

Draft Initial Environmental Examination

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BHU: Urban Infrastructure Project–Phuentsholing Road and Bridge Subproject

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CURRENCY EQUIVALENTS

(as of 5 October 2011)

Currency unit	–	ngultrum (Nu)
Nu1.00	=	\$ 0.020239
\$1.00	=	Nu 49.4075

ABBREVIATIONS

ADB	Asian Development Bank
CCC	construction complaints committee
CEMP	contractor's environmental management plan
EIA	environmental impact analysis
EMP	environmental management plan
NEC	National Environment Commission
PDM	Phuentsholing District Municipality
PIU	project implementation unit
PMO	project management office
PMU	project management unit
PPTA	project preparation technical assistance
RRP	report and recommendation of the President (ADB)

WEIGHTS AND MEASURES

db	–	decibels
ha	–	hectare
km	–	kilometer
km ²	–	square kilometer
l	–	liter
m	–	meter
m ²	–	square meter
m ³	–	cubic meter
MT	–	metric tons
mtpd	–	metric tons per day

NOTE

In this report, "\$" refers to US dollars.

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Executive Summary

1. An environmental assessment was made for the proposed new bridge and roads of Phuentsholing District Municipality (PDM). It is one of the three subprojects to be funded by the Asian Development Bank (ADB) under the Urban Infrastructure Project of the Ministry of Works and Human Settlement (MWHS). Phuentsholing is a busy commercial and industrial town located in the southern part of the Kingdom of Bhutan on the border of India. Relative to the significance of impacts and risks, this subproject is deemed environmental category B based on ADB's environmental categorization, and the type of assessment warranted only the preparation of an initial environmental examination (IEE) report. This IEE was carried out under ADB's TA 7630-BHU and in accordance with ADB's Safeguards Policy (2009) and government laws, including (i) the National Environmental Protection Act of 2007, (ii) the Environmental Assessment Act of 2000, and (iii) Regulation for Environmental Clearance of 2002.

2. The overall institutional setup follows the existing implementation arrangement of an ongoing project, the Urban Infrastructure Development Project (UIDP) supported by ADB, where the MWHS is the executing agency, with a project management unit operating under MWHS's Department of Urban Development and Engineering Services (DUDES). The participating Phuentsholing District Municipality (PDM) is the implementing agency with a respective project implementation unit (PIU), which is already implementing another ADB urban project.¹

3. **Subproject description.** The proposed Phuentsholing subproject will help improve the living conditions of the urban population by decongesting the core area and allowing an alternative route. The proposed subproject components include the following: (i) concrete bridge with a length of 46 m; (ii) 80-m approach road on the southern side of the bridge (left bank); (iii) 90-m approach road on the northern side of the bridge (right bank); and (iv) improvement of some 200 m of existing unpaved road on the northern side of the proposed bridge connecting the 90-m approach road. The roads shall be paved with bitumen. No land acquisition or involuntary resettlement is required.

4. **Environmental and socioeconomic conditions.** The project will not pose significant problems to any sensitive ecological or cultural areas. An important fact to consider is that the sites are not within undisturbed landscapes, and will occur on the margin of the municipal area near industrial and institutional land uses, outside the core of the city, where urban density is not high.

5. Phuentsholing is the second largest city in Bhutan, with a total population of 20,537. By virtue of its location on the Indo-Bhutan border, it has developed rapidly from a small settlement into the largest commercial center of the country. As the main commercial gateway to Bhutan, it occupies a unique place in the national economy and contributes much towards the growth of industrialization

6. **Impacts and EMP.** Screening for environmental impacts is made through a review of the parameters associated with projects for roads and bridges against the components of the

¹ ADB. 2006. *Urban Infrastructure Development Project*. Manila.

proposed Phuentsholing subproject. The proposed associated roads will be on existing roads outside the core of the city. The proposed subproject is therefore not a new incursion into an ecologically untouched area. The project will have positive impacts on air quality and decongest the urban core, which will experience improved pedestrian safety and livability with less trucks entering the city. The new bridge will not be built in an area with a known fish breeding habitat. The bridge site occurs near the confluence of two rivers. Based on field observations by the project team, the high river flow does not fully cover the river bed, and the proposed footing of the bridge will not significantly affect the physical hydrology or flow of the river. This issue shall be mitigated during the design phase by the inclusion of scour countermeasures to prevent the occurrence of vortex-induced turbulent flows, such as placement of precast concrete armor units around the base of the pier.

7. During detailed design and preconstruction, potential nuisances and problems to the public during construction shall be addressed by inclusion in the tender documents of specific provisions addressing these issues. Although there are no issues related to historical and cultural assets, a precautionary measure shall be taken by inclusion of provisions in tender and construction contract documents requiring the contractor to immediately stop excavation activities and promptly inform the authorities if archaeological and cultural assets are discovered.

8. Adverse environmental impacts during construction are temporary, less than significant, and can easily be mitigated. There will be no major earthworks since the roads will follow existing contours. Pile-driving activities in the center of the Om Chhu will be limited to only one pier. Typical construction issues are manageable with the implementation of a contractor's environmental management plan for (i) erosion and sediment runoff, (ii) pile-driving aquatic impact, (iii) nuisance to the public, (iv) noise and dust, (v) vehicular traffic, (vi) construction wastes, (vii) oil and fuel spillages, (viii) construction camps, (ix) occupational health and safety, and (x) public safety and convenience.

9. An environmental management plan is developed to effectively manage the environmental issues. The plan includes: (i) mitigating measures to be implemented; (ii) required monitoring associated with the mitigating measures; and (iii) implementation arrangement. Institutional setup discusses the requirements and responsibilities during preconstruction, construction, and operation. The plan includes tabulated information on: (i) required measures for each environmental impact that requires mitigation; (ii) locations where the measures apply; (iii) associated cost; and (iv) responsibility for implementing the measures and monitoring.

10. **Consultation and participation.** Project planning and the subsequent IEE preparation for the proposed bridge and roads subproject recognized the need for public consultation and participation as central to effective environmental safeguard. Within the context of "meaningful consultation," Phuentsholing initiated a process of consultation during project preparation, and intends to continue it during the construction phase. Phuentsholing conducted an initial public consultation and information disclosure on 29 July 2011. Participants included (i) elected people's representatives from various areas of Phuentsholing, (ii) the Phuentsholing executive secretary, (iii) staff, and (iv) PPTA consultant. Details of the subproject components were presented to the stakeholders, and their views on the proposed bridge and roads explained. Stakeholders expressed support to the proposed subproject. Project disclosure activities were also done during a socioeconomic survey in July 2011. A focus group discussion (FGD) was also conducted last 24 July 2011 in Phuentsholing with stakeholders and key informants.

11. **Grievance redress mechanism.** Implementation of the proposed Phuentsholing subproject will be fully compliant to ADB's safeguards requirement on grievance redress mechanism. Phuentsholing shall disclose the proposed mechanism in public consultations during detailed design and in meetings during the construction phase. Complaints about environmental performance of projects during the construction phase can best be handled by an ad hoc construction complaints committee (CCC) for the expeditious resolution of the complaints. Phuentsholing shall form the ad hoc CCC to be chaired by its PIU head. Members shall include the following: (i) contractor's highest official at the site, such as construction manager or construction superintendent; (ii) the elected people's representative of the area, the Thuemi; and (iii) Phuentsholing's PIU head. Creation of the ad hoc CCC and its operation shall be included in appropriate sections of the civil works contract.

12. **Conclusion and recommendation.** The northern area of Phuentsholing is presently connected to the core area by an old bridge that cannot be closed even for minor repairs due to the lack of an alternate route. Local officials raised the urgent need of having another bridge, since if the old bridge will collapse, the northern area will be isolated. The proposed bridge and associated roads under UIP will provide a reliable alternate route and will increase confidence on accessibility between the core area and the northern area. The bridge will greatly help the development of the town, since the industrial activities are located in the northern area. With the bridge, the interaction between the core area and the northern area will be facilitated. Pedestrian safety is also considered in the bridge design, with the provision of a 1.7-m pedestrian footpath on both sides. The bridge will help decongest the core area, since people on the other side of the river who need to go shopping can easily reach the core area by foot instead of bringing their cars through the existing bridge. In the future, it will also help decongest the core area since it will become part of a proposed bypass route. Trucks coming from India and just passing thru Phuentsholing shall be asked to use this route and bypass the core area.

13. Analysis of potential environmental impacts revealed no significant adverse impacts to people and environment from the proposed bridge and roads subproject. The IEE concludes that adverse environmental impacts arising from the location, design, construction, operation, and maintenance of the proposed subproject can be mitigated to less significant levels, and the corresponding mitigation measures are doable. Monitoring can easily be done. The project can be implemented in an environmentally acceptable manner. An expanded environmental impact assessment is therefore not warranted, and this IEE shall be finalized as the final environmental assessment document of the Phuentsholing subproject. Its environmental classification as category B is deemed appropriate.

14. The PMU and PIU shall ensure that EMP requirements for construction will be reflected in the tender documents and civil works contracts and implemented, including the contractor's submission of a CEMP. The PMU shall monitor PIU's compliance to the EMP. In addition, creation of the CCC and its operation shall be included in appropriate sections of the subproject's civil works contracts as part of the grievance redress mechanism. Institutional strengthening of Phuentsholing, including training, will occur through consultant support for effective EMP implementation. The PIU shall continue the process of public consultation and information disclosure during detailed design and construction.

I. INTRODUCTION

1. The Phuentsholing District Municipality (PDM) is a local government located in the Royal Kingdom of Bhutan and one of the selected subprojects under the Urban Infrastructure Project (TA 7630-BHU) funded by the Asian Development Bank (ADB). Phuentsholing is a busy commercial and industrial border town beside India and a gateway into Bhutan.
2. The objective of the TA study is to assist the Government of Bhutan in preparing a project for sustainable urban development in Phuentsholing. It is intended to improve the livability and competitiveness of the town through the provision of better facilities, including a bridge in the northern area of the town to support its bypass road and alleviate traffic in its core area. This project is part of the town's master plan to improve livability in the city.
3. Preparation of this initial environmental examination (IEE) is part of the activities under TA 7630-BHU. It provides ADB with an assessment of the environmental concerns to be considered regarding the subproject location, design, construction, and maintenance. This report is also intended to assist the Phuentsholing Municipality in the preparation of the required environmental document to meet the National Environment Commission (NEC) requirements for an application of the necessary environmental clearance (EC) before the start of construction activities.
4. Preparation of the IEE involved field visits to the proposed subproject area; review of available information; and discussions with local government officials, NEC, and other government agencies, and members of the community within the subproject area. The IEE has been carried out in accordance with ADB's Safeguard Policy (2009) and the requirements describe in its Appendix 1 (Safeguards Requirement 1 - Environment), and the laws of Bhutan and its requirements for environmental clearance as embodied by its Environmental Assessment Act of 2000.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

5. 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 and is required to: (i) protect, conserve, and improve the pristine environment; (ii) safeguard biodiversity; and (iii) prevent pollution and ecological degradation.
6. 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 mandated to look after all issues related to the environment throughout the country. 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.
7. 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 decision under Chapter III of the act, 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.

8. “Development consent” refers to the approval issued or renewed by a competent authority in the form of a license, lease, or permit for land use or construction. A competent authority is an agency of the government that has the power to issue development consent for a project. However, when an applicant is also a competent authority, NEC shall be the competent authority with jurisdiction to issue an environmental clearance. This law emphasizes the importance of public consultation and requires the applicant to consult all concerned people and organizations prior to submission of the application or the environmental assessment documents to the competent authority.

9. Following the Environmental Assessment Act of 2000, the Regulation for Environmental Clearance of 2002 was adopted. The regulation defines responsibilities and procedures for the implementation of the Environmental Assessment Act of 2000 concerning the issuance and enforcement of environmental clearance for individual projects. Information on the process for obtaining an environmental clearance and timelines for processing are presented in Appendix 1.

10. In cases where a forest has to be cleared, the municipality has to apply for a forestry clearance from the Department of Forestry in compliance with the 2006 Forest and Nature Conservation Rules of Bhutan. Information on the process for obtaining a forestry clearance is presented in Appendix 2.

11. Aside from environmental laws and regulations, the 2004 Penal Code of Bhutan also includes a provision on environmental pollution, wherein Article 409 states that a defendant shall be guilty of the offense of environmental pollution if such defendant knowingly or recklessly pollutes or contaminates the environment, including air, water, and land, and makes it noxious to public health and safety.

12. International conventions are also part of the environmental framework, since Bhutan is a party to some international conventions, treaties, and agreements on the principles and actions necessary for sustainable development and environmental protection. It has 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.

13. The overall institutional setup follows the existing implementation arrangement of an ongoing project, the Urban Infrastructure Development Project (UIDP) supported by ADB,² where the MWHS was also the executing agency with a PMU in DUDES. The participating local governments are the implementing agencies with their respective project management units (PIUs). Phuentsholing was a project town under the previous project, and therefore has an existing PIU, which will continue to implement projects in UIP.

² ADB. 2006. *Urban Infrastructure Development Project*. Manila.

14. The PMU will appoint one environmental officer, and there is one national environmental specialist in the design monitoring supervision consultant (DMSC) who will build capacity of the PIUs in environmental safeguards implementation and monitoring.

III. DESCRIPTION OF THE SUBPROJECT

A. Location

15. The proposed project is located in downstream of the Om Chhu in Phuentsholing Municipality. This site is very near the junction of the Om Chhu and Amo Chhu, a very large river. During non-summer months, this section of the Om Chhu has very little flow. Presently, grasses and shrubs dominate the site's riverbank, while the riverbed near the riverbanks can easily be seen due to a very low flow (Photographs No.1 and 2). According to the Phuentsholing PIU, there are no available studies regarding the biodiversity situation of the Om Chhu. The bridge pier will be located at the center of this river section.

B. Components and Cost Estimate

16. The proposed subproject components include the following: (i) concrete bridge with length of 46 m; (ii) 80-m approach road on the southern side of the bridge (left bank); (iii) 90-m approach road on the northern side of the bridge (right bank); and (iv) improvement of some 200 m of existing unpaved road on the northern side of the proposed bridge connecting the 90-m approach road. The roads shall be paved with bitumen. This bridge and roads are part of a proposed bypass/link road. It is located in the western part of Phuentsholing, as shown in Figure 1.

17. The proposed bridge is designed to primary urban road standards in terms of width and number of lanes (18-m width with four lanes). It shall be provided with footpaths and drains on both sides and a divider in the middle. It is a pre-stressed I-girder reinforced cement concrete bridge with pile foundations. Its overall design span is 46 m, with an intermediate pier that divides the span into two equal spans of 23 m length each. The associated approach roads are also designed to primary urban road standards. These roads will be on embankments ranging from 1 m to 2 m in height with retaining structures.

18. **3D model of proposed bridge.** A 3D model of the proposed bridge is presented in Figure 1 for a better visualization of the proposed structure. The pier of the proposed bridge shall have a width of 1.4 m, which is only 3% of the river's total width.

Figure 1: 3D Model of Proposed Bridge



19. **Subproject cost estimate.** The total estimated capital expenditure is about Nu 51.63 million. Cost estimates are based on 2010 prices plus 7.5% inflation rate per year.

C. Construction

20. Construction of the road will require the following activities: (i) clearing of the existing road and marking of alignments; (ii) stockpiling of materials for road construction such as sand, gravel, and soil; (iii) preparing the road bed for pavement construction; (iv) laying of pavement; and (v) cleaning and site closure of construction sites. Bridge construction will require: (i) clearing of the abutments areas and marking of alignments; (ii) stockpiling of construction materials; (iii) pile-driving for bridge supports at the bridge center and abutment areas; (iv) concreting; (v) placement of precast components such as beams; and (vi) cleaning and closure of construction sites.

21. Piles installation for the pier shall use a crane-supported pneumatic pile driver to sink the piles into the riverbed. This device uses air pressure to raise and drop a heavy hammer onto a pile. The hammering mechanism will move on vertical steel tracks called leads to be attached to the crane. The leads, which shall be longer than the piles, will be lifted vertically into position by the crane over the area where the pile shall be driven. The bottom of the leads has an anchor that will sink into the riverbed, holding it in place. To raise a pile into the leads, the crane operator shall first lower the hammering mechanism close to the riverbed, where a worker will attach flat nylon straps to the hammer to secure the pile. As the hammer is raised back up, the pile shall be lifted with it until it is fully upright in the leads. The hammering mechanism is started, and the machine repeatedly raises and drops the hammer on the top of the pile, driving it into the riverbed. The crane can easily be positioned in the riverbank to do the work, since the pier distance from the riverbank is only 23 m.

D. Implementation and Operation

22. The proposed bridge and roads shall be operated and maintained by the Phuentsholing municipality. Responsibility for roads and bridges within the municipality now rests on the local government and in cooperation with the Department of Roads (DOR). Construction is scheduled to start in the last quarter (Q4) of 2013, and is expected to be completed by Q3 2015.

IV. DESCRIPTION OF THE ENVIRONMENT

23. A brief description of the existing environmental and socioeconomic conditions of the Phuentsholing subproject influence area is presented in the following subsections:

A. Physical Resources

24. Phuentsholing is strategically located on the border with India and has an entrance/exit gate with the Indian city of Jaigaon. It is a busy commercial and industrial area. It occupies the river terraces of the Om Chhu, and is confined by steeply rising foothills to the north and east, and by the Amo Chhu to the west. It is a relatively flat town by Bhutanese standards. Topography around the core of the town is generally undulating, but there is considerable and expanding development on the sleeper periphery. Elevations range from approximately 190 msl to 320 msl. Areas to the north of the city consist of steep slopes, with many of the slopes already denuded for housing development, thus leaving little room for further expansion. Land within the Phuentsholing District Municipality boundaries is 320 ha, but only 180 ha are suitable for development and are 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.

25. The urban area is divided by the Om Chhu. This river rises in Bhutan, crosses the Indian-Bhutanese border, and discharges to the Amo Chhu. Amo Chhu, one of the major rivers in Bhutan, originates in China and flows through a well-defined valley system. Flow discharges can reach as high as 1,000 m³/s, and flooding can occur. Phuentsholing experiences warm subtropical climatic conditions, with temperatures ranging from 10°C to near 40°C during the summer. 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.

26. Geologically, Bhutan is divided into two broad geological zones, the Lesser Himalayan belt along the southern and southeastern border and the Tethyan belt in remaining parts. 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. Chhukha district falls 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.

B. Ecological Resources

27. The sites of the proposed bridge and roads are within the urban area. Devoid of forested areas in the urban area, the road corridors and immediate environs are unlikely habitats for large wild animals and rare or endangered species. Farm and domesticated animals are therefore the large faunal species, such as cows, goats, house cats, and dogs. Subtropical ornamental plants have been planted within the city, including mature trees in recreational ground.

28. According to the Phuentsholing PIU, there are no available studies of the Om Chhu in terms of (i) biodiversity situation, (ii) monthly average flow, and (iii) river flow velocity. However, the PIU has noted that there are few fish species in the river during summer and some prawns and crabs in winter.

29. An important fact to consider is that the sites are not within undisturbed landscapes. These are located in urban landscapes with residential and commercial areas and roads that have been functional for a very long time. Hence, over the years the ecological changes due to human activities in these areas resulted in the present residential and commercial landscapes.

30. **Protected area.** Information from the Nature Conservation Division of the Department of Forestry indicated that there are no protected areas in and around Phuentsholing.

C. Economic Development

31. By virtue of its location on the Indo-Bhutan border, Phuentsholing has developed rapidly from a small settlement to the largest commercial center of the country. As the main commercial gateway to Bhutan, with an industrial estate and mega-projects like the Chhukha and Tala hydropower projects in its immediate hinterland, Phuentsholing occupies a unique place in the national economy. The function of the city is manifold, acting simultaneously as the commercial center, industrial center, institutional center, and administrative center. Phuentsholing contributes much towards the growth of industrialization of the nation. This is evident from the type and number of industries located in the city and its hinterland, as well as investment and employment generation. Industries like Bhutan Polythene Company, Drangchu Beverages, Bhutan Board Product Ltd., and few other small and medium-size industries are operating from the existing industrial area of the city. Chhukha Dzongkhag, including Phuentsholing town, was recorded as having a total of 1,406 industrial establishments in 2003, most of them being contract based. In addition Phuentsholing has a number of wood processing and agro-based industries

D. Socio and Cultural Resources

32. Phuentsholing is the second largest city in Bhutan with a total population of 20,537. 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 area.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

33. A comprehensive screening for environmental impacts is made through a review of the parameters associated with roads and bridge projects against the components of the proposed

Phuentsholing subproject, and the environment where the facilities will be located. A screening checklist was developed from various sources such as ADB's Rapid Environmental Assessment (REA) Checklist, and World Bank (WB) Environmental Source Book. Some items of the checklist may not be applicable to this particular subproject. However, they are included in the discussions to indicate that their applicability was reviewed in the environmental impact screening process. This will help identify which topics do not require further attention.

34. The assessment is made on the following phases of the subproject: (i) preconstruction, (ii) construction, and (iii) operation and maintenance. Results of the environmental impacts screening are summarized in Table 1, while the discussions of each issue are presented in the succeeding sections. In Table 1, impact types and magnitudes are indicated for both impacts without the mitigating measures and the resulting situations when mitigating measures will be implemented. The screening table uses the symbols "+" for positive impacts and "-" for negative impacts. Symbols for impact magnitudes are "Δ" for insignificant and "●" for significant. The symbol for an insignificant negative impact is "Δ -", while a significant negative impact is "● -". The second column of the table indicates the type and magnitudes of the impacts without any mitigating measures being applied. Some impacts already have insignificant magnitudes even without mitigations, and mitigating measures are therefore no longer required. The last column of the table indicates the expected impact magnitude after applying the mitigating measures. Hence, a significant negative impact (● -) will become insignificant (Δ) after applying the mitigating measures. A summary of the environmental impacts that should be carried to the section for environmental management plan (EMP) is presented at the end of this section as Table 2.

Table 1: Summary of Environmental Impacts Screening for Phuentsholing Subproject

Environmental Impacts and Risks	Without Mitigation	With Mitigation
PRECONSTRUCTION PHASE		
Encroachment to environmentally sensitive areas	NA	NA
Impacts and risks to biodiversity conservation	● -	Δ
Potential damage to historical areas and cultural areas	Δ -	Δ
Potential nuisance and problems to the public	● -	Δ
CONSTRUCTION PHASE		
Modification of construction site topography	Δ -	Δ
Removal of trees	NA	NA
Displacement of rare or endangered species	NA	NA
Soil erosion and sediments in construction sites	● -	Δ
Pile-driving aquatic impact	● -	Δ
Noise from construction equipment	● -	Δ
Local air pollution due to construction activities	● -	Δ
Oil and other hazardous materials release	Δ -	Δ
Vehicular traffic congestion and public access	● -	Δ
Hazards to public due to construction activities	● -	Δ
Pollution and health risk due to workers' camp	● -	Δ
Occupational health and safety at work sites	● -	Δ
Increased employment opportunity in work sites	● +	● +
Improper closure of construction sites	● -	Δ
OPERATION AND MAINTENANCE PHASE		
Hydrodynamic and ecological effects on the river	● -	Δ
Waterlogging and soil erosion due to clogged and inadequate drainage facilities	● -	Δ
Increased risk of accidents	● -	Δ

Environmental Impacts and Risks	Without Mitigation	With Mitigation
Increased risk of water pollution	● -	Δ
Increased noise levels due to increased vehicular traffic	● -	Δ
Increased air pollution due to increased vehicular traffic	Δ -	Δ
Improved accessibility	● +	● +

Legend: NA = not applicable; Δ = insignificant; ● = significant; + = positive; - = negative.

A. Design/Preconstruction Phase Considerations

35. The proposed bridge and associated roads will not be new incursions into an ecologically untouched area. The locations of the bridge and approach roads are in industrial and commercial areas of the city, outside the core. The sites for the approach roads have been used as roads³, while the riverbanks are essentially open spaces with secondary growth of grasses and shrubs. There are no known archaeological and cultural assets in these sites that may be affected by the proposed bridge and roads. Nevertheless, precautions will be taken to avoid potential damage to any archaeological and cultural assets by inclusion of provisions in tender and construction documents requiring the contractors to immediately stop excavation activities and promptly inform the authorities if archaeological and cultural assets are discovered.

36. **Design measures.** During the design phase, the consultants shall review the bridge design with the aim of reducing impacts to river hydrodynamics and fish habitats by evaluating the following: (i) use of scour countermeasures in preventing the generation of vortex-induced turbulent flows at the bridge pier, and (ii) pier location. For the roads, the consultants shall ensure that the drainage system shall be designed with appropriate water carrying capacities thorough a detailed study of the road catchment hydrology. These requirements for design measures shall be included in the TOR of the design consultants.

37. **Impacts and risks to biodiversity and physical characteristics of the river.** There is no sensitive biodiversity at risk from the project. The occurrence scouring at the base of the bridge piers and the vortex-induced turbulent flows may slightly modify the physical characteristics of the river at the immediate location of the bridge. Design of the bridge pier shall therefore include scour countermeasures to prevent the occurrence of vortex-induced turbulent flows, such as placement of precast concrete armor units around the base of the pier.

38. **Nuisance and problems to the public.** Potential nuisances and problems to the public during construction of the proposed bridge and roads can best be avoided if proactively addressed during detailed design and preconstruction. Consultation and information dissemination to potentially affected people shall be done during detailed design. Tender documents shall include provisions addressing potential nuisances and problems to the public during construction. These include environmental management provisions on the following issues: (i) erosion and sediment runoff, (ii) noise and dust, (iii) vehicular traffic, (iv) construction wastes, (v) oil and fuel spillages, (vi) construction camps, (v) public safety and convenience, and (vi) maintaining pedestrian access at the bridge and approach road areas. These shall also be reflected in the construction contracts.

³ If the alignment is shifted to the immediate side of the existing road, the impacts would be on government land with no sensitive features.

B. Construction Phase Environmental Impacts

39. **Site preparation.** Construction of the proposed bridge and roads will not involve modification of the construction site topography. The road will follow as much as possible the existing site contour. This issue is therefore considered not significant. Removal of trees will not be an issue, since the sites for the approach roads have been used as roads, while the riverbanks are essentially open spaces with grasses and shrubs. The issue on displacement of rare or endangered species is not applicable to this subproject since there are no known rare or endangered species within the proposed sites.

40. **Soil erosion and sediment in construction sites.** During rainy periods, exposed soil at the construction site can easily be washed away by runoff and carried to the natural drainage system. Hence, soil erosion of the construction sites could occur if preventive measures are not instituted.

41. **Mitigation.** Control of the surface runoff is necessary in preventing erosion. The contractor shall be required to use structural erosion prevention and sediment control practices which will divert the storm water flows away from the exposed areas, prevent sediments from moving offsite, and reduce the erosive forces of runoff waters. These may include the following: (i) interceptor dikes, (ii) pipe slope drains, (iii) straw bale barriers, (iv) sediment traps, and (v) temporary sediment basins. Whenever possible, total exposed area shall be minimized

42. **Pile-driving aquatic impact.** Pile-driving may generate sound pressure underwater due to the high-energy capacity hammer driving the piles. The generated underwater sound pressure may be harmful to aquatic life; however, there is not much known habitat located in the immediate area of the bridge. It is not applicable to the abutment foundation since its location is not in the water, but on land.

43. **Mitigation.** Underwater sound pressure generation can be reduced by: (i) use of soft-start pile-driving, where the hammer is not used at full strength at the start of a pile-driving session; and (ii) installing a sleeve casing lined with polyurethane around the pile with some clearance and within the entire water depth during pile-driving. Whenever possible, the contractor may schedule the pile-driving activities during non-summer months, when the river flow is very small.

44. **Construction noise.** Potential sources of noise are the construction equipment, such as trucks and other equipment, which can generate noise of 80 dB from a distance of 30 m. Loud noise sources such as blasting are not expected in the construction activities of the Phuentsholing subproject.

45. **Mitigation.** Nuisance from equipment noise can be mitigated with the use of sound suppression devices for the equipment. In areas near any house or noise-sensitive sites, noisy equipment shall not be operated during nighttime to early morning (10 p.m.–6 a.m.). According to NEC standards, noise levels in residential areas should not exceed 55 dB during daytime and 45 dB during nighttime. Noise levels in commercial areas should not exceed 65 dB during daytime and 55 dB during nighttime. Workers using noisy equipment shall be provided with ear plugs. A noise wall shall be provided near any sensitive receptors, including any commercial and institutional structures.

46. **Local air pollution due to construction activities.** Dust generation from earthworks and soil preparation activities during dry periods will be an air pollution problem. Intermittent

episodes of air pollution from smoke belching equipment may also occur. This issue is considered significant during dry periods. Another potential source of air pollution are large stockpiles of construction materials such as soil and aggregates. Without any mitigating measures, dust generation could be significant during dry periods.

47. **Mitigation.** The contractor should be required to perform regular water spraying of the sites during dusty periods in order to reduce the generation of dusts. He will also be required to use equipment that are properly maintained and are not smoke belchers. Covers for stockpiles that will be left idle for a long time shall be required. Covers will prevent dust generation due to wind action.

48. **Oil and other hazardous materials release.** Heavy equipment and vehicles will be used in the various construction activities for the Phuentsholing subproject. Aside from fuel, oil, and grease, the activities may also involve the use of paints and solvents. Although there is potential for accidental releases of these materials, the issue is not considered significant since expected quantities will be relatively small. However, as part of good construction practice, the contractors will be required to implement an awareness program for all workers regarding the prevention and management of spills and proper disposal of used containers. Fuel and oil shall be stored in a designated secured area provided with an impermeable liner to prevent the accidental spills from seeping into the ground.

49. **Vehicular traffic congestion and public access.** Road construction activities may cause traffic congestion in narrow streets. It may hinder public access. This issue is considered significant, since the existing roads to be upgraded are connected to narrow roads. Near the approach roads of the bridge, there are commercial activities. During construction, vehicle movement to and from these commercial establishments will be hampered by the movement of equipment and the hauling of materials.

50. **Mitigation.** Contractors shall be required to (i) prepare a traffic plan, and (ii) closely coordinate with local authorities for the closure of roads or rerouting of vehicular traffic. Timing of construction activities in any sites should consider the schedules of local activities with heavy presence of people, such as festivities, processions, parades, etc.

51. **Hazards to public due to construction activities.** Road construction activities may result in hazardous driving conditions, since vehicles would still be using the road while construction activities are ongoing. The movement of construction vehicles and excavations would pose some hazards to the driving public.

52. **Mitigation.** The contractor shall be required to implement a road safety plan incorporated in his construction schedule. Safety measures shall be implemented, including (i) warning signs to alert people of hazards around the construction sites, (ii) barricades, and (iii) night lamps for open excavations.

53. **Pollution and health risk due to workers' camp.** The contractor is expected to erect temporary workers' camps during construction of the subproject. Improperly managed silt runoff and sanitary wastes from these camps may reach nearby areas. Poor sanitation and lack of proper solid waste management at the workers' camps will provide the conditions for vermin and other disease vectors to easily multiply and infect the workers. This may lead to the transmission of diseases from the workers' camp to other areas. These conditions will increase public health risk.

54. **Mitigation.** The construction contractor shall be required to: (i) install proper sanitary facilities to prevent the indiscriminate discharge of sanitary wastes at the camps surroundings; (ii) implement proper solid waste management; and (iii) prevent surface runoffs from flowing into the workers' camps to avoid carrying away any contaminants. The contractor shall be required to use temporary diversion drains, catch drains, and silt-traps at these camps.

55. **Occupational health and safety at work sites.** Hazards exist in all construction sites in many different forms, such as sharp edges, falling objects, flying sparks, chemicals, noise, and various potentially dangerous situations. Good practice in occupational health and safety requires that employers protect their employees from workplace hazards that can cause injury.

56. **Mitigation.** Contractors shall be required to address the issue on occupational health and safety at the construction sites by: (i) implementing a health and safety plan; (ii) ensuring that an equipped first aid station is available at all times; (iii) providing the workers with potable water and adequate sanitation facilities; (iv) providing the workers with clean eating areas; and (v) providing the workers with personal protective equipment (PPE) to minimize exposure to a variety of hazards.

57. However, establishing and maintaining a safe and healthful work environment requires responsibilities from both the contractors and their workers. In general, contractors are responsible for: (i) performing a "hazard assessment" of the workplace to identify and control physical and health hazards; (ii) identifying and providing appropriate PPE for employees; (iii) training employees in the use and care of the PPE; (iv) maintaining PPE, including replacing worn or damaged PPE; and (v) periodically reviewing, updating, and evaluating the effectiveness of the PPE program. Workers should (i) properly wear PPE; (ii) attend training sessions on PPE; (iii) care for, clean, and maintain PPE; and (iv) inform a supervisor of the need to repair or replace a PPE.

58. **Improper closure of construction sites.** Construction activities will generate construction solid wastes after completion of work. This may include used wood materials, steel works cuttings, paint and solvent containers, used oil from equipment, unused aggregates, etc. If not removed from the sites after completion of the construction activities, these solid wastes will cause aesthetic problems, and some will be potential sources of contaminants for surface runoffs.

59. **Mitigation.** After completion of work activities, the contractor shall be required to remove the construction wastes from the sites before finally leaving. The entire site must be free of any construction solid wastes. The required surface restoration must be implemented.

60. **Increases employment opportunities at work sites.** Various construction activities for road construction and bridge erection will definitely require a number of workers. The impact would be beneficial and significant, since employment opportunities in the area will increase.

61. **Enhancement.** Whenever possible, the contractor shall be encouraged to use the available local labor for these construction activities. The recruitment of workers shall be coordinated with the local officials.

C. Operation Phase Environmental Impacts

62. **Hydrodynamic and ecological effect on the Om Chhu River.** Presence of the proposed bridge may have effects on the hydrodynamics of the river at that location. As seen in

the 3D model shown in Figure 2, the proposed bridge will have an intermediate pier that divides the span into two equal spans of 23 m each. In general, the flow constriction effect of the bridge is not significant, since it will only have one pier with a width of 1.4 m or only 3% of the river's total width. The potential hydrodynamic effect is the occurrence of vortex-induced turbulent flows at the bridge pier. Without any mitigation, the pier will experience scouring at its base. The vortex-induced turbulent flows could also affect fish habitats. It is therefore necessary to prevent the occurrence of vortex-induced turbulent flows.

63. **Mitigation.** To reduce the chance of generating vortex-induced turbulent flows at the bridge pier, placement of precast concrete armor units around the base of the pier will be included in the design. These scour countermeasures will help prevent the occurrence of scour holes in the pier foundation due to vortex-induced turbulent flows. Due to the weight and design of the precast armor units, turbulent flows will not be able to develop into large holes at the riverbed and will fail to generate vortex-induced flows. This measure is one of the approaches for scour countermeasures recommended by the *Handbook of Scour Countermeasures Designs* (2005). During the design phase, the design consultants shall ensure that the scour countermeasure shall be included in the tender documents.

64. **Waterlogging and soil erosion due to clogged and inadequate drainage facilities.** During the operation phase, drainage facilities of the approach roads to the proposed bridge will accumulate some sediments and debris. This will surely reduce their water conveying capacity, and could lead to waterlogging and soil erosion. Eventually, it will cause the deterioration of the drainage facilities and further erosion of the surrounding environment. The situation will be aggravated if the drainage facilities have inadequate design capacities.

65. **Mitigation.** Road drainage facilities, such as culverts and drains, shall be maintained regularly to maintain their design capacities. Removal of the accumulated sediments and debris must be done regularly. Discharge points to streams must be inspected regularly to ensure they are stable and not deteriorating due to scour. It is therefore necessary for PDM to implement a road drainage maintenance program. Detailed study of the road catchment hydrology during the design phase shall ensure that the road drainage system has appropriate water-carrying capacities.

66. **Increased risk of road accidents.** Risks of accidents, associated with increased vehicular traffic, are normally influenced by the road features and its surroundings. In addition, pedestrians and nonmotorized vehicles are at greater risk since they use the road together with the motorized traffic. Improving the road will normally increase the vehicular traffic and the travel speed of the vehicles. It is therefore expected that the risks of accidents will slightly increase.

67. **Mitigation.** Decreasing the risks of accidents associated with increased vehicular traffic would require a strong information and education campaign at the local level on the risks of accidents. The following measures may also help decrease the risks: (i) improvement of crossing sites, such as by providing the appropriate signs and markings; (ii) speed-limiting measures, such as provision of speed limit signs and active police enforcement of speed limits at densely-populated areas, including the area at the Pheuntsholing Higher Secondary School; and (iii) provision of adequate road shoulders. Implementation of the mitigating measures will reduce the expected impact to an insignificant level.

68. **Increased risk of water pollution.** Phuentsholing intends to divert some of the road traffic from the existing bridge to this proposed new bridge. It is therefore expected that the risk

of water pollution from oil, grease, fuel spills, and other materials from vehicles using the proposed bridge and roads will increase. Oil tankers and chemical tankers, in particular, are expected to use this route.

69. **Mitigation.** PDM, together with the people's representative, shall prepare a spills response plan specific to this new bridge and roads. It should contain, at least, procedures on (i) how to stop the flow of spill; (ii) how to contain the spill to prevent from spreading, including the storage of absorbent material for spills; and (iii) cleanup of the spilled materials. A list shall be prepared of who are transporting hazardous materials and the quantities being transported along these routes. This will help estimate the magnitude of potential problems and design an effective spills response plan.

70. **Increased noise levels due to increase vehicular traffic.** This proposed bridge at the Om Chhu will be used as an alternate route from the city core area to the northern area of Pheuntsholing. PDM intends to divert the traffic to this route. This will surely increase the noise levels along the proposed road, especially from heavy truck traffic.

71. **Mitigation.** A noise mitigation will be necessary for sensitive sites such as the youth center and schools along the road on the right bank of the river. A noise barrier shall be constructed at these sites.

72. **Increased air pollution due to increased vehicular traffic.** Increased air pollution due to increased vehicular traffic at the bridge and approach roads will be insignificant, since the site is a place where air dispersion can easily dilute the emissions from vehicles. Bridge location is very near a large open space, the junction of Om Chhu with Amo Chhu, where wind can easily develop and provide air dispersion.

73. **Improved accessibility.** Constructing an alternate bridge with the associated approach roads at the Om Chhu has significant positive impacts on the served communities. This route will become an all-weather transport link between the two sides of the river.

74. After screening, Table 2 lists the environmental impacts and risks that require mitigation and shall be carried to the EMP Section.

Table 2: Environmental Impacts and Risks for Inclusion in EMP of Phuentsholing Subproject

Environmental Impacts and Risks	Without Mitigation	With Mitigation
PRECONSTRUCTION PHASE		
Impacts and risks to biodiversity conservation	● -	Δ
Potential damage to historical areas and cultural areas	Δ -	Δ
Potential nuisance and problems to the public	● -	Δ
CONSTRUCTION PHASE		
Soil erosion and sediments of construction sites	● -	Δ
Pile-driving aquatic impact	● -	Δ
Noise from construction equipment	● -	Δ
Local air pollution due to construction activities	● -	Δ
Vehicular traffic congestion and public access	● -	Δ
Hazards to public due to construction activities	● -	Δ
Pollution and health risk due to workers camp	● -	Δ
Increased employment opportunity in work sites	● +	● +
Occupational health and safety at work sites	● -	Δ

Environmental Impacts and Risks	Without Mitigation	With Mitigation
Improper closure of construction sites	● -	Δ
OPERATION AND MAINTENANCE PHASE		
Hydrodynamic and ecological effects to the river	● -	Δ
Waterlogging and soil erosion due to clogged and inadequate drainage facilities	● -	Δ
Increased risk of accidents		
Increased risk of water pollution	● -	Δ
Increased noise levels due to increase vehicular traffic	● -	Δ

Legend: Δ = insignificant; ● = significant;

+ = positive; - = negative.

VI. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

75. During the planning phase, PDM has undertaken various activities concerning information disclosure, public consultation, and public participation for its proposed bridge and roads subproject under UIP. The intent was to achieve a meaningful stakeholders' consultation and ensure subproject success.

76. In the course of conducting the PPTA study, information regarding the proposed bridge and roads subproject was disclosed to the public during a socioeconomic survey (SES) in July 2011. It was an occasion not only for information disclosure, but also for stakeholder identification and to scope issues and concerns. During the SES, respondent households in Phuentsholing were informed about the proposed subproject and interviewed for socioeconomic data. A focus group discussion (FGD) was also conducted last 24 July 2011 in Phuentsholing.

77. **Public consultation.** Last 29 July 2011, PDM conducted an initial public consultation and formally discussed the proposed bridge and roads subproject with the stakeholders and requested their views. Stakeholders were encouraged to raise their social and environmental issues. Participants included: (i) elected people's representatives from various areas of Phuentsholing, (ii) PDM executive secretary, (iii) PDM staff, and (iv) PPTA consultant. Stakeholders expressed support to the proposed PDM subproject. Summary of the consultation outcomes is presented in Table 3, while the documentation is presented in the appendices.

78. **Future disclosure and consultations.** A continuing process of public consultation and information disclosure shall be advocated. During the tendering process, PDM shall again conduct public consultations and information disclosure. Stakeholders' consultations shall be continued throughout the duration of the construction phase. PDM shall keep records of environmental and social complaints, received during consultations, field visits, informal discussions, and/or formal letters, together with the subsequent follow-up and resolutions of issues.

Table 3: Summary of Consultation Outcomes

Group Represented	Issues/Concerns Raised	Project's Response
Stakeholders at the left bank area of the proposed bridge	Increased risk to students of Phuentsholing Higher Secondary School	A traffic and road safety management program will be implemented; bridge will be provided with 1.7-m pedestrian path on both sides; a separate pedestrian bridge will be implemented by an ongoing project.
Stakeholders at the left bank area of the	There will be more impact to left bank areas, when the future development in	A master plan exists to guide development; however, more studies will be conducted regarding

proposed bridge	the north will be using the proposed bridge to reach the core area of Phuentsholing.	the future development in the north; wider roads will be built in the future to support the increased vehicle traffic coming from these areas.
Stakeholders at the right bank area of the proposed bridge	The people's representative expressed her support to the proposed bridge, since it will allow her constituents to access the other side of the river.	The project will give a lot of benefits not only to some areas, but to all Phuentsholing, since it will decongest the core area; people of the left bank can reach the core area easily by foot instead of bringing their cars through the existing bridge.
Stakeholders of other areas	What will happen if the old existing bridge will collapse	Northern areas of Phuentsholing will be isolated, since the existing bridge is the only access point. This is the reason why there is an urgency to construct the proposed bridge.
Stakeholders of various areas	All the people's representatives expressed their support to the proposed bridge and approach roads.	PDM executive secretary welcomed the expression of support and reiterated the importance of proposed bridge, not only to decongest the core area, but also to provide an alternate access to the northern areas in case the existing bridge will be destroyed.

VII. GRIEVANCE REDRESS MECHANISM

79. Local grievance redress mechanism (GRM) is important in the implementation of the proposed Phuentsholing bridge and roads subproject, since any complaints and concerns of the affected people must be address promptly at no costs to the complainant and without retribution. This mechanism shall be disclosed in public consultations during detailed design and in meetings during the construction phase. Complaints about the environmental performance of the subproject during the construction phase can be handled at various levels, including through the formation of an ad hoc construction complaints committee (CCC) for the expeditious resolution of the complaints.

80. **First level GRM.** An expeditious resolution to most grievances during construction can easily be handled by the contractors' representatives at the construction site and whenever necessary, together with the construction supervision consultants. At this first level, the grievance should be resolved within 2 days maximum. If the complaint is not resolved at this level, the complainant may elevate his grievances to the second level GRM, which is the ad hoc CCC.

81. **Second level GRM.** Phuentsholing shall form the ad hoc CCC to be chaired by its PIU head. Members shall include the following: (i) contractor's highest official at the site, such as construction manager or construction superintendent; (ii) the elected people's representative of the area, the Thuemi; and (iii) Phuentsholing's PIU head. Creation of the ad hoc CCC and its operation shall be included in appropriate sections of the civil works contract. Expeditious resolution of complaints during construction is important, since activities are sometimes continuous and can easily change the landscapes within a week. For the quick filing of complaints, the CCC shall prepare a form to be used for the filing of grievances or complaints. The use of the form will also facilitate the filing of complaints by illiterate persons through the assistance of another person.

82. The steps to be followed in filing complaints and the procedures for redress are as follows: (i) The complainant shall provide the background and file the complaint verbally or in writing to CCC. The CCC secretary shall assist the complainant in filling up the complaint form. (ii) Within 2 working days, Phuentsholing's PIU head, contractor's representative, and complainant shall discuss if the complaint can be resolved without calling for a CCC meeting.

(iii) If the complaint cannot be resolved by the PIU head and contractor's representative, a CCC meeting shall be called with the complainant to resolve the complaint within 5 working days.

83. **Third and fourth level GRMs.** If the complaint cannot be resolved at the CCC, the complainant has the option to first raise the issue to the Mayor of Phuentsholing (third level GRM), and if the complaint cannot be resolved at the Mayor's level, the complainant shall seek recourse with the courts.

VIII. ENVIRONMENTAL MANAGEMENT PLAN

84. This section addresses the need for mitigation and management measures for the Phuentsholing subproject. Information includes: (i) mitigating measures to be implemented, (ii) required monitoring associated with the mitigating measures, and (iii) implementation arrangement. Institutional set-up is presented in the implementation arrangement, and the roles during implementation and the required monitoring are discussed. This section also outlines the requirements and responsibilities during preconstruction, construction, and operation.

A. Environmental Mitigation

85. Table 4 presents the information on: (i) required measures for each environmental impact that requires mitigation; (ii) locations where the measures apply; (iii) associated cost; and (iv) responsibility for implementing the measures. Details of mitigating measures are already discussed in Section V, where the need for mitigation of each impact was determined in the screening process. Costs for mitigations during preconstruction, construction, and operation are part of the detailed design cost, construction contracts, and Phuentsholing operation and maintenance costs, respectively.

Table 4: Environmental Mitigation Plan of Phuentsholing Subproject

Project Activity	Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Location	Mitigation Cost	Responsibility for Implementation/ Supervision
PRECONSTRUCTION PHASE					
Excavation requirements	Potential damage to archaeological and cultural assets	Tender documents shall include a provision that will require construction activities to be stopped immediately upon discovery of any archaeological and cultural relics, and authorities will be informed promptly.	Roads	Part of detailed design cost	Design consultants/PMU and PIU
Design of bridge pier	Scouring of pier base due to vortex-induced turbulent flows	Bridge pier design shall include scour countermeasures to prevent the occurrence of vortex-induced turbulent flows such as placement of precast concrete armor units around the base of the pier.	Bridge pier	Part of detailed design cost	Design consultants/PMU and PIU
Social and community concerns	Potential nuisance and problems to the public	Consultation with the affected communities regarding the expected impacts and proposed mitigation measures of the	Roads	Part of detailed design cost	PIU, design consultants/PMU

Project Activity	Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Location	Mitigation Cost	Responsibility for Implementation/ Supervision
		project; tender documents shall include provisions addressing the potential nuisances and problems to the public during construction phase.			
Public use of bridge and roads	Increase noise levels due to increase vehicular traffic	Installation of noise barriers	Youth center and school at the right bank of the river	Part of design cost	Contractor/PIU, supervision consultants (installation during construction)
CONSTRUCTION PHASE					
Road construction and other civil works	Soil erosion and sediments of construction sites during rainy periods	Total area exposed shall be minimized; use of temporary diversion drains and catch drains at work sites	Roads, bridge abutments	Incorporated in construction contract	Contractor/PIU, supervision consultants
Pile-driving for bridge	Underwater sound pressure generation harmful to fish and aquatic animals	Use of soft-start pile-driving; installing a sleeve casing lined with polyurethane around the pile with some clearance and within the entire water depth during pile-driving; whenever possible, schedule the pile-driving activities during non-summer months, when the river flow is very small.	Bridge pier	Incorporated in construction contract	Contractor/PIU, supervision consultants
Road construction and other civil works	Nuisance from noise of construction equipment	Consultation with affected areas; not to operate noisy equipment during nighttime (10 p.m.–6 a.m.); sound suppression for equipment; ear plugs for workers; temporary noise walls at any sensitive receptors.	Roads, bridge abutments	Incorporated in construction contract	Contractor/PIU, supervision consultants
Road construction and other civil works	Air pollution due to construction activities	Water spraying for dust control; construction materials with potential for significant dust generation shall be covered; no smoke-belching equipment	Roads, bridge abutments	Incorporated in construction contract	Contractor/PIU, supervision consultants
Road construction and other civil works	Traffic congestion and hindrance to access	Close coordination with local authorities in road closure and traffic rerouting; contractor's traffic and road safety plan	Roads	Incorporated in construction contract	Contractor/PIU, supervision consultants
Road construction and other civil works	Pollution and health risks due to workers' camp	Proper camp sanitation; installation of sanitary facilities; solid waste management; surface runoffs control	Workers' camp	Incorporated in construction contract	Contractor/PIU, supervision consultants
Road construction and other civil works	Hazard to public due to construction activities	Implement road safety plan and safety measures, including warning signs to alert people of hazards	Roads, bridge abutments	Incorporated in construction contract	Contractor/PIU, supervision consultants

Project Activity	Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Location	Mitigation Cost	Responsibility for Implementation/ Supervision
		around the construction sites, barricades, and night lamps for open excavations			
Road construction and other civil works	Occupational health and safety at work sites	Implement health and safety plan; equipped first aid station available at all times; potable water and adequate sanitation facilities provided to workers; workers provided with clean eating areas; providing the workers with personal protective equipment	Roads, bridge, and abutments	Incorporated in construction contract	Contractor/PIU, supervision consultants
Rehabilitation and closure of construction sites	Improper closure of construction sites	Removal of all construction wastes and implementation of surface restoration	Roads, bridge abutments, pier	Incorporated in construction contract	Contractor/PIU, supervision consultants
Road construction and other civil works	Increased employment opportunities	Contractor required to give preference to local labor; workers recruitment to be coordinated with local officials	Roads and bridge	No cost	Contractor/PIU, supervision consultants
OPERATION PHASE					
Interaction of the bridge pier with river flows	Scouring of pier base due to vortex-induced turbulent flows	Placement of precast concrete armor units at the pier base	Bridge pier	Part of construction cost	Contractor/PIU, supervision consultants (installation during construction)
Public use of bridge and roads	Waterlogging and soil erosion due to clogged and inadequate drainage facilities	Regular maintenance of culverts and drains to maintain their design capacities; regular removal of accumulated sediments and debris in the drainage system; regular inspection of discharge points to streams to ensure they are stable and not deteriorating due to scour; ensuring appropriate water carrying capacities of the road drainage system through detailed study of the road catchment hydrology during the design phase	Road drainage	Part of operation and maintenance costs	PDM
Public use of bridge and roads	Increased risk of accidents	Strong information and education campaign at the local level on the risks of accidents; improvement of crossing sites, such as providing the appropriate signs and markings; speed-limiting measures such as provision of speed	Bridge and roads	Part of operation and maintenance costs	PDM

Project Activity	Potential Environmental Impact	Proposed Mitigation Measure or Enhancement Measure	Location	Mitigation Cost	Responsibility for Implementation/ Supervision
		limit signs and active police enforcement of speed limits at densely-populated areas; provision of adequate road shoulders			
Public use of bridge and roads	Increased risk of water pollution	Implementation of spills response plan that includes specific procedures on (i) how to stop the flow of spill; (ii) how to contain the spill to prevent from spreading, including the storage of absorbent material for spills; and (iii) cleanup of the spilled materials	Bridge and roads	Part of operation and maintenance costs	PDM
Public use of bridge and roads	Increased noise levels due to increase vehicular traffic	Installation of noise barriers	Youth center and school at the right bank of the river	Part of construction cost	Contractor/PIU, supervision consultants (installation during construction)

PDM= Phuentsholing District Municipality; PIU= project implementation unit.

86. Although details of the required mitigating measures are already discussed in the screening for impacts, the following items are discussed further to highlight their importance: (i) tender documents and construction contracts, (ii) contractor's environmental management plan, and (iii) unanticipated environmental impacts.

87. **Tender documents and construction contracts.** Environmentally responsible procurement advocates the inclusion in construction contract documents of the provisions addressing the management of environmental impacts and risk during construction. This includes the contractor's submittal of a CEMP and site management plan. Tender documents and construction contracts shall therefore include environmental management provisions on the following issues: (i) erosion and sediment runoff, (ii) noise and dust, (iii) vehicular traffic, (iv) construction wastes, (v) oil and fuel spillages, (vi) construction camps, and (vii) public safety and convenience.

88. **Contractor's EMP.** During construction, each contractor will be guided by a detailed contractor's EMP (CEMP). This shall be based on the subproject's EMP with details on staff, resources, implementation schedules, and monitoring procedures. The agreed CEMP will be the basis for monitoring by PDM's PIU and other monitoring parties. Inclusion in construction contract documents of the provisions requiring the contractor to submit a CEMP is important, since the contractor will be legally required to allocate a budget for mitigation measures implementation. The CEMP will allow PDM's PIU construction supervision engineer to focus on specific items expected from the contractor regarding environmental safeguards on a day-to-day basis. With the CEMP, PDM's PIU can easily verify the associated environmental requirements each time the contractor will request approval for work schedules.

89. The CEMP shall be prepared by all contractors before the start of construction, and shall be approved by PDM's PIU. This requirement shall be included in the construction contracts. It shall provide details on specific items related to the environmental aspects during construction. It shall include specifications on requirements for dust control, erosion and sediment control, avoidance of casual standing water, management of solid wastes, workers' camp sanitation, pollution from oil, grease, fuel spills, and other materials due to the operation of construction machineries, safety and traffic management, avoidance of inconveniences to the public, and air and noise pollution control. It shall also include guidance on the proper design of the construction zone, careful management of stockpiles, vegetation, topsoil, vehicles, and machinery.

90. **Unanticipated environmental impacts.** Where unanticipated environmental impacts become apparent during project implementation, PDM shall prepare a supplementary environmental assessment and EMP to assess the potential impacts, and outline mitigation measures and resources to address those impacts.

B. Environmental Monitoring

91. Table 5 presents the information on: (i) aspects or parameters to be monitored, (ii) location where monitoring is applicable, (iii) means of monitoring, (iv) frequency of monitoring, (v) responsibility for compliance monitoring, and (vi) cost of monitoring. The PMU shall prepare quarterly environmental monitoring reports to be submitted to ADB detailing the status of mitigating measures implementation. A sample template for the environmental monitoring report is presented in the appendixes.

Table 5: Environmental Monitoring Plan of Phuentsholing Subproject

Aspects/ Parameters to be Monitored	Location	Means of Monitoring	Frequency	Implemen- tation Respon- sibility	Compliance Monitoring Respon- sibility	Monitoring Cost
PRECONSTRUCTION PHASE						
Specific provision in tender documents on archeological/ cultural relics	Bridge abutment areas	Verify draft and final documents	Twice – draft and final documents	Design consultants	PMU	Part of project management in detailed design (minimal cost)
Design contract includes provision of scour countermeasure of bridge pier	Bridge pier	Verify draft and final documents	Twice – draft and final documents	PIU	PMU	Part of project management in detailed design (minimal cost)
Consultation meetings; specific provisions in tender documents on nuisance and problems to public	Roads	Verify meetings documentation; verify draft and final documents	After completion of meetings; twice – draft and final documents	PIU, design consultants	PMU	Part of project management in detailed design (minimal cost)

Aspects/ Parameters to be Monitored	Location	Means of Monitoring	Frequency	Implemen- tation Respon- sibility	Compliance Monitoring Respon- sibility	Monitoring Cost
CONSTRUCTION PHASE						
Total area to be exposed; runoff flowing into disturbed sites	Roads, abutment areas	Visual inspection of sites; plans verification	Daily during rainy periods	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Soft-start pile-driving; sleeve casing lined with polyurethane around the pile during pile-driving	Bridge pier	Visual inspection of pile driving activity	Daily	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Noise levels not to exceed 55 dB during daytime and 45 dB during nighttime in residential areas; for commercial areas, should not exceed 65 dB during daytime and 55 dB during nighttime	Bridge and roads	Use of sound level meter	Daily	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Dust, cover of stockpiles, smoke belching	Roads	Visual inspection of sites	Daily	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Road closure and traffic rerouting	Roads	Traffic plans verification	Weekly	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Sanitary toilets, garbage bins, runoff controls	Workers' camps	Visual inspection of camps	Once before start of construction and once monthly	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Road safety plan; sign, barricades, and night lamps	Roads	Visual inspection of sites	Daily	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Health and safety plan; first aid station,	Roads, bridge abutments	Check copy of health and safety plan;	Daily	Contractor	Construction supervision consultants,	Part of consultant's construction

Aspects/ Parameters to be Monitored	Location	Means of Monitoring	Frequency	Implemen- tation Respon- sibility	Compliance Monitoring Respon- sibility	Monitoring Cost
potable water and adequate sanitation facilities; clean eating areas; personal protective equipment	area	visual inspection of sites			PIU	supervision contract; minimal cost to PIU
Construction wastes	Roads, bridge abutments area	Visual inspection of sites	Once before final stage of demobilization	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Number of local labor employed	Construction sites	Verification of contractor's records	Once a month	Contractor	PIU	No cost
OPERATION PHASE						
Occurrence of vortex-induced turbulent flows at bridge pier	Bridge pier	Visual inspection	Once a month during rainy season	PDM	People's representatives (Thuemi)	Part of PDM's operation cost
Clogged culvert and drains	Roads	Ocular inspection of facilities	Five times per year	PDM	People's representatives (Thuemi)	Part of PDM's operation cost
Vehicular accidents involving pedestrians	Bridge and roads	Verification of community and police records	Twice per year	PDM	People's representatives (Thuemi)	Minimal cost to PDM
Fuel and other materials spills	Bridge and roads	Verification of community and police records	Once a month	PDM	People's representatives (Thuemi)	Minimal cost to PDM
Noise levels	Youth center	Use of noise meter	Twice per year	PDM	People's representative (Thuemi)	Part of PDM's operation cost

92. **Project performance monitoring.** Project performance monitoring presents the desired outcomes as measurable events by providing parameters or aspects that can be monitored and verified (Table 6). A tendering process advocating environmentally responsible procurement is a desired outcome during the preconstruction phase. This can easily be verified by checking if EMP requirements are incorporated in construction contracts. Construction phase desired outcomes include effective management of environmental impacts and reduced risk to public. Desired outcomes of the operation phase are the road drainage system performing well and very few vehicular accidents.

Table 6: Project Performance Monitoring of Phuentsholing Subproject

Desired Outcomes	Aspects/ Parameters to be Monitored	Means of Monitoring	Frequency	Implemen- tation	Compliance Monitoring	Monitoring Cost
PRECONSTRUCTION						
Detailed design	EMP	Verify detailed	Two reviews:	PIU,	PMU	Minimal cost

Desired Outcomes	Aspects/ Parameters to be Monitored	Means of Monitoring	Frequency	Implementation	Compliance Monitoring	Monitoring Cost
is environmentally responsive	requirements incorporated in detailed design	design documents; EMP requirements reflected in tender documents	(i) draft detailed design documents, and (ii) prior to approval of final documents	design consultants		
Tendering process advocates environmentally responsible procurement	EMP requirements incorporated in construction contracts	Verify construction contract documents	Prior to finalization of construction contract documents	PIU	PMU	Minimal cost
CONSTRUCTION PHASE						
Effective management of environmental impacts during construction	Number of public complaints on construction activities	Verification of contractor's records; PIU coordination with people's representative (Thuemi)	Once a month	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
Reduce risk to public during construction	Number of accidents involving construction activities	Verification of contractor's records; PIU coordination with local officials	Once a month	Contractor	Construction supervision consultants, PIU	Part of consultant's construction supervision contract; minimal cost to PIU
OPERATION PHASE						
No scouring of bridge pier	Presence of scour holes at pier river bed	Visual inspection during low flows	Once a year	PDM	People's representative (Thuemi)	Minimal cost
Road drainage system performed well	Clogged and overflowing drainage system	Verification of operation records and community records	Once a year	PDM	People's representative (Thuemi)	Minimal cost
Very few vehicular accidents due to effective traffic management	Number of vehicular accidents	Verification of operation records and community records	Once a year	PDM	People's representative (Thuemi)	Minimal cost
Few accidental spills of fuel and other materials	Number of spills	Verification of operation records and community records	Once a year	PDM	People's representative (Thuemi)	Minimal cost
No complaints on noise levels	Complaints on noise levels	Verification of operation records and community records	Once a year	PDM	People's representative (Thuemi)	Minimal cost

PIU= project implementation unit, PMU= project management unit.

C. Implementation Arrangement

93. This subsection presents the (i) institutional setup, (ii) implementation schedule, (iii) required clearance, and (iv) capability building.

94. **Project management unit (PMU).** The PMU in DUDES will appoint one staff to oversee the monitoring of environmental safeguards implementation. In general, this staff will oversee contractor's compliance with the environmental management plans, public complaints, PIU environmental monitoring, and reporting to ADB. Specifically, the PMU is responsible for the following activities related to environmental safeguards: (i) confirming that IEEs with EMPs are updated, where necessary, by design monitoring supervision consultants (DSMC) in accordance with ADB's Safeguard Policy Statement (SPS, 2009), based on detailed designs and submitted to ADB for review and approval prior to contract award; (ii) confirming EMPs are included in the bidding documents and civil works contracts; (iii) ensuring contractor's EMPs (CEMPs) are prepared by contractors prior to construction and endorsed by PIUs; (iv) establishing a system to monitor environmental safeguards of the project, including monitoring the indicators set out in the monitoring plan of the EMP; (v) facilitating and confirming overall compliance with all government rules and obtaining all required environmental clearances and any other environmental permits prior to contract award; (vi) supervising and providing guidance to the PIUs to properly carry out environmental monitoring and reporting; (vii) reviewing, monitoring, and evaluating the effectiveness with which the CEMPs are implemented, and recommending necessary corrective actions to be taken as necessary; (viii) consolidating quarterly environmental monitoring reports from PIUs and submitting semiannual environmental monitoring reports to ADB; (ix) ensuring timely disclosure of final IEE/EMPs in locations and form accessible to the public; and (x) addressing, recording, and reporting on any grievances brought about through the grievance redress mechanism in a timely manner as per the IEEs.

95. **Project implementation units (PIU).** The PIU in PDM will appoint one staff to oversee the monitoring of environmental safeguards implementation. The PIU, with the assistance of DSMC environmental specialists (consultant support), will do the following: (i) ensure the draft IEE/EMP prepared during the feasibility study is updated during detailed design stage, where necessary; (ii) ensure EMPs are included in bidding documents and civil works contracts; (iii) ensure overall compliance with all government rules and obtain all required environmental clearances as well as any other environmental permits prior to contract award; (iv) oversee implementation of EMP and CEMPs, including environmental monitoring; (v) take corrective actions when necessary to ensure no environmental impacts; (vi) submit quarterly environmental monitoring reports to the PMU; and (vii) address any grievances brought about through the grievance redress mechanism in a timely manner, as per the IEEs.

96. **Implementation schedule.** As presented in the project description, construction of the Phuentsholing subproject is scheduled to start in Q4 2013, and to be completed in Q3 2015. PDM shall ensure that construction contract provisions related to the EMP shall be included in the tendering stage in 2013.

97. **Clearances and permits.** Under present environmental regulations in Bhutan, PDM shall apply for an environmental clearance (EC) from the NEC for the proposed bridge and associated roads. PDM shall ensure that it has applied for EC by Q1 2012, since maximum time for EC processing is one year.

98. **Capability building.** UIP implementation will be supported by consulting services that include: (i) project management advisory services, including detailed engineering designs,

preparation of contract documents, and support to construction supervision and quality control; and (ii) institutional development and capacity building for MWHS, the PMU, and the municipalities with subprojects. Cost of the capacity building is included in the overall UIP consulting services. For Phuentsholing, there is a need for staff training on road and bridge maintenance, since its engineering division is now responsible for all roads and bridges inside the city.

IX. CONCLUSION AND RECOMMENDATIONS

99. The northern area of Phuentsholing is presently connected to the core area by an old bridge that cannot be closed even for minor repairs due to the lack of an alternate route. Local officials raised the urgent need of having another bridge, since if the old bridge collapses, the northern area will be isolated. The proposed bridge and associated roads under UIP will provide a reliable alternate route, and will increase confidence in accessibility between the core area and the northern area. The bridge will greatly help the development of the town, since the industrial activities are located in the northern area. With the bridge, the interaction between the core area and the northern area will be facilitated. Pedestrian safety is also considered in the bridge design with the provision of a 1.7-m pedestrian footpath on both sides. The bridge will help decongest the core area, since people on the other side of the river who need to go shopping can easily reach the core area by foot instead of bringing their cars through the existing bridge. In the future, it will also help decongest the core area, since it will become part of a proposed bypass route. Trucks coming from India and just passing thru Phuentsholing shall be asked to use this route and bypass the core area.

100. The environmental screening process has highlighted the environmental issues and concerns of the proposed bridge and associated roads subproject. The proposed approach roads will be on existing roads, or immediately adjacent on government land. There are no land acquisition or resettlement impacts. The proposed subproject is not a new incursion into an ecologically untouched area.

101. Based on the screening for potential environmental impacts and risks of the proposed bridge and roads subproject, there are no significant negative environmental impacts and risks that cannot be mitigated. Hence, the proposed subproject can easily be implemented in an environmentally acceptable manner. There is no need for further environmental assessment study. A full EIA is not warranted, and the subproject's environmental classification as category B is deemed appropriate. The IEE shall therefore be finalized as the final environmental assessment document of the proposed Phuentsholing subproject.

102. Implementation of the proposed Phuentsholing subproject is hereby recommended with emphasis on the following: (i) EMP of the bridge and road subproject shall be included in the design process; (ii) contracts of design consultants shall have provisions requiring the consultants to consider EMP recommendations in the design process; (iii) tendering process shall advocate environmentally responsible procurement by ensuring the inclusion of EMP provisions in the bidding and construction contract documents; (iv) contractor's submission of a CEMP shall be included in the construction contract; (v) contract provisions on creation and operation of the CCC shall be included in construction contracts; (vi) monitoring of health and safety requirements shall be given more importance during implementation to reduce risks to the public; and (vii) Phuentsholing's PIU shall continue the process of public consultation and information disclosure during detailed design and construction.

APPENDIX 1: APPLICATION OF ENVIRONMENTAL CLEARANCE UNDER THE REGULATIONS FOR ENVIRONMENTAL CLEARANCE OF PROJECTS (2002)

The following procedures shall apply to the screening of all environmental information by the secretariat or competent authority.

1. Environmental information: During the planning and design of a project, and prior to any irrevocable commitment of resources or funds, the applicant shall submit complete environmental information to either the secretariat or competent authority.
2. Minimum contents of environmental information: The environmental information shall contain a short and concise description of the following elements:
 - (i) the potential adverse effects of the project on the environment, including the direct, indirect, and cumulative effects;
 - (ii) how the project complies with relevant sectoral guidelines or code of best practices, if any, issued by the secretariat or competent authority;
 - (iii) how the impacts of the project will be avoided, minimized, or reduced; and
 - (iv) the environmental benefits of the project, including how the project will benefit concerned people and use clean and sustainable technologies.
3. Modification of proposal/application: If an applicant intends to make a material change to a project, including an increase in production capacity or the manner of implementing the project after submission of an environmental application, the application shall be treated as a new application.
4. Determination of adequacy of the environmental information: When the secretariat or competent authority receives an application/proposal for the issuance of environmental clearance, it shall communicate its decision to the applicant in writing within the time limit specified in Annex 1. When the competent authority determines that an application is duly completed, it shall accept the application and either proceed with review, if it is a listed project, or forward it to the secretariat for environmental clearance if it is a non-listed project, or falls under Section 17 of this regulation.
5. Public notice of proposal: After receipt of notice that the application is adequate, the applicant must comply with the minimum requirements for public consultation set forth in Section 31 of this regulation concerning the environmental application only in case of significant projects.
6. Screening decision: The secretariat or competent authority shall screen the application for environmental clearance as per sectoral guidelines and within time limit as per Annex 1. The secretariat or competent authority may issue an environmental clearance for the project on the basis of the environmental application only if the project meets the requirements set forth in Section 25 of this regulation. The environment application may contain terms and conditions consistent with Section 30 of this regulation, otherwise the secretariat or competent authority may ask the applicant to carry out environmental assessment or issue a blanket denial to the project.
7. If the secretariat or competent authority requires an environmental assessment or denies the project, a notice of the decision shall be promptly sent to the applicant.

8. When a decision on the environmental clearance has been taken, the secretariat or the competent authority shall make a public announcement of the decision and make the information available to the public under Article 28 of the EA Act, 2000.

APPLICABLE TIME LIMITS OF PROCESSING FOR ENVIRONMENTAL CLEARANCE

Action	Time Limit
Response by secretariat/competent authority on the receipt of application. This is simply an acknowledgement of the receipt of the application.	Within 15 days
Review by the secretariat/competent authority to assess the adequacy of the application as per government rules and guidelines	1–3 months
Competent authority forwards application to secretariat for non-listed and listed projects if it falls under Section 17 of this regulation.	Within 15 days
Screening of a project will be undertaken to determine the level of environmental assessment required.	1–3 months
If screening determines that an environmental assessment is required, the level and time frame for the assessment will be determined through negotiations between relevant parties and approved by the secretariat/competent authority.	Time frame to be negotiated
Decision/response on the environmental clearance based on the findings of the environmental assessment report	1–3 months
Public notification on decision by the secretariat/competent authority	Within 15 days
Appeal on the decision	Within 30 days from the date of publication of public notification
On approval of the clearance, a legal undertaking with the proponent of new projects to comply with the EA Act, 2000	10 days–1 month

Note: Applicable time limits are subject to submission of correct and complete information based on applicable government regulations and guidelines.

APPENDIX 2: SITE OF PROPOSED BRIDGE



Photo No.1 – Location of the proposed bridge at Om Chhu River. Location view of proposed right abutment as seen from the left bank



Photo No. 2 – Location view of proposed left abutment as seen from the right bank



Photo No. 3 – Location of proposed approach to the bridge at the left bank



Photo No. 4 – Proposed 200-m road connecting the approach road to the proposed bridge on the left bank

APPENDIX 3: MINUTES OF THE PUBLIC CONSULTATION/MEETING HELD AT THE CONFERENCE HALL OF PHUENSHOLING DISTRICT MUNICIPALITY, 29 JULY 2011

Opening/Presentations:

1. Phuentsholing District Municipality (PDM) executive secretary opened the public consultation/meeting at around 9:35 a.m. by welcoming everybody, and explained that the purpose of the meeting is to present the proposed bridge and associated roads subprojects and to elicit views from the stakeholders regarding the proposal, particularly issues that they may raise.

2. The meeting continued with the subproject presentation by PDM's chief urban planner, who emphasized the urgency of having this proposed bridge since the only existing bridge crossing the Om Chhu and connecting the northern and core area of the city is already old, and if the bridge will become impassable for some reason, the north area will be isolated. He further added that this old bridge cannot be closed even for minor repairs due to the lack of an alternate route.

Comments, Views, Issues, and Concerns raised by Stakeholders

3. Karma Chen, people's representative (Thuemi) of Om Chhu's left bank area, raised the potential increase in risk to students of the Phuentsholing Higher Secondary School. The executive secretary responded by saying that a traffic management program will be implemented during the operation of the bridge. He further explained that a separate pedestrian footbridge will be implemented by an ongoing project, and the tendering process is ongoing. The chief urban planner added that the proposed bridge subproject shall be provided with a 1.7-m pedestrian footpath on both sides.

4. Mr. Chen further raised the possibility of more impact to the left bank areas in the future, when development in the north will push through and more people from such areas will be using the proposed bridge to reach the core area of Phuentsholing. The executive secretary responded by saying that more studies will be conducted in the future regarding the proposed development in the north, and wider roads will be built to support the increased vehicular traffic coming from these areas.

5. Shasmila Limbu, people's representative (Thuemi) of Om Chhu's right bank area, expressed her full support to the proposed bridge, since it will enable her people to access quickly the other side of the river. The executive secretary welcomed the expression of support and further explained that the bridge will provide a lot of benefits not only to some areas, but to all Phuentsholing, since it will decongest the core area, and people of the left bank can reach the core area easily by foot instead of bringing their cars through the existing bridge, thus helping decongest the core area.

6. Ganesh Rai, another people's representative (Thuemi), asked what would happen if the old existing bridge collapsed. The executive secretary responded that the northern areas of Phuentsholing will be isolated since the existing bridge is the only access point. This is the reason that there is an urgency to construct the proposed bridge.

7. Finally, all the people's representatives expressed their support to the proposed bridge and associated roads. The executive secretary welcomed the expression of support and reiterated the importance of the proposed bridge not only to decongest the core area, but also to provide an alternate access to the northern areas in case the existing bridge will be destroyed.
8. The executive secretary closed the meeting by thanking everyone for their participation in the public consultation.
9. Meeting closed at 10:26 a.m.

APPENDIX 4: LIST OF PARTICIPANTS IN PHUENTSHOLING PUBLIC CONSULTATION AND INFORMATION DISCLOSURE (29 JULY 2011)

Stakeholders/participants:

- Karma Chen, people's representative (Thuemi)
- Ganesh Rai, people's representative (Thuemi)
- Shasmila Limbu, people's representative (Thuemi)
- Nar Bdr Rai, people's representative (Thuemi)

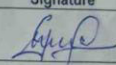

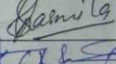
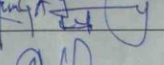
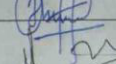
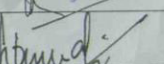
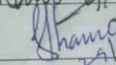
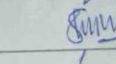
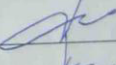
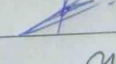
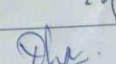
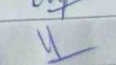
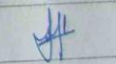
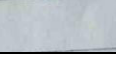

Phuentsholing District Municipality

- Kinzang Norby, executive secretary
- D.C. Dhimal, chief engineer
- Tshering Phuntsho, chief urban planner
- Sangay Wangmo, PIU representative
- Kinga Loday, survey engineer
- Jigme Phuntsho, Engineer
- C. B. Chuetin, survey officer
- Shara Lhamo, administration staff
- Mon Bdr Cummul, junior engineer
- Deopal Thapa, junior engineer

CONSULTANT

- Ruel Janolino – environment specialist, Poyry

APPENDIX 5: ATTENDANCE SHEET OF PHUENTSHOLING PUBLIC CONSULTATION AND INFORMATION DISCLOSURE (29 JULY 2011)

ADB TA 7630-BHU: URBAN INFRASTRUCTURE PROJECT LIST OF PUBLIC CONSULTATION PARTICIPANTS PROPOSED BRIDGE/ROAD SUBPROJECT OF PHUENTSHOLING				
Consultation Date: 29 July 2011				
No.	Name	Designation	Organization	Signature
1.	Ganesh Rai	Thurani	P.C.C.	
2	Nan Bdr Rai	-H-	P.C.C.	
3	Sharmila Limbu	"	P.C.C.	
4	Ginga Lodray	Survey Engineer	"	
5	Jigme Phuntsho	Engineer	P.C.C.	
6	C. B. Chhetri	Survey Officer	"	
7.	D. C. Dhimal	C.E.	"	
8.	Shara Khum	Asst HR/Adm	PCC	
9.	Man Bdr. Gunu	Junior Engineer	PCC	
10.	Karma Chen	Thuri -	PCC	
11.	RUEL JAYORING	CONSULTANT	POURBY	
12	Kenjane Norton	E.S.	PCC	
13.	Deopal Thapa.	J.E.	PCC	
14	Tshering Phuntsho	Chief Urban Planner	Phuntsho Thumbe	
15	Sangay Wangmo	Offg. PM	"	

APPENDIX 6: PHOTOGRAPHS OF PUBLIC CONSULTATION MEETING



Photo No. 5 – Chief town planner presenting the project at the public consultation meeting (29 July11)



Photo No. 6 – Peoples' representatives listening to the project presentation at the public consultation meeting (29 July 2011)



Photo No. 7 – A people's representative raising some points at the public consultation meeting (29 July 2011)



Photo No. 8 – Phuentsholing executive secretary answering the issues raised at the public consultation meeting (29 July 2011)

APPENDIX 7: SAMPLE CONTENTS FOR ENVIRONMENTAL MONITORING REPORT

A. Summary of EMP Implementation

1. Overall status of EMP implementation
2. Key issues, corrective actions, and any grievances

B. Details of EMP Implementation Status

1. Permissions/consents (list of relevant permits, clearances, etc. and status of obtaining these)
2. Field visits and consultations (sites visited, dates, persons met)
3. Training (nature of training, number of participants, date, location, etc.)
4. Progress of work (percentage of physical completion)
5. Design/location/preconstruction stage monitoring
6. Construction stage monitoring
7. Operation stage monitoring
8. Occupational health risks and safety plan for workers
9. Redress of grievances (type of grievance, date, persons, etc.)
10. Corrective actions taken

APPENDIX

Consents

Permissions

Monitoring data (water quality, air quality, etc.)

Photographs

Maps