

# ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

## HYDROMET AND DISASTER IMPROVEMENT REGIONAL PROJECT

Submitted to the World Bank

By

Department of Disaster Management, Ministry of Home & Cultural Affairs

In collaboration with the

Department of Hydromet Services, Ministry of Economic Affairs

Department of Agriculture, Ministry of Agriculture and Forests

June 2016

# CONTENTS

Acronyms .....	iii
<b>BHUTANESE TERMS.....</b>	<b>v</b>
<b>LIST OF TABLES.....</b>	<b>v</b>
<b>Executive Summary .....</b>	<b>1</b>
<b>1. INTRODUCTION.....</b>	<b>4</b>
1.1 Background and Objective of the project .....	4
1.2 Rationale and Objective of the ESMF.....	4
1.3 Preparation, Outline and Disclosure of the ESMF.....	5
<b>2. PROJECT DESCRIPTION .....</b>	<b>7</b>
2.1 Project Development Objective.....	7
2.2 Project Components and Description of Works .....	7
<b>3. RELEVANT ENVIRONMENTAL AND SOCIAL POLICIES &amp; REGULATIONS.....</b>	<b>9</b>
3.1 Relevant World Bank Safeguard Policies .....	9
3.2 National Policies and Regulations Relevant to the Project .....	10
<b>4. ENVIRONMENTAL AND SOCIAL BASELINE IN PROJECT AREAS .....</b>	<b>13</b>
<b>5. ENVIRONMENTAL &amp; SOCIAL IMPACTS and MITIGATION MEASURES .....</b>	<b>16</b>
5.1 Potential environmental and social risks/impacts.....	16
5.2 Description of Likely Sub-Component Related Risks and Possible Mitigation Measures .....	17
5.3 Guidance for Land Acquisition under the Project .....	26
<b>6. Environmental and Social Management in the Project.....</b>	<b>29</b>
6.1 Procedure for Managing Environmental and Social Impacts .....	29
6.2 Obtaining Clearances for Sub-component Specific Activities.....	33
6.3 Consultations and Disclosure .....	34
<b>7. INSTITUTIONAL ARRANGEMENTS FOR ESMF .....</b>	<b>36</b>
7.1 Responsibilities for ESMF implementation .....	36
7.2 Compliance Monitoring.....	37
7.3 Capacity Building .....	38
7.4 Grievance Redress and Management Process.....	38
<b>8. Budget Requirements for IMplementation of ESMF .....</b>	<b>40</b>
<b>Annex 1: Consultation Note on Environmental and Social management Framework.....</b>	<b>41</b>
<b>Annex 2: Terrain condition of Paro International Airport and Bumthang Domestic Airport.....</b>	<b>60</b>
<b>Annex 3: Location of proposed NEOC .....</b>	<b>62</b>
<b>Annex 4: Description of Wind Profiler.....</b>	<b>63</b>
<b>Annex 5: Procedural guidance for land acquisition (As per the Land Act of Bhutan &amp; Land Rules and Regulations, 2007) .....</b>	<b>66</b>

<b>Annex 6: Annexure II of the General Rules and Regulation on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries. ....</b>	<b>68</b>
<b>Annex 7: Format for Safeguard Eligibility and Impacts Screening for Sub-components.....</b>	<b>71</b>
<b>Annex 8: Initial Environmental Examination (IEE) Form .....</b>	<b>76</b>
<b>Annex 9: Outline of ESMP and its Contents.....</b>	<b>84</b>
<b>Annex 10: Responsibilities for Implementation of ESMF .....</b>	<b>86</b>
<b>Annex 11: Format for Environmental Compliance Monitoring .....</b>	<b>95</b>
<b>Annex 12: Terms of Reference for Environment and Social Safeguards Specialist (Draft) .....</b>	<b>96</b>
<b>Annex 13: List of Officials Consulted .....</b>	<b>98</b>

## ACRONYMS

AWOS	Automated Weather Observing System
BCB	Building Code of Bhutan
BCAA	Bhutan Civil Aviation Authority
BBR	Bhutan Building Rules
BP	Bank Procedures
CA	Competent Authority
CFO	Chief Forest Officer
CBDRM	Community Based Disaster Risk Reduction
CPS	Country Partnership Strategy
DC	Development Consent
DDM	Department of Disaster Management
DEC	Dzongkhag Environment Committee
DGPS	Digital Global Positioning System
DHMS	Department of Hydromet Services
DMIS	Disaster management information system
DGM	Department of Geology and Mines
DoA	Department of Agriculture
DoFPS	Department of Forests and Parks Services
DoR	Department of Roads
EAGG	Environment Assessment General Guidelines
EC	Environment Clearance
EA	Environment Assessment
EAA	Environment Assessment Act
EC	Environment Clearance
EIA	Environment Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESMP	Environmental and Social Management Plan
FATO	Final Approach and Takeoff Area
TLOF	Touchdown and Lift-off Area
FNCA	Forest and Nature Conservation Act
FYP	Five-Year Plan
GRM	Grievance Redress Management
GRF	Government Reserved Forest
HSDIRP	Hydromet Services and Disaster Improvement Regional project
HH	Household
IEE	Initial Environment Examination
NEC	National Environment Commission
MoAF	Ministry of Agriculture and Forests
MoWHS	Ministry of Works and Human Settlement
NECS	National Environment Commission Secretariat
NEOC	National Emergency Operations Centre

NEPA	National Environment Protection Act
NLC	National Land Commission
NLCS	National Land Commission Secretariat
NWFFC	National Weather and Flood Forecasting Centre
OP	Operational Policy
PAP	Project Affected Population
PAVA	Property Assessment and Valuation Authority
PDO	Project Development Objective
PSC	Project Steering Committee
RGOB	Royal Government of Bhutan
ROHSW	Regulations on Occupational Health, Safety and Welfare
SNC	Second National Communication
SGD	Snow and Glacier Division
TLOF	Touchdown and Lift-off Area
ToR	Terms of Reference
WPS	Wind Profiler System
WRR	Weather Research and Forecasting

## **BHUTANESE TERMS**

Dratshang	Monastic body
Dzong	Fortress, which normally houses district monastic body and district/local administrative offices
Dzongdag	District Administrator
Dzongkhag:	District
Dzongkhag Tshogdu	District Development Committee
Geog	Administrative Block consisting of a number of villages
Gewog Tshogde	Block Development Committee
Thromde	Municipality, City or township

## **LIST OF TABLES**

TABLE 1: LOCATION OF SUB-COMPONENT ACTIVITIES .....	13
TABLE 2: INSTALLATION OF WIND PROFILER AT PARO INTERNATIONAL AIRPORT .....	17
TABLE 3: INSTALLATION OF CEILOMETER AT PARO INTERNATIONAL AIRPORT & BUMTHANG DOMESTIC AIRPORT.....	19
TABLE 4: CONSTRUCTION AND ESTABLISHMENT OF NEOC IN THIMPHU THROMDE.....	21
TABLE 5: INSTALLATION OF 2 PROTABLE HELICOPTER-FUELLING STATIONS .....	23
TABLE 6: ESTABLISHMENT OF 10 HELIPADS .....	23
TABLE 7: ENTITLEMENT POLICY MATRIX .....	27
TABLE 8: TENTATIVE REQUIREMENT FOR VARIOUS CLEARANCES .....	33

## EXECUTIVE SUMMARY

The Environmental and Social Management Framework (ESMF) for the Hydromet and Disaster Improvement Regional Project describes the principles and procedures for addressing environmental and social impacts associated with the project in accordance with the Royal Government of Bhutan's (RGOB) laws and regulations and World Bank's safeguards policies.

The ESMF has been prepared based on consultations with relevant departments and concerned officials. A draft of the ESMF was presented at a stakeholder consultation workshop at the national level on May 6, 2016 (see Annex 1 for details). The final ESMF incorporates the relevant feedbacks, comments and suggestions.

**The Project:** The project development objective of this project is to strengthen Bhutan's capacity for improved hydromet services and disaster preparedness and response. The implementing agencies of the project are the (i) Department of Disaster Management under the Ministry of Home & Cultural Affairs which is also the overall coordinator of the project; (ii) Department of Hydromet Services under the Ministry of Economic Affairs; and (iii) Department of Agriculture under the Ministry of Agriculture and Forests.

The project has 3 components:

- **Component A: Hydromet Services Development (DHMS)** - The main objective of this component is to strengthen the capacity of DHMS to improve hydromet monitoring, forecasting and service delivery to priority sectors. It will support procurement and installation of instruments to provide additional information for aviation safety at Paro International Airport and Bumthang Domestic Airport. Funds will also be used to procure IT hardware and software, glacier monitoring equipment and development of a Common Operating Platform for automated hydro-met services delivery. This will help enhance monitoring and forecasting to improve DHMS's services.
- **Component B: Disaster Preparedness and Response Capacity Improvement (DDM)** - The main objective of this component is to strengthen capacity for disaster preparedness and response. This component will support the establishment of an NEOC through the design, build and equip phase, emergency communication equipment for all 20 District Disaster Management Offices and support establishment of critical infrastructure such as fueling stations and helipads for emergency helicopter operation. It will also support establishment of a DRM Geomatics system within DDM.
- **Component C: Design of an agromet decision support system (DOA)** - This component will fund the design of an agromet decision support system, development and delivery of agromet information products in to two Dzongkhags, training and capacity building. All the components will support institutional capacity building, regional collaboration and project management including monitoring and evaluation. Component B will also support specific training and capacity building of pilots to improve the inter-operability of Royal Bhutan Helicopter Services and members of the National Search and Rescue Team and local fire brigades to ensure efficient and safe operations.

**Policies and Regulations on Environmental and Social Issues:** The related laws that apply to the project include The Constitution of the Kingdom of Bhutan, Waste Prevention and Management Act, 2009; Forest and Nature Conservation Act, 2005; National Environment Protection Act, 2007; Environment Assessment Act, 2000; The Water Act of Bhutan, 2011; The Land Act Bhutan, 2007; The Civil Aviation Act, 2000; Environment Assessment General Guidelines, 2012; Thimphu Municipal Development Control Regulations, 2004; Regulation on Occupational Health, Safety & Welfare (OHS) in Construction, Manufacturing, Mining & Service Industries, 2006 and Bhutan Building Regulations, 2002:

The World Bank environmental safeguard policies applicable in the project are Environmental Assessment (OP/BP 4.01) and Involuntary Resettlement (OP 4.12). For each subproject the screening and management plan prepared under OP 4.01 will also cover the Forests (OP 3.36), and Physical Cultural Resources OP/BP (4.11) related issues, if encountered in any subproject.

**Environmental and Socio-economic Baseline and Issues:** The project sub-components are spread across the Dzongkhags of Paro, Thimphu, Bumthang and possibly in a few more districts where helipads will be established. The baseline information in the ESMF describes the socio-economic conditions, agro-ecological conditions and cultural aspects of these locations.

**Environmental and Social impacts:**

Environmental Impacts: The negative environmental impacts from the project are anticipated to be minimal. The site-specific impact could potentially include impacts arising from excavation, waste and material management or occupational health and safety hazards at construction sites; noise pollution during helicopter takeoff and landing at the helipads. These anticipated impacts can be minimized/mitigated by developing appropriate measures by adopting standard and applicable regulations. To address these concerns, the project will implement provisions made in this ESMF which requires preparation and implementation of sub-component specific screening, ESMP/ IEE etc.

Social Risks/Impacts: The project is expected to lead to primarily positive benefits in terms of enhancing safety during flight operations, enabling improved access to weather information and improving disaster response and risk reduction. Some of the social risks associated with the project could include those relating to land acquisition for construction of helipads and installation of aviation related equipment for which actual locations are not yet identified.

**Managing Environmental and Social Safeguard issues:**

The following procedure will be adopted for managing environmental and social impacts related to the project:

- Step 1: Project eligibility screening
- Step 2: Project screening for potential environmental and social safeguard impacts and determination of safeguards documents required according to RGOB regulations and World Bank policies
- Step 3: Development of Environment and Social Management Plans (ESMP) that includes mitigation measures/good practices at sub-component level, if required during the screening exercise



- Step 4: Application/Approval for Environment Clearance
- Step 5: Consultation, Disclosure, and Awareness Raising and Dissemination
- Step 6: Implementation and Monitoring

For activities, that require an Environment Clearance, the terms and conditions included as a part of the clearance will become a part of the ESMP/IEE of the project for implementation.

Consultation with local people/other stakeholders relevant to the project sub-components, particularly the affected groups will be carried out during various stages of the sub-component preparation and implementation. The affected stakeholders or communities will be informed about minimum social and environmental requirements, (ii) potential risks and benefits of the activities and (iii) Grievance management mechanism developed for the project. The ESMF will be disclosed in the websites of the implementing agencies - DHMS, DDM and DOA.

**Implementation Arrangement:** The NECS is the highest decision-making and coordinating body on all matters relating to the protection, conservation and improvement of the natural environment. Respective ministries of the Government are the final authority for social issues that pertain to their mandate. As designated by regulations for issuance of EC, Thimphu Thromde is the Competent Authority to issue EC and Development Consent for the NEOF as it falls within the core urban area of Thimphu municipality. For all other sub-component activities, the NECS is the authority for issuance of EC since these activities are neither included in the list of activities that do not require an EC nor in the list of activities that competent authorities are delegated to screen and issue environment clearance as per Annex 2 of the Environment Assessment Act.

At the activity level, self-regulatory monitoring of the environmental and social aspects will be carried out by the concerned implementing agency. While a quarterly report will be submitted at the project level, an annual report will be submitted to the NECS for their review and annual compliance monitoring.

Project related complaints/comments/suggestions will be registered at the concerned Gewog/Dzongkhag, for their action as per standard norms in place. These could also be taken up with the concerned component management department. For issues that cannot be resolved at the project or district level, it may be transferred to the Ministry or appropriate Boards. The final place of submission will be the Royal Court of justice of the concerned district.

**Approximate Cost of ESMF implementation:** The cost for implementation of the ESMF is estimated to be around USD 27,300. This is a part of the project management, monitoring and evaluation. Costs for cash compensation for acquisition of land and construction of ancillary structures such as roads and other amenities which may be incurred during the implementation shall be borne by the Royal Government of Bhutan.

# ། ལས་འགུལ་ལག་ལེན་གྱི་ཐབས་རིམ་བཅུད་བསྟུམ། །

༣ གནམ་གཤིས་དང་རྒྱུ་རྒྱུ་ལེགས་བསྟུར་ལུང་ཕྱོགས་ལས་འགུལ་གྱི་དོན་ལུ་བཟོ་མི་ མཐའ་འཁོར་དང་མི་སྡེ་འཛིན་སྐྱོང་  
འཆར་བཀོད་འདི་ནང་ ལས་འགུལ་ལག་ལེན་ལུ་བརྟེན་ མཐའ་འཁོར་དང་མི་སྡེ་ལུ་ འབྲུང་ངེས་པའི་དཀའ་ངལ་ཚུ་ སེལ་ཅི་གི་  
དོན་ལུ་ འབྲུག་རྒྱལ་ཁབ་ཀྱི་ཁྲིམས་དང་སློབ་གཞི་ཚུ་དང་ འཛམ་གླིང་དབུལ་ཁང་གི་ ཉེན་སྲུང་ལམ་སྟོན་སྲིད་བྱུས་ཀྱི་དགོངས་དོན་  
ཚུ་དང་འབྲེལ་ གཞི་རྩ་དང་བློ་འདི་རིམ་པ་ཚུ་ ཁ་གསལ་བཀོད་དེ་ཡོད།

མཐའ་འཁོར་དང་མི་སྡེ་འཛིན་སྐྱོང་འཆར་བཀོད་ཡིག་ཆ་འདི་ འབྲེལ་བ་ཡོད་པའི་ལས་ཁུངས་དང་ འགོ་དཔོན་ཚུ་དང་གཅིག་ཁར་  
གྲོས་བསྟུར་གནང་མི་ གྲོས་བཅུད་ཚུ་ལུ་ གཞི་བཟུང་སྟེ་ སློབ་བཀོད་འབད་ཡི། འཆར་བཀོད་ཀྱི་བེད་བྱས་འདི་ སྤྱི་ལོ་༢༠༡༤ལྷོ་  
པ་འཛམ་གླིང་གི་ཉེན་ ཁེ་བྱོང་ཅན་གྱི་གྲོས་སྟོན་ཞལ་འཛོམས་ནང་ རོ་འཛོམས་ཡོད་མི་ རྒྱལ་ཡོངས་གནས་རིམ་ནང་ གསལ་སྟོན་  
ལུ་ཡི་ (ཁ་གསལ་གྱི་དོན་ལུ་ ཟུར་སྟུགས་༡པའི་ནང་ག་བེད་བྱས་གནང་) ། འཆར་བཀོད་ཡིག་ཆ་མཐའ་བཅད་ནང་ འབྲེལ་བ་ཡོད་  
པའི་ བསམ་ལན་དང་ གྲོས་འདེབས་ དེ་ལས་ གྲོས་འཆར་ཚུ་ཡང་ མཉམ་བསྟེན་འབད་དེ་ཡོད།

**ལས་འགུལ་ལེན་གྱི་** ལས་འགུལ་གོང་འཕེལ་གྱི་དམིགས་གཏང་དོན་ཅིག་ རྒྱུད་གནམ་གཤིས་བརྟུག་དབྱེད་  
ལེགས་བསྟུར་དང་ རྒྱུ་རྒྱུ་ལུ་གདོང་ལེན་གསློབ་དང་ གདོང་ལེན་གྱི་དོན་ལུ་ འབྲུག་རྒྱལ་ཁབ་ཀྱི་ཕྱོགས་སྐྱབ་ སྤྱིང་སྤྱི་བཟོ་ནི་  
འདི་ཨིན། ལས་འགུལ་ལག་ལེན་འཐབ་མི་ རོ་ཚབ་ལས་སྟེ་ཚུ་ཡང་ ༡) བཟུང་དང་སྲོལ་འཛིན་ལྷན་ཁག་འོག་གི་ རྒྱུ་རྒྱུ་  
འཛིན་སྐྱོང་ལས་ཁུངས་ཨིན་མ་དུ་ ལས་ཁུངས་འདི་ ལས་འགུལ་གྱི་དོན་ལུ་ སྤྱིར་བཏང་འགོ་འཁྲིད་པ་ཅིག་ཡང་ཨིན། ༢) བསྟུན་  
རྒྱུ་རྒྱུ་ལུ་གདོང་ལེན་གསློབ་དང་ རྒྱུ་རྒྱུ་ལུ་གདོང་ལེན་གསློབ་དང་ ལས་ཁུངས་འདི་ ལས་འགུལ་གྱི་དོན་ལུ་ སྤྱིར་བཏང་འགོ་འཁྲིད་པ་ཅིག་ཡང་ཨིན། ༣) སོ་ནམ་དང་ནགས་ཚལ་ལྷན་ཁག་འོག་གི་ སོ་ནམ་  
ལས་ཁུངས་ཚུ་ཨིན།

## ལས་འགུལ་འདི་ལུ་ བཟུང་གསལ་ཡན་ལག་ གཙོ་བོ་ལོ་ལོ་ལུ་ཚུ་ཡང་

**ཡན་ལག་ལས་འགུལ་ །༡། སེ་** རྒྱུད་གནམ་གཤིས་བརྟུག་དབྱེད་ཞབས་ཏྲིག་ ཡར་ཤུག་གཏང་ནི་ (རྒྱུད་གནམ་གཤིས་  
བརྟུག་དབྱེད་ལས་ཁུངས་) - ཡན་ལག་ལས་འགུལ་འདི་གི་ དམིགས་གཏང་གཙོ་བོ་ར་ རྒྱུད་གནམ་གཤིས་ཀྱི་བཟུང་རྟོག་དང་  
སྟོན་བཤད་ དེ་ལས་ གཙོ་རིམ་ཅན་གྱི་ལས་ཚན་ཚུ་ལུ་ ཞབས་ཏྲིག་མཁོ་སྤོད་ཀྱི་གནས་ཚད་ ཡར་ཤུག་བཟོ་ནི་འདི་ཨིན། འདི་  
གིས་ སྤྱི་རྒྱལ་སྤྱི་གནམ་ཐང་དང་ བུམ་ཐང་ནང་འཁོད་གནམ་ཐང་ལུ་ མཁའ་འགྲུལ་ཉེན་སྲུང་གི་དོན་ལུ་ བརྟེན་འགྲོལ་བྱེད་  
ཚུགས་པའི་འཕྲུལ་ཆས་ མཁོ་སྤོད་དང་ བཟུག་སློབ་འབད་ནི་ནང་ རྒྱུ་རྒྱུ་ལུ་གདོང་ལེན་གསློབ་འབད་དགོ། མ་དབུལ་ཚུ་ བརྟེན་འགྲོལ་རིག་གི་  
སྤྱི་ཚབ་དང་མཉམ་ཆས་ དེ་ལས་ བྱེད་སྤྱོད་ཀྱི་མཁོ་ཆས་ མཁོ་སྤོད་འབད་ནི་དང་ རང་འགུལ་ཅན་གྱི་རྒྱུད་གནམ་  
གཤིས་ཀྱི་ཞབས་ཏྲིག་ མཁོ་སྤོད་ཀྱི་དོན་ལུ་ སྤྱིར་བཏང་ལག་ལེན་གྱི་ས་ལོ་ གཞི་བཟུང་གྱི་དོན་ལུ་ཡང་ ཟད་སོང་གཏང་དགོ།  
འདི་གིས་ རྒྱུད་གནམ་གཤིས་བརྟུག་དབྱེད་ལས་ཁུངས་ཀྱི་ཞབས་ཏྲིག་ ཡར་ཤུག་གི་དོན་ལུ་ གནམ་གཤིས་བཟུང་རྟོག་དང་ སྟོན་  
བཤད་ཀྱི་གནས་ཚད་ ཡར་ཤུག་ལུ་ སེ་ཐོགས་ཚུགས།

**ཡན་ལག་ལས་འགུལ་ །༡༩༽ སེ།** རྒྱུ་ལྷན་ལུ་ གདོང་ལེན་གྱི་སྒྲིག་དང་ དང་ལེན་གྱི་སྒྲིག་སྐབ་ སྒྲིང་སྒྲི་བཟོ་ནི་ (རྒྱུ་ལྷན་འཛིན་སྒྲིང་ལས་ཁྲུངས།) - ཡན་ལག་ལས་འགུལ་འདི་གི་ དམིགས་གཏང་གཙོ་བོ་ རྒྱུ་ལྷན་ལུ་ གདོང་ལེན་གྱི་སྒྲིག་དང་ དང་ལེན་གྱི་སྒྲིག་སྐབ་ སྒྲིང་སྒྲི་བཟོ་ནི་འདི་ཡིན། འདི་གིས་ རྫོང་ཁག་ཁལ་གཅིག་ནང་ཡོད་པའི་ རྫོང་ཁག་རྒྱུ་ལྷན་འཛིན་སྒྲིང་ལས་ཁྲུངས་ཡིག་ཚང་ ཆ་མཉམ་གྱི་དོན་ལས་ གྲོ་འབྱར་འཚབས་དོལ་གྱི་བརྒྱུད་འབྲེལ་མཁོ་ཆས་ཚུ་ བཟོ་བཀོད་དང་ བཟོ་བསྐྱུན་ དེ་ལས་ བརྒྱུགས་སྒྲིག་གི་ཐོག་ལས་ རྒྱལ་ཡོངས་འཚབས་དོལ་ལག་ལེན་ལྟེ་བ་ཚུ་ གཞི་བརྒྱུག་འབད་ནིའི་ནང་ རྒྱལ་སྒྲིང་བྱིན་ནི་དང་ གྲོ་འབྱར་འཚབས་དོལ་སྐབས་ ཁག་ཆེ་བའི་ གཞི་རྟེན་མཁོ་ཆས་ དཔེར་ན་ ས་སྐྱུམ་མར་ཁུ་བྲུགས་ས་ གཞི་བརྒྱུགས་དང་ གནམ་གུ་ཉེ་ལི་ཀོམ་ཏར་ ཆགས་སའི་གནམ་ཐང་ཚུ་ བཟོ་བསྐྱུན་འབད་ནི་ལུ་ རྒྱལ་སྒྲིང་འབད་དགོ། དེ་མ་ཚད་ རྒྱུ་ལྷན་འཛིན་སྒྲིང་ལས་ཁྲུངས་ནང་འཁོད་ལུ་ DRM ས་ཁམས་རིག་པའི་རིམ་ལུགས་ གཞི་བརྒྱུགས་འབད་ནི་ལུ་ཡང་ རྒྱལ་སྒྲིང་འབད་དགོ།

**ཡན་ལག་ ལས་འགུལ་ །༢༠༽ སེ།** སོ་ནམ་དང་གནམ་གཤིས་ བརྒྱུ་དཔྱད་ཞབས་ཏྲོག་རིམ་ལུགས་ བཟོ་བཀོད་ (སོ་ནམ་ལས་ཁྲུངས།) - ཡན་ལག་ལས་འགུལ་འདི་གིས་ རྫོང་ཁག་གཉིས་ནང་ སོ་ནམ་དང་གནམ་གཤིས་ བརྒྱུ་དཔྱད་ཞབས་ཏྲོག་རིམ་ལུགས་ བཟོ་བཀོད་དང་ གོང་འཕེལ་ དེ་ལས་ སོ་ནམ་དང་གནམ་གཤིས་བརྒྱུ་དཔྱད་ཀྱི་བརྒྱ་དོན་ཚུ་ བརྒྱ་སྐེལ་འབད་ནི་དང་ སྒྲིང་བརྒྱུ་དང་ རྒྱུགས་སྐབ་ཡར་ཕྱག་བཟོ་ནི་ནང་ མ་དངུལ་གཏང་དགོ།

ལས་འགུལ་ཡན་ལག་ཆ་མཉམ་གྱིས་ ལས་སྡེའི་སྒྲིག་སྐབ་ཡར་ཕྱག་དང་ ལུང་ཕྱོགས་མཉམ་འབྲེལ་ དེ་ལས་ བརྒྱ་དོན་དང་ དཔྱད་ཞིབ་བརྒྱུ་ཉེ་ ལས་འགུལ་འཛིན་སྒྲིང་འཐབ་ནིའི་ནང་ རྒྱལ་སྒྲིང་འབད་དགོ། ཡན་ལག་ལས་འགུལ་ཁ་ཤིག་ འབྲུག་ཉེ་ལེ་ཀོབ་ཏར་ཞབས་ཏྲོག་ལས་སྡེ་གི་ རྫང་འཁོད་འབྱུར་འབྲུལ་ལམ་ལུགས་ ཡར་ཕྱག་གི་དོན་ལས་ གནམ་གུ་དེད་དཔོན་ཚུ་དང་ རྒྱལ་ཡོངས་འཚོལ་ཞིབ་དང་སློབ་སྦྱོར་སྐབས་སྡེ་ཚན་ དེ་ལས་ ས་གནས་ཀྱི་མེ་བསད་སྡེ་ཚན་ཚུ་ལུ་ཡང་ སན་རུས་ཅན་དང་ ཉེན་སྲུང་ལྷན་པའི་ལག་ལེན་གྱི་དོན་ལུ་ དམིགས་བསལ་གྱི་སྒྲིང་བརྒྱུ་དང་ རྒྱུགས་སྐབ་ཡར་ཕྱག་གཏང་ནིའི་ནང་ རྒྱལ་སྒྲིང་འབད་དགོ།

**མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེའི་གནད་དོན་གྱི་སྒྲིང་ སྤྱིད་བྱུས་དང་སྒྲིག་གཞི།** ལས་འགུལ་ལག་ལེན་ལུ་ རྒྱབ་ཚད་ལྷན་པའི་ འབྲེལ་བ་ཡོད་པའི་ཁྲིམས་ལུགས་ཚུ་ཡང་ འབྲུག་གི་ཙུ་ཁྲིམས་ཆེན་མོ། ལུགས་སྒྲིགས་སྡེ་མོག་དང་འཛིན་སྒྲིང་བཅའ་ཁྲིམས་ ༢༠༠༧ ཅན་མ། རྒྱལ་ཚལ་དང་རང་བཞིན་གནས་སྤངས་སྤྱི་བཅའ་ཁྲིམས་ ༢༠༠༥ ཅན་མ། རྒྱལ་ཡོངས་མཐའ་འཁོར་གནས་སྤངས་སྤྱི་བཅའ་ཁྲིམས་ ༢༠༠༧ ཅན་མ། མཐའ་འཁོར་གནས་སྤངས་དཔྱད་ཞིབ་བཅའ་ཁྲིམས་ ༢༠༠༠ ཅན་མ། འབྲུག་གི་ འཐུང་ཚུ་བཅའ་ཁྲིམས་ ༢༠༡༡ ཅན་མ། འབྲུག་གི་སའི་བཅའ་ཁྲིམས་ ༢༠༠༧ ཅན་མ། ཞི་བའི་མཁའ་འགྲུལ་བཅའ་ཁྲིམས་ ༢༠༠༠ ཅན་མ། མཐའ་འཁོར་དཔྱད་ཞིབ་ཀྱི་སྤྱིར་བཏང་ལམ་སྟོན་ ༢༠༡༢ ཅན་མ། ཐིམ་ཕུག་ཁྲོམ་སྡེ་གོང་འཕེལ་ཚད་འཛིན་སྒྲིག་གཞི་ ༢༠༠༤ ཅན་མ། ཁང་ཁྲིམ་བཟོ་བསྐྱུན་དང་ རྒྱ་དོན་བཟོ་བསྐྱུན་ དེ་ལས་ ས་གཏེར་དང་ཞབས་ཏྲོག་ལས་ཁང་ཚུ་ནང་ ལས་གཞུག་པའི་འཕྲོད་བསྟེན་དང་ ཉེན་སྲུང་ སན་བདེའི་སྒྲིག་གཞི་ ༢༠༠༤ ཅན་མ་དང་ འབྲུག་སྤྱིར་བཏང་སྒྲིག་གཞི་ ༢༠༠༢ ཅན་མ།

ལས་འགུལ་འདི་གི་དོན་ལུ་ རྒྱབ་ཚད་ལྷན་པའི་ འཛམ་གླིང་དངུལ་ཁང་གི་ མཐའ་འཁོར་གནས་སྤངས་ཉེན་སྒྲིབ་ཀྱི་སྤྱིད་བྱུས་ཚུ་ ཡང་- མཐའ་འཁོར་དཔྱད་ཞིབ་(ཨོ་ཕི་ཕི་ཕི་༤.༠༡)དང་ ཐབས་མེད་གཞིས་ཆགས་(ཨོ་ཕི་/༤.༡༢)། རྫང་གསེས་ཀྱི་ལས་འགུལ་ རེ

རེ་བཞིན་གྱི་དོན་ལས་ འཛམ་གླིང་དངུལ་ཁང་གི་མཐའ་འཁོར་ཉེན་སྲོལ་སྲིད་བྱས་ ཨོ་པི་༤༠། གི་དགོངས་དོན་ཐོག་ གྲམ་སྒྲིག་  
བཟོ་མི་ བརྟག་ཞིབ་དང་འཛིན་སྲོལ་འཆར་གཞི་ནང་ བློ་སྦྱོར་ཚལ་(ཨོ་པི་༣,༣༤)དང་ དོས་གཟུགས་ལམ་སྲོལ་ཐོན་ལུངས་(ཨོ་པི་  
/འི་པི་༤,༡༡) དེ་ལས་ བློ་སྦྱོར་ཚལ་ལས་འགྲུལ་ གང་རུང་ལག་ལེན་གྱི་སྐབས་ གདོང་ཐུག་འབྱུང་ངེས་པའི་ འབྲེལ་བ་ཡོད་པའི་  
གནད་དོན་ཚུ་ ཚུད་དེ་ཡོད།

**མཐའ་འཁོར་དང་མི་སྲིད་པལ་འབྱོར་གྱི་གཞི་རྒྱུ་དང་གནས་སྤངས་ལས་འགྲུལ་གྱི་ནང་གསལ་ཡན་ལག་ཚུ་** སྲུ་རེ་དང་ཐིམ་  
ཐུག་ བྱམ་ཐང་རྫོང་ལག་ཚུ་ནང་ གཞི་བཙུགས་འབད་ཡོད་པ་མ་ཚད་ ཐང་འཕུར་གནས་ཐང་ གཞི་བཙུག་འབད་ནི་ཨིན་མི་ རྫོང་  
ལག་གཞན་དག་པ་ཅིག་གི་ནང་ལུ་ཡང་ གཞི་བཙུག་འབད་ནི་ཨིན། མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྲིད་འཛིན་སྲོལ་འཆར་བཀོད་  
ནང་གསལ་གྱི་ གཞི་རྒྱུ་བཟོ་དོན་ནང་ ས་གནས་དེ་ནང་གི་ མི་སྲིད་པལ་འབྱོར་གྱི་གནས་སྤངས་དང་ སོ་ནམ་དང་སྐྱེས་ལྷན་  
གནས་སྤངས་ དེ་ལས་ ལམ་སྲོལ་གྱི་གནས་དོན་ཚུ་ གསལ་བཀོད་འབད་དེ་ཡོད།

**མཐའ་འཁོར་དང་མི་སྲིད་པན་གོད་པལ་** ལས་འགྲུལ་ལུ་བརྟེན་པའི་ མཐའ་འཁོར་ལུ་ གོད་སྲོལ་གྱི་ཆ་རྒྱུ་ཚུ་ ག་དེ་ཉུང་ཉུང་གི་  
ཐོག་ ལག་ལེན་འཐབ་ཚུགས་པའི་རེ་བ་ཡོད། ས་ཁོངས་ནང་ འབྱུང་ངེས་པའི་གོད་སྲོལ་ཚུ་ཡང་ ས་བཅད་པའི་སྐབས་དང་  
ཐུགས་སྐྱེགས་དང་རྒྱ་དོས་འཛིན་སྲོལ་ ཡང་ཅིན་ བཟོ་བསྐྱུན་གྱི་ས་ཁོངས་ནང་ ལུ་གཡོག་གི་འཕྲོད་བསྟེན་དང་ ཉེན་སྲུང་གི་  
གོད་པ་ དེ་ལས་ ཐང་འཕུར་གནས་ཐང་ལས་ གནས་སྤངས་འཕུར་བའི་སྐབས་དང་ ཆགས་པའི་སྐབས་ལུ་ སྐད་གྱི་འཆར་སྤངས་ཚུ་  
ཚུད་པ་ཨིན། དེ་སྲུ་ འབྱུང་ངེས་པའི་ གོད་སྲོལ་ཚུ་ཡང་ གནས་ཚད་ཅན་དང་ བྱམ་ཚད་ལྡན་པའི་སྐྱེག་གཞི་གི་ཐོག་ལས་ འོས་  
འབབ་དང་ལྷན་པའི་ ཐབས་ལམ་ཚུ་བརྟོན་ཞིན་མ་ལས་ མར་མབ་གཏང་ཚུགས་པའི་འབད་ནི་ ཡང་ཅིན་ ཅུ་མེད་བཟོ་ཚུགས་པ་  
འབད་ནི་ཨིན། འབྱུང་ངེས་པའི་གོད་སྲོལ་དེ་ཚུ་དང་འབྲེལ་བའི་ ཆ་གྲངས་ལེ་ཐབས་ལུ་ མཐའ་འཁོར་དང་མི་སྲིད་འཛིན་སྲོལ་འཆར་  
བཀོད་འདི་ནང་ གྲམ་སྒྲིག་དང་ལག་ལེན་གྱི་དོན་ལུ་ དགོས་ངེས་ཅན་སྲུ་བཀོད་ཡོད་པའི་ ལས་འགྲུལ་གྱི་ནང་གསལ་ཡན་ལག་གི་  
དམིགས་བསལ་གྱི་བརྟག་ཞིབ་དང་ མཐའ་འཁོར་དང་མི་སྲིད་འཛིན་སྲོལ་འཆར་བཀོད་/འགོ་ཐོག་མཐའ་འཁོར་གནས་སྤངས་དབྱེ་  
ཞིབ་དང་འབྲེལ་ ལག་ལེན་འཐབ་དགོ།

**མི་སྲིད་ལུ་ཉེན་ལ་གོད་པལ་** ལས་འགྲུལ་ལག་ལེན་གྱི་སྐབས་སུ་ དམིགས་བསལ་དུ་ གནས་སྤངས་འགྲུལ་སྐབས་ཀྱི་ཉེན་སྲུང་  
སྲིད་སྲུ་བཟོ་ནི་དང་ གནས་གཞིས་བཟོ་དོན་གྱི་སྐོར་ ཐོབ་སྲོད་ཡར་དྲག་ དེ་ལས་ རྒྱུ་རྒྱུ་གདོང་ལེན་དང་ ཉེན་ལ་མར་མབ་གྱི་  
ཐབས་བྱས་ཚུ་ ཡར་དྲག་བཟོ་ཐོག་ལས་ བན་བྱུང་ཅན་གྱི་སྐོར་ལས་ འགོ་འདྲེན་འཐབ་ཚུགས་པའི་རེ་འདོད་ཡོད། ལས་འགྲུལ་ལུ་  
བརྟེན་པའི་ མི་སྲིད་ཉེན་ལའི་གངས་སུ་ གནས་ཐང་བཟོ་ནི་དང་ མཐའ་འགྲུལ་དང་འབྲེལ་བའི་མཁོ་ཆས་ གཞི་བཙུགས་གྱི་དོན་  
ལུ་ ས་ཆ་གཞུང་བཞེས་དང་འབྲེལ་བའི་གནད་དོན་ཚུ་ ཨིན་མི་འདི་ཡང་ ད་ལྟོ་ཚུན་ཚོད་ལུ་ ས་གོ་ངོ་མ་ ངོས་འཛིན་མ་འབད་བར་  
ཡོད་མི་ལུ་བརྟེན་ཨིན།

**མཐའ་འཁོར་དང་མི་སྡེ་ཉེན་སྐྱོད་ཀྱི་ཐབས་ལམ་འཛིན་སྐྱོང་།**

ལས་འགུལ་དང་འབྲེལ་བའི་ མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེ་འོག་གོད་པ་ཚུ་ འཛིན་སྐྱོད་གི་དོན་ལས་ གཤམ་གསལ་བྱ་སྐྱོད་  
རིམ་པ་ཚུ་ ལག་ལེན་འཐབ་ནི་འདི་ཡང་།

**ཐབས་རིམ་༡་པ་།** ལས་འགུལ་གྱི་འོས་འབབ་བརྟག་ཞིབ་ འགོ་འདྲེན་འཐབ་ནི།

**ཐབས་རིམ་༢་པ་།** མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེ་ཉེན་སྐྱོད་དང་འབྲེལ་བའི་ བཅུག་གོད་ཀྱི་འོས་འབབ་ བཅུག་དཔུང་དང་  
འབྲུག་གཞུང་གི་སློག་གཞི་ཚུ་དང་ འཛམ་གླིང་དདུལ་ཁང་གི་སྲིད་བྱུས་ཀྱི་དགོངས་དོན་ཚུ་དང་འཕྲིལ་ དགོས་ངེས་ལྡན་པའི་ ཉེན་  
སྐྱོད་ཡིག་ཚུ་ གཏན་འབབས་ཀྱི་དོན་ལས་ ལས་འགུལ་བརྟག་ཞིབ་ འགོ་འདྲེན་འཐབ་ནི།

**ཐབས་རིམ་༣་པ་།** མཐའ་འཁོར་དང་མི་སྡེ་འཛིན་སྐྱོད་འཆར་གཞི་བཟོ་ནི། བརྟག་དཔུང་འགོ་འདྲེན་འཐབ་པའི་སྐབས་ དགོས་མཁོ་  
ཡོད་པ་སྡེ་མཐོང་བ་ཅིན་ འཆར་གཞི་འདི་གི་ནང་ལུ་ ནང་གསེས་ཡན་ལག་གི་གནས་རིམ་ནང་ ཕ་མེད་བཟོ་ནི་ཐབས་ལམ་/ལག་  
ལེན་གྱི་ཐབས་ཤེས་ ལེགས་ཤོམ་ཚུ་ཚུད་དགོ།

**ཐབས་རིམ་༤་པ་།** མཐའ་འཁོར་ཉེགས་མེད་ཀྱི་དོན་ལུ་ ལུ་ཚོག་/ཚོག་གོལ་གནང་བ།

**ཐབས་རིམ་༥་པ་།** གོས་བསྐྱུན་དང་ གསལ་བསྐྱུགས་ དེ་ལས་ གོ་བདེ་སྦྱོང་ནི་དང་ ལྷབ་སྡེལ།

**ཐབས་རིམ་༦་པ་།** ལག་ལེན་དང་ བཟོ་རྒྱུ་།

མཐའ་འཁོར་ཉེགས་མེད་ཡི་གུ་ དགོས་མཁོ་ཡོད་པའི་ ལས་སྣ་ཚུ་གི་དོན་ལས་ ཉེགས་མེད་ཀྱི་ཆ་ཤས་སུ་གཏོགས་པའི་ ལག་ལེན་  
ལམ་ལུགས་ཚུ་ ལས་འགུལ་ལག་ལེན་གྱི་དོན་ལུ་ ལས་འགུལ་འདི་གི་ མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེ་འོག་གོད་འཆར་  
གཞི་/འགོ་ཐོག་མཐའ་འཁོར་གནས་སྤངས་དབྱེ་ཞིབ་ཀྱི་དོན་ལས་ཡང་ དགོས་ངེས་ཅན་གྱི་ཆ་ལག་ཅིག་སྡེ་ ཚུད་དགོ།

ལས་འགུལ་གྱི་ ནང་གསེས་ཡན་ལག་གྱི་གྲ་སློག་དང་ ལག་ལེན་གྱི་འགོ་རིམ་སྣ་ཚོགས་ འགོ་འདྲེན་འཐབ་པའི་སྐབས་ ལས་  
འགུལ་གྱི་ནང་གསེས་ཡན་ལག་དང་ འབྲེལ་གནད་ཡོད་པའི་ ས་གནས་ཀྱི་མི་དོད་ ཁེ་སྲོང་ཅན་གཞན་ཚུ་དང་ དམིགས་བསལ་  
དུ་ གོད་སྐྱོན་ཕོག་མི་ སྡེ་ཚན་ཚུ་དང་གཅིག་ཁར་ གོས་བསྐྱུན་ལས་རིམ་ཚུ་ འགོ་འདྲེན་འཐབ་ནི། གོད་སྐྱོན་ཕོག་མི་ ཁེ་སྲོང་  
ཅན་དང་ མི་སྡེ་ལུ་ ༡༽ ལས་འགུལ་གྱི་དོན་ལས་ མི་སྡེ་དང་མཐའ་འཁོར་ ཉེན་ཚད་ཅིག་ལས་བརྒལ་ དགོས་མཁོ་མེད་པའི་  
སྐྱོར་ གོ་བདེ་བྱིན་ནི་དང་། ༢༽ ལས་སྣ་ཚུ་ལས་བརྟེན་པའི་ ཉེན་ཁ་དང་ ཁེ་སྲོང་གི་སྲིད་ཆ་ཚུ་གི་སྐྱོར་ལས་ བདེ་སྦྱོང་བྱིན་ནི།  
དེ་ལས་ ༣༽ ལས་འགུལ་གྱི་དོན་ལས་ རྒྱུད་གསོའི་འཛིན་སྐྱོད་ཐབས་ལམ་བཟོ་ནི། མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེ་འོག་  
གོད་སྐྱོད་འཆར་བཀོད་འདི་ ལས་འགུལ་ལག་ལེན་འཐབ་མི་ལས་སྡེ་ ཚུ་དང་གནམ་གཤིས་བརྟག་དཔུང་ལས་ཁུངས་དང་ རྒྱུན་ལྔ་  
འཛིན་སྐྱོད་ལས་ཁུངས་ དེ་ལས་ སོ་ནམ་ལས་ཁུངས་ཚུ་འི་ ཡོངས་འབྲེལ་འཆར་སྐྱོད་ གསལ་སྐྱོན་འབད་ནི།

**ལག་ལེན་གྱི་འགོ་རིམ་** རྒྱལ་ཡོངས་མཐའ་འཁོར་གནས་སྤངས་ལྷན་ཚོགས་ཀྱི་དྲུང་ཚེན་ཡིག་ཚང་འདི་ རང་བཞིན་མཐའ་འཁོར་གནས་སྤངས་ སྤངས་སྐྱོབ་དང་ ཉམས་སྤངས་ དེ་ལས་ ཡར་རྒྱས་དང་འབྲེལ་བའི་གནད་དོན་ ཚམས་ཉམས་གྱི་ནང་ གོས་ཚོད་བཟོ་མི་དང་ འགོ་འདྲན་འབྲེལ་མི་འདུས་ཚོགས་ མཐོ་ཤོས་ཅིག་ཡིན། གཞུང་གི་འབྲེལ་བ་ཡོད་པའི་ལྷན་ཁག་ཚུ་ཡང་ རང་སོའི་ཕྱག་འགན་ལས་བརྟེན་པའི་ མི་སྡེའི་གནད་དོན་ཚུ་གི་དོན་ལས་ དབང་འཛིན་མཐོ་ཤོས་ཅིག་ཡིན། ཐིམ་ཕུག་ཁྲོམ་སྡེ་ཡིག་ཚང་འདི་ མཐའ་འཁོར་ཉོགས་མེད་ཡི་གུ་ ཕྱིར་སྤོད་ཀྱི་དོན་ལུ་ སྤྲིལ་གཞི་ལས་གནང་བའི་འགན་ཁྲི་ཡོད་པ་ལས་བརྟེན་ མཐའ་འཁོར་ཉོགས་མེད་ཀྱི་གནད་བསྐྱོད་ནི་དང་ ཐིམ་ཕུག་ཁྲོམ་སྡེའི་ས་ཁོངས་རོ་མའི་ནང་ཚུད་ཡོད་མི་ རྒྱལ་ཡོངས་འཚབས་དོལ་ལག་ལེན་ལྷན་ཁག་གི་དོན་ལུ་ གོས་བསྐྱོད་ཀྱི་མི་སྡེ་མཐུན་བཟོ་མི་ ཚད་ལྡན་གྱི་དབང་འཛིན་ གཙོ་བོ་ཅིག་ཡིན། རྒྱལ་ཡོངས་མཐའ་འཁོར་གནས་སྤངས་ལྷན་ཚོགས་ཀྱི་དྲུང་ཚེན་ཡིག་ཚང་འདི་ རང་གསེས་ཡན་ལག་གི་ལས་སྡེ་ གཞན་ཚམས་ཉམས་གྱི་དོན་ལས་ མཐའ་འཁོར་ཉོགས་མེད་ཀྱི་གནད་བསྐྱོད་མི་ དབང་ཚད་ཅན་གྱི་དབང་འཛིན་ཅིག་ ཡིན་དགོ་མི་འདི་ཡང་ རང་གསེས་ཡན་ལག་གི་ལས་སྡེ་ཚུ་ མཐའ་འཁོར་ཉོགས་མེད་ཀྱི་ཡི་གུ་ དགོས་མཁོ་མེད་པའི་ལས་སྡེའི་ གནས་ཐོག་གྲངས་སྤྲོ་ཡང་ མ་ཚུད་པའི་ཁར་ མཐའ་འཁོར་གནས་སྤངས་དབྱེ་ཞིབ་ཀྱི་བཅའ་ཁྲིམས་ཀྱི་ཟུར་སྒྲགས་ལུ་པའི་དགོངས་དོན་ཐོག་ ཚད་ལྡན་དབང་འཛིན་ལུ་ བརྟེན་ཞིབ་དང་ མཐའ་འཁོར་གནས་སྤངས་ཉོགས་མེད་སྤོད་ནི་ལུ་ འགན་སྤོད་འབད་ཡོད་པའི་ ལས་སྡེ་ཚུ་གི་གྲངས་སྤྲོ་ཡང་ མེད་པ་ལས་བརྟེན་ཡིན།

འབྲེལ་བ་ཡོད་པའི་ ལས་འགྲུལ་ལག་ལེན་འབྲེལ་མི་ ལས་སྡེ་ཚུ་གིས་ ལས་སྡེ་ལག་ལེན་གྱི་སྐབས་ མཐའ་འཁོར་གནས་སྤངས་དང་ མི་སྡེའི་ཕན་གོད་ཚུ་ རང་གིས་འབད་ འཚམས་འཛིན་དང་བཟླ་ཉོག་འབད་དགོ། དེ་གི་སྐབས་ལུ་ ལྷན་ཁག་ཚུ་ ལྷན་ཁག་ལུ་འཛིན་ལས་འགྲུལ་གནས་རིམ་ནང་ བཅུག་དགོ་པ་ད་ ལོ་བསྟར་གྱི་སྐབས་ལུ་ བསྐྱར་ཞིབ་དང་ ལོ་བསྟར་འབྲེལ་བསྐྱོད་ཡོད་མེད་ བཟླ་ཉོག་གི་དོན་ལུ་ རྒྱལ་ཡོངས་མཐའ་འཁོར་གནས་སྤངས་ལྷན་ཚོགས་ཀྱི་དྲུང་ཚེན་ཡིག་ཚང་ལུ་ བཅུག་དགོ།

ལས་འགྲུལ་དང་འབྲེལ་བའི་ ཉོགས་བཤད་/བསམ་འཆར་/གོས་འཆར་ཚུ་ གནས་ཚད་ལྡན་པའི་ལས་ལུགས་ཐོག་ དང་ལེན་འབད་ནི་གི་དོན་ལུ་ འབྲེལ་བ་ཡོད་པའི་རྒྱུ་ལོག་/རྒྱུ་ལོག་ནང་ ཐོ་བཀོད་འབད་དགོ་པ་ད་ འབྲེལ་ཡོད་ཡན་ལག་ལས་འགྲུལ་ འཛིན་སྐྱོང་ལས་ཁུངས་དང་གཅིག་ཁར་ཡང་ སེལ་ཐབས་འབད་ཚོགས། ལས་འགྲུལ་དང་ རྒྱུ་ལོག་གནས་རིམ་ནང་ སེལ་ཐབས་འབད་མ་ཚུགས་པའི་གནད་དོན་ཚུ་ ལྷན་ཁག་ ཡང་ཅིན་ འོས་འཚམས་ལྷན་པའི་བཀོད་ཚོགས་ལུ་གཏང་དགོ། དེ་ནང་ཡང་ སེལ་ཐབས་འབད་མ་ཚུགས་པ་ཅིན་ འབྲེལ་ཡོད་རྒྱུ་ལོག་ཁྲིམས་འདུན་ལུ་ ལྷན་ཁག་འབད་དགོ།

**མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེ་འཛིན་སྐྱོང་འཆར་བཀོད་ ལག་ལེན་གྱི་དོན་ལུ་ མ་དངུལ་གྱི་ཚད་ཅིས་** མཐའ་འཁོར་གནས་སྤངས་དང་མི་སྡེ་འཛིན་སྐྱོང་འཆར་བཀོད་ ལག་ལེན་གྱི་དོན་ལུ་ ཟད་འགོའི་ཚད་ཅིས་ ཡུ་ཨེ་ཤི་ཤོ་ལར་ ༢༧,༣༠༠ བཏོན་ཡོད་པ་ད། མ་དངུལ་འདི་ ལས་འགྲུལ་འཛིན་སྐྱོང་དང་ བཟླ་ཉོག་ དེ་ལས་ དབྱེ་ཞིབ་ཀྱི་དོན་ལུ་ རྒྱུང་གཅིག་ཡིན་མ་ལས། ས་ཆ་མཁོ་སྐྱབ་དང་ ལས་བྱེད་པའི་སྤོད་ཁྲིམ་དང་ ཉེར་མཁོའི་མཐུན་ཚུན་ དཔེར་ན་ འཁོར་ལམ་དང་མཐུན་ཚུན་གཞན་ཚུ་གི་དོན་ལས་ ཟད་སོང་འབྲེལ་གནས་ནི་གི་ སྤོད་ཆ་ཡོད་མི་ཚུ་ འབྲུག་གཞུང་ལས་གནང་ནི་ཡིན་ཟེར་ལུ་ནི་ཡིན།

**བཀའ་རྒྱུ་ཆེ།**

# **1. INTRODUCTION**

## **1.1 Background and Objective of the project**

Bhutan is a land-locked least developed country located in the fragile mountainous landscape of Eastern Himalayas. About 50% of the geographical area comprises of slopes greater than 50% and about 52.65 % of the land area lies above 2600 meters above mean sea level (Bhutan RNR Statistics, 2015) with elevations ranging from 100m to 7000m (SNC, 2011). The country's rugged topography, high relief and variable geo-climatic conditions render it vulnerable to climate change, climate variability and natural disasters. Large areas are exposed to disaster threats of monsoons, floods, fires, droughts, landslides, earthquakes and epidemic outbreaks.

In this context, the Royal Government of Bhutan (RGoB) requested the World Bank's support in strengthening its capacity for improved weather services and disaster preparedness through the Hydromet and Disaster Improvement Regional project (HSDIRP). The objective of the project is to strengthen Bhutan's capacity for improved hydromet services and disaster preparedness.

## **1.2 Rationale and Objective of the ESMF**

The HSDIRP is classified as a "Category B" project under the World Bank's OP/BP 4.01, with the requirement of a partial assessment as the impacts are likely to be small-scale and site specific; and mitigation measures can be designed more readily. In order to apprehend the negative impacts and put in place appropriate mitigation measures for an overall positive impact of the project, it is necessary to carry out adequate environmental and social impact studies on subproject activities and design corresponding measures for avoidance, minimization and mitigation of the possible impacts.

As will be described in the next section, the HSDIRP consists of several components and activities. Details and locations of these activities are not known at this stage and will be finalized only during the implementation phase. As a result, it is not possible to identify site-specific social and environmental impacts and accordingly draw a sub-component specific safeguards management or sub-component specific safeguards documents. In such a context, an Environment and Social Management Framework (ESMF) is the most appropriate document that can be prepared at this stage.

This ESMF for the HSDIRP has been prepared to serve as a tool to ensure due consideration of environment and social safeguards in project formulation, design, planning, implementation and monitoring process. It describes the principles and approaches to be followed for selecting sites, avoiding, minimizing and/or mitigating any adverse environmental and social impacts that are likely to arise due to the project. The framework is based on the relevant laws and regulations of the Kingdom of Bhutan and that of the World Bank's safeguards policies.

Specifically, the objectives of the ESMF are to:

- Assess the potential adverse environmental and social impacts based on the potential impacts/issues/concerns identified during screening

- Suggest measures to avoid/ minimize/mitigate adverse potential impacts including potential alternatives (e.g. technology, locations, designs, etc).
- Provide overall guidance for operational steps that will be required to process and get environmental and other clearances from relevant agencies
- Provide guidance for developing Environmental and Social Management Plan (ESMP), if required, specific to the sub-component activities, site, and installation/ construction during the design and implementation phase.
- Describe the institutional arrangements, monitoring plan, capacity development requirements, and budget required for compliance with the ESMF and effective implementation of environmental and social safeguard issues related to the project.

### **1.3 Preparation, Outline and Disclosure of the ESMF**

The methodology followed for the preparation of this ESMF is a combination of a) desk review of the World Bank safeguards policies and RGOB's environmental and social assessment policies b) consultation and discussions with stakeholders including implementing entities, and c) Field visits to some of the sub-component sites (e.g., the location for the National Emergency Operations Centre).

The ESMF is divided into eight chapters as follows:

Chapter 1: Introduction contains information on the overall objective of the project, the rational and objective of the ESMF and description of ESMF preparation and its disclosure.

Chapter 2: Description of the Project contains brief information of the project and its sub-components. The details of the project will be available in the project document (separate document).

Chapter 3: Relevant Environmental and Social Policies and Regulations contain brief description of RGOB and World Bank policies and regulations that pertain to environmental and social safeguards. The briefs describe how these policies and regulations apply in the context of this project.

Chapter 4: Environmental and Social Baseline in the project area contains information on the social and environmental conditions prevalent in the project areas. Where the exact location of the sites is not identified or where information is not available, description of the baseline is done either at the *Gewog* or *Dzongkhag* level.

Chapter 5: Environmental and Social impacts, and mitigation measures contain sub-component level information on likely impacts and possible risks of the project activities and potential mitigation measures. However, actual impacts, risks and mitigation measures will be identified when the project details are available and impact assessments are done to process for required clearances. It also includes guidance on the process for acquiring land for the project activities and safeguards to be considered in implementing these processes.



Chapter 6: Environmental and Social Management in the Project contains tentative list of clearances required and information on where to get these clearances from. The chapter also contains the description of process for seeking environmental clearances, process for preparation of the ESMP and for public consultation and disclosure.

Chapter 7: Institutional Arrangement for ESMF contains description of responsibilities for implementation of ESMF, compliance monitoring, capacity building and mechanism for managing grievances within the scope of the project.

Chapter 8: Budget requirement for implementation of the ESMF contains estimated budget required for implementation of this ESMF.

Prior to the finalization of the ESMF, a national level consultation workshop was carried out with representatives from national, municipality and district governments and civil society organizations on May 6, 2016 (See Annex 1). The draft of the ESMF was disclosed on May 26, 2016 and made available on websites of DDM ([www.ddm.gov.bt](http://www.ddm.gov.bt)); DHMS (<http://www.hydromet.gov.bt/?q=224>) and DOA (<http://www.moaf.gov.bt/#>).

The ESMF has been agreed between the World Bank and the RGOB. However, as a 'living document,' the ESMF may be revised, if necessary, during implementation with prior approval of the World Bank.

## **2. PROJECT DESCRIPTION**

### **2.1 Project Development Objective**

The main objective of the Hydromet Services and Disaster Improvement Regional project (HSDIRP) strengthen Bhutan's capacity for improved hydromet services and disaster preparedness and response.

### **2.2 Project Components and Description of Works**

The Project has three components as described below:

#### **Component A: Hydromet Services Development**

The main objective of this component is to strengthen the capacity of DHMS to improve hydromet monitoring, forecasting and service delivery to priority sectors. It will be implemented by DHMS and have two sub-components as follows:

##### ***Sub-component A1:*** Strengthening forecasting and services:

In order to provide additional information for aviation safety at Paro International Airport and Bumthang Domestic Airport, the Project will support procurement and installation of:

- One wind profiler system at the Paro International Airport
- One Aviation Weather Observing System (AWOS) at Paro airport
- One ceilometer each at Paro International Airport and Bumthang Domestic Airport

The subcomponent will also support procurement of weather work-station, software and ICT equipment, a portable ice penetrating radar equipment and development of a common operating platform for automated hydro-met services delivery system. There is no physical construction foreseen for these activities.

***Sub-component A2:*** Institutional Capacity Strengthening, Project Management, Regional Collaboration and Monitoring and Evaluation - No environmental impacts are envisaged for the activities under this sub-component which includes project management, M&E, training and capacity building.

#### **Component B: Disaster Preparedness and Response Capacity Improvement**

The main objective of this component is to strengthen capacity for disaster preparedness and response. It will be implemented by DDM. It will have two sub-components as follows:

##### ***Sub-component B1:*** This sub-component will fund the:

- Establishment of an NEOC including design, build and equip, emergency communication equipment for all 20 District Disaster Management Offices
- Establishment of critical infrastructure for emergency helicopter operation (10 helipads and 2 portable fuelling stations).

***Sub-component B2:*** Institutional Capacity Strengthening, Regional Collaboration, Project Management and M&E: This sub-component will fund establishment of a DRM geomatics

system within DDM, training and capacity building, regional collaboration, project management, monitoring and evaluation. No environmental impacts are foreseen for this.

**Component C: Design of an agro met decision support system**

Activities under this component which will be implemented by the DOA include design of an agro-met decision support system and generation of agro-met information products for two Dzongkhags (potentially in Paro and Punakha-Wangdue valley); Capacity building of DOA staff to prepare weekly agro-met information and dissemination to agriculture extension agents and local institutions. The hardware to be purchased is not identified at this stage but are not likely to cause any environmental or social impacts.

### **3. RELEVANT ENVIRONMENTAL AND SOCIAL POLICIES & REGULATIONS**

#### **3.1 Relevant World Bank Safeguard Policies**

The activities of the Hydromet and Disaster Improvement Regional Project (HSDIRP) trigger the following World Bank's operational policies on environmental and social safeguard.

**Environmental Assessment OP/BP 4.01:** Environmental Assessment is used in the World Bank financed projects to identify, avoid, and mitigate the potential negative environmental and social impacts associated with the project. This policy is applicable since some of the project activities are likely to have impacts on both social and natural environments due to civil works and material management. However, these likely impacts are envisaged to be minor/moderate, site-specific, and those for which mitigation measures can readily be designed. The policy requires that environmental assessments be carried out at early stage of project preparation so that safeguard tools (such as Environmental and Social Management Framework, Environmental Impacts Assessment, Environmental Management Plan) can be determined and prepared in a timely manner to avoid or address potential negative environmental and social impacts.

**Forests OP 3.36:** This policy aims to reduce deforestation, enhance the environmental contribution of forested areas, promote afforestation, reduce poverty, and encourage economic development. Most of the activities supported under the project such as construction of NEOC which will be located within the premises of the DDM office and installation of the wind profiler and ceilometers which would be most probably within the premises of the airport are not likely to have impact on forestlands. However, construction of helipads and installation of the wind profilers and ceilometers, if located outside the airport compounds, may require few trees to be cut. Under the project, this policy has not been triggered but for each subproject, the screening and management plan prepared under OP 4.01 will also cover the Forests (OP 3.36), if encountered during the implementation of any subproject.

**Physical Cultural Resources OP/BP 4.11:** This policy requires that project activities avoid impacts on any known physical cultural resources. Since the anticipated project areas do not contain any cultural or physical sites that are considered national or world heritage sites, this policy has not been triggered. However, for each subproject, the screening and management plan prepared under OP 4.01 will also cover Physical Cultural Resources OP/BP (4.11) related issues, if encountered during the implementation of any subproject.

**Involuntary Resettlement OP 4.12:** The policy applies to situations involving involuntary taking of land and involuntary restrictions of access to legally designated parks and protected areas. The policy aims to avoid involuntary resettlement to the extent possible, or to minimize and mitigate its adverse social and economic impacts. The policy prescribes compensation and other resettlement measures to achieve its objectives and requires that adequate resettlement planning instruments be prepared. In the context of the current project, it is envisaged that the installation of ceilometers and wind profilers, and construction of helipads may involve land acquisition. Accordingly, the ESMF includes measures that would be taken to prevent, minimize and mitigate against any negative impacts arising out of land acquisition.

### 3.2 National Policies and Regulations Relevant to the Project

Bhutan has a broad and comprehensive set of national environmental and social policies to protect its environment and the citizens from the potential adverse impacts of developmental activities. Some of the policies and legal provisions relevant to implementation of this project are reflected below:

**The Constitution of the Kingdom of Bhutan 2008:** *Article 7 - Fundamental Rights* states that a person shall not be deprived of property by acquisition or requisition, except for public purpose and on payment of fair compensation in accordance with the provisions of the law. This clause may apply to construction of helipads and installation of wind profiler depending on the location selection and the ownership status of the land in question.

**Waste Prevention and Management Act, 2009:** *Precautionary Principle* of the Act, under section 8 defines that every person shall take all precautionary measures in maintaining a clean and healthy environment and further in its section 10, the Act prescribes that a person polluting the environment or causing ecological harm shall be responsible for the costs of avoidance, contamination, abatement, medical compensation, mitigation, remediation and restoration in application of the *Polluter Pays Principle*. The lead implementing agencies shall make arrangements (sections 22) for dealing with waste. This clause is applicable in management of waste in the project sites.

**Forest and Nature Conservation Act, 2005:** Extraction of any natural resources from the Government Reserve Forestland (GRF) is permissible only on obtaining permit from the Department of Forest and Park Services under the Ministry of Agriculture and Forests. The extraction of natural resources such as trees or vegetation may be applicable only to the development of helipads depending on the location. The Guideline on Lease of GRF Land for Commercial Agriculture provides that the Government shall have the exclusive right to take over the “land” in the interest of the nation. However, taking over of the land shall be done only under unavoidable circumstances to secure the position of lessee in a vibrant society. Competent authority, such as Property Assessment and Valuation Authority (PAVA), shall assess compensation modalities for such acquisition. These could apply for construction of helipads depending on the location of the helipads and the ownership status of the land in question.

**National Environment Protection Act, 2007:** *Environment Principles (Section 4)* - defines NECS as the independent authority and the highest decision making body on all matters relating to the environment and its management in the country. It also defines *Dzongkhag* Environment Committees, chaired by the *Dzongdag* as Competent Authorities at the *Dzongkhag* Level (section 44) for issuance of environmental clearances to projects listed as being under their competence as per the Environmental Assessment Act, 2000.

**Environment Assessment Act, 2000:** Section 7 requires that the Royal Government of Bhutan shall ensure that environmental concerns are fully taken into account when formulating, renewing, modifying and implementing any policy, plan or program. Section 8 of the Act mandates that issuance of an environment clearance shall be prerequisite to the issuance of a

development consent. The act and ensuing notifications from the NECS identifies sectors that do not require environment clearances and delegates identified competent authorities to issue environment clearances. The Regulations for Issuance of Environment Clearance for developmental activities requires that all developmental activities must undergo ESIA and obtain EC from the NECS or the designated CAs. According to the EA Act and its regulations, the ESIA demands public consultation, wherein consent of the affected families and individuals is required whenever there are impacts. The laws are also specific for conforming compensations and replacement of the properties if land acquisition and property displacement is involved (NEPA and EA Act). This may be applicable to the construction of helipads and installation of wind profiler. An EC issued by the CA or the NECS would include terms to ensure that the project is managed in an environmentally sound and sustainable way.

**The Water Act of Bhutan, 2011:** The Act accords priorities for allocation of water for drinking, agriculture, energy, industrial use, tourism and recreation and for other uses. It requires location of water to be based on the principle that water is a resource owned by the State and that every citizen has an equal right to these resources. The Act stipulates that use of water should not result in denial of water to any individual or community, including downstream and upstream needs or discharge of any effluent directly or indirectly to any water resource unless the discharge is in compliance with the Effluent Discharge Standard. At the *Dzongkhag* level, the Act accords the *Dzongkhag* Environment Committee to function as the *Dzongkhag* Water Management committee for the purpose of proper and effective protection and management of water resources. This Act is relevant in enabling safeguard measures in use of water for the project activities.

**The Land Act Bhutan, 2007:** The Act stipulates that the Government may acquire a registered land for public interests and provide substitute land or cash payment, or both, as fair compensation. However, acquisition of the land occupied by religious monuments shall be avoided. Acquisition of such land shall be in accordance with the procedure on acquisition of registered land and assessment of compensation carried out by the Property Assessment and Valuation Agency (PAVA) established under the Ministry of Finance. Government land can also be allotted for use by the Government institutions and *Dratshang*. The application for land acquisition or for allotment must be submitted for approval to the National Land Commission through the concerned *Dzongkhag* Committee or *Thromde* Committee. This Act is relevant as private or Government land may have to be acquired for project activities.

**Bhutan Civil Aviation Regulation-3:** The document provides guidance for safety of air navigation to the Bhutan Civil Aviation Authority which is now renamed as Bhutan Civil Aviation Authority (BCAA). This document is relevant to the project activities related to establishment of helipads and installation of portable fuel stations.

**Environment Assessment General Guidelines, 2012:** None of the activities under this project would require a full EIA. However, in accordance to the Environment Assessment Act 2000, all developmental activities having developmental consent from the government or not, whether the activity is implemented by a government agency, other public entity or a private proponent, it is mandatory for the activity/project to undergo environment assessment (EA) which includes social impact assessment and obtain Environment Clearance (EC) from the National

Environment Commission Secretariat (NECS) or the designated Competent Authority (CA). Therefore, except for training and procurement activities, all other activities require EA and EC.

**Thimphu Municipal Development Control Regulations, 2004:** This regulation specifies requirements to be fulfilled for availing permission from Thimphu Thromde for land development or constructions and its procedures, defines urban precincts and regulations within the different precincts and prescribes general planning requirements for development planning as well as for building activities.

**Regulation on Occupational Health, Safety & Welfare (OHS) in Construction, Manufacturing, Mining & Service Industries, 2006:** These rules of the Ministry of Labour and Human Resources mandates the employer to be responsible for health and safety of the employees. This includes provision for health and safety of employees in standards prescribed in Annex II of the rules and regulations. It includes standards on personal protective gears, fire protection, hand and power tools, signs/signals and barricades and standards for material handling/use/storage/disposals, scaffolds, excavations, electrical works, sanitation and hygiene.

**Bhutan Building regulations, 2002:** The rules define norms to be followed in construction of buildings, procedures of availing permits, architectural and structural controls, water and electrical supply installations norms and regulation on maintenance of buildings. These regulations apply in the context of the NEOC and the construction of helipads.

#### 4. ENVIRONMENTAL AND SOCIAL BASELINE IN PROJECT AREAS

The project will be implemented in various parts of the country with different project activities carried out in different locations. At present, the precise locations of the sub-components are not known. As a result, the baseline information are derived from a wide area, primarily for the entire *dzongkhag* and the *gewog* where the sub-component activities will be implemented. The listing of sub-component activities and the areas of implementation are presented in Table 1 followed by detailed description of these areas.

**Table 1: Location of sub-component activities**

Sub-components	Locations
Installment of wind profiler, AWOS and ceilometers	Paro Airport; Bumthang Airport
Construction of NEOC	Thimphu Thromde, Department of Disaster Management
Construction of emergency helipads	(i)Punakha-Zomlingthang, (ii) Lunana, (iii) Mongar-Near Hospital, (iv) Lhuntse- Takila, (v) Wangdi-Gantey Gonpa, (vi) Sarpang- Manas, (vii) Tashigang-Merek Sakten, (viii) Dagana-Dagapela, (ix) Pemagatshel- School Ground, and (x) Thimphu - Near JDWNRH (Note: The sites mentioned are very tentative)
Installation of portable helicopter fuelling stations	(i)Gelephu Domestic airport; (ii) Bumthang Domestic airport (Note: The sites mentioned are very tentative)
Agro-met Information	2 districts Paro and Punakha-Wangdue valley (tentative)

**Paro airport and its surrounding (ceilometer, wind profiler, AWOS):** The Paro International Airport is located within Wangchang gewog of Paro Dzongkhag. The gewog has a population of 5916 (PHCB, 2005). Mean rural household income of the gewog is Nu. 191,448 as of 2010. The gewog has 90% coverage with rural water supply scheme. More than 50% of the households have access to improved waste disposal system and 84% have access to improved sanitation facilities.

Paro International Airport is the only international airport in Bhutan and is located at an altitude of 2330 meters above sea level (See Annex 2). It is nestled in a narrow valley surrounded by high mountains. The Pachhu River flows through the valley beside the airport. Land use in the immediate surrounding areas of the airport comprises of settlements and agriculture. Flights are operated under Visual Flight Rules (VFR), and are restricted to daylight hours as a result of which noise levels near the airport are generally not considered an issue. Types of wastes generated within the airport are mainly institutional wastes, which are managed by integrating with the urban waste management practices. Migratory birds are not reported in the airport vicinity.



The airport currently is equipped with an Aviation Weather Observing System (AWOS), which provides conditions along the runway of wind speed, direction, runway visibility, temperature and relative humidity, and this system is aging being 14 years old and is in need of replacement. Information on severe clear air turbulence and low cloud base are not available at the moment, which remains to be a potential hazard even under VFR. The exact location for the installation of the ceilometer and wind profiler is not yet determined.

***Bumthang airport and its surrounding (for ceilometer):*** Bumthang is a very popular tourist destination and has one of the three domestic airports in the country. The airport is located at an altitude of 2480 meters above sea levels (See Annex 2). The installation of a ceilometer is proposed within the airport area although exact location within the airport is yet to be identified. Chhoekhor Gewog, where the domestic airport is located has a total of about 800 households based on which the population could be estimated at around 4,000. Land use in the immediate surrounding areas of the airport comprises of settlements and agriculture. Flights are operated only by the day during which noise levels near airports are generally not considered an issue. Type of wastes generated within the airport are mainly institutional wastes, which are managed by integrating with the urban waste management practices. Migratory birds are not reported in the airport vicinity.

***Thimphu Thromde and its surrounding (for construction of NEOC):*** Thimphu Thromde, capital city of Bhutan has a total area of 26.13 square kilometers, out of which 30% comprises of green areas. It is located at a height of over 2000 meters above mean sea level, and is one of the most populated cities in Bhutan. As per the Thromde's 11 FYP document, the total population of Thimphu Thromde is estimated to be about 120,000 as of 2011. Data from the annual information bulletin of MoWHS, 2014 indicate that about 50 to 60 buildings are constructed within the premises of Thimphu city annually. The proposed construction of the NEOC falls within the core urban development area and the site identified for the NEOC is a vacant government plot bearing no trees or vegetation of conservation values, cultural assets or water bodies (See Annex 3).

***Potential locations of Helipads:*** In order to enable emergency operations, the RGOB has recently established the Royal Bhutan Helicopter Services Limited. However, lack of helipads, technical staff and helicopter pilots remain challenges for its effective functioning. Precise locations for the proposed helipads in 10 districts have not yet been identified. A tentative list of probable locations are: Punakha-Zomlingthang, Thimphu-Lunana, Mongar-Near Hospital, Lhuntse-Takila, Wangdi-Gantey Gonpa, Sarbang-Manas, Tashigang-MerakSakten, Dagana-Dagapela, Pemagatshel-School Ground, and Thimphu (Near JDWNRH). In order to be facilitative during emergencies, the following considerations will be applied while deciding on the precise locations for the helipads: (i) near more densely populated Dzongkhag headquarters; (ii) open locations and within adequate distance from dense settlement; and (iii) hotspots where emergency operations/rescue operations would be most meaningful.

The baseline information for these locations is not available due to lack of information on exact locations. However, the preference of DDM indicates that the helipads will be constructed near district headquarters. In the context of Bhutan, the district headquarters typically, are relatively populated areas while the outskirts comprise of mixed residential and agricultural fields. These

locations also have the Dzong, monasteries, and other social amenities close by. In general, Dzongkhag head quarter locations do have a delineated urban area, a district hospital, and local level offices of almost all sectors of the Government. These potential locations are normally well connected with roads, water supplies and provision of basic social amenities and already more disturbed in terms of natural landscape and habitat as compared to other parts of the dzongkhags.

***Paro and Punakha-Wangdue Valley (for dissemination of agro-met information):*** Although a wide network of meteorological stations exists in Bhutan, weather information that is of practical use to farmers across the country has not been a reality due to lack of appropriate design of an agro-met decision support system and generation of agro-met information products. Under this project, Paro and Punakha Wangdue valley have been identified to provide weekly or shorter term weather information to famers, particularly paddy farmers.

Paro dzongkhag has very fertile land and suitable terrain for agricultural activities and the entire valley is suitable for growing varieties of crops such as paddy, wheat, millet, potatoes, apple and seasonal vegetables. However, it has only 5% of its land under agriculture. Meadows cover 5.6% of the land and 4% of the district is under snow cover. On the other hand, Punakha and Wangdue dzongkhags together have an area of 112 sq. km of agriculture land out of which 18% comprise of dry land, 82% wetland and a marginal portion under horticulture.

## 5. ENVIRONMENTAL & SOCIAL IMPACTS AND MITIGATION MEASURES

### 5.1 Potential environmental and social risks/impacts

**Environmental Impacts:** The negative environmental impacts from the project are anticipated to be minimal. These are impacts, which are likely to be site-specific and could potentially include:

- Construction-related impacts arising from excavation, waste and material management at site;
- Noise pollution during helicopter takeoff and landing at the helipads, and increases in noise levels during operation of construction equipment and vehicles;
- Soil erosion/landslide;
- Extraction (excessive) of water and forest resources;
- Disturbance to wildlife habitat, migration, breeding and pollination arising from construction of helipads and related ancillary facilities (e.g., construction of roads), and installation of aviation equipment (e.g., avian mortality from ceilometers).
- Occupational health and safety hazards, especially for construction workers and local communities.

**Social Risks/Impacts:** The project is expected to lead to primarily positive benefits in terms of enhancing safety during flight operations, enabling improved access to weather information and improving disaster response and risk reduction. Some of the social risks associated with the project include:

- Land acquisition for construction of helipads and installation of ceilometers and wind profiler. At present, the locations of helipads and the exact location for installation of ceilometers and wind profiler are not yet identified. The sites could be within government owned lands which would involve getting a “Use Rights” from the National Land Commission. It may be possible that under unavoidable circumstances, these locations could be within private lands in which case the process could involve land acquisition and compensation;
  - Loss of livelihoods, especially of households whose lands will be acquired;
  - Involuntary restriction of access to government reserve forests, especially for forest-dependent communities;
  - Inadequate consultations with local communities during the design and implementation of sub-component activities;
  - Impact on cultural resources and artifacts;
  - Conflict between construction workers and local communities.

However, given the scale of the project, these risks are expected to be minimal, site-specific and those for which mitigation measures can easily be developed through standard and applicable regulations.

These impacts are again site-specific, reversible and can be minimized/mitigated by developing appropriate measures. Specifically, to address these concerns, the project will comply with the relevant Acts and Rules and Regulations of the Kingdom of Bhutan. Specific Environment and

Social Management Plan (ESMP) will be prepared as per requirement based on this ESMF to ensure adequate mitigation measures.

## 5.2 Description of Likely Sub-Component Related Risks and Possible Mitigation Measures

This section includes description of the various sub-components that will be financed under this project. Accordingly, Table 2(a) to Table 2(f) describes the expected site specific and sub-component specific environmental and social impacts. To address such risks, possible mitigation measures are also suggested.

**Wind profiler at Paro International Airport:** Wind profilers provide useful information on turbulence intensity to approaching or departing flights in a given airport. The type of wind profiler appropriate for use in determining wind conditions at airports are generally of the type with 1000 MHz with following specifications (Rep. ITU-R M.2013)

**General specification of a wind profiler**

Parameters	Measurements
Height range (km)	0.5-3
Height resolution (m)	30-150
Antenna type	dish, patch co-linear
Antenna size (m <sup>2</sup> )	3-15
Peak power (kW)	0.5-5
Mean power (kW)	0.05-0.5
Necessary bandwidth (MHz)	0.7-7.3

Such wind profilers would occupy an area of 2.8 m x 2.8 m and can be installed on 16 pavers (61 cm) with stands. These stands have vertical adjustments that can be used to level the radar without leveling the ground surface. The actual site would have flat surfaces due to prior leveling associated with original construction of the airports. Hence, it will not require any surface grading (see Annex 4 for details). At present, it is not clear if the wind profiler at Paro Airport would be installed within the airport premises or outside. If it were the latter, land would have to be acquired for the purpose. Potential risks associated with the installation and possible mitigation measures are described in Table 2.

**Table 2: Installation of wind profiler at Paro International Airport**

Cause/ Source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
Allotment of government land for installation	<ul style="list-style-type: none"> <li>Land area of approximately 2.8 m x 2.8 m may be required for installation</li> <li>Impacts on communities who might be using surrounding area for livelihood purposes</li> </ul>	<ul style="list-style-type: none"> <li>Screening checklist to identify need for additional land.</li> <li>If land acquisition is unavoidable, identify impacts in accordance with 'Procedural Guidance for Land Acquisition described in Annex 5 and provide support/compensation according to the 'Entitlement Matrix' presented in Table 3</li> <li>Clearances from relevant government authorities for</li> </ul>

Cause/ Source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
		acquiring 'user rights' for the land (See Annex 5) <ul style="list-style-type: none"> <li>• Alternate arrangement for forest dependent communities</li> </ul>
Acquisition of private land for installation	<ul style="list-style-type: none"> <li>• Land area of approximately 2.8 m x 2.8 m will be required</li> <li>• Impacts on livelihoods of households whose land is acquired</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid acquisition of private land, to the extent possible</li> <li>• Provide compensation and other support to affected households according to the 'Procedural Guidance for Land Acquisition' described in Annex 5 and the 'Entitlement Matrix' presented in Table 3</li> </ul>
Removal of trees/vegetation during installation	<ul style="list-style-type: none"> <li>• Possible loss of vegetation</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid removal of trees</li> <li>• Carry out plantation works in the vicinity to replace removed trees</li> </ul>
Impact on cultural resources and artifacts	<ul style="list-style-type: none"> <li>• Site selected for installation might affect cultural sites of local importance</li> </ul>	<ul style="list-style-type: none"> <li>• Avoid areas where there are cultural sites of national importance</li> <li>• Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</li> <li>• If cultural resources are identified, select another site for installation</li> <li>• If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</li> </ul>
Local conflict over the installation	<ul style="list-style-type: none"> <li>• Installation of new equipment could cause anxiety amongst local population over health and other risks/hazards. This is less likely in the case of Paro because of familiarity with the airport and related equipment and machinery</li> </ul>	<ul style="list-style-type: none"> <li>• Assess the potential impacts of wind profilers on human health and safety</li> <li>• Consult with local communities prior to the installation</li> <li>• Inform community about the benefits as well as risks associated with wind-profilers</li> <li>• Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase</li> </ul>
Inappropriate location of the wind profiler within the airport	<ul style="list-style-type: none"> <li>• Relocation may be required if the wind profiler is located at inappropriate site</li> </ul>	<ul style="list-style-type: none"> <li>• NOC from Civil Aviation</li> </ul>

**Aviation Weather Observing System (AWOS) at Paro airport:** AWOS are sensor suites, which are designed to serve aviation and meteorological observing needs for safe and efficient aviation operations, weather forecasting and climatology. Installation of AWOS would include work items pertaining to: site clearing, grading, excavation, filling and backfilling; concrete work (tower base, sensor foundation pads, etc.); installation of the tower with obstruction lights and lightning rod; installation of data cable from tower to the central data processing computer; installation of tower lights and antenna masts.

Since the Paro airport already has one AWOS, the installation of new AWOS is expected to be within the same facility replacing the existing one and would not involve further earth moving activities. A No-Objection Certification from the Bhutan Civil Aviation Authority will be obtained prior to the replacement of the new AWOS equipment.

**Ceilometers at Paro and Bumthang Airports:** Ceilometers provide information on anticipated visibility to approaching or departing flights in a given airport. Ceilometer monitors sky conditions continuously and reports up to four detected cloud bases and depths to an altitude of 25,000 feet above ground level. A laser pulse is emitted at a maximum rate of 1 kHz vertically into the atmosphere, and the resulting backscattering is analyzed for water density. Clouds are identified when the water density changes abruptly.

Although dimensions could be different by type of the equipment, these are small portable equipment. For instance, the laser ceilometer CT12K has a total height of 52.8 in. (1340 mm) and width of 22.8 in. (580 mm). Hence, its installation would occupy minimal surface area/footprint of 1 m x 1 m [3 ft x 3 ft) and hence would require minimal ground preparation works (Technical Manual, Operations and Maintenance Instructions, Laser Ceilometer CT12K, 100 Commerce Way, Woburn, MA 01801). Power supply for the unit can be made from the airport power supply systems and would not involve stand-alone battery use and hence no waste products are foreseen from its operations. Potential risks associated with the installation and possible mitigation measures are described in Table 3.

**Table 3: Installation of ceilometer at Paro International Airport & Bumthang Domestic Airport**

Cause/ Source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
Allotment of government land for installation	<ul style="list-style-type: none"> <li>Additional land area of approximately 1 m x 1 m [3 ft x 3 ft] might be required for installation</li> <li>Impacts on communities who might be using surrounding area for livelihood purposes</li> </ul>	<ul style="list-style-type: none"> <li>Screening checklist to identify need for additional land.</li> <li>If land acquisition is unavoidable, identify impacts in accordance with 'Procedural Guidance for Land Acquisition' described in Annex 5 and provide support/compensation according to the 'Entitlement Matrix' presented in Table 3</li> <li>Clearances from relevant government authorities (See Table 4 for details)</li> <li>Alternate arrangement for forest dependent communities</li> </ul>
Acquisition of private land for installation	<ul style="list-style-type: none"> <li>Additional land area of approximately 1 m x 1 m might be required</li> <li>Impacts on livelihoods of households whose land is acquired</li> </ul>	<ul style="list-style-type: none"> <li>Avoid acquisition of private land to the extent possible</li> <li>Provide compensation and other support to affected households according to the 'Procedural Guidance for Land Acquisition' described in Annex 5 and the 'Entitlement Matrix' presented in Table 3</li> </ul>
Removal of trees/vegetation during installation	<ul style="list-style-type: none"> <li>Possible loss of vegetation</li> </ul>	<ul style="list-style-type: none"> <li>Avoid removal of trees</li> <li>Carry out plantation works in the vicinity to replace removed trees</li> </ul>
Impact on	<ul style="list-style-type: none"> <li>Site selected for installation might affected</li> </ul>	<ul style="list-style-type: none"> <li>Avoid areas where there are cultural sites of national importance</li> </ul>

Cause/ Source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
cultural resources and artifacts	cultural sites of local importance	<ul style="list-style-type: none"> <li>• Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</li> <li>• If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</li> </ul>
Local conflict over the installation	<ul style="list-style-type: none"> <li>• Installation of new equipment generally causes anxiety amongst local population over health and other risks/hazards.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess potential hazards of ceilometer on human health and safety</li> <li>• Consult with local communities prior to the installation</li> <li>• Inform community about the benefits as well as risks associated with ceilometers</li> <li>• Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase</li> </ul>
Impact of ceilometer beam	<ul style="list-style-type: none"> <li>• Avian mortality, especially of migratory birds at night, is a risk often associated with the ceilometer</li> </ul>	<ul style="list-style-type: none"> <li>• Assess the potential impact on migratory birds</li> <li>• Choose technology with minimal affect (Rotating beam ceilometers have no visible impact on migration of birds)</li> <li>• Adopt light out periods at night during bird migratory season</li> </ul>

**Establishment of a National Emergency Operations Centre (NEOC):** The project will support designing, building and equipping of the NEOC. The building will be located within the premises of the Department of Disaster Management office, which is located within core area of Thimphu Thromde (see location map in Annex 3). The area of the proposed site/plot is 27,007 sq feet and the land is government owned and free of any encumbrances (e.g., squatters, encroaches, vegetation, crops, etc). The National Land Commission, which is the authority for land use and ownership in Bhutan, has already accorded consent for the proposed use of the site. Development Consent for the construction of the NEOC building will be formally accorded by Thimphu Thromde prior to the construction of the NEOC building.

The NEOC building is expected to withstand known hazards and operate 24/7 for an extended period even during major disasters affecting immediate area. Construction of NEOC building will involve excavation/civil works as well as works normally done in building construction, such as RCC concrete, brick, stone, wood, plumbing and electric works. The construction materials includes cement, sand, gravel stone, timber, water, wires, steel, cables, etc. Construction will use vehicles, machines, tools and human labour.

The NEOC is expected to be equipped with monitor and projection systems, map displays, multi-layered telecommunications equipment (landlines, mobile, satellite, radio) as well as initial food and water stock, security systems, etc. The project will also support procurement of emergency communication equipment for all 20 District Emergency Operation Centers. The list of equipment include a portable generator and cord, All-in-one Printer/Scanner/Fax, Portable projector, Satellite phone Wi-Fi Hotspot, VHF radio handset, VHF repeater system with antennae, Hand-held GPS with camera and Rugged/Waterproof equipment case will be procured. No environmental impacts are foreseen for the procurement of equipment. Table 4 lists the

relevant social and environmental impacts associated with the construction and establishment of the NEOC and recommended measures for addressing the impacts.

**Table 4: Construction and Establishment of NEOC in Thimphu Thromde**

Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
Geological instability of the site for construction	<ul style="list-style-type: none"> <li>If the construction site happens to be geologically an unstable area, it can destabilize emergency response during disasters</li> </ul>	<ul style="list-style-type: none"> <li>Conduct geotechnical and geo-physical assessment by DGM before preparation of architectural &amp; structural design (TDCR, 2004)</li> </ul>
Drawings including architectural, structural, sewerage and plumbing drawings	<ul style="list-style-type: none"> <li>Objection from the Thimphu Thromde</li> </ul>	<ul style="list-style-type: none"> <li>Prepare the drawings as per BBR 2002 and other relevant building codes</li> </ul>
Soil erosion/landslide during site development	<ul style="list-style-type: none"> <li>Damage to the site conditions due to excavation causing destabilization of the site and surrounding areas</li> <li>Generation of waste water during construction</li> <li>Increase in sediment load in the nearby water bodies</li> </ul>	<ul style="list-style-type: none"> <li>Plantation of trees in slide prone areas</li> <li>Erect local retention walls</li> <li>Construct drainage around the construction site (EAGG, 2012)</li> </ul>
Dust pollution during earthmoving civil works	<ul style="list-style-type: none"> <li>Overall local air condition could be polluted throughout the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>Provide water spraying system at the site to suppress dust (EAGG, 2012)</li> <li>Provide respiratory protection devices to workers (ROHSW, 2006)</li> </ul>
Noise pollution	<ul style="list-style-type: none"> <li>Operation of construction machinery and vehicles could lead to increased pollution affecting workers at the site, employees of DDM and nearby community</li> </ul>	<ul style="list-style-type: none"> <li>Restrict noise-prone activities in the night between 10 PM and 6 AM, to minimize impacts (EAGG 2012)</li> <li>Provide ear protecting devices to workers (ROHSW, 2006 presented in Annex 6)</li> </ul>
Traffic and vehicular congestion	<ul style="list-style-type: none"> <li>Use of public road/ place for loading &amp; unloading and stacking of construction materials &amp; equipment during construction could lead to increased traffic and vehicular congestion</li> </ul>	<ul style="list-style-type: none"> <li>Traffic management plan to be prepared by the contractor</li> <li>Provide clear instruction to workers to avoid obstructing traffic flow to the extent possible</li> <li>Use of appropriate signage</li> <li>Seek clearance from Thromde on use of public road or a public place prior to construction.</li> </ul>
Labour related Impacts	<ul style="list-style-type: none"> <li>Workers health and spread of diseases across the local population</li> <li>Waste generation from labour</li> </ul>	<ul style="list-style-type: none"> <li>Construct temporary toilets for the workers</li> </ul>



Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
	camps <ul style="list-style-type: none"> <li>Potential conflict between workers and local community</li> </ul>	<ul style="list-style-type: none"> <li>Provide safe drinking water and medical facility for workers (EAGG, 2012)</li> <li>Install waste bins around construction sites and worker camps (ROHSW, 2006)</li> <li>Integrate site waste management with Thromde waste collection system</li> <li>Develop Code of conduct for workers and ensure close supervision by the contractor (BBR 2002)</li> <li>Develop robust mechanism for public consultation with local communities prior to the initiation of construction work</li> <li>Set up grievance redress mechanism for handling complaints, including from local communities</li> </ul>
Working conditions, Occupational health and safety	<ul style="list-style-type: none"> <li>Construction related accidents and other hazards are likely</li> <li>Possible risk of employing or presence of under-aged children at the site</li> </ul>	<ul style="list-style-type: none"> <li>Equip every person at site with helmet/ boots/gloves/safety belts/first aid kit etc.</li> <li>Erect site safety barriers around all chutes, shafts, floor openings and slab edges, etc. (TDCR, 2004/EAGG, 2012/ROHSW, 2006)</li> <li>Ensure that no underage workers, or children are present on the construction site, either as employees, guests, or as dependents of legal employees. (TDCR, 2004)</li> </ul>
Pressure on existing infrastructure, electricity, water and energy sources	<ul style="list-style-type: none"> <li>Construction works might lead to increased pressure on public infrastructure in Thimphu Thromde and surrounding areas during the entire construction period</li> </ul>	<ul style="list-style-type: none"> <li>Secure prior permission and management for use of public amenities such as electricity, water, street /road, etc,</li> </ul>

**Portable helicopter fuelling stations:** Two portable helicopter-fuelling stations will be procured under the project. The fuelling stations will consist of fuel storage devices that can be transported to emergency landing locations to provide helicopter fuel. The Bhutan Helicopter Services Limited will provide technical specifications for the fuelling station for the procurement purpose. Since operation of normal fuel stations are accorded by the Department of Trade, the clearance for procurement and operations of this portable fuelling station will be availed from the Department of Trade by the DDM.

**Table 5: Installation of 2 portable helicopter-fuelling stations**

Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
Specification of the fuel storage	<ul style="list-style-type: none"> <li>Fuel spillage and adulterations</li> </ul>	<ul style="list-style-type: none"> <li>Specification prior to procurement to include measures that ensures no fuel spillage and adulteration of fuel; appropriate metal construction and design, mounting, securing arrangement and electrical fittings should be certified safe.</li> <li>The fuel station should be equipped with appropriate fire extinguishers</li> <li>Follow Aviation Fuel Handling and Quality Control Procedures Manual, August 2008.</li> <li>Clearance from Department of Trade prior to procurement</li> </ul>

**Development of helipads in 10 districts:** Ten helipads will be developed in 10 districts. A tentative potential list of locations are identified for the construction of helipads but exact geographic coordinates are not yet determined. Exact sites will be identified during project implementation, and helipad’s engineering designs/detailed project report will be prepared before the actual implementation on site. Land may need to be acquired for the purpose. Typically, the size of a helipad could be about 25 meters in diameter surrounded by about 7 meters of concrete perimeter apron. Depending on the location, some helipads may require an access road of about 2.5 meters in width is there is no existing access road.

The suitable sites for helipad includes areas that have at least two unobstructed flight paths into and out of the designated landing area for safe operations; areas that are not too close to buildings, power lines or physical structures; or areas that are not too far from a hospital. Construction of helipads will usually involve concrete work of a 6-inch thick (15 cm) Portland Cement Concrete (PCC) covering the TLOF and FATO areas. Technical specifications for the construction of helipads shall be discussed with Bhutan Civil Aviation Authority and Department of Air Transport.

**Table 6: Establishment of 10 helipads**

Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
Allotment of government land for installation	<ul style="list-style-type: none"> <li>Land area of approximately 25 m x 25 m may be required for construction of a helipad</li> <li>Additional land for road access to the helipad of about 2.5 m wide</li> <li>Impacts on communities who might be using surrounding area for livelihood purposes</li> </ul>	<ul style="list-style-type: none"> <li>Screening checklist to identify need for additional land.</li> <li>If land acquisition is unavoidable, identify impacts in accordance with ‘Procedural Guidance on Land Acquisition’ (Annex 5) and provide support/compensation according to the ‘Entitlement Matrix’ presented in Table 3</li> <li>Clearances from relevant government authorities for acquiring ‘user rights’ for the land (See Annex 5)</li> <li>Alternate arrangement for forest dependent communities</li> </ul>

Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
		<ul style="list-style-type: none"> <li>Where possible, select sites with road access or where access can be provided with ease</li> </ul>
Acquisition of private land for installation	<ul style="list-style-type: none"> <li>Land area of approximately 25 m x 25 m may be required for construction of the helipad</li> <li>Impacts on livelihoods of households whose land is acquired</li> </ul>	<ul style="list-style-type: none"> <li>Avoid acquisition of private land, to the extent possible</li> <li>Provide compensation and other support to affected households according to the 'Procedural Guidance on Land Acquisition' (Annex 5) and the 'Entitlement Matrix' presented in Table 3</li> </ul>
Removal of trees/ vegetation during installation	<ul style="list-style-type: none"> <li>Possible loss of vegetation</li> </ul>	<ul style="list-style-type: none"> <li>Avoid removal of trees</li> <li>Select barren government land</li> <li>Carry out plantation works in another location to replace removed trees</li> </ul>
Impact on cultural resources and artifacts	<ul style="list-style-type: none"> <li>Site selected for installation might affected cultural sites of local importance</li> </ul>	<ul style="list-style-type: none"> <li>Avoid areas where there are cultural sites of national importance</li> <li>Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</li> <li>If cultural resources are identified, select another site for installation</li> <li>If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</li> </ul>
Local conflict over the helipad siting	<ul style="list-style-type: none"> <li>Construction of new helipads could cause anxiety amongst local population over health and other risks/hazards including noise level.</li> </ul>	<ul style="list-style-type: none"> <li>Assess the potential impacts of noise levels on human health</li> <li>Consult with local communities prior to the installation</li> <li>Inform community about the benefits as well as noise pollution associated with helipads.</li> <li>Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase</li> <li>Avoid settlement areas</li> </ul>
Inappropriate location of helipad	<ul style="list-style-type: none"> <li>Relocation may be required if the helipad is located at inappropriate site</li> </ul>	<ul style="list-style-type: none"> <li>Avoid forest areas</li> <li>Seek administrative clearance from the concerned Dzongkhag or Municipal Administration</li> <li>Assess wind pattern in the proposed location</li> </ul>
Physical structures or air turbulence effects on structures (cell	<ul style="list-style-type: none"> <li>Obstruction to departure and approach path of helicopters</li> </ul>	<ul style="list-style-type: none"> <li>Maintain minimum TLOF dimension (length, width) of 1 RD (Rotor Diameter) of the helicopter but not less than 12 m</li> <li>Maintain minimum FATO dimension (length, width) of not less than 1.5 OL (overall</li> </ul>

Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
towers, radio tower, buildings, power lines etc		length) of helicopter <ul style="list-style-type: none"> <li>Structures within 5000 feet must be marked (NEMSPA Safety Regulations 1)</li> </ul>
Dust pollution during earthmoving civil works and during flight operations	<ul style="list-style-type: none"> <li>Overall local air condition could be polluted throughout the construction phase</li> </ul>	<ul style="list-style-type: none"> <li>Provide water spraying system at the site to suppress dust (EAGG, 2012)</li> <li>Provide respiratory protection devices to workers and helipad staff (ROHSW, 2006)</li> <li>Avoid placement of garbage bins, sand/mud piles around the helipad</li> <li>Grow and maintain grass in areas surrounding the helipad, i.e., greenbelt (EAG 2014) or</li> <li>Construct concrete slab around helicopter foot print</li> </ul>
Noise pollution	<ul style="list-style-type: none"> <li>Overall noise level in the locality would be increased</li> </ul>	<ul style="list-style-type: none"> <li>Provide ear protecting devices to workers and helipad staff (ROHSW, 2006)</li> <li>Maintain adequate distance form settlements for siting of the helipad</li> </ul>
Weak load bearing capacity of helipad	<ul style="list-style-type: none"> <li>Accidents due to load bearing capacity of the helipad</li> </ul>	<ul style="list-style-type: none"> <li>Maintain a minimum of 6-inch thick (15 cm) cement pavement or thicker to support operations by helicopters weighing up to (9,070 kg) or larger.</li> <li>Do not use asphalt for the TLOF, (helicopters can sink into asphalt during hot weather) (NEMSPA Safety)</li> </ul>
Fire Safety issues	<ul style="list-style-type: none"> <li>Fire hazards during operation of helicopter services</li> </ul>	<ul style="list-style-type: none"> <li>Permanent and marked area within helipad for fueling station (maintain open space of at least 3 m radius of fuelling station as hazardous area)</li> <li>Maintain minimum lateral distance of 50 feet from FATO of flammable liquid storage tanks, compressed gas storage tanks, and or liquefied gas storage tanks.</li> <li>The fuel station should be equipped with appropriate fire extinguishers</li> </ul>
Labour related Impacts	<ul style="list-style-type: none"> <li>Workers health and spread of diseases across the local population</li> <li>Waste generation from labour camps</li> <li>Potential conflict between workers and local community</li> </ul>	<ul style="list-style-type: none"> <li>Construct temporary toilets for the workers</li> <li>Provide safe drinking water facility for workers (EAGG, 2012)</li> <li>Install waste bins around construction sites and worker camps (ROHSW, 2006)</li> <li>Integrate site waste management with Thromde or local waste collection system</li> <li>Develop Code of conduct for workers and ensure close supervision by the</li> </ul>

<sup>1</sup> National EMS Pilots Association - a professional organization dedicated to serving pilots involved in the air-medical transport industry, and to improving the quality and safety of those services (<http://www.nemspa.org/>).

Cause/ source of impact	Nature/Significance of Possible Impacts	Recommended Mitigation Measures
		contractor (BBR 2014) <ul style="list-style-type: none"> <li>• Develop robust mechanism for public consultation with local communities prior to the initiation of construction work</li> <li>• Set up grievance redress mechanism for handling complaints, including from local communities</li> </ul>
Working conditions, Occupational health and safety	<ul style="list-style-type: none"> <li>• Construction related accidents and other hazards are likely</li> <li>• Possible risk of employing or presence of under-aged children at the site</li> </ul>	<ul style="list-style-type: none"> <li>• Install/erect signage at the site</li> <li>• Ensure that no underage workers, or children are present on the construction site, either as employees, guests, or as dependents of legal employees. (TDCR, 2004)</li> </ul>
Pressure on existing infrastructure, electricity, water and energy sources	<ul style="list-style-type: none"> <li>• Construction works might lead to increased pressure on public infrastructure in Thimphu Thromde and surrounding areas during the entire construction period</li> </ul>	<ul style="list-style-type: none"> <li>• Secure prior permission for use of public amenities from the local authority.</li> </ul>

### 5.3 Guidance for Land Acquisition under the Project

Land space needed for this project would primarily be for the construction of helipads in 10 districts, installation of ceilometers at Paro Airport and Bumthang Airport, and installation of wind profiler at Paro Airport. For ceilometers and wind-profiler, while it is likely that they will be installed within the airport premises, thus requiring no additional land, there is also possibility that the equipment may have to be installed outside the airport compound.

The land required for the project can be sourced either from the Government land or from private land as per the procedures described in the Land Act, 2007 and the Land Rules and Regulations, 2007. However, for the project purpose, required land will be sourced from Government land to the extent possible. Procedural guidance for processing the Land Use Rights from private and government land is described in Annex 5. The RGOB bears the responsibility for implementation of the procedure for land acquisition as well as for payment of cash compensation or land substitution as may be required. The National Land Commission will issue the “use rights” for the land under consideration.

All social agreements or clearances involved in the process for acquiring the land needs to be documented and recorded as part of the public consultation for any subproject activities. Some of the World Bank financed projects, completed and ongoing, have followed the same practice, and implementation experiences so far indicate that this practice is generally accepted and practiced smoothly.

An entitlement policy that is in line with the Land Act of Bhutan 2007 and World Bank OP 4.12, is required to be prepared as part of the Land Acquisition and Rehabilitation Plan (LARP). Table 7 is an example of an entitlement matrix that outlines generic resettlement entitlements. All population thus affected and recorded in the impact inventory are eligible for and entitled to compensation and/or livelihood assistance. This is regardless of their legal status, titled or non-

titled, to the lands they are cultivating or occupying. The matrix below outlines generic resettlement entitlements.

**Table 7: Entitlement Policy Matrix**

Type of Impact	Entitlement Unit	Entitlements
Loss of private lands	Affected HHs having ownership certificate issued by the RGoB	<ul style="list-style-type: none"> <li>Substitute lost lands or cash compensation as per the Land Act of Bhutan 2007.</li> <li>Resettlement allowance in cash equivalent to the difference between compensation as per the Land Act of Bhutan 2007 and full replacement value as per current values in the same vicinity, plus value of all land transaction fees and charges.</li> <li>Allotment of replacement land for families who become landless after acquisition as per provisions of the Land Act of Bhutan 2007</li> </ul>
	Affected Vulnerable HHs	<ul style="list-style-type: none"> <li>Additional assistance to be identified most vulnerable groups to restore livelihoods.</li> <li>Preferential treatment in employment in project activities</li> <li>Skill training and income generation support</li> <li>Priority in Poverty reduction/social development programs</li> </ul>
Loss of residential structures	Affected person/families	<ul style="list-style-type: none"> <li>Cash compensation in line with Property Assessment and Valuation Agency (PAVA) Rates</li> <li>To ensure compensation at replacement value, rehabilitation assistance in cash equivalent to cover depreciation over and above compensation determined on the basis of PAVA rates.</li> </ul>
Loss of cash crops	Affected HHs	<ul style="list-style-type: none"> <li>Compensation for cash crops and trees calculated as per the Land Act of Bhutan 2007 and 2009 (revised rates), including non-title holders.</li> </ul>
Loss of income	Affected person/Families	<ul style="list-style-type: none"> <li>Rehabilitation assistance for lost or diminished livelihoods.</li> <li>Preferential treatment in employment in project activities</li> <li>Skill training and income generation support</li> <li>Priority consideration in poverty reduction/social development programs</li> <li>In the case of landless families who suffer partial or total loss of livelihood, allotment of land free of cost.</li> </ul>
Loss of Community Resources	Affected institution/community	<ul style="list-style-type: none"> <li>Compensation for re-establishing or re-constructing lost community resources such as religious and cultural structures or providing alternatives in consultation with affected communities.</li> </ul>
Temporary losses	Affected person/families	<ul style="list-style-type: none"> <li>Cash compensation/transition allowance</li> </ul>
Loss due to voluntary land donation <sup>2</sup>	Donor HHs	<ul style="list-style-type: none"> <li>Preferential employment in sub-component construction work</li> <li>Priority consideration in project assistance programs</li> </ul>

<sup>2</sup> Voluntary donation is accepted only if AP: (i) is subproject beneficiary and is fully consulted and informed about rights; (ii) doesn't fall below poverty line after land donation; (iii) donating up to 25% land holding; and (iv) freely willing to donate (with an agreement, including a "no coercion" verified by a third party) the

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remaining land should not be less than minimum size of plot or land as defined by Land Act of Bhutan 2007. No donation in case of impact on structure unless the house owner has more than one house in the same village.

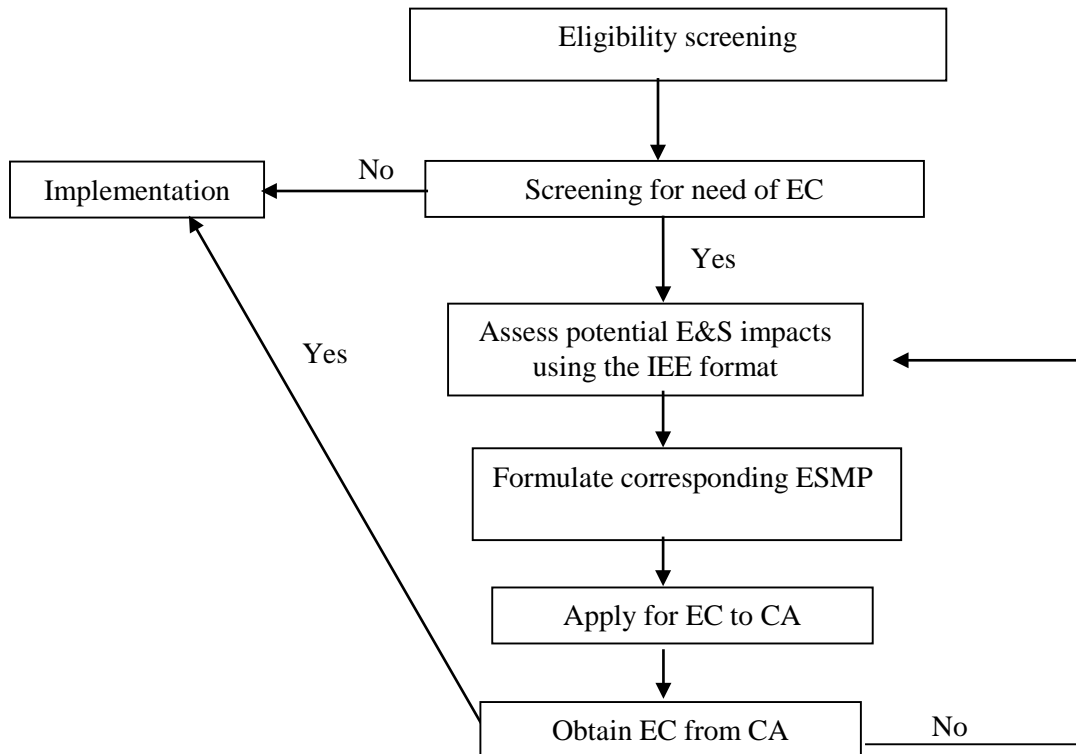
## 6. ENVIRONMENTAL AND SOCIAL MANAGEMENT IN THE PROJECT

### 6.1 Procedure for Managing Environmental and Social Impacts

The following procedure will be adopted for managing environmental and social impacts related to the project, including screening, assessment of social and environmental impacts, development of mitigation measures and preparation of the sub-project specific 'Environment and Social Management Plan' (ESMP), implementation arrangements, and monitoring.

- Step 1: Project eligibility screening
- Step 2: Project screening for potential environmental and social safeguard impacts and determination of safeguards documents required according to RGOB regulations and World Bank policies;
- Step 3: Development of ESMP that includes mitigation measures/good practices at sub-component level if required as per the screening exercise
- Step 4: Application and Approval for Environment Clearance
- Step 5: Consultation, Disclosure, and Awareness Raising and Dissemination
- Step 6: Implementation and Monitoring

**Figure 1: Steps for Managing Social and Environmental Issues**





**Step 1: Sub-component Eligibility:** For each of the project sub-components, basic information about project-specific activities, specifications and exact activity sites will be compiled and screened for eligibility by using the formats presented in part one and two of the screening tool presented in Annex 7. If any of the aspects in this part is applicable (e.g., located in protected areas, near historical and cultural heritage sites, etc), the sub-component activity will be deemed ineligible for support under the project and the proponent would be required to find an alternative site/location and activities of the sub-component and repeat the eligibility screening process till all aspects included in the format are considered.

**Step 2: Sub-component screening:** **Once the sub-component activity is deemed eligible for support under the project,** an environmental screening procedure will be carried out in accordance to the screening procedures and guidelines annexed to the Regulation for Issuance of EC, 2002 (available at NECS website [www.NECS.gov.bt](http://www.NECS.gov.bt)). During this phase, the project implementing entities will identify details of project activities and sites based on which screening of specific sub-component sites will be carried out to determine the applicability of RGOB laws and regulations, World Bank safeguard policies and the corresponding safeguard requirements as well as opportunities for sustainability enhancement. The screening will use the screening format provided in Annex 7, Part 3.

Specifically, the screening exercise will:

- Identify potential (physical, biological, social, cultural) issues specific to the area (in and around the site) and sub-component.
- Identify the need for additional land, and possible impacts on livelihoods due to land acquisition either from public or private land
- Identify whether or not there are vulnerable groups in the area requiring special attention
- Identify the need to obtain any regulatory clearances such as from local communities, local government or other institutions for specific purposes. A tentative list of possible clearance required is presented in Table 4.
- Establish the need to carry out any further investigation/survey/ assessment for preparation of safeguard document like IEE, ESMPs or any specific study.

The screening format should be completed by the implementing agency and reviewed by the NECS or the Competent Authority. Environmental clearances will be issued based on the screening application. The terms and conditions reflected in the environment clearance will have to be implemented as safeguard measures.

**Step 3: Preparation of Environment and Social Management Plans (ESMP):** The potential project impacts and proposed mitigation measures described in the ESMF are indicative. Therefore, during the preparation of detailed design of each sub-component, an impact assessment using the IEE form (IEE form attached in Annex 8) will be used, and if required, a more comprehensive Environment and Social Impact Assessment (ESIA) will also be carried out. Based on the findings from the screening exercise, the IEE or the ESIA, sub-component specific Environment and Social Management Plan (ESMP) will be prepared for each sub-component, if deemed necessary. The activities and measures included in the ESMP (format presented in Annex 9) will also ensure that the recommendations from the screening review by the Competent Authority or the NECS have been incorporated.

The preparation of the ESMP will be done by the implementing agency of the project from the RGOB. In case the need arises to hire an external consultant for the preparation of the ESMP and its implementation, the Terms of Reference for the consultant will be approved by the NECS/CA.

The ESMP will include:

- The environmental and social management objective to be realized during pre-construction, construction and operation phases to enhance benefits and minimize adverse environmental impacts.
- Description of the detailed actions needed to achieve these objectives (how, by whom, by when, with what resources, with what monitoring/verification mechanism they will be achieved and to what the target or performance level will be). Mechanisms will also be provided to address changes in the project implementation, emergencies or unexpected events, and the associated approval processes.
- Clarification of institutional structures, roles, communication and reporting processes required.
- Description of the link between the ESMP and associated legal requirements.
- Description of requirements for record keeping, reporting, review, auditing and updating of the ESMP.

At present, it is expected that an ESMP would be required only for the following sub-components that may need an environmental clearance.

- Installation of a wind profiler system at the Paro International Airport
- Installation of Aviation Weather Observing System (AWOS) at Paro airport (This is direct replacement of the existing system. The need for an EC will be verified during implementation).
- Installation of ceilometer at Paro International Airport and Bumthang Domestic Airport
- Construction of the National Emergency Operation Centre (NEOC) in Thimphu
- Installation of 2 portable helicopter fuelling stations
- Development of helipads in 10 districts

***Step 4: Application for Environment Clearance to NECS/ CA and Review:***

Respective implementing agency will be responsible for the preparation of the sub-component level screening and ESMP/ IEE as required. Upon availing of all clearances related to the sites and specifications, the implementing agency will seek Environmental Clearance from the NECS or CA. The procedures for applying for environmental clearances and development consent are different for the different sub-components.

For the construction of the NEOC: Depending on the outcome of the screening evaluation, an IEE may or may not be required. In the case of requirement of an IEE, the findings of the IEE will be submitted along with other documents such as the building drawings, project details, etc. to the Thimphu Thromde. The Thimphu Thromde will accord the Development Consent upon evaluation of the documents submitted. The terms and conditions mentioned by the Thimphu Thromde in the development consent will be incorporated in the update of the IEE or the ESMP of NEOC.

For all other Sub-components (installment of ceilometers, wind profilers, construction of helipads): In the case of all other sub-components, the screening application will be submitted to the NECS based on which an Environmental Clearance will be issued. However, upon evaluation of the screening application, if the NECS recommends for an IEE, the IEE will be conducted by the implementing agency. The IEE thus prepared will be submitted to the NECS for evaluation and issuance of the Environment Clearance. Upon issuance of the Environment Clearance, the IEE/ESMP will be updated to include the terms and conditions reflected in the EC. The clearance procedures are described in detail in Section 6.2 of the ESMF.

**Step 5: Consultation and Disclosure:** Prior to the initiation of project activities related to each subcomponent, the relevant stakeholders and affected communities will be informed about the ESMF requirements and the need for internalizing the environmental and social issues in the design and implementation of the project activities. Sub-component specific ESMPs developed in accordance with this ESMF will also be discussed during the local consultations. These consultations will adopt the principle of ‘free, prior and informed consultations. Details on consultations and information disclosure are included in Section 6.3.

**Step 6: Implementation and Monitoring:** The DHMS (for wind profilers, ceilometers, AWOS) and DDM (for NEOC, helicopter fuelling stations and helipads) have the overall responsibility for ensuring that environmental and social issues are adequately addressed within the various sub-components.

The ESMF implementation requires detailed supervision, monitoring and reporting. All the implementing agencies will have a focal person for Environmental and Social Safeguards for their component who may be the project component focal person. This person will be responsible for the management of environment and social safeguards for preparation, implementation, monitoring and reporting on safeguards management plans and compliance. In case a need arises, the project may hire an external Safeguards consultant to assist the implementing agencies for this purpose.

**Preparation:** Preparation of the IEE or the ESMP will be the responsibility of the implementing agency and the Focal Person will ensure that the preparation takes place on time and provide coordination with relevant stakeholders as may be required.

**Implementation and Supervision:** The implementation of the safeguards will be the responsibility of the hired contractor or consultant in the case of construction works; that of the component management (procurement officer of the concerned organization) in the case of procurement of equipment; that of the engineers and architects in the case of structural design. The implementing agency focal persons who in this case may also be the Social and Environment Safeguards focal persons are responsible for the supervision of the activities detailed in the project activities as well as the ESMF and ESMP, and ensure that safeguards measures identified in the ESMF, EC or IEE are implemented. If an external Safeguards consultant is hired for the project, he/she will support the agency focal persons for this purpose.

**Reporting:** The agency focal persons with support from the Safeguards consultant will provide quarterly progress report on the progress of safeguards implementation to the Project

Coordinator for submission to the PSC. An annual report will be submitted to the CA or NECS and a bi-annual report to the World Bank by the Project Coordinator (Hired for overall coordination of the project through DDM).

*Monitoring:* Monitoring of the safeguards compliance will be done by the Competent Authority or the NECS periodically. The monitoring reports by the authority will be provided to the implementing agencies for follow up actions. Based on the quarterly reporting by the implementing agencies and feedback from the monitoring reports (applicable after receiving feedback for CA), the Project Coordinator with support from the implementing agency focal persons and Safeguards consultant will prepare reports as per the reporting requirements for submission to the PSC which will further submit it to the CA/NECS and the World Bank highlighting any major social and/or environmental issues. The World Bank may visit project sites during mission visits of the project and provide technical advice on way forward on highlighted issues. Details of Implementation and Monitoring arrangements are presented in Chapter 7.

## 6.2 Obtaining Clearances for Sub-component Specific Activities

As indicated in Chapter 5, the project is unlikely to have adverse impacts that are sensitive, diverse, or unprecedented. Mitigations for the likely adverse impacts can be designed readily. However, as per the Environment Assessment Act (EAA) 2000, it is mandatory for all activities to seek EC except for those mentioned in the list of activities exempted from requiring EC (List B of Annex 2 of EAA 2000). A tentative list of clearances required for the various activities of the project is summarized in Table 8. The requirement is subject to the outcome of the screening process.

**Table 8: Tentative requirement for various clearances**

Activities	Requirements	Proponent	Competent Authority
Procurement and installation of wind profiler system at the Paro International Airport	Environment Clearance	DHMS	NECS
	Land Use Right	DHMS	NLC
	Administrative Approval from Paro Dzongkhag	DHMS	DEC, Paro
	Forest Clearance (in case the site fall within GRF land)	DHMS	DoFPS through CFO, Paro Division
	NOC from Bhutan Power Corporation	DHMS	BPC
	NOC from private individual (in case the site falls on private land)	DHMS	Private individual
Procurement and installation of AWOS at Paro airport	Environment Clearance	DHMS	NECS
	NOC from the Bhutan Civil Aviation Authority for installation at the existing AWOS site	DHMS	Dept. of Civil Aviation
Procurement and installation of ceilometer at Paro International Airport and	Environment Clearance	DHMS	NECS
	Administrative Approval from Paro and Bumthang Dzongkhags	DHMS	DEC of Paro and Bumthang
	Land Use Right	DHMS	NLC
	Forest Clearance		DoFPS through CFO,

Activities	Requirements	Proponent	Competent Authority
Bumthang Domestic Airport			Paro
	NOC from Bhutan Power Corporation	DHMS	BPC
	NOC from private individual (in case the site falls on private land)	DHMS	Private individual
Construction of NEOC	Environment Clearance	DDM	Thimphu Thromde
	Development Consent	DDM	Thimphu Thromde
	Geotechnical and Geo-physical report	DDM	DGM
	ESMP	DDM	Thimphu Thromde
Installation of 2 portable helicopter fuelling stations	Environment Clearance	DDM	NECS
	Approval for operation of fuel station	DDM	Department of Industries
Development of helipads in 10 districts	Administrative approval from the concerned Dzongkhag	DDM	Concerned Dzongkhag Administration through the DEC
	Environment Clearance	DDM	NECS
	NOC from concerned Thromde (in case the site falls within local Thromdey area)	DDM	Concerned Thromde
	Land Use Right	DDM	NLC
	Forest Clearance (in case the site fall within GRF land)	DDM	DoFPS through the concerned Divisional CFO
	NOC from private individual (in case the site falls on private land)	DDM	Private individual
	NOC from the Department of Culture (in case the site is located within 100m of a cultural or religious site)	DDM	Dept. of Culture
	NOC from the Department of Roads (If access road takes off from highways and feeder roads)	DDM	DOR
	Approval of helipad design	DDM	Bhutan Civil Aviation Authority and Department of Air Transport under the Ministry of Information and Communications
	ESMP	DDM	NECS

### 6.3 Consultations and Disclosure

During the preparation of the ESMF, consultations were held with relevant agencies and concerned officials. A national level consultation workshop was organized on May 6, 2016 in Thimphu. Annex 1 provides details of the consultation.

Additionally, consultation with local people and other stakeholders relevant to the project sub-components, particularly the affected groups will be carried out during various stages of

implementation. This includes consultations during selection of sites and identification of impacts and mitigation measures; construction designs and specifications of minimum standards; and for understanding any specific social-economic needs of the affected communities or stakeholders. Measures will be taken to ensure free, prior and informed consultations.

The stakeholders and affected communities will be informed about the ESMF requirements and the need for internalizing the environmental and social requirements in the design and implementation of the project activities. This process will also empower beneficiaries/local communities to supervise the quality of project activities. Specifically, the consultation with the community/settlement, and relevant stakeholders (local level and district level) will be carried out as follows: (i) during selection of sites and design of constructions, (ii) screening and ESMP preparation and (iii) during implementation. All such proceedings, decisions/community consents and resolutions will be properly documented, including through written and visual means.

An orientation session will be conducted for raising awareness amongst relevant stakeholders. This will be done once the project details are available (project document and ESMF) and sites of various activities have been identified. The orientation and awareness program will target all the project implementers, district-level offices of the government where activities will take place, project-affected groups and stakeholders. The program will cover: (i) minimum social and environmental requirements, (ii) potential risks and benefits of sub-component activities (e.g., the risks of ceilmeters), and (iii) Grievance management mechanism established under the project. Additional orientation will be organized for project implementing agencies, and support organizations/ partner organizations to raise awareness regarding environmental and social issues, responsibilities, procedures, and mitigations.

The ESMF will be disclosed in the websites of the implementing agencies—DHMS, DDM and DoA and Competent Authorities as applicable. Copies of the ESMF will also be made available at the relevant Dzongkhags. Any revised safeguards documents, which consider the feedbacks received during consultations will be re-disclosed in the websites of the concerned implementers and officially submitted to the World Bank for clearance. Information to be disclosed will include, project activities and locations, implementing agency details; construction designs; activity schedule and information on the GRM.

## **7. INSTITUTIONAL ARRANGEMENTS FOR ESMF**

The project will be implemented by DDM, DHMS and DOA of the RGOB. Component A will be managed by the DHMS, Component B by the DDM and Component C by the DOA. These agencies will be responsible for: (i) ensuring timely procurement of consultants including a project coordinator, works and equipment under the project in compliance with World Bank's fiduciary and safeguards guidelines; (ii) coordinating with other technical departments / agencies and other relevant stakeholders for input in the design and implementation of the proposed activities under each subcomponent; and (iii) monitoring & evaluation (M&E) and reporting activities. To the extent possible, existing RGOB financial management arrangements will be used for the implementation of the project and compliance with the World Bank's fiduciary and safeguards guidelines.

A PSC will be constituted which will be convened by the DDM for the overall coordination of the project. The PSC will include representatives from across the RGOB, and will include: representatives from the following agencies: Department of Public Accounts (DPA) under the Ministry of Finance (MoF); DDM; DHMS and DOA.

As per the discussion with the implementing agencies thus far, the focal person for each of the implementing agencies will also be responsible for safeguards. In case, a need arises for additional support for the preparation and implementation of ESMPs, an external safeguards consultant will be hired to support the focal persons. The focal persons and the safeguards consultant will be responsible for:

- seeking clearances and preparation of ESMPs
- carrying out orientations of the ESMF and ESMPs at various levels
- information dissemination to stakeholders
- reporting and monitoring

Implementation of the EC conditions will be done by the contractor, supervised and reported by the focal persons with support from the Safeguards consultant.

### **7.1 Responsibilities for ESMF implementation**

The NECS is the highest decision-making and coordinating body on all matters relating to the protection, conservation and improvement of the natural environment. Respective ministries of the Government are the final authority for social issues that pertain to their mandate.

As designated by Regulations for issuance of EC, Thimphu Thromde is the Competent Authority to issue EC and Development Consent for the NEOC as it falls within the core urban area of Thimphu municipality. For all other sub-component activities, the NECS is the authority for issuance of EC since these activities are neither included in the list of activities that do not require an EC nor in the list of activities that competent authorities are delegated to screen and issue environment clearance as per Annex 2 of the EAA. However, prior to the issuance of EC by CA or the NECS, clearances from other concerned agencies or communities will need to be sought and attached along with the application for EC. The implementing agency has the responsibility to coordinate with relevant stakeholders and to seek required clearances.

Depending on the location of the project sub-components, concerned Dzongkhag Administrations or the concerned Thromde will be informed about each sub-component preparation and implementation. Where required, administrative approval will be obtained from the concerned Dzongkhag Administration or the Thromde. A tentative list of clearances that may be needed, proponent and competent authority concerned are presented in Table 4.

The implementing agencies are responsible for seeking all clearances from community, Dzongkhags or Thromde and the NECS.

Specific responsibilities for implementation of the ESMF are presented in Annex 10.

## **7.2 Compliance Monitoring**

*Monitoring at the Sub-Component level:* Self-regulatory monitoring of the environmental and social activities will be carried out at the sub-component level by the concerned implementing agency. It is expected that all impacts and mitigation measures included in the ESMP/IEE and the terms and conditions included in the environment clearances are taken care of during the implementation of individual activities.

The focal person also designated as the focal for safeguards for each of the implementing agency will be responsible for the supervision of environmental compliance by the contractor. He/she will also be responsible to certify the environmental and social mitigation measures carried out by the contractors on a monthly basis. This will be part of the documentation for payment schedules of the contractors. If an external Safeguards consultant is hired, this consultant will support the focal persons for the above task. When there are complaints, the focal person together with the representative of the contractors will investigate the issues and agree on the corrective actions as necessary. The team will follow up and document the corrective actions until the cases are completely resolved.

The self-regulatory compliance monitoring will occur as a regular activity, and will include compliance monitoring of the ESMF, process reviews and reporting of status on implementation of ESMP/IEE and conditions laid out in the EC on a monthly basis from the focal persons. The Safeguards consultant (in case one is hired) will compile the reports on a quarterly basis and submit to the PSC with copies to all focal persons. In case no consultant is hired, the overall Project coordinator with support from focal persons will do the compilation and reporting. The implementing agencies will be responsible for oversight of social and environmental issues, providing guidance, developing policies (if Necessary) and coordinating with other relevant organizations to facilitate implementation of good practices.

*Monitoring at the CA or NECS level:* NECS and/or CA are mandated for annual compliance monitoring, which is announced and pre-informed. They are also empowered for unannounced or spot-checking.

Compliance monitoring pertains to monitoring of compliance to the terms and policy and legal compliance requirements. The activity and location specific compliance are normally specified in



the EC by the clearance issuing authority as terms and conditions of the EC. Hence, compliance monitoring will be done by the Competent Authority or the NECS.

In order to facilitate compliance monitoring, the Focal Person, with support from the consultant will submit an annual compliance report or as per time line indicated in the EC to the CA or the NECS, who ever has issued the environment clearance. This compliance report should contain the number and name of the project activity for which EC has been issued; the terms and conditions mentioned in the EC and the status of implementation of these terms and conditions.

The CA or the NECS may conduct ad-hoc compliance monitoring visits to project sites to monitor compliance of the conditions specified in the EC and whether the implementation is as per existing environmental regulations and the provisions included in the Environmental and Social Management Framework (ESMF) prepared for this project. During such monitoring, the CA will issue recommendations or impose penalties as may be appropriate.

A compliance monitoring format is presented in Annex 11. This will however be modified depending on the terms and conditions mentioned in the ECs.

### **7.3 Capacity Building**

The DHMS has some experience in environmental and social safeguards related to land acquisition processes. Beyond this, none of the implementing agencies have the required expertise.

The project support will include sub-component level screening, ESMP preparation, EC application, obtaining clearances from CAs and NOCs and in organizing consultations/orientations or training on environmental and social safeguards to stakeholders (implementing agencies, contractor, local stakeholders, site supervision).

Local capacity building will be critical for the implementation of the above safeguard-related activities. The capacity strengthening measures include:

- Appointing or hiring an overall Environmental and Social Safeguards Specialist at the DDM through RGOB (Draft ToR in Annex 12)
- Organizing orientation sessions/workshops for the focal persons of the implementing agencies on the environment and social safeguards
- Provide awareness on the ESMF and ESMPs to relevant stakeholders at various levels (Dzongkhag, Gewog, Thromde)
- Information dissemination to stakeholders

### **7.4 Grievance Redress and Management Process**

The grievances redress mechanism will comprise of grievance reporting and recording system maintained by the project implementing agency for grievances to be filed either verbally or in writing by the affected stakeholders or individuals.

The grievances may be sent to the following contacts:

Area of Grievance	Concerned Department	Contacts
Ceilometers (in Bumthang and Paro airports), wind profiler and AWOS (at Paro airport)	DHMS	Email: Phone:
NEOC, helipads, helicopter fuelling station	DDM	Email: Phone:

Complaints may also be registered at the concerned Head of the Gewog/Dzongkhag, who will resolve the complaints within their jurisdiction (Gewog or the Dzongkhag Administration) or forward the case to the project implementing agencies.

Alternatively, the Gewog or Dzongkhag can take up these complaints with the concerned implementing agency of the project. The project team will review these feedbacks and take appropriate actions.

Regardless of the modality adopted for resolving conflicts, all complaints will be recorded by the recipient at the department and documented as part of the progress report of works. The project management will coordinate with relevant parties to address the complaints and follow up actions should be reported to the directorate of the concerned departments for inclusion in reporting to the World Bank.

Normally, it is only when all alternative and out of court options are exhausted or there arises cases of criminal nature, that the cases are referred to the court. In case of Civil Case, the courts usually suggest first for alternative dispute settlement, such as internal settlement (negotiation) or be resolved mutually by local government authorities, elderly folks, or trained para-lawyers (locally known as Jabmis). Therefore, the disputes or grievances from affected stakeholders will be referred to Gewog Tshogdey or the Dzongkhag Tshogdu or respective departments.

The complainant or the litigant, if still dissatisfied after interventions from these authorities, may submit the complaint to the relevant agency such as the Construction Development Board (CDB) for construction works and National Land Commission for land issues for alternative dispute resolution. When this mechanism fails to resolve, the complainant may approach the royal court of justice.

## **8. BUDGET REQUIREMENTS FOR IMPLEMENTATION OF ESMF**

The key elements of the environmental and social management cost of any project usually include the following:

Cost of environmental and social personnel: There is a need for Environmental and Social Safeguards consultant to assist in preparing the screening format and to prepare IEE/ESMP for all sub-components that are identified to require IEE/ESMP. However, the decision to hire a consultant for this purpose will be made by the RGOB. If it is decided to hire one, the consultant will assist in preparing the clearance documentations, impart training to the staff and support in monitoring of compliance and for supporting the quarterly reporting. For this purpose, it is recommended to set aside about 0.02% of the project cost (i.e. approximately USD 6600).

Cost of environmental and social mitigation measures: Application fees for environmental clearances are estimated at Nu. 1000 per application (rate for urban activities applied here) would cost about Nu. 15000 or about USD 300. The cost of land acquisition, providing access road to helipads and related clearances has not been included in the project since it is expected to be borne by the RGOB.

Cost of monitoring if an independent monitoring team is found relevant: This will depend on the decision of the implementing agencies and the World Bank. The total budget for the external monitoring is estimated to be about USD 10,000. The cost of each external monitoring may be estimated after ToR is finalized for the external monitoring.

Cost of trainings, orientations, awareness programs and information dissemination: Regular monitoring by the project staff has to be facilitated by providing training to the staff. The training to staff (twice) is estimated to cost about USD 10,000. These activities will be combined with other trainings, awareness and information dissemination activities. Disclosure and stakeholder consultations of the ESMF and ESMP are expected to cost about USD 10,000.

Cost for Printing ESMF and ESMPs: The total budget for printing ESMF and ESMPs is estimated at USD 400.

The cost for implementation of the ESMF is estimated to be around USD 27,300. This is a part of the project management, monitoring and evaluation.

Costs for cash compensation for acquisition of land and construction of ancillary structures such as roads and other amenities which may be incurred during the implementation shall be borne by the Royal Government of Bhutan.

## **Annex 1: Consultation Note on Environmental and Social management Framework**

### **Hydromet and Disaster Improvement Regional Project**

#### A. Introduction:

The consultation on the ESMF for the Bhutan Weather Services and Disaster Risk Management Regional Project was held on May 6, 2016 at the Ariya Hotel in Thimphu, Bhutan (see Section C below for Agenda). The consultation was chaired by the Director of the Department of Disaster Management under the Ministry of Home & Cultural Affairs. The focal persons of the implementing agencies presented their respective parts of the framework (see Section D below for the presentation slides). Participants included from national, municipality and district governments and NGO (see Section E below for list of participants).

#### B. Issues and concerns discussed:

1. *Overall presentation:* The document should be more concise with full names of the documents referred to avoid confusion such as “The Constitution of the Kingdom of Bhutan” instead of just The Constitution.
2. *Relevance to other documents of the Royal Government of Bhutan:* The Water Act 2011 may be relevant to include as an Act to abide by to avoid or mitigate impacts on water sources. Another Act to be included is the Bhutan Civil Act 2000.
3. *Potential Impacts and proposed mitigation measures:* A major limitation to providing clarity on the potential impacts and probable mitigation measures is the unidentified locations for most of the proposed activities. It was suggested that the document should only identify potential impacts, proposed mitigation measures and the procedure to obtain clearance and may not be justifiable to confirm that the impacts would be minimal since the extent of impacts is not yet determined. Although a lot of good practices are identified, a judgment should be made on its applicability during implementation as per current practices. Clarify in the ESMF that impacts and mitigations included in the ESMF are anticipated based on the type of envisaged subproject, not confirmed for the location and activity. Subproject specific impacts will be specifically assessed during project implementation, applying the processes and procedures described in the ESMF e.g. screening, ESMP and IEE preparation, obtaining EC etc.
4. *Overall project objective:* Clarity should be provided on the benefits of the project at the national level and the regional level.
5. *Grievance Redress Mechanism:* This section needs to be sharpened to clearly spell out the procedure to be followed during grievances. Considering that there are well defined mechanisms in place as per the Kingdom of Bhutan Acts, local procedures can be followed. GRM for this project could build on the government system, the GRM of other project funded by the World Bank, such as DRDP etc.

6. *Mention of ancillary infrastructure and amenities:* It would be important to mention the required ancillary infrastructure and amenities (such as electricity and road access) for the installation of equipment and facilities proposed under the project to ensure adequate selection of sites. This is particularly so for the helipad.
7. *Impact on cultural heritage sites:* The Department of Culture should be informed of the site selection for the activities as the project progresses to ensure that no important cultural heritage sites are negatively affected.
8. *Environmental Clearance, Permits and No Objection Letter:* Clarity is needed with regard to competent authority for issuing EC. For example, Thimphu Thromde, may not be CA for NEOC building, and CA for some activity may be DEC. Process and procedures for EC needs to be explained. All permits and No Objection Letters that needs to be obtained should be identified and listed for each subproject type.
9. *Operation of helicopters:* Noise disturbance is one of the emerging concerns as per the CEO of Royal Bhutan helicopter Services. There are no regulations in place for mobile noise disturbances in Bhutan. Control regulations are in place only for longer duration exposure such as to people who work in noisy areas for the entire day. Another concern on the helicopter operation was the impact of the strong wind trail. There were complains of blowing away dried chillies from roofs of residents. Such concerns needs to be looked into while locating the helipads.
10. *Site selection for helipads:* Thorough consultations and site realities need to be considered during the selection of sites for construction of helipads. Concerns were raised by the RSPN on the impact of helicopter flight routes on the natural habitat and inhabitants in Phobjikha. Therefore, a set of guiding principles for the selection of sites for helipad construction needs to be developed. However, when a disaster is localized and needs the services of a helicopter in that particular location, this may not be applicable.
11. *Emission from vehicles and equipment:* It would be important to mention the potential change in level of emissions and vehicular and machinery traffic in the local area where the activities will take place.
12. *Construction of the National Emergency Operation Center (NEOC) and procurement of emergency communication equipment:* The GNHC raised their concern on the use of the proposed NEOC under this project with the pre-fabricated NEOC under construction. The DDM responded that the pre-fabricated NEOC is an interim measure and will be functional by the end of this year. This will serve as the NEOC till the permanent structure is completed which will take another 2 to 3 years. Once the permanent structure is in place, the pre-fabricated structure will be used as a multi-function office. The DDM also clarified that the equipment supplied are basic and will support equipping the district EOCs.
13. *Installation of aviation related equipment:* The Bhutan Civil Aviation Authority and Department of Hydromet Services agreed to initiate a joint discussion with pilots from

both the airlines of Bhutan (Druk Air and Bhutan Airlines) to identify potential sites for installation of the ceilometer and wind profiler.

14. *Implementation Arrangement:* Since a number of activities will be located in district jurisdiction and may need clearance from district level, it is very important to brief the Governors of the concerned districts for a collaborative process. The procedure and institutional arrangement for seeking clearances can also be further made more concise for clarity during implementation.
15. *Way forward:* The draft ESMF would be revised based on the comments received during the consultation. The team may seek further inputs from relevant agencies during the revision of the document. The revised document will be shared through email to all the participants for their comments. Once the document is finalized for disclosure, it will be posted on the websites of implementing agencies as well as relevant agencies such as the NEC which is the authority for providing environment clearances.

### C. Agenda for the consultation

- 9:30 AM: Welcome address by Director of DDM, MoHCA
- 9:45 AM: Presentation on Project Overview – DDM
- 10:00 AM: Presentation on the DHMS Component
- 10:15 AM: Presentation on the DDM Component
- 10:30 AM: Presentation on the RBHSL activities
- 10:45 AM: Tea break
- 11:15 AM: Discussions
- 1:00 PM: Wrap up followed by Lunch

## D. Presentation slides

### Presentation on project Overview

### **Stakeholder Consultation**

ENVIRONMENTAL AND SOCIAL MANAGEMENT  
FRAMEWORK

BHUTAN WEATHER AND DISASTER IMPROVEMENT  
REGIONAL PROJECT

DDM, DHMS, DOA

### **Overall Project Description**

- PDO - To strengthen the Royal Government of Bhutan's capacity to provide weather and hydrological forecasting services including delivery in priority sectors and improve disaster preparedness.
- Budget – USD 3.3 million
- Implementing Agencies:
  - (i) Department of Disaster Management, Ministry of Home & Cultural Affairs (USD 2.0 million)
  - (ii) Department of Hydromet Services, Ministry of Economic Affairs (USD 1.1 million)
  - (iii) Department of Agriculture, Ministry of Agriculture and Forests (USD 0.2 million)

2



## **OBJECTIVE OF ESMF**

- Assess the potential adverse environmental and social impacts based on the potential impacts/ issues/ concerns identified during screening
- Provide pragmatic and cost effective measures in order to mitigate adverse potential impacts including potential alternatives
- Provide environmental and social mitigation measures specific to the project components
- To provide guidance and procedure for assessment of potential impacts and risk associated with the project activities

3

## **ESMF - Steps**

*Alignment to RGOB laws & regulations and Bank's safeguard policies with regard to Environment and Social policies*

### **1. Project screening**

- To be done by proponent and assessed by Competent Authority
- Issue Environmental Clearance or recommend for IEE or ESMP
- Identify potential Env. & Social issues specific to the locations & activities.
- Identify the need to obtain any regulatory clearances
- Establish the need to carry out IEE/ESMPs or any specific study

### **2. ESMP (IEE) - If screening recommends**

- Develop sub-component level IEE

### **3. Application for Environment Clearance**

4

## ESMF-Steps

### 4. ESMF consultation

- Project implementers, district-level offices where activities will take place, project-affected groups, stakeholders
- sub-component site/ activity relevant feedbacks/ suggestions & comments will be incorporated in ESMF update
- Translation to Dzongkha
- Web upload in (DDM/DHMS/DoA website)

5

## ESMF-Steps

### 5. ESMF Implementation/Monitoring

- *Environmental & Social Safeguard Specialist (ESS Specialist) hired by RGOB*

#### **Preparation:**

- ESS Specialist to coordinate and support preparation of ESMPs, any other required documents to obtain clearance and monitoring

#### **Monitoring:**

- By the CA or NEC
- CA or NEC issues need for follow up actions (if applicable)
- Bank may visit project sites during mission visits

6

## Presentation on DHMS Component



### Bhutan Weather and Disaster Improvement Regional Project

Component A  
(Strengthening Weather and hydrological forecasting and Services)



[www.hydromet.gov.bt](http://www.hydromet.gov.bt)



### *Major Activities*

In order to provide additional information for aviation safety at Paro International Airport and Bumthang Domestic Airport, the Project will support procurement and installation of:

- ✓ One wind profiler system at the Paro International Airport
- ✓ One Aviation Weather Observing System (AWOS) at Paro airport
- ✓ One ceilometer each at Paro International Airport and Bumthang Domestic Airport



## Major Activities

- Procurement of
- ✓ weather work station,
  - ✓ a portable ice penetrating radar equipment and development of a common operating platform for automated hydro-met services delivery system.

(There is no physical construction foreseen for these activities).



## Installation of AWOS at Paro Int. Airport

Cause/ source of impact	Receiver of impact	Assess the extent, severity, duration	Potential Mitigation
<b>Potential Impact 1: Site conflicts</b>			
Actual location of AWOS within the airport	DHMS	Relocation may be required if the AWOS is located at inappropriate site	NOC from Civil Aviation
<b>Potential impact 2: Obstruction to flight</b>			
Flight disruption	Airline	Flight disruption could cause airline accidents	Appropriate location of the AWOS so that flight path is not obstructed



## **Installation of Ceilometer at Paro Int. Airport & Bumthang Domestic Airport**

Cause/ source of impact	Receiver of impact	Assess the extent, severity, duration	Potential Mitigation
<b>Potential Impact 1: Ceilometer beam could affect migratory birds at night if such migrations occur</b>			
Beam arising from the ceilometer at night	Migratory birds	No report of migratory birds at the moment. Could occur in future	Choose technology with minimal affect (Rotating beam ceilometers have no visible impact on migration of birds)  Adopt light out periods at night during bird migratory season



## **Installation of Wind Profiler at Paro Int. Airport**

Cause/ source of impact	Receiver of impact	Assess the extent, severity, duration	Potential Mitigation
<b>Potential Impact 1: Site conflicts</b>			
Actual location of the wind profiler within the airport	DHMS	Relocation may be required if the wind profiler is located at inappropriate site	NOC from Civil Aviation
<b>Potential Impact 2: Obstruction to flight</b>			
Flight disruption	Airline	Flight disruption could cause airline accidents	Appropriate location of the wind profiler so that flight path is not obstructed



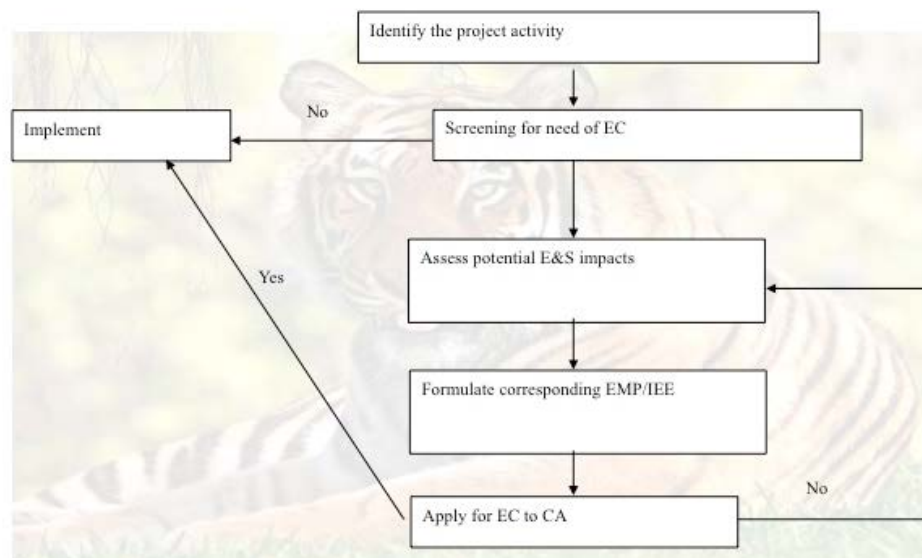


### The requirement for various clearances related to the project

Sub-Component	Activities	Requirements	Proponent	Competent Authority
A1	Procurement and installation of wind profiler system at the Paro International Airport	EC NOC	DHMS	NEC Civil Aviation
	Procurement and installation of Aviation Weather Observing System (AWOS) at Paro airport	EC NOC	DHMS	NEC Civil Aviation
	Procurement and installation of ceilometer at Paro International Airport and Bumthang Domestic Airport	EC NOC	DHMS	NEC Civil Aviation
A1.2:	Procurement of and Meteorological Work Station for Met Division, fire wall router and backup generator for NWFFC, backup server for WRF,	None		
A1.3	Procurement of Ice Penetrating Radar and Digital Global Positioning System	None		
A1.4	Procurement of computer server and software for Common Alert Protocol automated hydro-met services delivery	None		
A2	Institutional Capacity Strengthening	None		



### The process applied for environment clearance pertaining to this project is identified as below:





**Class C**



**Class A**



**Automatic Water Level Station**

**Wading Method**



**Pilot basins (Mangdechhu, Chamkharchhu)**

Met. data (GPV etc.)

**GIS Network**

Data reception

NWFFWC, Thimphu (National weather flood forecasting and warning center)

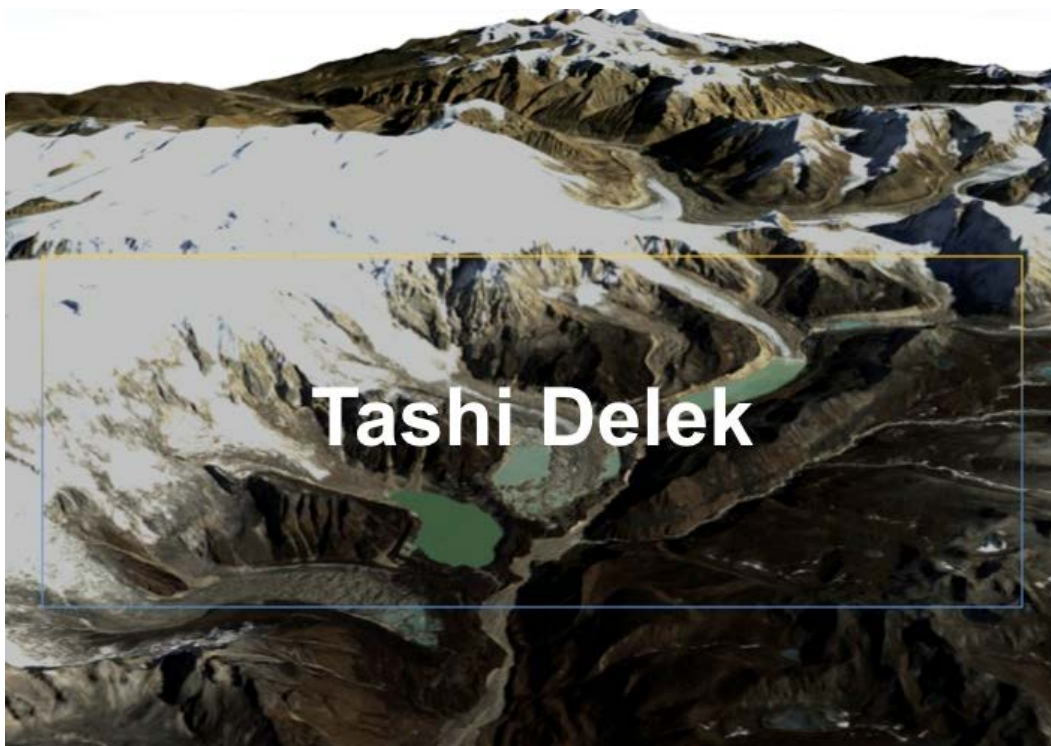
**Output**

Capacity enhancement on disaster response at central level

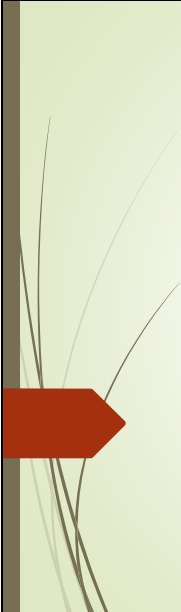
- Flood Risk Assessment
- Flood/Weather Forecasting and Warning
- City Development Planning
- Mainstreaming of Disaster Risk Reduction

DHMS, DDES, DGM  
DHMS  
DHS, NLCS  
DHMS, DDES, DGM  
DHMS  
DHS, NLCS  
DHMS, DDES, DGM

2016-04-06 14







# Component B: Strengthening Disaster Preparedness and Response Capacity

Department of Disaster Management  
Ministry of Home and Cultural Affairs



## Activities

- Establish a DRM Geomatics System
- Establishment of National Emergency Operation Centre (NEOC)
- Equipping the District Emergency Operation Centre (DEOCs) – basic equipment
- Strengthening helicopter services for emergencies
- Institutional capacity building for DDM and RBHSL

## Potential impacts

- Instability of the land for construction
- Cultural conflicts- deviation from traditional architectural elements
- Sanitation issues- poor labour camps sanitation and hygiene condition
- Dust pollution- due to earthmoving civil works
- Waste generation from labour camps and construction activities
- Noise pollution- construction machinery and vehicles
- Obstruction to road traffic- use of public road/place for loading and unloading and stacking of const. materials
- Fire hazards- labour camp or fire at site
- Occupational hazard

## Mitigation Measures

- Test to determine soil bearing capacity for appropriate structural design consideration
- Design must be prepared by accredited architects and approved by Thimphu Thromde (BBR, 2002)
- Proper toilets and safe drinking water and medical facilities for workers, waste bin to be installed
- Provide water spraying system in at the site
- Provide respiratory protection devices & other PPE
- Integrate site waste management with TT waste collection system & also install waste bins at the site
- Restrict noise-prone activities in the night time & provide ear protection devices to workers
- Clear instruction to be given to the workers to avoid traffic obstruction, seek clearance from Thromde to use public road and access road to site to be widened
- Firefighting system to be installed at the site and fire safety drills to be conducted

## Procedure for Clearance

- Approval of land use for construction of NEOC from Thimphu Thromde
- Approval of architectural, structural and other relevant drawings from Thimphu Thromde
- Seek environmental clearance from Thimphu Thromde



**ENVIRONMENTAL & SOCIAL  
MANAGEMENT FRAMEWORK**

**BHUTAN WEATHER SERVICES & DISASTER  
RISK MANAGEMENT IMPROVEMENT  
REGIONAL PROJECT**

IMPLEMENTING AGENCY-DDM (rbhs)

**COMPONENT B: STRENGTHENING DISASTER  
PREPAREDNESS & RESPONSE CAPACITY**

<b>SUB-COMPONENT B2.2</b>	<b>Establishment of infrastructure for helicopter services</b>
	Portable helicopter fuelling stations
	Helipads in districts for emergency landing

<b>SUB-COMPONENT B2.2</b>	<b>Establishment of infrastructure for helicopter services</b>
	Portable helicopter fuelling stations
	Helipads in districts for emergency landing
<b>ENVIRONMENT &amp; SOCIAL POLICY and LEGISLATION</b>	<b>WORLD BANK POLICIES</b>
	<b>RGOB POLICIES</b>

<b>ENVIRONMENT AND SOCIAL IMPACT AND MITIGATION MEASURES</b>	
Procurement of 2 portable fuelling stations	Table 1.e
Development of helipads in 10 Dzongkhags for emergency landings	Table 1.f



E. List of Participants/ Attendance sheet

Registration Form for Consultation on ESMF

Venue: Ariya Hotel, Olakha, Thimphu

Sl No	Name	Designation/Agency	Phone Number	Email Address	Signature
1.	PHUNTSHO NAMGYAL	CHIEF ENGINEER DEPT. OF HYDROELECTRIC SERVICES	17584648	phuntsho.dhms@gmail.com	
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5.	PASSANG DORJI	Asst DCO, GNHC	13125303	pdorji@gnhc.gov.bt	
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8.	SANGAY PENJOK	PAUC/ GNHC	1771584	spenjok@gnhc.gov.bt	

Sl No	Name	Designation/Agency	Phone Number	Email Address	Signature
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10.	TASHI DUKPA	CHIEF OF AVIATION METEOROLOGY (DOAT)	17606741	tdukpa@doat.gov.bt	
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12.	Dechen Tshering	DRM Specialist, WB	1741464	dtshering@worldbank.org	
13.	Diana Raj Shukine	Sr. Env. Specialist WB		dshukine@worldbank.org	
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16.	Yeshi Sanday	Architect, DCHS, Doc, MoHCA	12575918	yeshisanday@mohea.gov.bt	
17.	Jigme Chozel	Sr. PO, DDM	17707400	jchozel@mohea.gov.bt	

Sl No	Name	Designation/Agency	Phone Number	Email Address	Signature
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19.	Cubador Nangdi	Director, DDM	—	cwangdi@mohe.gov.bt	—
20.	Tejari Yangzom	Project Coordinator, PHRD, DDM	17927336	tejayzom@gmail.com	



## Annex 2: Terrain condition of Paro International Airport and Bumthang Domestic Airport



Terrain conditions of Bumthang Domestic International airport:





### Annex 3: Location of proposed NEOC

Thimphu City



NEOC location



#### **Annex 4: Description of Wind Profiler**

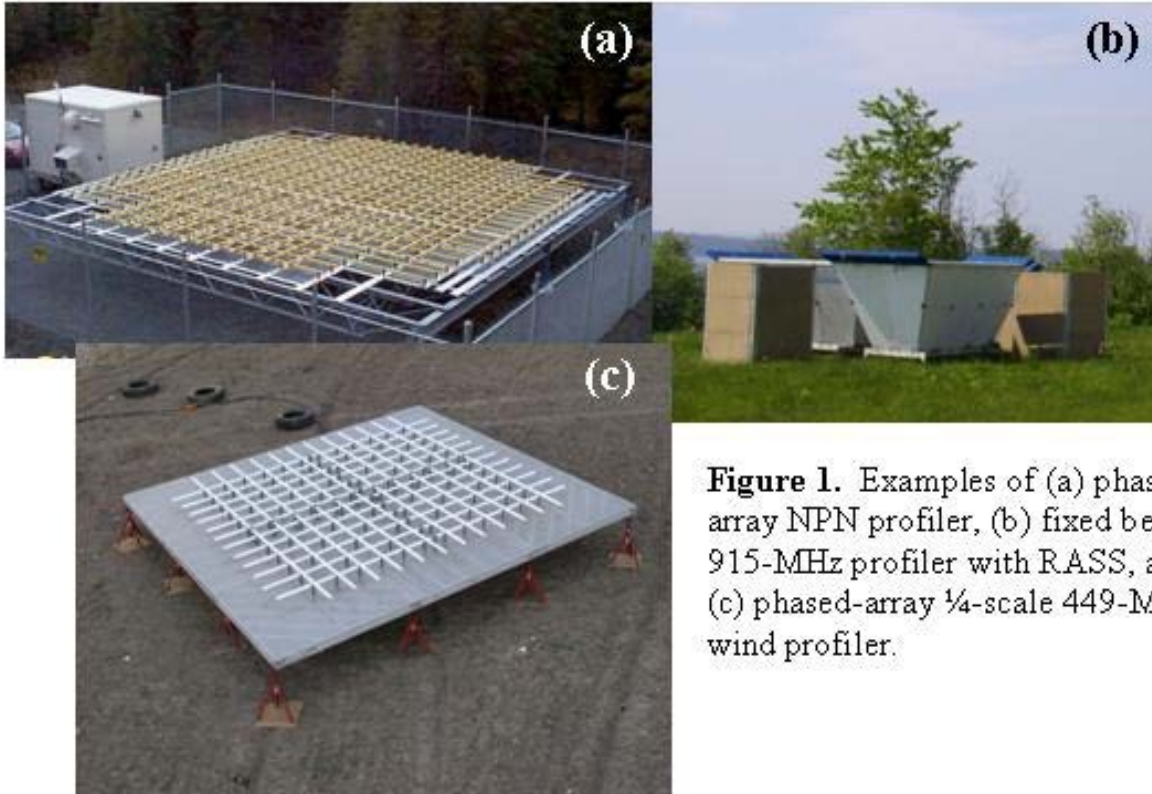
Wind profiler produces vertical profiles of the horizontal and vertical wind by measuring the radial velocity of the scatterers as a function of range on three or five antenna beam positions. One antenna beam is pointed toward zenith, and the other two or four beams are pointed about 15 degrees off-zenith with orthogonal azimuths (three-beam systems) or orthogonal and opposite azimuths (five-beam systems).

Each radar unit is installed on pavers with stands. These stands have vertical adjustments that can be used to level the radar without leveling the ground surface. The proposed sites have flat surfaces due to prior leveling associated with original construction of the airports, and will not require any surface grading.



**915 MHz phased array wind profiler**





**Figure 1.** Examples of (a) phased-array NPN profiler, (b) fixed beam 915-MHz profiler with R.A.S.S., and (c) phased-array ¼-scale 449-MHz wind profiler.

As previously mentioned, the antenna size is frequency dependent. For 1-GHz boundary layer radar wind profiler, the antenna might be as small as 2-m in diameter. For a 400-MHz band unit, the antenna will typically be between 6 to 12 m in diameter. As for a 50-MHz stratospheric radar, the antenna can be as large as 150 m in diameter. Figure 4 illustrates the wide variation of antenna size for a boundary layer (BL), tropospheric (T), stratospheric tropospheric (ST) and mesospheric-stratospheric-tropospheric (MST) radar wind profiler types.

Comparative antenna sizes for various radar wind profiler types (Scott A. McLaughlin, The right radar wind profiler for your application, URL: [www.detect-inc.com](http://www.detect-inc.com))

Frequency	Antenna Size
50 MHz MST (mesospheric-stratospheric-tropospheric)	125m x 125m
200 or 49 MHz ST (stratospheric-tropospheric)	24m x 24m
449 MHz ST	12m x 12m
449 MHz T (tropospheric)	6m x 6m
915 MHz BL (Boundary Layer)	2m x 2m

As frequency increases over 1300 MHz, performance of the wind profiler radar decreases significantly. The choice of operating frequency is influenced by the required altitude coverage and resolution.

The International Telecommunications Union’s report, ITU-R M.2013 WIND PROFILER RADARS identifies 1000 MHz wind profiler radars for use in determining wind conditions at airports. These wind profiler radars are ideally suited for the monitoring of the lower atmospheric layers. High resolution wind data between typically ground level and 5 km altitude are essential for local very short-term forecasting applications, warnings to the general public and aviation, air pollution monitoring and atmospheric research. They are of smaller size and could be transportable. 1 000 MHz wind profiler radars may be used to determine wind conditions at airports.

Range of operational wind profiler radars characteristics (Rep. ITU-R M.2013)

	50 MHz	400 MHz	1 000 MHz
Height range (km)	1-24	0.5-16	0.5-3
Height resolution (m)	150-1 500	150-1 200	30-150
Antenna type	Yagi, coaxial, co-linear	Yagi, coaxial, co-linear, co-linear	dish, patch co-linear
Antenna size (m <sup>2</sup> )	2500-10 000	30-150	3-15
Peak power (kW)	5-60	5-50	0.5-5
Mean power (kW)	0.5-5	0.2-2.0	0.05-0.5
Necessary bandwidth (MHz)	0.2-2.2	0.3-2.2	0.7-7.3

The wind profiler equipment comprises of planar array of 256 microstrip patch ANT elements arranged in a 16x16 matrix **over an area of 2.8 m x 2.8 m**. The patch element, designed for linear polarization, is rectangular in shape with dimensions of 73.1 mm x 73.1 mm with a ground plane of 92 mm x 92 mm, and is incorporated with mounting holes at the four corners in order to be fitted onto an aluminum ground panel (Srinivasulu et. al; 1280-MHz Active Array Radar Wind Profiler for Lower Atmosphere:

System Description and Data Validation, 2012  
 (<http://journals.ametsoc.org/doi/pdf/10.1175/JTECH-D-12-00030.1>)

**Annex 5: Procedural guidance for land acquisition (As per the Land Act of Bhutan & Land Rules and Regulations, 2007)**

Steps	Actions as per the procedure	Time line	Responsible
1	<p>Submission of application (letter of intent) to the Dzongkhag or Thromde Administration (Dzongkhag/Thromde Land Acquisition Committee). The application should contain:</p> <ul style="list-style-type: none"> <li>• Purpose of the land</li> <li>• Area required</li> <li>• Owner detail (in case of private land)</li> <li>• Location of the proposed land</li> <li>• Avoid selecting Chhuzhing or land belonging to Dratshang</li> <li>• Include private land only under unavoidable circumstance</li> <li>• Clearance from the Ministry of Agriculture and Forests in case of Government land</li> </ul>		Component Management and Focal Person
2	The Dzongkhag Administration submits the application for preliminary approval to the NLC		Dzongkhag Land Records Officer
3	Preliminary approval by NLCS	2 weeks after receipt of the application	NLCS
4	If feasible, the Secretariat shall instruct the Dzongkhag/Thromde Committee to submit a detailed report or informs the applicant otherwise, stating the reasons.		
5	<p><i>For acquisition of private land:</i></p> <p>The Dzongkhag/Thromde Committee shall prepare a detailed report in the format prescribed under Annexure PLA Form (1) to PL A Form (7). The detail report should contain details on:</p> <ul style="list-style-type: none"> <li>• Compensation to be provided based on the valuation of the PAVA (in case of private land).</li> <li>• Clearance certificates under the applicable laws such as Forest and Nature Conservation Act and Environment Act if compensation includes substitute land,</li> <li>• Location of the substitute land from rural area in compliance with Section 155 of the Land Act of Bhutan 2007.</li> <li>• Cadastral maps indicating clearly the total area, location and identification of the land to be acquired and substitute land (substitute land for rural land should not be from Thromde area)</li> <li>• Responsible agency to pay cash compensation if it involves cash compensation.</li> </ul>	3 months	Component Management to follow up with the Dzongkhag/Thromde land records officer and initiate processes for sector clearances as advised by the DLAC

Steps	Actions as per the procedure	Time line	Responsible
	<p><i>For acquisition of government land:</i></p> <p>The Dzongkhag/Thromdey Committee shall prepare a detailed report in the format prescribed under Annexure GLA Form (2) and GLA Form (3). The detail report should contain details on:</p> <ul style="list-style-type: none"> <li>• Demarcation done by the DFO and Surveyor from Dzongkhag/Thromdey Land Records office</li> <li>• Cadastral map prepared by Dzongkhag/Thromdey Land records sector</li> <li>• Clearance certificates under the applicable laws such as Forest and Nature Conservation Act, 1995 and Environment Act</li> </ul>		
6	Dzongkhag/Thromde submits the detail report to the NLCS		
7	Upon final decision (from the NLC) the NLCS shall convey to Dzongkhag Committee and the landowner whose land is acquired.	Within 1 month from date of receipt	
8	Payment of compensation, release, and registration of acquired land substitute land		
9	<p>Applicant makes the necessary cash payment if cash compensation is decided by the Land Commission.</p> <p>Taking over of acquired land after compensation is provided to the landowner</p>	Within 30 days from the decision of the Commission	Component Management for payment NLCS for transfer of land ownership
10	<p>Release of substitute land from of Government land and register substitute land in the name of the person whose land was acquired</p> <p>Release of the government land in case of acquiring government land as per the decision of NLC</p>	Within 30 days from the decision of the Commission	DFO/Park Manager/Thromde

## **Annex 6: Annexure II of the General Rules and Regulation on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries.**

All construction activities carried out under the project will comply with the General Rules and Regulation on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries, promulgated in 2006 by the Ministry of Labour and Human Resources, Royal Government of Bhutan.

For any construction, renovation/alteration, painting (including traditional painting) of structures, the employer is responsible for health and safety of the employees. The employer shall initiate and maintain this standard to provide good working environments in their construction site. The Standards contained in this part shall apply with respect to employments performed in a workplace/construction site in Bhutan.

### **1. Personal protective and lifesaving equipment:**

The employer shall be responsible for providing suitable personal protective equipment or clothing, based on the type of work and risk, without cost to workers.

- (a) Helmet shall be provided to all workers, or visitors visiting the site for protection of head against impact or penetration of falling or flying objects.
- (b) Safety belt shall be provided to workers working in heights (more than 20ft) such as roofing, painting and plastering.
- (c) Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.
- (d) Ear protecting devices shall be provided to all workers and to be used during the occurrence of extensive noise.
- (e) Eye and face protection equipments shall be provided to all welders to protect against sparks of fire.
- (f) Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxin gas/vapor.
- (g) Safety nets shall be provided when workplaces are more than 25 feet (7.5m) above the ground or other surfaces where the uses of ladders, scaffolds, catch platforms, temporary floor or safety belts is impractical.
- (h) First aid kits shall be made available at all times throughout the entire construction period. Arrangement shall be made to ensure medical attention for workers who have met with an accident or sudden illness at any time during the construction period.

### **2. Fire protection: the employer shall be responsible for a fire protection and prevention throughout all phases of the construction or demolishing works.**

### **3. Hand and power tools: Conditions of all hand and power tools like belts, gears, shafts, pulleys, sprockets, spindles, chains or other reciprocating, rotating or moving parts of equipments shall be maintained by the employer in a safe condition to prevent any accidents.**

4. Signs, signals and barricades: Appropriate signs and symbols shall be required to be put up at work places. Barricades shall be put up all around the construction site at all times during construction or demolishing period to deter the passage of vehicles or persons to the construction site.
5. Material handling, storage, use and disposal
  - (a) All materials stored in shall be stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling or collapse.
  - (b) Aisles and passageways shall be kept clear to provide for free and safe movement of material handling equipment and workers. Material if stored/stacked at roadside must not hinder free movement of vehicles and persons.
  - (c) The areas used for construction shall be kept in good repair to ensure safe movement of vehicle or person.
  - (d) Maximum safe load limits of floors within buildings and structures shall be conspicuously posted in all storage areas.
  - (e) Materials shall not be stored on scaffold.
  - (f) Brick stacks shall not be more than 7 feet in height and for concrete blocks they shall not be more than 6 feet high.
  - (g) All scrap timber, waste material, and rubbish must be removed from the immediate work area as the work progresses.
6. Scaffolds
  - (a) Each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied or transmitted to it.
  - (b) In case of direct connection of adjustable suspended scaffolds to roof or floor for balance, it shall be capable of resisting at least 4 times the tipping movement imposed. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope.
  - (c) Pole scaffolds over 60feet (5.6m) in height shall be designed by a registered professional engineer and shall be constructed and loaded in accordance with that design.
  - (d) The platform/scaffold plank shall be at least 15 inches (46cm) wide and 1.5 inches thick.
  - (e) The ends of platform, unless wedged, shall extend over the centerline of its supports at least 6 inches (15cm) for fully decked platform. For 10 feet or less platforms the extension should be designed and installed so that the cantilevered portion of the platform is able to support workers without tripping. Guardrails must be constructed to block the access to cantilever ends.
  - (f) The front edge of all platforms shall not be more than 14 inch (36cm) from the face of the work.
  - (g) For fully decked platform the lapped (minimum of 12inch and nailed) or abutted should be supported with separate support surface.
  - (h) Platform should not deflect more than 1/60 of the span when loaded.
  - (i) Ramp or walkway should be at least 6feet (1.8m) wide having slip resistance threads and must not be inclined more than a slope of 1 vertical and 3 horizontal.
  - (j) A rail consisting of a top and middle bar shall be provided on open sides of the ramp



scaffolds and should provide adequate handhold for employees grasping them to avoid falling.

- (k) Workers should not be made to work on scaffolds covered with snow, ice or other slippery materials except as Necessary for removal of such materials.
- (l) Workers should not be made to work on the scaffolds during storm or high wind.
- (m) Makeshifts devices and ladders shall not be used on top of scaffolds to increase the working level height for workers.
- (n) While working on roof, roofing brackets shall be constructed to fit the pitch of a roof. A catch platform shall be installed below the working area of roof where the height is more than 16 feet above the ground level and the roof slope is more than 4/12. The worker shall wear the safety belt all the time while working on truss/roof.
- (o) The rope used to securing brackets and scaffolds or as an anchorage shall be damage free and strong.

#### 7. Excavations

- (a) Excavated earth must be stacked away (at least 2 feet) from the pit to avoid from falling back or rolling into the excavation and burring the workers or injuring the workers from rolling loose rock unless a protective barricades/retaining devices is provided to prevent falling earth.
- (b) When the adjoining building/structure is endangered by excavation operation, support systems such as shoring, bracing or underpinning shall be provided to ensure the stability of such structures.

#### 8. Electrical works

- (a) All Electrical equipment and installation shall be constructed, installed and maintained by a competent person, and so used as to guard against risk of electrical shocks and electrocution.
- (b) Adequate steps shall be taken to ascertain the present of and to guard against dangers to workers from any live electrical cable, which may be under, on or above the construction site.

#### 9. Sanitation and Hygiene

- (a) Facilities such as toilets, drinking water, and waste bins shall be adequately installed at the workplace.

## Annex 7: Format for Safeguard Eligibility and Impacts Screening for Sub-components

### PART 1: BASIC INFORMATION

1	Sub-component name	
2	Type of construction:	New activity <input type="checkbox"/> Rehabilitate <input type="checkbox"/>
3	Project location:	
	Chiwog/Village:	
	Gewog: Dzongkhag:	
4	Design Parameters (area/length)	
5	Preparation period	
6	Construction	
7	Project completion and operation	
8	Is construction carried out in rainy season?	
9	Acquired land area (acres)	
10	Total investment capital	

(Move to Part 2 after filling in all information in the table above)

### PART 2: ELIGIBILITY SCREENING

No.	Screening Questions	Yes	No	Comments/Explanation
	<i>Would the project activity be?</i>			
1.	Located or disturb a land area located within 5 kilometers from any primary forest, protected areas, national parks, nature reserve, specialized forest, areas biologically importance?			
2	Located or disturb areas of critical natural habitats, breeding ground of known rare/endangered species?			
3	Disturb areas having landscape or historical values?			
4	Require relocation of any known physical cultural resources such as			
	a <i>Lhakhangs, Chortens, Mani Dungkors</i>			
	b <i>Duthrues</i> (Cremation grounds)			
	c    Statues, monuments, historical sites,			
	d    Community cultural centre			
	e    Buildings, sacred trees or objects having spiritual values to local communities			

Notes:

- If all answers are “No”, project activity is eligible and move to Part 3

- If at least one question answered as “yes”, the project activity is ineligible and the proponent can reselect the site of project activity and do screening again.

### PART 3: IMPACTS SCREENING

Answer the questions below and follow the guidance to describe the potential impacts

No. S	Yes	No	Description of the potential impacts
<b>1. PRE-CONSTRUCTION PHASE</b>			
	<i>Will the project activity</i>		<i>(the texts below are guidance)</i>
1.1	Require <i>Land acquisition</i> for construction and or worker’s camp, construction materials loading and storage, etc.?		(Guidance: provide the information below) Total land area to be acquired: <ul style="list-style-type: none"> <li>• Permanently:      Temporarily:</li> </ul> In which: <ul style="list-style-type: none"> <li>• Public land:      Private land:</li> </ul>
1.2	<i>Loss or damages to trees and existing vegetation cover due to site clearance, machinery operation or disposal of excavated materials?</i>		<ul style="list-style-type: none"> <li>• Number of trees to be cut down:</li> <li>• Total land area of vegetation cover removed:</li> </ul>
<b>2. CONSTRUCTION PHASE</b>			
2.1	<i>Disturb vegetation cover or damage trees at construction sites, or other areas disturbed during construction phase</i>		Observe the area and describe where existing vegetation cover, trees will be affected during construction phase:
2.2	<i>Cause increased level of dust and noise?</i>		Identify source of dust and noise: loose construction materials, soil, and sand blown by wind. Assess Level of impacts depends on weather (wet/dry), number and distance of houses from sites.
2.3	<i>Generate smoke and smell (cause pollution, health impacts)</i>		Identify possible sources: fuel burning, vehicle exhausts, toilets, domestic wastes from camp kitchen  Assess level of impact: consider duration, intensity of smoke/smell taking into account wind directions
2.4	<i>Cause ground vibration (Cause nuisance to community, damages to weak existing objects and infrastructure)</i>		Identify sources: ground compaction (roadwork’s, storage, drilling)  Level of impacts: intensity of compaction, and strength of existing infrastructure

No. S		Yes	No	<i>Description of the potential impacts</i>
2.5	<i>Pollution of soil and water sources (From waste and wastewater generation, excavated soil, acid sulphate soil, construction, packaging materials, domestic and sewerage wastes generated by the workers)</i>			Identify sources of waste and wastewater generation, such as construction site, worker camps and quantify the waste/wastewater for assessing the level of impact, taking into account the distance from source to receptor (e.g. water bodies).  Leakage of oil stored at the site may also cause soil and water pollution
2.6	<i>Localized flooding related to disturbance to existing drains, changes in ground elevation etc.</i>			Localized flooding may occur if existing/natural drainage path is blocked or disrupted.  Consider the issues at construction sites, camps, borrow pits, quarries and disposal sites.  If materials are bought from existing licensed borrow pits and quarries, the issues would not be considered in the project
2.7	<i>Sedimentation in areas next to construction site as surface runoff wash away loose materials from construction sites?</i>			Loose construction materials and excavated soil may be blown by wind or washed away by surface water runoff and cause sedimentation in existing drains
2.8	<i>Damage or interrupt operations of existing infrastructure (drain, power line, roads, etc.)</i>			If not avoided, some project activities (road rehabilitation, construction of large storage facility) sited in areas where power line, irrigation canals, drains, roads, etc. exist, they may be affected or cause blockage
2.9	<i>Cause loss or damage to physical cultural resources, such as cremation sites, historical objects/structures, temples, religious sites (Ney), sacred trees, objects of spiritual important to communities, etc.</i>			If not avoided, some activities (road rehabilitation, construction of large storage facility, etc.) may cause loss or damages to physical cultural resources such as temples, chortens, mani dungkors, Neys, sacred trees, etc.  Construction activities may also cause dust, noise, and visual impacts to these sites.

No. S		Yes	No	<i>Description of the potential impacts</i>
2.10	<i>Disturb farming activities due to the presence of workers and machineries at the site, damages to crops:</i>			If construction takes place agriculture area, construction materials, waste, wastewater and surface runoff from construction sites, camps may enter rice or plantation nearby disturbed areas and cause loss or harm to plants, trees The presence and movement of machinery, construction materials, workers may disrupt access to or affect farming activities
2.11	<i>Social disturbance due to construction activities and the presence of workers in the project area</i>			Dust, noise, vibration from construction or interactions between workers with local people may cause nuisance and conflict between the workers and local community. In some cases, workers may also involved in “social evils” in the project areas such as gambling, drinking, drugging, etc. to have bad impacts on local people, particularly where ethnic minority groups present.
2.12	<i>Safety and health risks for workers (loading and unloading of construction materials, excavated areas, fuel storage and usage, electrical use, machinery operations etc, adequacy of accommodation etc.)</i>			There are some safety risks for workers related to transportation and loading of construction materials, working high above the ground or in canals where slops are unstable, machinery operations, electrical uses for office, camp and construction
2.13	<i>Safety risks for community (related to loading and unloading of construction materials, excavated areas, fuel storage and usage, electrical use, machinery operations etc, adequacy of accommodation etc.)</i>			If local people presence at or near construction site, they would be exposed to safety risks related to construction
2.14	<i>Disturb traffic and/or cause traffic safety risks</i>			Rehabilitation of access road to farms may disrupt traffic. Transportation of construction materials and wastes, temporary loading of materials in other sub-components may also disrupt traffic and/or cause traffic safety risks
2.15	<i>Others (specify)</i>			<i>Identify and describe site-specific and type-specific issues, concerns, risks, potential impacts</i>

No. S		Yes	No	Description of the potential impacts
<b>3. OPERATION PHASE</b>				
3.1	Cause dust, noise during operation phase (e.g. from pumps)			Dust and noise along access roads
3.2	Safety risks for community			(Considers those related to electrical poles, falling into canals, traffic safety etc)
3.3	Water pollution?			
	Others impacts (specify)			

### Screening Conclusions.

- (i) Main environmental issues are:.....
- (ii) Permits/ clearance needed are: .....
- (iii) Main social issues are. ....
- (iv) Land acquisition and involuntary resettlement (permanent or temporary) if any;
- (v) Further assessment/ investigation needed and next step.
  - a. Need for any special study:.....
  - b. Preparation ESMP (main issue to be addressed by the ESMP):.....
  - c. Need for IEE or EIA:.....
  - d. Any other requirements/ need/ issue etc:

<p><b>Screening Tool Completed by:</b></p> <p>Signed: _____</p> <p>Name: _____</p> <p>Title and Date: _____</p>	<p><b>Screening Tool Reviewed by:</b></p> <p>Signed: _____</p> <p>Name: _____</p> <p>Title and Date: _____</p>
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**Annex 8: Initial Environmental Examination (IEE) Form**

- General Information

- Name of the project:
- Proposal for new project/expansion of existing project:
- Name of the project proponent with following details
  - i) Name of the applicant:
  - ii) Address:
  - iii) Phone/Fax:
  - iv) Email:

- Location of the project (Dzongkhags/ Geogs/ Thromdeys): *Thimphu Thromdey*
- Geographical details

i) Latitude

ii) Longitude

iii) Elevation above Mean Sea Level

- Cost of the project:

- Does the project falls in Notified Industrial Area/Estate (Yes/No): *No*
- If yes, then:

1. Total land required for the project (in ha):

If no, then:

2. Describe the total land requirement as well as the current land use pattern of the proposed project site under the following headings:

- Agricultural
- Government
- Forest
- Private
- Others





Total

3. If it is private land, and if land acquisition is involved then

- Number of families or households likely to be displaced: *NA*
- Number of houses likely to be demolished: *NA*

- Alternative sites considered (not applicable for projects coming in notified industrial area/state)
  - i) *None*
  - ii) \_\_\_\_\_
  - iii) \_\_\_\_\_
  - iv) \_\_\_\_\_

State the reasons for selecting the proposed site:

- Describe whether proposed land use is as per approved Master Plan/ Development plan of the area. If there is no approved plan, the consent from appropriate authority should be taken and should be submitted along with IEE form or at the time of Environmental Clearance. If an area is outside municipal limits/ outside planning area, a full justification for the proposed development should be provided.
- Describe the terrain characteristic at the project site and in surrounding area:
- Presence of any of the following within the study area (core and buffer area) of the project
  - i) River
  - ii) Spring, stream, water crossing
  - iii) Flood plain, if applicable
  - iv) Forest, then status of forest
  - v) Wildlife Habitat
  - vi) Habitat of endangered/threatened/endemic species
  - vii) Others

*None*

- Presence of any of the following within the study area (core and buffer area) of the project
  - 1. Historical site
  - 2. Defense installation
  - 3. Hospital
  - 4. Presence of religious site or archaeological site
  - 5. Any others sensitive receptors

*None*

*Note: The Study area will be decided by NECS/CA*



- Is the proposed site located in a low-lying area?

Yes  No

If yes,

- Level before filling (above MSL, in meters)

\_\_\_\_\_

- Level after filling (above MSL in meters)\_\_\_\_\_

Quantity of Fill Material required (in cum.)	Source

- Does the project require cutting of trees?

Yes

If yes, please furnish the following details:

- How many trees are proposed to be cut?

- Species of the above trees

- Are there any protected/endangered species?

Yes  No.

If yes, provide details.

- Numbers of vehicles likely to be increased during project's construction/operation, if applicable:

- Description of existing infrastructure such as, roads, educational facility, health centre, other industries, commercial area etc. in the project study area

- Project details

- Type of project (industrial/commercial/residential/ waste management etc)

- Describe the project activities

- Technology to be used

- Provide the following details, wherever it is applicable
  - Total site area: 27007 sq feet
  - Total built up area (provide area details) and total activity area:
  - Source of water and total water requirement (m<sup>3</sup>/day)
  - Source of energy and total energy requirement
  - Parking/Stockyard requirements
- Describe the list of raw materials to be used in the manufacturing process, their daily consumption, sourcing, and methods of storage.
- Describe list of hazardous chemicals, toxic or inflammable substances (including carcinogenic materials) to be used in the process, if yes, then specify
  - Type of material
  - Daily requirements
  - Storage methods
  - Details of waste types (solid/liquid and gas) including the quantity and characteristic of waste, if any.
- Employment potential in term of numbers, during construction and operational stage including the daily or average working hour:

**Table 1: Sensitivity of the project site and adjoining areas**

S.No	Information/Checklist confirmation	Yes/No	Distance from the project site with proper explanation and provide supporting documents wherever applicable
	Protected areas under international conventions, national or local legislation for their ecological importance		
	Project will affect the access of people to common resources. For example, the site was initially used as common grazing land, or fishing pond, or source of revenue for local community/ community forests etc.)		
	Risk to aquatic flora and fauna due to release of wastewater		
	Project site or adjoining areas used as routes by the public/tourists /pilgrims to access recreational/tourist site or pilgrimage areas in the vicinity		
	Project site or adjoining areas occupied by sensitive man-made land user (schools, park, playground/religious site/community facilities)		A Private school located on the northern side about 70 meters apart but is separated from the site by a road.
	Project site or adjoining areas already subjected to pollution or environmental damage. (Where existing legal environmental standards have exceeded)		
	Areas susceptible to natural hazard such as earthquakes, subsidence landslides, erosion, flooding or extreme or adverse climatic conditions	No	

**Table 2: Change in physical structure (topography, land use, changes in water bodies, etc.) due to construction and operation of the development project**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data/ provide explanations, wherever applicable.
	Potential to cause permanent or temporary change in land use, land cover or topography.		
	Will the project involve clearance of existing land vegetation?		
	Will the project involve demolition of the existing structure?		
	Will the project operation/activities trigger land disturbance, erosion, subsidence and instability		
	Will the project involve construction of new road during construction and operation?		
	Will the project involve closure or diversion or realignment of existing natural drain?		
	Potential to increase influx of people either temporarily (workers) or permanently to an area?		<i>Temporarily by project construction workers</i>
	Will the project involve abstraction or transfers of water from ground or surface water?		

**Table 3: Use of resources for construction or operation of the project (such as land, water, materials or energy)**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	Expected quantity of water to be used by the project during construction and operation including source of water		
	Expected Quantity of construction materials to be used – stone, aggregates and soil (in MT) and mode and place of sourcing.		
	Energy requirement – electrical energy (in kWh) and fuel (coal, gas, diesel others in tons) and mode of sourcing.		
	Any other resources (use appropriate standard units)		

**Table: 4 Production of solid wastes and liquid during project construction and operation**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	Will the project have potential to generate solid wastes, if yes,		

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	then specify types and quantity of wastes, wherever it is applicable		
	Will the project have potential to generate sewage sludge, wastes such as domestic and commercial wastes		
	Will the project have potential to produce hazardous waste from process, treatment plant and other allied activities?		
	Any other wastes (specify)		

**Table: 5 Air pollution and emissions**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	Location of project in an industrialized area where there are other sources of air pollutants		
	Will the project have potential to alter ambient air quality during construction and operation?		
	Emissions from production processes and/or utilities, specify the type of pollutants, if applicable.		
	Potential to generate odour from handling, storage, process and operation of pollution control equipment.		
	Emissions from incineration of waste, if applicable. If yes, specify the type of pollutants.		
	Potential to generate fugitive emissions		
	Potential to release gaseous pollutants, if yes, then specify		
	Will the project have potential to release toxic gas from handling, transport, storage and its use?		
	Any other emissions, specify		<i>There will be dust pollution due to physical construction activities</i>

**Table 6: Generation of noise**

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data/ provide explanations, wherever applicable.
	Will the project have potential to alter the ambient noise due to the following listed activities	<i>Yes</i>	<i>But not beyond noise levels in urban areas.</i>

S.No	Information/Checklist confirmation	Yes/No	Details thereof (with approximate quantities /rates, wherever possible) with source of information data/ provide explanations, wherever applicable.
	<ul style="list-style-type: none"> <li>✓ Construction of project</li> <li>✓ Plant operations</li> <li>✓ Increase in traffic</li> </ul>		<p><i>Noise generated would be from construction activities such as unloading of materials, worker presence and use of machines for material management</i></p> <p><i>Marginal and Intermittent traffic increase foreseen due to transport of materials for construction but not on a continuous basis</i></p>
	Will the project have potential to increase the risk of occupational noise hazard or cause disturbance to adjoining human settlements?		<i>Adjoining settlements are well separated from the site by physical or natural barriers. Minimal disturbance is foreseen.</i>
	Any other potential sources that may cause occupational hazard specify.		

**Table 7: Risks of contamination of land or water from release of pollutants into the sewers, surface waters and groundwater**

S.No	Information/checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	Located in potential erosion/landslide prone area		
	Will project activities increase the sediment load in the local water bodies?		
	Potential to contaminate land and water due to handling, transport, storage of raw material/chemical or hazardous substances		
	Discharge of sewage or other effluents to water or land (Expected mode and place of discharge)		
	From any other sources, specify		

**Table 8: Risk and disaster**

S.No	Information/checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	Activities/operations or processes leads to fire risk/ explosion/ electrocution and others.		
	Risk of road accident		
	Any other risk, specify		

**Table 9: Information on Socio-economic environment**

S.No	Information/checklist confirmation	Yes/No	Details thereof (with Approximate quantities /rates, wherever possible) with source of information data/ provide explanations, Wherever applicable.
	Will the project involve land acquisition?		<i>Land use right from NLC already accorded from government land</i>
	Will the project impacts the common/local community resources such as grazing land, fishing area, source of drinking water, play ground, recreational place, religious or historical site etc.		
	Project would likely to improve the social infrastructure of an areas (schools, hospitals and roads)		<i>Marginally as the all nearby area already have good accessibility</i>
	Will the commissioning of project significantly improve the lifestyle and increase employment opportunities?		

- List of documents to be attached with this IEE form:

1	Layout plan of the project
2	Summary of the project proposal
3	No objection certificate from various departments and others relevant stakeholders (applicable if EA is not required)
4	Environment Management Plan (applicable if EA is not required)

- Declaration certificate stating with name & signature of project proponent

Seal:

Signature of the project proponent

Name:

Address:

Phone:

Date:

## **Annex 9: Outline of ESMP and its Contents**

**A) Introduction:** This should provide brief but concise information on:

- ESMP context: describe how the ESMP fits into the overall planning process of the project, listing project activity environmental studies.
- ESMP's conNECStion with the ESMF (if relevant) and the project.
- Project specific objectives of the ESMP: describe what the ESMP is trying to achieve. The activity-specific ESMP shall form part of the project contract specifications.

**B) Project description**

The project/activity objective and description should be provided in sufficient detail to define the nature and scope of the project. These should include:

- Project location: site and activity location should be described including location maps
- Construction/operation activities: the description of construction and operation processes; employment numbers and type; the plant and equipment to be used; the location and site facilities and worker camps; bill of quantities for civil works.
- Timing and scheduling: anticipated commencement and completion dates should be indicated. If the project is to be completed in stages then separate dates for each stage should be provided.

**C) *Baseline data***

This should provide key information on the environmental background of the project activities. Focus should be given to provide clear data on topography, major land use and water uses, soil types, flow of water, and water quality/pollution, noise levels. Brief description on socioeconomic condition and environment (if relevant) should also be provided. Photos showing existing conditions of project sites should be included.

**D) Potential impacts and mitigation measures**

An ESMP identifying specific activity potential impacts and corresponding mitigation measures referring to ECOP, if available, should be developed for this Section.

**E) Monitoring**

Monitoring of ESMP implementation would encompass environmental compliance monitoring and environmental monitoring during project implementation as described in details below:

**Environmental and Social compliance monitoring:** this should be the responsibilities of Site supervisors, DDM/DHMS/DOA and benefited Dzognkhags.

**F) ESMP Implementation arrangements:** Institutional Arrangements should be in line with the ESMF. Discussions should cover the following aspects:

- Responsibility for ESMP implementation.
- Incorporation of ESMP into detailed technical design and bidding and contractual documents.
- Environmental and social compliance framework.
- Reporting procedures.

**G) Institutional Strengthening Plan:**

The institutional strengthening plan (capacity building along with the proposed budget) is elaborated in subsequent section)

**H) Estimated Budget for ESMP Implementation:**

Conventionally the costs of implementing ESMP are estimated individually to each sub-component activity on determining need of the ESIA and environment clearance and also the complexity nature of the activity. When a mitigation measure is incorporated into engineering design, it becomes easier to estimate the cost of the ESMP.

**I) Consultation, Disclosure of the ESMP:**

Described the consultation and disclosure activities carried out during sub-component implementation as guided in the ESMF.



## Annex 10: Responsibilities for Implementation of ESMF

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
Procurement and installation of wind profiler system at the Paro International Airport	Site identification	Agree on the site for installation with Bhutan Civil Aviation Authority	DHMS, Focal Person and DCA
	Site Selection	<p>Avoid acquisition of private land, to the extent possible</p> <p>Seek Clearances from relevant government authorities for acquiring 'user rights' for land</p> <p>Avoid areas where there are cultural sites of national importance</p> <p>Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</p> <p>If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</p>	DDM, Focal Person, Specialist
	Land acquisition	<p>Screening checklist to identify need for additional land.</p> <p>If land acquisition unavoidable, identify impacts in accordance with 'Policy Guidance on Land Acquisition'</p> <p>Clearances from relevant government authorities for acquiring 'user rights' for the land</p> <p>Alternate arrangement for forest dependent communities</p> <p>Land substitution and/or cash compensation</p>	DDM & Focal Person
	Process Environment Clearance (Screening/IEE/E SMP)	<p>Assess the potential impacts of helicopter operation on human health and safety</p> <p>Consult with local communities prior to the installation Inform community about the benefits as well as risks associated with wind-profilers</p> <p>Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase</p> <p>Fill up Project Screening and seek Environment Clearance (EC) from NECS</p> <p>If the NECS recommends for IEE, the Environment and</p>	DHMS, Focal Person and Specialist

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
		Social Safeguards Specialist prepares the IEE which include ESMP. DHMS submits the IEE to NECS along with the clearance from DCA	
	Environment Clearance	Evaluation of screening and if required IEE Issue of EC with terms and conditions Compliance monitoring	NECS supported by the Focal Person
	Procurement	Specification and tender document for supply of wind profiler	DHMS
	Installation	Installation works at Paro airport Avoid removal of trees Carry out plantation works in the vicinity to replace removed trees	DHMS
	Monitoring and reporting	Self-regulatory monitoring and monthly report to Focal Person	DHMS
		Quarterly report compliance reporting to the PSC	Focal Person
		Annual compliance report to NECS	PSC, Focal Person
Procurement and installation of Aviation Weather Observing System (AWOS) at Paro airport	Site identification	Agree with Bhutan Civil Aviation Authority installation of AWOS in the existing AWOS site within Paro International Airport premise	DHMS, DCA
	Process Environment Clearance (Screening/IEE/ESMP)	Assess the potential impacts of AWOS on human health and safety Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase Fill up Project Screening and seek Environment Clearance (EC) from NECS . If the NECS recommends for IEE, the Environment and Social Safeguards Specialist prepares the IEE which include ESMP. DHMS submits the IEE to NECS along with the clearance from DCA	DHMS, Focal Person and Specialist
	Procurement	Specification and tender document for supply of AWOS	DHMS,
	Installation	Installation works at Paro airport	DHMS,
	Monitoring and reporting	Self-regulatory monitoring and monthly report to Focal Person	DHMS
		Quarterly report compliance reporting to the PSC	Focal Person, Specialist

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
		Annual compliance report to NECS	PSC, Focal Person, Specialist
Procurement and installation of ceilometer at Paro International Airport and Bumthang Domestic Airport	Site identification	Agree on the site for installation in Paro airport as well as in Bumthang airport with Bhutan Civil Aviation Authority	DHMS, Focal Person and DCA
	Site Selection	<p>Avoid acquisition of private land, to the extent possible</p> <p>Seek Clearances from relevant government authorities for acquiring 'user rights' for land</p> <p>Avoid areas where there are cultural sites of national importance</p> <p>Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</p> <p>If cultural resources are identified, select another site for installation</p> <p>If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</p>	DHMS & Focal Person
	Land acquisition	<p>Screening checklist to identify need for additional land.</p> <p>If land acquisition unavoidable, identify impacts in accordance with 'Policy Guidance on Land Acquisition'</p> <p>Clearances from relevant government authorities for acquiring 'user rights' for the land</p> <p>Alternate arrangement for forest dependent communities</p> <p>Land substitution and/or cash compensation</p>	DHMS & Focal Person
	Process Environment Clearance (Screening/IEE/E SMP)	<p>Assess the potential impacts of ceilometer beams on migratory birds</p> <p>Assess potential hazards of ceilometer on human health and safety</p> <p>Consult with local communities prior to the installation</p> <p>Inform community about the benefits as well as risks associated with ceilometers</p>	DHMS, Focal Person and Specialist

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
		<p>Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase</p> <p>Fill up Project Screening and seek Environment Clearance (EC) from NECS</p> <p>If the NECS recommends for IEE, the Environment and Social Safeguards Specialist prepares the IEE which include ESMP.</p> <p>DHMS submits the IEE to NECS along with the clearance from DCA</p>	
	Environment Clearance	<p>Evaluation of screening and if required IEE</p> <p>Issue of EC with terms and conditions</p> <p>Compliance monitoring</p>	NECS supported by the Focal Person
	Procurement	<p>Specification and tender document for supply of wind profiler</p> <p>Assess the potential impact on migratory birds</p> <p>Choose technology with minimal affect (Rotating beam ceilometers have no visible impact on migration of birds)</p>	DHMS Focal Person Specialist
	Installation	<p>Installation works at Paro airport</p> <p>Avoid removal of trees</p> <p>Carry out plantation works in the vicinity to replace removed trees</p>	DHMS
	Monitoring and reporting	Self-regulatory monitoring and monthly report to Focal Person	DHMS
		Quarterly report compliance reporting to the PSC	Focal Person
		Annual compliance report to NECS	PSC, Focal Person
Construction and Establishment of NEOC in Thimphu Thromdey	Site Assessment	Avail geotechnical and geo-physical assessment report from DGM before preparation of architectural & structural design (TDCR, 2004)	DDM, Focal Person, DGM
	Design	Recruit accredited architects and those approved by Thimphu Thromdey for the design of the building (BBR, 2002)	DDM
	Process Environment Clearance (Screening/IEE/E	Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase	DDM, Focal Person and Specialist

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
	SMP)	<p>Fill up Project Screening format and seek Environment Clearance (EC) and Development Consent from Thimphu Thromdey</p> <p>If the NECS recommends for IEE, the Environment and Social Safeguards Specialist prepares the IEE which include ESMP.</p> <p>DHMS submits the IEE to Thimphu Thromdey</p> <p>Secure prior permission for use of public street /road./water and electrical connections</p>	
	Environment Clearance	<p>Evaluation of screening and if required IEE</p> <p>Issue of EC and Development Cosnsent with terms and conditions</p> <p>Compliance monitoring</p>	Thimphu Thromdey supported by the Focal Person
	Construction	Integrate site waste management with Thromde waste collection system	DDM
		<p>Construct drainage around the construction site (EAGG, 2012)</p> <p>Plantation of trees in slide prone areas</p> <p>Erect local retention walls to prevent drainage, soil erosion/landslides</p> <p>Construct drainage around the construction site (EAGG, 2012)</p> <p>Provide water spraying system at the site to suppress dust (EAGG, 2012)</p> <p>Traffic management plan to be prepared by the contractor</p>	Contractor
	Labour related issues	<p>Ensure that no underage workers, or children are present on the construction site, either as employees, guests, or as dependents of legal employees. (TDCR, 2004)</p> <p>Install/erect signage at the site</p> <p>Develop Code of conduct for workers and ensure close supervision by the contractor (BBR 2014)</p> <p>Install waste bins around construction sites and worker camps (ROHSW, 2006)</p> <p>Provide safe drinking water and medical facility for workers (EAGG, 2012)</p>	Contractor

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
		<p>Construct temporary toilets for the workers</p> <p>Provide clear instruction to workers to avoid obstructing traffic flow to the extent possible</p> <p>Provide respiratory protection devices to workers (ROHSW, 2006)</p> <p>Restrict noise-prone activities in the night between 10 PM and 6 AM, to minimize impacts (EAGG 2012)</p>	
	Monitoring and reporting	Self-regulatory monitoring and monthly report to Focal Person	DDM
		Quarterly report compliance reporting to the PSC	Focal Person
		Annual compliance report to NECS	PSC, Focal Person
Procurement of 2 portable helicopter fuelling stations	Procurement	<p>Specification prior to procurement to include measures that ensures no fuel spillage and adulteration of fuel; appropriate metal construction and design, mounting, securing arrangement and electrical fittings should be certified safe.</p> <p>The fuel station should be equipped with appropriate fire extinguisher</p> <p>Follow Aviation Fuel Handling and Quality Control Procedures Manual, August 2008.</p>	DDM/BHSL
	Clearance	Clearance from department of Industries prior to procurement	DDM/BHSL
Establishment of 10 helipads	Site identification	Agree on appropriate site in all 10 Dzongkhags with the Local Administration, Bhutan Civil Aviation Authority and the DDM	DDM, Focal Person, DCA, Local Administration
	Site Selection	<p>Avoid acquisition of private land, to the extent possible</p> <p>Avoid areas where there are cultural sites of national importance</p> <p>Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</p> <p>If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</p> <p>Avoid acquisition of private land, to the extent possible</p> <p>Seek Clearances from relevant government authorities for acquiring 'user rights' for land</p>	DDM, Focal Person, Specialist, BHSL

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
		<p>Avoid areas where there are cultural sites of national importance</p> <p>Apply screening checklist to ensure that the selected site does not affect cultural resources of local significance</p> <p>If cultural resources are present within 100 meters of the identified site, select another site for installation or seek clearance from the Department of Culture.</p> <p>Where possible, select sites that have large open grounds to enable emergency operations and to accommodate a weather station (temperature, relative humidity, windspeed/direction, and ideally, a remote camera, before they launch is invaluable for disaster response operations) and space on site or directly adjacent to the site to accommodate structure for supply and distribution of goods for or from the flight.</p> <p>Select sites that are far enough outside the town that people will not be able to gather quickly and create a safety hazard and that noise level impact is low</p> <p>However, the site must be close enough to a town so that supplies can easily be carried by foot into the town.</p> <p>Maintain minimum TLOF dimension (length, width) of 1 RD (Rotor Diameter) of the helicopter but not less than 12 m</p> <p>Maintain minimum FATO dimension (length, width) of not less than 1.5 OL (overall length) of helicopter</p> <p>Ensure that there existence or possibility for road access, water and power connections.</p> <p>Ensure that the site is not prone to hazards such as landslide, forest fire, flood, etc.</p>	
	Land acquisition	<p>Screening checklist to identify need for additional land.</p> <p>If land acquisition unavoidable, identify impacts in accordance with 'Policy Guidance on Land Acquisition'</p> <p>Clearances from relevant government authorities for acquiring 'user rights' for the land</p> <p>Alternate arrangement for forest dependent communities</p> <p>Land substitution and/or cash compensation</p>	DDM & Focal Person
	Process	Assess the potential impacts of helipad operations on	DDM,

Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
	Environment Clearance (Screening/IEE/E SMP)	<p>human health and safety, particularly of noise levels</p> <p>Consult with local communities prior to the installation Inform community about the benefits as well as risks associated with helipad</p> <p>Establish robust grievance redress mechanism to address any complaints/grievances arising during implementation and operation phase Fill up Project Screening and seek Environment Clearance (EC) from NECS</p> <p>If the NECS recommends for IEE, the Environment and Social Safeguards Specialist prepares the IEE which include ESMP. DHMS submits the IEE to NECS along with the clearance from DCA and Local administration (Dzongkhag or Thromdey)</p> <p>Seek administrative clearance from the concerned Dzongkhag or Municipal Administration</p>	Focal Person and Specialist
	Environment Clearance	<p>Evaluation of screening and if required IEE</p> <p>Issue of EC with terms and conditions</p> <p>Compliance monitoring</p>	NECS supported by the Focal Person
	Construction	Integrate site waste management with local waste collection system	DDM
		Construct access road to the helipad	
		Establish water supply and electrical connections to the site	
		<p>Provide water spraying system at the site to suppress dust (EAGG, 2012)</p> <p>Structures within 5000 feet must be marked (NEMSPA Safety Regulations<sup>3</sup>)</p> <p>Maintain a minimum of 6-inch thick (15 cm) cement pavement or thicker to support operations by helicopters weighing up to (9,070 kg) or larger.</p> <p>Do not use asphalt for the TLOF, (helicopters can sink into asphalt during hot weather) (NEMSPA Safety)</p>	Contractor
	Labour related issues	Ensure that no underage workers, or children are present on the construction site, either as employees, guests, or as dependents of legal employees. (TDCR, 2004)	Contractor

<sup>3</sup> National EMS Pilots Association - a professional organization dedicated to serving pilots involved in the air-medical transport industry, and to improving the quality and safety of those services (<http://www.nemspa.org/>).



Sub-components	General Responsibilities	ESMF - Specific Responsibilities	
		Activities	Responsible Agency
		<p>Install/erect signage at the site</p> <p>Develop Code of conduct for workers and ensure close supervision by the contractor (BBR 2014)</p> <p>Install waste bins around construction sites and worker camps (ROHSW, 2006)</p> <p>Provide safe drinking water and medical facility for workers (EAGG, 2012)</p> <p>Construct temporary toilets for the workers</p> <p>Provide clear instruction to workers to avoid obstructing traffic flow to the extent possible</p> <p>Provide respiratory protection devices to workers (ROHSW, 2006)</p> <p>Restrict noise-prone activities in the night between 10 PM and 6 AM, to minimize impacts (EAGG 2012)</p>	
	Monitoring and reporting	Self-regulatory monitoring and monthly report to Focal Person	DDM
		Quarterly report compliance reporting to the PSC	Focal Person

## Annex 11: Format for Environmental Compliance Monitoring

Project Activity/Contract package:

Monitoring Officer:

Name:                      Mobile phone number                      email

Date reporting:

	<b>Environmental issues</b>	<b>Description of Mitigation Measures implemented</b>	<b>Evaluation 1=good; 0 = acceptable; -1 = bad</b>
1	Dust, smoke		
2	Noise, vibration		
3	Disturb vegetation cover, cut trees		
4	Waste generation		
5	Water pollution		
6	Localized flooding		
7	Traffic disturbance		
8	Public health and safety		
9	Damages or disrupt operations of existing infrastructure		
10	Disturb Socio economic activities		
11	Social impacts related to mobilization of workers to the site		
12	Impacts on physical cultural objects		
	Others (specify)		

Signature

Name and Designation

Name of the CA

## **Annex 12: Terms of Reference for Environment and Social Safeguards Specialist (Draft)**

POST TITLE: Environment and Social Safeguards Specialist  
PROJECT NAME: Bhutan Weather and Disaster Improvement Regional Project  
PLACE OF POSTING: Department of Disaster Management, Ministry of Home and Cultural Affairs, Thimphu, Bhutan

Requirement of Environmental and Social Safeguard Specialist:

The World Bank is supporting the Royal Government of Bhutan to strengthen its capacity for improved weather and hydrological forecasting and disaster related early warning systems through the Bhutan Weather and Disaster Improvement Regional Project. In this context, the project aims to strengthen the capacity of the Department of Hydromet Services (DHMS), under the Ministry of Economic Affairs, the Department of Disaster Management (DDM) and the Department of Agriculture (DoA), Ministry of Agriculture and Forests, yielding benefits both at national and regional levels. The project has the following components:

- Component A (Strengthening Weather and hydrological forecasting and Services) will support the strengthening of meteorological and hydrological forecasting, improving IT infrastructure for enhancing meteorological and hydrological forecasting, strengthening glacier monitoring, establish a Common Alert Protocol for automated hydro-met services delivery and Institutional Capacity Strengthening inclusive of project management, regional collaboration, monitoring and evaluation of the project.
- Component B (Strengthening Disaster Preparedness) will support establishment of a DRM Geomatics system, Establishment of a National Emergency Operations Centre (NEOC) including equipment for District Disaster Management Offices for emergency communications and coordination, Strengthen emergency response (portable helicopter fuelling station and emergency landing) and Institutional Capacity Strengthening.
- Component C (Design of an agro met decision support system) will support an agro met decision support system and generation of agro met information products for two Dzongkhags including capacity building.

The Environmental and Social Management Framework (ESMF) for the project describes the principles and procedures for addressing environmental and social impacts associated with the project in accordance with RGoB's laws and regulations and World Bank's safeguards policies.

The Department of Disaster Management, seeks the services of a Environment and Social Safeguards Specialist who will support the implementation of its environmental and social safeguards framework.

The job responsibilities will include but not limited to:

- Providing support in internalizing the environmental and social issues in the sub-component planning & design and to address the potential impacts as well as to promote good practices.
- Developing a set of planning and implementation tools and guidelines for training of the officials on environmental and social safeguard. These will be used for training and reference for technical staff during implementation. The training could include providing basic knowledge and information on the key environmental and social issues associated with the sub-component activities.
- Supporting the Environmental Focal Person of the project in preparing the quarterly ESMF reports as required by the ESMF implementation and monitoring framework.
- Assist in preparing the Environmental Screening document and Initial Environmental Examination report of each sub component, where Necessary.
- Develop a strategy to build capacity within the DDM and other implementing partners in understanding environmental and social safeguards functions.
- Any other related tasks that are proactive in nature to minimize credit risks arising out of environmental issues.

#### Qualifications and Experience:

- Master's degree in Environmental Engineering/Planning/Social Science

#### Experience:

- The candidate should have at least 8 years of experience out of which two to three years of professional experience in preparation of Environmental Impact Assessments (EIA) and Environmental Management Plan (EMP) and well versed with national and local environmental regulations and compliance requirements.
- Candidates having experience in projects assisted or funded World Bank and in implementation and monitoring of Environmental Management Plans shall be given preference
- Ability to interact with and motivate/guide primary lending institutions to carry out environmental due diligence activities as related to weather related information, emergency and disaster response projects.
- Candidates are expected to possess good written and verbal communication and analytical skills, with ability to work with interdisciplinary team.

### Annex 13: List of Officials Consulted

Sl No.	Name	Designation	Organization
1	Mr. Chador Wangdi	Director	DDM
2	Mr. Chewang Gyeltshen	CEO	Bhutan Helicopter Services Limited
3	Mr. Tashi Namgyel	Engineer	DHMS
4	Mr. Pema Thinley		DDM
5	Mr. Yeshey Lotey	Engineer	DDM
6	Yehsey Choden	Environment Officer	Thimphu Thormde
7	Phuntsho	Chief	DHMS
8	Tashi		DHMS
9	Karma Tshering	Sr. Program Officer	NECS
10	Tshering Wangchuk	Program Officer	DDM
11	Mr. Tenzin Khorlo	Chief, Environment Clearance	NECS
12	Mr. Chimi Rinzin	Chief Agriculture Officer	DoA
13	Mr. Karma C Nidup	Specialist	NECS
14	Ms. Tashi	Program Officer	DDM
15	Mr. Jamyang	Engineer	DGM
16	Ms. Karma Choden Tshering	Offtg. Head	Land Management Division, National Land Commission
17	Ms. Tashi Palden	Sr. Survey Engineer	National Land Commission
18	Mr. Jigme Thinley	Focal person for Satshab	NLC