

Initial Environmental Examination

March 2014

BHU: SASEC Road Connectivity Project

Phuentsholing Mini Dry Port

Prepared by the Ministry of Economic Affairs, Royal Government of Bhutan for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 17 March 2014)

Currency unit	–	Ngultrum (Nu)
Nu1.00	=	\$
\$1.00	=	Nu

ABBREVIATIONS

ADB	–	Asian Development Bank
BOD	–	biological oxygen demand
CFO	–	Chief Forestry Officer
DO	–	dissolved oxygen
DOR	–	Department of Roads
DOT	–	Department of Trade
EAA	–	Environmental Assessment Act (2000)
EIA	–	Environmental Impact Assessment
EMP	–	Environmental management plan
ES	–	Environmental Specialist
IEE	–	Initial Environmental Examination
MDP	–	Phuentsholing Mini Dry Port
MOEA	–	Ministry of Economic Affairs
MOLHR	–	Ministry of Labour and Human Resources
MMP	–	Materials Management Plan
MOAF	–	Ministry of Agriculture and Forests
MOWHS	–	Ministry of Works and Human Settlements
PMU	–	Project Management Unit
PT		Phuentsholing Thromde
REA	–	Rapid environmental assessment
RECOP	–	Regulations for Environmental Clearance of Project 2002
RGOB	–	Royal Government of Bhutan
SPS	–	ADB Safeguard Policy Statement (2009)
SR	–	sensitive receiver
TA	–	Technical Assistance
TOR	–	Terms of Reference
TSP	–	total suspended particulate
TSS	–	total suspended solids
TOR	–	terms of reference

WEIGHTS AND MEASURES

dB (A)	decibel (A-weighted)
masl	meters above sea level
km	kilometre
km/h	kilometre per hour
m	meter
m ³	cubic meter

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EXECUTIVE SUMMARY

1. The Royal Government of Bhutan (RGOB) has requested the Asian Development Bank (ADB) to provide financing to facilitate investments to support the Phuentsholing Mini Dry Port (MDP). For the purposes of this Initial Environmental Evaluation, the executing agency (EA) for the Project has been defined as Department of Trade (DOT) under the Ministry of Economic Affairs (MEA for management and coordination of project implementation. In the event that Phuentsholing Municipality (PM) assumes the role of Executing Agency, actions under DOT as defined in this IEE would be performed by PM.
2. This report is the initial environmental examination (IEE) for the Project and complies with the provisions of ADB's Safeguard Policy Statement (SPS 2009). The IEE has been carried out to ensure that the potential adverse environmental impacts are appropriately mitigated and to present the environmental assessments for the Project. The Phuentsholing Bypass Road (MDP) will be located in and around Phuentsholing near the international border crossing facilities and the associated roads (Figure 1.1).
3. The objectives and scope of this IEE are to (i) assess the existing environmental conditions of the project area, (ii) identify potential environmental impacts from the proposed works, (iii) evaluate and determine the significance of the impacts, (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts, and (v) carry-out public consultations to document any issues/concerns and to ensure that such concerns are addressed in the project design. This IEE is submitted to ADB by the DOT and before the proposals are agreed to be financed by ADB the final IEE report will be disclosed to the public through the ADB website and to the public in Bhutan by DOT.
4. **Project Description.** The MDP is intended to provide suitable facilities for all import/export trade with Bhutan through Phuentsholing in the short to medium term. The proposed works will require construction of entrances and exits to the MDP yards and several administration and warehouse type buildings and service roads. A facility will be created to manage imports and exports with ample warehouse and other operational spaces for inspection loading and unloading. Additional special areas will be included for a weighbridge, containers transfer zone, container scanning and storage of hazardous goods. The Project will include (i) the clearing and reconstruction of drainage around the storage areas and internal roads, renewing and reconstructing drainage and culverts across the MDP site, providing better crossing drains and better perimeter drains and lead off drainage facilities (ii) earthworks to facilitate resurfacing and paving of cargo-handling areas of the existing and new MDP yards (iii) construction of warehouse sheds in the terminal yards (iv) installation of new toilet facilities with showers and cleansable septic tanks (v) installation and re-provisioning of water supply and sewerage services and (vi) installation and re-provisioning for electric power and telecommunications.
5. The proposed works will generally be within the boundaries of land designated for the MDP by DOT/PM with some additional adjacent working areas. For purposes of this IEE it is estimated that project construction will be started in 2015 and will be completed in 2017.
6. **Categorization.** The project is classified as Category B in accordance with ADB's Safeguard Policy Statement (2009), as no significant impacts are envisioned.

7. The focus of this IEE is on the key physical activities in the above outputs which would cause environmental impacts as defined by SPS, 2009. This IEE is based on field reconnaissance surveys, secondary sources of information, and public consultation undertaken specifically for this study.

8. **Implementation Arrangements.** Phuentsholing Thromde (PT) is the implementing agency and the Phuentsholing Bypass Road (PBR) will be implemented through the Project Coordination Unit (PCU). Under the PCU there will be two Project Implementation Units (PIUs) responsible for day-to-day operation of each subproject, viz. one for Phuentsholing Mini Dry Port (MDP) and Alay Land Customs Station (LCS) and one for Phuentsholing Bypass Road (PBR). Project Manager (PM) heading the PIU will be the environmental focal person for the PT at the PIU level, who is responsible for ensuring the compliance of environmental conditions of the project. Construction Supervision Consultant (CSC) hired is part of the PCU. It includes Team Leader (the Engineer) supported by Survey Engineer, Bridge Engineer, Material Engineer, Quantity Surveyor, Environmental Specialist (ES), Resettlement Specialist (RS), and resident engineers (RE) and site inspectors (SI). Each PIU will have respective RE and SI that includes MDP. RE and SI will be main the persons who will carry out the daily monitoring of construction works; and ensure the implementation of environmental mitigation measures as prescribed in the EMP, by the contractor. The contractor through its Project Manager/engineer will be responsible for submission of monthly EMP compliance report. Similarly, RE will also submit the monthly project progress report which includes the section on compliance of environmental terms and conditions. ES will carry out intermittent environmental compliance monitoring of the project to ensure the environmental mitigation measures or conditions are adequately addressed. ES will be responsible for compiling and submitting the quarterly environmental compliance report to the PT through PCU; and semi-annual report to the ADB.

9. **Policy, legal, and administrative framework.** The Project shall comply with requirements of the ADB SPS 2009 and the Government's guidelines or initiatives on implementation of Environmental Assessment Act 2000 and the Regulation for Clearance of Projects (RECOP), 2002 under the Environmental Assessment Act 2000). The National Environment Commission (NEC) delegates powers to various competent authorities including MOWHS for issuances of environmental clearance for the projects as listed under the RECOP 2002. MOWHS can issue environmental clearance (EC) for MDP based on the IEE submitted by PT.

10. **Environmental management plan.** Mitigation measures, environmental monitoring, and capacity development are required to minimize the environmental impacts in the design, construction, and operational phases.

11. The environmental management plan (EMP) is prepared to ensure the negatives impacts are mitigated to the maximum feasible extent. The EMP which will form part of the bidding and contract documents and will include: (i) waste management and spoil disposal; (ii) temporary and permanent drainage; (iii) runoff control and excavation protection; (iv) noise and dust control; (v) temporary traffic management; and (vi) worker and public safety.

12. The construction and operation of the MDP will have beneficial effects on the overall surrounding environment. The construction of MDP in combination with the construction of Phuentsholing Bypass Road will remove congestion of Phuentsholing town; improve transport efficiency through shortening of transport distance; reduce greenhouse gas emission; minimize air pollution; and improve the regional trade and commerce.

13. **Information disclosure, consultation, and participation.** The stakeholder consultation process disseminates information to all key stakeholders, including the general public and authorities, through meetings and door-to-door surveys around the project area. Information was provided on the scale and scope of the project works, expected impacts, and the proposed mitigation measures by means of consultations with local government departments, local authorities, and the general public in meetings and by surveys. The process also gathered information on relevant concerns of the authorities and local community so as to address these in the project implementation stage.

14. **Grievance redress mechanism (GRM).** A GRM will be established to receive, evaluate and facilitate the resolution of affected people's concerns, complaints, and grievances. The GRM aims to provide a time bound and transparent mechanism to voice out and resolve social and environmental concerns linked to the project.

15. **Conclusion and recommendations.** The IEE study of the proposed development of Mini Dry Port reveals that the benefits from their implementation are more significant and long term in nature; against the adverse impacts, most of which could be mitigated or avoided. Therefore, this IEE is sufficient for approval of the proposed project. This project is recommended for implementation with incorporation of mitigation measures and environmental monitoring plan.

Figure 1: Location of Phuentsholing Mini Dry Port

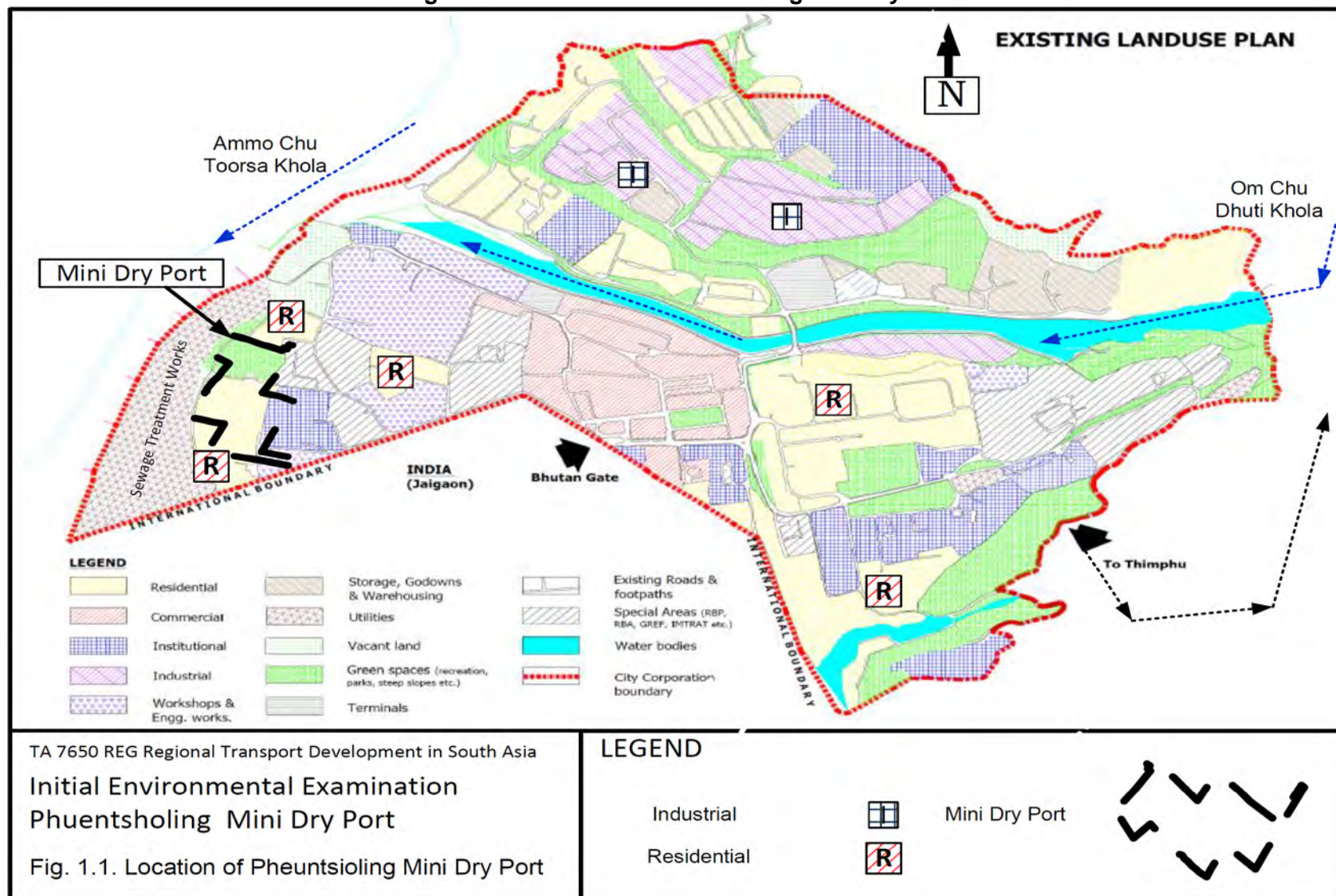


Figure 2: Locality Plan of Phuentsholing Mini Dry Port



I. INTRODUCTION

A. Project Background

1. South Asia Subregional Economic Cooperation (SASEC) involving four member countries; namely Bangladesh, Bhutan, India and Nepal; have entered into a regional cooperation to improve or develop regional trade and commerce through development of integrated land transport and related infrastructures. For Bhutan, project is identified as “SASEC Road Connectivity Project”, which includes following components or sub-projects:

- a. 68.3Km Nganglam-Deothang Highway (NDH);
- b. 1.2Km Pasakha Access Road (PAR) including Land Custom Station (LCS) at Alay;
- c. 2.8km Phuentsholing Bypass Road (PBR); and
- d. Mini Dry Port (MDP) at Phuentsholing

2. 68.3km NDH is the major components of the SASEC Road Connectivity Project; and it is classified as an Environment Category A Project in line with ADB’s Safeguard Policy Statement (SPS 2009) project classification system. The detailed Environment Impact Assessment (EIA) studies have been carried out; and accordingly the draft final EIA report has been disclosed on ADB website on 2nd December 2013. NDH is physically located at some 184km aerial distances from the other subprojects, which are located within the Phuentsholing Thromde (PT) or Municipality.

3. The three remaining subprojects – 1.2km Pasakha Access Road (PAR) including Alay Land Custom Station (LCS); 2.8km Phuentsholing Bypass Road (PBR); and Mini Dry Port are classified as Category B project requiring only the initial environmental examinations (IEE). This report presents the findings of initial environmental examination for the proposed construction of Mini Dry Port (MDP) at Phuentsholing.

B. Purpose of the Study

4. The objectives and scope of this IEE are to (i) assess the existing environmental conditions of the project area, (ii) identify potential environmental impacts from the proposed works, (iii) evaluate and determine the significance of the impacts, (iv) develop an environmental management plan (EMP) detailing mitigation measures, monitoring activities, reporting requirements, institutional responsibilities and cost estimates to address adverse environmental impacts, and (v) carry-out public consultations to document any issues/concerns and to ensure that such concerns are addressed in the project design. The IEE is done under the guidance of the policies of the Asian Development Bank (ADB) and the Royal Government of Bhutan (RGoB) and includes chapters on description of the project, environmental impacts and mitigation measures, mitigation and monitoring plan, and public consultation procedures. The draft IEE was submitted to ADB and other stakeholders for review; and, it has been finalised during the detail design. The final IEE is submitted to ADB and National Environment Commission (NEC) for approval and further public disclosure.

C. Methodology Adopted for IEE

5. The IEE study has followed the guidelines of RGOB and ADB. The study has been conducted through review of secondary information collected from relevant agencies, and primary information collected from the field survey in November 2012. Public consultations and disclosure were carried out and the concerns of affected persons are documented. The relevant

Phuentsholing Thromde (PT) officials were contacted to verify information collected and also to solicit their concerns. Based on the analysis of information the impacts have been predicted, mitigation measures prepared and monitoring plan has been developed.

D. Description of Project

6. The proposed site for the mini dry-port (MDP) is located near the eastern bank of the Amo Chhu River, near the Phuentsholing city sewage treatment ponds and the Bhutan/India border wall. Site reservation has been completed by the Department of Trade. The site has a total estimated size of 2.2ha (5.4 acres).

7. MDP construction activities will include i) widening and rehabilitation of 1.8km of the existing access road; ii) 1km of new road construction; iii) construction of flyover bridge; iii) construction of river training and check dams for minimizing the flow velocity; iv) construction of road side drains and culverts; and v) road surfacing works.

8. The proposed works will require construction of entrances and exits to the MDP yards and several administration and warehouse type buildings and service roads. A facility will be created to manage imports and exports with ample warehouse and other operational spaces for inspection loading and unloading. Additional special areas will be included for a weighbridge, containers transfer zone, container scanning and storage of hazardous goods. The Project will include (i) the clearing and reconstruction of drainage around the storage areas and internal roads, renewing and reconstructing drainage and culverts across the MDP site, providing better crossing drains and better perimeter drains and lead off drainage facilities (ii) earthworks to facilitate resurfacing and paving of cargo-handling areas of the existing and new MDP yards (iii) construction of warehouse sheds in the terminal yards (iv) installation of new toilet facilities with showers and cleansable septic tanks (v) installation and re-provisioning of water supply and sewerage services and (vi) installation and re-provisioning for electric power and telecommunications.

9. The proposed works will generally be within the boundaries of land designated for the MDP by DOT/PT with some additional adjacent working areas. For purposes of this IEE it is estimated that project construction will be started in 2014 and will be completed in 2016.

E. Construction Approach

10. MDP construction will be carried out in an environment friendly manner following the principles of balance cut and fill. Excess excavated materials will be disposed off in the pre-identified approved disposal sites. Climate change adaptation (CCA) measures of improved adequate drainage constructions will be carried out.

F. Project Cost and Implementation Schedule

11. The estimated cost for MDP is Nu. 218.174million including design and supervision costs.

12. The construction of MDP is scheduled to by 2015 and expected to be completed by 2017 within 2 years.

II. POLICY AND LEGAL FRAMEWORK

A. Environmental Regulatory Compliance

13. The implementation of the Project will be governed by Asian Development Bank Safeguard Policy Statement (SPS, 2009) and the environmental laws, policies and regulations of the Government of Bhutan (RGOB).

14. **Asian Development Bank.** The ADB SPS stipulates addressing environmental concerns, if any, of a proposed activity in the initial stages of Project preparation. For this, the ADB SPS categorizes the proposed components into categories (A, B or C) to determine the level of environmental assessment required to address the potential impacts. The Project has been categorized as B. Accordingly this IEE is prepared to address the potential impacts in line with the SPS. Stakeholder consultation was an integral part of the IEE and an environmental management plan (EMP) specifying mitigation measures to be adhered to during implementation of the Project has been prepared.

15. **Royal Government of Bhutan.** The implementation of the Project will also be governed by laws, regulations, and standards for environmental assessment and management of Royal Government of Bhutan (RGOB). Table 1 summarizes the main requirements of RGOB for environmental management that will apply to the Project.

Table 1: Government Environmental Policies, Laws, Regulations, and Standards

Statute	Outline	Relevance
Environmental Assessment Act, 2000	This Act establishes procedures for the assessment of potential effects of projects on the environment, and aims to determine measures to reduce potential adverse effects and to promote environmental benefits.	<ul style="list-style-type: none"> To ensure that all foreseeable impacts on the environment, including cumulative effects are fully considered prior to any irrevocable commitments of resources or funds. To ensure that all feasible alternatives are fully considered.
Regulation for the Environmental Clearance of Projects, 2002	Regulation for Environmental Clearance defines responsibilities and procedures for the implementation of the Environmental Assessment Act, 2000 for issuance and enforcement of environmental clearances.	<ul style="list-style-type: none"> To ensure that all projects are implemented in line with the sustainable development policy of the Royal Government of Bhutan To ensure that all feasible means to avoid or mitigate damage to the environment are implemented; and To ensure that concerned people benefit from projects in terms of social facilities.
National Environment Protection Act, 2007	The aim of this Act is to enable an effective system of conserving and protecting Bhutan's environment. This system is constituted of the National Environment Commission or other designated Competent Authorities and advisory committees responsible for independently regulating and promoting sustainable development in	<ul style="list-style-type: none"> The Act provides a framework for developing measures and standards to protect Bhutan's environmental quality. Guidance relevant to this project includes: Handling of hazardous substances: No person shall handle or cause to be handled any hazardous substance except in accordance with such

Statute	Outline	Relevance
	an equitable manner.	<p>procedure and after complying with such safeguards as may be prescribed under national and international instruments.</p> <ul style="list-style-type: none"> • Discharge of environmental pollutants: No person shall discharge or emit or be permitted to discharge or emit any pollutants in excess of such standards as may be prescribed.
Waste Prevention and Management Act of Bhutan, 2009	This Act defines the institutional framework for preventing and managing waste in Bhutan. It sets out the principles, measures, mechanisms and responsibilities for reduction, segregation, and appropriate disposal of waste to protect the country's environment.	<ul style="list-style-type: none"> • Waste management requirements of relevance to the proposed development include: • Non-hazardous waste: Implementing agencies shall ensure that the reduction, reuse, recycling and disposal of non-hazardous waste are addressed in an environmentally sound manner. • Hazardous waste: Implementing agencies shall prevent manufacturing of products with potential to generate hazardous waste. The agencies shall also ensure that the reduction, storage, treatment, and disposal of hazardous waste are addressed in an environmentally sound manner.
General Rules and Regulations on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries, 2006	OHS Rules and Regulations aims 'to assure safe and healthful working conditions for working men and women as well as other persons present at workplaces from work related risks to their health, safety, and well being	During Construction and operation stage of the project.
The Labour and Employment Act of Bhutan, 2007	The labour and employment act of Bhutan 2007 provide policies and programs in the areas of employment promotion, labour protection and relations, vocational education and training, and occupational standards setting and certification.	The proposed development will adhere to the policies provided under different sections of the Act.
The Forest Act (1969).	The first environmental legislation in Bhutan. It brought all forest resources under government custody to regulate utilization.	This was repealed with the enactment of the FNCA in 1995
Forest and Nature Conservation	Allows community stewardship of forests and aims to provide protection and sustainable use of forests, wildlife,	Schedule I of the Act, lists those wild animals and plants that are given full protection under the Act. The FNCA

Statute	Outline	Relevance
Act (FNCA) 1995	and related natural resources.	establishes that all forests in Bhutan are Government Reserved Forests (GRF), and prohibits any development activity in these areas except with a permit.
Forest and Nature Conservation Rules (FNCR) 2000	Under powers established by the FNCA, the Ministry of Agriculture promulgated the FNCR in 2000, which was revised in 2006.	Amongst other things the FNCR allows for: <ul style="list-style-type: none"> • Allotment of land and land rights in GRF; • Prohibitions, restrictions and concessions in GRF; • Transport and trade of forest produce; • Declaration and administration of protected areas; • Protection of wildlife and use of certain wild species; • Prevention of forest fires, land clearance, and activities potentially impacting soil, water and wildlife resources; and • Enforcing penalties for offences related to these and other aspects of the FNCR.
Land Act 1979 (Revised 2007)	The Land Act 1979 provides the basis for land tenure in Bhutan was revised in 2007 to streamline many provisions in the Land Act. One major Change was the establishment of an autonomous National Land Commission Secretariat which has been given full responsibility for all matters pertaining to land registration. Land categories have been reduced to seven including i) Chhuzhing (wetland), ii) Kamzhing (dry land) including orchard, iii) Khimsa (Residential land), iv) Industrial land, v) Commercial land, vi) Recreational and vii) Institutional land.	Under this Act, there are provisions for acquisition of land by the Government, if it is required for the benefit of the country. In such cases, the affected person will be compensated with substitute land from the same Dzongkhag or given cash compensation depending on the land classification as per the prevailing land compensation rate determined by the Act. If a house is acquired, compensation is paid on the basis of an evaluation carried out by a qualified engineer appointed by the competent authority.

16. The policy, legal, and administrative frameworks relevant to the environmental assessment of infrastructure projects in Bhutan have been established by the following laws and regulations: (i) the National Environmental Protection Act of 2007, (ii) the Environmental Assessment Act of 2000, and (iii) Regulation for Environmental Clearance of 2002. At the national policy level, environmental protection and conservation is a constitutional mandate to: (i) protect, conserve, and improve the pristine environment; (ii) safeguard biodiversity; and (iii) prevent pollution and ecological degradation.

17. The National Environmental Protection Act of 2007 is the overall law on environmental protection and specifies the powers, functions, and operational framework of the National Environment Commission (NEC), the government agency with responsibility for all issues

related to the environment. Their mandate includes the maintenance of environmental quality through the enforcement of environmental standards and promotion of best environmental management practices to address pollution and environmental hazards.

18. The Environmental Assessment Act of 2000 was enacted to establish procedures for the assessment of the potential effects of strategic plans, policies, programs, and projects on the environment, and for the determination of policies and measures to reduce potential adverse effects and to promote environmental benefits. Under this law, no development consent can be issued without first seeking an environmental clearance. The permission is given under Chapter III of the act and is issued in writing by the secretariat or the competent authority, to let a project proceed, which includes terms to ensure that the project shall be managed in an environmentally sound and sustainable way.

19. The Guideline for Application for Environmental Clearance for Forestry Activities has been promulgated by the NEC. However, the small area of trees on part of the MDP site is a plantation forest and is not affected by these guidelines. The Application for Environmental Clearance Guidelines for Urban Development has also been promulgated by the NEC. Project information consistent with an initial environmental examination (IEE) report will be required under general provisions including requirements for no-objection certificates that are provided by affected parties that include but are not necessarily limited to those presented in Table 2.

Table 2: No Objection Statements required

Agency/concerned people to issue NOC	Yes / No	Why/when
Dzongkhag /City Corporation	Yes	Dzongkhag Administrative approval
Department of Culture	No	Project is located within 50m of a cultural or religious site
DoF	Yes	Project involves felling of trees, or riverside quarrying or small-scale quarrying
Nature Conservation Division	No	Within boundary of a Protected Area
Municipal Authority	No	Within 50m of a public park
Department of Health	No	within 50m of hospital
Department of Energy	Possible	Project will require the relocation of power transmission line
Bhutan Telecom Authority	Possible	Project will require relocation of telephone lines
National Environment Commission	Yes	All new construction projects need an environmental clearance from NEC. However, the EC will be issued only upon receipt of all necessary No Objection statements enlisted above.

B. Environmental Clearance Requirements

20. Article 33.1 of the Environmental Assessment Act 2000, grants the competent authority (CA) a power to screen, issue or deny the environmental clearance (EC) of the activities or project listed under Annex 2 of RECOP 2002. However, the CA cannot issue EC to itself or the Departments directly under it; even for the listed activities of the RECOP. However, it can issue the clearance to organisation like Phuentsholing Thromde (PT); which is partially autonomous organisation.

21. However, the PT is obliged to fill up the standard IEE forms and submit it to MOWHS along with the no objection certificates (NOC) from the affect persons/public and other stakeholders.

C. Occupational Health and Safety

22. The Project will conform to the labour laws and occupational and health related rules as outlined in Table 3.

Table 3: Relevant Occupational Health and Safety Laws and Rules

Title	Year	Overview
Labour and Employment Act 2007, Bhutan	2007	The L&E Act, 2007 provides general legislation governing employment conditions and environment at work. The aim of the Act is to improve the work environment and working conditions in order to safeguard and maintain the employees' work ability, and to prevent occupational accidents, diseases, and other physical or mental health problems related to work. Employers are required to identify the hazards and risk factors at workplace, eliminate, and assess the effects of the remaining risks to the employees' health and safety. The Act describes the employers and employees general duties, rights and obligations in pursuing a healthy and safe workplace. The Act also emphasizes reporting system for workplace injury and diseases and the requirement of the enterprise to develop health and safety policy at the enterprise level.
Mines and Mineral Act, 1995	1995	The Department of Geologies and Mines under the Ministry of Economic Affairs are responsible for implementing the Mines and Mineral Act, 1995. Under the Mines and Mineral Act, 1995 the employers or lessees are responsible to ensure a safe and healthy working environment. They should report any workplace accident to the ministry. The ministry is also empowered to frame regulations and standards on health and safety in keeping with the view of national legislation on occupational health and safety.
Mines and Minerals Management Regulations 2002. (MoEA)	2002	This regulation clearly outlines Occupational Health and Safety procedures to be followed by the mining industries.
Road Safety and Transport Act, 1999	1999	The objectives of the Road Safety and Transport Act 1999 are to provide safe and efficient use of road systems and to provide an efficient and a safe public transport system. This responsibility is shouldered by the RSTA. The Act also describes general duties of the drivers related mainly to traffic safety signs and safety procedures in order to prevent transport accidents.
Electricity Act of Bhutan, 2001	2001	The Act provides authority to the Bhutan Electricity Authority to develop regulations, standards, codes, principles & procedures, which include performance standards, including minimum technical & safety requirements for construction, operation & maintenance of generation, transmission & distribution facilities.

Title	Year	Overview
Pesticides Act of Bhutan 2000	2000	The objectives of this act are to minimize deleterious effect of pesticides on human beings and the environment. Guidelines direct the import procedures of pesticides and the use of pesticides in a way that the effect on the environment is mitigated.
Food Act of Bhutan 2005	2005	The purpose of this act is to protect human health from consumption of food which has adverse effect on the health and to regulate and facilitate the import, export and trade of food in the country.
Regulations on Occupational Health, Safety and Welfare (MoLHR)		This regulation was framed under the Labour and Employment Act, 2007. It prescribes standards and procedures on occupational health, safety and welfare for workplaces, instruments, vessels, appliances, apparatuses, tools, devices, electrical safety and other hazardous conditions. The objective of this regulation is to ensure safety, health and welfare for employees as well as other persons at workplaces, from work related risks to their health, safety and wellbeing.
Regulations on Occupational Health and Safety for Construction Industry (MoLHR)		Regulation on Occupational Health and Safety for the Construction Industry was framed under the Labour and Employment Act, 2007. This regulation establishes occupational health and safety standards and procedures on construction safety. It aims to ensure safety and health for employees, as well as other persons at the construction sites, from work related risks to their health, safety, and wellbeing. It also prescribes the roles and responsibilities of the workers and employers in ensuring health and safety at the site.
Regulation on Workers Compensation 2009 (MoLHR)	2009	Regulation on Workers Compensation was notified by MoLHR as empowered by the Labour and Employment Act, 2007. It establishes standards and procedures for compensation of employees and their dependents as a result of injury, diseases or death arising from their work or related to the tasks and duties they are required to perform. It aims to compensate employees or their dependents for a loss of earning capacity rather than compensate for a particular injury or disease, and provides for the payment of medical and related costs and the rehabilitation of employees to enable them to return to work as soon as possible.
Regulation on Hours of Work 2009 (MoLHR)	2009	This regulation was framed as per the Labour and Employment Act, 2007 and it provides the maximum working hour and related matters falling within the scope of the Labour Act. It prescribes a maximum of 8 working hours per day with 2 hours overtime per day.
Bhutan Building Rule 2002 (MoWHS)	2002	The Municipal Offices of the respective towns have the responsibility to enforce the Bhutan Building Rules, 2002, which make reference to aspects of safety on construction sites.

Source: Profile on the Occupational Health and Safety of Bhutan, March 2012

D. International Conventions

23. Bhutan is a party to several international conventions that are relevant to environmental management. Bhutan ratified the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change (25 August 1995). These international conventions explicitly reference the application of environmental assessment to address the effects of human activities. The Convention on Biological Diversity, in particular, promotes the use of appropriate procedures requiring environmental impact assessment of proposed projects that are likely to have significant adverse effects on biological diversity. Bhutan acceded to the Convention on Biological Diversity (CBD) on 10 October 2006, and became a Party to the Convention on 8 January 2007. It also acceded to the Convention to Combat Desertification

(CCD) in 2003 and ratified the Framework Convention on Climate Change (FCCC) in 2006. Local conservation legislation is still in development.

E. Environmental Roles of Relevant Agencies¹

1. National Environmental Commission Secretariat (NECS)

24. NECS has overall responsibility for enforcing environmental assessment and management in Bhutan. Various functions and responsibilities have been delegated to ministries and competent authorities. NECS will be directly involved in the environmental management of the proposed project as requested by the secretariat as there is no appropriate delegation of authority in this case. NECS will issue the environmental clearance and provide guidance when needed.

2. Ministry of Agriculture and Forest (MOAF)

25. MOAF is competent authority for certain type of project activities in its purview. In this project the Chief Forest Officer for the district in MOAF will be consulted regarding permission to cut trees.

3. District Environmental Committee (DEC)

26. A District Environmental Committee (DEC) consists of Dzongkhag planning officer, Dzongkhag forest officer, Dzongkhag land record officer, Dzongkhag agriculture officer, Dzongkhag environmental officer, and Dzongkhag engineer. The District Environmental Officer (DEO) is district official of NECS. DEC is responsible for issuing Environmental Clearance to some project activities mandated to the committee and for checking compliance of the projects to which it issues EC periodically. As part of its regular activities, NECS gives general training and orientation to DEOs before sending them to districts. These orientations focus mainly on Bhutan's environmental requirements.

¹ Royal Govt of Bhutan-Agriculture and Environment

III. DESCRIPTION OF THE PROJECT

A. Background

27. Most of the country's cross border trade takes place in Phuentsholing and there is only one entry and exit point for the core area which results in traffic congestion from local traffic and trucks transporting goods to and from Thimphu, and containers carrying raw materials and finished goods to and from the Pasakha industrial area. Congestion and poor urban mobility restricts an urban area's growth and this situation also limits national development and economic growth.

28. Customs facilities at Phuentsholing lack suitable facilities to process traffic between India and Bhutan. Customs checks are currently performed at four separate sites in and around Phuentsholing town: (i) Customs Office, for Indian imports, (ii) Customs Head Office, for multi-item containers, (iii) Mini dry-port site (southern portion), for single-item containers and (iv) Amo Cho river bank, for large-scale goods such as plant for hydro-electric projects. The Mini Dry-Port project (MDP) is intended to provide suitable facilities for all import/export trade with Bhutan.

29. The MDP is intended to provide suitable facilities for all import/export trade with Bhutan through Phuentsholing in the short to medium term. It is intended that some or all of this traffic would be transferred to Alay LCS site in the medium to long term.

30. Due account has also been taken of cross border traffic volume as the base on which to work out the desirable dimensions of the MDP facilities. The border procedures and logistics requirements applied on the Indian side of the border and time-related procedural aspects have also been taken into account.

B. Description of MDP operations

31. There are three distinct areas in the MDP (Figure 3). (i) In the south there will be the inspection area and transshipment of general cargo. (ii) In the central area there will be administrative services and (iii) to the north there will be the area dedicated to container handling and warehousing for exportable goods.

32. The entrance is located in the south-east and the exit is at the north-east. Both will connect to the Phuentsholing bypass road. Secondary access and egress (for emergencies / fire access) is proposed to the north-west (on an existing road).

33. Overall traffic movement and direction is only from south (entry) to north (exit). However, two way traffic lanes are included in most of the MDP. This is to allow the possibility for the MDP operator to modify traffic flow in different areas if the need arises. In addition lane width (2 lanes each 6 meters wide) is relevant to ensure easy movement of trucks and avoid congestion.

34. After entering, the MDP traffic will turn right to the weighbridge. The weighbridge approach road has been widened to three lanes to allow room for a queuing system next to the main track because otherwise the tail back would be limited to two or three trucks. Access is also allowed from the transshipment area via the gyratory system of roads to allow trucks to be reweighed or visit the weighbridge after discharging goods elsewhere in the MDP.

35. The transshipment area occupies much of the south zone. It is designed so that a large area of the platform is covered which will allow work in inclement weather and help suppress

noise that would otherwise affect multi-storied dwellings nearby. The inspection areas and manual inspection platforms (with room for 4 trucks) are located to the west side of the transshipment area. There is also a bonded warehouse and warehouse for dangerous goods.

36. At the centre of the site is the administrative area which consists of the administrative building, an adjacent building containing the canteen and toilets, and parking for staff vehicles.

37. To the north of MDP is the container zone. Containers will be transferred as necessary with an adjacent warehouse for confiscated goods. At the northern end there is the preparation area for exports. It is divided into two parts. A part separated by a wall (NW corner) allows truck access to the warehouse preparing containers for export (including at night for oranges). It also allows a second possible access to the site (secondary entry) which is not intended for truck use (but for staff cars and emergencies).

38. The middle of the area of exports is a packing zone for container shipments, divided into three separate mini-warehouses with access to handling equipment to load the containers. Roller shutters / warehouse doors shut both sides of each cell and will allow secured transfer from cargo preparation (opening to the left) to packaging container (right opening). The enclosed warehouses will suppress noise and it is safer to consider this work area for work that must be done in the dry and avoid double-handling.

39. Additional features such as; (i) provision of the improved water supply system; (ii) improved sanitation and drainage facilities ; (iii) the procurement modern cargo handling and lifting equipment; (iv) the procurement of generator sets to avoid interruptions to services; (v) expansion of the use of energy-efficient lighting, floodlighting, street lights all around the MDP; (vi) traffic management measures to ease interface with local on-street traffic; and (vii) environmental and safety management measures will be put in place. The project will also undertake organizational developments to efficiently manage MDP operations and ensure efficient operations.

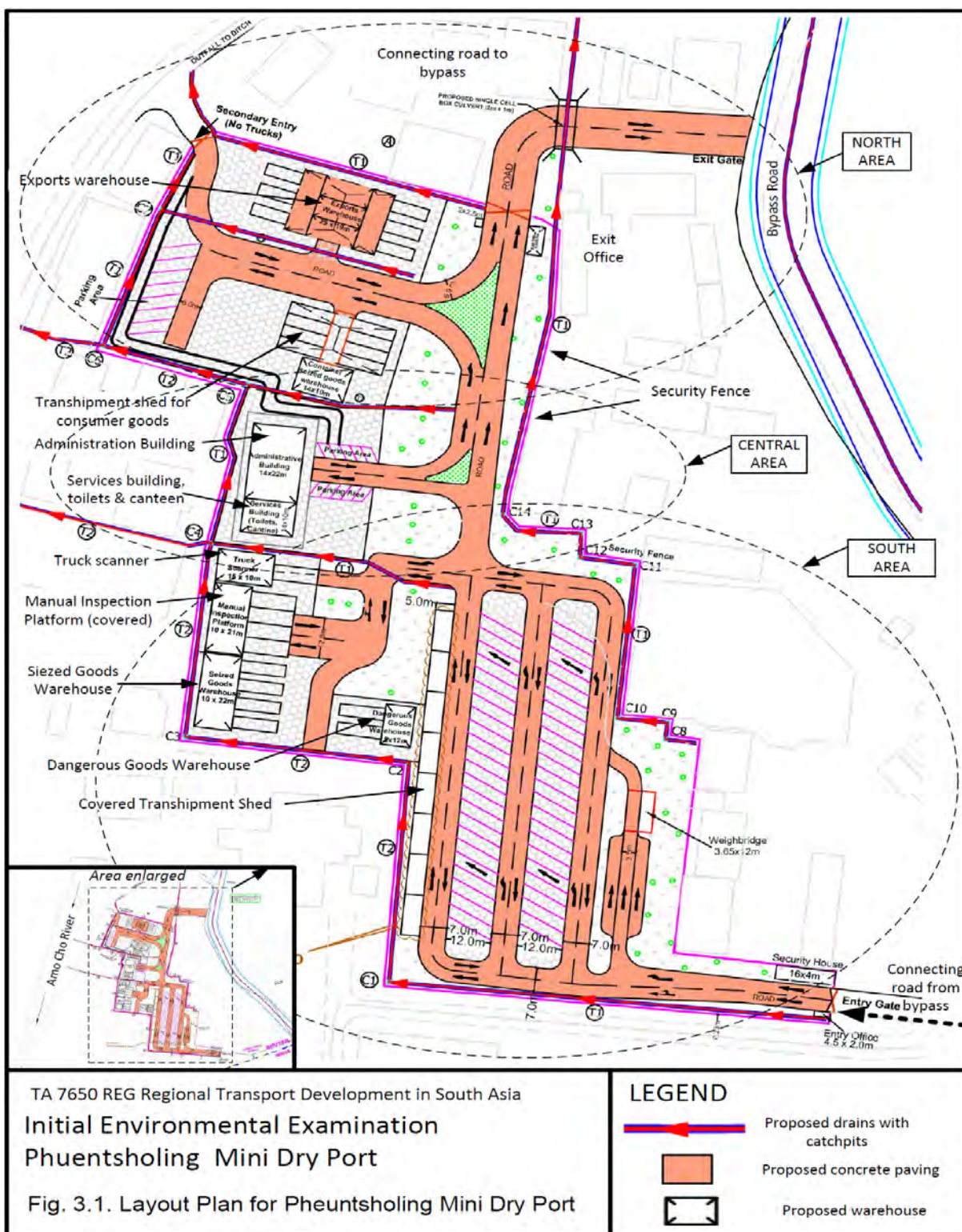
40. Other improvements to logistics, customs procedures, transshipment arrangements, non-environmental management measures are also under consideration. These improvements will be designed overall to make movement of freight carrying vehicles more efficient. Therefore indirect environmental benefits may accrue as they will have an effect on the amount of fuel consumed and therefore overall adverse impacts should be reduced. Other environmental benefits can also be increased by simple traffic management measures such as switching of vehicle engines when vehicle are stationary.

C. Implementation Schedule and Cost Estimate

41. The MDP construction is intended to start by last quarter of 2015 and will be completed by end of 2017.

42. According to the draft final report of June 2013 of “Regional Transport Development in South Asia – Bhutan Subregional Project (Phuentsholing)”, the MDP development cost is estimated to be Nu.218.174 million.

Figure 3: Layout Plan for Phuentsholing Mini Dry Port



IV. DESCRIPTION OF ENVIRONMENT

A Physical Environment

1. Topography

43. Bhutan is a landlocked and entirely mountainous country bordered by China in the north, the Indian states of Assam and West Bengal in the south, Sikkim in the west and Arunachal Pradesh in the east. The country has three geographical zones ranging from an altitude of 150m in the south to over 7000m on the northern border. The southern zone with below 2000m has low forest hills and dense tropical forests with a hot and humid climate. The central zone lies between 2,000m and 3,500m with a semi-tropical climate. The northern zone lies from east to west between 6,800m and 7,400m and is part of the eastern Himalayas.

44. Phuentsholing is in Chukka District situated in the south of Bhutan at the edge of the Duar plain on the low spurs of the sub Himalayan foot hills. The geographical co-ordinates of Phuentsholing are 26 51' N 89 23' E and the city lies at an altitude of 160 metres above mean sea level. The distance from Thimpu is 176 km and the nearest airport is Bagdogra (India), 4hrs drive from Phuentsholing.

45. The topography of Phuentsholing District is mostly hilly with occasional steeper slopes and mountainous sections. Phuentsholing City is hilly and is dominated by the Om Chhu River (Dhote Khola) that flows east to west through the centre between the industrial area to the north and the commercial border area to the south. The surrounding mountains and the Amo Chhu River (Toorsa River) and the plains to the West lead to India. The topography around the MDP is flat.

2. Meteorology and Climate

46. Bhutan experiences four seasons: spring (March-May), summer (June-August), autumn (September-November) and winter (October-February). Annual rainfall is concentrated in the monsoon season from June to September. The autumn months of September to November bring shorter days and cooler evenings. However, Phuentsholing is typical of the south which has a warmer sub-tropical to temperate climate.

47. Surface air temperature data in Bhutan from 1985 to 2002 has shown a warming trend of about 0.5°C, mainly during the non-monsoon season. Analysis of data from 2000 to 2009 from meteorological stations of the four representative eco-floristic zones of Bhutan also shows a trend of rising mean summer and winter temperature. However, due to the short time-series data on temperature, it is difficult to quantify the annual rise in temperature. In Phuentsholing temperatures vary between 10°C in winter to 40°C in summer. Phuentsholing experiences warm subtropical climatic conditions and all four seasons with a heavy monsoon rain for about three months starting from June. The local climate is wet, and the highest rainfall of the country is reported to occur in the southern foothills, including Phuentsholing town, where it has been known to reach a total maximum of 4,400 mm.

48. Unlike temperature, no consistent spatial trends have been observed in precipitation throughout the eastern Himalayan region. The changes in annual precipitation are quite variable, decreasing at one site and increasing at a nearby site. In Bhutan, no comprehensive precipitation observations are available to conclude any trends. However, rainfall fluctuations are largely random with no systematic change detectable on either annual or monthly scale. A

recent analysis of rainfall data from 2000 to 2009 across four eco-floristic zones of Bhutan shows annual fluctuations within regions without any detectable trend. A summary of total daily rainfall in Phuentsholing City (1996 to 2011) is given in Table 4.

49. Given the rainfall pattern over the region of the subproject, it is important that season be considered in planning the implementation of the improvement programme. In order to avoid runoff and protect the works earthworks and major construction should be planned for the dry season (October to March) particularly for areas susceptible to flooding and landslides and for works near rivers.

Table 4: Summary of rainfall data

Year / Month	Total Jan-Dec	May - Sep	May - Sep (%)
	(mm)	(mm)	
1996	3554.8	3064.6	86
1997	4376.6	3828.6	87
1998	6699.0	6026.6	90
1999	4547.2	3865.2	85
2000	6106.4	5512.1	90
2001	4593.6	3623.6	79
2002	4691.4	4040.0	86
2003	4633.2	3545.0	77
2004	5034.8	4243.6	84
2005	2606.0	2259.9	87
2006	1975.9	1788.6	91
2007	3376.6	3105.6	92
2008	1681.4	1536.1	91
2009	3175.8	2582.3	81
2010	4181.8	3454.7	83
2011	3049.9	2749.0	90

Source: Meteorology Section, Hydrological Meteorological Services Division, Department of Energy, MTI, Thimphu, Bhutan

Annual Report Daily Rainfall, Station Number: Ph11150048, Phuentsholing, Elevation : 220.0 m

3. Geology, and Soils

50. Bhutan covers two broad geological zones, the Lesser Himalayan belt along the southern and south-eastern border and the Tethyan belt further north. The Lesser Himalayan formation includes a wide range of sedimentary and low-grade metamorphic rocks, including argillites and metargillites, sandstones, quartzites, limestone, dolomite, and gypsum. The Tethyan formation mainly includes stronger gneisses that account for more than 70% of the country's bedrock and schists and marble, affording a relatively high degree of stability compared to other locations in the Himalayas. Chukka district is in the Lesser Himalayan belt with tectonically active sedimentary and metasedimentary rocks, gneiss, schist, quartzite, and limestone. The "main central thrust" area falls close to Phuentsholing. Hence, it is underlain mostly with schistose rocks. The majority of the soil in and around the town is of weaker phyllites. This makes the soil texture very fine and the slopes very unstable.

51. Intermittent occurrence of heavy rain, slow erosion-deposition, rapid mass washing processes, including rock falls and landslides, the and weaknesses underlying in the rocks coupled with the steep terrain, make erosion and sedimentation significantly active geological

processes in the Phuentsholing area, however none are known in the flat project area near the river and the MDP.

4. Seismicity

52. Bhutan is prone to a number of natural hazards due to fragile geological conditions, steep sloping terrain, great elevation differences, variable climatic conditions and active tectonic processes taking place in the Himalayas.

53. There is no detailed seismic micro-zonation of the country. However, since the north-eastern parts of India (next to Bhutan) fall under seismic zone V (seismically most active), it can reasonably be assumed that Bhutan is contiguous with this zone and either in seismic zone IV or V. Hence, there is a threat of a significant earthquake.

5. Surface Water

54. Bhutan has four major river basins, namely the Amo Chhu (Toorsa), the Wang Chhu (Raidak), the Punatshang Chhu (Sunkosh) and the Drangme Chhu (Manas). All these river systems are either directly or indirectly fed by permanent or seasonal snows, glaciers or high altitude lakes at their sources and surface runoff water from the monsoon rainfall. The subalpine lakes above 3,000 masl constitute valuable high altitude wetland ecosystems in Bhutan but these are far from Phuentsholing. They are also valued for the diverse habitat provided and the willow, rhododendron bushes and juniper forests.

55. Phuentsholing urban area is divided by the River Om Chhu (Figure 1.1). This river rises in Bhutan, and discharges to the River Amo Chhu that crosses the Indian-Bhutanese border. Amo Chhu originates in China and flows through a well-defined valley system.

56. Phuentsholing lies on the east bank of the River Amo Chhu which emerges from its steep upstream reaches onto the Duar plain and broadens to a width up to one kilometre near Phuentsholing. High monsoon flows in the river are eroding the land along the western city limit, and expose the town to the danger of flooding from the river. The river banks have been protected with limited success. The potential of the flood and bank protection works could create 350ha of new land to provide an opportunity for the development of better and planned new township, integrated with the existing city². River Om Chhu also has high flow and discharges can reach as high as 1000m³/s, and flooding can occur.

57. River flows are the highest from May to September. When they do discharge they carry high sediment loads, depositing large quantities of gravels and sands in the lower reaches. During the wet season some of the culverts are inundated, cutting off roads. Water levels in the rivers drop to almost nothing in the dry season and have very low flow October to April unless there is unusually heavy rain.

58. The area does not provide any aquatic resources for subsistence or trade, but the streams in the hills provide water for drinking, bathing, and crop irrigation. The rivers are not navigable. Transportation is on the roads.

² Detailed Feasibility Study and Engineering Design of Toorsa River Flood Mitigation Project

59. There are no major industries in the catchment area of the River Amo Chu but there are small to medium factories and a bitumen drum storage area just upstream of the confluence with the River Om Chhu. The major land use in the project area is urban and some industries. Apart from domestic sources, pollution loading from other sources is moderate. Thus water quality in such a setting is recorded as good based on secondary sources³.

60. Upstream of central Phuentsholing, Om Chhu River has generally good water quality and can be used for drinking after chlorination but near the subproject road is subject to industrial pollution from industrial areas alongside the river in central Phuentsholing, however this water is not abstracted for further use but flows downstream to the confluence with the Amo Chu. No quarries are in operation near this subproject stretch. Limestone exploitation nearby is from quarries in the nearby foothills and aggregates are also taken from the River Amo Chu. There are settlements and local mechanical, carpentry and other workshops near the banks of the river Om Chhu that will affect the water quality during implementation.

61. Water quality monitoring was not undertaken during the environmental assessment. The Bhutan Water Act (2011) regulates water pollution and is the appropriate standard for comparison purposes for impacts on water supply for human consumption. NEC has created standards for ambient water quality in Bhutan (Appendix C). The World Bank's Environmental, Health, and Safety (EHS) General Guidelines⁴ will also apply to the implementation of the subproject if World Bank's parameters are not included in the NEC standards.

6. Ground water and Ground water quality

62. There are no data available on the groundwater potential. Ground water resources are also abundant with springs emerging from basement rocks, old landslides and fluvial deposits. Groundwater in landslide and alluvial deposits has been estimated at an exploitable rate of 3l/s/km². Currently water quality monitoring is only conducted in the four major river system of Bhutan. Generally, the state of Bhutan's ground water quality is still good but with expanding settlement along rivers, there are localized pollution problems due to expanding settlement along rivers. In project area, water quality is anticipated to be good.

7. Water supply and sanitation

63. Phuentsholing Municipality (PM) is responsible for providing safe drinking water to the residents within the city. Piped water supply is available to all parts of the main city and some of the sub-urban areas. The outermost areas such as Damdara, Pipaldara are served through rural water supply schemes. Average daily demand is 7000 m³ per day with an estimated household consumption is 133 l/d based on metered water consumption. The Amo Chhu filtration gallery and the Om Chhu intake were destroyed by the August 2000 flood and groundwater extraction was then initiated including rehabilitation of the surface water intakes to stabilize the water supply. Water supply was satisfactorily restored and is being developed and improved with donor assistance.

64. The city's water supply includes surface water and ground water. The existing water supply system comprises operational bore wells, four raw water streams, three treatment plants, 10 water reservoirs, one break-pressure tank, one fire flow tank (nearby the main booster

³ Detailed Feasibility Study and Engineering Design of Toorsa River Flood Mitigation Project

⁴ World Bank Group, 2007. *Environmental, Health, and Safety General Guidelines*. Washington, DC.

station), approx. 12.0 km of raw water transmission lines and approximately 27km of distribution pipelines with more than 870 connections. Most of the existing water supply network was constructed in 1990's. All the service area is supplied intermittently⁵. The bypass road project will run adjacent to two of the water reservoirs.

65. The drainage system in Phuentsholing was constructed in the 1990's. The present system is combined system, conveying both storm water runoff and household wastewater. The drains are usually lined open drains with a rectangular or trapezoidal profile. The implementation of drainage infrastructure has not been governed by City-wide drainage plans and universal standards. The present drains therefore are of different designs and lack conformity to an overall plan. Because the total connecting areas often are not known the sizes of the main and collector drains are found by "rule of thumb". These general conditions have amplified the adverse effects related to disrepair and the requirement for maintenance.

8. Air Quality

66. Air pollution in Bhutan is a recent phenomenon and can be attributed to rapid urbanization and industrial developments. Diesel vehicles with poor engine maintenance and poor quality of fuel are also major sources for the urban air pollution.

67. Air quality monitoring was not undertaken for the subproject. By observation in general, air quality is acceptable and there appears currently be no problem. The areas near Phuentsholing and around the subproject have a few potential sources of atmospheric pollution from domestic, commercial and industrial sources but these are not making significant impacts on air quality based on observation. These areas are more polluted due to significant town development as well as emissions from a few modest workshops and poor waste disposal practices.

68. Ambient air quality concerns are mainly limited to the industrial estates near the cities such as Pasakha near Phuentsholing. In this subproject area the gaseous pollutants of carbon monoxide (CO), sulfur dioxide (SO₂), nitrogen dioxide (NO₂) from traffic are well dispersed in the open terrain and there is potentially adequate dispersion in the wide main thoroughfares of the town to keep concentrations below the NEC standards (Appendix C). Air quality appears to be generally acceptable with the exception of dust. Dust arises owing to the poor condition of some of the roads and dust arising when vehicles pass over unsealed shoulders of roads in many places. Dust concentrations will be higher, if only intermittently, within about 10m of the subproject when dust rises as vehicles pass around the site on unpaved roads during construction. Dust from road surfaces will be reduced when the site is completed and all areas are sealed.

69. Ambient air quality monitoring is not being done in project area. NEC has completed air quality monitoring in the past at Pasakha industrial area. The concentrations of respirable particulate matter and gaseous pollutants concentrations at Pasakha were within the limits (NEC pers. comm.) at that time. In project area ambient air quality is expected to be better as there are less heavy traffic and industrial activities. These both are contributor to air quality through release of exhaust gases. GOB standards (Appendix C) and World Bank's Environmental, Health, and Safety (EHS) General Guidelines will apply to the implementation of the subproject.

⁵ Urban Development Plan-Phuentsholing

9. Noise

70. Noise from vehicles is not a concern in most of the areas around the subproject at present as traffic is confined to occasional vehicles. Noise levels are generally within acceptable limits for the public and there were no complaints about current noise levels from the public during consultation. The criterion for site noise for a mixed area in Bhutan is Leq 65dB(A) (day) and Leq 55dB(A) (night Appendix C). The World Bank standard applies an ambient criterion of Leq 55dB(A) for residential areas, hospitals and schools which is equivalent to the NEC standard for sensitive areas. Where the background exceeds the ambient standards the criterion is background +3dB (A). Based on observation in the settlements and towns where traffic runs throughout the day the criterion of Leq 55dB(A) for residential, school and hospital sensitive receivers is potentially exceeded at some times. As the criteria are potentially exceeded at some times of the day it is recommended that in order to make a consistent assessment for all locations the existing criterion of background +3dB(A) will be applied in the assessment for both daytime and night time. This will meet the requirements of ADB SPS. However there is a general presumption that there will be no night time working except in exceptional circumstances.

71. Data on measured noise levels is not available in the project area as NEC is measuring current noise levels only at Thimphu. Major contributors to the ambient noise levels are commercial activities and vehicular traffic. In project area these activities are not very high, therefore, noise is expected to be within the stipulated limits notified by NEC for a Mixed Area (65 dB(A) during day, and 55 dB(A) during night).

B Biological Environment

1. Agriculture

72. Agriculture in Bhutan has a dominant role in the economy of the country. In 2000, agriculture accounted for 35.9% of GDP of the nation. The share of the agricultural sector in GDP declined from approximately 55% in 1985 to 33% in 2003. However, agriculture remains the primary source of livelihood for the majority of the population. Approximately 80% of the population of Bhutan are involved in agriculture. Over 95% of the earning women in the country work in the agricultural sector. Agriculture in Bhutan is characterized by its labor intensive nature with relatively low intensity of farm inputs. Most of the peasants in the country are small and marginal.

73. Among the agricultural lands in the nation, an estimated 21% are irrigated, approximately 43% are rain fed, about 27% are used for shifting cultivation, approximately 8% are used for orchards and 1% is kitchen gardens.

74. Major crops cultivated in Bhutan are maize and rice. Maize accounts for 49% of total domestic cereal cultivation, and rice accounts for 43%. Rice is the major staple crop. Agriculture in the country includes cultivation of wheat and other minor cereal crops. Rice is the primary crop in those regions where proper irrigation is available. Other crops like wheat, barley, oil seed, potato and different vegetables are also cultivated in these lands. Maize is mainly cultivated in dry land regions at lower elevation⁶. Forests in the nation act as the source of livestock fodder and organic materials for the purpose of development of fertility. Forests are also responsible for regulating the availability of water for agricultural purpose.

2. Forestry

75. Bhutan has significant natural forest resources. The subtropical plains and alpine terrain provide more rainfall than neighbors to the west which facilitates forest growth. The forests contain numerous deciduous and evergreen species, ranging from tropical hardwoods to predominantly oak and pine forests. About 87.7% of the Pemagatshel and 86.9% of Samdrup Jongkhar Dzongkhag are under original forest cover⁶. Pemagatshel has the slightly higher percentage of agriculture land (5.1%) than Samdrup Jongkhar (4.3%) in relation to its land area. Broadleaf forests are dominant in both Dzongkhags.

76. Forests are managed according to four types: government owned national forest, community forest, sokshing (registered to an individual person or household) and private tree plantations. Government forests are managed by the Department of Forests while community forest is managed by the village or a community. The sokshing (woodlots) and private forests are owned and managed by individuals, households and local communities. No forest management units (FMUs) are within the project area of influence.

77. The project site is within the urban area where there are no forests. Subtropical ornamental plants and trees have been planted within the city for street beautification and there are many mature trees the vicinity of the project. A plantation of trees remains at the north part of the site.

78. The local forests are managed by the Department of Forests and there is a District Forestry Office for Phuentsholing District which has the headquarters in Gedu city. Forests are managed according to the instructions and quotas for cutting and planting received from the Ministry of Agriculture and forests (MOAF). The Department for Forests and Park Services indicated that the Sal forest area can be cleared and that the mature trees can be removed with permission.

3. Fauna and Flora

79. The area around the subproject is urban development and there are no rare, threatened or endangered species of terrestrial and aquatic flora and fauna in the impact zone. The urban area, the road corridors and immediate environs are unlikely habitats for large wild animals and rare or endangered species. The animals present are domesticated animals as well as those species that can tolerate urban conditions.

C Social-Cultural Environment

1. Human Issues and Quality of Life

80. **Land Use.** Phuentsholing is strategically located on the border with the Indian city of Jaigaon. Phuentsholing is a busy commercial and industrial area. It occupies the river terraces of the River Om Chhu and is confined by steeply rising foothills to the north and east and by the Amo Chhu to the west. Topography around the core of the town is generally undulating and hilly, but there is considerable and expanding residential development on the steeper mountainous periphery. Areas to the north of the city consist of steep slopes, with many of the slopes already denuded of trees to create space for housing development, thus leaving little

⁶ As per NSB's Statistical Yearbook of Bhutan, 2011,

room for further expansion. The land within the Phuentsholing Municipality (PM) boundary is 320ha, but only 180ha are suitable for development and are mostly already fully developed. Because of land constraints, development has already grown beyond the existing city boundaries to the elevated areas like Kabreytar, Damdara, and Kharbandi to the north and Pasakha to the east.

81. Due to rapid urbanization, more than half of Bhutan's population will reside in urban centers by 2020. There is a rapid influx of rural migrants, resulting in an urgent need for improved urban services. The urban centers such as Phuentsholing will be major drivers of economic growth; reliant on good infrastructure. Owing to the thriving trade and related development in Phuentsholing, the town has experienced rapid population growth and urbanization and now suffers overcrowding, traffic congestion and unhygienic conditions. Expansion is constrained by fragile hill slopes around the city, the flood prone River Amo Chhu and the international border.

82. A conceptual land use plan has been formulated, as the beginning of a process to develop a vision for the utilization of the land resource. Possible courses for development are⁷ (i) an extension of the existing town, continuing in the style of the existing town, (ii) extension of the existing town and redevelopment in a new form (iii) a fresh approach to development, setting an example for development in the 21st century, which would influence resource development of the existing city.

D Demographic characteristics and public health

83. Phuentsholing is the second largest city in Bhutan. In 2005 the total population of 20,537 has been projected to exceed 24,000 by 2013. The unprecedented growth of the city in 1986-1991 converted the surrounding forests and available agricultural land into residential, commercial, and other uses to accommodate the increasing population. The population is projected to reach 67,000 by the year 2027. There are no sensitive cultural features in the project area⁸⁹.

84. The public health condition is more or less similar throughout the PM. Most Bhutanese have access to potable drinking water in the urban areas (98%) and basic sanitation (91%). Widespread health concerns include diarrhea and pneumonia. Diabetes, alcohol-related liver disease and cancer are also prevalent. Less widespread are w malaria and tuberculosis. Among children under age 5, skin infections; conjunctivitis and intestinal worms are significant concerns. Influenza, including H1N1 ("swine flu") and H5N1 ("bird flu") strains, are present in Bhutan. As of 2009, there were 6 confirmed cases of H1N1, none of which were fatal. Bird flu, however, has resulted in at least one outbreak in Phuentsholing and remains a serious concern for the Ministry of Health.

85. Bhutan launched its telephone Health Help Centre in 2011 which has proved successful and provides emergency response and the Healthcare Helpline which dispenses medical

⁷ Urban Development Plan-Phuntsholing

⁸ Draft IEE-Urban Infrastructure Project-Phuentshilong road and Bridge Subproject

⁹ <http://world-gazetteer.com/wg.php?x=&men=gcis&lng=en&des=wg&srt=npan&col=abcdefghijklmnoq&msz=1500&geo=-41>

advice. Both services accessible through land and mobile phones. Emergency responses are served by ambulances in Phuentsholing.

1. Cultural and historical sites, schools and housing

86. The Bhutan Himalayas straddle the watershed of the Brahmaputra River basin. The river is regarded with religious reverence and faithfully believed as the blessed water of Lha Tshangpa or Goddess Tshangpa, thus called as Tshangpo in its head water sources of the Autonomous Region of the Tibetan Plateau.

87. **Kharbandi Goenpa:** This monastery was founded in 1967 by the Royal Grandmother, Ashi Phuntsho Choedron and Guru Rimpoche. From the monastery garden there is a fascinating view of Phuentsholing town and surrounding plains.

88. **Zangtho Pelri:** this is a small temple built in the centre of Phuentsholing town, represents the heaven of Guru Rimpoche. On the ground level there are statues of the eight manifestations of Guru Rimpoche and paintings of Buddha's life. The next floor contains the eight Bodhisttavas and statues of Avalokiteshwara and Shabdrung Ngawang while on top floor, the main statue is of Amitabha.

89. **The Crocodile Zoo:** This zoo was established during 1976 with two different species mugger crocodile & gharial crocodile. In total there are 21 crocodiles. Entry inside this zoo is restricted. This small zoo is situated east of the old Norgay Cinema Hall across the river and 1 km from the proposed MDP site.

90. The subproject district is home to a number of cultural and historical sites but generally not near the subproject. There are cemeteries and all are more than 10 m outside the road corridor and more than 15 m from the centerline and away from where the rehabilitation and improvement works would need to take place. During public consultation no sacred places or traditional heritage sites for local villagers were brought to the attention of the consultants.

91. Schools are located at some distance in many locations and there is an IT College in close proximity to the subproject. Schools and colleges are particularly vulnerable to construction impacts and the scheduling of works should be scheduled after discussions with the IT College principal to avoid impacts.

92. Residential properties are located at intervals and residential development is spread out in patches all around the MDP. The front facades of the houses are generally set back from the MDP site by >10m (outside the area of direct impact) with the front fences and walls or temporary structures just a few meters from the existing MDP proposed site edge in some places. Some land acquisition will be required in a few places but relocation of properties or resettlement does not seem to be a significant issue based on observation.

2. Power supply

93. Electrical power is supplied in Phuentsholing Bhutan Power Corporation (BPC) grid. The low voltage distribution network runs on poles adjacent to the subproject site and will need to be protected during the works. Some of these poles and lines may need to be re-provisioned before the improvement works commence to ensure continuity of power supply. The subproject road works must be programmed not to create any impacts on these facilities and maintain security of power supply.

94. Given the status of Phuentsholing as the Gateway and Commercial Capital of Bhutan, the Bhutan Power Corporation (BPC) has been recommending adoption of UG cable network irrespective of higher costs. Selective adoption is contemplated mainly from the view-point of safety in major cases and specific cases related to aesthetical considerations.

3. Telecommunications

95. The telephone system in Phuentsholing consists mainly of primary (UG & Aerial) and secondary (Aerial) networks with 5200 pairs of telephone line capacity. The primary or the UG network is laid underground. The capacity of the network is sufficient to meet the demand and is met as and when applied by the consumers. The future proposals include provision of UG secondary network in every building and replacement of the existing aerial network by underground network. Apparently, the Bhutan Telecom does not have a Master Plan of telephone network in Phuentsholing but their plan has been prepared based on the annual growth or demand.¹⁰

4. Rail Transportation

96. There are no railways in Bhutan but it is possible to travel close up to the Bhutan border by Indian Railway. Nearest major railway station is Alipurduar and Hasimara is also close by. Phuentsholing is half an hour drive from Hashimara.

5. Roadways

97. Jaigaon the Indian border town is 180 kilometers from Siliguri. Phuentsholing in Bhutan is approximately 182 kilometers by road from Siliguri. Phuentsholing is six / seven hour's drive from Bagdogra / New Jalpaiguri and seven hours drive from Gangtok or Darjeeling. The Royal Bhutanese Government runs bus services to Phuentsholing from Kolkata. These buses depart from Kolkata Esplanade bus station and reaches Phuentsholing via Siliguri. Phuentsholing is the only entry / exit point via road. The other is only entry point is in Assam.

98. Phuentsholing is one of the few cities which is well connected with other parts of the country through national road network. It is connected with Thimphu, the capital of Bhutan and other important cities like Gedu, Chhukha, Paro, etc. through Thimphu – Phuentsholing Highway. The access is not easy due to difficult terrain, poor road conditions and the distance involved (170 kms – Thimphu). Being the gateway, it is also connected to other parts of Bhutan like Samdrup, Jhonkhar, Gelephu, and Samste etc. through the road networks of India.

99. Phuentsholing has good advantages due to connectivity with major commercial towns of India i.e. Siliguri, Kolkatta, Coochbehar, Guwahati etc., which allows a free flow of trade between India, Bhutan and Bangladesh.

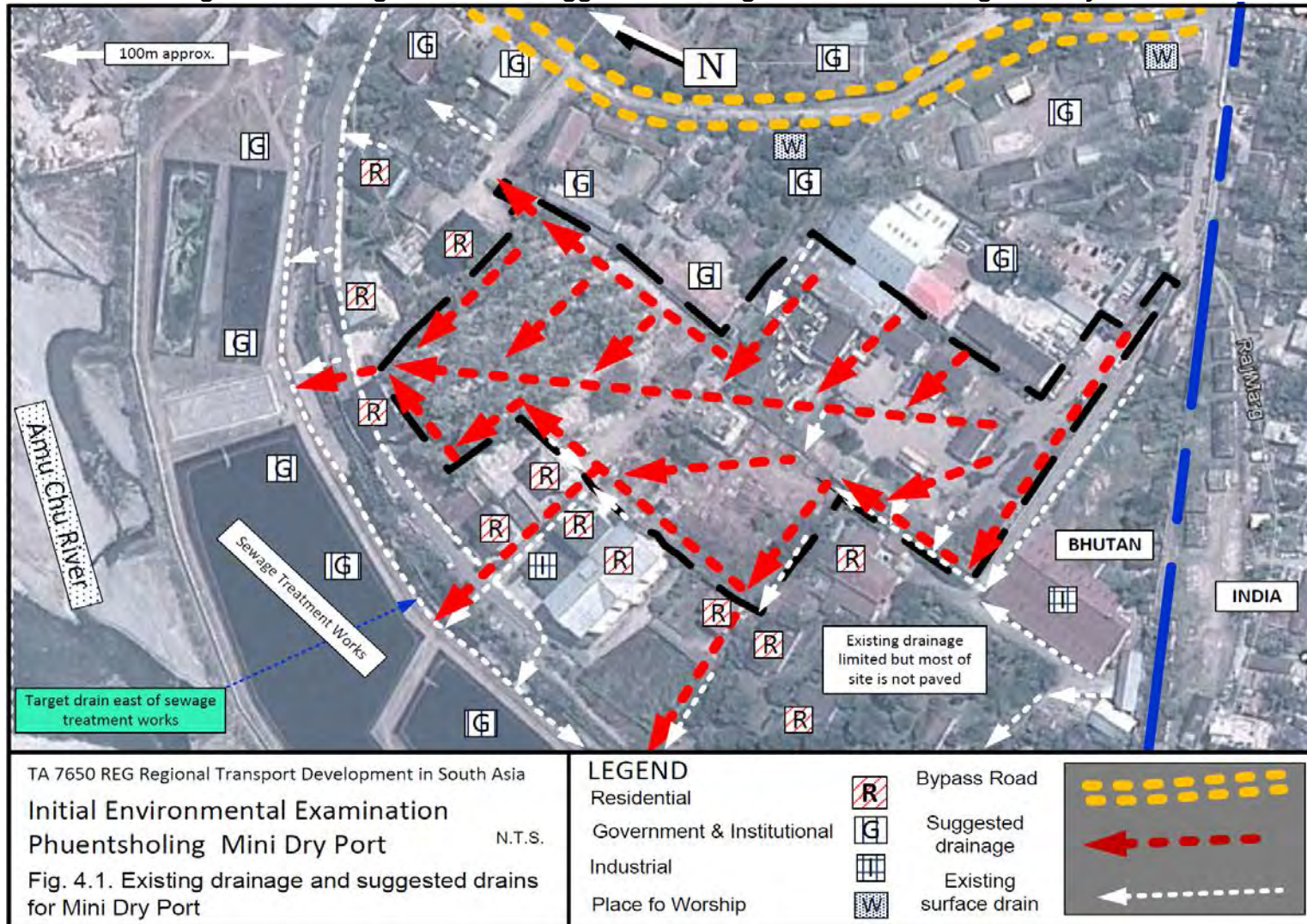
6. Air Travel

100. Bagdogra airport is 192km from Phuentsholing. Bhutan's national air carrier, Druk Air, operates several flights per week from Bangkok, Bagdogra, Delhi, Kolkata and Kathmandu to

¹⁰ Urban Development Plan-Phuntsholing

Paro. Spectacular flights fly passengers through the stretch between Kathmandu and Bhutan. The flight passes along the Himalayan Range.

Figure 4: Existing Drains and suggested drainage for Phuentsholing Mini Dry Port



V. ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

A. Environmental Impact Associated with the Project

101. This section discusses the potential environmental impacts of the proposed Project and identifies mitigation measures to minimize the impacts in the design, construction and operational phases. Environmental analysis covered potential direct, indirect, cumulative, and induced impacts but primarily focusing on the physical impacts within and around the MDP operational areas.

102. **Physical Impacts.** The main physical issues relate to impacts such as new construction within the MDP area, reconstruction of the drains and associated earthworks to upgrade the drainage and access, construction of new access to the MDP area roadways, obtaining rock based construction materials, supply and installation of pavement surfacing, casting of concrete components for septic tanks and drains, noise, dust, clearing waste and sediment from drains, disposal of residual hazardous goods, disposal of other general waste, and water quality. The construction for the civil works will create some unavoidable dust and noise and all the above require to be addressed. There are also about removal of a large proportion of the 120 mature trees on site but some of these can be retained at the perimeter for aesthetic purposes and to provide visual mitigation by shielding the site.

103. **Management Issues.** The main management issues relate to impacts such as waste management and waste disposal, prevention of flooding, repair and re-provisioning drainage, materials supply, planning temporary traffic management measures, controlling noise and dust and managing workers and public safety.

104. **Biological Impacts.** The only biological issues relate to probable removal of the trees in the north section of the MDP areas. The trees to be removed were planted in the 1970s, however some of these trees can be easily avoided. There is no issue of interference with sites protected for their biodiversity as the Project is very far from the nearest protected area. There will be no interference with protected forests as the works will be in the urban area.

105. **Social Impacts.** In the short-term the proposed sub-project will potentially have positive impacts on local employment in Phuentsholing by creating a demand for unskilled construction workers for the development of infrastructure in the transshipment areas. This will result in improvement of the operational environment in the transshipment yards, which potentially would contribute to improve the working environment and facilitate better health and safety provisions if other management practices are introduced.

106. The proposed capacity building for increased efficiency and modernization of transshipment should result in safer and healthier working practices overall but introduction of less labour intensive transshipment practices in the future may result in a reduction of the requirements for day labourers and temporary increase unemployment. However there may be other opportunities to reemploy day labouring staff such as in waste management and support of sanitary provisions and non-skilled health and safety activities.

107. By affirmative actions such as training to support more intensive transshipment practices, against human trafficking, the spread of HIV/AIDS, and for increased gender balance among DOT and customs officers, the proposed sub-project will ultimately contribute to reducing regional border-related crimes and human rights violations, and have a positive impact on men's and women's health, security and empowerment in Bhutan and the region as a whole.

108. The social and human impacts are minimal as the improvements will be mostly within the MDP area. Adverse impacts outside are difficult to identify at this time but may be to adjacent employers businesses adjacent that may be affected by drainage works. Improvements to drainage within MDP will have overall benefits for the residents outside the MDP if the recommendations in the EMP are implemented effectively.

B. Design / Pre-Construction Phase

1. Detailed Design

109. Mini Dry Port (MDP) development will follow design and built modality. The contractor hired will be responsible for detailed design and subsequent construction of the MDP facilities. Detail design will refer and comply with Bhutan Building Rules (BBR) 2002 for structural analysis and design of MDP. BBR requires any proposed building or structure to comply with following IS code

- i. IS 1893-1894 -Criteria for earthquake resistant design of structures
- ii. IS 875 –1987: Code of practice for Design loads (other than earthquake)
- iii. IS 4326 – Earthquake resistant design & construction of building
- iv. IS 13920 –1993: Ductile detailing of concrete structures subjected to seismic forces
- v. IS 4326 – Earthquake resistant design & construction of building

110. Further, the contractor will hire Environmental Specialist (ES) who will carry out the review and update the existing EMP during detail design. The project design will incorporate the IEE study recommendations. EMP will be made integral part of the bidding and contract document. Environmental Mitigation measures will be itemized and put in the Bill of Quantities (BOQ).

2. Tree Felling

111. Part of the MDP development site falls on the tree plantation area. Approximately about 100 trees will need to be removed to make way for MDP development. Tree felling will be done with approval from Department of Forest and Park Services (DOFPS). The application for tree felling process has been initiated and approval will soon be accorded. Upon approval from the DOFPS, PT will carry out tree felling in accordance with procedure set forth in Forest and Nature Conservation Rules (2006). Only the necessary trees that marked by the DOFPS will be felled. The economically valuable timbers will be handed to the Natural Resource Development Corporation limited (NRDCL). PT in consultation with DOFPS will carry out compensatory plantation. Depending on the availability vacant or barren government land, compensatory ratio of minimum of 1:1 will be followed if area designated is small and for large area a ration 1:4 to be applied.

3. Environmental capacity development

112. Environment Division under PT is involved in management and operation of city's solid waste collection and disposal; sewerage treatment; water treatment and supply; and maintenance of drainage and footpaths. However, it is not involved in monitoring and supervision of any new projects; since it is the responsibility of the Engineering Division. Both the Divisions lack expertise and experiences in carrying out the environmental compliance monitoring of the projects. Under the current SASEC road connectivity project, personnel of

Engineering Division who are part of the Project Coordination Unit (PCU); will be provided on the job training on environmental monitoring and reporting.

113. Moreover, as part of the overall capacity development, ADB will provide environmental baseline (air and noise) monitoring equipment and the required training on data collection and assessment. During the construction period, equipment will be placed with the respective PCU/CSC; and after the completion of project it will be handed over to the Engineering Division for PT.

114. PIU shall conduct awareness training for the contractors and the site agents and workers on implementation of construction mitigation measures in the Project EMP and any additional mitigation measures that may be required during construction phase.

4. Ambient baseline data on Noise and Air

115. As part of institutionalization and capacity building for environmental compliance monitoring and reporting, ADB will finance the procurement environmental monitoring equipment and provide the necessary training. Baseline data on air quality and noise levels of all sensitive area (commercial, residential and institutional) will be assessed before commencement of civil works. These data will help in assessing project impacts during implementation.

116. Based on noise quality assessment, detailed design will design noise barrier of high concrete compound wall around MDP compound to limit direct noise impact during operation. Further during detailed and pre-construction stage, the hired contractor will ensure that tree felling strictly limited to required level. Design will consider wherever possible leaving those trees that are immediately in and outside the proposed concrete boundary wall (noise barrier) to further act as noise barriers.

C. Construction Phase

117. The source of the construction impacts from the MDP will include (i) excavation of building foundations; (ii) construction dry port buildings, (iii) construction of the internal roads and parking areas; (iv) construction of perimeter walls and security fencing (v) construction of internal road side drainage (viii) installing landscaping road signage and accessories (viii) construction of the buildings and security apparatus throughout the site. The waste disposal issues for the works should be manageable as there will be no major excavation necessary.

1. Occupational Health and Safety

118. Worker occupational health and safety is generally governed Labour and Employment Act of Bhutan 2007. Construction works will generally result in accidents and injuries or even demise of the workers if no health and safety measures are followed. General Rules and Regulations on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries 2006 will be applied for occupation safety.

119. Mitigation measures to be implemented by contractors to ensure health and safety of workers are as follows:

- a) The contractor will conduct of training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees. The contractor will

instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities.

- b) The contractors will instruct and induct all workers in health and safety matters (induction course) including construction camp rules and site agents/foremen will follow up with toolbox talks on a weekly basis. Workforce training for all workers starting on site will include safety and environmental hygiene.
- c) Fencing on all areas of excavation greater than 1m deep and sides of temporary works shall be observed.
- d) Workers shall be provided with appropriate personnel safety equipment such as safety boots, helmets, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers.
- e) Reversing signals (visual and audible) shall be installed on all construction vehicles and plant.
- f) Contractor will at all-time keep the first aid kit at the construction sites.
- g) Contractor will be responsible for evacuation injured person to the nearest medical center and bear all the medical expenses

2. Community Health and Safety

120. Public safety, particularly of pedestrians and children can be threatened by the excavation of the trenches for side drain construction. Since construction site is within the city limit, it will be guarded on all sides by security personnel. Construction activities will be timed and provision for safe passage of school children and elderlies will be made. The window period for local traffic and pedestrian will be based on agreement between the local community and local authority (PT, RSTA¹¹, & RBP¹²). Excavated trenches/ditches and freshly cut steep side slopes will be clearly marked and fenced for the safety of passersby and workers alike. Project or construction vehicles will be briefed on speed limit within sensitive areas such as schools, commercial and residential areas. In event of accidents, the contractor will be responsible for immediate evacuation of injured person to the nearest medical center. The contractor shall bear medical and other expenses of the injured person.

3. General Construction Waste Management

121. Uncontrolled waste disposal will contaminate soil and water bodies, thereby harming the environment. Mitigation measures will seek to reduce, recycle and reuse waste as far as practicable. The contractors will ensure implementation of following measures.

- a) In principle, the waste generation will be minimized at source.
- b) Waste products will be segregated, recycled and reused whenever possible.
- c) Recyclable waste will be sold to the scrap dealers.
- d) Organic waste such as plant materials will be composted
- e) Residual non-hazardous waste will be disposed off in the municipal landfill.
- f) Construction/workers' camps will be provided with sufficient refuse bins.
- g) Burning of construction and domestic wastes will be prohibited.

¹¹ RSTA – Road Safety and Transport Authority

¹² RBP – Royal Bhutan Police

- h) Disposal of solid wastes into flood ways, wetland, rivers, other watercourses, farmland, forest and associated places of worship or other culturally sensitive areas or areas where a livelihood is derived canals, agricultural fields and public areas will be prohibited.

4. Hazardous materials and hazardous waste disposal

122. Use of hazardous substances including oils and lubricants can cause significant impacts if uncontrolled or if waste is not disposed correctly. Hazardous waste disposed directly into drainage system can poison water body and affect downstream aquatic life. Mitigation measures will seek to control access to and the use of hazardous substances including chemicals, oils and lubricants and control waste disposal. Contractor will carry out following measures to minimize the impacts:

- i) Hazardous chemicals, oil and lubricants waste will be safely stored. Secondary containment around fuel storage area will be ensured.
- ii) Hydrocarbon, toxic material and explosives (if required) will be stored in adequately protected sites as per the Explosive and Hazardous Rules of RGOB to prevent soil and water contamination.
- iii) Equipment/vehicle maintenance and refuelling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency.
- iv) Fuel and other hazardous substances will be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant.
- v) Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labelled and safely stored. The spent oil and batteries will be sold to recycling dealers.
- vi) Hazardous materials will be stored away from water bodies and above flood level.
- vii) Cleanup operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste
- viii) All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory stipulation.

5. Drainage and hydrology

123. Omchhu and Amochhu Rivers are within the vicinity of the project area. Amochhu River originates from Tibetan plateau and it is joined by Omchhu River drains through north-west of the project area. These rivers will not be directly affected by MDP construction activities. However, there will be an induced impact on the river water quality and its aquatic life, since the storm water carrying silt and other waste will ultimately join the river. During construction, the contractor will ensure the proper disposal of spoil and other waste. Hazardous waste such as oil and lubricants will be properly stored and sent for recycling. Solid municipal waste will be disposed off in a municipal landfill.

6. Traffic Management

124. Construction activities are likely to cause hindrance in local traffic flow if not properly planned and executed. Contractor in consultation with PIU; local authorities (such as RBP,

RSTA and PT); and local communities will come up with traffic management during construction. Work hours and traffic windows will be decided and implemented accordingly. Traffic flow during the rush hours (school and office opening and closing time) will be kept open. Assistance of traffic police will be sought during Pedestrian movement will be allowed uninterrupted; however under the proper guidance by the security personnel.

7. Sanitation and Disease Vectors

125. Potential sanitation and impacts from disease need to be controlled by maintaining hygienic conditions in the MDP area throughout the operational phase as well during construction by implementing appropriate social and health programs for the Project. MDP will ensure that improvements are made to site sanitation and will implement the mitigation measure below for all operational activities and also that the contractor ensures that:

- a) Measures to prevent malaria shall be implemented by installation of proper drainage to avoid formation of stagnant water, etc.
- b) Standing water will not be allowed to accumulate in the drainage facilities or along the warehouse sides to prevent proliferation of mosquitoes.
- c) Temporary and permanent drainage facilities will be designed to facilitate the rapid removal of surface water from all areas and prevent the accumulation of surface water ponds.
- d) Malaria controls will be implemented in line with social plans for the Project.
- e) HIV/AIDS awareness and HIV-AIDS education and prevention program shall be implemented in line with social plans under the social development work stream.

8. Asphalt hot mix plant, rock crushing and bitumen supply

126. It is assumed that the rock based materials, concrete and asphalt will be obtained on an as needed basis in bulk and supplied on carrier trucks from local suppliers, therefore there will not be any significant impact near the MDP. Emissions from powered mechanical equipment that supply crushed rock and asphalt will be rapidly dispersed.

127. Fumes from asphalt chemicals are likely to be well dissipated in the wide open area. However phenol compounds in the bitumen have a very low odour threshold and extremely low concentrations can cause nuisances. These are unlikely to accumulate to toxic levels but the plant for the supply of molten bitumen should be sighted well away from the local residential areas at the perimeter of the site.

128. Bituminous materials will probably be applied using machines supplied from the asphalt plant but if bituminous compounds are to be applied by hand labour methods and melted in heaters the fuel used shall be kerosene, diesel or gas fuel. Fuel wood shall not be used for heating bitumen, neither will bitumen be used as fuel.

9. Noise and Dust

129. Earthworks and rock crushing activities will be the main sources of dust and noise. There will be significant dust and noise impacts on surrounding environment if no proper mitigation measures are followed. Therefore to minimize the dust pollution impacts, contractor will implement following measures:

- a) Water sprinkling or spraying using tanker will be done twice a day to reduce dust generation. Water can be sourced from the nearby rivers (Amochhu or Omchhu).
- b) Construction work will be carried out only during day time (from 8.00am to 6 pm).
- c) If works have given rise to complaints over dust, the contractor shall investigate the cause, report it in the monthly progress reports and review and propose alternative mitigation measures before works recommence.
- d) Suitable construction noise barrier will be designed and constructed
- e) Fuel-efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out.
- f) Vehicles transporting soil, sand and other construction materials will be covered with tarpaulin sheets to reduce the release of dust and avoid impacts from dust. Speed limits of such vehicles within the works site and on unpaved edge areas of the Project road will be established and agreed with the PMU.

130. Bhutan's noise standard permissible for industrial or commercial establishment are Daytime of 75dB(A) and Nighttime of 65dB(A). And this applies for MDP construction area. However, immediately outside (within 10m), there are mixed used area and the permissible noise standard of daytime of 65dB(A) and nighttime of 55dB(A). So the construction noise reaching will be limited to mixed used standard. Noise will be monitored within MDP compound and as well as for sensitive areas (residential and institutional places) during construction. Based on the noise quality monitoring, a temporary noise barrier (made of high thick ply board or MS sheet) will be erected in all places where the noise is expected to create nuisance. However, as the permanent solution, based on detailed design, high concrete compound wall will be constructed which will act as noise barrier limiting the direct impact of noise. Further during pre-construction stage, the hired contractor will ensure that tree felling strictly limited to required level. Design will consider wherever possible leaving those trees that are immediately in and outside the proposed concrete boundary wall (noise barrier) to further act as noise barriers.

10. Vibration

131. At this stage anticipated that limited powered mechanical equipment and a lot of local labour with hand tool methods will be used to implement the MDP area improvements. No deep piling is required therefore vibration should not be an issue.

11. Water Resource and Water Quality

132. Omchhu and Amochhu Rivers are within the vicinity of the project area. Amochhu River originates from Tibetan plateau and it is joined by Omchhu River drains through north-west of the project area. These rivers will not be directly affected by MDP construction activities. However, there will be an induced impact on the river water quality and its aquatic life, since the storm water carrying silt and other waste will ultimately join the river. During construction, the contractor will ensure the proper disposal of spoil and other waste. Hazardous waste such as oil and lubricants will be properly stored and sent for recycling. Solid municipal waste will be disposed off in a municipal landfill.

12. Construction camps and canteen facilities

133. Construction camps will be sited close to the MDP construction zone. Influx of labourer may to some extent increase the pressure on local drinking water supply. Open defecation by labourers may increase the local health problems. In consultation with the local authority (PT),

the contractor will provide drinking water supply to labourers without affecting the local community supply. Pit latrines will be constructed to prevent labourers from open defecation. Once the construction is over, campsite will be cleaned; and pit latrine will be filled and covered with mud to prevent the spread of germs.

13. Impact Flora and Fauna

134. The project area is totally inside the built up area of Phuentsholing City. Except for removal of 100 trees (from the plantation area), there will be no other impact on flora and fauna. For removed trees, project will carry out compensatory plantation with locally available native tree species. Depending on the availability of space, compensatory ration would be either 1:1 (in small area) or 1:4 (if larger vacant area is available).

14. Archaeological and cultural artifacts

135. There are no known archaeological and cultural sites within Project area. And hence no impact is expected.

15. Compensatory Plantation

136. Project or PIU in consultation with local government; Divisional Forest Office (DFO) and community will locate the government or even community barren for compensatory plantation. Compensatory plant using local or native tree species will be carried out to replace the trees felled during the construction. Ratio for compensation will be 1:1 if the area of plantation is small. However, the project can go up to 1:4 if the larger areas available. Project could possibly explore plantation area in the degraded upstream catchment of Omchhu River. This will serve dual purpose – it will lessen erosion and flooding¹³; and in the long term plantation would act as carbon sink.

D. Operational Phase

137. During the operational phase of the Project, Department of Trade will operate and maintain the Mini Dry Port. DOT will be responsible for occupational health and safety of the workers and other occupants of the MDP. It will also take fully responsibility of handling and management of all hazardous materials shipped through the dry port. No hazardous waste will be discharge directly into the local drainage system. All hazardous waste will be collected and stored in a safe place until it is disposed of or recycled.

1. Noise and Dust

138. Bhutan's noise standard permissible for industrial or commercial establishment are Daytime of 75dB(A) and Nighttime of 65dB(A). And this applies for MDP operational area. However, immediately outside (within 10m), there are mixed used area and the permissible noise standard of daytime of 65dB(A) and nighttime of 55dB(A). So the operational noise reaching will be limited to mixed used standard. Noise will be monitored within MDP compound and as well as for sensitive areas (residential places) during construction and operational stages. Based on noise quality assessment, detailed design will design noise barrier of high

¹³ Omchhu River occasionally causes flooding of Phuentsholing City.

concrete compound wall and constructed it all around MDP compound to limit direct noise impact. Further during detailed and pre-construction stage, the hired contractor will ensure that tree felling strictly limited to required level. Design will consider wherever possible leaving those trees that are immediately in and outside the proposed concrete boundary wall (noise barrier) to further act as noise barriers.

139. MDP operation will give rise to dust and toxic fumes pollution both within and outside MDP area. Dust pollution will be of problem particularly during dry winter season, it will be reduced by having concrete/asphalt surfacing of parking and trucks plying area. Further, if required, the water will be sprayed at least twice daily to dampen the dust. With regard to toxic fumes emissions, the trucks entering the MDP compound will be checked of emission standards as per the current practice of Road Safety and Transport Authority of Bhutan (RSTA). Routine checking and penalizing the defaulters is expected to bring level of toxic fume emission to acceptable limits.

2. Dangerous Goods and Hazardous Waste

140. During operations, MDP may handle dangerous and hazardous goods which will pose risk to safety of workers and the surrounding inhabitants. Import and handling of hazardous chemicals and explosives may result in accidents and injuries or even death to people working and living in and around the MDP. Hazardous chemicals if discharged into drainage system will affect the downstream water quality and poison the aquatic life of Amochhu River. If the hazardous substances are disposed of in an open area it will affect surrounding vegetation and even pose health and safety risk to local population. Therefore, MDP operator, the Department of Trade will implement following measures to avoid accidents or poisoning local environment involving hazardous substances:

- i) Hazardous chemicals, oil and lubricants waste will be safely stored. Secondary containment around fuel storage area will be ensured.
- ii) Explosive material or substances will be prohibited into MDP area
- iii) Equipment/vehicle maintenance and refuelling areas will be confined to designated areas. And it will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency.
- iv) Fuel and other hazardous substances will be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant.
- v) Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labelled and safely stored. The spent oil and batteries will be sold to recycling dealers.
- vi) Hazardous materials will be stored away from water bodies and above flood level.
- vii) Cleanup operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste
- viii) All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory stipulation.

3. Sewerage and Wastewater Management

141. MDP operation will generate sewage and wastewater. If untreated sewage and wastewater from MDP is released directly surrounding into environment or into the local

drainage system, it will lead to pollution of land and water bodies. In order to avoid impacts of sewage and wastewater, DOT will implement following measures:

- i) MDP sewage system will be connected Phuentsholing Thromde Sewage Treatment Plan through sewage network in the area.
- ii) Based on the resulting wastewater from the MDP operation, DOT will install wastewater treatment plant. Treated wastewater could be used for spraying to dampen dust during operation.

E. Cumulative Environmental Impact

142. More than adverse cumulative impacts, the cumulative beneficial impacts would be higher for the entire region as well as for Phuentsholing City, if MDP development along with the Phuentsholing Bypass Road (PBR) and Pasakha Access Road (PAR) is carried out. Currently, all heavy transport carriers pass through the narrow Phuentsholing City border crossing; and customs and transshipment activities are carried out at various locations without centralized processes. This results in huge delays which increases the vehicle operating cost and causes congestion within the city. Therefore, development of MDP, and the construction of PBR and PAR would have following cumulative beneficial impacts:

- i) Easing of traffic congestion inside Phuentsholing town (currently all vehicles to and from India passes through only border crossing at Phuentsholing);
- ii) Reduction of travel distance for heavy trucks (traveling through PBR and PAR)
- iii) Reduction of overall transportation cost
- iv) Reduction of fuel consumption and thereby lower greenhouse gas emissions
- v) Reduction of vehicular noise and exhaust pollution within Phuentsholing
- vi) Allowing of smooth and faster trading between Bhutan and regional countries; leading to better economic output of the country.

F. Trans-boundary Issues and Impacts

143. The proposed Mini Dry Port (MDP) project is located close to Bhutan-India border. The southern boundary of MDP is particularly very close to boundary, at some point distance between project boundary and border is only around 5m. The noise and dust pollution would be the major trans-boundary issues. Noise and dust during construction and operation will impact neighbouring settlement in India. However, impact will not be severe as there is 2m high border separation wall which will act as noise and dust barrier. Further the mitigation measures such as MDP's temporary noise barrier and the permanent concrete noise barrier will further reduce and dust from reaching Indian neighbourhoods.

VI. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION

144. The objectives of the stakeholder consultation process was to disseminate information on the project and its expected impact, long-term as well as short-term, among primary and secondary stakeholders and to gather information on relevant issues so that the feedback received could be used to address these issues at early stages of project design. Another important objective was to determine the extent of the concerns amongst the community, to address these in the project implementation and to suggest appropriate mitigation measures. The feedback received has been used to address these issues at early stages of project design.

A. Identification of Stakeholders

145. The stakeholders consulted for the Project included local affected persons, local authorities, educational institutions, and other groups with an interest in the area around the subject Project MDP improvements will be implemented. Government agencies were also consulted. Individuals representing persons from the local community and around the MDP area and representatives of the local municipality (PM) were informed about the Project and invited to comment on their environmental concerns. These stakeholders were considered to be representative of the community living in the area, the road users, the business associated with the roads near MDP area and the locally elected representatives. Consultations took place between 1st to 5th December 2012.

146. The consultation with the general public was conducted at various residential and commercial locations around the MDP area. The dates and locations of consultations are presented in Appendix B.

B. Consultation with Stakeholders

147. The summaries of results of the public consultations are recorded in Appendix B. Many local affected people were pleased to respond but requested anonymity. Some responded in groups. The main environmental and other concerns can be summarized as follows.

148. Interest in the survey: Most of the respondents in the general public around the MDP area indicated they had some comments to make on the Project. None said the Project would affect their working and home lives.

149. Support for Project: All respondents were in favour of the project and none identified anything that they could think of that was likely or would cause them not to support the Project.

150. Overall environmental impact: When questioned on the overall environmental impact of the project almost all respondents had some ideas to share. However did not know enough to express and opinion or saw no potential improvement. Several respondents identified in terms of temporary increased pollution, increases in accidents and that although impacts were moderate the implementing agency should be more environmentally aware.

151. Controlling environmental impacts: When questioned on ideas on how to control the overall environmental impact of the project, respondents did not have any answers.

152. Most affected people were not very concerned about social issues as there were government employees and did not want to comment further.

153. No significant operational phase impacts were identified and the communities around the subproject generally indicated they would fully support the Project.

C. Concerns expressed by stakeholders

154. The affected persons also fully expect that the necessary arrangements to compensate for general environmental impacts but did not comment further. Results are summarized broadly Appendix B.

D. Concerns Addressed

155. The main issues raised are addressed in the environmental management plan, as far as is reasonably practicable at this stage. Concerns with respect to temporary increased pollution, increases in accidents and environmental controls have been addressed in the EMP.

E. Information disclosure and Participation

156. PT will disclose IEE report to the public through its website to provide public an opportunity to review the project design and engaged in further consultation if necessary. Similarly, ADB will disclose the final IEE on its website for public dissemination.

VII. GRIEVANCE REDRESS MECHANISM

157. As both components of the project are closely interlinked a unified Project grievance redress mechanism (GRM) will be established to receive, evaluate and facilitate the resolution of affected people's concerns, complaints and grievances about the social and environmental performance at the level of the Project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

158. Phuentsholing Thromde (PT) shall make the public aware of the GRM through public awareness campaigns. The contact phone number Project Coordination Unit (PCU) will serve as a hotline for complaints and shall be publicized through the media and placed on notice boards outside their offices and at PT. Information on the project shall be made available at the PT office and a brochure/leaflet will be made available to include information on the GRM and it shall be disseminated to the local government offices, temples, schools and residential associations in Phuentsholing by the environmental safeguards officers in the PT. Grievances can be filed in writing or by phone to any member of the PT as well as the environmental safeguards officer.

159. **First tier of GRM.** The Project Implementation Unit (PIU) under PCU is the first tier of GRM which offers the fastest and most accessible mechanism for resolution of grievances. The Project Managers (PM) of PIUs will be designated as the key officer for grievance redress. Resolution of complaints will be done within seven working (7) days. Investigation of grievances will involve site visits and consultations with relevant parties (e.g., affected persons, contractors, police, etc.) Grievances will be documented and personal details (name, address, date of complaint, etc.) will be included unless anonymity is requested.

160. A tracking number shall be assigned for each grievance, including the following elements; (i) initial grievance sheet (including the description of the grievance), with an acknowledgement of receipt handed back to the complainant when the complaint is registered; (ii) grievance monitoring sheet, mentioning actions taken (investigation, corrective measures); (iii) closure sheet, one copy of which will be handed to the complainant after he/she has agreed to the resolution and signed-off.

161. The updated register of grievances and complaints will be available to the public at the PT head office and the PIU office near the Project. Should the grievance remain unresolved it will be escalated to the second tier.

162. **Second Tier of GRM.** The PM of respective PIUs will activate the second tier of GRM by referring the unresolved issue (with written documentation) to the head of the Project Coordination Unit (PCU) in PT who will pass unresolved complaints upward to the Grievance Redress Committee (GRC). The GRC shall be established by PT before commencement of site works. The GRC will consist of the following persons: (i) Executive Secretary; (ii) Division Heads of PT; (iii) Environmental Officer (iv) Project Coordinator; (v) representative of the affected person(s); and (vi) representative of the Dzongkhag Environmental Officer (representing NEC) for environmental related grievances. A hearing will be called with the GRC, if necessary, where the affected person can present his/her concern/issues. The process will facilitate resolution through mediation. The local GRC will meet as necessary when there are grievances to be addressed. The local GRC will suggest corrective measures at the field level and assign clear responsibilities for implementing its decision within fifteen (15) working days. The contractor will have observer status on the committee. If unsatisfied with the decision, the existence of the

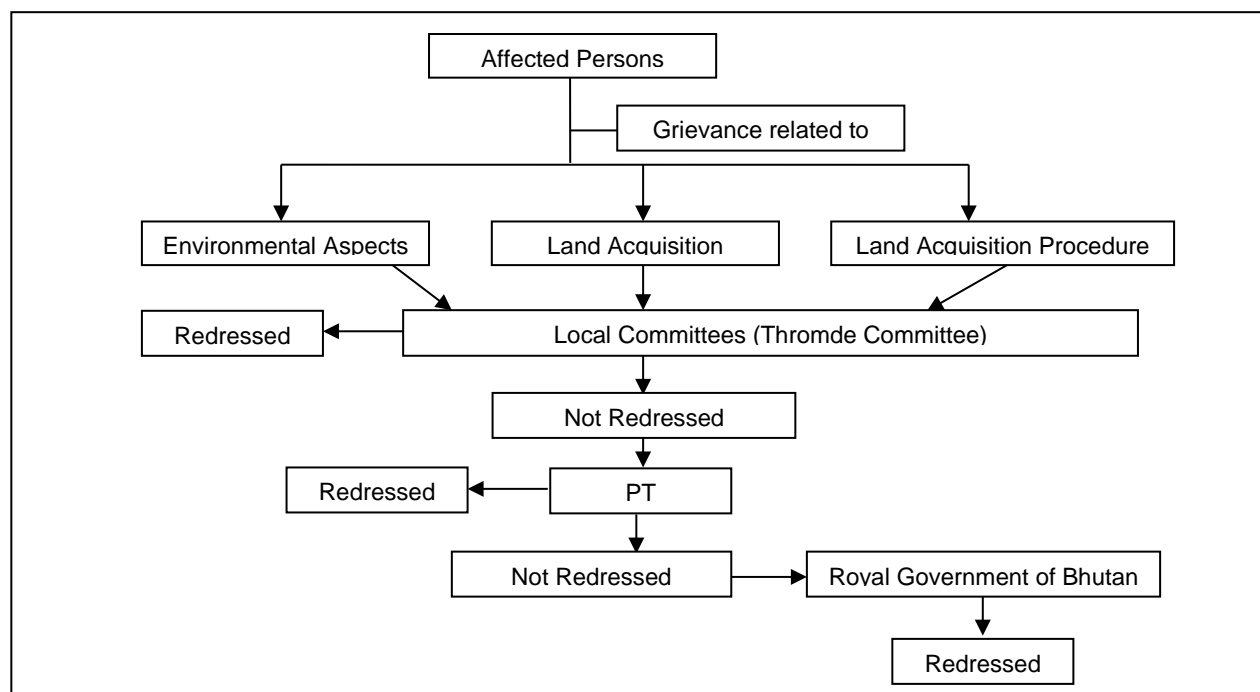
GRC shall not impede the complainant's access to the Government's judicial or administrative remedies.

163. The functions of the local GRC are as follows: (i) resolve problems and provide support to affected persons arising from various environmental issues and including dust, noise, utilities, power and water supply, waste disposal, traffic interference and public safety as well as social issues land acquisition (temporary or permanent); asset acquisition; and eligibility for entitlements, compensation and assistance; (ii) reconfirm grievances of displaced persons, categorize and prioritize them and aim to provide solutions within a month; and (iii) report to the aggrieved parties about developments regarding their grievances and decisions of the GRC.

164. The Environment officer in PT will be responsible for processing and placing all papers before the GRC, maintaining database of complaints, recording decisions, issuing minutes of the meetings and monitoring to see that formal orders are issued and the decisions carried out.

165. **Third tier of GRM.** In the event that a grievance cannot be resolved directly by the PIU/PCU (first tier) or GRC (PT second tier) the affected person can seek alternative redress through an appropriate court. The GRC will be kept informed by the district, municipal or national authority. The grievance redress mechanism and procedure is depicted in Figure 5 for MDP development. The monitoring reports of the EMP implementation shall include the following aspects pertaining to progress on grievances: (i) Number of cases registered with the GRC, level of jurisdiction (first, second and third tiers), number of hearings held, decisions made, and the status of pending cases; and (ii) lists of cases in process and already decided upon may be prepared with details such as Name, ID with unique serial number, date of notice, date of application, date of hearing, decisions, remarks, actions taken to resolve issues and status of grievance.

Figure 5: Grievance Redress Mechanism



VIII. ENVIRONMENTAL MANAGEMENT PLAN

A. Implementation Arrangements

166. The environmental regulations of RGOB are derived from the Environmental Assessment Act (2000). The environmental assessment rules are set out in the Regulation for Environmental Clearance of Projects (2002). For this project the requirement for statutory environmental assessment will be determined by Ministry of Works and Human Settlements (MOWHS) in due course (see Chapter III).

167. MDP development will follow the principle of design and built modality. PT will hire construction contractor who will be responsible for design as well as carry out the subsequent construction. ADB will assist in capacity building in environmental monitoring and reporting.

168. Environmental Clearance will be issued by the MOWHS upon submission of IEE forms and related no objection certificates (NOC) from the affected persons/community; BPCL; BTL; and Phuentsholing Thromde.

169. The table below defines the responsibilities for EMP implementation.

Table 5: Responsibilities for EMP Implementation

Agency	Responsibilities
Project Coordination Unit (PCU) of Phuentsholing Thromde (PT)	<ul style="list-style-type: none"> • Executing agency with overall responsibility for project construction and operation • Ensure that sufficient funds are available to properly implement the EMP • Ensure that Project, regardless of financing source, complies with the provisions of the EMP and <i>ADB Safeguard Policy Statement 2009 (SPS)</i> • Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP. • Project Manager of PIU for will be environmental focal persons. • Ensure that Construction Supervision Consultant (CSS) is recruited. • Environmental Specialist (ES) part of CSC to ensure proper implementation of EMP provisions. Through this specialist, the PT shall: (i) ensure proper and timely implementation of tasks specified in the EMP, (ii) conduct environmental training as specified in the IEE/EMP, (iii) conduct contractors workers' orientation on EMP provisions, (iv) undertake regular monitoring of the contractor's environmental performance, as scheduled in the EMP (v) conduct field measurements for dust and noise as if complaints arise, and (v) prepare environmental baseline report and semi-annual environmental monitoring reports, as specified in the EMP, for submission to ADB • Ensure that Project implementation complies with RGOB/ADB environmental policies and regulations • For project duration ensure that the PT retain an ES to oversee EMP implementation. • Ensure that environmental protection and mitigation measures in the EMP are incorporated in the detailed designs • Establish and implement an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance • In case of change in project components that will result in adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.). Obtain environmental approvals and certification under RECOP from NEC prior to award of civil works contracts. • Confirm that bidding and contract documents include the EMP. Submit semi-annual monitoring reports on EMP implementation to ADB and identify environmental corrective actions and prepare a corrective action plan, as necessary, for submission to ADB.

Agency	Responsibilities
Project implementation Unit (PIU) of PT	<ul style="list-style-type: none"> • Liaise with the Environmental Officer in PT to ensure that Project implementation complies with ADB's Safeguards Policy Statement (SPS 2009) principles and requirements; • Ensure that bidding and contract documents include the EMP; • Ensure that the Contractor provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP and the contractor(s) identify these sums separately in the bidding documents; • Submit quarterly reports on EMP implementation to PT; • Ensure that EMP provisions are strictly implemented during various project phases (design/pre-construction, construction and operation) to mitigate environmental impacts to acceptable levels; • Check that environmental protection and mitigation measures in the EMP are incorporated in the detailed designs; • Check that necessary environmental clearances and approval(s) from NEC prior to award of civil works contracts; • In case of change in project components that will result in adverse environmental impacts that are not within the scope of the IEE prepared during loan processing, etc.) Assist PT in obtaining environmental approvals and certification under RECOP from NEC prior to award of civil works contracts; • Participate in an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance; • Ensure monitoring of the implementation of the EMP (mitigation and monitoring measures); • Prior to bidding ensure that the contractors agree to implement environmental and safety requirements as required in draft contracts to ensure compliance with environmental statutory and contractual obligations and proper implementation of the EMP; • Conduct environmental management awareness training sessions for Contractor as described in the IEE and EMP.
Construction Supervision Consultant (CSC)	<ul style="list-style-type: none"> • Attend environmental management and capacity building training sessions on the IEE and EMP; • Ensure implementation of mitigation and monitoring measures for various project phases in the EMP by contractors; • Undertake day to day environmental management and make observations and keep written record of environmental management activities for PT as described in the IEE and EMP. • Participate in an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance.
Contractor	<ul style="list-style-type: none"> • Prior to start of bidding agree in writing to implement (if selected) environmental and safety requirements to ensure compliance with environmental statutory and contractual obligations and proper implementation of the EMP. • Provide sufficient funding and human resources for proper and timely implementation of required mitigation measures in the EMP and identify these sums separately in the bidding documents. • Implement environmental and safety requirements to ensure compliance with environmental statutory and contractual obligations and proper implementation of the EMP • Attend environmental management awareness training sessions for Contractor as described in the IEE and EMP. • Implement additional environmental mitigation measures for unexpected impacts, as necessary • Participate in an environmental grievance redress mechanism, as described in the IEE, to receive and facilitate resolution of affected peoples' concerns, complaints, and grievances about the Project's environmental performance.
DOT authority (operator of MDP)	<ul style="list-style-type: none"> • Responsible for operation and maintenance of Project. • Implement EMP monitoring during operations.
National Environment	<ul style="list-style-type: none"> • Review and approve environmental assessment reports required by the

Agency	Responsibilities
Commission	Government. <ul style="list-style-type: none"> • Undertake monitoring of the project's environmental performance based on their mandate
ADB	<ul style="list-style-type: none"> • Review and approve environmental assessment reports required by ADB. • Undertake monitoring of the project's environmental performance based on above requirements and SPS.

170. To facilitate effective EMP implementation during construction, the contractors will be oriented on the environmental terms and conditions of the project. The contractor's compliance with the environmental conditions is directly linked with the work progress payments. Clearances for payments will include certification from the Project Manager as to the effective implementation of the EMP and all other mitigation measures specified in the EMP. The completion of implementation of mitigation measures will therefore be linked to payment milestones.

B. Environmental Mitigation

171. The anticipated environmental impacts and mitigation measures discussed in the previous section is presented in Table 6. The table also shows responsibilities and timeframe/schedule for implementation of mitigation measures and monitoring.

172. Table 6 shows that most mitigation activities during pre-construction are to be implemented by the PCU/PIU (assisted by CSC). During construction mitigation measures shall be primarily implemented by the contractor and monitored by CSC/PIU on behalf of PT. During operation stage, PT and Department of Trade (DOT) will undertake environmental mitigation and monitoring requirements specified in the EMP. To ensure implementation of mitigation measures during construction, the EMP will be included in the bidding and contract documents for civil works. Contractors' conformity with environmental contract procedures and specifications will be regularly monitored by PCU/PIU and results shall be reported semi-annually to ADB.

Table 6: Environmental Mitigation and Environmental Performance Monitoring Plan for MDP

Table of Environmental Mitigation and Environmental Performance Monitoring Plan for MDP										
		Impact mitigation					Performance and Impact monitoring			
Environmental Concern	Objective	Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
DESIGN & PRE-CONSTRUCTION										
1. Detailed Design	Incorporate design measures in the project design to minimize environmental impacts.	<p>1. Mini Dry Port (MDP) development will follow design and built modality. The contractor hired will be responsible for detailed design and subsequent construction of the MDP facilities.</p> <p>2. Detail design will refer and comply with Bhutan Building Rules (BBR) 2002 for structural analysis and design of MDP. BBR requires any proposed building or structure to comply with following IS code:</p> <p>i. IS 1893-1894 -Criteria for earthquake resistant design of structures</p> <p>ii. IS 875 –1987: Code of practice for Design loads (other than earthquake)</p> <p>iii. IS 4326 – Earthquake resistant design & construction of building</p> <p>iv. IS 13920 –1993: Ductile detailing of concrete structures subjected to seismic forces</p> <p>v. IS 4326 – Earthquake resistant design & construction of building</p> <p>3. The contractor will hire Environmental Specialist (ES) who will carry out the review and update the existing EMP during detail design. The project design will incorporate the IEE study recommendations.</p> <p>4. EMP will be made integral part of the bidding and contract document. Environmental Mitigation measures will be itemized and put in the Bill of Quantities (BOQ).</p> <p>5. Grievance Redress Committee will be formed prior to the start of civil works</p>	Contractor	1 and 4 Start of detailed design. 5: Before start of civil works	All MDP	Design and Construction cost	Check at DD. Complete check of items 1 to 5.	Completion detailed design/prior to start of site works. Once.	PCU/CSC	CSC Budget
2. Environmental capacity development	Develop environmental management capacity =PT/PCU/PIU/Contractor	<p>1. Under the current SASEC road connectivity project, Project Coordination Unit (PCU) staff will be provided on the job training on environmental monitoring and reporting.</p> <p>2. ADB will provide environmental baseline (air and noise) monitoring equipment and the required training on data collection and assessment.</p> <p>3. PMU shall conduct awareness training for the contractors and the site agents and workers on implementation of construction mitigation measures in the Project EMP and</p>	ADB PIU/CSC	Initiate during detailed design phase and Pre-construction period	MDP Construction Site	CSC Budget	Check at DD. Complete training and check before and during construction.	Prior to start of site works and throughout construction phase.	PCU/CSC NEC/ District Environment officer	CSC Budget NEC Budget

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		any additional mitigation measures that may be required during construction phase.								
3 Tree Felling or Site Clearance	Tree felling by contractor	<p>Approximately 100 trees will be felled to make way for MDP construction.</p> <p>1. Tree felling will be done with approval from Department of Forest and Park Services (DOFPS). The application for tree felling process has been initiated and approval will soon be accorded.</p> <p>2. Upon approval from the DOFPS, PT will carry out tree felling in accordance with procedure set forth in Forest and Nature Conservation Rules (2006). Only the necessary trees that marked by the DOFPS will be felled.</p> <p>3. The economically valuable timbers will be handed to the Natural Resource Development Corporation limited (NRDCL).</p> <p>4. PT in consultation with DOFPS will carry out compensatory plantation. Depending on the availability vacant or barren government land, compensatory ratio of minimum of 1:1 will be followed if area designated is small and for large area a ration 1:4 to be applied.</p>	Contractor	Pre-construction	Throughout MDP	Contractor Construction Cost	<p>No of trees felled.</p> <p>Tree felling procedures</p> <p>No of trees handed over to NRDCL</p>	Prior to start of site works and throughout construction phase.	PCU/CSC DOFPS	<p>CSC Budget</p> <p>DOFPS budget</p>
4 Baseline Environment data (Air and Noise)	Establishment of baseline data on air and noise	<p>As part of institutionalization and capacity building for environmental compliance monitoring and reporting, ADB will finance the procurement environmental monitoring equipment and provide the necessary training. Baseline data on air quality and noise levels of all sensitive area (commercial, residential and institutional) will be assessed before commencement of civil works. These data will help in assessing project impacts during implementation.</p> <p>Based on noise quality assessment, detailed design will design noise barrier of high concrete compound wall around MDP compound to limit direct noise impact during operation. Further during detailed and pre-construction stage, the hired contractor will ensure that tree felling strictly limited to required level. Design will consider wherever possible leaving those trees that are immediately in and outside the proposed</p>	CSC/PIU Contractor	Detailed Design and Pre-construction	Construction and Sensitive area	CSC and Contractor Cost	<p>Establishment of Baseline data on air and noise</p> <p>Design of noise barrier</p>	Once during detailed design and pre-construction stage	PCU/CSC	CSC Budget

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		concrete boundary wall (noise barrier) to further act as noise barriers.								
CONSTRUCTION STAGE										
1. Safety Precautions for the Workers	Ensure worker safety.	<p>Worker's occupational health and safety will be generally governed Labour and Employment Act of Bhutan 2007. Construction works will generally result in accidents and injuries or even demise of the workers if no health and safety measures are followed. General Rules and Regulations on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries 2006 will be applied for occupation safety. Mitigation measures to be implemented by contractors to ensure health and safety of workers are as follows:</p> <ol style="list-style-type: none"> 1. The contractor will conduct of training (assisted by PIU) for all workers on safety and environmental hygiene at no cost to the employees. The contractor will instruct workers in health and safety matters as required by law and by good engineering practice and provide first aid facilities. 2. The contractors will instruct and induct all workers in health and safety matters (induction course) including construction camp rules and site agents/foremen will follow up with toolbox talks on a weekly basis. Workforce training for all workers starting on site will include safety and environmental hygiene. 3. Fencing on all areas of excavation greater than 1m deep and sides of temporary works shall be observed. 4. Workers shall be provided with appropriate personnel safety equipment such as safety boots, helmets, gloves, protective clothes, dust mask, goggles, and ear protection at no cost to the workers. 5. Reversing signals (visual and audible) shall be installed on all construction vehicles and plant. 6. Contractor will at all-time keep the first aid kit at the construction sites. 7. Contractor will be responsible for evacuation injured person to the nearest 	Contractor	Throughout construction phase	Throughout project site	Cost included in contracts	<p>Check implementation item 1 to 7.</p> <p>Compliance with OHS 2006</p>	<p>Bi-weekly</p> <p>as part of day-to-day project construction supervision</p>	<p>ES/CSC/PIU</p> <p>MOWHS Environmental Officer,</p> <p>Dzongkhag Environmental Officer, NEC</p>	<p>PIU/PMU and CSC Budgets</p> <p>MOWHS Budget</p> <p>Dzongkhag budget</p> <p>NEC budget</p>

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		medical center and bear all the medical expenses								
3. Public safety	Prevent accident with public in local community	<p>1. Install barriers (e.g., temporary fence) at construction areas to deter pedestrian access to the roadway except at designated crossing points.</p> <p>2. The general public/local residents shall not be allowed in high-risk areas, e.g., excavation sites and areas where heavy equipment is in operation and such sites have a watchman to keep public out.</p> <p>3. Speed restrictions shall be imposed on Project vehicles and equipment when traveling within 50 m of sensitive receptors (e.g. residential, schools, temples, etc.).</p> <p>4. Upon completion of construction works, borrow areas will be backfilled (if suitable materials are available, e.g., excavation spoils) or fenced.</p>	Contractor	At all times throughout construction phase	Throughout project road, borrow areas and other areas utilized for the Project	Cost included in contracts	Check implementation of items 1 to 4	<p>Bi-weekly</p> <p>as part of day-to-day project construction supervision</p>	<p>ES/CSC/PIU</p> <p>MOWHS Environmental Officer,</p> <p>Dzongkhag Environmental Officer, NEC</p>	<p>PIU/PMU and CSC Budgets</p> <p>MOWHS Budget</p> <p>Dzongkhag budget</p> <p>NEC budget</p>
4a. General Construction Waste Management	Reduce, reuse and recycle waste and contamination due to poor waste disposal practices.	<p>Uncontrolled waste disposal operations can cause significant impacts. Mitigation measures will seek to reduce, recycle and reuse waste as far as practicable. The contractors will ensure implementation of following measures.</p> <p>1. In principle, the waste generation will be minimized at source.</p> <p>2. Waste products will be segregated, recycled and reused whenever possible.</p> <p>3. Recyclable waste will be sold to the scrap dealers.</p> <p>4. Organic waste such as plant materials will be composted</p> <p>5. Residual non-hazardous waste will be disposed off in the municipal landfill.</p> <p>6. Construction/workers' camps will be provided with sufficient refuse bins.</p> <p>7. Burning of construction and domestic wastes will be prohibited.</p> <p>8. Disposal of solid wastes into flood ways, wetland, rivers, other watercourses, farmland, forest and associated places of worship or other culturally sensitive areas or areas where a livelihood is derived canals, agricultural fields and public areas will be prohibited.</p>	Contractor	Throughout construction phase	Project site and waste disposal areas	Cost included in contracts	Check implementation of items 1-8	<p>Bi-weekly</p> <p>as part of day-to-day project construction supervision</p>	<p>ES/CSC/PIU</p> <p>MOWHS Environmental Officer,</p> <p>Dzongkhag Environmental Officer, NEC</p>	<p>PIU/PMU and CSC Budgets</p> <p>MOWHS Budget</p> <p>Dzongkhag budget</p> <p>NEC budget</p>
4b. Use of hazardous substances and	Minimize contamination due to use and storage	Use of hazardous substances including oils and lubricants can cause significant impacts if uncontrolled or if waste is not disposed	Contractor	Throughout construction phase	Project site and waste disposal areas	Cost included in contracts	Check implementation of items 1-7	Bi-weekly	ES/CSC/PIU	PIU/PMU and CSC Budgets

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
hazardous waste disposal	of hazardous substances	<p>correctly. Hazardous substance disposed of into open area and drainage system will directly harm surrounding environment and downstream water body. Mitigation measures will seek to control access to and the use of hazardous substances such as oils and lubricants and control waste disposal. Contractor will carry out following measures to minimize the impacts:</p> <ol style="list-style-type: none"> 1. Oil and lubricants will be safely stored. Secondary containment around fuel storage area will be ensured. 2. Hydrocarbon, toxic material and explosives (if required) will be stored in adequately protected sites as per the Explosive and Hazardous Rules of RGOB to prevent soil and water contamination. 3. Equipment/vehicle maintenance and refuelling areas will be confined to areas in construction sites designed to contain spilled lubricants and fuels. Such areas will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency. 4. Fuel and other hazardous substances will be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant. 5. Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labelled and safely stored. The spent oil and batteries will be sold to recycling dealers. 6. Hazardous materials will be stored away from water bodies and above flood level. Cleanup operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste 7. All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory stipulation. 						as part of day-to-day project construction supervision	<p>MOWHS Environmental Officer,</p> <p>Dzongkhag Environmental Officer, NEC</p>	<p>MOWHS Budget</p> <p>Dzongkhag budget NEC budget</p>
5. Drainage and Hydrological	To minimize hydrological	Omchhu and Amochhu Rivers are within the vicinity of the project area. These rivers will not	Contractor	Throughout construction	Construction Site.	Included in project and	Check implementation	1to 3: Daily by	ES/CSC/PIU	PIU/PMU and CSC

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
Impacts	impacts flooding and runoff of river banks.	be directly affected by MDP construction activities. However, there will be an induced impact on the river water quality and its aquatic life, since the storm water carrying silt and other waste will ultimately join the river. Contractor will implement following measures to minimize the impacts: 1. During construction, the contractor will ensure the proper disposal of spoil and other waste. 2. Hazardous waste such as oil and lubricants will be properly stored and sent for recycling. 3. Solid municipal waste will be disposed off in a municipal landfill.		phase		bid costs	of items 1-3 and DMP provisions	CSC 1 to 3: Monthly ES	MOWHS Environmental Officer, Dzongkhag Environmental Officer, NEC	Budgets MOWHS Budget Dzongkhag budget NEC budget
6. Traffic Management	Minimize disturbance of traffic and traffic congestion	1. Communicate to the public through local officials regarding the scope and schedule of construction, as well as certain construction activities causing disruptions or access restrictions. 2. In coordination with local traffic authorities, implement appropriate traffic diversion schemes to avoid inconvenience due to project operations to road users, ensure smooth traffic flow and avoid or minimize accidents, traffic hold ups and congestion 3. In coordination with local traffic officials, schedule transport of materials to avoid congestion, set up clear traffic signal boards and traffic advisory signs at the roads going in and out the road and bridge construction sites to minimize traffic build-up. 4. Provide safe vehicle and pedestrian access around construction areas. 5. Install bold diversion signs that would be clearly visible even at night and provide flag persons to warn of dangerous conditions (24 hours, as necessary) 6. Provide sufficient lighting at night within and in the vicinity of construction sites.. 7. Designate traffic officers in construction sites.	Contractor and PIU	Throughout construction. Check and report on same day.	Throughout project site	Cost included in contracts.	Check implementation of items 1-7	1: Before construction 2 & 7: Weekly	ES/CSC/PIU MOWHS Environmental Officer, Dzongkhag Environmental Officer, NEC	PIU/PMU and CSC Budgets MOWHS Budget Dzongkhag budget NEC budget
7. Sanitation and Diseases	Control of infectious diseases.	1. Standing water will not be allowed to accumulate in the temporary drainage facilities or along the roadside to prevent proliferation of mosquitoes. 2. Temporary and permanent drainage facilities will be designed to facilitate the rapid removal	Contractor	Throughout construction.	Throughout project site, workers camps	Cost included in contracts.	Check implementation of items 1-4	Monthly	ES/CSC/PIU MOWHS Environmental Officer,	PIU/PMU and CSC Budgets MOWHS

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		<p>of surface water from all areas and prevent the accumulation of surface water ponds.</p> <p>3. Malaria controls ((e.g., provision of insecticide treated mosquito nets to workers, installation of proper drainage to avoid formation of stagnant water, etc.) and HIV-AIDS education will be implemented in line with social plans for the project.</p> <p>4. HIV/AIDS awareness and prevention program shall be implemented in line with social plans under the Project</p>							Dzongkhag Environmental Officer, NEC	<p>Budget</p> <p>Dzongkhag budget</p> <p>NEC budget</p>
8. Asphalt plant rock crushers, bitumen usage and soil contamination	Avoid air pollution, nuisances, traffic obstacles and contamination	<p>1. Locate asphalt plant and rock crushers (wherever practical) at least 500m from nearest sensitive receivers (residential areas, schools, hospital, etc.) and rivers and install and maintain dust suppression equipment.</p> <p>2. Bitumen as well as firewood will not be used as fuel for heating bitumen. Bitumen drums stored in dedicated area not scattered along Project roads and other project facilities.</p> <p>3. Bitumen will not be allowed to enter drainage system.</p> <p>4. Bitumen storage and mixing areas shall be protected against spillage.</p> <p>5. All accidental spills of bitumen or chemicals should be cleaned up immediately with the top 2cm of any contaminated soil underneath and disposed of as chemical waste to a site approved by the local authority.</p> <p>6. Recycle debris generated by dismantling of existing pavement subject to the suitability of the material.</p>	Contractors	Throughout construction phase	Construction zone within MDP area	Cost included in contracts	<p>Check implementation of items 1-9</p> <p>Monthly monitor TSP within the plant site.</p>	<p>1: Before establishment of facilities</p> <p>2 & 6: Daily by CSC</p>	<p>ES/CSC/PIU</p> <p>MOWHS Environmental Officer,</p> <p>Dzongkhag Environmental Officer, NEC</p>	<p>PIU/PMU and CSC Budgets</p> <p>MOWHS Budget</p> <p>Dzongkhag budget</p> <p>NEC budget</p>
9. Noise and dust nuisances	To minimize air impacts effectively and avoid complaints due to the airborne dust.	<p>Although temporary in nature, construction activities generate noise and dust pollution affecting local communities as well as other establishments. Since the MDP construction area is close to Indian border, it may trigger trans-boundary issue. Noise and dust may affect the communities living across the border. Following mitigation measure will be applied to reduce nuisances:</p> <p>1. Water sprinkling or spraying using tanker will be done twice a day to reduce dust generation.</p> <p>2. Water can be sourced from Omchhu or Amochhu Rivers</p>	<p>Contractors</p> <p>CSC/ES</p>	Throughout construction phase	Construction zone within MDP area	Cost included in contracts	<p>Check implementation of items 1-9</p> <p>Monthly Monitor noise (dBA) levels at sensitive areas within 200m from active construction front(s).</p> <p>Ambient TSP levels monthly</p>	Daily during construction	<p>ES/CSC/PIU</p> <p>MOWHS Environmental Officer,</p> <p>Dzongkhag Environmental Officer, NEC</p>	<p>PIU/PMU and CSC Budgets</p> <p>MOWHS Budget</p> <p>Dzongkhag budget</p> <p>NEC budget</p>

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		<p>3. No work will be carried out within 500m of any settlement during the night (2100 hrs to 0700 hrs).</p> <p>4. If works have given rise to complaints over dust, the contractor shall investigate the cause, report it in the monthly progress reports and review and propose alternative mitigation measures before works recommence.</p> <p>5. Fuel-efficient and well-maintained haulage trucks will be employed to minimize exhaust emissions. Regular maintenance will be carried out.</p> <p>6. Vehicles transporting soil, sand and other construction materials will be covered with tarpaulin sheets to reduce the release of dust and avoid impacts from dust. Speed limits of such vehicles within the works site and on unpaved edge areas of the Project road will be established and agreed with the PMU.</p> <p>7. Noise and dust monitoring will be required carried out during the construction.</p> <p>8. Temporary Noise barrier made of thick ply board or MS sheet will be erected during construction.</p> <p>9. High concrete wall (as prescribed by design) will be constructed all around the MDP compound to noise travel and impact on communities living nearby.</p>					within 300m from active construction front(s), and materials handling, and storage areas.			
10. Compensatory Plantation	Provide environmental enhancement of the project	Project or PIU in consultation with local government; Divisional Forest Office (DFO) and community will locate the government or even community barren for compensatory plantation. Compensatory plant using local or native tree species will be carried out to replace the trees felled during the construction. Ratio for compensation will be 1:1 if the area of plantation is small. However, the project can go up to 1:4 if the larger areas available. Project could possibly explore plantation area in the degraded upstream catchment of Omchhu River. This will serve dual purpose – it will lessen erosion and flooding; and in the long term plantation would act as carbon sink.	Contractors	Throughout construction.	Throughout project site	Cost included in contracts.	Confirmed implementation of required enhancements	Monthly during construction	ES/CSC/PIU MOWHS Environmental Officer, DOFPS	PIU and CSC Budgets MOWHS Budget DOFPS NEC budget
OPERATIONAL STAGE										
1. Noise and Dust	Minimize noise and dust pollution	1. Noise will be monitored within MDP compound and as well as for sensitive areas	MDP operator	During operation.	Throughout Entire MDP	Included in operation and	Throughout operations and	Quarterly	DOT	DOT Budget

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
	impacts	<p>(residential places) during construction and operational stages. Based on noise quality assessment, detailed design will design noise barrier of high concrete compound wall and constructed it all around MDP compound to limit direct noise impact. Further during detailed and pre-construction stage, the hired contractor will ensure that tree felling strictly limited to required level. Design will consider wherever possible leaving those trees that are immediately in and outside the proposed concrete boundary wall (noise barrier) to further act as noise barriers.</p> <p>2. MDP operation will give rise to dust and toxic fumes pollution both within and outside MDP area. Dust pollution will be of problem particularly during dry winter season, it will be reduced by having concrete/asphalt surfacing of parking and trucks plying area. Further, if required, the water will be sprayed at least twice daily to dampen the dust.</p> <p>3. Toxic fumes emissions, the trucks entering the MDP compound will be checked of emission standards as per the current practice of Road Safety and Transport Authority of Bhutan (RSTA). Routine checking and penalizing the defaulters is expected to bring level of toxic fume emission to acceptable limits.</p>			AREA .	maintenance cost	<p>maintenance.</p> <p>Roadside monitoring of SO_x, NO_x, HC, and TSP annually during dry-season.</p>		<p>NEC</p> <p>RSTA</p>	<p>NEC Budget</p> <p>RSTA Budget</p>
2.Dangerous goods and Hazardous waste	Minimize noise and dust pollution impacts	During operations, MDP may handle dangerous and hazardous goods which will pose risk to safety of workers and the surrounding inhabitants. Import and handling of hazardous chemicals and explosives may result in accidents and injuries or even death to people working and living in and around the MDP. Hazardous chemicals if discharged into drainage system will affect the downstream water quality and poison the aquatic life of Amochhu River. If the hazardous substances are disposed of in an open area it will affect surrounding vegetation and even pose health and safety risk to local population. Therefore, MDP operator, the Department of Trade will implement following measures to avoid accidents or poisoning local environment	MDP operator	During operation.	Throughout Entire MDP AREA .	Included in operation and maintenance cost	Throughout operations and maintenance	Quarterly	DOT NEC	DOT Budget NEC Budget

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		<p>involving hazardous substances:</p> <ol style="list-style-type: none"> 1. Hazardous chemicals, oil and lubricants waste will be safely stored. Secondary containment around fuel storage area will be ensured. 2. Explosive material or substances will be prohibited into MDP area 3. Equipment/vehicle maintenance and refuelling areas will be confined to designated areas. And it will be provided with drainage leading to an oil-water separator that will be regularly skimmed of oil and maintained to ensure efficiency. 4. Fuel and other hazardous substances will be stored in areas provided with roof, impervious flooring and bund/containment wall to protect these from the elements and to readily contain spilled fuel/lubricant. 5. Hazardous wastes (oil, used batteries, fuel drums) will be segregated, labelled and safely stored. The spent oil and batteries will be sold to recycling dealers. 6. Hazardous materials will be stored away from water bodies and above flood level. Cleanup operation using readily available absorbent such as sawdust will be carried out immediately during accidental spillage of hazardous waste 7. All areas intended for storage of hazardous materials will be quarantined and provided with adequate facilities to combat emergency situations complying with all the applicable statutory stipulation 								
2.Waste Water management	Prevent waste water from entering into local water bodies	<p>MDP operation will generate sewage and wastewater. If untreated sewage and wastewater from MDP is released directly surrounding into environment or into the local drainage system, it will lead to pollution of land and water bodies. In order to avoid impacts of sewage and wastewater, DOT will implement following measures:</p> <ol style="list-style-type: none"> 1. MDP sewage system will be connected Phuentsholing Thromde Sewage Treatment Plan through sewage network in the area. 2. Based on the resulting wastewater from the 	MDP operator	During operation.	MDP AREA .	Included in operation and maintenance cost	Throughout operations and maintenance	Quarterly	DOT NEC	DOT Budget NEC Budget

Environmental Concern	Objective	Impact mitigation					Performance and Impact monitoring			
		Proposed Mitigation Measures (MM)	Responsible to Implement MM	Timing to Implement MM	Locations Implement MM	Mitigation Cost	Parameter to monitor	Frequency & Verification	Responsible to Monitor	Monitoring Cost
		MDP operation, DOT will install wastewater treatment plant. Treated wastewater could be used for spraying to dampen dust during operation.								

C. Environmental Monitoring

1. Compliance Monitoring

173. Table 7 above also shows the program for monitoring the compliance on various provisions of the EMP during pre-construction, construction and operation phases. Detail design for MDP will incorporate the IEE recommendations. During construction, most of the mitigation measures shall be implemented by the contractors and their environmental performance, in terms of implementation of such measures, shall be monitored by CSC/PIU. The timing or frequency of monitoring is also specified in Table 8.2. During operation EMP implementation shall be the responsibility of the DOT as operator of facilities.

174. **Design Stage.** MDP development will follow the principle of design and built modality. The construction contractor engaged will be responsible for design and construction of MDP. During detailed design, the contractor will update the EMP.

175. **Pre-Construction Stage.** During pre-construction, PT will need to obtain environment clearance (EC) from the Ministry of Works and Human Settlement (MOWHS) for construction of MDP. PT's compliance with environmental conditions will be monitored. PCU/PIU/CSC will assess the contractor's understanding of Environmental Conditions and EMP that needs to be implemented during pre-construction and construction stages.

176. **Construction Stage.** The updated EMPs/method statement prepared by the contractors, with assistance from the CSC, will be reviewed and approved by PCU/PIU before any construction activity is initiated to take account of any subsequent changes and fine tuning of the draft EMP. The PCU/PIU through CSC will undertake regular monitoring of the contractor's implementation of mitigation measures specified in the EMP.

177. **Operational Stage.** The DOT assisted by the Environmental Officer will implement the EMP mitigation and monitoring requirements during operation such as monitoring of waste management, health and safety plan, drainage management measures, survival of planted trees, etc. Accidents within the MDP jurisdiction shall also be monitored as basis for implementation of mitigation measures to improve site safety.

2. Environmental Effects Monitoring

178. PT assisted by the ES/CSC shall implement the EMP mitigation and monitoring requirements during operation such as monitoring of waste management, health and safety plan, drainage management measures, enhancements to traffic management and survival of retained and planted trees, etc. Accidents within the MDP jurisdiction shall also be monitored as basis for implementation of mitigation measures to improve site safety.

D. Reporting

179. PT will submit the following environmental monitoring reports to ADB:

180. **Environmental Monitoring Reports:** Environmental monitoring reports shall cover the status of EMP implementation in terms of required mitigation measures for different project phases, necessary remedial actions to effectively address negative environmental impacts due to project implementation, status of environmental capacity building activities as well as documentation of complaints received and corresponding action/resolution. The environmental

monitoring reports will be submitted to ADB semi-annually during the construction period and annually for two years after completion of construction.

181. **Environmental Costs.** Under current SASEC Road Connectivity Project, the environmental cost will be totally integrated into the overall project cost. The environmental mitigation measures will be itemized and will be put into BOQ for budgeting. This will ensure the proper implementation of environmental mitigation measures. The environmental monitoring, supervision and reporting costing will be part of the overall construction supervision consulting cost.

Table 7.: Summary of Estimated Costs for EMP Implementation (4 years)*

Item	Estimated Total Cost (USD)	Costs covered by
Environmental and safety consultant specialist in PMU/ESM		
National (1 person for 16 months @ USD2,000/month)*	32,000	PT/PCU
Environmental management capacity building program/training to be undertaken by ESC	5,000	PT/PCU
Mitigation measures (included in project costs)*	Determined during detailed design as part of project design costs	Contractor
Environmental Permitting**	[3000]**	PT/PCU
Tree Planting enhancement.	15,000	PT/PCU
Sub-total		
Contingency (10%, approximately)***	5,000	
Total	60,000	

* includes design and construction phases.

** In case of complaints

*** Contingency item in case design is modified and permits are required for environmental clearance certificates under ECR not required as yet from NEC.

E. Capacity Assessment

182. In Bhutan, the environmental assessment process is established but environmental awareness and capability for implementation of EMP in infrastructure projects of the executing agency like PT is in the very early stages of development.

183. PT's current approach in tackling environmental issues is only on a project basis. There is no dedicated office which is responsible tackling environmental issues with regard to ongoing and future projects. Therefore, through this project, there is an opportunity to establish Environmental Unit perhaps under the Engineering Division of PT. Engineering Division is responsible for planning, designing, and execution of various infrastructure projects under PT. Environment unit with trained environmental officer would be able to institutionalize the environmental assessment process; implementation of mitigation measures; and carry out compliance and effect monitoring.

F. Capacity Building

184. Under the current SASEC Road Connectivity Project, PT has agreed to assimilate the environmental assessment and monitoring under the project's institutional setup. At the project

coordination level, the project coordinator (of SASEC Project) under PT will assume responsibilities of environmental focal person; who will be answerable to the PT, ADB and other relevant agencies. At the PIU level, the project manager (PM) will act as environmental focal person who will report to their PC. PCU and PIU/PMU will be assisted by Construction Supervision Consultant (CSC) which includes Resident Engineer (RE), Site Inspector (SI) and Environmental Specialist (ES). RE and SI will be the main environmental persons carrying out day to day monitoring and supervision of implementation of environmental management plans. While ES will carry out the intermittent environmental monitoring and reporting. RE, SI and ES will report to the PIU/PMU through their team leader.

185. Further under the current project, ADB has committed to enhance the EMP implementation and monitoring capacity of the project staffs. During the pre-construction stage; all relevant project staffs will be trained in baseline environmental data collection particularly on air and noise. ADB will also train the contractors, project engineers, ES, REs and SIs on EMP implementation, monitoring and reporting.

IX. CONCLUSIONS AND RECOMMENDATIONS

186. This IEE study reveals that the impacts from MDP construction and development are predictable and manageable; impacts can be either avoid, minimized or compensated. The Environmental Management Plan (EMP) covers all aspects MDP construction and development. The contractor engaged for MDP development, will be responsible for carrying out the detailed design and subsequent construction of MDP facilities. The current EMP will be further reviewed and updated by PIU or CSC of the MDP prior to the construction and even during the construction. Institutionalization of environmental compliance monitoring and capacity building of project and related staffs will be carried out.

187. The proposed Mini Dry Port will enable grouping of Land Customs Station (LCS); immigration; and other facilities in one single area thus enabling faster processing of goods and services. In addition, by providing appropriate transshipment and parking areas for the trucks in the LCS premises, the current congestion on the existing road crossing Phuentsholing will be avoided. The major benefits of the project are following:

- i) Truck and cargo idle time savings resulting from reduced dwell time in the LCS.
- ii) Reduction of losses of perishable goods resulting from the construction of a covered area.
- iii) Share of the benefits (Vehicle operating cost/VOC and travel time savings) resulting from avoided distance to drive to the current weighbridge before going down into town or to Customs office.

188. Over all, the environmental benefits result from lower emission due to lesser requirement of truck movements due to faster customs clearance and efficient transshipment. Benefit also result from lesser waste generation due to minimum spoilage of perishable goods.

189. Therefore, this project is recommended for implementation as its implementation will benefit both natural and man-made environment in the long run.

.Selected Photographs (Phuentsholing)



Photograph 1
Approach (road on left) from Gudwarra to Entrance



Photograph 4
View of (north) storage area under tree plantation



Photograph 2
Approach (road in front) from MDP to Exit



Photograph 5
View existing drain west side existing dry port



Photograph 3
Drain inside perimeter wall (existing) south section



Photograph 6
Central area designated for administration & DGS.



Photograph 7
Mast trees outside perimeter form visual barrier.



Photograph 10
Residential area at west of central area.



Photograph 8
Graveyard next to north sector of MDP site



Photograph 11
Drainage from north west via culvert to river side.



Photograph 9
View across centre of area to residential at north



Photograph 12
Public Consultation at existing offices Mini Dry Port

Summary of Information Disclosure, Consultation and Participation

Summary of Information Disclosure, Consultation and Participation with local people A x B 1 – Introduction to the project (December 2012)

Ref.	Information Provided
1	As consultants for the ADB Project Regional Transport Development in South Asia we are collecting information from interested parties.
2	The main part of the project is the improvement and expansion the Mini Dry Port at Phuentsholing. Do you know about the Mini Dry Port Project? Let me clarify.
3	The Project will create a larger Mini Dry Port facility at Phuentsholing. Final MDP facilities to be designed by consultants by 16 March, 2012
	<p>Phuentsholing Mini Dry Port</p> <ul style="list-style-type: none"> - Construct boundary walls and gates, level and seal site with asphalt, construct perimeter drainage, drainage works and outfalls. - Construct alternative and emergency road access for connection to nearest road(s) - Construct buildings facilities for customs office, accommodation block, open checking warehouse, closed warehouses, climate controlled warehouses, weighbridge.) - Construct dangerous goods warehouse (paving). - Install lighting and lifting and unloading, weighing, X-ray machine computers and office networking machines.
4	The Project will construct a Mini Dry Port consisting of administration buildings, storage warehouses, unloading facilities and transshipment area surfacing. The site drains and surfaces will be improved and paved and some transshipment areas will be covered and procedures will be streamlined so that traffic can move faster through Phuentsholing.
5	The project will introduce drainage measures and waste disposal measures.
6	The Project will within the existing areas Government land south east of the sewage works and there will be improvements and a new road access and egress leading to and from the Phuentsholing Mini Dry Port.
7	The project will be detailed designed later in 2013 and contractors will be selected in 2013/2014.
8	Construction will be for a few months in each location but is targeted for completion in late 2014
9	We would like to ask about your opinions on the Project and if you have any other comments / suggestions or ideas?

QUESTIONNAIRE MDP Location No-1: 0 m from Mini Dry Port

Name:	Declined -
Province/District/Locality	FCB Colony, Phuentsholing
Workplace / Home	Home
Position / Occupation	Housewife
Location - Distance to project boundary (approx.)	Next to proposed Mini Dry Port (North side)
Time / Date	3:30 PM 28 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project and shared their views that there will be more job opportunity, more business and more economical development of surrounding nearby due to proposed mini dry port.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	Local community will get more job opportunity and also the local transportation facilities will increase due to proposed development of Mini dry port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	There will minor impact to habitation staying nearby proposed project. Due to movements of trucks and lorries, there will be impact due to air and noise pollution in residential buildings around the proposed project site.
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	Not any, however one Graveyard is there next to proposed mini dry port site.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Phuentsholing Higher Secondary School around 500 meters and nearest hospital is Phuentsholing General Hospital around 1 Km from the colony.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project. Suggested to plan the basic infrastructure facilities in dry port in such a manner that more polluting source shall be other side of (away) from residential area.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	Not any
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	Stacking of sand creates the air pollution; hence the material stacking shall be planned in such a way that there should be minimum impact to surrounding buildings.
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. Also the drain around the mini dry port shall be maintained and cleaned by the department.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

QUESTIONNAIRE MDP Location No-2: 0 m from Mini Dry Port

Name:	Ms. Sonam Chotel
Province/District/Locality	FCB Colony, Phuentsholing
Workplace / Home	Home
Position / Occupation	House wife
Location - Distance to project boundary (approx.)	Next to proposed Mini Dry Port (North side)
Time / Date	4:00 PM 28 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project and shared their views that there will be more job opportunity, more business and more economical development of surrounding nearby due to proposed mini dry port.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	Local community will get more job opportunity and also the local transportation facilities will increase due to proposed development of Mini dry port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	Due to movements of trucks and lorries, there will be impact due to air and noise pollution in residential buildings around the proposed project site.
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	Not any, however one Graveyard is there next to proposed mini dry port site.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Phuentsholing Higher Secondary School around 500 meters and nearest hospital is Phuentsholing General Hospital around 1 Km from the colony.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project. Due to tree cutting, there will be impact on surround with respect to more air and noise pollution.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project. Suggested to plan the basic infrastructure facilities in dry port in such a manner that more polluting source shall be other side (away) from residential area.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	There will be cutting of tree and reduction of fresh air due to proposed project.
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	Stacking of sand creates the air pollution; hence the material stacking shall be planned in such a way that there should be minimum impact to surrounding buildings.
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. Also the drain around the mini dry port shall be maintained and cleaned by the department.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

QUESTIONNAIRE MDP Location No-3: 0 m from Mini Dry Port

Name:	Mr. Kinzang Dorji
Province/District/Locality	Front side of KMT road, Phuentsholing
Workplace / Home	Work place
Position / Occupation	Promoter/ Head of Nyinshar Computer Learning Centre
Location - Distance to project boundary (approx.)	Front side of KMT road west side of proposed Mini Dry Port
Time / Date	9:30 AM 29 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project; however there will be disturbance with respect to noise pollution in the computer learning institute.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	Local community will get more job opportunity and also the local transportation facilities will increase due to proposed development of Mini Dry Port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	There will minor impact to habitation staying nearby proposed project. Due to movements of trucks and lorries, there will be impact due to air and noise pollution in residential buildings around the proposed project site.
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	No idea.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Nyinshar Computer Learning Centre next to proposed project site, Phuentsholing Higher Secondary School around 500 meters and nearest hospital is Phuentsholing General Hospital around 1 Km.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	There will be air pollution during construction stage of the proposed mini dry port area; however by adopting good construction practice, the impact can be minimized. There shall be separate water storage and water sprinklers tanks, which can be utilized for continuous water sprinkling at dust generation area to minimize the air pollution.
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	Air and noise pollution due to current activities near the Computer Learning Centre.
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. Also the drain around the mini dry port shall be maintained and cleaned by the department.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

QUESTIONNAIRE MDP Location No-4: 0 m from Mini Dry Port

Name:	M/s Kunlay Construction, KMT Road
Province/District/Locality	KMT Road, Phuentsholing
Workplace / Home	Workplace
Position / Occupation	Contractor
Location - Distance to project boundary (approx.)	Front side of KMT Road & north east side egress from proposed Mini Dry Port
Time / Date	10:30 AM 29 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project and certainly there will be more job opportunity, more business and more economical development of surrounding nearby due to proposed mini dry port.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	Local community will get more job opportunity and also the local transportation facilities will increase due to proposed development of Mini dry port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	Gurudwara is around 200meter away from proposed project site to south east.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Phuentsholing Higher Secondary School around 500 meters and nearest hospital is Phuentsholing General Hospital around 1 Km from the colony.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	There will be air pollution during construction stage of the proposed mini dry port area; however by adopting good construction practice, the impact can be minimized. There shall be separate water storage and water sprinklers tanks, which can be utilized for continuous water sprinkling at dust generation area to minimize the air pollution.
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	No idea
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. Also the drain around the mini dry port shall be maintained and cleaned by the department. If possible, A separate small Buddhist temple closed to project site for prayer has been suggested.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

QUESTIONNAIRE MDP Location No-5: 0 m from Mini Dry Port

Name:	Mr. Ugen Namgyel
Province/District/Locality	Adjacent to south west corner of Sal Forest area. MDP Phuentsholing
Workplace / Home	Home
Position / Occupation	Retired Regional Director of Custom
Location - Distance to project boundary (approx.)	West Side proposed Mini Dry Port set back from KMT Rd
Time / Date	11:00 AM 29 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project and shared their views that there will be more job opportunity, more business and more economical development of surrounding nearby due to proposed mini dry port.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	Local community will get more local transportation facilities due to proposed development of Mini dry port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	There will minor impact to habitation staying nearby proposed project. Due to movements of trucks and lorries, there will be impact due to air and noise pollution in residential buildings around the proposed project site.
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	Gurudwara is next to proposed mini dry port site.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Phuentsholing Higher Secondary School around 800 meters and nearest hospital is Phuentsholing General Hospital around 1 Km from residence.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project. There shall be good design and good construction practice, so that there shall not be adverse impact during construction and operation stage.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project. Suggested to plan the basic infrastructure facilities in dry port in such a manner that more polluting source shall be other side (away) from residential area.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	Tree is acting as barrier to reduce the air and noise pollution around the surrounding areas. Due to tree cutting (more than 100 numbers) there will be impact on surrounding areas.
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	Stacking of sand creates the air pollution; hence the material stacking shall be planned in such a way that there should be minimum impact to surrounding buildings.
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. Also the drain around the mini dry port shall be maintained and cleaned by the department.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

QUESTIONNAIRE MDP Location No-6: 10 m from Mini Dry Port

Name:	Mr. Chhimi Tenzing (Mobile-17110808) Email-mamickey@gmail.com
Province/District/Locality	Plot No-92, H.N.Company, South side of MDP
Workplace / Home	Home & Workplace
Position / Occupation	Owner
Location - Distance to project boundary (approx.)	Behind proposed Mini Dry port
Time / Date	12.15 PM 29 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project and shared their views that there will be more job opportunity, more business and more economical development of surrounding nearby due to proposed mini dry port.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	Local community will get more local transportation facilities due to proposed development of Mini dry port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	There will minor impact to habitation staying nearby proposed project. Due to movements of trucks and lorries, there will be impact due to air and noise pollution in residential buildings around the proposed project site.
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	His Grandfather's Graveyard is there next to proposed mini dry port site, which is more than 40 years old. They are the Chinese people and they have no reservations about MDP so long as the MDP does not disturbed it is required to be relocated due to proposed project. As per them, it is non-negotiable. Gurudwara is next to proposed mini dry port site.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Phuentsholing Higher Secondary School and Phuentsholing General Hospital around 1 Km from the H.N.Company.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project. Also, if dangerous good will be stored, there will be risk from hazardous material loading, unloading, storage and transportation to the workers and residence nearby surrounding areas. Hence, it shall follow the rules and regulation of hazardous good management & handling.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	Tree is acting as barrier to reduce the air and noise pollution around the surrounding areas. Due to tree cutting (more than 100) there will be impact on surrounding areas.
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	Stacking of sand creates the air pollution; hence the material stacking shall be planned in such a way that there should be minimum impact to surrounding buildings.
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. Also the drain around the mini dry port shall be maintained and cleaned by the department. The dry port shall have a separate ground water facility for water requirements within dry port area. It shall not costing more than 2 lakhs to provide a separate tube well for the dry port.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

QUESTIONNAIRE MDP Location No-7: 0 m from Mini Dry Port

Name:	Mr. Singay Dorji, Head HR, STCBL
Province/District/Locality	State Trading Corporation of Bhutan Ltd.L, Phuentsholing
Workplace / Home	Work place (Co-operation trading house)
Position / Occupation	Head HR, STCBL
Location - Distance to project boundary (approx.)	Next to proposed Mini Dry Port (South East side)
Time / Date	12:45 PM 29 th Nov, 2012

Questions asked during the Public Consultation to local people to get their reactions and comments on the proposed project activities.

Ref.	Questions	Response / Comments
1	What are your general comments and observations regarding the Project construction and works? / Agree disagree / comment.	Agree with the proposed project.
2	What are your observations and do you have a comment on the design of the facilities and alterations / improvements	No comments, as no information about design.
3	How will the upgraded facilities benefit local community, contribute to local development / local commerce.	More job opportunity and more local transportation facilities due to proposed Mini dry port.
4	How will Project benefit / affect your local transport? / Community. Will the project cause any local problems? What are your comments on the local access for the project lorries/ trucks?	There will minor impact to habitation staying nearby proposed project. Due to movements of trucks and lorries, there will be impact due to air and noise pollution in residential buildings around the proposed project site.
5	Are there any cultural archaeological, religious, or historical sites nearby or within 100m from the Project? Is there any cemetery or other site with religious or cultural or heritage significance nearby, Where / what is the distance to the project from that site (Approximately in meters).	No idea.
6	Please tell us about nearest sensitive structures such as school & college, hospital clinic, place of worship, cemetery nearby to the Project.	Phuentsholing Higher Secondary School around 500 meters and nearest hospital is Phuentsholing General Hospital around 1 Km.
7	In your opinion, what will be THE environmental problems we should pay attention to? What will be the environmental problems you expect from the project?	Mostly air and noise pollution during construction and operation stage of the project.
8	Will construction of the Project affect your working and / or home life?	Minor impact will be there due to proposed project.
9	Do you as a local representative / resident / worker have any specific observation on environmental changes & impacts that will take place?	There will be air pollution during construction stage of the proposed mini dry port area; however by adopting good construction practice, the impact can be minimized.
10	Is there any water /air/ noise pollution due to current activities on this Project site? If, yes, please indicate the specific location, so that mitigation measures can be proposed.	Air pollution due to storage of sand.
11	As part of project, what you expect from DOT Authority? If there are improvements how can they be enhanced? Better cultural facilities? / Better waste disposal? / better drainage?	Better drainage and better waste collection & disposal due to proposed project activities. The important suggestion from STCBL is that the approach road which is being used by them shall not be used for Dry port purpose; otherwise there will be huge traffic congestion. They were also concern about storage location of dangerous goods in dry port area. Suggestion from their end is that it should be away from their boundary side and proper care shall be give for handling, storage and transportation of the same.
12	Do you have any other suggestions to reduce such environmental impacts? Or general comments	The local people suggested that tree cutting should be minimized during the implementation of improvement proposals and the landscaping around the mini dry port area should be done.

Environmental Criteria and Standards

a) Ambient Air Quality Standards (Maximum Permissible Limits in $\mu\text{g}/\text{m}^3$)

Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

Parameter	Industrial Area	Mixed Area*	Sensitive Area**
<i>Total Suspended Particulate matter</i>			
24 Hour Average	500	200	100
Yearly Average	360	140	70
<i>Respirable Particulate matter (PM10)</i>			
24 Hour Average	200	100	75
Yearly Average	120	60	50
<i>Sulfur Dioxide</i>			
24 Hour Average	120	80	30
Yearly Average	80	60	15
<i>Nitrogen Oxides</i>			
24 Hour Average	120	80	30
Yearly Average	80	60	15
<i>Carbon Monoxide</i>			
8 Hour Average	5,000	2,000	1,000
1 Hour Average	10,000	4,000	2,000

* **Mixed Area** means where residential, commercial or both activities take place

** **Sensitive Area** means where sensitive targets are in place like hospitals, Schools, sensitive ecosystems.

Source: Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

b) Noise Level Limits:

Industrial Area		Mixed Area		Sensitive Area	
Day *	Night **	Day	Night	Day	Night
75 dB (A)	65 dB (A)	65 dB (A)	55 dB (A)	55 dB (A)	45 dB (A)

Note: All the values are maximum values

*Day time is from 0600 hours to 2200 hours (human activities)

**Night time is from 2200 hours to 0600 hours (no human activities)

Source: Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

c) Vehicle Emission Standards:

Fuel Type	Vehicle registered prior to 01 st Jan 2005	Vehicle registered after 01 st Jan 2005	Type Approval
Petrol (% CO)	4.5	4	Euro II
Diesel (% HSU)	75	70	

Source: Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

d) Ambient Water Quality Criteria for various uses (September, 2010)

Sl. No.	Parameters	A	B	C
1	pH	6.5-8.5	6-9	6-9
2	Colour, Hz Units	5	50	-
3	TSS mg/l	25	100	-
4	Conductivity, μ S/cm	800	1000	2000
5	Odour	Unobjectionable	Unobjectionable	-
6	Mineral Oil	No film	No film	-
7	Nitrate, mg/l	10	50	-
8	Flouride, mg/l	1.0	2.0	-
9	Sulphates, mg/l	25	100	-
10	Chloride, mg/l	50	200	-
11	Surfactants, mg/l	0.1	0.2	-
12	Phosphates, mg/l	0.5	<1.0	-
13	DO, mg/l	6	4	-
14	BOD, mg/l	2	5	50
15	TKN, mg/l	0.5	2	
16	Ammonia, mg/l	0.05	0.5	
17	T. Coliform, MPN/100 ml*	50	5000	10000
18	F. Coliform, MPN/100 ml*	20	2000	5000
19	F.streptococci, MPN/100 ml*	20	1000	1000
20	Dissolved Iron, mg/l	0.2	0.5	-
21	Copper, mg/l	0.05	0.1	-
22	Zinc, mg/l	0.2	0.5	
23	Arsenic, mg/l	0.01	0.05	-
24	Cadmium, mg/l	0.003	0.003	-
25	Total-Chromium, mg/l	0.05	0.05	-
26	Lead, mg/l	0.02	0.02	-
27	Selenium, mg/l	0.01	0.01	-
28	Mercury, mg/l	0.0005	0.0005	-
29	Phenol, mg/l	0.001	0.002	-
30	Cyanides	0.05	0.05	-
31	PAH, mg/l	0.0002	0.0002	0.001
32	Total Pesticides, mg/l	0.0005	0.0005	0.001
33	PCB mg/l	0.0002	0.0002	-
34	SAR	-	-	-
35	Boron	-	-	1
36	Floating Materials such as wood, plastic, rubber, excreta, garbage etc.	Absent	Absent	Absent

Source: Environmental Standards, National Environmental Commission, Royal Government of Bhutan, Nov 2010

Note:

A: (Very good) Drinking water source without conventional treatment, but after disinfection whenever necessary.

B: (Good) Drinking water source without conventional treatment.

C: (Moderate) Use for irrigation, industrial cooling etc.

**To achieve the drinking quality standards, disinfection/ boiling of the water is recommended. The total coli form may be high due to their contribution from natural sources like soil, litter, etc., which does not relate to pathogen. If MPN of total coli form is noticed to be more than the limit suggested, than regular test should be carried out. The criteria would be satisfied if during a period not more than 5 % sample shows greater than prescribed limit.*