**1,488**	**3,178**
Total amount of water (1+2)	m^3/day	**3,288**	**6,680**

Water Consumption	Unit	Quantity (2030)	Quantity (2050)
Minimum Potable Water Storage	Day	7	7
Minimum non-potable Water Storage	Day	2	2
Total plot size – water supply facilities	m^2	9,000	15,200
3. Firefighting	m^3	**4,755**	**4,817**

TABLE 3.4 AVIATION FUEL DEMAND ESTIMATIONS

No	Aviation Fuel	Unit	2030	2050
1	Annual Aircraft Movements	-	109,800	184,900
2	Peak Day Aircraft Movements (1-way)	-	178	300
3	JET A-1 fuel Consumption	m^3/day	1,170	1,980
4	Fuel Storage Demand	m^3	16,000	28,000
5	Fuel Storage Facility Plot Size	m^2	8,000	14,000

Airport City Special Economic Zone

An Airport City Special Economic Zone (SEZ) is planned to be built by CAIC, close to the airport. However, the SEZ is still in the conceptual stage and a master plan has not been designed or approved yet. The total area of the SEZ is expected to be 1,400 hectares. No additional information on the location of the SEZ was provided to ERM.

Real Estate Development

Airports are catalysts for economic development of an area. The significance of airports extends beyond their primary function of air travel; they act as hubs of economic activity. The development of an airport can lead to the transformation of its surroundings into an economic center. The presence of an airport boosts businesses and industries in its vicinity. Airports provide critical connectivity and accessibility, making nearby areas attractive locations for businesses. This proximity advantage is particularly beneficial for industries reliant on quick transportation, such as logistics, manufacturing, and e-commerce. A notable example of this indirect economic benefit is seen in the hospitality and tourism sectors. Furthermore, airports are instrumental in enabling local businesses to access global markets. They provide the necessary infrastructure for the transport of goods, allowing companies to expand their reach beyond local markets. This capability is particularly beneficial for industries that rely on the speedy delivery of products, such as pharmaceuticals, perishable commodities, and high-tech equipment. Businesses often consider the proximity to a major airport as a critical factor when

deciding on locations for their operations, as it ensures efficient logistics and easy access to global markets.

Additional Land Allocated to CAIC

The RGC recently transferred an additional 600 hectares of land to CAIC (***Figure 3.5***), southeast of the airport as per Sub-decree No. 273. Although there are currently no concrete plans to develop on the land, the additional land has been reserved for future development surrounding the airport.

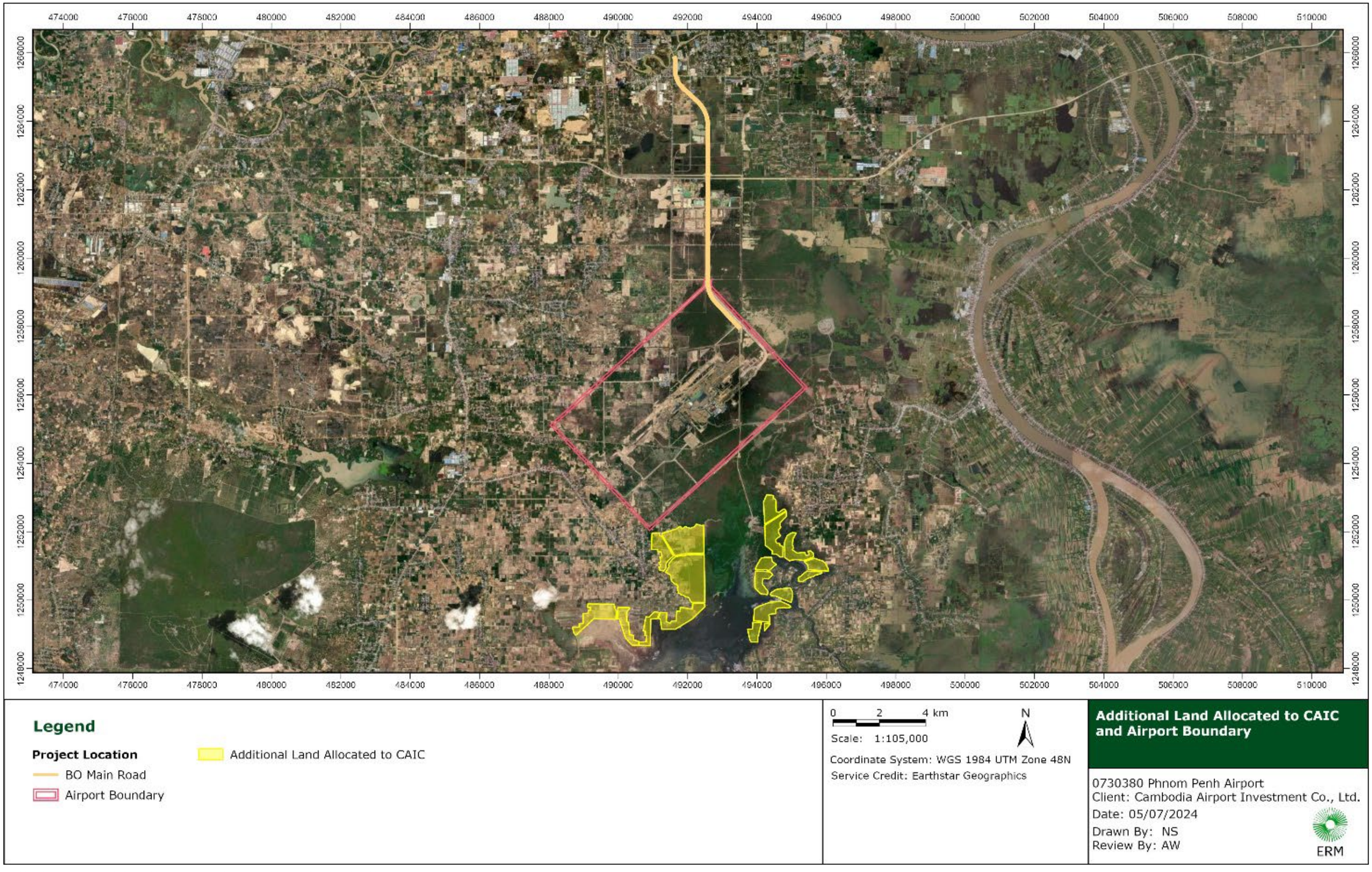

FIGURE 3.5 ADDITIONAL LAND ALLOCATED TO CAIC

3.2.3 EXTERNAL DRIVERS

Floods

Desktop research and interviews with community members conducted during the EIA process found that the SAoI was affected by flash floods caused by extreme rainfall. The level of flood water in the SAoI is generally approximately 1 m deep but has reached a maximum of 8.2 m, with the water taking between 5 to 10 days to recede. The flooding in the area is mainly caused by flash floods from the upper catchment area, west of the National Road No. 3, and the limited capacity of the drainage system in the SAoI. The drainage network consists of canals, secondary canals, and tertiary canals which drain the water from the inlets and runoff water from the paddy fields into Sa'ang Phnom Reservoir. The water ultimately flows into the Tonle Bassac River from the reservoir through outlets such as bridges and culverts situated along National Road 21.

The Project site was also inundated once by flooding from the Prek Thnot River in 1991. There was also a Mekong flood event which occurred in 2000. This event is predicted to occur once every 75 years, according to historical records and hydrological analysis. Since the headwork and flood control dikes were built in 2001, the flood waters from the river did not reach the area. Flooding is occurring more frequently in the SAoI due to climate change and land use and infrastructure changes. Climate change means a high likelihood of wetter and stronger monsoons in the future, which will increase risks for monsoon-related disasters, such as floods.

3.3 POTENTIAL VEC IDENTIFICATION AND SELECTION

VECs or Valued Social and Environmental Components were identified through the ESIA process based on the outcomes of the baseline biodiversity and social assessment findings, stakeholder and expert consultations and the Critical Habitat Assessment. Potentially eligible VECs were analysed against the following criteria: (1) confirmed to be valued by an identifiable stakeholder group (in the case of local communities, identified by a representative number of communities in the SAoI) and/or the scientific community during the stakeholder consultations for the EIA conducted by E&A); (2) reasonably expected to be potentially impacted by the Project; and (3) reasonably expected to be potentially impacted by some combination of other Projects and/or external drivers. Priority VECs were selected on the basis of risk, rather than predicted impact (aligning with the IFC 2017 approach) and are summarized in ***Table 3.5***.

TABLE 3.5 VEC SCREENING

Potential VEC	Valued by Stakeholders	Impacted by CAIC	Impacted by Other Projects and Stressors	Screened into the CIA	Justification, Comments
Critical Birds (i.e., Tailorbird)	Yes, according to consultations	Yes	No potential for cumulative impacts	No	This VEC has not been screened into the CIA as the primary areas where the Tailorbird is predominantly found is outside of the spatial boundaries of the CIA.

Potential VEC	Valued by Stakeholders	Impacted by CAIC	Impacted by Other Projects and Stressors	Screened into the CIA	Justification, Comments
Land Use Changes	Yes, according to consultations	Yes, potentially significant	Yes	Yes	Land use changes resulting in loss of agricultural land has been considered in this CIA. Conversion of agricultural land to construct real estate Projects which will serve the airport will transform the surroundings into urban areas.
Agriculture-based Livelihoods	Yes, according to consultations	Yes, potentially significant	Yes	Yes	Loss of agricultural land, loss of access to water bodies for irrigation,
Fishing-based Livelihoods	Yes, according to consultations	Yes, potentially significant	Yes	Yes	Loss of livelihoods resulting in the diminished quantities of fish, as a result of infilling of water bodies and climate related impacts are considered in this CIA.
Displacement	Yes, according to consultations	Yes	Yes	Yes	Cumulative impacts from the Project, other developments and climate change, on physical and economic displacement of households, and associated effects are considered in this CIA.
Air Quality	Yes, according to consultations	Yes	Yes	No	This VEC has not been screened into the CIA because there is negligible potential for significant cumulative air quality impacts from other existing or future developments. Air quality impacts from the existing factories is not expected to be significant due to the nature of the factories being garments and food processing, which generally have limited air emissions.

Potential VEC	Valued by Stakeholders	Impacted by CAIC	Impacted by Other Projects and Stressors	Screened into the CIA	Justification, Comments
Noise Quality	Yes, according to consultations	Yes	No potential for cumulative impacts	No	This VEC has not been screened into the CIA because there is negligible potential for significant cumulative noise impacts from other existing or future developments. Noise impacts from other existing or future developments are expected to be temporary, limited to the construction phase.
Water Resources	Yes, according to consultations	Yes, potentially significant	Yes	Yes	Cumulative impacts on flooding, as well as water quality and soil mining, and are considered in this CIA.
Traffic	Yes, according to consultations	Yes	No potential for significant cumulative impacts	No	This VEC has not been screened into the CIA because there is negligible potential for significant cumulative traffic impacts from other existing or future developments. The impacts from other future or existing Projects is expected to be minimal compared to the traffic impacts resulting from the Project itself.

3.4 DESCRIPTION OF EXISTING VEC CONDITIONS

Using results of stakeholder consultations, data analysis, and literature review, the following five VECs were selected for the CIA study: land use changes, agriculture-based livelihoods, fishing-based livelihoods, displacement and water resources. The baseline conditions of the selected VECs are summarized in the Updated Environmental Baseline and the EIA conducted by E&A Consultants.

3.5 CUMULATIVE IMPACTS ON VECS

3.5.1 CUMULATIVE IMPACTS TO LAND USE CHANGES

Majority of the land in the spatial boundaries of the CIA is agricultural land.

Key stressors and impacts that result in land use changes are:

- *Real Estate Development:* conversion of agricultural land to construct hotels and restaurants to serve the airport, transforming the surroundings into urban areas.
- *Airport City SEZ:* conversion of agricultural land to construct the SEZ, transforming the surroundings into urban areas.
- *Additional Land Allocated to CAIC:* the additional land has been reserved for future development surrounding the airport, which would entail infilling another portion of the wetlands and changing the land use of the area.
- *Climate Change:* increased climate related disasters such as floods in the future.

Since the Project has been announced the land prices in the surrounding areas have increases drastically. Land prices are expected to continue to increase when the airport becomes operational. As a result, numerous private companies have already started to purchase or acquire farmland to establish businesses.

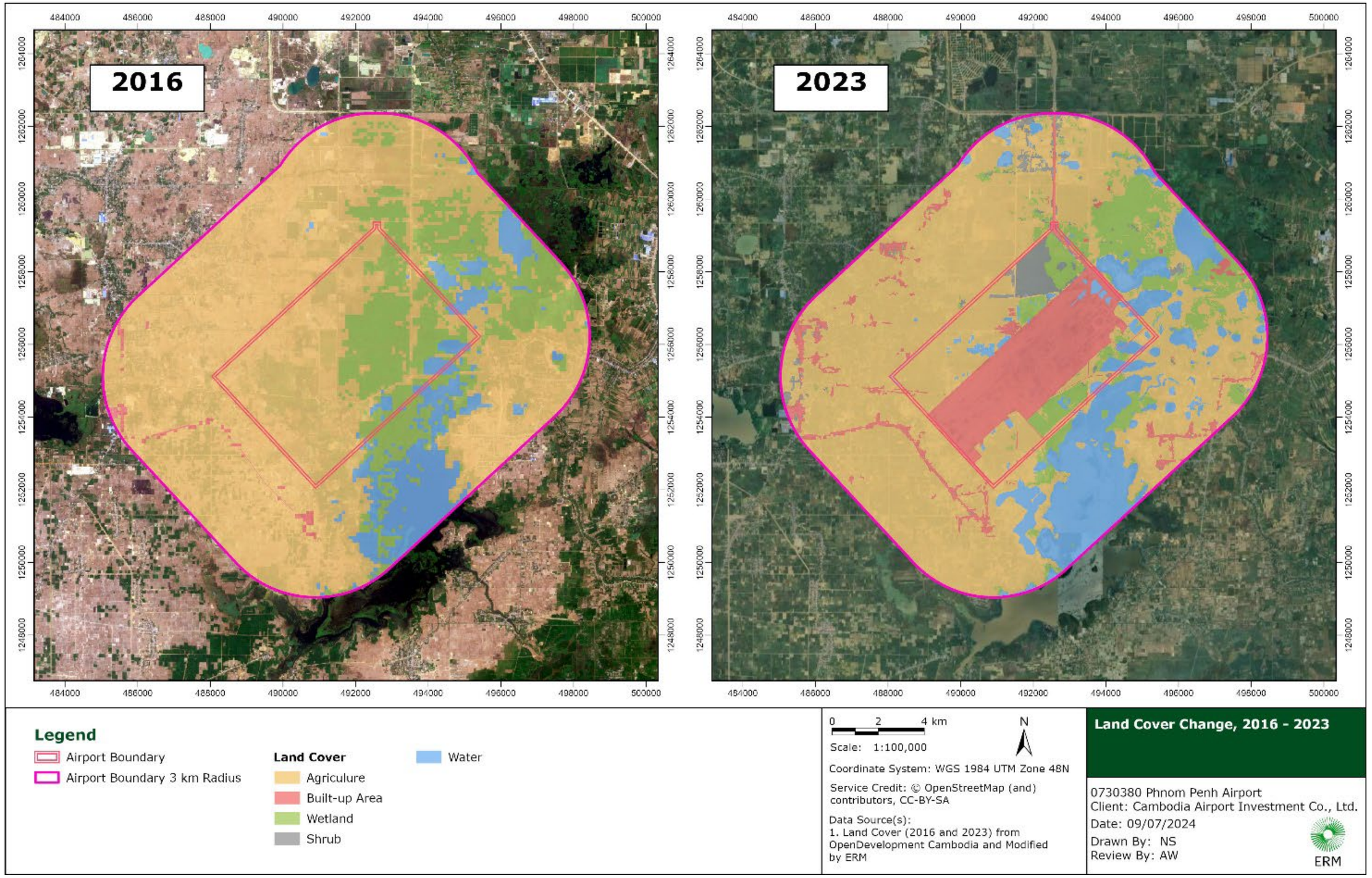

FIGURE 3.6 LAND USE CHANGES SINCE THE ANNOUNCEMENT OF THE PROJECT

With the establishment of more business, new roads will need to be constructed or existing roads will need to be expanded to connect the businesses to other areas in the city. The construction and operation of the various infrastructure will permanently alter the land use of the area. Climate change further exacerbates the aforementioned impacts to land use, as a high likelihood of stronger monsoons will increase impacts and risks for monsoon related disasters such as floods in the future.

At this point the most significant impact would be from the Airport City SEZ, which would require acquiring an additional 1,400 hectares of agricultural land and transforming it into buildings. There is limited information available on other future development Projects. The land use has been gradually transitioning from agricultural land to urban areas since the airport was announced in 2018. Cumulatively, the impacts from anthropogenic activities to land use changes is considered to be of **Moderate Significance**.

3.5.2 CUMULATIVE IMPACTS TO AGRICULTURE-BASED LIVELIHOODS

Majority of the land in the spatial boundaries of the CIA is agricultural land.

Key stressors and impacts to agriculture-based livelihoods are:

- *Real Estate Development:* conversion of agricultural land to construct hotels and restaurants to serve the airport, will result in more community members losing their agricultural land and therefore their livelihoods.
- *Airport City SEZ:* conversion of agricultural land to construct the SEZ, will result in more community members losing their agricultural land and therefore their livelihoods.
- *Additional Land Allocated to CAIC:* satellite imagery shows that there are paddy fields on the additional land which has been reserved for future development surrounding the airport. The community members farming on the land will lose their agricultural land and therefore their livelihoods.
- *Climate Change:* increased climate related disasters such as floods in the future can submerge paddy fields, resulting in loss of yield.

Infrastructure development often impact a multitude of place related values including land, traditional forms of livelihood and access to water bodies amongst others, which will be impacted by the Project and future infrastructure development in the spatial boundary for this CIA. Numerous stakeholders, both community members and government representatives raised concerns related to loss of agricultural land and livelihoods during the consultations conducted as part of the EIA. The concerns ranged from direct impacts such as losing their farmland to indirect impacts such as losing access to water bodies which the community depend on to irrigate their paddy fields. As majority of the area in the spatial boundary for this CIA consists of agricultural land, future development Projects spurred as a result of the airport will necessitate acquiring agricultural land, causing people to lose their livelihoods.

The immediate impact of land acquisition is the displacement of farmers from their fields. For many, farming is not just a source of income but a way of life that has been passed down through generations. The loss of farmland means the loss of a primary income source, and for smallholder farmers, this can lead to financial instability. The transition from farming to other forms of employment is not straightforward, as many farmers may lack the skills or opportunities to move into different sectors.

Since the Project has been announced the land prices in the surrounding areas have increases drastically. Numerous private companies have already started to purchase or acquire farmland to establish businesses. Land prices are expected to continue to increase when the airport becomes operational, pricing out community members who have lost their land and making it unaffordable for them to purchase land in the surrounding areas. Majority of the people impacted will need to transition out of agriculture-based livelihoods into labour jobs or move to different provinces where agricultural land is more affordable. This comes with impacts on their "sense of place" - a concept which is an interactional and psychological which makes it very difficult to move away from a place that one consider home. Affected people will likely transition into labour jobs, however, this transition poses several challenges. Many farmers have limited education and skills suited to other sectors. Transitioning to jobs in urban centers or different industries may require training and education, which can be time-consuming and costly. The available jobs for unskilled laborers are often low-paying and precarious. These positions may not offer the same level of financial stability or job security as farming, leading to a decrease in the overall quality of life for these individuals. In search of employment, many might migrate to urban areas or other provinces. This migration can disrupt family structures and community ties, leading to social fragmentation and loss of cultural heritage. The migration of some men to urban centers and abroad will increase the number of women in agriculture, as well as contribute to an increase in female-headed households. However, women are more unlikely to have land registered in their name or obtain documentation to prove entitlement – which further magnifies the impact of land acquisition from future development Projects.

As the Project has resulted in public scrutiny, and there is not widespread public consent, social tensions may arise between Project opponents and proponents. These divisions may occur along the lines of stakeholders or community members who perceive themselves to be beneficiaries of Project development (employment opportunities, supply opportunities, or other economic benefits or compensation for losses which are considered fair and advantageous), and those who do not. Differences in lifestyle and levels of development present within the Project area may increase as certain members of communities secure work or supply opportunities with the Project, while others do not; this can also contribute to tension and intra-community divisions.

Another concern raised by stakeholders is that the Project will need to build transportation routes which will impact their farmland. With the establishment of more business, additional roads will need to be constructed or existing roads will need to be expanded to connect the businesses to other areas in the city, which will require acquiring additional agricultural land, resulting in loss of livelihoods.

Climate change further exacerbates the aforementioned impacts to land use, as a high likelihood of stronger monsoons will increase impacts and risks for monsoon related disasters such as floods in the future, which can submerge paddy fields, resulting in loss of yield.

At this point the most significant impact would be from the Airport City SEZ and the additional land allocated to CAIC, which would require acquiring an additional 2,400 hectares of agricultural land. There is limited information available on other future development Projects. Cumulatively, the impacts of development and climate change on community members reliant on agriculture-based livelihoods is considered to be of **High Significance**.

3.5.3 CUMULATIVE IMPACTS TO FISHING-BASED LIVELIHOODS

Fishing is a primary form of income generation for people within the spatial boundary of the CIA.

Key stressors and impacts to fishing-based livelihoods are:

- *Real Estate Development:* infilling of lakes and water bodies to construct hotels and restaurants, will result in more community members losing their agricultural land and therefore their livelihoods. Development could also result in soil erosion into rivers leading to a significant increase in total dissolved solid levels which degrades aquatic habitats.
- *Additional Land Allocated to CAIC:* satellite imagery shows that the additional land which has been reserved for future development surrounding the airport, will require infilling another portion of Beoung Chueng Loung. The livelihoods of community members who depend on the lake for fishing will be impacted.
- *Climate Change:* stronger and more frequent storms, changes in water levels, and increased salinity can further threaten fish stocks and fishing livelihoods.

In addition to agriculture, fishing is a crucial source of livelihood for many of the communities surrounding the Project. The Project, along with future development Projects, could significantly affect fishing activities, with far-reaching implications for local fishers and their families. Infrastructure development could disrupt local water bodies, altering water flow patterns, reducing water quality, and degrading aquatic habitats, which are essential for sustaining fish populations. Construction activities can lead to increased sedimentation and pollution, adversely affecting the breeding grounds and health of fish species. Infrastructure development may also lead to restricted access to traditional fishing areas. New transportation routes and the expansion of urban areas can limit the movement of fishers to key fishing spots. Additionally, security zones around development Projects might limit or prohibit access to nearby water bodies, further constraining fishing activities.

Multiple stakeholders, both community members and government representatives raised concerns related to loss of livelihoods due to impacts on fisheries during the consultations conducted as part of the EIA. The primary concern was that the Project would likely endanger the fisheries due to the infilling of water bodies.

The community members in particular requested that Beoung Chueng Loung lake be left intact. Their requests ranged from not infilling the lake to not prohibiting people from fishing on the lake to allowing people to access fishing areas. There were also requests to not close the waterway flowing from Tonle Bati to Beoung Chueng Loung because it is the main water source for the lake. If the waterway is filled in, the lake will lack water and fish stocks will reduce. The Project has necessitated the infilling of a proportion of the lake and other waterways, impacting fishermen. When the additional land which has been allocated to CAIC will be developed, it will entail infilling another portion of the lake. As a result, the impacts on fishermen will be compounded. Since the Project started construction, there have been reports of the daily catch of fishermen dwindling due to the infilling of water bodies. Any additional infrastructure development, therefore, is likely to add additional stress to the existing impacts. Future development Projects in the spatial boundary for this CIA spurred as a result of the airport will necessitate infilling additional water bodies, causing people to lose their livelihoods. The cumulative impact of pollution, habitat destruction, and restricted access can lead to a decline in fish stocks. Reduced fish populations can diminish catches, directly impacting the income

and food security of fishing households. Over time, the decreased availability of fish can lead to increased competition and conflict among fishers. There have already been reports of fishers taking jobs as construction workers but some could not work as construction workers due to health problems preventing them from doing the dangerous manual labour. The reduced viability of fishing as a livelihood may force fishers to seek alternative sources of income. Similar to displaced farmers, fishers may face challenges in transitioning to new forms of employment. Many fishers have specialized skills and knowledge unique to their trade, making it difficult to find equivalent work in other sectors. The transition from fishing to other forms of employment is not straightforward, as many fishers may lack the skills or opportunities to move into different sectors. Women play a significant role in fishing communities, often engaging in post-harvest activities such as processing and selling fish. The decline in fishing activities can disproportionately affect women, who may lose their livelihoods and face increased economic hardship. Vulnerable groups, including the elderly and children, also depend on the fishing industry for sustenance and support.

For many, fishing is not just a source of income but a way of life that has been passed down through generations. It is also a supplementary source of livelihood for people, complementing other existing income and nutrition sources. The loss of fishing grounds means the loss of a primary income source, and can lead to financial instability. The decline of fishing as a viable livelihood can disrupt community cohesion. Long-established social networks and support systems may weaken as families and individuals face economic pressures and potential displacement. Social tensions may arise between those who can adapt to new opportunities and those who struggle to transition.

The degradation of aquatic ecosystems due to construction and pollution can lead to a loss of biodiversity. The decline in fish species and other aquatic life can have cascading effects on the broader ecosystem, further reducing the resilience and sustainability of local water bodies.

The impacts of climate change, such as rising temperatures and altered precipitation patterns, can exacerbate the challenges faced by fishing communities. Stronger and more frequent storms, changes in water levels, and increased salinity can further threaten fish stocks and fishing livelihoods.

Cumulatively, the impacts of development and climate change on community members reliant on fishing-based livelihoods is considered to be of **High Significance**.

3.5.4 CUMULATIVE IMPACTS TO WATER RESOURCES

Key stressors and impacts to water resources are:

- *Real Estate Development:* infilling of lakes and water bodies to construct hotels and restaurants, could result in flooding. Development could also result in soil erosion into rivers leading to a significant increase in total dissolved solid levels which degrades aquatic habitats.
- Soil mining: could impact upon water quality from increased turbidity and suspended soils, and oil spills or leakages from the excavation machinery.
- *Additional Land Allocated to CAIC:* satellite imagery shows that the additional land which has been reserved for future development surrounding the airport, will require infilling another portion of Beoung Chueng Loung.
- *Climate Change:* could affect water flows.

Sand in-filling, the practice whereby sand is used to fill a lake or waterbody to create real estate for construction of buildings, requires sand dredging to harvest or mine the required amount of sand. Environmental concerns related to river sand dredging include river embankment destruction; increased flood risk; fish kills; groundwater table retention reduction; changes in flow velocity; loss of land; and animal habitat loss. The construction of hotels, restaurants, and other infrastructure involves infilling lakes and water bodies. This practice can disrupt the natural hydrology, leading to increased flooding risk. The loss of these water bodies reduces natural water retention and absorption capacity, exacerbating flood impacts during heavy rainfall events. Construction activities often result in soil erosion, which can lead to increased sedimentation in rivers and lakes. This sedimentation raises the total dissolved solids (TDS) levels, degrading water quality and aquatic habitats. High TDS levels can harm fish and other aquatic organisms, reducing biodiversity and disrupting the ecological balance.

Contamination from the poor management of wastes generated onsite can also impact aquatic fauna and flora. Operational mismanagement resulting in releases, spillages and leakages of chemicals, hydrocarbons and sewage may lead to a depletion of the natural ecosystem.

Soil mining, particularly for construction purposes, can also increase water turbidity and suspended solids. Elevated turbidity can smother aquatic habitats, reduce light penetration, and interfere with photosynthesis in aquatic plants. The machinery used in soil excavation poses a risk of oil spills and leakages, contaminating water sources. Hydrocarbon pollution is toxic to aquatic life.

Climate change is expected to alter precipitation patterns, leading to changes in water flows. More intense and frequent storms can increase runoff, leading to erosion and sedimentation. Conversely, prolonged dry periods can reduce water availability, stressing both human and ecological systems.

Cumulatively, the impacts of development and climate change on water resources is considered to be of **Moderate Significance**.

3.5.5 CUMULATIVE IMPACTS TO DISPLACEMENT

Key stressors and impacts to displacement are:

- *Real Estate Development:* acquiring land to construct hotels and restaurants to serve the airport, could result in community members being physically displaced. Some of the community members who were resettled due to the Project could be displaced again due to other future development Projects.
- *Airport City SEZ:* acquiring land for the SEZ, could result in physical displacement.
- *Climate Change:* increased climate related disasters such as floods in the future can submerge houses.

Numerous stakeholders, both community members and government representatives raised concerns related to displacement during the consultations conducted as part of the EIA. The concerns were primarily related to land grabs and developers purchasing land below market values. In addition, given Cambodia's history with de-privatization of land, many households do not have hard land titles for their land, making them vulnerable to physical and economic displacement with inadequate compensation. Without these titles, families are vulnerable to both physical and economic displacement without fair compensation. This lack of formal land ownership makes it easier for developers to acquire land through coercive or unfair means,

often leaving the displaced individuals without adequate recourse or support. Following the announcement of the Project, various disputes over land grabbing have been reported through the competition over land purchase and sales, provoking uproar and disputes. These disputes often arise from unclear land ownership, unfair compensation practices, and the pressure exerted by developers eager to capitalize on the rising land values around the airport.

Losing land and housing often results in families losing their livelihoods and income, which in turn impacts their physical and mental health. Displacement is widely acknowledged to be an incredibly stressful and traumatic event, which significantly impacts the mental health of those affected. The loss of income resulting from eviction, leads to urban poor families placing themselves in precarious situations for money, including migration for work or taking out loans with money lenders. When displacement occurs, social networks are scattered and close-knit communities which used to derive emotional and physical support from their neighbors, become disrupted. Communities and individuals may experience diminished social cohesion and cultural identity due to displacement. Resettlement has the potential to disturb currently cohesive communities. Additionally, through the process of resettlement, relocated people will be separated, either temporarily or permanently, from spaces that hold community and cultural significance, including cemeteries, gathering spaces and ancestral lands. These separations can diminish social cohesiveness as well as connection to cultural identity. With changes in community membership that result from resettlement activities, existing social safety nets may be weakened or lost. Social safety nets include informal but established patterns of caring for elders, impoverished or otherwise socioeconomically vulnerable individuals who may not have the means to meet their basic needs independent of community support. Vulnerable households without land ownership often rely on someone else's land for livelihood (land users). Losing land access will potentially result in increased vulnerability for such households. The "sense of place" concept is interactional and psychological, which makes it very difficult to move away from a place that one consider home. Land acquisition resulting in physical displacement is one of the most critical impacts to communities' sense of place. In addition, given the limited availability of replacement land and the increased prices of land in the area, the likelihood of having to move to a different community is higher which adds to the impact.

Climate change poses an additional threat to the stability of housing in the area. Increased climate-related disasters, such as more frequent and severe floods, can submerge homes and render them uninhabitable. The communities within the spatial boundaries of the CIA are particularly vulnerable, as many houses and farmlands are located in flood-prone areas. The compounded impact of climate change and development-induced displacement can significantly undermine the resilience and adaptive capacity of these communities.

Cumulatively, the impacts of development and climate change on displacement is considered to be of **High Significance**.

4. CUMULATIVE IMPACT MANAGEMENT STRATEGY

Project design features and management measures included in the current ESIA provide a means to mitigate the specific contributions of the Project to effects on VECs. Effective application of the mitigation hierarchy (avoid, reduce, mitigate, and compensate) to manage individual contributions of cumulative impacts is recommended as best practice. CAIC and other developers of future Projects within the spatial boundary of the CIA should incorporate Project design features that include physical and procedural controls to avoid and reduce possible impacts that are planned as part of the Projects.

The responsibility for the management of cumulative impacts ought to be collective, requiring individual actions to eliminate or minimize each individual development's contributions. Project sponsors should be responsible for mitigating their own contribution to cumulative impacts, as well as participating in collaborative watershed management efforts. Moreover, management measures recommended during the CIA process may ultimately be effective only if the Royal Government of Cambodia becomes actively involved (IFC, 2013). However, it is considered best international practice that private-sector developers make best efforts to engage relevant stakeholders and promote management of cumulative impacts in their Project areas (IFC, 2013; Franks et al., 2010).

The Project sponsors should foster collaboration by participating, to the extent feasible and practicable, in working groups and/or government initiatives. The collaboration should be aimed at addressing management of potential impacts on regional resources to which the Projects could incrementally contribute with respect to cumulative impacts.

This section provides some key recommendations regarding managing cumulative impacts.

Fishing-based Livelihoods – Protect key water bodies and avoid developing on lakes and wetlands (i.e., soil mining) when possible. Conduct regular socialization, consultation and monitoring activities with relevant stakeholders. Develop and implement a grievance mechanism accessible for all community groups to report concerns and complaints. Conduct investigation into the grievances and address them in a timely manner. Develop relevant community development programs for the affected people in coordination with government authorities. Provide livelihood restoration for residents are affected to minimize the impacts on loss of income. Implement a monitoring and evaluation scheme to track the infilling of water bodies. Implement monitoring and evaluating to understand changes/impacts (if any) on livelihood activities that depend on water resources quality and quantity. In addition, the government should review and update regulations for aquatic habitat protection.

Displacement – Ensure meaningful participation of Project-affected local communities in all phases of the Project – planning, implementing, monitoring and evaluation. Provide required information on the Project to the affected communities. Ensure both quantity and quality with respect to the representation of women in Project-related consultations and decision-making processes. Women's concerns should be clearly reflected in the mitigation plans/measures. The relevant government bodies should publish a map classifying public state land in order to prevent land disputes.

Agriculture-based Livelihoods - maximise the recruitment of local workers where feasible and provide training to increase the capacity of eligible local people. Develop and implement a grievance mechanism accessible for all community groups to report concerns and complaints. Conduct investigation into the grievances and address them in a timely manner. Implement a

monitoring and evaluation scheme to track agriculture land and land use conversion. Implement monitoring and evaluating to understand changes/impacts (if any) on livelihood activities that depend on agricultural land. Coordinate closely to implement interventions if necessary with a qualified NGO/government working group related to water resource management and irrigation.

Water Resources - include an effective strategy for managing sediment. There is a need for the development of a robust methodology for long-term monitoring of aquatic habitats and biodiversity. A good understanding of the aquatic ecosystems is required for management of impacts of infrastructure development Projects on fish populations. Sustainable sediment mining plans should be formulated on a scientific basis, to balance the economic benefits of mining with impacts of mining on aquatic ecosystems and to achieve a win-win for economy and environment - sand mining sites must be selected to avoid environmental and social impacts. Sand mining practices should be continuously monitored. Establish a reporting commitment in coordination with the local fishery and agriculture agency, river management agency. Raise awareness among local communities and other stakeholder groups for proper management of waste. Develop a Worker Code of Conduct for proper waste management – which specifies which activities are allowed. The government should ensure that more research is produced to fully understand the effects of infilling water resources and that all future Projects have assessed all environmental, hydrological and sanitation impacts prior to construction. Any research should be released for public and professional review. The relevant government bodies, should release a report that outlines which water bodies are public property, and where public property has lost its public interest use this should be published for public review. Public property should not be reclassified without meaningful participation of members of the public in the process. One such way to achieve this is to publish this information for public review before a proposed reclassification. Also, soil mining/water body infilling combined with climate change is likely to worsen future flood events. Efforts to minimize filling of water bodies, and in fact preserve wetlands and water bodies, are key measures to minimize future flooding. It should be noted that the airport expansion has placed special attention on the issue of future flooding and taken steps to mitigate this impact.

General - There is also a need for effective construction and operation phase monitoring and enforcement by the Royal Government of Cambodia. Further, little government compliance monitoring or enforcement is occurring, and no efforts at adaptive management. A much more robust compliance monitoring, enforcement program, and adaptive management is needed to achieve sustainable development in Cambodia.

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