Environmental Management Plan (DRAFT FINAL)

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BHUTAN: AIR TRANSPORT CONNECTIVITY ENHANCEMENT PROJECT – ADDITIONAL FINANCING

BUMTHANG DOMESTIC AIRPORT

(Extension Airside Security Fencing)

Prepared by Department of Air Transport, Ministry of Information and Communications, Royal Government of Bhutan for the Asian Development Bank (ADB)

FINAL EMP

ABBREVIATIONS

ADB	:	Asian Development Bank
ATCEP	:	Air Transport Connectivity Enhancement Project
ATCEP-AF	:	Air Transport Connectivity Enhancement Project – Additional Financing
BDA	:	Bumthang Domestic Airport
CSC	:	Construction Supervision Consultant
DOAT	:	Department of Air Transport
EMP	:	Environmental Management Plan
CEMP	:	Construction Environmental Management Plan
FNCA	:	Forest and Nature Conservation Act
IEE	:	Initial Environmental Examination
NEC	:	National Environment Commission
OHS	:	Occupational Health and Safety
RECOP	:	Regulation for Environmental Clearance of Project
RGOB	:	Royal Government of Bhutan
SPS	:	Safeguard Policy Statement

FINAL EMP

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1 Introduction

1.1 Background

In June 2012, the Asian Development Bank (ADB) financed the Air Transport Connectivity Enhancement Project (ATCEP) through a grant (No.0295-BHU) worth US$ 6.92 million. Subsequently, with the request from the RGOB, an additional finance of US$ 4.00 million was provided through a second grant project -Grant 0484-BHU: Air Transport Connectivity and Enhancement Project - Additional Financing (ATCEP-AF) - which is hereafter referred to as project. The project, together with the original project, will improve safety, security, and capacity at Bumthang, Gelephu, and Yonphula domestic airports by providing infrastructure as well as improve passenger convenience in terms of level of service at these airports. The overall project will support the government's plan to develop a safe, reliable, and efficient air transport system connecting urban and rural centers to help overcome the limitations of road transport, improve accessibility, and promote tourism and high-value agriculture in less-developed regions of the country.

Bhutan's "*Transport 2040 Integrated Strategic Vision*" [1]aims to provide the entire population with a safe, reliable, affordable, convenient, cost effective and environment-friendly transport system in support of strategies for socioeconomic development. Domestic civil aviation infrastructure development has been one of the key objectives for civil aviation sector of the RGOB since 2011. Funding was requested from the ADB under the ATCEP and subsequent ATCEP-AF. The project is still being implemented by the Department of Air Transport (DOAT).

In March 2016, Initial Environmental Examination (IEE) and Environmental Management Plan (EMP) for the project (Air Transport Connectivity Enhancement Project Additional Financing) was published concerning the development of three domestic airports. This EMP is in compliance with ADB's Safeguard Policy Statement (SPS) 2009 and national legislations of Bhutan. The EMP provides a framework for mitigation of the projects impacts and development of specific EMPs for the detailed design and construction stages. Consultation and public disclosure were undertaken during the project preparation phase with details of stakeholders and outcomes included in the EMP. This EMP was updated to include detailed environmental impacts and mitigation measures specifically during the final detailed designs.

The current document specifically deals with the preparation of new Construction Environmental Management Plan (CEMP) for additional construction activities apart from the ongoing new terminal building construction of Bumthang Domestic Airport (BDA). This CEMP is mandatory document to be attested with the bidding or contract document.

[1] https://www.adb.org/sites/default/files/publication/30268/bhutan-transport-2040.pdf

1.2 Project Objective

The project's objective is to provide safe and secure air transport operations and environmentally sustainable and efficient airports which is aligned to the RGOB's regional balanced development objectives.

1.3 Environmental Management Plan Objective and Scope

The ATCEP-AF is a Category B project requiring development of a site-specific EMP. The ADB involuntary resettlement is not triggered by the components of the Project since no land acquisitions and resettlements were required.

This EMP is a dynamic document to be updated if there are changes to the project scope, detailed designs, or if further information becomes available as a result of consultation with stakeholders and the general public. The objective of the EMP is to provide a framework for managing the airport upgrade works in a manner that incorporates the principles of environment sustainability while minimising adverse effects on the local community, if any, and environment.

To achieve this objective, the EMP outlines the mitigation measures required for avoiding or minimising the potential impacts of the works and provides a monitoring program to confirm effectiveness of the required mitigation measures. Roles and responsibilities are clearly defined for all stages of the project works and their execution.

This EMP is limited to the scope of works as described in Section 2 of this document and addresses impacts and mitigation measures identified at each stage of the project's execution, namely detailed design, construction and operation. This EMP builds on the impacts and mitigation measures as identified in the overarching EMP which included outcomes of the consultation undertaken to date. This EMP will be included in the bidding documents for construction contractors and form the basis of the Contractor's EMP. The mitigation measures identified in this EMP form the minimum requirement for reducing impacts on the environment as a result of works associated with the project.

1.4 EMP Methodology

The methodology used to develop this EMP is as follows:

- Review of the IEE and generic EMP including consultation outcomes to inform the DOAT and Construction Supervision Consultant of specific issues or items for detailed design.
- Field survey and site visits, using the generic EMP, IEE and an environmental screening checklist as bases for assessment.
- Coordination and discussion with the Design and Supervision teams regarding any findings which may influence detailed design.
- Preparation of the construction EMP based on generic EMP framework and consultation outcomes and subsequent updating with information obtained from the field survey and detailed designs.

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- ADB and DOAT review prior to consultation and subsequent updates based on comments and feedback.
- Consultation with DOAT to finalise the site specific EMP which will be included in bidding documents.
- Submission of final EMP to ADB for final review and to agree on further action.

2 Bumthang Domestic Airport Upgrade Work Descriptions

2.1 Overview of Works

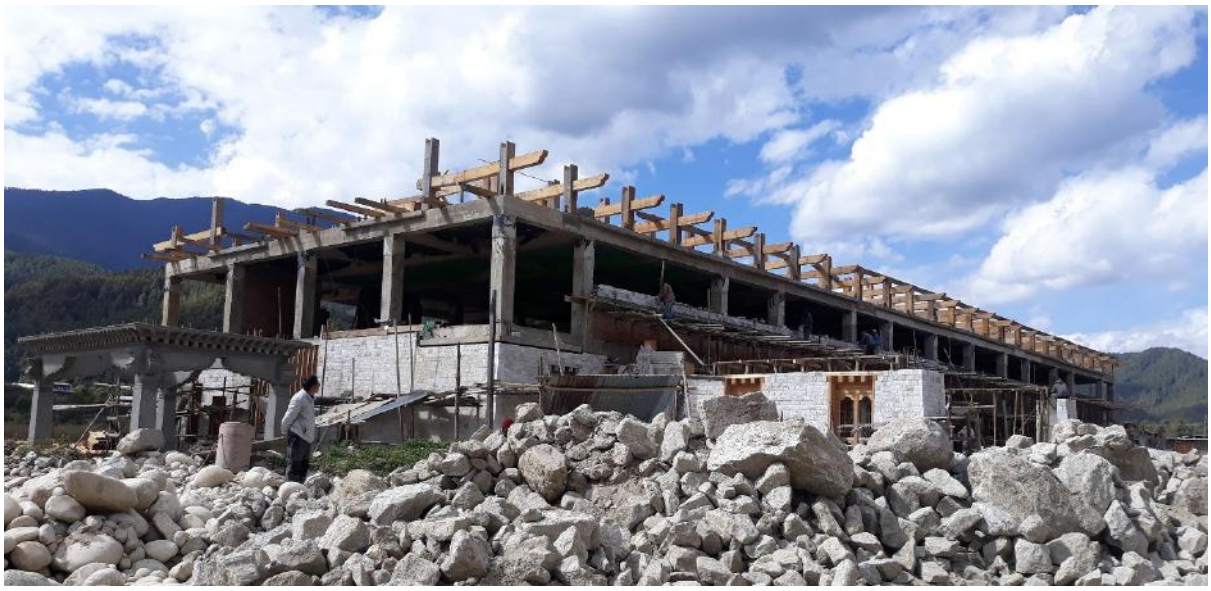
BDA improvement project include following works:

- Construction of new terminal building (ongoing)
- Proposed extension of apron towards the new terminal building
- Airside fencing for safety of landing and taking off of the aircraft

2.1.1 New Terminal Construction – Ongoing works under the Project

The construction of new passenger terminal building of BDA started in September 2017 and was targeted to be completed by August 2019. However, due to limited construction window in Bumthang, owing to long cold and harsh winter, the work progress has been severely affected. As of November 2019, only of 38% works have been completed. Under the new dateline provided by the DOAT, the contractor needs to complete entire works by February 2020. Figure 1 illustrates the work progress as of November 2019.

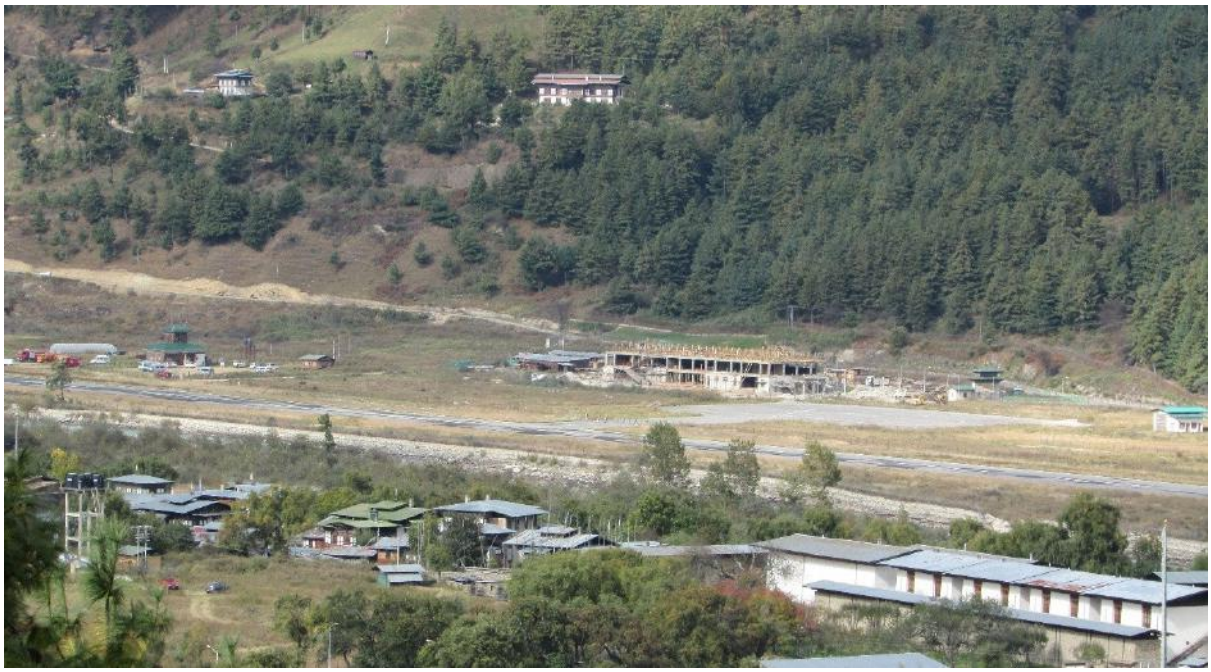
Figure 1: New Passenger Terminal Building construction at Bumthang Domestic Airport



2.1.2 Airside Security Fencing

To be able to use new terminal building an approximately 1500m long airside fencing is being proposed for erection. This is required to maintain the runway security - for the safety of landing and taking off of the aircraft.

Figure 2: Illustrates the old and new terminal building and the existing apron and taxiway at Bumthang airport



2.2 Alternatives

The alternative of a completely new apron and taxiway has been done away due to budget constraints. Instead, only a short extension has been considered.

For airside security fence, there is no other feasible option other than the barbed wire fence that has been considered for erection.

2.3 Construction Methodology

The construction of new terminal building is the main development activity carried out for BDA, which is ongoing and is planned to be completed by February 2020. The additional works are proposed, gearing towards the use of the new terminal building by 2020.

The contracts for the extension of apron and erection of fence have yet to be awarded so the precise construction methodology is unknown. However, the conceptual and detailed designs provide an indication of the nature of the work. The Contractor's implementation of EMP will address specific methodological measures or impacts.

2.4 Materials and Equipment

Most of the materials and equipment for are locally available.

2.5 Aggregate and Sand Supply

Major construction materials to be used are sand and aggregates.

Sand will be sourced either from Wangduephodrang or from Lingmithang region as the good quality sand is not available in Bumthang region. Bumthang airport is located about 197km and 156km from Wangduephodrang and Lingmithang, respectively.

Similarly, aggregates will also be sourced from outside Bumthang, from Yurmung near Langthel, under Trongsa district or dzongkhag. Yurmung is 115km from Bumthang airport.

2.6 Duration and Timing of Construction Activities

Extension of fencing on the airside are to be started by September 2020 and completed by December 2020. Total of four months duration is earmarked for the completion of construction activities.

3 Environmental Management Policy and System

3.1.1 National Requirement

Bhutan has a well-established regulatory framework that provides measures to protect and preserve the environment from abuse, pollution and degradation, to manage the environment for sustainable development and to promote environmental awareness.

Legislation concerning the protection and preservation of the environment is found in a number of Acts and is the responsibility of a number of different Ministries according to their focus. Amongst these, the following are the key legislative acts:

- National Environmental Protection Act 2017
- Environmental Assessment Act 2000
- Regulation for Environment Clearance of Projects 2016
- The Water Act of Bhutan 2011
- Water Regulation of Bhutan 2014
- Waste Prevention and Management Act of Bhutan 2009
- Waste Prevention and Management Regulation 2016
- Forest and Nature Conservation Act (FNCA) 1995
- Forest and Nature Conservation Rules 2006
- Biological Corridor Rules 2007
- General Rules and Regulations on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries 2006
- Mines and Minerals Act 1995

National Environment Commission is the principal agency mandated to oversee environment policies, issues and laws, and coordinate inter-sectoral environment programmes in the country. The commission monitors the impact of development on the environment and aims to put in place the necessary controls, regulations and incentives to private and public sectors to achieve sustainable development through judicious use of natural resources.

As mandated under the Environmental Assessment Act 2000 to require environmental impact assessments and impose conditions for development projects within Bhutan.

Accordingly, activities funded under the ATCEP-AF will follow the RGOB's established procedures and associated guidelines established under the Environmental Assessment Act 2000, and environmental legislations of the relevant agencies.

The **Environmental Assessment Act 2000** is specifically concerned with ensuring development projects are managed, conducted and carried out sustainably and appropriately. It requires that all major development projects submit an appropriate environmental impact assessment (EIA) report that will include a review of all relevant impacts as determined by the NEC from time to time.

The NEC is also empowered with imposing appropriate mitigation measures on proposed development projects, in accordance with the outcomes of the environmental impact assessment reports.

The new Regulations under this Act (Regulation for Environment Clearance of Projects 2016) providing fuller procedural, compliance and penalty requirements were approved in 2016. The EIA regulations identify information requirements for assessment of minor and major projects.

The NEC makes its recommendation for approval, deferral, mitigation, or cancellation of projects in relation to the powers of the National Environmental Protection Act 2017.

3.1.2 ADB's Safeguard Policy Statement

Overall, The ATCEP-AF is a category B project under ADB's SPS 2009 environmental and social screening guidelines and requires development of the project specific EMP. However, additional works proposed under the project will be insignificant due to small size of the works. There will be negligible impacts on the local environment.

Due to the nature of the project it is expected that environmental impacts will be site specific, few if any are irreversible, and mitigation measures can be readily designed and implemented. In accordance with the ADB's SPS 2009, this EMP includes information on mitigation, monitoring, capacity development and training, and implementation costs. The EMP outlines the potential environmental impacts and the measures needed to prevent, minimise, mitigate or compensate for adverse impacts and improve environmental performance of the project.

The EMP is a dynamic document which must be updated as consultation and detailed designs of the project components are finalised to ensure unanticipated impacts and revised mitigation measures are addressed or included. Effective implementation of the EMP is a requirement of the ADB and implementing agency so monitoring is an integral component of implementation. A Monitoring Plan is included in Section 7 of this EMP. This EMP is to form part of the bidding documents for contract(s) awarded under the Project and will form the basis of the contractor's environmental management implementation plan.

4 Consultation and Stakeholder Engagement

4.1 Background and Approach

The Project overall was classified as Category B project and accordingly has undertaken various stakeholder consultations throughout the project implementation in line with the requirement of ADB's SPS 2009. Due to the project's potential environmental and social impacts, the discussion and review during the Initial Environmental Examination/ EMP process to inform detailed design and mitigation measures were required. Where necessary, the EMP was fully updated upon the completion of stakeholder consultations.

4.2 Stakeholder Consultations and Outcome

For the proposed additional works under BDA, no public consultations were carried out since the scale of additional activities under the project is very small and will be within BDA boundary. However, consultations with the contractor of ongoing new terminal building and construction supervision consultants (CSC) have been carried out. The issue of excavation and filling was discussed. It was learnt through CSC consultation that 100% excavation and filling can be achieved without having to look for distant dump yard.

4.3 Disclosure

The final IEE and EMP for the initial coverage of the project have been made available on the ADB website and in hard copy at government offices (most applicable and accessible).

This construction EMP for additional work should also be made available online (ADB and DOAT websites) with hard copies available at DOAT head office and Bumthang Domestic Airport Management.

5 Environmental Management Plan

Environmental management plans detail the management actions required to protect environmental standards of Bumthang Airport during construction. Management plans outline the following:

- construction activities and potential impacts to each environmental factor
- performance objectives for that factor
- performance criteria for that factor
- management actions to address or mitigate potential impacts
- a monitoring programme to identify the effectiveness of management actions
- reporting requirements
- contingency actions in the event that monitoring (or incidents/complaints) identifies possible improvements to current management strategies.

Actions assigned to the 'Contractor Site Manager' may be allocated to other relevant contractor positions as detailed in Appendix B.

5.1 Noise and Vibration

Activities associated with the development that are likely to generate noise include building and site construction activities and traffic noise generated by vehicles transporting materials to and from the site. Vibration will be less of an issue and will be highly contained within the immediate vicinity of construction activity.

Activities

The key activities during construction that have been identified to have potential to generate noise and/or vibration are:

- clearing
- earthworks
- vehicle movements (including reversing beepers)
- compacting.

Impacts

Potential impacts associated with noise emissions and vibration include:

- detrimental impact to neighbouring communities
- damage to neighbouring infrastructure (from vibration)
- changes to fauna movements (avoidance or attraction)
- disruption of fauna feeding or breeding patterns.

Mitigation Measures

- Identify location of nearest potential sensitive receptors to noise/vibration impacts.
- Construction will occur during the hours of 7am – 7pm. (Note: Material and personnel transport to and from site may occur outside of these hours).

- Compaction activities that have the potential to impact on nearby structures will consider using static rolling
- Maintain and service plant, equipment and vehicles used during works regularly to ensure that noise levels associated with construction are as low as can be reasonably achieved. Records are to be retained by the contractor and made available to CSC upon request.

5.2 Air Quality and Dust Management

The two primary causes of air quality issues will be emissions from construction machinery and airborne dust (including wind-blown sand and dust). Airborne dust results from the excavation and stockpiling of soil as well as vehicle movement around the site. Batpalathang and Wangdicholing settlements close to the airport may be affected due to dust pollution. All reasonable and practicable measures will be implemented during the construction and operation phase. Management measures to be implemented prior to construction and for the duration of operation will be compliant with the RECOP 2016.

Activities

The key activities during construction identified as having potential to generate dust and emissions are:

- vegetation clearance (leading to exposed soil surfaces)
- construction earthworks, haulage and topsoil stripping and stockpiling
- vehicle movements on unsealed roads
- emissions from construction machinery/equipment.

Impacts

Potential impacts of dust and emissions generated through construction include:

- reduced visual amenity
- decline in vegetation health
- risk to human health
- nuisance to terrestrial fauna
- risk to aircraft safety.

Mitigation Measures

- Identify location of nearest potential sensitive receptors to air quality impacts (e.g. residential areas, aircraft movement areas, neighbouring tenants, etc.).
- Erect a notice at the site entrance identifying the contractor and contact details of a point of contact for works.
- During activities that have the potential to generate dust, water sprinkling with suitable water tanker will be done on site to suppress the dust.
- Observe weather conditions and keep dust-generating activities to a minimum during dry and windy conditions. Cease all works that have the potential to generate dust in

excessively windy conditions and/or use methods (e.g. water tanker) to suppress the dust.
- Position stockpiles in locations that will minimise impacts on sensitive receptors, taking prevailing winds conditions into consideration.
- Aggregates and sand will be covered during transport
- Hotmix and batching plants located away from residential and sensitive areas.
- Maintain and service plant, equipment and vehicles used during works regularly to demonstrate equipment is running efficiently and fumes are minimised. Records are to be retained by the contractor and made available to CSC upon request.
- Ensure dumpsite is levelled and sprayed with water to prevent dust pollution

5.3 Erosion and Sediment Control Management

The proposed work site at Bumthang airport is in a flat terrain where the possibility of erosion is minimal yet should there be any erosion and sedimentation, controls are to be identified and implemented during and following clearing.

Activities

Activities that may cause erosion and sedimentation include the following:

- vehicle movement (light vehicles and heavy vehicles) over unstable surfaces
- earthworks and changes to existing topography
- wastewater storage and disposal
- stockpiling of topsoil or mulch
- poor drainage

Impacts

Impacts of the activities above might include the following:

- vehicle movement
  - disturbance of dusty surface material, exposing loose sand to wind and water potentially leading to erosion, reducing the quality of runoff
- earthworks
  - alteration of surface flow patterns and infiltration
- stockpiling
  - providing a large surface area of unstable, loose material exposed to wind and water potentially leading to erosion, reducing the quality of runoff
- poor drainage
  - allowing water to collect, potentially resulting in uncontrolled escape across areas of unstable sand potentially leading to erosion, reducing the quality of runoff

Mitigation Measures

- Minimize erosion and if required design erosion protection measures including incorporation of effective drainage systems (soakage pits) and consideration of surface flow paths.

- If necessary, construct catch drains to collect sediment-laden runoff along downstream boundary of construction activities, where risk of sediment-laden runoff being generated is high.
- Stockpile sand and aggregates in an area away from natural drainage and runoffs (See Figure 3 under Appendix A)
- Excavated material shall be dumped and levelled adjacent to the existing apron. Dumpsite shall be planted with native plants as part of beautification of the airport.

5.4 Water Quality Management

Within core area of Bumthang Airport there are no natural drainage channels or defined areas of surface water. The risk of surface and ground water pollution is minimal based on the proposed activities if the proper wastewater management is initiated.

Activities

Key construction activities that have the potential to impact on water quality include:

- earthworks
- storage and handling of chemicals and hydrocarbons (Bitumen).
- dewatering

Impacts

Potential impacts of construction on water quality include:

- contamination of surface and groundwater

Mitigation Measures

- Identify approved sources of water for use during construction.
- Identify dumpsite away from natural drainages
- Lubricants shall be collected and recycled or disposed of according to Waste Prevention and Management Regulation 2016.
- Sediment laden runoff from excavations or stockpiles must be directed to a settling area or collected for dust suppression provided the runoff is not contaminated with any chemicals (e.g. fuel).
- If necessary, construct catch drains to collect sediment-laden runoff along downstream boundary of construction activities where risk of sediment-laden runoff being generated is high.
- Stockpile sand and aggregates in an area away from natural drainage and runoffs
- Excavated material shall be dumped and levelled adjacent to the existing apron. Dumpsite shall be planted with native plants as part of beautification of the airport

5.5 Solid Waste Management

Erection of airside security fence will generate minimal or insignificant waste unlike the extension of apron. The construction of apron will require digging and excavation resulting in

generation of spoils. Similarly, significant waste will be generated during laying of asphalt concrete.

Activities

Waste streams associated with construction might include:

- construction waste such as packaging,
- contaminated material
- food waste
- recyclable plastic, glass, metals scraps and paper
- equipment service waste
- hazardous material waste.

Impacts

Where waste is not dealt with appropriately, it might result in the following:

- loose, windblown waste
  - negative aesthetic impacts
  - potential risk to aircraft safety
- exposed waste stockpiles
  - attraction of vermin and scavenging birds
  - generation of foul odour
  - creation of fauna trap hazards
  - negative aesthetic impacts
  - potential health risk in the event of unauthorised access
- unnecessary placement of inert waste to landfill
  - wider implications for waste minimisation strategies of whole Bumthang Airport operations.

Mitigation Measures

- Temporary waste storage area has to be identified,
- Waste management plan to be developed
- Designate waste storage areas for each waste stream.
- Establish a suitable location for storage of hazardous waste outside or at a safe distance from the airport or runway and drainage lines. If a location outside of the airport is not feasible, the storage location must be approved by airport authority subject to conditions such as imposing maximum permissible waste volume, specifying secondary containment requirement etc.).
- Separate waste into different categories: recyclable, organic, hazardous and liquid
- Store all domestic organic waste in lidded bins located in designated storage area.
- Handle and transport waste off site in appropriate containers with necessary placarding for dangerous goods or hazardous materials (in accordance to Waste Prevention and Management Regulations 2016).

- Reuse spoil (basically topsoil) to fill low areas nearby the existing apron (See figure 3 under Appendix A)

5.6 Hazardous Materials Management

During the clearing and civil construction projects, the most likely source of any chemical spill is oil or diesel from plant and machinery. Provided that good handling and storage practices are employed on site the risk of contaminating the environment due to chemical spills should be very low.

For the purpose of this management plan, hazardous materials are considered to be those that have the potential to cause alteration to the environment leading to degradation of environmental value if released. These goods will be managed in accordance with legislative requirements, and consistent with the Waste Prevention and Management Regulations 2016.

Activities

Key activities during construction that involve hazardous materials or dangerous goods include:

- storage and handling
- transportation, including delivery and receipt
- operation of plant and equipment
- refueling and lubrication of plant, vehicles and other equipment.

Impacts

Impacts from poor handling of dangerous goods might include:

- explosion and fire leading environmental harm
- contamination of surface soil and infiltration to groundwater.

The scale of impact from surface spills or leakage is dependent on the nature of the material and the volume released to the environment.

Mitigation Measures

- Provide a contractor spill control plan to CSC under DOAT.
- Ensure fully stocked saw dust is available on refueling site and (if applicable) in the vicinity of hazardous material storage area(s).
- Provide bunded storage area outside the airport area and drainage lines. If a location outside of the airport area is not practicably possible, the designated storage location must be approved by the CSC (noting the CSC may approve waste storage within airport boundaries subject to conditions such as imposing maximum permissible volume limits, specifying secondary containment requirements etc.).
- Establish a register of hazardous materials and dangerous goods (including potentially polluting substances) for use on site and ensure hazardous substance list is provided to the CSC.

- All oil and chemical products will be placed in concrete floored base and the sump with brim around for containment oil and other hazardous wastes. All stockyards will have its associated custom-built stores for storing oil and chemicals.
- Used oils/waste will be stored in the drum and will be sent for recycling or reuse.
- Ready stock of sawdust will be kept at the site to contain oil and fuel leaks.
- Sawdust soaked with oil from accidental spillage will be ultimately put in plastic bags and stored till it is buried underground.

5.7 Traffic Safety

Traffic impacts will occur in transporting equipment and materials from the nearest market and quarry. These impacts will mostly be short-term and through good mitigation and traffic management the impacts should be low. The Contractor(s) is responsible for developing and implementing a Traffic Management Plan (TMP). The TMP will need to consider pedestrian traffic as well as vehicle traffic management, and particular attention will need to be given to management near sensitive receptors (residential dwellings, markets, schools, etc.). Upon completion of the construction phase of works traffic and road safety impacts caused by the project should cease.

Activities

Key activities during construction the activity that are likely to cause to traffic safety issues include:

- Transportation of aggregates and sand from Quarries
- Transportation of equipment and construction materials from the market centers
- Operation of plant and equipment

Impacts

Traffic violation may result in pedestrian safety issues like injury or even loss of lives due to reckless driving through sensitive areas (residential, market and other sensitive areas)

Mitigation Measures

- Preparation of traffic management plan to ensure safe movement of construction equipment and vehicles
- Implement the TMP to ensure smooth traffic flow and safety for workers, passing vehicles and pedestrian traffic.
- Where appropriate, employ flag operators on the road to prevent traffic accidents. The workers shall have relevant safety equipment.

5.8 Flora and Fauna Management

The presence of flora and fauna species is limited within the airport boundary except for small riparian forest north end of the runway. The floral species in the immediate vicinity of proposed construction site are fodder grass and willow trees that were planted by the

National Feed and Fodder Development Programme and Brown Swiss Farm and Horse Breeding Program of the Department of Livestock.

Fauna that can be found are basically an avian species. Commonly found birds in the area are large billed crow (*Corvus macrorhynchos),* Black-billed magpie (*Pica pica),* Gray-backed shrike *(Lanius tephronotus),* and Blue whistling thrush (*Myophonus caeruleus)*. These species of birds are categorized as "Least Concern" as per IUCN redlist (https://www.iucnredlist.org/).

Activities

The key activities during construction that have the potential to impact flora and fauna are:

- earthworks and levelling
- vehicle and machinery activity
- waste storage
- human contact

Impacts

No impacts are foreseen as the construction is going happen close to the new terminal building which is devoid any natural vegetation.

5.9 Fire Prevention

Bumthang, being in the temperate coniferous region where winters are dry and brittle, is prone to fire accidents. Without proper fire prevention measures, the construction activities could start fire and affect natural vegetation.

Activities

The key activities during construction that have the potential to cause fire include:

- earthworks and levelling
- vehicle and machinery activity
- storage and use of hazardous materials
- burning of vegetation and other wastes

Impacts

Potential fire impacts (fire accidentally burns the natural forest outside airport) include:

- loss/damage/change to vegetation and fauna habitats
- loss/injury of fauna
- loss of biodiversity
- loss/damage of infrastructure/human lives

Mitigation Measures

- Areas within 3 metres of where dangerous goods are stored shall be free from combustible materials.

- No open fires are permitted on site (except if permission is obtained from relevant authorities to burn infested vegetation stockpiles following clearing).

5.10 Occupational Health and Safety

During construction and operation, health and safety is to be managed through a Site-Specific Safety Management Plan to be developed by the contractor/s for their respective works and application of international environmental and health and safety (EHS) standards (WB/IFC EHS Guidelines).

Activities

The key activities during construction that have the potential to cause health and safety issues:

- heating bituminous product (up to 165°C) for asphalt concrete
- vehicle and machinery activity
- storage and use of hazardous materials

Impacts

Lack of occupational health and safety management can lead to:

- Injuries and loss of even human lives

Mitigation Measures

- Areas within 3 metres of where dangerous goods are stored shall be free from combustible materials.
- Construction workers will be provided with personal protective equipment (PPE) such as safety helmet, boots, goggle, facemask etc.
- Contractor shall ensure that construction workers adhere to the site safety management rules.
- Contractor to maintain basic minimum first aid kits at the work site
- In the event of major accident, the contractor shall evacuate the victim to the nearest health facility – Bumthang district hospital.

6 Roles and Responsibilities

The DOAT is responsible for delivery of the ATCEP-AF project, including all components, funding received, and contracts awarded under the ATCEP-AF. DOAT is the Implementing Agency with regard to funding received from ADB. A Project Implementation Unit (PIU) within DOAT has been established to undertake the day to day management of the project. Aspects of the monitoring required by the EMP will be undertaken by DOAT. The implementation of this EMP is the responsibility of the contractors awarded contracts under the DOAT. The DOAT recruited Construction Supervision Consultant (CSC), to assist it to manage and implement the project.

6.1 Institutional Capacity

DOAT will require environmental awareness training for monitoring the Contractor/s. Personnel from the CSC will work alongside the Contractor and Resident Engineer to build capacity and gain a better understanding of the type of apron surface design and construction.

6.2 Complaints and Incident Reporting

All complaints and incidents should be referred to the DOAT's Project Coordinator (or designated staff) for undertaking complaint/incident investigation procedures. All complaints must be acknowledged with the complainant within 24hours. In general, the following procedure should be followed:

- Log complaint/incident, date of receipt and acknowledge complaint receipt
- Investigate the complaint/incident to determine its validity and to assess the source of the problem
- Identify and undertake any action required, communicate response action to complainant (if requested by complainant)
- Log the date of resolution
- Report the complaint in monthly monitoring report including actions, resolution status and any outstanding actions required.

7 Compliance and Monitoring Plan

7.1 Monitoring Plan

The Environmental Monitoring Plan identifies the environmental monitoring requirements to ensure that all the mitigation measures identified in this EMP are implemented effectively. Environmental monitoring methodology (refer Appendix B for details) for this project includes:

- Audit of detailed designs
- Consultations with communities and other stakeholders as required
- Routine site inspection of construction works to confirm or otherwise the implementation and effectiveness of required environmental mitigation measures

Non-compliance with environmental mitigation measures identified in the EMP will be advised to the Contractor(s) in writing by CSC's Environmental Officer as required. The non-compliance notification will identify the problem, including the actions the Contractor needs to take and a time frame for implementing the corrective action.

7.2 Monitoring Plan Reporting

Throughout the construction period, the Contractor(s) will include results of the EMP monitoring in a monthly report for submission to the CSC who is responsible for submitting these monthly progress reports to the DOAT. The format of the monthly report shall be decided between CSC and the Contractor but is recommended to include the following aspects:

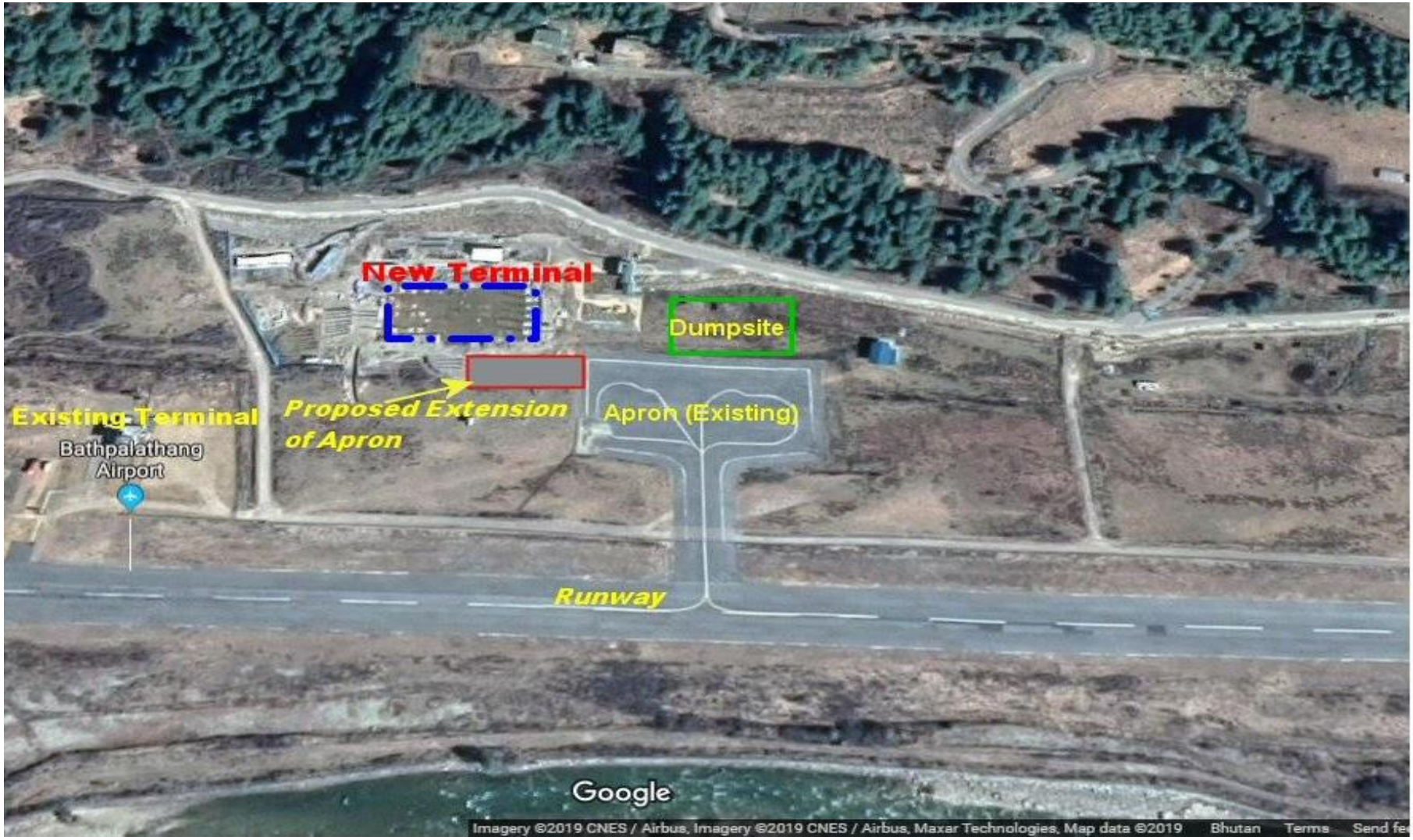
- Description and results of environmental monitoring activities undertaken during the month
- Status of implementation of relevant environmental mitigation measures pertaining to the works
- Key environmental problems encountered and actions taken to rectify problems.
- Summary of non-compliance notifications issued to the Contractor during the month.
- Summary of environmental complaints received and actions taken.
- Key environmental issues to be addressed in the coming month.

DOAT is also responsible for quarterly progress reports to the ADB. This quarterly progress report will include a section on environmental compliance and issues. This section will cover (as a minimum) the overall compliance with implementation of the EMP, any environmental issues arising as a result of project works and how these issues will be remedied or mitigated, and the schedule for completion of project works.

Appendix A:

Draft Layout of Runway Extension

Figure 3: Draft Layout of Apron extension for Bumthang Domestic Airport



Appendix B:

Mitigation Measures and Monitoring Plan

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Appendix B: Mitigation Measures and Monitoring Plan

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
Detailed Design and Pre-construction Mobilisation Stage						
Noise and vibration	• Identify location of nearest potential sensitive receptors to noise/vibration impacts.	Area around construction zone	Design Team	CSC/DOAT	Sensitive Locations identified	Prior to construction
Road Traffic Safety	• Preparation of traffic management plan to ensure safe movement of construction equipment and vehicles	All locations	Design team	CSC/DOAT	Traffic management plan prepared	Prior to construction
Air and Dust pollution	• Identify location of nearest potential sensitive receptors to air quality impacts (e.g. residential areas, aircraft movement areas, neighbouring tenants etc.). • Erect a notice at the site entrance identifying the contractor and contact details of a point of contact for works.	Airport and nearby settlements	Design team	CSC/DOAT	Sensitive receptors are identified and signage erected providing the contract details	Prior to construction
Soil erosion	• Minimize erosion and if required design erosion protection measures including incorporation of effective drainage systems (soakage pits) and consideration of	Construction zone	Design team	CSC/DOAT	Minimized erosion, designed effective erosion control measures	Prior to construction

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	surface flow paths.					
Water and soil pollution	• Identify dumpsite away from natural drainages • Identify approved sources of water for use during construction	Within airport boundary	Design team	CSC/DOAT	Dumpsite identified away from drainage, Approved water source identified	Prior to construction
Solid Waste	• Temporary waste storage area has to be identified, • Waste management plan to be developed • Designate waste storage areas for each waste stream.	Within airport boundary	Design team	CSC/DOAT	Waste storage area identified; Waste management plan developed	Prior to construction
Hazardous waste	• Provide a contractor spill control plan to CSC under DOAT.	All location	Design team	CSC/DOAT	Spill control plan developed	Prior to construction
Sourcing sand and aggregate materials	• Ensure aggregate and sand are sourced from an approved/ permitted quarry and are operating in accordance with the RGOB law.	All components	Contractor	CSC/DOAT	Sand and aggregates sourced from govt. approved quarries	Prior to construction
Construction Phase						
Traffic (vehicle and pedestrian) and construction safety	• Implement the traffic management plan (TMP) to ensure smooth traffic flow and safety for workers, passing vehicles and pedestrian traffic.	Airport	Contractor	CSC/DOAT	Implementation of TMP; No records of accidents	Throughout the construction

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	• Where appropriate, employ flag operators on the road to prevent traffic accidents. The workers shall have relevant safety equipment.					
Noise and vibration	• Construction will occur during the hours of 7am – 7pm • Compaction activities that have the potential to impact will be carried out using static rolling. • Maintain and service plant, equipment and vehicles used during works regularly to ensure that noise levels associated with construction are as low as can be reasonably achieved. Records are to be retained by the contractor and made available to CSC upon request.	All locations	Contractor	CSC/DOAT	Construction carried out in specified timing; Timely maintenance of equipment and vehicles	Throughout construction period
Air and dust pollution	• During activities that have the potential to generate dust, water sprinkling using suitable water tanker will be used on site to suppress the dust. • Observe weather conditions	All locations	Contractor	CSC/DOAT	Number of dust related complaints; Number of air quality related complaints; Distance of batching plants and	Throughout construction phase

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	and keep dust-generating activities to a minimum during dry and windy conditions. Cease all works that have the potential to generate dust in excessively windy conditions and/or use methods (e.g. water tanker) to suppress the dust. • Position stockpiles in locations that will minimise impacts on sensitive receptors, taking prevailing winds conditions into consideration. • Aggregates and sand will be covered during transport • Hotmix and batching plant located away from residential area. • Maintain and service plant, equipment and vehicles used during works regularly to demonstrate equipment is running efficiently and fumes are minimised. Records are to be retained by the contractor and made available to CSC upon request.				asphalt plants from nearest residential area.	

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	• Ensure dumpsite is levelled and sprayed with water to prevent dust pollution					
Soil erosion	• If necessary, construct catch drains to collect sediment-laden runoff along downstream boundary of construction activities, where risk of sediment-laden runoff being generated is high. • Stockpile sand and aggregates in an area away from natural drainage and runoffs (See Figure 3 under Appendix 1) • Excavated material shall be dumped and levelled adjacent to the existing apron. Dumpsite shall be planted with native plants as part of beautification of the airport.	All locations	Contractor	CSC/DOAT	Observance of no visible soil erosion; Excavated materials are stockpiled and used for filling at the designated site	Throughout construction phase
Water and soil pollution	• Lubricants shall be collected and recycled, or disposed of according to Waste Prevention and Management Regulation 2016. • Sediment laden runoff from	All locations	Contractor	CSC/DOAT	Monthly auditing of management of hazardous material against safety data sheet; Number of reports if any non-	Throughout construction phase

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	excavations or stockpiles must be directed to a settling area or collected for dust suppression provided the runoff is not contaminated with any chemicals (e.g. fuel). • If necessary, construct catch drains to collect sediment-laden runoff along downstream boundary of construction activities, where risk of sediment-laden runoff being generated is high. • Stockpile sand and aggregates in an area away from natural drainage and runoffs (See Figure 3 under Appendix 1) • Excavated material shall be dumped and levelled adjacent to the existing apron. Dumpsite shall be planted with native plants as part of beautification of the airport				compliance; Number of related complaints	
Waste management	• Separate waste into different categories: recyclable, organic, hazardous and liquid • Store all domestic organic	All locations	Contractor	CSC / DOAT	Spoil dumped at the designated dumpsite and levelled;	Throughout the construction period

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	waste in lidded bins located in designated storage area. • Handle and transport waste off site in appropriate container with necessary placarding for dangerous goods or hazardous materials (in accordance to Waste Prevention and Management Regulations 2016). • Reuse spoil (basically top soil) to fill low areas nearby the existing apron (See figure 3 under Appendix 1) • Construction workers will be provided with sanitation facilities like toilet to prevent open defecation.				Pit toilets are provided for the labourers; Wastes are separated based on waste types	
Hazardous waste	• All oil and chemical products will be placed in concrete floored base and the sump with brim around for containment oil and other hazardous wastes. All stockyards will have its associated custom-built stores for storing oil and chemicals. • Used oils/waste will be stored	All locations	Contractor	CSC / DOAT	Checking visible signs of hazardous waste spill; Containment of oil and hazardous chemicals	Throughout the construction period

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	in the drum and will be sent for recycling or reuse. • Ready stock of sawdust will be kept at the site to contain oil and fuel leaks. • Sawdust soaked with oil from accidental spillage will be ultimately put in plastic bags and stored till it is buried underground.					
Occupational health and safety	• Areas within 3 metres of where dangerous goods are stored shall be free from combustible materials. • Construction workers will be provided with personal protective equipment (PPE) such as safety helmet, boots, goggle, facemask etc. • Contractor shall ensure that construction workers adhere to the site safety management rules. • Contractor maintain basic minimum first aid kits at the work site • In event of major accident, the contractor shall evacuate the	All locations	Contractor	CSC / DOAT	Availity of PPE; Usage of PPE, Presence of First aid box, Accident records	Throughout the construction period

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	victim to the nearest health facility – Bumthang district hospital.					
Operation Phase						
Hazardous Substance Management	• Strictly apply and enforce manufacturer's recommendations for handling and storage. These measures include sealing of drums, and avoiding extreme heat. • Compliance with international good practice. • Security of storage areas to facilitate transport, handling and placement to be maintained (e.g. fences and locks fixed immediately if broken or vandalised). • Staff to wear manufacturers recommended personnel protective equipment (e.g. gloves and overalls) when handling or mixing hazardous substances. • Emergency vehicles are to be serviced and maintained at existing workshop areas.	Airport compound	BDA Management	DOAT	No leakage of hazardous waste at any time	Continuously during operational phase
Water or soil pollution	• Workshops or maintenance areas to be fitted with bunded areas for storage of oil and fuel drums (and any other hazardous substances).	All locations	BDA Management	DOAT	Waste recycled; No issue of waste pollution	Continuously during operational phase

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Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	• Used oil drums will be sold to scrap dealer for recycling • Used oils may be used for emergency drills/preparedness exercises as appropriate by DOAT & BCAA.					
Maintenance of drainage and soakage systems	• Drainage systems shall be periodically cleared of sediment and organic matter build up to ensure appropriate flows. • Material to be disposed at approved site (e.g. landfill) or composted if organic. • Vegetation to be cleared from drainage channels are disposed properly	All locations	BDA Management	DOAT	No blocked drains;	Continuously during operational phase
Wastewater management	• Septic systems of the terminal to be cleaned regularly and sludge disposed.	Terminal	BDA Management	DOAT	No septic overflow and foul smell	Continuously during operational phase