Environmental Management Plan (FINAL)

Document Stage: **FINAL**
Project No: G0484
March 31, 2020

BHUTAN: AIR TRANSPORT CONNECTIVITY ENHANCEMENT PROJECT – ADDITIONAL FINANCING

YONPHULA DOMESTIC AIRPORT

(Construction of gabion wall and Construction of Footpath to Stupa)

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
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	:	Regulaltion for Environmental Clearance of Project
RGOB	:	Royal Government of Bhutan
SPS	:	Safeguard Policy Statement
YDA	:	Yonphula Domestic Airport

FINAL EMP

Table of Contents

FINAL EMP

List of Figure

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.

To help address environmental impacts during the implementation of ATCEP, additional activities were proposed under the project. The current document specifically deals with the preparation of new Construction Environmental Management Plan (CEMP) for the dredging of the silted pond northwest of the YDA runway and the construction of footpath to the stupa located southeast of the runway. 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 organize site visits, using the generic EMP, IEE and an environmental screening checklist as a basis 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.

FINAL EMP

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

2 Yonphula Domestic Airport Upgrade Work Descriptions

2.1 Overview of Works

All the major works for YDA upgradation was under ATCEP which were completed in 2017. Only a small component, the construction of low safety barrier, is earmarked to be carried out under ATCEP-AF and it is yet to be commenced.

The current proposed additional activities under YDA are mitigation measures to minimize the impacts of ATCEP implementation. The mitigation works are:

- Dredging of pond which has been silted heavily since 2017
- Construction of footpath to the stupa that was relocated under ATCEP

2.1.1 Dredging of Silted Pond

The runoff from the YDA runway and its bare shoulders and as well as erosion adjacent slope during rainy season have resulted in siltation and drying of pond which is located northwest end of the runway. Dredging of pond is required to reinstate the pond back to its pre-construction phase. The silt will be dredged and placed in terraced area supported by the gabion walls to prevent erosion and siltation of the pond. In this terraced area, native species like *Erythrina* sp. can be planted (bioengineering works). The Erythrina is locally known as *Kharshing* and is a native species abundantly grown in the vicinity of the YDA. It is easy to plant through vegetative propagation and success rate is much higher than the seed sown plants. Figure 1 shows sample gabion wall with plantation that could be replicated at YDA pond area. The schematic diagram of gabion wall and backfill areas are shown in the Appendix A. For this component, DOAT has allocated funds, separate from ADB funding to proceed partially with the dredging activities.

2.2 Construction of Footpath

The current rough footpath was constructed by the community to connect to the stupa where they perform annual ritual or puja. However, the footpath is not in good condition due to steep terrain. Therefore, the project is responsible for the construction of concrete footpath with safety railing wherever necessary to avoid accidents. Further, DOAT may have to consider the construction of a retaining wall particularly at the takeoff point of the footpath. This component will be done under the ADB-funded project.

2.3 Alternatives

The alternative for dredging and transport of silt away from the pond has been done away due to the cost and for want of proper disposal site. Therefore, the option of gabion wall supported back filled terraced with silt dredged from the pond and then planting the terrace with native plant like erythrina is found to be feasible.

Similarly, for the construction of footpath, the feasible option was to use the existing dirt footpath constructed and used by the locals to access the stupa.

Figure 1: Sample gabion wall with plantation to stop soil erosion.

2.4 Construction Methodology

The gabion wall supported terrace will be built. It will be back filled with the silt dredged from the pond. Terracing is the technique of converting a slope into a series of horizontal step-like structures (Figure 4) with the aim of: controlling the flow of surface runoff by guiding the runoff across the slope and conveying it to a suitable outlet at a non-erosive velocity; reducing soil erosion by trapping the soil on the terrace; and creating flat land suitable for plantation. Terracing helps prevent the formation of rills, improves soil fertility through reduced erosion, and helps water conservation. The detailed design of the terraces will be prepared by the design consultants or the engineers of the engineering section of the DOAT similar to the sample that is illustrated in Figure 1.

Similarly, the footpath will be either by the design consultant or the DOAT engineers. The Contractor's implementation of EMP will address specific methodological measures or impacts.

2.5 Materials and Equipment

Some of the materials and equipment necessary for gabion wall and footpath construction of will need to be imported from outside the country. The contract or bidding documents require the contractor to have machineries such as excavators, dumper truck (if necessary) and mixture machines to be qualified for the award of work. So, the import new machineries will not be required for this small works.

2.6 Boulder/Stone, Aggregate and Sand Supply

Main construction materials required for the construction of gabion walls and footpath will be stones, sand, aggregates and cement. However, only stone will be required in substantial quantity almost 800m^3. Sand and aggregates will be not more than 40m^3.

Sand will be sourced from NRDCL sand quarry at Dangmechhu which some 37km from YDA while boulder and aggregates will be sourced from Chiya stone quarry at Udzorong or SMCL quarry at Doksum.

2.7 Duration and Timing of Construction Activities

Both the dredging and rehabilitation of the pond and the construction is to be started by March 2020 and completed by June 2020. Total of four months duration is earmarked for the completion of both 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. The works under YDA are basically the mitigatory activities that were recommended under annual environmental monitoring report 2017 for ADB supported ATCEP. The nature activities are limited and confined to the small areas in and around the airport.

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 currently 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.

While the dredging of the pond will partially be funded separately, this EMP provides mitigation measures for the two components to ensure that the activities meant to respond to the mitigation needs arising from impacts sustained during the implementation of ATCEP are also carried out in view of avoiding or minimizing all foreseen negative environmental impacts. Separate matrices for the two components have been prepared to be provided to contractors which will be selected through separate bidding processes.

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. The EMP was fully updated upon the completion of stakeholder consultations.

4.2 Stakeholder Consultations and Outcome

For the proposed mitigation works under YDA, consultation with the locals was carried out in March 2019 in which they expressed the need of rehabilitation of the pond and a safe, well-paved footpath. Subsequently, the YDA management was also consulted for the feasibility of carrying out dredging and rehabilitation of the pond. The joint site visit in November 2019 by YDA management and the consultant has concluded that dredging and terracing the silt with support of gabion wall is necessary to prevent further siltation. The need of bioengineering work– planting of native plant– species was agreed as a further measure to stop or prevent erosion and siltation.

4.3 Disclosure

The final IEE and EMP has 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) and hard copies available at DOAT head office and Yonphula Domestic Airport Management.

5 Environmental Management Plan

Environmental management plans detail the management actions required to protect environmental standards of Yonphula airport during construction. Separate management plan matrices were prepared for the dredging of the pond which will be partially funded by DOAT and the construction of the footpath which is planned to be covered under the ADB-funded project. 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 of vegetation for the construction of footpath
- earthworks for footpath construction and dredging of silt
- vehicle movements (including reversing beepers)
- backfilling and compacting silt on terrace as part of rehabilitation of pond

Impacts

Potential impacts will be minimal as nearest settlement is about a kilometer away. However, there might be some temporary disturbance to

- fauna movements (avoidance or attraction)
- fauna feeding or roosting patterns.

Mitigation Measures

- Identify location of nearest potential sensitive receptors to noise/vibration impacts.

- 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. Runway and Yonphula settlements close to the airport may be affected due to dust pollution. Dredging is planned to be carried out during dry season from the dried pond. 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) particularly for the construction of footpath to stupa
- dredging silt from the pond, transporting to the terrace site
- 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 particularly for the aircraft landing and takeoff.

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.
- 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 particularly for the period of aircraft landing and takeoff. 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.
- Boulders, Aggregates and sand will be covered during transport
- 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 backfilled terrace with silt dredged from the pond is levelled and sprayed with water to prevent dust pollution because of wind blows.

5.3 Erosion and Sediment Control Management

Erosion is a major issue for Yonphula airport. The erosion from the runway and its unsealed shoulders as well as the erosions from the side slopes of the runways has disturbed natural environment downstream. One of the major impacts as result of the erosion is the sedimentation of the pond located on the northwest end of the YDA runway.

Activities

Activities that may cause erosion and sedimentation include the following:

- vehicle movement (light vehicles and heavy vehicles) over unstable surfaces
- earthworks for the construction of footpath
- wastewater storage and disposal
- stockpiling of dredged silt material
- 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
  - dredging and stockpiling of silt from the pond if not properly compact on the terrace would succumb to erosion and downstream sedimentation.
- 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 and consideration of surface flow paths on the terraces.

- Gabion terrace and the backfilling with the silt dredged from the pond will be carried out. The terrace will be then planted with native plant species – erythrina or locally known as *kharshing* to prevent erosion.
- Construct catch drains and the gabion check dams (sample photo below to collect sediment-laden runoff from the runway). The existing drainage from the runway towards the pond will be rehabilitated including the construction of check dams to prevent erosion and siltation (Refer to Figures 2 and 3 for sample of gabion and masonry check dams).
- Stockpile sand and aggregates in an area away from natural drainage and runoffs (See Figure 3 under Appendix A)

Figure 2: Gabion check dam

Figure 3: Masonry check dam

Source: ICIMOD, http://lib.icimod.org/record/27709/files/Chapter%205%20Physical%20Methods.pdf

5.4 Water Quality Management

The only permanent water hole was the pond on northwest end of the runway which dried up as a result of heavy siltation during the construction and following construction period. Similarly, the runoff from the runways carrying silt causes downstream water pollution affecting aquatic environment. However, it was noticed that erosions on all sides of the runway have subsided substantially owing to the regeneration of native plant species. The slopes have now stabilized.

Activities

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

- Earthworks for the construction of footpath though it will be insignificant in scale.
- Desilting of pond and terracing work may also contribute to water pollution during rainy season due to runoff from the area back into the pond and downstream

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.
- Lubricants shall be collected and recycled or disposed of according to Waste Prevention and Management Regulation 2016.
- Gabion terrace and the backfilling with the silt dredge from the pond will be carried out. The terrace will be then planted with native plant species, erythrina or locally known as *kharshing,* to prevent erosion.
- Construct catch drains and the gabion check dams to collect sediment-laden runoff from the runway. The existing drainage from the runway towards the pond will be rehabilitated including the construction of check dams to prevent erosion and siltation.
- Stockpile sand and aggregates in an area away from natural drainage and runoffs

5.5 Solid Waste Management

Dredging of pond will result in massive amount of silt (dredged material), which if not disposed-off properly will become of a huge waste. The waste as result of the construction of footpath will be minimal.

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
  - potential health risk in the event of unauthorised access
- unnecessary placement of inert waste to landfill
  - wider implications for waste minimisation strategies of whole Yonphula 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 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 container with necessary placarding for dangerous goods or hazardous materials (in accordance to Waste Prevention and Management Regulations 2016).
- Gabion terrace and the backfilling with the silt dredge from the pond will be carried out. The terrace will be then planted with native plant species to prevent erosion.
- Construct catch drains and the gabion check dams to collect sediment-laden runoff from the runway. The existing drainage from the runway towards the pond will be rehabilitated including the construction of check dams to prevent erosion and siltation.

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
- operations of plant and equipment
- refueling and lubrication of plant, vehicles and other equipment.

Impacts

Impacts from poor handling of dangerous goods if poorly handled 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 quarries. 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 boulders, aggregates and sand from Quarries (Udzorong, Dangmechhu and Doksum)
- Transportation of equipment and construction materials from the market centers
- Operation of 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 the natural forest upslope at eastern, southern and southwest sides the runway. Scrub forest is dominant in the immediate surroundings of the airport. However, warm broadleaf and chirpine forest are found towards Drangme Chhu valley and cool broadleaved forest above 2500 m. The change in land use is not significant as the airport has been in existences since 1960s.

The wildlife habitat immediately around Yonphula airport is poor due to the proximity to human habitat. However, further away from the human habitation, the abundance of wildlife (mammals and birdlife) is evident. Mammals such as Assamese macaque, wild boar, barking deer, goral, Himalayan Serow, Sambar, leopard, etc. are known to inhabit the areas further away from the human habitation. Although Yonphula area is quite rich in bird life, there are no reports endangered or threatened bird species in the area.

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 on the natural vegetation and habitat from the dredging works as there are not vegetation in and around the proposed work site. Whereas the construction of footpath may involve minor degree of impact on the vegetation downslope if the construction spoils are dumped indiscriminately.

- Disturbance to downslope vegetation and thereby damage of habitat
- Damage and blockage of drainage system of airport access road.
- loss/injury of fauna

- loss of biodiversity

Mitigation Measure

- Proper disposal of spoil or muck from the construction of footpath.
- Slope stabilization work through bioengineering works (plantation of local plant species).

5.9 Fire Prevention

Yonphula, being in the temperate coniferous region where winters are dry and brittle, are 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:

- 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 adheres 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 victim to the nearest health facility – Tashigang 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 use of civil and bioengineering good practices to mitigate the adverse impacts – such as a rehabilitation of silted of pond at Yonphula airport.

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 24 hours. 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:

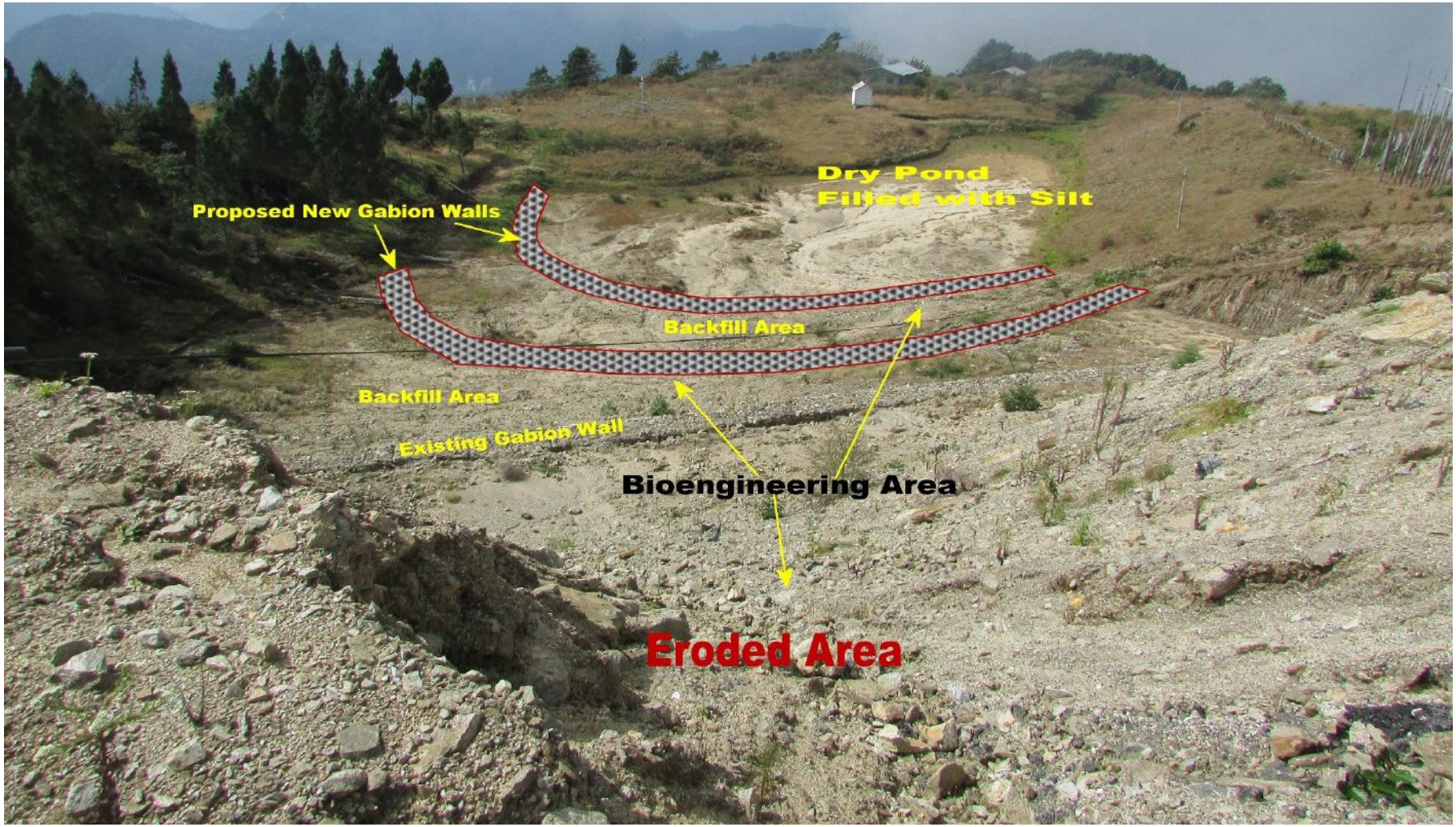
- Description and results of environmental monitoring activities undertaken during the month.
- Status of implementation of relevant environmental mitigation measures pertaining to the works.
- Key environmental problems encountered and actions taken to rectify problems.
- Summary of non-compliance notifications 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 Pond Rehabilitation

Figure 4: Draft Layout of Pond Rehabilitation through Gabion supported terracing and Backfilling of Silt from the Pond



Appendix B:

Mitigation Measures and Management Plan

FINAL EMP

Appendix B: Mitigation Measures and Monitoring Plan

Table 1. Environmental Management and Monitoring Plan for Dredging of the Pond

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	Construction zone	Design team	CSC/DOAT	Minimized erosion, designed effective erosion control measures	Prior to construction

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	drainage systems (soakage pits) and consideration of 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, 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	Airport	Contractor	CSC/DOAT	Implementation of TMP; No records of	Throughout the construction

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	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.				accidents	
Noise and vibration	• 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	• Erect a notice at the site entrance identifying the contractor and contact details of a point of contact for works. • Dredging is supposedly to be carried out during dry season from the dried pond. Water	All locations	Contractor	CSC/DOAT	Number of dust related complaints; Number of air quality related complaints; Distance of batching plants and	Throughout construction phase

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	sprinkling with suitable water tanker will be used to on site to suppress the dust. • Observe weather conditions and keep dust-generating activities to a minimum during dry and windy conditions particularly for the period of aircraft landing and takeoff. 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. • Boulders, Aggregates and sand will be covered during transport • Maintain and service plant, equipment and vehicles used during works regularly to demonstrate equipment is running efficiently and fumes				asphalt plants from nearest residential area.	

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	are minimised. Records are to be retained by the contractor and made available to CSC upon request. • Ensure backfilled terrace with silt dredged from the pond is levelled and sprayed with water to prevent dust pollution because of wind blows.					
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 • 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	All locations	Contractor	CSC/DOAT	Monthly auditing of management of	Throughout construction phase

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	according to Waste Prevention and Management Regulation 2016. • Gabion terrace and the backfilling with the silt dredge from the pond will be carried out. The terrace will be then planted with native plant species – erythrina or locally known as *kharshing* to prevent erosion. • Construct catch drains and the gabion check dams (sample to collect sediment-laden runoff from the runway. The existing drainage from the runway towards the pond will be rehabilitated including the construction of check dams to prevent erosion and siltation (Refer to Figures 2 and 3 for sample of gabion and masonry check dams). • Stockpile sand and aggregates in an area away from natural drainage and runoffs				hazardous material against safety data sheet; Number of reports if any non-compliance; Number of related complaints	
Waste	• Separate waste into different	All locations	Contractor	CSC / DOAT	Spoil dumped at	Throughout the

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
management	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 container 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 • Construction workers will be provided with sanitation facilities like toilet to prevent open defecation.				the designated dumpsite and levelled; Pit toilets are provided for the labourers; Wastes are separated based on waste types	construction period
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.	All locations	Contractor	CSC / DOAT	Checking visible signs of hazardous waste spill;	Throughout the construction period

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	• 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 until proper disposal.					
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 adheres to the site safety management rules. • Contractor maintain basic minimum first aid kits at the work site • In event of major accident, the	All locations	Contractor	CSC / DOAT	Availity of PPE; Usage of PPE, Presence of First aid box, Accident records	Throughout the construction period

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	contractor shall evacuate the victim to the nearest health facility – Tashigang district hospital.					
Operation 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). • 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.	All locations	YDA Management	DOAT	Waste recycled; No issue of waste pollution	Continuously during operational phase
Maintenance of drainage 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	YDA Management	DOAT	No blocked drains;	Continuously during operational phase

FINAL EMP

Table 2. Environmental Management and Monitoring Plan for Construction of the Footpath

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 surface flow paths.	Construction zone	Design team	CSC/DOAT	Minimized erosion, designed effective erosion control measures	Prior to construction

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
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, 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. • Where appropriate, employ	Airport	Contractor	CSC/DOAT	Implementation of TMP; No records of accidents	Throughout the construction

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	flag operators on the road to prevent traffic accidents. The workers shall have relevant safety equipment.					
Noise and vibration	• 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	• Erect a notice at the site entrance identifying the contractor and contact details of a point of contact for works. • Observe weather conditions and keep dust-generating activities to a minimum during dry and windy conditions particularly for the period of aircraft landing and takeoff.	All locations	Contractor	CSC/DOAT	Number of dust related complaints; Number of air quality related complaints; Distance of batching plants and asphalt plants from nearest residential area.	Throughout construction phase

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	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. • Boulders, Aggregates and sand will be covered during transport • 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.					
Soil erosion	• If necessary, construct catch drains to collect sediment-laden runoff along downstream boundary of construction activities, where risk of	All locations	Contractor	CSC/DOAT	Observance of no visible soil erosion; Excavated materials are stockpiled and used	Throughout construction phase

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	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.				for filling at the designated site	
Water and soil pollution	• Lubricants shall be collected and recycled, or disposed of according to Waste Prevention and Management Regulation 2016. • Stockpile sand and aggregates in an area away from natural drainage and runoffs	All locations	Contractor	CSC/DOAT	Monthly auditing of management of hazardous material against safety data sheet; Number of reports if any non-compliance; Number of related complaints	Throughout construction phase
Waste management	• Separate waste into different categories: recyclable, organic, hazardous and liquid • Store all domestic organic waste in lidded bins located in	All locations	Contractor	CSC / DOAT	Spoil dumped at the designated dumpsite and levelled;	Throughout the construction period

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	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 topsoil) to fill low areas • 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 in the drum and will be sent for recycling or reuse. • Ready stock of sawdust will be kept at the site to contain oil	All locations	Contractor	CSC / DOAT	Checking visible signs of hazardous waste spill;	Throughout the construction period

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	and fuel leaks. • Sawdust soaked with oil from accidental spillage will be ultimately put in plastic bags and stored until proper disposal.					
Flora and Fauna management	• Proper disposal of spoil or muck from the construction of footpath. • Slope stabilization work through bioengineering works (plantation of local plant species).	All long footpath construction site	Contractor	CSC / DOAT	Site visit and documentation of spoil disposal and down slope damages	Throughout the construction period
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 adheres to the site safety management rules. • Contractor maintain basic	All locations	Contractor	CSC / DOAT	Availity of PPE; Usage of PPE, Presence of First aid box, Accident records	Throughout the construction period

FINAL EMP

Potential Negative Impact	Environmental and Social Mitigation Measures	Implementing Location	Executing Agency	Supervision	Performance Indicator	Schedule
	minimum first aid kits at the work site • In event of major accident, the contractor shall evacuate the victim to the nearest health facility – Tashigang district hospital.					
Operation 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). • 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.	All locations	YDA Management	DOAT	Waste recycled; No issue of waste pollution	Continuously during operational phase