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東埔寨機場投資有限公司
Cambodia Airport Investment Co., Ltd

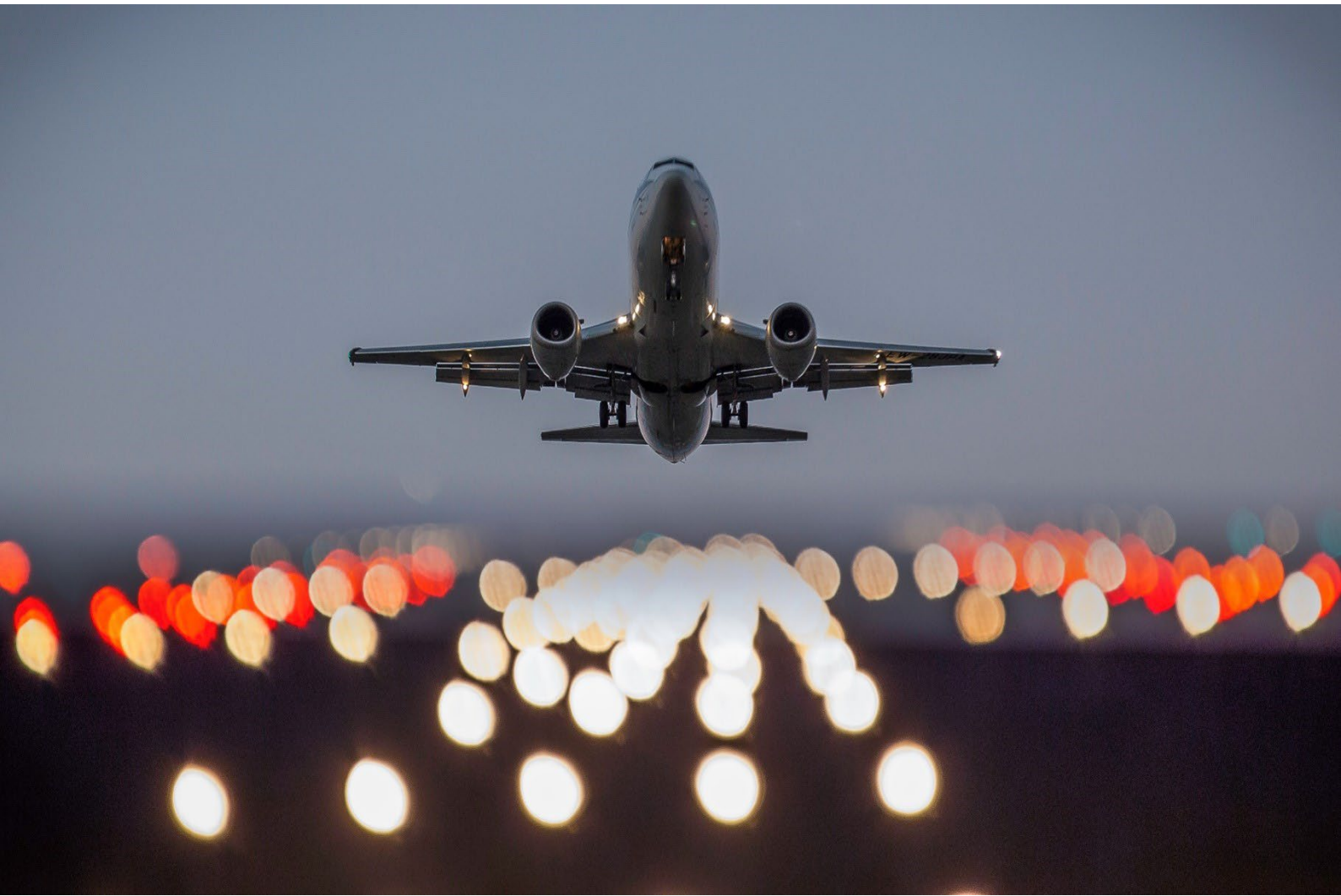
Cambodia Airport Investment Co., Ltd.

DATE
08 November 2024

REFERENCE
0730380

ESIA Addendum

Unplanned Events



DOCUMENT DETAILS

DOCUMENT TITLE	ESIA Addendum
DOCUMENT SUBTITLE	Unplanned Events
PROJECT NUMBER	0730380
Date	08 November 2024
Version	02
Author	Var.
Client name	Cambodia Airport Investment Co., Ltd.

DOCUMENT HISTORY

				ERM APPROVAL TO ISSUE		
VERSION	REVISION	AUTHOR	REVIEWED BY	NAME	DATE	COMMENTS
Draft 01	00	As above	David Blaha	Kamonthip Ma-oon	21.06.2024	Issued to Client
Draft 02	01	As above	David Blaha	Kamonthip Ma-oon	08.11.2024	Issued to Lender

SIGNATURE PAGE

ESIA Addendum

Unplanned Eventss

0730380

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ACRONYMS AND ABBREVIATIONS

Acronyms	Description
ALARP	As Low As Reasonably Practicable
CAIC	Cambodia Airport Investment Co., Ltd.
EIA	Environmental Impact Assessment
EPC	Engineering, Procurement and Construction
EPRP	Emergency Preparedness and Response Plan
ESIA	Environmental and Social Impact Assessment
PSZ	Public Safety Zones

1. UNPLANNED EVENTS

This section presents the probable impacts of unplanned events associated with construction and operation of the Project. The unplanned events are those that potentially arise from technical failure, human error, or as a result of natural phenomena.

The assessment of unplanned impacts considers the probability of events occurring and an estimate of the severity of consequences. The assessment of the severity of impacts due to fire and explosion is based on the worst-case scenario, where it is assumed that safety devices and associated measures fail to operate properly resulting in the incidents.

1.1 SCOPE OF IMPACT ASSESSMENT OF UNPLANNED EVENTS

This assessment addresses the following unplanned events:

- Leakage and spill incidents;
- Fire and explosion;
- Vehicle collisions;
- Aircraft crashes; and
- Natural hazard such as floods.

1.2 IMPACT ASSESSMENT METHODOLOGY

To evaluate potential impacts from unplanned events, a risk-based approach is used to define:

- the most likely unplanned events leading to environmental, social and/or community health impacts; and
- those unplanned events with the most significant potential environmental, social and/or community health impacts overall. Impact significance for unplanned events is therefore determined by evaluating the combination of likelihood and consequence.

1.2.1 ASSESS THE SCALE OF CONSEQUENCE

Indicative levels of consequence for potential impacts from unplanned events can be defined for the physical, biological, and social environment as provided in ***Table 1.1***.

TABLE 1.1 INDICATIVE LEVELS OF CONSEQUENCE FOR POTENTIAL IMPACTS FROM UNPLANNED EVENTS

	Incidental (A)	Minor (B)	Moderate (C)	Major (D)	Severe (E)
Physical Environment	Impacts such as localized or short-term effects or environmental media, meeting all environmental standards	Impacts such as widespread, short-term impacts to environmental media, meeting all environmental standards	Impacts such as widespread, long-term effects on environmental media, meeting all environmental standards	Impacts such as significant, widespread, and persistent changes in environmental media OR Exceedance of environmental standards	Exceedance of environmental standards and fine/ prosecution
Biological Environment	Impacts such as localized or short-term effects on habitat or species	Impacts such as localized, long-term degradation of sensitive habitat or widespread, short-term impacts to habitat or species	Impacts such as localized but irreversible habitat loss or widespread, long-term effects on habitat or species	Impacts such as significant, widespread, and persistent changes in habitat or species	Impacts such as persistent reduction in ecosystem function on a landscape scale or significant disruption of a sensitive species.
Social Environment	Slight, temporary, adverse impact on a few individuals	Temporary (<1 year), adverse impacts on community which are within international health standards	Adverse specific impacts on multiple individuals that can be restored in <1 year OR One or more injuries, not lost-work injuries.	Adverse long-term, multiple impacts at a community level, but restoration possible. OR One or more lost-work injuries to a member of the public including permanently disabling injuries.	Adverse long-term, varied, and diverse impacts at a community level or higher – restoration unlikely. OR Fatalities of public.

1.2.2 ASSESSING THE LIKELIHOOD

For the purposes of assessment, the likelihood of an unplanned event occurring can be classified as per below table.

TABLE 1.2 LIKELIHOOD CLASSIFICATION

Likelihood	Description
Remote	Not known in the industry
Very unlikely	Known of in the industry
Unlikely	May occur once or more in life of the Project
Likely	May occur once or twice per year
Expected	May occur more than twice per year

1.2.3 ASSESSING THE CONSEQUENCE

The consequences and likelihood of potential unplanned events are combined to determine the overall impact significance using the risk matrix shown in ***Table 1.3***.

For potential impacts that are determined to have an impact significance of Moderate or Major, risk reduction measures are identified; these can include measures that reduce the likelihood of the event from occurring (i.e., preventive barriers), those that reduce the consequences on sensitive receptors/resources if the event were to occur (i.e., mitigation or recovery measures), and those that affect the likelihood and consequence.

TABLE 1.3 RISK MATRIX FOR POTENTIAL UNPLANNED EVENTS

		Likelihood of Occurrence				
		Remote (1)	**Very unlikely (2)**	**Unlikely (3)**	**Likely (4)**	**Expected (5)**
Consequence	**Incidental (A)**	Negligible	Negligible	Negligible	Negligible	Negligible
	Minor (B)	Negligible	Minor	Minor	Minor	Moderate
	Moderate (C)	Minor	Minor	Moderate	Moderate	Major
	Major (D)	Moderate	Moderate	Major	Major	Major
	Severe (E)	Major	Major	Major	Major	Major

Source: ERM

The matrix applies universally to all resources/receptors, and all impacts to these resources/receptors, as the resource/receptor-specific considerations are factored into the assignment of magnitude and sensitivity/vulnerability/importance designations that enter into the matrix. ***Box 1.1*** provides a context for what the various impact significance ratings signify.

It is important to note that impact prediction and evaluation take into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the ESIA Process). This avoids the situation where an impact is assigned a magnitude based on a hypothetical version of the Project that considers none of the embedded controls.

BOX 1.1 CONTEXT OF IMPACT SIGNIFICANCES

An impact of **negligible** significance is one where a resource/receptor (including people) will essentially not be affected in any way by a particular activity, or the predicted effect is deemed to be 'imperceptible' or is indistinguishable from natural background variations.

An impact of **minor** significance is one where a resource/receptor will experience a noticeable effect, but the impact magnitude is sufficiently small and/or the resource/receptor is of low sensitivity/vulnerability/importance. In either case, the magnitude should be well within applicable standards.

An impact of **moderate** significance has an impact magnitude that is within applicable standards but falls somewhere in the range from a threshold below which the impact is minor, up to a level that might be just short of breaching a legal limit. Clearly, to design an activity so that its' effects only just avoid breaking a law and/or cause a major impact is not best practice. The emphasis for moderate impacts is therefore on demonstrating that the impact has been reduced to a level that is as low as reasonably practicable (ALARP). This does not necessarily mean that impacts of moderate significance have to be reduced to minor, but that moderate impacts are being managed effectively and efficiently.

An impact of **major** significance is one where an accepted limit or standard may be exceeded, or large magnitude impacts occur to highly valued/sensitive resource/receptors. An aim of EIA is to get to a position where the Project does not have any major residual impacts, certainly not ones that would endure into the long-term or extend over a large area. However, for some aspects there may be major residual impacts after all practicable mitigation options have been exhausted (i.e. ALARP has been applied). An example might be the visual impact of a facility. It is then the function of regulators and stakeholder to weigh such negative factors against the positive ones, such as employment, in coming to a decision on the Project.

It is important to note that impact prediction and evaluation takes into account any embedded controls (i.e., physical or procedural controls that are already planned as part of the Project design, regardless of the results of the IA Process).

1.3 ASSESSMENT OF POTENTIAL IMPACTS

Based on the Project activities, the potential unplanned events that were considered to have the highest potential environmental and social risks during all phases of the Project were shown in ***Table 1.4***. Noted that for the commissioning and operational phases, only indicative Project activities were listed. A more comprehensive evaluation of potential impacts would be conducted once sufficient detailed design information is available.

TABLE 1.4 UNPLANNED EVENTS LEADING TO POTENTIAL IMPACTS

Project Phase	Activity	Potential Receptors Affected
Construction	Small scale leakage and spill incidents from construction activities	▪ Users of surface water in nearby communities
	Fire and explosion	▪ Nearby communities
	Natural Hazards	▪ Nearby communities ▪ Forest, habitats, flora, and fauna in the vicinity of the site.
Operation and Maintenance	Small scale leakage and spill incidents from activities on site	▪ Users of surface water in nearby communities
	Fire and explosion	▪ Nearby communities
	Aircraft crash	▪ Nearby communities ▪ Airport service users ▪ Forest, habitats, flora, and fauna in the vicinity of the site
	Natural Hazards	▪ Nearby communities ▪ Forest, habitats, flora, and fauna in the vicinity of the site.

A summary of potential Project-related hazards, contributing causes, and consequences for the Project workforce, nearby communities and/or surrounding environment were summarized in ***Table 1.5***.

In order to reduce Project risk from the key potential unplanned events, the standard mitigation hierarchy should be applied. Typically, all the unplanned events resulting in a Risk Ranking higher than Minor should be further discussed. Additional mitigation measures should be proposed to reduce the Risk Ranking to a Minor or Negligible level.

TABLE 1.5 POTENTIAL IMPACT FROM UNPLANNED EVENTS AND PRE-MITIGATION RISK RANKING

No.	Unplanned Event	Cause	Consequence	Likelihood of Occurrence	Consequence	Risk Ranking
						Pre-mitigation
Construction						
1.	Small scale leakage and spill incidents from site preparation/ Construction activities	Corrosion, dropped objects, or other damages to storage oil tanks/mobile gas stations; failure to secure valves; failure to maintain large mobile construction plant.	Physical Environment – Consequences are limited to the construction site and the potential spills will be limited to the capacity of the containers or fuel tanks of the vehicles. Unlikely to have an effect of water, soil, air, flora, or fauna.	Unlikely	Minor	3B Minor
			Social Environment – Consequences are limited to the construction site and the potential spills will be limited to the capacity of the containers or fuel tank of the vehicles. Very unlikely to have any consequences for surrounding communities.	Unlikely	Minor	3B Minor
2.	Fire and explosion	Leakage and spill incidents of flammable materials, malfunctioning equipment, and failure to operate large mobile construction vehicle.	Social Environment – A fire could start in construction site and spread to surrounding areas and in the worst case affect villages nearby resulting in potentially severe injuries. Consequences are limited to the construction site as although there are many residential areas within 1 km from the airport boundary, it would require a significant amount of time for the fire to spread and reach the surrounding communities. In addition, airport buildings are generally designed with fire safety features such as fire-resistant materials and fire suppression system.	Very unlikely	Major	2D Moderate
3.	Natural hazards	According to EIA conducted by E&A (November 2020), the flooding in the airport boundary was mainly caused by flash floods from the upper catchment area west of National Road No. 3, and the limited capacity of the drainage system in the airport boundary. However, the last major flood event occurred in 2000, with a with a predicted recurrence period of 75 years.	Social Environment – floods could result in loss of human life, damage to property, public facilities and infrastructure, destruction of crops, and loss of livestock, which affects livelihoods. Floods can also lead to potential delays on the Project construction.	Unlikely	Moderate	3C Moderate
			Biological Environment – floods could result in damage to local flora and fauna and potentially alter the ecosystem.	Unlikely	Moderate	3C Moderate
Operation and Maintenance						
1.	Small scale spill from activities on-site	Corrosion, dropped objects or other damage to small storage vessels; failure to secure valves; failure to maintain equipment.	Physical Environment – Consequences are limited to the designated operational area such as apron area and the potential spills will be limited to the capacity of the containers or fuel tanks of the vehicles. Unlikely to have an effect of water, soil, air, flora, or fauna.	Unlikely	Incidental	3A Negligible
2.	Fire and explosion	Leakage and spill incidents of flammable materials, malfunctioning equipment, and engine failure.	Social Environment – A fire could start in construction site and spread to surrounding areas and in the worst case affect villages nearby resulting in potentially severe injuries. Consequences are limited to the construction site as although there are many residential areas within 1 km from the airport boundary, it would require a significant amount of time for the fire to spread and reach the surrounding communities. In addition, airport buildings are generally designed with fire safety features such as fire-resistant materials and fire suppression system.	Very unlikely	Major	2D Moderate
3.	Aircraft crash	Severe weather, air traffic control errors, mechanical malfunctions.	Social Environment – aircraft crash could result in loss of life and injury, erode public trust, also could cause anxiety.	Very unlikely	Severe	2E Major

No.	Unplanned Event	Cause	Consequence	Likelihood of Occurrence	Consequence	Risk Ranking
						Pre-mitigation
			Physical Environment – aircraft crash could result in soil and water contamination, as well as air and noise pollution.	Very unlikely	Severe	2E Major
			Biological Environment – aircraft crash could result in loss of wildlife and habitat damage.	Very unlikely	Severe	2E Major
4.	Natural hazards	According to EIA conducted by E&A (November 2020), the flooding in the airport boundary was mainly caused by flash floods from the upper catchment area west of National Road No. 3, and the limited capacity of the drainage system in the airport boundary. However, the last major flood event occurred in 2000, with a with a predicted recurrence period of 75 years.	Social Environment – floods could result in loss of human life, damage to property, public facilities and infrastructure, destruction of crops, and loss of livestock, which affects livelihoods. In addition, contaminated floodwaters can increase the risk of waterborne disease. Floods can also lead to potential delays on the operation of the airport.	Unlikely	Moderate	3C Moderate
			Biological Environment – flood could result in damage to local flora and fauna and potentially alter the ecosystem.	Unlikely	Moderate	3C Moderate

1.3.1 DURING CONSTRUCTION

1.3.1.1 LEAKAGE AND SPILL INCIDENTS

Background

Construction of the Project entails large mobile machinery that would be powered by diesel oil. As a result, there is potential for environmental damage if the materials are lost to ground.

During construction any accidental release of oils would be to unpaved areas. As a result, the oil would seep into the ground and potentially groundwater, if the release was not responded to immediately. Lube oils are not readily biodegradable. However, any release is likely to be small if there was immediate response.

Significance (Before Mitigation)

The significance is provided in ***Table 1.5***.

Mitigation Measures

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental spills are summarized in ***Table 1.6***.

TABLE 1.6 PREVENTATIVE AND MITIGATION MEASURES OF LEAKAGE AND SPILLS INCIDENTS

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Design the site to include good site management practices to ensure that the products are properly stored on site (e.g., secondary containment, double walled tanks, over filling alarm system).	EPC Contractor	During construction
Prevent	Implement a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event.	CAIC	During construction
Prevent	Ensure good inspection and maintenance procedures for large mobile construction plant to minimize small leaks and spills.	EPC Contractor	During construction
Mitigate	Prepare an Emergency Preparedness and Response Plan (EPRP) to cover	CAIC	During construction and operation

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
	accidental and emergency situations. This Plan will detail: ▪ Planning coordination: including procedures for informing local communities about emergency response, documentation and first aid / medical treatment; ▪ Emergency equipment: including equipment in the Project design and any additional emergency equipment; ▪ Training: employees and contractors will be trained in emergency response procedures; ▪ Auditing: audit records will be maintained on how the Plan is being implemented.		
Mitigate	Implement Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation.	EPC Contractor	During construction and operation

Residual Impacts

Because the majority of the mitigation measures presented are preventative, the primary goal of these measures is to reduce the likelihood of the unplanned events from occurring. However, if the event occurred, the consequence of the oil spills could potentially remain as severe. In these cases, the mitigation measures described in the previous section would apply to minimize impacts.

		Impact Significance
Without Mitigation Measures	Physical Environment	3B Minor
	Social Environment	3B Minor
With Mitigation Measures	Physical Environment	2B Minor
	Social Environment	2B Minor

Monitoring and Auditing

- Monthly monitoring the implementation of all proposed mitigation measures specified in the Emergency Preparedness and Response Plan should be conducted properly;
- Daily inspection of any secondary containment of oil/chemicals on site to ensure good maintenance procedures to minimize small leaks and spills.

1.3.1.2 FIRE AND EXPLOSION

Background

Onsite fuel required during construction will be diesel. Fuels will be provided for daily requirements and transported to the site by fuel specialized trucks. The onsite delivery of fuel or lubricant will be at designated locations that will have an impervious base. So, risk of fire and explosion at the site will be reduced.

In addition, failure of malfunctioning and/or outdated machinery and equipment could also lead to the risk of fire and explosions. Large scale fires, or explosions, could potentially release smoke and fumes into the broader area, generating health issues associated with inhalation of toxic substances and uncontrollable wildfire that would contribute to a loss of crops and habitats and impacts on the livelihoods of communities in the area.

Significance (Before Mitigation)

The significance is provided in ***Table 1.5***.

Mitigation Measures

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental fire and explosion are summarized in ***Table 1.7***.

TABLE 1.7 PREVENTATIVE AND MITIGATION MEASURES OF FIRE AND EXPLOSION

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Implement on-site prevention measures such as: ▪ Equip the site with proper equipment (fire extinguishers, proper communication equipment) and regularly inspect and maintain them; ▪ Prepare the Fire prevention and Fighting Plan and ensure compliance; ▪ Conduct firefighting training to the emergency support team, contractors and workers on site.	CAIC	During construction and operation
Prevent	Implement a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to passengers and residents in	CAIC	During construction and operation

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
	the event of an unplanned event.		
Mitigate	Develop an Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation. The Emergency response plan should include: ▪ Immediately pull the nearest fire alarm if a fire occurs, report the event to shift supervisor or foreman immediately for emergency response; ▪ When the emergency alarm sounds, all employees shall stop all activities and move to emergency assembly places immediately; ▪ Limit the fire areas by utilizing the appropriate firefighting equipment, if the fire is small and controllable; and ▪ Follow the procedure included in the Emergency Preparedness and Response Plan to take actions.	CAIC	During construction
Mitigate	Conduct a Quantitative Risk Assessment to determine the potential risks and their consequences to the Project due to fire and explosion.	CAIC	During construction
Mitigate	Implement an Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation.	CAIC	During construction and operation

Residual Impacts

Because the majority of the mitigation measures presented are preventative, the primary goal of these measures is to reduce the likelihood of the unplanned events from occurring. However, if the identified events occurred, the consequences remained the same level. In these cases, the post-event measures described in the previous section would apply to minimize impacts.

		Impact Significance
Without Mitigation Measures	Social Environment	2D Moderate
With Mitigation Measures	Social Environment	1D Moderate

Monitoring and Auditing

- A monthly audit program shall be established to check the implementation of the Emergency Preparedness and Response Plan, the staff training, equipment inspection, and firefighting drills.

1.3.1.3 NATURAL HAZARDS

Background

According to the EIA conducted by E&A (November 2020), the flooding in the airport boundary was mainly caused by flash floods from the upper catchment area west of National Road No. 3, and the limited capacity of the drainage system in the airport boundary. The maximum flood level is approximately 8.2 m (msl) and on average the area remains flooded for 5 to 10 days.

In addition, the airport boundary can also be affected by flooding of the Mekong River. Historical data and hydrological analysis indicate that there was a major flood event in 2000, with a predicted recurrence period of 75 years.

Significance (Before Mitigation)

The significance is provided in ***Table 1.5***.

Mitigation Measures

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental natural hazard events are summarized in ***Table 1.8.***

TABLE 1.8 PREVENTATIVE AND MITIGATION MEASURES OF NATURAL HAZARDS

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Incorporation of siting and safety engineering criteria to prevent failures due to natural disasters.	CAIC	During construction
Prevent	Implement a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event.	CAIC	During construction

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Implement periodic routine inspection and maintenance procedures (in line with international best practice).	CAIC	During construction
Prevent	Install warning system, signal boards, flood prevention systems.	CAIC	During construction
Mitigate	Develop and implement an Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation.	CAIC	During construction
Mitigate	Conduct a Quantitative Risk Assessment to determine the potential risks and their consequences to the Project due to fire and explosion.	CAIC	During construction

Residual Impacts

As the Project is building a dike around the entire site, the impacts and damages caused by floods will be limited. The dike can minimize disruptions to construction schedules, and overall Project timelines from flood event.

		Impact Significance
Without Mitigation Measures	Social Environment	3C Moderate
	Biological Environment	3C Moderate
With Mitigation Measures	Social Environment	2C Minor
	Biological Environment	2C Minor

Monitoring and Auditing

A monthly audit program shall be established to check the implementation of Emergency Preparedness and Response Plan, the staff training and equipment inspection.

1.3.2 DURING OPERATION AND MAINTENANCE

1.3.2.1 LEAKAGE AND SPILL INCIDENTS

Given that unplanned events identified for leakage and spill incidents lead to Negligible impacts, no additional mitigation measures are proposed.

1.3.2.2 FIRE AND EXPLOSION

Background

Cause of fire and explosion can be divided into 2 main reasons: 1) ground operations and 2) aircraft related. Fuel leaks/ spills or overheating in ground service equipment could spark fire and lead to explosions. Engine failure could cause fire or explosions. In addition, collisions with birds (bird strike) during take-off or landing could damage critical engine components and also lead to fires or explosions.

Fire and explosions will lead to the loss of terrestrial flora and fauna, also pose health and safety risk to local communities as well as airport service users.

Large scale fires, or explosions, could potentially release smoke and fumes into the broader area, generating health issues associated with inhalation of toxic substances and uncontrollable wildfire that would contribute to a loss of crops and habitats and impacts on the livelihoods of communities in the area.

Significance (Before Mitigation)

The significance is provided in ***Table 1.5***.

Mitigation Measures

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental fires and explosions are summarized in ***Table* 1.**.

TABLE 1.9 PREVENTATIVE AND MITIGATION MEASURES OF FIRE AND EXPLOSION

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Implement a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event.	CAIC	During operation
Prevent	Implement routine inspection and maintenance procedures (in line with international best practices) for all aircraft ground support equipment used for storing and handling hazardous materials.	CAIC	During operation

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Install warning systems, signal boards, lighting protection system where risks of fire and explosions could occur.	CAIC	Prior to commissioning
Mitigate	Implement Emergency Preparedness and Response Plan with wildfire protection and monitor contractors to ensure consistent implementation. Provide regular safety and fire prevention & fighting drills.	CAIC	During operation

Residual Impacts

Because the majority of the mitigation measures presented are preventative, the primary goal of these measures is to reduce the likelihood of the unplanned event from occurring. However, given the likelihood of the event is well-known in the industry and has been known to occur sporadically, the possibility of such incident still remains the same.

In these cases, the mitigation measures described in the previous section could potentially apply to minimize the severity on communities and the surrounding environment.

		Impact Significance
Without Mitigation Measures	Social Environment	2D Moderate
	Biological Environment	2D Moderate
With Mitigation Measures	Social Environment	1D Moderate
	Biological Environment	1D Moderate

Monitoring and Auditing

A monthly audit program shall be established to check the implementation of the Emergency Preparedness and Response Plan, the staff training, equipment inspection, and firefighting drills.

1.3.2.3 AIRCRAFT CRASHES

Background

Take-off and landing are the most dangerous phases of aircraft operations, so most crashes occur at, or near, the ends of runways.

Severe weather conditions (e.g. turbulence, adverse wind, wind shear, icing) could cause significant impacts on aviation safety. These conditions can reduce visibility and/or make it difficult to maintain control of the aircraft, increasing the risk of mid-air collisions.

Aircraft accidents can also be attributed to mechanical failures and air traffic control errors.

Significance (Before Mitigation)

The significance is provided in ***Table 1.5***.

Mitigation Measures

All preventative and mitigation measures proposed to reduce the likelihood and severity of aircraft crashes are summarized in ***Table 1..***

TABLE 1.10 PREVENTATIVE AND MITIGATION MEASURES OF AIRCRAFT CRASH

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Implement a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event.	CAIC	During operation
Prevent	Designate Public Safety Zones (PSZs) at the proposed airport, which would restrict what new development can be located in these zones. PSZs are usually triangular shaped, pointing away from the end of the runway. Their shape and size is determined based on the number of flights at the airport, the likelihood of a crash, where the crash might occur, and the likely consequences of a crash.		During operation
Mitigate	Develop and implement Emergency Preparedness and Response Plan.	CAIC	During operation

Residual Impacts

Given the likelihood of the event is well-known in the industry and has been known to occur sporadically, the possibility of such incident still remains the same.

In these cases, the mitigation measures described in the previous section could potentially apply to minimize the severity on communities and the surrounding environment.

		Impact Significance
Without Mitigation Measures	Social Environment	2E Major
	Physical Environment	2E Major
	Biological Environment	2E Major
With Mitigation Measures	Social Environment	1E Major
	Physical Environment	1E Major
	Biological Environment	1E Major

Monitoring and Auditing

A monthly audit program shall be established to check the implementation of the Emergency Preparedness and Response Plan, and the staff training.

1.3.2.4 NATURAL HAZARDS

Background

Flood events can have a direct impact to the Project which could disrupt airport operations by submerging runways, electrical malfunctions, potential fire risks etc. These issues lead to flight cancellations, delays, safety concerns, and could shut down airports. Flooding of access roads and transport networks surrounding the airport can lead to down-time for an airport.

According to the EIA conducted by E&A (November 2020), the flooding in the airport boundary was mainly caused by flash floods from the upper catchment area west of National Road No. 3, and the limited capacity of the drainage system in the airport boundary. The maximum flood level is approximately 8.2 m (msl) and on average the area remains flooded for 5 to 10 days.

In addition, the airport can also be affected by flooding of the Mekong River. Historical data and hydrological analysis indicate that there was a major flood event in 2000, with a predicted recurrence period of 75 years.

However, a flood barrier (dike) will surround the entire site to prevent floodwaters from entering to the airport.

Significance (Before Mitigation)

The significance is provided in ***Table 1.5.***

Mitigation Measures

All preventative and mitigation measures proposed to reduce the likelihood and severity of accidental natural hazard events are summarized in ***Table 1..***

TABLE 1.11 PREVENTATIVE AND MITIGATION MEASURES OF NATURAL HAZARDS

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Implement a robust stakeholder engagement program on emergency response. Engagement on emergency response will provide regular information on safety drills and guidance to residents in the event of an unplanned event.	CAIC	During operation
Prevent	Implement periodic routine inspection and maintenance procedures (in line with international best practice).	CAIC	During operation

Type of Control (i.e. Prevent/ Mitigate)	Management Control	Responsibility - Organization	Timing
Prevent	Install warning system, signal boards, flood prevention systems.	CAIC	Prior to operation
Mitigate	Develop and implement an Emergency Preparedness and Response Plan and monitor contractors to ensure consistent implementation.	CAIC	During operation

Residual Impacts

The Project should provide mitigation measures to minimize impacts and damage caused by floods.

		Impact Significance
Without Mitigation Measures	Social Environment	3C Moderate
	Biological Environment	3C Moderate
With Mitigation Measures	Social Environment	2C Minor
	Biological Environment	2C Minor

Monitoring and Auditing

A monthly audit program shall be established to check the implementation of Emergency Preparedness and Response Plan, the staff training and equipment inspection.

ERM HAS OVER 160 OFFICES ACROSS THE FOLLOWING COUNTRIES AND TERRITORIES WORLDWIDE

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
France
Germany
Ghana
Guyana
Hong Kong
India
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