Initial Environmental Examination (Draft)

August 2018

Bhutan: Skills Training and Education Pathways Upgradation Project

Prepared by the Ministry of Labour and Human Resources, and the Ministry of Education for the Asian Development Bank. This is an updated version of the draft originally posted in June 2018 available on https://www.adb.org/projects/documents/bhu-50296-002-iee

CURRENCY EQUIVALENTS

(as of 1 August 2018)

Currency unit	–	ngultrum (Nu)
Nu1.00	=	$0.01460
$1.00	=	Nu68.4907

ABBREVIATIONS

ADB	-	Asian Development Bank
BVQF	-	Bhutan Vocational Qualifications Framework
CA	-	competent authority
CITES	-	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CS	-	central school
DEC	-	District Environment Committee
DoEHR	-	Department of Employment and Human Resources
DOS	-	Department of Occupational Standards
DTE	-	Department of Technical Education
EA	-	executing agency
EC	-	environmental clearance
EIA	-	environmental impact assessment
EMP	-	environmental management plan
EMoP	-	environmental monitoring plan
FNCA	-	Forest and Nature Conservation Act
FNCR	-	Forest and Nature Conservation Rules
GLOF	-	glacial lake outburst flooding
GRM	-	grievance redress mechanism
HSS	-	higher secondary school
IEE	-	initial environmental examination
MOE	-	Ministry of Education
MOLHR	-	Ministry of Labour and Human Resources
NEC	-	National Environment Commission
NECS	-	National Environment Commission Secretariat
PIU	-	project implementing unit
PMU	-	project management unit
PPE	-	personal protective equipment
PSC	-	project steering committee
RECOP	-	Regulation for Environmental Clearance of Projects
SPBD	-	School Planning and Building Division
SPCD	-	School Planning and Coordination Division
SPS	-	Safeguard Policy Statement
TVET	-	Technical and Vocational Education and Training

WEIGHTS AND MEASURES

^{o}C	-	degree Celsius
CFU/100ml	-	colony forming units per 100 milliliters
dB(A)	-	decibel (measure of noise)
ha	-	hectare
km	-	kilometer
km^2	-	square kilometer
m	-	meter
m^2	-	square meter
mg/L	-	milligram per liter
$\mu g/m^3$	-	microgram per cubic meter
NTU	-	Nephelometric turbidity units

NOTE

(i) In this report, "$" refers to United States dollars.

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EXECUTIVE SUMMARY

Introduction

The Asian Development Bank (ADB) will provide the Government of Bhutan with a grant of $15 million to support the interventions of the skills training and education pathways upgradation project (STEP UP). Building on the experience and lessons learnt from the Basic Skills Development Project supported by ADB in June 2001 and completed in March 2008, the STEP UP aims to contribute to the expansion and modernization of the technical and vocational education and training (TVET) system and in enhancing the vocational orientation and skills of high school students. In addition, STEP UP will create performance-based partnerships with the private sector and thus, is expected to improve employability and job outcomes for skilled graduates.

Launched by government in June 2016, the TVET Blueprint 2016–2026 articulates a long–term strategic vision that will guide and influence reforms and development in TVET over the next 10 years. Central to this is the four pillars which identify broad reform areas to respond to specific constraints facing the TVET system. The four pillars are expanding TVET provision, improving relevance, improving quality, and strengthening management systems. The interventions proposed in the STEP UP are consistent to the four-pillar strategy.

Project Description

It is envisioned that the following outputs will enhance chances of TVET graduates for employment and in increasing the skilled human capital needed for equitable socioeconomic development in Bhutan.

Output 1: Access to skills development increased. This will support (i) physical infrastructure, a new flagship technical training institute (TTI) in a new campus in Thimphu with modern facilities, and new classrooms, workshops, and dormitories in Samthang TTI; (ii) the provision of modern and advanced technology equipment and tools in all the TTIs;[1] and (iii) the introduction of at least six new courses at middle and advanced (diploma) level and in diversified disciplines. These interventions are expected to benefit about 1,000 students enrolled in TTIs, including an additional 500 students during the project period (35% female).

Output 2: Quality and relevance of skills development enhanced. This will support: (i) improved training of trainer programs with workplace experience to at least 60% of trainers in TTIs; (ii) private sector partnership for skills delivery in emerging occupations benefiting about 800 students (35% female); and (iii) provide e-resources in TTIs to develop future-ready skills in graduates.[2] The project will establish performance-based contracts with private sector training providers to strengthen market relevance of skills and assure job placements.

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[1] The project will provide hi-tech equipment such as computer numerical control (CNC) machines, spray plastering machines, and advanced survey equipment like total station and green technology equipment (e.g., CNC 3D simulation workstations and virtual welders) that will enable students to practice with low consumption of electricity and raw materials. The simulators will supplement theoretical and classroom teaching prior to actual practice on real machines.

[2] The project will equip the TTIs with a range of e-resources like multimedia-based and self-learning modules incorporated to increase effectiveness and interest in learning skills. These systems also inculcate problem solving, fault-finding and project-based learning.

Output 3: Vocational orientation of secondary school students improved. This will provide support to: (i) pilot TVE elective subjects for grades 9–12 in seven schools linked to TTIs, and to strengthen the vocational clubs for grades 7–8; (ii) enable career guidance with exposure to the world of work to secondary students; and (iii) offer ICT-enriched teaching and learning to improve foundational skills critical for increasing employability. The project will upgrade seven secondary schools into TVE Premier Schools consistent with the objectives of the Twelfth Five Year Plan. These interventions are expected to encourage a larger number of grade 10 students to take up skills training, support the establishment of TVE Premier Schools, and to provide modern career guidance services.

Output 4: Governance and institutional capacity for TVET improved. This will provide support to: (i) operationalize an online TVET management information system and employment services portal; and (ii) facilitate international partnership in at least one TTI. The project will deliver qualitative studies and surveys to strengthen evidence-based planning and implementation of skills development programs at TVET institutions and schools.

The interventions with environmental implications are the physical infrastructures in Output 1 (i.e., construction of new Thimphu TTI and additional new buildings in Samthang TTI) and the provision of 13 new TVE laboratories (TVE labs) in seven premier secondary schools to introduce TVET electives (Output 3). These TVE labs are spread over six *dzongkhags* (districts) and the Thimphu Thromde.

Implementation arrangements. The Ministry of Labour and Human Resources (MOLHR) and the Ministry of Education (MOE) will be the executing agencies (EAs). A project management unit (PMU) will be created in the MOE and MOLHR. The PMU in MOLHR will be the Department of Technical Education (DTE) while the PMU in MOE will be the Department of School Education (DSE). Under the PMUs will be the project implementation units (PIUs). The PIUs under the PMU of MOLHR will include the Thimphu TTI (Construction), Samthang TTI (Construction), Department of Employment and Human Resources (DoEHR), Department of Occupational Standards (DOS), and the Royal Institute of Tourism and Hospitality (RITH). In the PMU of MOE, the PIUs will be the School Planning and Building Division (SPBD), Department of Youth and Sports (DYS), and the Royal Education Council (REC). SPBD will oversee the construction of the new TVE labs while the construction works for the MOLHR will be supervised by a full time Design and Supervising Consulting firm.

An inter-ministerial Project Steering Committee (PSC) will be established to provide strategic guidance and oversight to the EAs, monitor and review the overall progress and results of project implementation. The PSC will be chaired by Secretary, MOLHR and co-chaired by the Secretary, MOE with members from representatives of relevant agencies. STEP UP is expected to begin in November 2018 until October 2023.

Environmental Requirements for STEP UP

ADB requirements. The Safeguard Policy Statement (SPS) 2009 sets out the requirements for environmental safeguard that applies to all ADB-financed projects and grants. Under SPS 2009, projects or grants are screened and categorized based on their potential environmental impacts. STEP UP is classified as category B on environment requiring the preparation of an initial environmental examination (IEE). Based on the requirements of SPS 2009, this draft IEE is prepared and will be publicly disclosed to ADB website. Disclosure of IEE is also required by the Public Communications Policy (PCP) 2011.

Government requirements. The environmental assessment of projects are based on the Environmental Assessment Act (EAA) of 2000, the National Environmental Protection Act (NEPA) of 2007, and the Regulation for Environmental Clearance of Projects (RECOP) 2016. The National Environment Commission (NEC) is the highest decision-making body on all aspects relating to the environment and its management. The jurisdiction and powers of NEC were conferred by NEPA 2007. Policies and regulations formulated by NEC are implemented by the NEC Secretariat (NECS). NECS decentralized the environmental management by designating any ministries, organizations or committees as the Competent Authority (CA) to carry out its functions for listed projects. The list of projects is an integral part of RECOP and is known as, *List of Activities that the Competent Authorities shall Screen and Issue Environmental Clearance and List of activities not requiring Environmental Clearance 2016.* This aims to properly streamline the approval process and avoid unnecessary delays.

Section 43 with powers and duties set forth in Section 47(a) of NEPA 2007, the Dzongkhag Environment Committee (DEC) is designated as CA at Dzongkhag Level and the Environment Committee at the Thromde level.

STEP UP interventions are included in the list of projects within the jurisdiction of CA. Specifically, the Thimphu Thromde and the DECs in Wangdue Phodrang, Punakha, Bumthang, Trashigang, and Trashiyangtse will issue the environmental clearance (EC). According to the Thimphu Structure Plan 2002-2027 and Development Control Regulations 2016, the new Thimphu TTI in Serbithang is consistent with the approved land use of the Serbithang Local Area Plan, thus, no EC will be required. The new TVE lab in Babesa Middle Secondary School is also under the Thimphu Thromde. The requirements for EC of the construction of additional new buildings in Samthang TTI and the remaining 12 new TVE labs for secondary schools will be subject to the screening of the DEC in the *dzongkhag* where they will be located.

Description of the Existing Environment

The new Thimphu TTI will be located in Serbithang, Thimphu Thromde while the additional buildings for Samthang TTI will be located within the existing premises in Wangdue Phodrang. The 13 new single-storey TVE labs for the seven secondary schools will be located in Thimphu Thromde (one TVE lab), Punakha (4 TVE labs), Wangdue Phodrang (1 TVE lab), Bumthang (2 TVE labs), Trashigang (3 TVE labs), and Trashiyangtse (2 TVE labs).

Description of the existing environment was based on secondary data from relevant publications of the government, international organizations, special studies, and websites of the seven *dzongkhags* where the TVE labs will be located. No environmental quality measurements to collect primary data were conducted. Site visits were done in August 2017, December 2017, January and February 2018. Prior to construction works, PMUs will require the Contractor(s) to conduct baseline environmental quality measurements for air, noise, and source of drinking water to be provided to workers at construction sites. These data will be included in the revisions and/or update of this draft IEE during implementation. Soil testing is part of construction planning to determine its suitability for construction and design of foundation.

Anticipated Impacts and Mitigation Measures

Prior to any civil works, the PMUs (MOE and MOLHR) together with the Environmental Safeguard consultant will conduct an orientation to the Contractor and their workers about the environmental requirements of the government (through the NEC) and ADB that need to be complied with, their roles and responsibility for compliance, record keeping and reporting, and awareness of diseases

such as HIV/AIDS and tuberculosis, etc., to avoid the potential occurrence in the construction sites.

The Contractor will be required to prepare a Construction Management Plan (CMP) describing the measures to manage potential environmental impacts during construction phase. The CMP will be reviewed and approved by the PIUs (Thimphu TTI, Samthang TTI, and TVE labs of MOE) and the PMUs. As excavation works will be involved, a "chance find" procedures will guide workers in the event a physical cultural resource is encountered.

Three existing structures in Serbithang site where the new Thimphu TTI will be located will be demolished. Two structures were used for the pilot compost plant of the Thimphu Thromde and one structure served as staff quarters. The pilot compost plant and the three existing structures were funded by ADB under Loan 2258-BHU: Urban Infrastructure Development Project approved on 27 September 2006 and completed on 31 August 2016. A demolition plan which will describe, among others, the procedures, safety measures, schedule, disposal site, and estimated volume of debris will be prepared by the Contractor and will be approved by the PMU of MOLHR and the Engineering Sector of Thimphu Thromde. A demolition permit will be secured by the Contractor from the Thimphu Thromde prior to any demolition works. Demolition works will be monitored by the PIU and the Environmental Safeguard consultant.

Potential environmental impacts associated with STEP UP are mainly during construction such as increased noise and dust levels due to site preparation and construction of the new buildings, occupational and community safety risks due to civil, mechanical and electrical works. Other impacts include potential traffic congestion in the access roads to Serbithang, Samthang, and the seven secondary schools, presence of construction workers, and potential disturbance and/or inconvenience to daily activities of local residents in Serbithang and Samthang, and the secondary school students as the sites for the TVE labs are within the existing school premises. These impacts are temporary, of short duration and can be easily mitigated by compliance to relevant regulations of the government and the requirements of ADB.

The main sources of noise generation are movements of construction vehicles and heavy equipment. Transport and delivery of construction material will also generate noise and increase dust level. PMUs will ensure that ambient air quality limits set by the International Finance Corporation (IFC)-World Bank (WB) Environmental, Health, and Safety (EHS) General Guidelines 2007 (Table 1.1.1) will not be exceeded during construction phase. Noise generating activities will be limited to daytime hours and will ensure that ambient noise level limit of 55 dB(A) during daytime and 45 dB(A) at nighttime (for receptors such as residential, institutional and educational) set by the IFC-WB EHS General Guidelines 2007 (Table 1.7.1). Environmental Standards 2010 issued by the NEC are less stringent compared to the IFC-WB EHS General Guidelines 2007. The ADB's SPS 2009 provides that when host country regulations differ from the levels and measures set by the IFC-WB EHS General Guidelines 2007, host country will achieve whichever is more stringent. In this case, the IFC-WB EHS General Guidelines 2007 will be the relevant limits that Contractor needs to comply.

Safety gears and personal protective equipment will be provided to workers by the Contractor. Sanitary facilities, safe drinking water, first aid kit, emergency survival kit and fire extinguishers will be also provided. Good housekeeping in the construction sites and labour camps will be enforced at all times. PIUs and the Environmental Safeguard consultant engaged for the project will monitor compliance of the Contractor

To avoid traffic congestions in the access road to Serbithang at Ngabiphu Lam and Samthang along the Thimphu-Wangdue Phodrang Highway, appropriate traffic signs will be posted and temporary pedestrian crossing will be installed to accommodate children, women, elderly, and persons with disability. A staff of the Contractor will be assigned to ensure the safe flow of traffic and pedestrian crossing. Clear and visible warning signs/markers following appropriate safety standards will be installed. An environmental management plan and monitoring plan are included in this IEE to ensure that impacts are minimized.

Analysis of Alternatives

Both a "no project" and "with project" options were considered in some of the sites for the new buildings. Under the "no project" option, the sites will remain the same as the existing conditions but the current needs of the trainees in Thimphu TTI and the Samthang TTI for new workshops, classrooms, and hostels will not be realized including the requirements of the seven secondary schools for new TVE laboratories to introduce TVET.

There was no alternative site considered for the new Thimphu TTI in Serbithang as this is the best site in terms of ownership, availability, and size of land. The 3-acre Serbithang site used to be the compost plant of the Thimphu Thromde but now reallocated to MOLHR by the National Land Commission when the composting operations were moved to Memelakha landfill about 10 km from Thimphu.

The new additional buildings for Samthang TTI will be within the existing premises. The selection for the site within the premises was limited to the restrictions of potential GLOF. Land use restrictions were issued by the government through the Department of Disaster Management (DDM). The development restrictions were based on the hazard zonation in the Punakha-Wangdue Valley communities as a result of comprehensive studies by national and international experts on GLOF. Samthang TTI was identified as within the yellow zone (i.e., blue is the lowest and red is the highest) which represents medium risk areas where most probable indirect impact of GLOF can occur during the worst case scenario of 53 million cubic meter (MCM) of water, thus, future developmental activities should be planned accordingly. Given this, the option will be towards the eastern side where an evacuation zone within Samthang TTI was identified by the government in the event of GLOF. Automated early warning device and flood markers are currently installed within the Punakha-Wangdue Valley as part of reducing the risks.

The 13 new TVE labs for the seven secondary schools identified by the MOE will be within the existing premises as well. While the TVE labs will be located within the existing premises of the seven secondary schools, the criteria considered in selecting the site include the following:

(a) minimal disruption to students during classes when construction is ongoing;
(b) should be more than 30 m from the edge of a river or major stream/edge of gullies;
(c) should be more than 15 m from the edge of all natural rivulets/gulleys and natural drainage channels;
(d) will not entail major site/land development like backfilling or cutting of slopes;
(e) should not cause clearing of trees and will avoid trees as far as practicable; and,
(f) easy access during construction.

All the sites selected for the seven secondary schools met the criteria.

Information Disclosure, Consultation and Participation

A total of two consultation events were conducted in Serbithang and in Samthang on 31 January 2018 and on 2 February 2018, respectively participated by 13 residents together with one-on-one interview of 14 persons. Participants are farmers, housewives, ex-development workers, and businessmen. Concerns of participants include lack of project information disclosed to them, potential impacts during construction such as traffic congestion in Serbithang, increased noise levels, presence of workers at the construction site, and competing demand for water in Serbithang. Participants recognized the benefits of STEP UP to youth and the potential for job creation and small-scale business opportunities during construction. Concerns such as noise level will be monitored during construction.

A project brief (or Q & A) with details on grievance redress mechanism (GRM), and contact person in case of complaints will be prepared both in *Dzongkha* and English. The project brief will be made available at the field offices of the PMU in Serbithang and Samthang for the MOLHR, and in the seven secondary schools in Punakha, Wangdue Phodrang, Bumthang, Trashigang, and Trashiyangtse for MOE. As well, the project brief will be posted to the website of MOLHR and MOE. More details on the project will be also available from the IEE to be posted in the ADB website. Consultations will continue in varying degrees during implementation.

Grievance Redress Mechanism

To meet the requirements of SPS 2009, the PMU in MOLHR and in MOE will set-up a grievance redress mechanism (GRM) and will create a grievance redress committee (GRC) as soon as the grant becomes effective. GRC members will be (i) PMU Head-Project Director, (ii) representative from local government based on nature of complaints directly relevant to the Local Government, and (iii) representative of Contractor(s). The project environmental safeguard consultant, who will be engaged during construction stage, will act as the secretary of the GRC.

The GRC will be responsible in resolving complaints submitted against the project, meet once a month to review complaints received by the PMUs (if any), maintain a record of complaints received and resolved, and advise the complainant on the decision made.

Complaint can be lodged either in writing or by phone. Transparency will be maintained on the grievances received and their resolution. Affected persons can seek redress to their complaints in three levels: (i) through the project implementing unit (PIU) or through the site engineer of the Contractor, (ii) through the GRC, and (iii) the NEC Secretariat or the appropriate courts of law. Resolution of complaints at the 1st level will be done in 7 days, at the 2nd level for 10 days and in the 3rd level will depend on processing at NEC or courts of law. The complainant is not restricted to seek redress through the legal system at any point in the GRM process.

A record of all complaints received including contact details of the complainant, date the complaint was received, nature of grievance, decisions and date, and date the complainant was informed of the decision will be maintained by the GRC through the PMU Head-Project Director. Grievances filed and resolved will be summarized and included in the semi-annual monitoring reports submitted to ADB. The PMUs will disclose details of GRM through their websites as well as in the billboards at the construction sites. Details will include the contact person, a hotline phone number, and a simplified flowchart on how to file a complaint.

Environmental Management Plan

Potential environmental impacts are mainly during construction phase. An environmental management plan (EMP) and environmental monitoring plan (EMoP) were prepared each for MOLHR and MOE for the potential impacts identified (**Table 9.1** to **Table 9.4**). Environmental monitoring reports will be submitted by the PMUs to ADB semi-annually during construction and annually post-construction once the grant becomes effective. These monitoring reports will be posted in the ADB website as required by SPS 2009 and the Public Communications Policy (PCP) 2011.

There is lack of technical capability in the MOLHR and MOE on environmental safeguard. An environmental safeguard consultant will be engaged intermittently for 4-person months during construction phase to provide technical support to the PMUs in meeting the requirements of ADB and to ensure that environmental requirements of the government are complied with.

Conclusion and Recommendation

STEP UP is category B on environment according to SPS 2009 requiring the preparation of IEE. Following the requirements of SPS 2009, an IEE was prepared. This draft IEE will be disclosed in the ADB website in accordance with SPS 2009 and PCP 2011. Prior to construction works, all the relevant permits required for the STEP UP will be obtained by MOLHR and MOE. A copy of the relevant permits obtained for the project will be included in the environmental monitoring report submitted to ADB semi-annually during construction phase and annually post-construction phase.

Selection of sites, where appropriate, considered environmental factors such as presence of river which may pose hazard risks. The potential environmental impacts of STEP UP are mainly during the construction phase which are temporary, of short duration and can be easily mitigated through the implementation of the EMP and EMoP, and compliance of the Contractor to the approved building design and relevant regulations on building construction, occupational and environmental health and safety.

An EMP and EMoP were prepared where implementation and compliance by the Contractor will be monitored by the PIUs and PMUs of MOLHR and the MOE. Design of the new buildings and construction will be undertaken and supervised by a Design and Supervision Consultant to be engaged during implementation.

Stakeholders and relevant agencies of the government were consulted during the preparation of IEE. A GRM will be set up by the PMUs of MOLHR and MOE consistent with the requirements of SPS 2009. A project brief in English and in *Dzongkha* with details on the GRM will be made available at the construction sites and the offices of the MOE and MOLHR. Public consultations will continue in varying degrees throughout the project implementation.

ADB will monitor implementation through project review and environmental monitoring reports to be submitted by MOE and MOLHR. The environmental monitoring reports will be publicly disclosed in the ADB website as required by SPS 2009 and PCP 2011.

I. INTRODUCTION

1. Recognizing that the Technical and Vocational Education and Training (TVET) is one of the key dimensions that will contribute to the greater socioeconomic development of Bhutan, the Government of Bhutan has launched the TVET Blueprint 2016-2026 in June 2016. The TVET Blueprint was developed by the Ministry of Labour and Human Resources (MOLHR) through a technical assistance from the Asian Development Bank (ADB).

2. [1] This Blueprint presents the long-term strategic vision that will guide and influence reforms and development in TVET over the next 10 years from 2016 to 2026.

3. According to the Labor Report Survey of MOLHR in 2015, youth unemployment is high and increasing at 10.7% in 2015 compared to 7.3% in 2012 which is four times the national average unemployment of 2.5%.[2] The report indicated that contributors to high educated unemployment are preference for academic study and inadequate availability and awareness of opportunities for skills development. Survey results also showed that youth appears to prefer public sector and white collar jobs which are limited. Thus, there is a need to re-balance the education and training system that will strengthen skills development to ensure the required human capital in Bhutan.

4. Also, the Bhutan Education Blueprint 2014-2024 indicates that, "technical/vocational education is typically viewed as 'second-class education' and therefore fails to attract student to take up technical courses".[3] It was also recognized that there is limited access to these kinds of programmes even with the growing demand for technical skills. Hence, it was recommended to enhance access to basic, higher secondary, and technical/vocational education. One of the identified game changing initiatives is to introduce pre-vocational orientation to grade VII and VIII students, and technical/vocational courses as elective subjects to grade IX to XII students to equip them with technical/vocational skills, entrepreneurial skills and promote dignity of labour.

5. The success of these initiatives is contingent to the availability of strong financial support. ADB has been instrumental in providing the needed support by the government in developing the TVET Blueprint. Consistent with this, ADB will provide assistance on skills development to improve access and enhance youth employability.

1.1 Overview of the Project

6. The Project will have four outputs given in **Table 1.1** whose main objective is to improve skills needed to increase the chances of TVET graduates to get employment. Total financing support from ADB will be $15 million (see **Table 1.2**). A summary of cost estimates is shown in **Table 1.3**.

Table 1.1 Project Outputs

Project Component	Description	Executing Agency
Output 1: Access to skills development increased	(i) a new flagship TTI in a new campus in Thimphu with modern facilities, and new classrooms, workshops, and dormitories in Samthang TTI; (ii) provision of modern and	Ministry of Labour and Human Resources (MOLHR)

[1] ADB. 2014. *Kingdom of Bhutan: Institutional Strengthening for Skills Development (Financed by the Japan Fund for Poverty Reduction)*. Manila (TA 8712).
[2] Government of Bhutan. Ministry of Labour and Human Resources. *Labour Force Survey Report 2015.*
[3] Ministry of Education. Bhutan Education Blueprint 2014-2024. Rethinking Education.

Project Component	Description	Executing Agency
	advanced technology equipment and tools in all the TTIs; and (iii) the introduction of at least six new courses at middle and advanced (diploma) level and in diversified disciplines	
Output 2: Quality and relevance of skills development enhanced	(i) to improve training of trainer programs with workplace experience to at least 60% of trainers in TTIs; (ii) a private sector partnership for skills delivery in emerging occupations benefiting about 800 students (35% female); and (iii) to provide e-resources in TTIs to develop future-ready skills in graduates.	MOLHR
Output 3: Vocational orientation of secondary school students improved	(i) a pilot TVE elective subjects for grades 9-12 in seven schools linked to TTIs, and to strengthen the vocational clubs for grades 7–8; (ii) to enable career guidance with exposure to the world of work to secondary students; and (iii) offer ICT-enriched teaching and learning to improve foundational skills critical for increasing employability	Ministry of Education (MOE)
Output 4: Governance and institutional capacity for TVET improved	(i) to operationalize an online TVET management information system (MIS) and employment services portal; and (ii) to facilitate international partnership in at least one TTI.	MOLHR

7. **Implementation arrangements and schedule** The EAs will be the MOLHR and MOE. A PMU will be set up each at MOLHR and MOE responsible for the day-to-day management, monitoring, and coordination during implementation. PMU in MOLHR will be DTE and the DSE for MOE. Under the PMUs will be PIUs consisting of the DoEHR, DOS, and RITH for MOLHR while in the MOE, it will be the DYS, REC, and SPBD. A Project Steering Committee (PSC) will be established to provide guidance and direction to the EAs, monitor and review the overall progress and results of project implementation. PSC will be Chaired by Secretary, MOLHR and Co-Chaired by the Secretary, MOE with members from representatives of relevant agencies. An Environmental Safeguard consultant will be engaged intermittently until the completion of construction phase to provide technical support on compliance to environmental requirements of the government and ADB such as environmental clearance, relevant permits, and environmental reporting to ADB. STEP UP is expected to begin in November 2018 until October 2023.

Table 1.2 Estimated Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank		
Special Funds resources (Asian Development Fund grant)	15.0	83.3
Government	3.0	16.7
Total	**18.0**	**100.0**

Source: Asian Development Bank estimates.

Table 1.3 Summary of Cost Estimates

Item	Amount ($ million)[a]
A. Base Cost[b]	
Output 1: Access to skills development increased	9.60
Output 2: Quality of TVET enhanced	2.62

Item	Amount ($ million)[a]
Output 3: Orientation of secondary education to the world of work improved	2.69
Output 4: Governance and institutional capacity for TVET improved	0.86
Subtotal (A)	**15.77**
B. Contingencies[c]	**2.23**
Total (A+B)	**18.0**

[a] Excludes taxes and duties. The gvernment will seek exemption from the levy of taxes and duties on goods and works to be procured in the project. Any residual taxes and duties not exempted will be financed by the government in the form of cash contribution.
[b] In April 2018 prices
[c] Physical and price contingencies computed at 10% for civil works and equipment. Price contingencies computed at an average of 1.5–2% on foreign exchange costs and 2.5-3% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.
Source: Asian Development Bank and the Government of Bhutan.

1.2 The Need for Environmental Assessment

1.2.1 ADB requirements

8. The Safeguard Policy Statement (SPS) 2009 sets out the requirements for environmental safeguard that applies to all ADB-financed projects and grants.[4] Under SPS 2009, projects or grants are screened and categorized based on their potential environmental impacts. This project is category B on environment requiring the preparation of an initial environmental examination (IEE). Based on the requirements of SPS 2009, this draft IEE is prepared and will be publicly disclosed to ADB website. Disclosure of IEE is also required by the Public Communications Policy (PCP) 2011.

1.2.2 National requirements

9. The environmental assessment of projects is based on the Environmental Assessment Act of 2000, the National Environmental Protection Act (NEPA) of 2007, and the Regulation for Environmental Clearance of Projects 2016. The National Environment Commission (NEC) is the highest decision-making body on all aspects relating to the environment and its management. NEC has jurisdiction and powers conferred by NEPA 2007. Policies and regulations formulated by NEC are implemented by the NEC Secretariat (NECS). NECS decentralized the environmental management by designating any ministries, organizations or committees as the Competent Authority (CA) to carry out its functions. At the Dzongkhag (district) level, the *Dzongkhag* Environment Committee (DEC) is designated as CA and the Environment Committee at the Thromde level.

10. The physical infrastructures in the STEP UP are included in the *List of Activities that the Competent Authorities shall Screen and Issue Environmental Clearance and List of activities not requiring Environmental Clearance2016* issued by the NECS. Specifically, the Thimphu Thromde and the DECs in Wangdue Phodrang, Punakha, Bumthang, Trashigang, and Trashiyangtse will issue the environmental clearance (EC). According to the Thimphu Structure Plan 2002-2027 and Development Control Regulations 2016, the new Thimphu TTI in Serbithang is consistent with the approved land use of the Serbithang Local Area Plan, thus, no EC will be required. The

[4] Asian Development Bank Safeguard Policy Statement (SPS 2009), http://www.adb.org/documents/safeguard-policy-statement.

new TVE lab in Babesa Middle Secondary School is also under the Thimphu Thromde. The requirements for EC of the additional new buildings in Samthang TTI and the remaining 12 new TVE labs for secondary schools will be subject to the screening of the DEC in the *dzongkhag* where they will be located.

1.2.3 Objectives of the IEE

11. The objectives of conducting the IEE are as follows:

(i) to assess the potential environmental impacts of the proposed project
(ii) to identify the mitigation and/or enhancement measures corresponding to the environmental impacts;
(iii) to describe the environmental management and monitoring plan to be implemented and complied; and,
(iv) to ensure that all the statutory regulatory requirements relevant to the project have been identified and considered to ensure compliance.

1.2.4 Scope and Methodology

12. The scope of the IEE covers the general existing environmental profile of the sites where interventions will be located, assessment of potential environmental impacts within the project's area of influence during design and/or pre-construction, construction, and operation (or post-construction) stages; and a description of the environmental management plan (EMP) and environmental monitoring plan (EMoP). The IEE followed a number of steps:

(i) Conduct field visits to collect secondary data relevant to the project area to establish the baseline environmental condition;
(ii) Assess the potential impacts on environmental attributes due to location, design, construction and operation of the Project through field investigations and data analysis;
(iii) Explore opportunities for environmental enhancement and identify measures;
(iv) Prepare an EMP outlining the measures for mitigating the impacts identified including the institutional arrangements;
(v) Identify critical environmental parameters required to be monitored during project implementation and prepare an EMoP;
(vi) Compare the environmental safeguard requirements of the government and ADB, and identify the gaps and measures to bridge the gap, if any;
(vii) Carry out consultation with affected stakeholders, local administrative bodies to identify perception of the project, introduce project components and anticipated impacts; and,
(viii) Disclose the draft IEE at ADB website and prepare project brief and/or FAQs in Dzongka to be made publicly available at the offices of MOE and MOLHR and at the construction sites.

13. Field visits were done between August 2017 to February 2018 intermittently to conduct ocular inspection, collect secondary data, conduct consultations, and coordinate with relevant agencies of the government such as Thimphu Thromde, MOE, NEC, and MOLHR.

II. POLICY, LEGAL, AND ADMINISTRATIVE FRAMEWORK

14. The following presents the regulatory agency, process, regulations and international environmental agreements relevant to the project.

2.1 Environmental requirements of the Government of Bhutan

2.1.1 National environmental agency

15. The National Environment Commission (NEC) is an independent authority and the highest decision-making body on all aspects relating to the environment and its management. NEC has the jurisdiction and powers, and discharges the functions and duties conferred or imposed by or under the National Environmental Protection Act (NEPA) 2007. Policies and regulations formulated by NEC are implemented by the NEC Secretariat (NECS).

16. Following Section 30(b) of NEPA 2007, NEC has the authority to designate any ministries, organizations, agencies or committees as the competent authority (CA) to carry out its functions. As a result, the Department of Forests and Park Services which is under the Ministry of Agriculture and Forests is key in protecting forests and wildlife and in managing protected areas. Monitoring of glacial lakes related to glacial lake outburst flood (GLOF) risks becomes the responsibility of the Department of Geology and Mines (DGM), Ministry of Economic Affairs while the Department of Disaster Management (DDM) of the Ministry of Home and Cultural Affairs is the lead agency for facilitating the coordination in the event of disasters and emergency.

2.1.2 Competent Authority at the Dzongkhag Level

17. Under Article 33.1 of the Environmental Assessment Act (EAA) 2000, NEC is empowered to adopt a list of projects in which the CA can screen and issue the environmental clearance (EC). With the enactment of EAA 2000, NEC adopted a Regulation for the Environmental Clearance of Projects (RECOP) in 2002 (now 2016). The list of projects is an integral part of RECOP and is known as, *List of Activities that the Competent Authorities shall Screen and Issue Environmental Clearance and List of activities not requiring Environmental Clearance 2016.* The purpose of having the list is to properly streamline the approval process and avoid unnecessary delays. The Dzongkhag Environment Committee (DEC) is designated as CA at Dzongkhag Level according to Section 43 with powers and duties set forth in Section 47(a) of NEPA 2007. Generally, members of the DEC include the following:

Dasho Dzongdag	Chairperson
Planning Officer	Member
Dzongkhag Engineer	Member
Dzongkhag Agriculture Officer	Member
Dzongkhag Forestry Officer	Member
Land Record Officer	Member
Environment Officer	Member Secretary

18. Duties and responsibilities of the DEC include: (i) issuance of environmental clearance (EC) for projects listed under the competence of Dzongkhag according to EAA 2000 and its regulations (i.e, RECOP 2016), (ii) review of non-listed projects prior to forwarding to NECS or any other relevant competent authority, (iii) compliance monitoring of the conditions provided for in the EC and takes necessary action for non-compliance, (iv) Collect and forward environmental information on a regular basis to NECS, and (v) monitoring of environmental quality.

2.1.3 Environment Committee at the Thromde Level

19. The Thimphu Thromde has a separate Environment Division responsible for issuing permit such as tree felling, waste dumping, and EC on projects or activities (e.g., Construction of community, primary, lower, middle & higher secondary schools (private or government). Chapter 6 of the Standard Operating Procedure of Thimphu Thromde 2016 provides guidance on securing permits for projects under their jurisdiction that do not require the approval of NECS.[5]

2.1.4 Applicable environmental regulations

20. The policy, legal, and administrative frameworks relevant to the environmental assessment of projects are established according to the following regulations: (i) the Environmental Assessment Act (EAA) of 2000, (ii) the National Environmental Protection Act (NEPA) of 2007, and (iii) Regulation for Environmental Clearance of Projects (RECOP) 2016. Aside from these, Constitution of Bhutan 2008 mandates for the environmental protection and conservation in order to (i) protect, conserve, and improve the pristine environment; (ii) safeguard biodiversity; and, (iii) prevent pollution and ecological degradation.

21. The EAA 2000 establishes the procedures for the assessment and reduction of potential effects of strategic plans, policies, and projects on the environment. As provided for in Section 8 of EAA 2000, the issuance of an EC shall be prerequisite to the issuance of development consent. Under the Act, 'development consent' is defined as the approval issued or renewed by a CA in the form of license, lease or permit for land use or construction. Chapter III of EAA 2000 (Environmental Assessment Process) describes the requirements and procedures in securing the EC. Section 9 of the Act provides that a project of the government which does not require development consent may commence only after receiving an EC from the NECS. The EC sets out environmental terms for the project. When a development consent is required, EC shall be attached to and be an integral part of it.

22. The NEC is the lead agency responsible for adopting regulations under EAA 2000, deciding on the issuance of EC, monitoring compliance and violations, and reporting on enforcement. CAs are also given the responsibility for screening, issuing or denying EC on the activities or project in the List of Activities that the Competent Authorities shall Screen and Issue Environmental Clearance and List of activities not requiring Environmental Clearance 2016.

23. The National Environment Protection Act (NEPA) of 2007 strengthens the implementation of EAA 2000 and RECOP 2002 (now 2016) regulations by setting out standards for environmental protection for compliance with the project. It has 10 Chapters. Under Chapter II, it sets out environmental principles, fundamental rights and duty, precautionary principles, principles of 3Rs, polluter pay principle, right to information and, access to justice which applies to the project. Amongst others, NEPA authorizes the government to establish environment tribunal to hear environmental disputes beyond the authority of NECS on disputes. The environment tribunal is a quasi-judicial authority with the power to hear, take evidence, investigate, issue summons, request information and pass its decision. Chapter IV sets out environmental standards; protection of forests, biodiversity and integrity (Chapter V); environmental financing and incentives (Chapter VI); right to environmental information and citizen's participation (Chapter VII), procedures for inspection and verification (Chapter VIII); enforcement, offenses and penalties (Chapter IX) relevant to the project's activities.

[5] www.thimphucity.bt/index.php/standard-operating-procedure-sop/

24. **Requirements for environmental clearance** Due to the type and nature of interventions proposed under the project, the environmental requirements and compliance fall within the jurisdiction of the Competent Authority specifically, the Thimphu Thromde and the DECs in Wangdue Phodrang, Punakha, Bumthang, Trashigang, and Trashiyangtse.

25. According to the Thimphu Structure Plan 2002-2027 and DCR 2016, the new Thimphu TTI is in conformity with the approved land use of Serbithang LAP, thus, no EC will be required.[6] However, for construction of additional new buildings in Samthang TTI in Wangdue Phodrang, EC requirement or exemption will be subject to the screening of the Dzongkhag Environment Committee in Wangdue Phodrang. **Table 2.1** presents regulatory compliance and **Table 2.2** presents the relevant national environmental regulations, and other laws.

Table 2.1 Relevant regulatory compliance

Government Agency	Clearance/Permit	Yes/No	Comments
Thimphu Thromde, Development Control Division	Building application	Yes	Thimphu TTI considered major construction
	Green Channel	Yes	For Babesa MSS new TVE laboratory
	Construction Permit/Inspection Permit	Yes	Required for Thimphu TTI and Babesa MSS based on DCR 2016
Environment Section Thimphu Thromde	Environmental clearance	No	Thimphu TTI and Babesa MSS interventions are in conformity with Thimphu Structure Plan 2002-2027, Serbithang Local Area Plan
	Demolition Permit	Yes	There are three existing structures at the Thimphu TTI site in Serbithang. Two structures may be demolished.
	Tree felling	Yes	There are some trees in the Thimphu TTI site Tree plantation: one tree for every 100 m^2 of land shall have to be undertaken and maintained in all sites
National Environment Commission	Environmental clearance	No	Based on RECOP 2016, Thimphu Thromde is the CA for Thimphu TTI and Babesa MSS; and DEC of *dzongkhag*s where intervention is located (Wangdue Phodrang, Punakha, Rangjung, etc.)
Dzongkhag Environment Committee, Wangdue Phodrang	Environmental clearance	Yes	Construction of additional new buildings for Samthang TTI is within Wangdue Phodrang
	No objection clearance or	Yes	Construction for TVE laboratory – Bajothang HSS

[6] www.thimphucity.bt/wp-content/uploads/2017/04/DCR%20%202016.pdf and www.thimphucity.bt/wp-content/uploads/TSP/Thimphu-Structure-Plan-2002-2027.pdf.

Government Agency	Clearance/Permit	Yes/No	Comments
	Environmental Clearance		
Dzongkhag Environment Committee (Punakha, Bumthang, Trashigang, Trashiyangtse)	No objection clearance or Environmental Clearance	Yes	Construction of TVE labs within the existing secondary schools
	Tree felling permit or No objection clearance	Yes	Construction of TVE labs within the existing secondary schools
Dzongkhag Engineering Sector, Wangdue Phodrang	Construction Permit/Approval	Yes	• Permit obtained on 2 July 2012 for two units of hostel for Samthang TTI • Given the time elapsed, needs to reconfirm if permit still valid. • Construction of TVE laboratory in Bajothang HSS
Dzongkhag Engineeing Sector (Punakha, Bumthang, Trashigang, Trashiyangtse)	Construction Permit/Approval	Yes	Construction of TVE labs in existing secondary schools

Table 2.2 National environmental regulations, and other laws

Regulation	Brief Description	Remarks
Environmental assessment		
Environmental Assessment Act 2000	Establishes procedures for the assessment of potential environmental impacts and aims to determine the measures to avoid, mitigate, reduce the adverse impacts, and promote environmental benefits of projects, plans, and policies.	Project is subject to this Act as construction of new TTI, hostels, workshops, and TVE labs will incur environmental impacts.
Regulation for The Environmental Clearance of Projects (RECOP) 2016	Describes the responsibilities and procedures for the implementation of Environmental Assessment Act 2000 in relation to the issuance and enforcement of environmental clearances at the project level. It defines specific activities of projects where competent authorities can issue an environmental clearance (EC) and those requiring NEC evaluation and approval of EC.	Project will adhere to the required elements in the RECOP
National Environment Protection Act 2007	Provides an effective system of conserving and protecting the environment and established the NEC and other designated Competent Authorities and advisory committees responsible for independently regulating and promoting sustainable development.	Project will ensure compliance to the requirements embodied in the Act

Regulation	Brief Description	Remarks
Occupational Health and Safety		
Bhutan Constitution 2008	The following are relevant provisions on protection of workers: • Article 5 (2.d) ensures a safe and healthy environment. • Article 9 (12) endeavors to ensure the right to work, vocational guidance and training and just and favorable conditions of work. • Article 9 (13) endeavors to ensure the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay. • Article 9 (14) ensures the right to fair and reasonable remuneration for one's work. • Article 9 (17) takes appropriate measures to eliminate all forms of discrimination and exploitation against women including trafficking, prostitution, abuse, violence, harassment and intimidation at work in both public and private spheres. • Article 9 (18) takes appropriate measures to ensure that children are protected against all forms of discrimination and exploitation including trafficking, prostitution, abuse, violence, degrading treatment and economic exploitation. • Article 9 (22) provides security in the event of sickness and disability or lack of adequate means of livelihood beyond one's means of control.	These provisions on workers' occupational health and safety will be complied by the project.
Labour and Employment Act (LEA) 2007	Provides for the regulation of employment and working conditions, including occupational health and safety, labour protection and relations as well as setting of occupational standards and certification. The Act aims to improve employees' work environment and working conditions to safeguard and keep work ability, prevent occupational accidents, diseases, and other physical or mental problems related to work.	Executing agencies (EAs) will ensure that Contractor(s) comply with the relevant provisions of this Act
Regulations on Occupational Health, Safety and Welfare, March 2012	Prescribes standards and procedures on occupational health, safety and welfare for workplaces, instruments, vessels, appliances, apparatuses,	The PMU of MOLHR and MOE will monitor compliance of the Contractor(s) in providing for safe and healthy working

Regulation	Brief Description	Remarks
(supersedes the General Rules and Regulations on Occupational Health and Safety in Construction, Manufacturing, Mining and Service Industries 2006)	tools, devices, electrical safety and other hazardous conditions. It aims to ensure safety, health and welfare for employees as well as other persons at workplaces from work-related risks to their health, safety and wellbeing	conditions during construction of the buildings.
Regulations on Working Conditions 2012 (first edition in 2009)	Under the MOLHR, these are 15 regulations which provide for the employment conditions required to implement the provisions of the LEA 2007 effectively. The 15 Regulations cover issues such as recruitment and management of foreign workers, child labor, hours of work, grievance procedure, sexual harassment, workers' compensation, etc.	Contractors will be required to strictly comply with the relevant provisions identified in the regulations. The PMU of MOLHR and the MOE will monitor compliance.
Regulations on Occupational Health and Safety for Construction Industry 2012 (supersedes 2009)	These regulations set the occupational health and safety standards, and procedures on construction safety. It aims to ensure safety and health for employees, as well as other persons at the construction sites, from work related risks to their health, safety, and wellbeing. It also prescribes the roles and responsibilities of the workers and employers in ensuring health and safety at the site.	Contractor(s) will be required to provide workers with safe and healthy working conditions during construction. Workers will be provided with safety and protection equipment, where needed. PMU of MOLHR and the MOE will monitor compliance of the Contractor(s).
Road Safety and Transport Act 1999	Provides for safe and efficient use of road systems and to ensure an efficient and a safe public transport system. Describes the duties of the drivers related to traffic safety signs and safety procedures to prevent and minimize transport accidents.	Contractor(s) will be required to comply with the relevant provisions of this Act to prevent accidents in the construction sites. EAs will monitor compliance.
Disaster Management Act of Bhutan 2013	Establishes and strengthens institutional capacity for disaster management in institutions, mainstreaming of disaster risks reductions in policies and plans, and integrates and coordinates disaster management activities and how to respond to emergencies.	Project will ensure that relevant provisions in this Act will be complied during construction and post-construction. Contractor(s) will be required to have a contingency plan in the event of emergency or disaster during construction. Administration of TTIs and secondary schools will ensure compliance to this Act.
Bhutan Environmental Standards 2010, and Drinking Water Quality Standards 2016	Sets minimum standards for i) ambient water quality, ii) industrial effluent discharge standards, iii) standard for sewerage effluents, iv) ambient air quality, v) industrial emission standards, vi) workplace emission standards, vii) vehicle emission standards and, viii) noise level limits.	Applicable environmental standards for the project are ambient air and water quality, workplace emissions, noise level limits, and drinking water quality. EAs will ensure compliance of Contractor(s) to applicable environmental standards during construction.

Regulation	Brief Description	Remarks
Waste Management		
Waste Prevention and Management Act of Bhutan 2009	Institutional framework on waste management to reduce generation at source, promotes segregation, reuse, and recycling, storage, transportation, environmentally-sound treatment and disposal of waste, and monitoring procedures and coordination at every organizational level	Waste minimization will be pursued in every opportunity. Waste generated by the project will be disposed of properly.
Waste Prevention and Management Regulation 2012 (amended 2016)	This regulation establishes procedures and requirements to implement the Waste Prevention and Management Act 2009.	All the relevant regulations will be complied with
Water		
Water Act of Bhutan 2011	Ensures that water resources are protected, conserved, and/or managed in an economically efficient, socially equitable, and environmentally sustainable manner.	EAs will ensure that Contractor(s) will comply with this Act.
Water Regulation of Bhutan 2014	Promulgated to enforce the objectives and purposes of the Water Act 2011, effectively implement and enforce the Water Act by the Competent Authorities; and identify roles and responsibilities of designated Competent Authorities and other relevant organizations.	Project will comply with relevant requirements
Forestry and Biodiversity		
The Forest Act 1969	Provides for all forest resources under government custody to regulate utilization.	Project is not located in forest area but some sites like the new Thimphu TTI has some trees that will be cleared.
Forest and Nature Conservation Rules 2000 (revised 2006, 2017)	Provides rules for project activities that involve clearing and felling of trees, blasting, etc. It also define activities that are prohibited in forested areas, outlines procedures for sourcing sand and gravel, peat, stone, and surface soil from forested areas.	Will secure clearance prior to clearing of few trees in some sites.
Forest and Nature Conservation Act 1995	Allows community stewardship of forests and aims to provide protection and sustainable use of forests, wildlife, and related natural resources. Describes activities that require special permits from the Department of Forests and Park Services as well as other activities such as forest clearing and cutting of trees, hunting and polluting which are not allowed in Government Reserved Forests. All wild animals whether enlisted under Schedule I (totally protected species) or not, cannot be killed, injured, captured or collected unless under special	Only Thimphu TTI is located in a new site but not in forested area. Other new buildings funded by STEP UP are located within the existing premises of the institute and secondary schools.

Regulation	Brief Description	Remarks
	conditions of self-protection and other genuine reasons.	
Biodiversity Act 2003	Sets forth national sovereignty over genetic resources; ensures conservation and sustainable use of biochemical and genetic resources; promotes equitable sharing of benefits derived from genetic resources; promotes technology transfer and capacity building; recognizes and protects traditional knowledge, innovation, and practices of local communities associated with biodiversity; regulates the collection of genetic resources and prevents illegal access; recognizes and protects farmers' and breeders' rights; and regulates plant variety and property rights and use.	Project is not located in ecologically-sensitive areas such as forest but will comply with the relevant provisions in this Act.
Others		
Local Government Act 2009	Provides for activities to be undertaken that are consistent with other relevant laws and policies of the country which are formulated to conserve the environment within its jurisdiction, to reduce public health impacts, and to improve socioeconomic development.	The project is subject to this Act in a way as the responsibility to monitor implementation from design to operation has been decentralized to the local level.
Bhutan Building Rules (BBR) 2017	Set of rules to facilitate and regulate a functional and safe building construction, promote a healthy living environment, encourage professional approach to building design and construction, preserve and promote traditional architecture, and to promote awareness on basic minimum design standards and procedures.	Design and construction of the new Thimphu TTI, additional buildings in Samthang TTI, and TVE laboratories for secondary schools will adhere to the rules and standards provided for in this regulation such as safety from fire, wind, electrical, etc.
Thimphu Thromde Development Control Regulations (DCR) 2016	This is the second document tailor-made for the capital and supersedes the BBR 2002 and the Development Control Regulations 2004 in Thimphu. Based on this, wherever a local area plan (LAP) has been notified, its specific regulations, if any, shall be applicable within that local area alone.	Relevant provisions in the Serbithang LAP will be complied by the design and construction of the Thimphu TTI.

Source: ADB Consultant, January 2018

2.1.5 Applicable environmental standards

26. The National Environment Commission has issued environmental standards in November 2010 and the succeeding tables **(Table 2.3)** list the applicable standards to the project to meet national regulations. SPS 2009 of ADB provides that during construction, the Government will apply pollution prevention and practices that are in line with international good practice as given

by international standards such as the IFC-WB EHS General Guidelines 2007. In addition, should the regulations of the Government differ from the levels and measures set by the IFC-WB EHS General Guidelines 2007, the Government will achieve whichever is more stringent. The relevant standards from IFC-WB EHS General Guidelines 2007 are given in **Table 2.4**.

Table 2.3 Environmental Standards 2010

Parameter	Averaging time	Unit of measure	Maximum permissible limit)	
			Mixed area	Sensitive area
A. Ambient air quality				
Total suspended particulates (TSP)	24-hour average	µg/m^3	200	100
	Annual average		140	70
Particulate matter 10 micrometers or less in diameter (PM_{10})	24-hour average	µg/m^3	100	75
	Annual average		60	50
Sulfur dioxide (SO_2)	24-hour average	µg/m^3	80	30
	Annual average		60	15
Nitrogen oxides (NO_x)	24-hour average	µg/m^3	80	30
	Annual average		60	15
Carbon monoxide (CO)	8-hour average	µg/m^3	2,000	1,000
	1-hour average		4,000	2,000

B. Workplace emissions for 8-hour average			
Parameter	**Unit of measure**	**Standard**	
Total suspended particulates	mg/m^3	10	
Respirable particulate matter	mg/m^3	5	
SO_2	mg/m^3	1	
NO_x	mg/m^3	1	
CO	mg/m^3	5	
C. Noise level limits			
		Mixed area	Sensitive area
Daytime	6:00AM until 10:00PM	65 dB(A)	55 dB(A)
Nighttime	10:00PM until 6:00AM	55 dB(A)	45 dB(A)
Maximum workplace noise level	-	75 dB(A)	

A mixed area land use is where residential, commercial or both activities take place; sensitive area is where sensitive targets are in place like hospitals, schools, sensitive ecosystems

Drinking water quality standards, 2016

No.	Parameter	Unit	Maximum permissible Limit
Physical Parameters (Urban)			
1	Colour (TCU)	Hazens Unit	15
2	Odour	-	non-objectionable
3	pH	-	Acceptable range 6.5 – 8.5
4	Taste	-	non-objectionable
5	Turbidity	NTU	5
General Chemical Parameters causing undesirable effect (Urban)			
1	Calcium	mg/L	No permissible limit but recommended < 75
2	Free Residual Chlorine*	mg/L	Target range 0.2 – 0.5
3	Iron	mg/L	No permissible limit but recommended < 0.3

No.	Parameter	Unit	Maximum permissible Limit
4	Manganese	mg/L	0.4* Maximum permissible limit
5	Sulphate	mg/L	No permissible limit but recommended < 250
Chemical Parameters of health concern (Urban)			
1	Fluoride (to be tested for ground and spring water only)	mg/L	1.5
2	Nitrates	mg/L	50
3	Arsenic	mg/L	0.01
4	Lead	mg/L	0.01
5	Mercury	mg/L	0.006
Microbiological Parameters (Urban)			
1	*E.Coli*	CFU/100ml sample	0

* Chlorine residual must be maintained throughout the distribution system

Table 2.4 Relevant IFC-WB EHS General Guidelines 2007

Ambient air quality		
Parameter	Averaging Period	Guideline value in µg/m^3
Sulfur dioxide (SO_2)	24-hour	20
	10 minute	500
Nitrogen dioxide (NO_2)	1-year	40
	1-hour	200
Particulate matter (PM_{10})	1-year	20
	24-hour	50
Particulate matter ($PM_{2.5}$)	1-year	10
	24-hour	25
Noise level guidelines (one-hour L_{Aeq} (dBA)		
Receptor	Daytime (0700-2200)	Nighttime (2200-0700)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

2.1.6 Relevant International Environmental Agreements

27. Aside from the national environmental regulations, international environmental agreements where Bhutan is a party will be referred to, as appropriate, as additional guidance during construction phase. **Table 2.4** lists applicable international environmental agreements that can provide guidance during project implementation.

Table 2.4 Relevant international environmental agreements

International Environmental Agreement	Description	Date Ratified	Date Entered into Force	Comments
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	Defines and provides for the conservation of world`s heritage by listing the natural and cultural sites whose value should be preserved.	22 October 2001	—	A “chance find” procedure is included as Annex 1.

International Environmental Agreement	Description	Date Ratified	Date Entered into Force	Comments
Convention on Biological Diversity (1992)	A framework for biodiversity and requires signatories to develop national strategies (National Biodiversity Strategy and Action Plan) for the conservation and sustainable use of biological diversity.	20 August 1995	23 November 1995	Construction of new Thimphu TTI and additional new buildings for Samthang TTI will comply with the requirements of this convention. Construction of the new 13 TVE laboratories will be within the existing secondary schools.
Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington 1973) – also known as CITES	Addresses the exploitation patterns and overharvesting that threaten species of flora and fauna. Under this Convention, the government agree to restrict or regulate trade in species that are threatened by unsustainable patterns and to protect certain endangered species from overexploitation by means of a system of import/export permits.	15 August 2002 (accession)	13 November 2002	Construction of new Thimphu TTI and additional new buildings for Samthang TTI will comply with the requirements of this convention. Construction of the new 13 TVE laboratories will be within the existing secondary schools.
Vienna Convention for the Protection of the Ozone Layer	A framework for efforts to protect the globe's ozone layer by means of systematic observations, research and information exchange on the effects of human activities on the ozone layer and to adopt legislative or administrative measures against activities likely to have adverse effects on the ozone layer.	23 August 2004 (accession)	—	Interventions will comply with the requirements of this convention, where appropriate.
Kyoto Protocol (1997)	Commits its Parties to set internationally-binding emission reduction targets. This agreement is	26 August 2002	16 February 2005	Contractor(s) will be required by the PMUs to ensure their construction vehicles are properly maintained.

International Environmental Agreement	Description	Date Ratified	Date Entered into Force	Comments
	linked to the United Nations Framework Convention on Climate Change (UNFCCC).			
UNFCCC (1992)	Aims to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level low enough to prevent dangerous anthropogenic interference with the climate system.	25 August 1995	23 November 1995	Contractor(s) will be required by the PMUs to ensure their construction vehicles are properly maintained. Spot checking of smoke belchers will be conducted during construction.
Paris Agreement	Aims to strengthen the ability to deal with the impacts of climate change and through "nationally determined contributions" which requires regularly reporting of emissions and implementation efforts.	19 September 2017	19 October 2017	Contractor(s) will be required by the PMUs to ensure their construction vehicles are properly maintained. Spot checking of smoke belchers will be conducted during construction.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	Aims to reduce the amount of waste produced by signatories and regulate the international traffic in hazardous wastes.	26 August 2002 (accession)	24 November 2002	A waste management plan/protocol will be included in the Construction Management Plan.

Source: ADB Consultant, January 2018

2.2 Environmental requirements of ADB

28. The Safeguard Policy Statement (SPS) 2009 of ADB sets out the requirements for environmental safeguard that applies to all ADB-financed and grant projects.

29. SPS 2009 consists of three key safeguard areas, (i) environment, (ii) involuntary resettlement, and (iii) indigenous peoples; aims to avoid adverse project impacts to both the environment and the affected people; minimize, mitigate and/or compensate for adverse project impacts; and help Borrowers to strengthen their safeguard systems and to develop their capacity in managing the environmental and social risks.

30. During the project identification stage, ADB uses a categorization system to indicate the significance of potential environmental impacts and is determined by the category of its most environmentally-sensitive component, including direct, indirect, cumulative, and induced impacts within the project's area of influence. The project categorization system and the assessment required is described in **Table 2.5**.

Table 2.5 SPS 2009 environmental categorization

Category	Definition	Assessment Requirement
A	Likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented, and may affect an area larger than the sites or facilities subject to physical works.	Environmental impact assessment (EIA)
B	Likely to have adverse environmental impacts that are less adverse than those of Category A. Impacts are site-specific, few if any of them irreversible, and in most cases mitigation measures can be designed more readily than Category A.	Initial Environmental Examination (IEE)
C	Likely to have minimal or no adverse environmental impacts.	No environmental assessment is required but the environmental implications of the project will be reviewed.
FI	Project involves investment of ADB funds to or through a financial intermediary (FI).	FIs will be required to establish an environmental and social management commensurate with the nature and risks of the FI's likely future portfolio to be maintained as part of the FI's overall management system.

Source: ADB. Safeguard Policy Statement 2009, p. 19. http://www.adb.org/sites/default/files/institutional-document/32056/safeguard-policy-statement-june2009.pdf.

2.2.1 Disclosure requirements

31. Aside from SPS 2009, the Public Communications Policy (PCP) 2011 provides for the requirements of disclosure for project information of projects and grants funded by ADB. Consistent with SPS 2009, PCP 2011 requires the disclosure of documents submitted by the borrower and/or client:

(i) a draft EIA report for category A project, at least 120 days before Board consideration;
(ii) a draft EARF, where applicable, before appraisal;[7]
(iii) the final EIA or IEE, upon receipt by ADB;
(iv) a new or updated EIA or IEE, and a corrective action plan, if any, prepared during project implementation, upon receipt by ADB; and,
(v) the environmental monitoring reports, upon receipt by ADB.

32. To meet the disclosure requirements of ADB, this IEE will be disclosed to ADB website.

33. **Table 2.6** presents the implications of SPS 2009 on the project.

Table 2.6 Implications of SPS 2009 to the Project

No.	SPS 2009 Principles	Description
1	Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.	The components with environmental implications have been identified: (a) under Output 1 – (i) construction of new TTI in Serbithang, Thimphu, (ii) additional buildings (i.e., hostels, classrooms, etc.) to be located within the available land at Samthang TTI in Wangdue Phodrang *dzongkhag*; (b) under Output 3 – construction of one-

[7] If no further mission for appraisal is required, the document will be posted before the management review meeting or the first staff review meeting for sovereign projects, or before the final investment committee meeting for nonsovereign projects, as applicable (ADB procedures).

No.	SPS 2009 Principles	Description
		storey TVE labs in seven secondary schools to introduce and promote TVET. A Rapid Environmental Assessment (REA) checklist was completed for these components, and the environment category based on SPS 2009, is B requiring an initial environmental examination (IEE).
2	Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and physical cultural resources in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.	An IEE following the requirements of SPS 2009 was conducted for the components with environmental implications.
3	Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.	Alternative sites, where appropriate, were considered and included in the IEE.
4	Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an environmental management plan (EMP) that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.	An environmental management plan (EMP) was prepared for each of the components with environmental implications under the MOE and MOLHR. The EMPs will provide guidance to the Design & Supervision Consultant that will be engaged during project implementation, contractors, and the PMUs to ensure compliance to the relevant provisions in SPS 2009.
5	Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment. Establish a grievance redress mechanism to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.	Two consultation events were undertaken during the preparation of the IEE. MOLHR and MOE, through their PMUs, will continue the consultations with relevant stakeholders (as appropriate) during implementation. A three-tiered grievance redress mechanism (GRM) is included in the IEE including the proposed composition of the grievance redress committee (GRC). The implementation of the GRM will be monitored by the PMUs.
6	Disclose a draft environmental assessment (including the EMP) in a timely manner, before project appraisal, in an accessible place and in	The IEE will be endorsed by the MOE and the MOLHR for public disclosure to ADB website.

No.	SPS 2009 Principles	Description
	a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.	
7	Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.	At the construction phase, the contractor will be responsible for implementing the EMP and will be monitored by the Design & Supervision Consultant, and the PMUs. Environmental monitoring reports and corrective actions (if needed) will be prepared by the PMUs and will be disclosed to ADB website.
8	Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.	All the proposed interventions with environmental implications are not located in critical habitats as defined by SPS 2009.
9	Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phaseouts. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	Construction activities will generate waste and may increase ambient dust and noise levels. Vegetation and land clearing will be done. No hazardous chemicals will be used in vegetation clearing.
10	Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.	Construction works may cause accidents or injuries to workers. Contractors will be required to comply with the Regulation on Occupational Health, Safety and Welfare (2012) and the Labour and Employment Act 2007. Compliance will be monitored by the PMUs and the Design & Supervision Consultant.

No.	SPS 2009 Principles	Description
11	Conserve physical cultural resources and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-approved management and conservation approach for materials that may be discovered during project implementation.	The sites selected are not known to have physical cultural resources as defined by SPS 2009. Nonetheless, a "chance find" procedures is given in Annex 1

III. DESCRIPTION OF THE PROJECT

3.1 Introduction

34. Building on the experience and lessons learnt from the Basic Skills Development Project supported by ADB in June 2001 and completed in March 2008, the proposed project aims to contribute to the expansion and modernization of TVET system and in enhancing the vocational orientation and skills of high school students. In addition, the proposed project will create performance-based partnerships with the private sector and thus, is expected to improve employability and job outcomes for skilled graduates.

35. Launched by the government in June 2016, the TVET Blueprint 2016-2026 articulates a long–term strategic vision that will guide and influence reforms and development in TVET over the next 10 years. Central to the TVET Blueprint 2016-2026 is the four pillars which identify broad reform areas that respond to specific constraints facing the TVET system. The four pillars are: expanding TVET provision, improving relevance, improving quality, and strengthening management systems. The interventions proposed for skills development project are consistent with these four-pillar strategy.

3.2 Project Outputs

36. It is envisioned that the following outputs will enhance chances of TVET graduates for employment and in increasing the skilled human capital needed for equitable socioeconomic development in Bhutan. **Table 3.1** presents the summary of outputs and estimated costs.

Output 1: Access to skills development increased

37. This will support (i) physical infrastructure, a new flagship technical training institute (TTI) in a new campus in Thimphu with modern facilities, and new classrooms, workshops, and dormitories in Samthang TTI; (ii) the provision of modern and advanced technology equipment and tools in all the TTIs;[8] and (iii) the introduction of at least six new courses at middle and advanced (diploma) level and in diversified disciplines. These interventions are expected to benefit about 1000 students enrolled in TTIs, including an additional 500 students during the project period (35% female). **Figure 3.1** shows the location of the TTIs.

[8] The project will provide hi-tech equipment such as computer numerical control (CNC) machines, spray plastering machines, and advanced survey equipment like total station and green technology equipment (e.g., CNC 3D simulation workstations and virtual welders) that will enable students to practice with low consumption of electricity and raw materials. The simulators will supplement theoretical and classroom teaching prior to actual practice on real machines.

Output 2: Quality and relevance of skills development enhanced

38. This will support: (i) improved training of trainer programs with workplace experience to at least 60% of trainers in TTIs; (ii) private sector partnership for skills delivery in emerging occupations benefiting about 800 students (35% female); and (iii) provide e-resources in TTIs to develop future-ready skills in graduates.[9] The project will establish performance-based contracts with private sector training providers to strengthen market relevance of skills and assure job placements.

Figure 3.1 Location of the TTIs

Output 3: Vocational orientation of secondary school students improved

39. This will provide support to: (i) pilot TVE elective subjects for grades 9-12 in seven schools linked to TTIs, and to strengthen the vocational clubs for grades 7–8; (ii) enable career guidance with exposure to the world of work to secondary students; and (iii) offer ICT-enriched teaching and learning to improve foundational skills critical for increasing employability. The project will upgrade seven secondary schools into TVE Premier Schools consistent with the objectives of the Twelfth Five Year Plan. These interventions are expected to encourage a larger number of grade 10 students to take up skills training, support the establishment of TVE Premier Schools, and to provide modern career guidance services. **Figure 3.2** shows the location of the seven secondary schools of the MOE.

[9] The project will equip the TTIs with a range of e-resources like multimedia-based and self-learning modules incorporated to increase effectiveness and interest in learning skills. These systems also inculcate problem solving, fault-finding, and project-based learning.

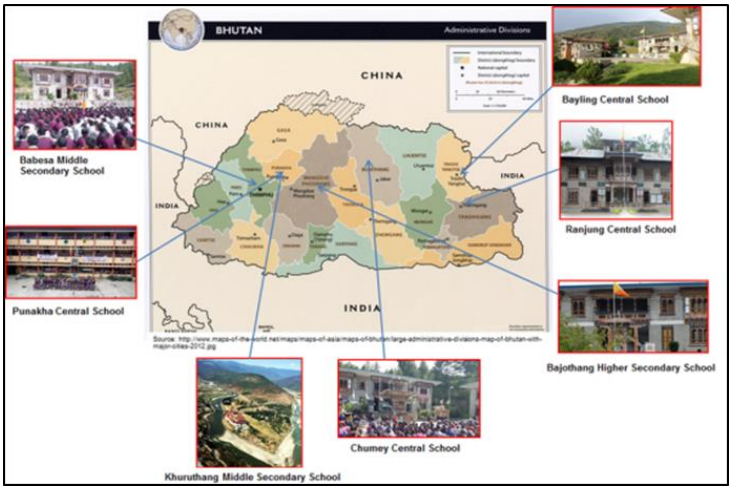


Figure 3.2 Location of the seven secondary schools

Output 4: Governance and institutional capacity for TVET improved

40. This will provide support to: (i) operationalize an online TVET management information system and employment services portal; and (ii) facilitate international partnership in at least one TTI. The project will deliver qualitative studies and surveys to strengthen evidence-based planning and implementation of skills development programs at TVET institutions and schools

Table 3.1 Summary of activity-based costing

No.	Output/Activity	Estimated Cost (Nu M)	Estimated Cost ($ M)
1	**Output 1: Access to skills development increased**		
1.1	Construction of new buildings – Thimphu TTI	268.11	4.26
1.2	Construction of workshops, classrooms, hostel building at Samthang TTI	110.65	1.76
1.3	Design and Supervision consultant for Thimphu TTI and Samthang TTI	31.00	0.49
	Subtotal: Construction	409.76	6.50
1.4	Khuruthang TTI - Mechanical, Electrical, Welding lab upgrade	49.65	0.79
1.5	Chumey TTI - Welding lab upgrade	8.10	0.13
1.6	Samthang TTI - Automobile lab upgrade + Furniture	29.89	0.47
1.7	Thimphu TTI - Automobile, ICT, Packaging labs + Furniture	57.54	0.91
1.8	Rangjung TTI - IT, Electrical, Automobile lab upgrade	35.26	0.56
	Subtotal: Lab Equipment and Furniture	180.45	2.86
	Subtotal of Output 1	**590.21**	**9.37**
2	**Output 2: Quality and relevance of skills development enhanced**		
2.1	Trainer's Training in Technical Trade, Pedagogy and Master Trainer Training	27.00	0.43
2.2	New Trainer's Training and Industry Attachment for Trainers	8.91	0.14
2.3	Implementation of QMS in 3 TTIs	-	-
2.4	Existing and new course alignment to BVQF - Standards Development (number = 10)	3.74	0.06
2.5	New course and curriculum development (10 new courses)	13.03	0.21
2.6	Courses for 1,000 candidates through private training providers and collaboration	93.58	1.49

No.	Output/Activity	Estimated Cost (Nu M)	Estimated Cost ($ M)
2.7	Design and develop (or adapt existing international material and customise) soft skills modules and support implementation	2.00	0.03
	Subtotal of Output 2	**148.25**	**2.35**
3	**Output 3: Vocational orientation of secondary school students improved**		
3.1	Strengthen Cl. IX–X School TVE elective subjects and extend up to class XII in seven pilot schools	100.11	1.59
3.2	Establish/strengthen vocational clubs (VC) in seven pilot secondary schools (Cl. VII to VIII); Introduce Pre-Vocational Orientation Programmes (PVOP) in seven pilot schools (Cl. VII to VIII)	4.96	0.08
3.3	Piloting of career guidance services in all secondary schools with exposure to the world of work for Cl. VII-XII	26.79	0.43
3.4	Improving critical thinking and problem solving skills through ICT-enriched teaching and learning	23.63	0.38
	Subtotal of Output 3	**155.49**	**2.47**
4	**Output 4: Governance and institutional capacity for TVET improved**		
4.1	Strengthening of MOLHR MIS (Standardisation of Data Structure and Inter-linkages across 11 MIS Modules operating in MOLHR)	13.00	0.21
4.2	Regional and International linkages for TTIs	20.00	0.32
4.3	Research Studies	10.00	0.16
	Subtotal of Output 4	**43.00**	**0.683**
5	**Miscellaneous**		
5.1	Program Management expenses (6%)	56.22	0.89
5.2	Contingency (15%)	140.54	2.23
Grand Total		**1,133.71**	**18.00**

3.3 Implementation arrangements and schedule

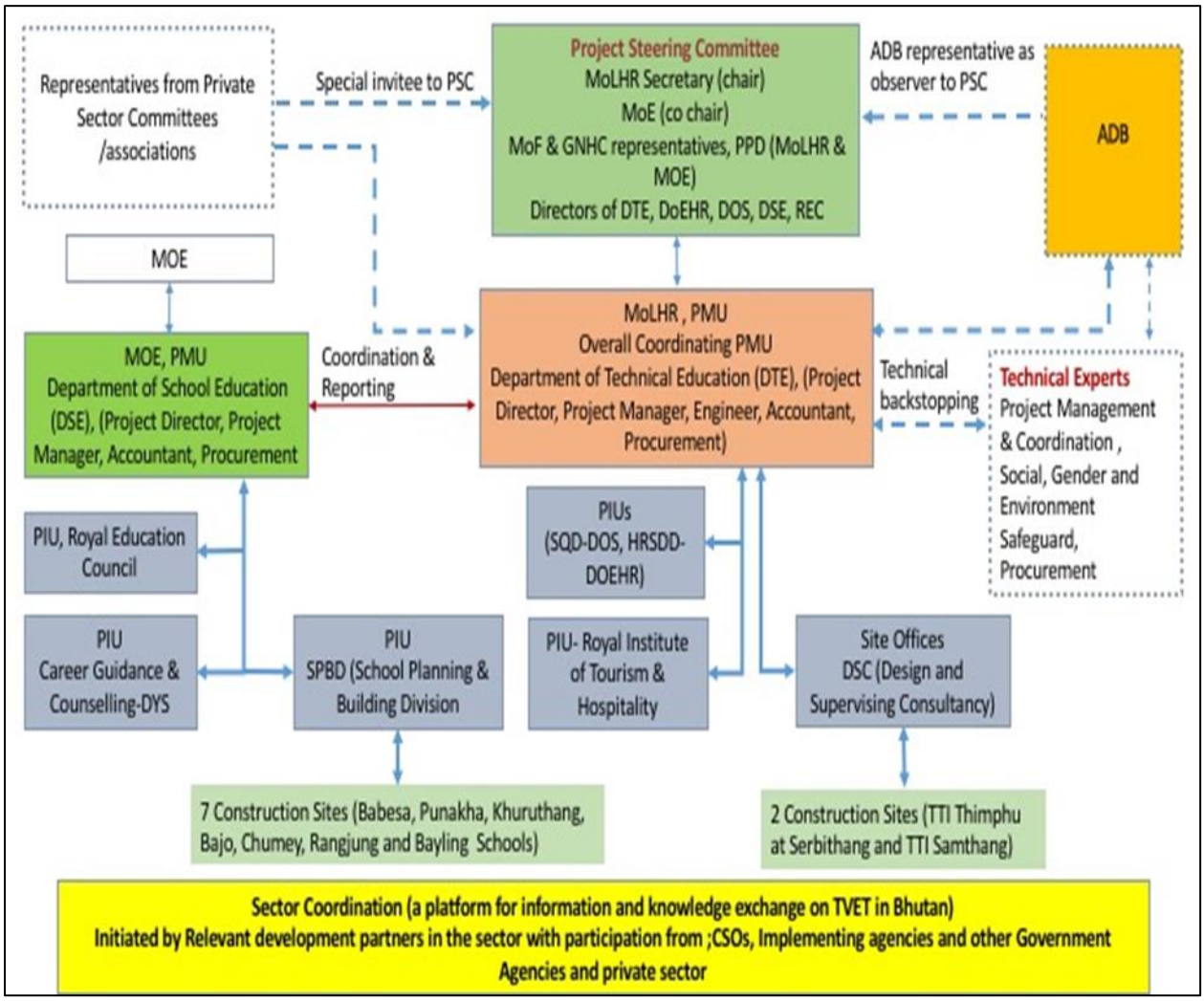
41. A Project Steering Committee (PSC) will be set up, chaired by the Secretary MOLHR and Secretary MOE, with members drawn from other Ministries and agencies to address the main components and themes of the project as well as selected private sector representatives. PSC will provide the overall strategic guidance and will monitor the timely execution of project outputs.

42. At the project level, there will be two PMUs from the respective ministries headed by the Project Director [DG/Director the Department of Technical Education (DTE), MOLHR and DG/Head of Department of School Education, MOE]. Aside from the Project Director, each PMU will have a project manager, engineer, accountant, and procurement staff. The PMU in MOLHR will also function as the coordinating PMU for reporting such as annual project financial reports, and the progress reports.

43. Under the PMUs will be PIUs responsible for smooth implementation of specific outputs. The PIUs under the MOLHR, PMU will include the DoEHR, DOS, and the RITH. In the PMU of MOE, the PIUs will be the SPBD, DYS, and the REC. SPBD will oversee the design and construction works of the new 13 TVE labs while a full time Design and Supervision Consulting firm will be recruited by the MOLHR to oversee the detailed engineering design and construction of the new Thimphu TTI in Serbithang and the additional buildings in Samthang TTI. The PMU Engineer and representatives from Thimphu TTI and Samthang TTI will work closely with the Design and Supervision Consulting firm.

44. There will be a pool of experts to provide technical support to the project which include: project management and coordination, social safeguard and gender, procurement, and environmental safeguard. A consultant on environmental safeguard will be engaged for 4 person-months within 24 months (intermittent) to support the project on EC, permits, capacity building; coordination among Contractor(s), PIUs, and PMUs on environmental compliance, and reporting to ADB. **Annex 2** gives the terms of reference (ToR) of the project implementation arrangements and **Annex 3** presents the ToR for the environmental safeguard consultant. **Figure 3.3** shows the overall project implementation arrangements. The project is expected to start in November 2018 until October 2023. Construction works is set to begin in March 2019 and is planned to be completed after 24 months.

Figure 3.3 Project implementation arrangements



IV. DESCRIPTION OF THE ENVIRONMENT (BASELINE DATA)

4.1 Project's Area of Influence

45. The beneficial impacts of the different interventions outlined in the four outputs are expected to cover the entire country while potential adverse impacts which are temporary and of short duration will be confined to the interventions with associated construction works. Overall, Output 1 for MOLHR and Output 3 for MOE will have environmental implications in six *dzongkhags* (districts): Thimphu, Wangdue Phodrang, Trashigang, Punakha, Bumthang, and Trashi Yangtse.

46. The description of the existing environment was based on available secondary data from government publications such as statistical yearbook, State of the Environment Report, Dzongkhag websites, etc., and special studies conducted by agencies like the United Nations, World Bank and ADB. Site visits were done in August 2017, November 2017, December 2017, January 2018 and February 2018 by multidisciplinary consultants for the project. No environmental quality measurements were done during the site visits. Prior to construction works, PMUs will require the Contractor(s) to conduct baseline environmental quality measurements for air, noise, and source of drinking water to be provided to workers at construction sites. These data will be included in the revisions and/or update of this draft IEE during implementation. Soil testing is part of construction planning to determine its suitability for construction and design of foundation.

Output 1. Access to skills development increased

47. This will involve infrastructure upgrade in two TTIs: (i) Thimphu TTI in Serbithang (Thimphu Thromde) with a new institute building and facilities including administration and academic buildings, hostel, multi-purpose hall and staff quarters, and (ii) Samthang TTI in Wangdue Phodrang with new hostel, workshop and classrooms. In addition, there will be equipment upgrade in five TTIs: (i) Thimphu, (ii) Samthang, (iii) Khuruthang, (iv) Chumey, and (v) Rangjung. **Figure 4.1** shows the location of Output 1 and the proposed interventions.

Output 3. Vocational orientation of secondary school students improved

48. This will include construction of 13 TVE labs required to support the introduction and orientation of vocational courses in seven secondary schools. Table 4.1 gives the description of the TVE lab and Figure 4.2 shows the typical basic design (details in **Annex 4**). Depending on the location, design and description of the TVE labs may be adjusted to blend with the existing secondary school buildings consistent with building codes and regulations in Bhutan. Figure 4.3 shows the location of Output 3 with construction involved.

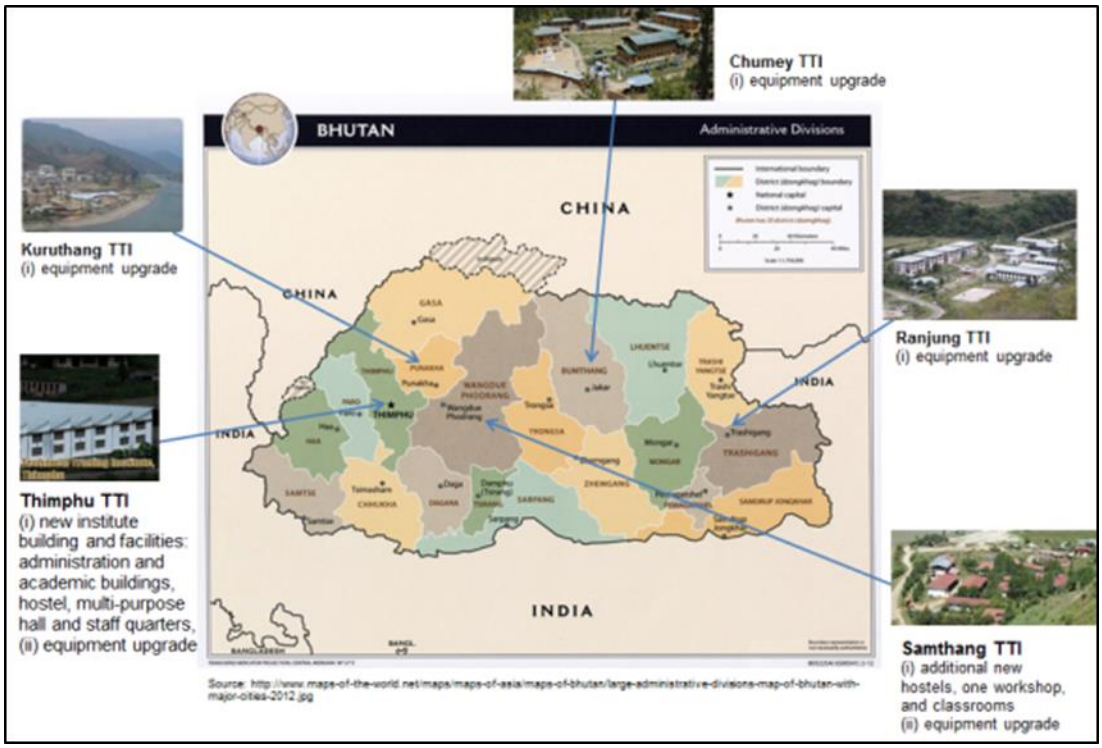


Figure 4.1 Location of Output 1 and the proposed interventions

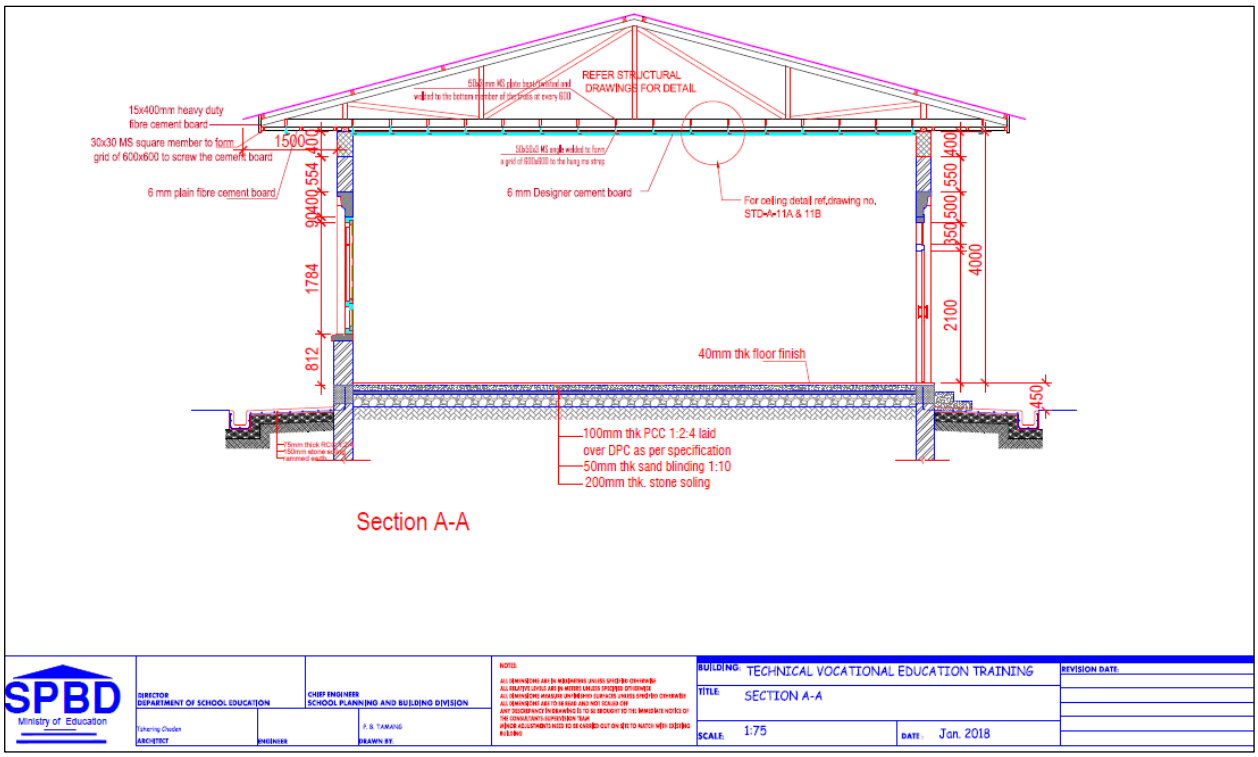


Figure 4.2 Design of the single-storey TVE labs for secondary schools

Table 4.1 Description of the TVE lab for secondary schools

Item	No. of floors	Description	Length (m)	Width (m)	Area (m^2)	Units	Total Area (m^2)
TVE Laboratory	1	Training labs	14.00	9.00	126.00	13	1,512.00
		Wall and Circulation					75.60
						Total area	**1,587.60**

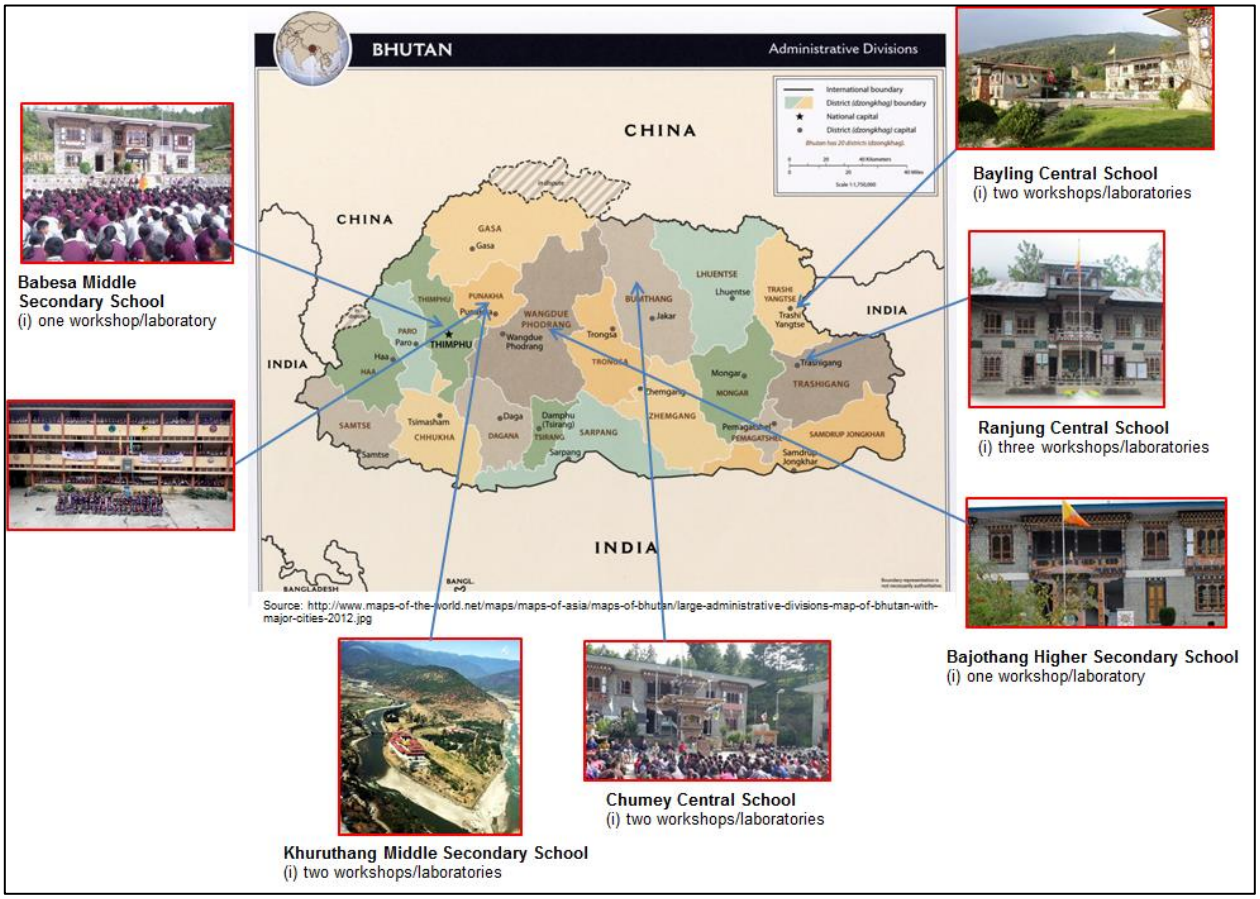


Figure 4.3 Location of Output 3 and proposed interventions

4.2 Existing environment in Output 1 – construction of new Thimphu TTI and additional buildings for existing Samthang TTI

49. The component under Output 1 that will be managed by the PMU of MOLHR is discussed in the following section.

4.2.1 Thimphu TTI in Serbithang, Thimphu

50. Serbithang is located approximately 10 km away from the main town Thimphu. Out of the total 11.77-acre government land allocated to the National Biodiversity Centre (NBC), 3 acres which was used by Thimphu Thromde for their pilot composting plant has been reallocated to MOLHR to be used as site for the new Thimphu TTI. The pilot composting plant is part of the Thimphu Solid Waste Management Strategy and Action Plan under ADB Loan 2258-BHU: Urban Infrastructure Development Project ($24.6M) approved on 27 September 2006 and completed on 31 August 2016. Aside from the composting plant, the upgrading of the existing access road to the composting plant was also included in the loan.

51. The site at Serbithang is secured by gate and fence. The access road to the site is in good condition and vegetation consists of grass, flower and vegetable garden, shrubs and a few evergreen trees (see **Figure 4.4**). Occasionally, the smell from the previous operation of the pilot composting plant can still be felt especially when the wind blows. There are scraps/debris/tools

left within the two existing structures. There are no occupants in the site but there are some houses farther north of the site.

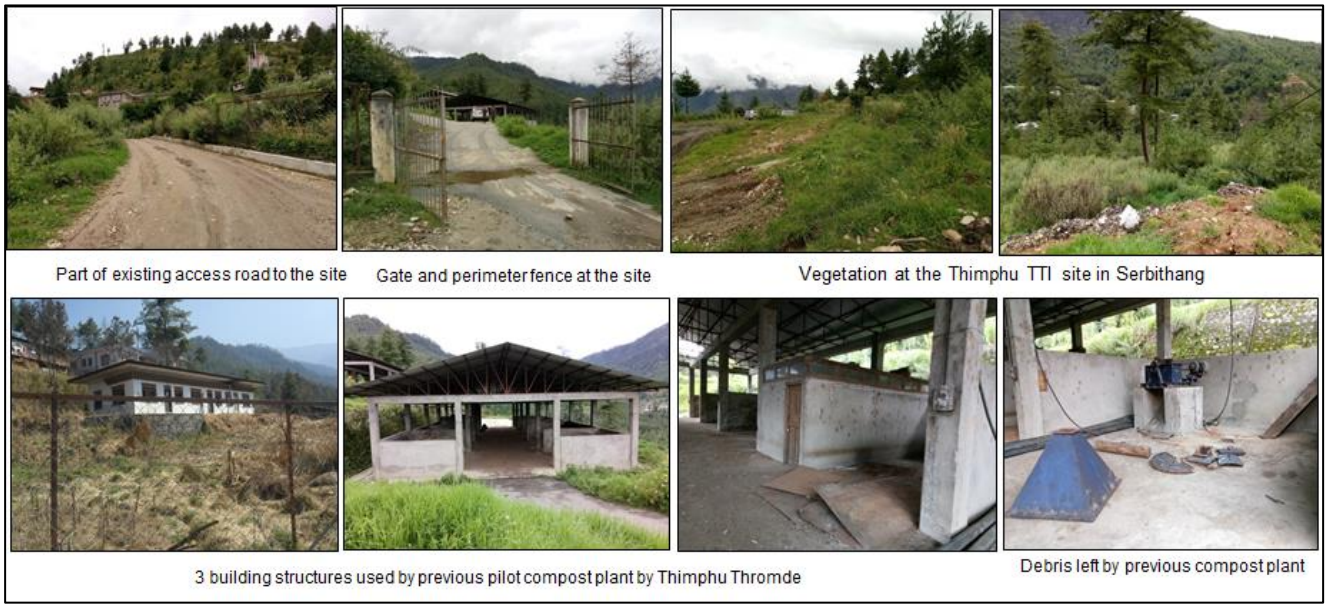


Figure 4.4 Site for the new Thimphu TTI in Serbithang, Thimphu

4.2.2 Samthang TTI in Wangdue Phodrang

52. Samthang TTI is located 4 kilometers (kms) away from the Khuruthang town towards Wangdue Phodrang after crossing the Khuru Kuenphen Zam and 5 kms away from Bajo town following the Shengana road (see **Figure 4.5**). The Samthang TTI used to be the National Drivers Training Institute (NDTI) and the Royal Technical Institute (RTI) Automobile Department relocated in June 2003. The Institute offers the following courses: (i) auto mechanic National Certificate (NC) 2 and NC3, (2) auto electrical NC2, (3) heavy earth moving operator NC2, (4) heavy vehicle driving NC2, and (5) short course (basic and advance mechanic) for in-service drivers, and there are currently 144 trainees.[10] Existing facilities for learning are shown in **Figure 4.6**.

[10] Bhutan Vocational Qualifications Framework has five qualifications: National Certificate 1 (NC1), National Certificate 2 (NC2), National Certificate 3 (NC3), National Diploma 1 (ND1), and National Diploma 2 (ND2). NC 1 is the lowest and NC 3 is the highest in terms of skill competency requirements or complexity at the vocational level. www.MOLHR.gov.bt/MOLHR/wp.../07/Bhutan-Vocational-Qualifications-Framework.pdf

Figure 4.5 Location of Samthang TTI

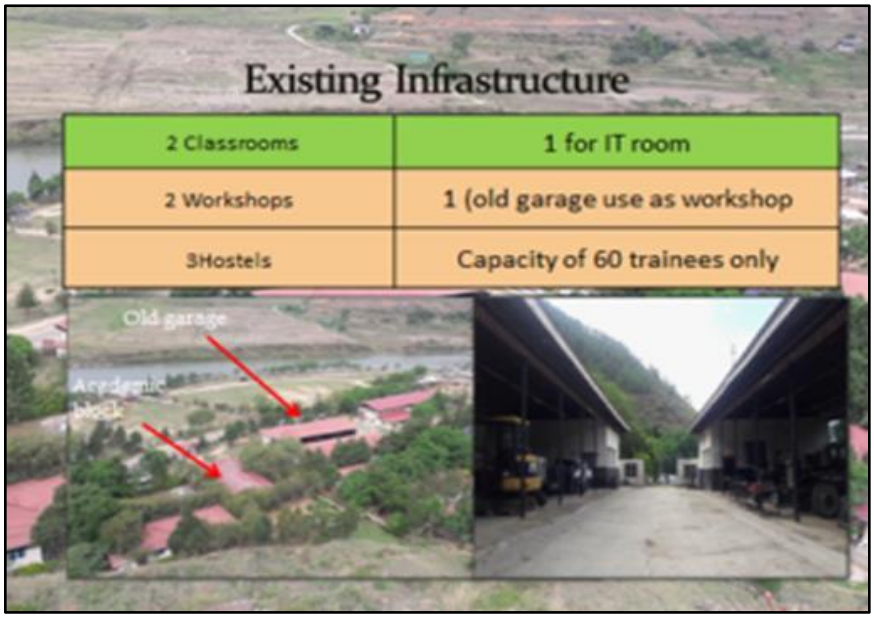


Figure 4.6 Learning facilities at Samthang TTI

53. Given the nature of activities in the Institute, occupational health and safety practices are strictly observed (see **Figure 4.7**). Safety signs and warnings are posted in the workshops. In terms of waste management, trainees made use of plastic bottles and used tires to make decorations within the campus (see **Figure 4.8**). There are "transfer stations" where garbage bins are spread strategically within the campus and collected daily or every other day. These are then transferred to the main collection bin located close to the main gate for easier access to the garbage collection of the Wangdue Phodrang *dzongkhag* service. Oily waste like rags used at the workshops are separated from other solid waste generated in the campus. All new trainees undergo orientation on environmental management and sustainability.

Figure 4.7 Safety awareness strategies at Samthang TTI

Figure 4.8 Waste management efforts at Samthang TTI

54. Vulnerability *to glacial lake outburst flooding (GLOF).* Based on the extensive research and studies done by the United Nations Development Programme (UNDP), Global Environment Facility (GEF), Austrian Government and other donor agencies in collaboration with the Department of Geology and Mines (DGM) and the Department of Disaster Management (DDM), land use restrictions were issued according to hazard zonation in the Punakha-Wangdue Valley communities. Hazard zonation map was prepared from the source of Pho Chu to Khuruthang in

Punakha until Lhamoizingkha in Dagana Dzongkhag covering a distance of about 147 km.[11] . The hazard maps from Lunana to Punakha were prepared based on the worst case scenario which is a future occurrence of GLOF with 53 million cubic meters of water (MCM). From the results of these international collaborations, the infrastructures and buildings of Samthang TTI fall in yellow zone (see **Figure 4.9**). However, the driving training ground, part of football ground which are all below the road fall under red zone.

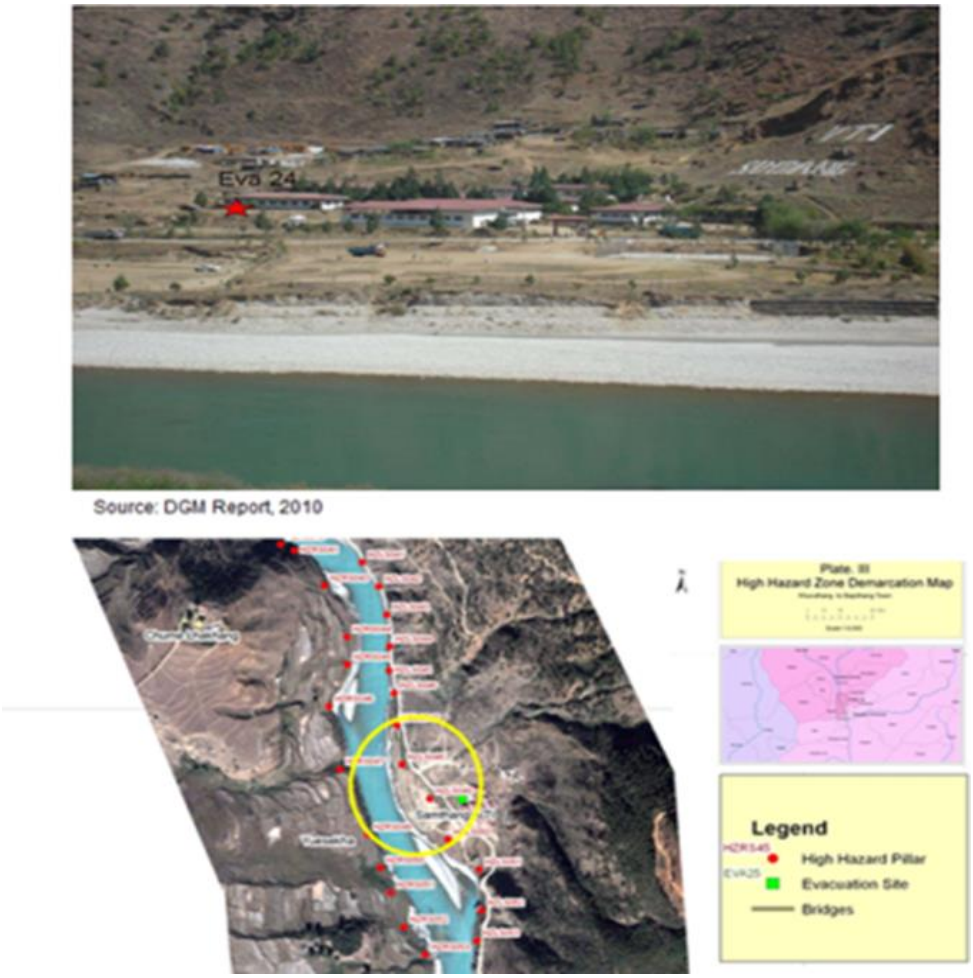


Figure 4.9 Evacuation area for Samthang TTI under the yellow hazard zone

55. Given this, an evacuation area was identified in the unlikely event of emergency due to GLOF. The dining hall was identified and marked as it will only take less than a minute from the TTI complex. All the structures of Samthang TTI are above the road. The red and yellow zone boundary passes parallel to Punatsangchhu River by 1m to 2m below the road. There are two isolated river protection gabion wall existing towards the downstream part of Samthang. The gabion wall measures 51.79 m by 2.5 m by 1.2 m and 25.74 m by 2.5 m by 2.86 m, respectively.

[11] Hazard zonation: **Red Zone**: This represents high risk areas where most probably water level will reach and the areas will be submerged in case of the worst case scenario. Therefore this zone is a restricted zone where in case of worst case GLOF in future the structures will be submerged under water. **Yellow Zone**: This represents medium risk areas where most probable indirect impact of GLOF can occur during the worst case scenario. Therefore future developmental activities should be planned accordingly. **Blue Zone**: This represents the areas that are found safe from the worst case of GLOF.

The details of the evacuation plan are given in **Table 4.2** below. Aside from these protections, there are flood level marks and automated early warning systems installed below the road and along the road (see **Figure 4.10**)

Table 4.2 Evacuation details for Samthang TTI

Locality Name/Village	Distance to the proposed evacuation site	Direction to move to avoid GLOF	Time estimated on normal walk	Evacuation area No. and elevation	Remarks
Samthang TTI (Yellow Zone)	50 m to 100 m	East	Less than 1 minute	EVA No. 24 and at 1,218 m	Driving training ground and other structures at 3m below the road are in red zone

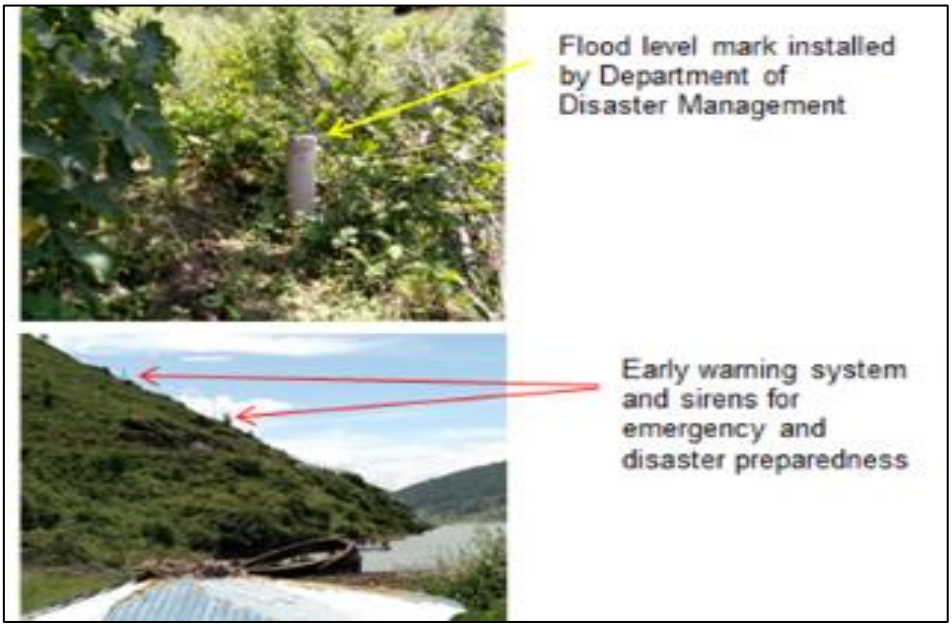


Figure 4.10 Early warning systems and flood level marker

56. The site for the new additional buildings is located within the existing campus premises (see **Figure 4.11**) high above the danger zone and existing vegetation consist of shrubs and other plants being maintained by in-house support staff.

Figure 4.11 Proposed site for the new additional buildings at Samthang TTI

4.3 Existing environment for Output 3 – construction of 13 one-storey TVE laboratories for seven secondary schools

4.3.1 Babesa Middle Secondary School

57. The Babesa Middle Secondary School (MSS) was established in 2008 and is located about 14 km away towards the south of Thimphu City above the Royal Botanical Garden. It covers about 7.64 acres and an additional 3 acres of Government land will be provided to complete the property registration to 10.64 acres. Thus, there is adequate land available to accommodate the new TVE lab on automotive.

58. Currently, the school has a total students of 417 (230 girls); 26 teachers (14 females) and 10 support staff (7 females). Classes offered are from grades VII to X. There are 16 sections in this day school. **Figure 4.12** shows the location map while **Figure 4.13** shows the proposed site for the TVE lab. Babesa MSS has a waste management coordinator as well as disaster management coordinator.

Figure 4.12 Location map, Babesa MSS

59. A site visit was conducted by designated staff of SPCD on 6 February 2018 and again on 14 April 2018 to check on the best location for the new TVE lab. The selected site is near the IT school laboratory. **Figure 4.13** shows the selected site.

Figure 4.13 Proposed site of TVE in Babesa MSS

4.3.2 Bajothang Higher Secondary School

60. Established in 1997, the Bajothang Higher Secondary School (HSS) is located in newly established Bajo town in Tshedtsho Gewog in Wangdue Phodrang covering 15.2 acres where two acres are allocated for agriculture activities below the football ground. It has 22 sections from Grades VII to Grade XII. **Figure 4.14** shows the location map.

61. The school has a standard football ground, a basketball court, two volleyball courts, cricket playing pitch, and table tennis and badminton facilities. It now caters not only to the local students but students across the 20 Dzongkhags. In 2017, there are 53 teaching staff (24 females) and 1,134 students (622 girls). With support from Punatsangchu Hydropower Project, the school established 12-unit classrooms addressing shortage and lack of administrative block. The school aims to build a friendly, healthy and conducive atmosphere for teaching and learning, and

endeavors to provide a wholesome education through a wide range of curriculum and co-curricular activities.

Figure 4.14 Location map, Bajothang HSS

62. *Health and safety.* Bajothang HSS is close to the Wangdue Hospital which can provide immediate medical support on health and safety issues for both students and teachers. Health awareness to students is done on a regular basis however, there is a need to have safety gears (uniforms, gloves, eyewear, and boots) for the trainees.

63. *Emergency preparedness.* Bajothang HSS has a disaster management committee comprised of focal teachers and students with training on emergency preparedness. Awareness program on earthquake (mock drills) is conducted regularly. There is also a flood risk management team headed by the *Dzongda*, *Dzongkhag* Administration, Wangdue. Disaster sirens and mobile handsets for communication are established in the strategic points and handled by responsible teachers as part of the early warning systems.

64. *Waste management*. The waste management committee is responsible for the waste collection, storage, and disposal once a week and/or on-need basis in collaboration with the municipal authority. Waste segregation is also done at the source and non-degradable wastes are sold. The waste management program is the most successful in terms of handling, mobilization and management in the school.

65. The school management and SPBD has identified the sites for the proposed TVE lab within the existing school campus. The identified locations is relatively flat. However, it is close to the Punatsangchhu River within 30 m from the edge of the river which is considered to be environmentally sensitive and a major hazard. Therefore, an alternative location was identified within the school campus also during the site visit on 19 December 2017. This location is near the existing Punakha-Bajo highway and is about 240 m from the river (see **Figure 4.15**).

Figure 4.15 Proposed site of TVE lab in Bajothang HSS

4.3.3 Khuruthang Middle Secondary School

66. The Khuruthang Middle Secondary School (MSS) was established in November 1996 and was upgraded in 2005 as middle secondary school. It is located near Khuruthang, 4 km south of Punakha Dzong, Punakha (see **Figure 4.16**). Since 2005, Khuruthang MSS had become the largest school in Punakha district with 1,109 students. These include 16 classrooms in four academic blocks, a library/laboratory building, multipurpose hall and an administrative block. The school caters to boarders with two hostels for girls and one for boys including accommodations for the principal and the caretaker.

67. *Health and safety risks*. Currently, there is no dress code e.g., uniform, boots, eyeglass, or gloves available to the students and teachers. In case of minor injuries (cuts/wounds), the health coordinator collaborates with the nearest hospital.

68. *Disaster management*. There is a disaster management committee comprised of focal teachers and students. On disaster risk (e.g., earthquake, fire), awareness and mock drills are regularly done by focal teachers and students.

Figure 4.16 Location map, Khuruthang MSS

69. *Waste management*. The school does not generate IT waste. The school's nature club coordinates the waste management activities. Each class have two bins (1 for degradable; 1 non-degradable). Biodegradable wastes are emptied in the school pits whereas the non-degradable waste, e.g., plastics including Maggi and *wai-wai* are segregated at source, transported and disposed of in collaboration with the Eco-Waste Solution- a private agency based in Wangdue Phodrang. Paper waste is easier to manage than plastics.

70. There is no formal collaboration with the Dzongkhag/municipality on waste management, however; their services are called on as-need basis. The school plans to segregate wastes at source, transport and sale non-degradable waste to earn additional income to the school.

71. A site visit was conducted on 19 December 2017 to do ocular inspection for the new TVE lab. The school management and SPBD have identified two sites within the existing school campus. The two identified locations are relatively flat above the existing highway. It is about 140 m way away from Punatsangchhu River. The selected site is towards the north of the campus and is adjacent to an access road near the school toilet. However the existing underground water supply line has to be identified and avoided (see **Figure 4.17**).

Figure 4.17 Proposed site of TVE lab in Khuruthang MSS

4.3.4 Punakha Central School

72. The Punakha Central School (CS) was established in 1973 and was upgraded to central school in 2016 under the central school programme initiatives of the school reform policy. It is located along the confluence of Pochu-Mochu Rivers in the gentle slopes at Lekithang, Punakha under the Guma Gewog. The school has a total area of 54.54 acres and is on the south side of the historic Punakha Dzong.

73. Punakha CS provides education to Grade 7 to Grade 12. At present, there are 750 students of which 381 students are female. Of the 750 students, 332 students are living in the hostels within the premises. The current students are managed by 39 staff both technical and support.

74. In the case of minor health issues (cuts/wounds), the school health coordinator treats students with First Aid in the school premises. For major health issues, students are admitted and treated in nearby hospital. Part of emergency and disaster preparedness, the school disaster

management committee conducts awareness, rescue operations, health and safety concern, etc. Health awareness and mock drills to students by health coordinator and focal teachers are regular exercises. In case of fire emergency, fire extinguishers are installed in strategic locations in the school.

75. There is a waste management committee consisting of teachers and students. The school's Nature Club takes care of the waste collection, transport and disposal. In each class, waste management captains ensure that there are two dustbins (one for degradable and another non-degradable). Degradable waste (dry grass, leaves, branches, etc.,) are disposed of in the green waste pits while non-degradable (plastics) are sold to Eco Solution from Bajothang. Disposal of wastes is also arranged in collaboration with Dzongkhag or municipality once a week.

76. Together with the school management, the SPBD and consultants visited Punakha CS on 19 December 2017 and has identified two sites for the proposed TVE labs within the existing school campus of 54.54 acres. The location near the girl's hostel was recommended as it can accommodate the two TVE labs allocated for Punakha CS. However, there is a need to move the location farther away from the existing girl's hostel towards the south-east in order to maintain some open space in front of the girl's hostel and also to avoid the sheer drop to the highway below (see **Figure 4.18**). Construction in this location will affect six trees.

Figure 4.18 Proposed site of TVE lab in Punakha CS

4.3.5 Baylling Central School

77. Established in 2004 through the support of the World Bank, the Baylling Central School (CS) is located in the Trashi Yangtse Dzongkhag.[12] Baylling CS is located 4 km away from the town of Trashi Yangtse with an overview of panoramic landscape offering a good living and learning environment (see **Figure 4.19**). The school was formally handed over to the Dzongkhag Administration, Trashi Yangtse on 8 March 2005 after verification of the infrastructure.

78. Baylling CS has a good administrative and academic buildings, library facility with books, computer and laboratory facilities, hostels, summer houses, games and sports arena, spaced auditorium, internal road network, campus street lights and standard size archery ground.

[12] DoE, History of Baylling Autonomous School.

Figure 4.19 Location map, Baylling CS

79. A field visit was made by designated staff of SPBD and School Planning and Coordination Division (SPCD) on 14 December 2017 during the 12th Five Year Plan consultative Meeting with the Dzongkhags. As proposed by the School Management, the team identified the site beside the road inside the school compound close to the school gate. The area is suitable for the proposed construction as it is spacious and relatively flat. The site is located at reasonable distance from the academic site below the assembly ground and there are no trees in the proposed site (see **Figure 4.20**).

Figure 4.20 Proposed site of TVE lab in Baylling CS

4.3.6 Rangjung Central School

80. The Rangjung Central School (CS) is located 18 km away from the main town of Trashigang in eastern Bhutan (see **Figure 4.21**).[13] The school has a total area of 13 acres which is sufficient to accommodate a new TVE lab for secondary students. Rangjung CS was established in 1997 and was upgraded to central school in 2015.

[13] DoE, Brief History of the Rangjung School.

81. The school is well-established with good facilities that enable the school to run the program successfully. Further, the teachers and staff are competent to impart excellent learning materials and environment to the students.

Figure 4.21 Location map, Rangjung CS

82. A field visit was done by designated staff of SPCD on 16 January 2018 to check the proposed location for the TVE lab. The site identified is within the existing school campus of 12.647 acres, relatively flat, and beside the existing football field towards the fence on the other end of the academic area. This is to ensure minimal disturbance to the students during construction (see **Figure 4.22**).

Figure 4.22 Proposed site of TVE lab in Rangjung CS

4.3.7 Chumey Central School

83. Established in 1983, the Chumey Central School (CS) is located about 20 km away from Jakar Dzong towards Trongsa under Chumey Gewog, Bumthang (see **Figure 4.23**). The school has a total area of 35.524 acres and offers vocational curriculum in collaboration with Chumey

TTI located about 4 km from the school.[14] The school has 26 teachers (9 females) and 20 support/non-teaching staff (9 females). The school caters to 463 students (246 girls).

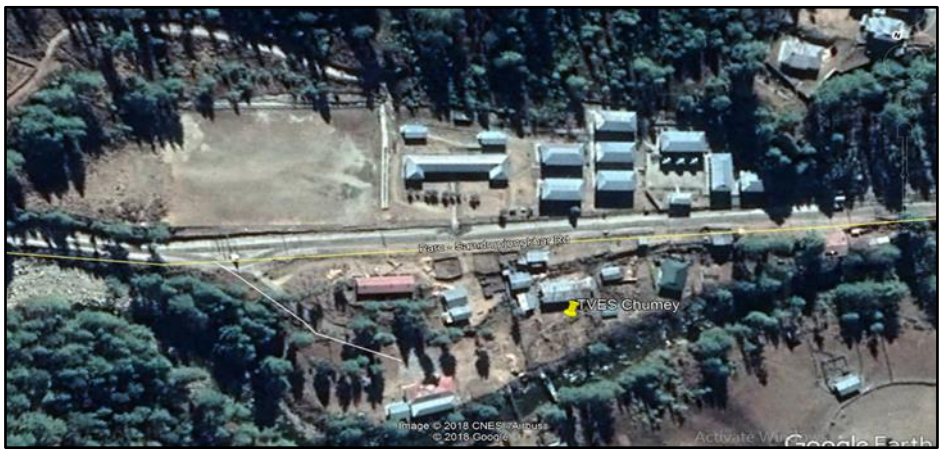


Figure 4.23 Location map, Chumey CS

84. Site visit was conducted by SPCD on 10 December 2017 the same time as the 12th Five Year Plan Consultative Meeting with the Dzongkhags. The school management and SPCD selected the site below the old hostel. The site is flat and construction can start directly with the foundation. There is no need to do extensive site development such as backfilling. The site is below the highway and all academic infrastructures above the highway, thus, minimal disturbance is expected to the students during construction (see **Figure .4.24**)

Figure 4.24 Proposed site of TVE lab in Chumey CS

4.4 Existing environment in *Dzongkhags*

85. This section briefly describes the existing environment based on available secondary data from the *Dzhongkhags* and publications from the government.

[14] DoE, Chumey Central School Basic Amenities and Facilities, 2018.

4.4.1 Thimphu

86. *Geography and topography.* Thimphu City is the capital of Thimphu Dzongkhag located in western Bhutan at 27°30'N latitude and 89°30'E. Thimphu is bordered by Gasa, Punakha and Wangdue Phodrang in the east, Chukka and Dagana in the south and Paro to the west. Its total area is 1,795.87 km^2 at elevation within 2,330 meter above sea level (masl) and 7,300 masl.[15] Thimphu is drained by the Wang Chhu River linearly in a north-south direction. There is no urban agglomeration north of Thimphu, thus, access to the city is limited to the south through Babesa district. Thimphu has a typical V-shaped valley.

87. *Climate.* Based on Köppen and Geiger climate classification, climate is Cwb characterized by mild, generally warm, and temperate throughout the year. Annual mean maximum temperatures range from 14°C to 25°C during the monsoon from June through September but drops to -3°C in January during winter. Total annual mean precipitation is 672 mm.

88. *Geology.* Parent material is limestone, quartzite, garnetiferous mica schist, and calc-silicate. Thimphu has limestone soils which are medium to fine textured with neutral pH and gneiss/quartzite soils that are coarse texture and acidic (Dhital et al., 1992).[16]

89. *Seismicity.* No detailed and comprehensive seismic zonation was conducted yet in Bhutan. However, due to its proximity to northeast India considered to be the "most active" seismic Zone V based on the Bureau of Indian Standards (BIS), it indicates that Bhutan could either be Zone IV or Zone V.[17] Bhutan has adopted the building codes for reinforced concrete buildings according to Zone IV and V of BIS. There are no specific codes for traditional buildings such as stone masonry, rammed earth, adobe construction, and timber construction where they were constructed using indigenous practices passed down through generations.

90. *Water resources.* Wang Chhu River flows through the watersheds of Thimphu and Paro draining into the major river basin of Bhutan. The river provides drinking, irrigation and other agricultural purposes water and industrial uses to human settlements and institutions.

91. *Natural hazards.* Extreme weather events such as heavy rains during summer cause swelling of the river triggering flash floods and landslides. Little or no rain during winter induces seasonal drought and occasional hailstorms that increasingly damage crops, livelihood and infrastructure. On 25 May 2009, cyclone Aila brought unprecedented rain-inducing severe flooding in 17 Dzongkhags which includes Thimphu with an estimated damage worth US$17 million.[18] No rains during winter causes drought which is an emerging concern as it reduces availability of water for drinking and irrigation for agricultural crops. This condition also induces forest fires. In 2013-2014, there were 64 forest fires recorded destroying about 45,095 acres of forests - an increase from the 34 incidences of forest fires burning about 12,175 acres in 2012-2013.[19]

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[15] Dzongkhag at a glance, Thimphu 2017.
[16] Dhital, D.B., Pushparajah, M., Maatta, M. 1992. Forest Management Plan (1992-2002). Gidakom Forest Management Unit, Forest Resources and Development Division, Department of Forest and Park Services.
[17] The World Bank. Seismic Risk Assessment in Thimphu Bhutan. http://siteresources.worldbank.org/INTSOUTHASIA/Resources/223497-1378327471830/SeismicRisk_Bhutan_V5_foreword-email.pdf.
[18] Department of Disaster Management, Disaster Report 2016.
[19] Ministry of Agriculture and Forests, Renewable Natural Resources Statistics.

92. *Biological environment.* Thimphu Dzongkhag falls under the temperate zone encompassing alpine, and glaciers ecosystems of the Himalayan landscapes. The forest type includes cool broadleaf, mixed broadleaf and conifer, mixed conifer, conifer through alpine meadows to glaciers. In the Northwest, bordering Thimphu, Paro, Haa and Samtse in the south, the Jigme Dorji Wangchuck National Park harbours some of the globally important species of plants and mammals. They include tiger (*Panthera tigris*), snow leopard (*Panthera uncia*), wild dog (*Cuon alpinus*), musk deer (*Moschus chrysogaster*), golden langur (*Trachypithecus geei*) listed as threatened or endangered by the IUCN. All these species are totally protected under the Forest and Nature Conservation Act of Bhutan 1995, and Forest and Nature Conservation Rules and Regulations 2017.

43. Socioeconomic *condition.* As of 2015, the total population is 116,012 with 53,647 female and a population density of 64.6 persons km^2.[20] Unemployment rate is 3.6% with labor participation of 55.5%. Total labour force was 45,651 with 18,675 females. Rural water supply coverage is about 99.3% where rural population access to safe drinking water supplies is 97% and access to improved sanitation is 98.3%. *Dzongkhag* waste management committee manages the solid waste management storage, transport and disposal. Total school enrollment is 3,327 students with 210 teachers corresponding to a ratio of 16 students per one teacher. Households are 100% electrified. There are 92 religious institutions and 353 religious monuments.

4.4.2 Punakha

44. *Physical environment*. Punakha *Dzongkhag* is bordered by Gasa in the north, Wangdue Phodrang in the east and north, and Thimphu in the west. It has a total area of 1,109 km^2 and elevation ranges from 1,200 masl to 5,400 masl.[21]

45. *Climate*. Mean annual maximum temperature is 29.35°C in July while the minimum temperature is 9.29°C in January/February during the winter. Mean annual precipitation is 1,203 mm/year.

46. *Geology.* It is similar to many western *Dzongkhag* with limestone, quartzite, garnetiferous mica schist, and calc-silicate. Limestone soils are medium to fine texture with neutral pH and gneiss/quartzite soils that are coarse and acidic.

47. *Water resources.* The Pochhu River (male) and Mochhu River (female), which are glacier-fed, drains the town providing drinking water, irrigation water for agricultural farms along the river, and water for industries. However, the river is subject to climate variability and extremes such as heavy rains that triggers flash floods and occasional landslides.[22]

48. *Natural hazards.* Glacial lake outburst floods (GLOFs) are of particular concern for Bhutan's high mountain glaciers which are reportedly melting at a faster rate than before. It directly impacts drinking and irrigation water as well as hydroelectricity generation for socioeconomic development (NEC, 2011). In 1994, a major GLOF from Luggye Tsho in Lunana north-west of Bhutan caused extensive damage to agricultural farms and pastures, and loss of human lives and livestock along *Pho Chu* River in Punakha.

[20] Thimphu Dzongkhag at a Glance 2016, http://www.nsb.gov.bt/publication/download.php?id=1208.
[21] Punakha Dzongkhag at a Glance 2017, http://www.nsb.gov.bt/publication/download.php?id=1284.
[22] Bhutan Second National Communication to the UNFCCC (NEC, 2011).

93. *Disaster and emergency preparedness.* The *Dzongkhag*'s disaster management committee looks after any disaster emergencies and several other committees such as environment, waste management, etc. deal with emergencies and management issues.

94. *Biological environment.* Punakha Dzongkhag offers a fertile land for growing rice, vegetables and fruit growing environment owing to its rich soil and climatic conditions. Main agricultural crops grown are paddy, wheat, maize and mustard while fruits include citrus, apple, peach and plums. Globally threatened species according to IUCN such as Tiger *(Panthera tigris), R*ed panda (*Alirus fulgens)*, Golden Langur *(Trachypithecus geei)* are found in the Dzongkhag landscapes along with good diversity of ungulates including Musk deer (*Moschus chrysogaster)*, Serow (*Capricornis sumatraensis)*, Takin *(Buorcas taxicolor whitei)*, and Sambar *(Cervus unicolor)*.

95. *Socioeconomics and land use.* In 2016, the total population is 27,838 (13,801 females) with a population density of 25.08 km^2. Unemployment rate is 3.2% with total labour force participation at 16, 944 (9,127 females). About 538 persons are unemployed. Population engaged in agriculture was 73.5%. Total student enrollment is 7,602 (3,916 females). There were 407 teachers (161 females), 13 non-formal education instructors (12 females) and, 80 non-formal education learners (67 females).

96. About 96.7% of the population have access to safe rural water drinking supply while access to improved sanitation is 96.14%. The waste management committee looks after waste segregation, storage, transport, and disposal of waste generated by the Dzongkhag. There are about 40.3 km roads, 4.4 km Thromde roads, 65.99 km Gewog connectivity road, 318 km farm roads, and 59 km forest roads. Land registration by type includes dry land (647 acres), irrigated paddy land (12,538 acres), orchard (42 acres), and 47 km-irrigation channels.

97. There are 17 religious institutions and 130 religious monuments with some of them culturally significant. The historic Dzong is located near the Kuruthang TTI. In terms of public health, infant mortality rate per 1,000 live births is 8.2% with none maternal mortality rate. Less than 1 year old child immunization is in 2015. Less than one-year-old child immunization coverage is 100%.

4.4.3 Wangdue Phodrang

98. *Physical environment.* It is located at 90º05´longitude and 27º 30´ latitude in western Bhutan. Elevation varies at valley bottoms with 1,180 masl in Bajothang while uphill slopes are about 2,200 masl. The valleys are drier than the uphill forested slopes. Total area is 4,029 km^2.[23]

99. *Climate.* Mean annual maximum temperature is 28ºC while minimum temperature is at 10ºC. Wangdue Phodrang falls under the mid-elevation zone with large temperature difference in the valley and uphill forested slopes. The mean annual total precipitation is 668 mm/year.

100. *Geology.* The geology of Wangdue Phodrang is similar to the Thimphu Dzongkhag.

101. *Water resources.* The Punatsangchhu River is a glacier-fed river that drains through the town providing drinking and irrigation water for households, agricultural farms along the river banks, and water for industries and institutions. Similar to other rivers in Bhutan, the Punatsangchhu River is subject to climate variability.

[23] Dzongkhag at a Glance Wangdue Phodrang 2017, http://www.nsb.gov.bt/publication/download.php?id=1276

102. *Natural hazards.* Bhutan has 25 glacial lakes that have been identified potentially dangerous. Raphstreng and Thorthormi lakes have been assigned as the most dangerous lakes and the Pho Chhu sub-basin, which includes the *dzongkhags* of Punakha and Wangdue Phodrang, indicated as the most vulnerable valley in terms of GLOF.[24] GLOF is a major concern to Bhutan's high mountain glaciers reportedly melting at a faster rate due to climate change. The outburst of the Lugge Tso in 1994 resulted to destruction of both human lives and property causing damage to 1,700 acres of agriculture and pasture land, washed away five mills and 16 yaks, destroyed six tons of food grains, washed away houses, caused critical infrastructure damage and killed 22 people. This affected the Pho Chhu River in Punakha and Wangdue Phodrang.

103. The Dzongkhag has a *disaster* management committee responsible for any emergency or disaster and will be supported by several other committees such as environment, waste management committee, etc.

104. *Biological environment*. Most of Wangdue Phodrang is environmentally protected. The northern *half (the gewogs of Kazhi, Dangchu and Sephu) falls within Wangchuck Centennial National Park,* with northwestern pockets belonging to Jigme Dorji National Park. Southeastern Wangdue (Athang and Phobji) is part of *Jigme* Singye Wangchuck National Park. The biological corridors crisscrossing the districts connect and form Bhutan's extensive protected area network.

105. The environmentally precious and vulnerable lands of Phobjika valley are maintained by the Royal Society for the Protection of Nature (RSPN), Bhutan's premier NGO. The Dzongkhag comprised of xeric species such as *Pinus roxburghii (Chirpine), Cotoneaster microphyllus, Leptodermis kumaonensis, Zanthoxylum armatum, Rosa sericea, Berberis aristata, Prinsepia utilis, Colquhounia coccinea, Artemisia* sp., and *Ceratostigma griffithii.* IUCN globally threatened species such as Snow leopard *(Panthera uncia)*, Tiger *(Panthera tigris) R*ed panda (*Alirus fulgens)*, Golden Langur *(Trachypithecus geei)* are found in these landscapes along with good diversity of ungulates including Musk deer (*Moschus chrysogaster)*, Serow (*Capricornis sumatraensis)*, Takin *(Buorcas taxicolor whitei)*, and Sambar *(Cervus unicolor)*.
The Samthang TTI and Bajothang HSS are not located close to these national protected areas.

106. *Socioeconomic conditions.* Total population is 29,109 (14,695 female) in with a population density of 7.2 km^2. Total labour force participation was 24,228 (12,056 female). Unemployed population is 1,000 persons while population employed in agriculture or farming activities is 85.1%. Unemployment rate is 4.1%. Rural water supply coverage is 85.44% with access to safe drinking water at 75.1% while access to improved sanitation is 97.2%. Solid waste management is done by the individual institution/residents in compliance with the waste management guidelines of the Dzongkhag.

107. School enrollment students are 8,208 (3,900 females), teachers are 387 (167 females), non-formal instructors are 24 (16 females) while non-formal learners are 315 (221 females). The total length of roads is 746.9 km. Land use by registration types include dry land (5,294 acres), irrigation paddy land (7,177 acres), and irrigation channels (299 km).

108. About 16,068 tourists visited Wangdue Phodrang in 2016. There are 124 religious institutions and 296 religious monuments. Chimmi Lhakhang is culturally significant to the people of the Dzongkhag and tourists. There are no important physical cultural monuments near Samthang TTI and Bajothang HSS.

[24] UNDP. The Report on the International Conference on Glacial Lake Outburst Flood. 5-7 December 2013.

4.4.4 Bumthang

109. *Physical environment*. Located in the northern part of Bhutan bordered by Lhuntse Dzongkhag in the east, Trongsa and Wangdue Phodrang Dzongkhag to the west, Zhemgang Dzongkhag to the south and the People's Republic of China to the north. It has about 2,667 km^2 of land at an elevation that ranges from 2,711 masl and 6,000 masl across the Dzongkhag.[25] Bumthang is air linked domestically with excellent motor road access that has brought about great socioeconomic development to the people.

110. *Climate.* Bumthang experiences cold climatic condition in winter with relatively cool and mild warm summer days. The annual mean maximum temperature is 25.4°C in July and August and minimum temperature is -9°C in *December* and January. The mean annual precipitation is 769 mm/year.

111. *Geology*. Bumthang geology is characterized by pre-Cambrian to tertiary series of meta-sedimentary migmatites and granitoid rock, soils are rocky, well-drained and acidic with pH of about 5.5.

112. *Water resources*. The Chamkhar Chhu River drains Bumthang watershed into other rivers in the central belt of Bhutan. The river provides an important source for drinking, irrigation, industrial, recreation, and institutional uses.

113. *Natural hazards.* Bumthang is also within the area that will be vulnerable to GLOF. The Dzongkhag has a disaster management committee responsible for handling disaster-related and emergency issues, prevention and awareness. Disaster management committee is supported by other relevant committees in the Dzongkhag such as the environment committee.

114. *Biological environment*. The temperate conifer forest, especially blue pine and spruce occur at the elevation in Bumthang. In the northern zone, forests above 4,000 m elevation are rhododendron and alpine scrub-covered by *perpetual* snow, rock, glaciers, bare ground, marshy areas, water spreads and landslides. Commercially important medicinal plants such *as Picorrhiza* sp, *Gentia aurnula*, *Rhodiola* sp. and *Ophiocordyceps sinensis* commonly known as Cordyceps are high-value export products from high elevation areas in Bhutan. The high altitude areas of Bhutan like in Bumthang are permanent conservation habitats of snow leopard and other cats.

115. *Socioeconomics and land use.* The total population is 18,965 (8851 females) with a population density of 7 km^2. Rural water supply coverage is 100% and the entire population has access to safe drinking water and improved sanitation. Electrification of households is also 100%

116. Total labour force is 7,284 (3,464 females) with unemployment rate of 0.8%. Population engaged in farming is 3.2% and labour force participation rate is 62%. Income from potato, livestock farms and increasing tourists are gradually changing the economic status in Bumthang. The recent legalization of the sale of *cordyceps* has further added to rural income. Sale of Masutake mushroom and medicinal plants have also further enhanced the purchasing power of people of upper Chhoekhor and Ura Geogs. It is expected that economic growth will improve once the Dzongkhag is connected to the Kurichu Hydropower grid. The Kurichhu Hydropower Plant is located at Gyalpozhing, Mongar.

[25] Dzongkhag at a glance, Bumthang 2017, http://www.nsb.gov.bt/publication/download.php?id=1274.

117. Land use type is dry land (2,232 acres), irrigated paddy land (155 acres), apple orchard (40.39 acres), and 55.9 km of irrigation channels. Community forest is 3,514 acres, protected area is 5,819 acres, and forest cover is 59.34%.

118. There are 26 religious institutes and 28 religious monuments. A total of 12,275 tourists visited the Dzongkhag's cultural heritage sites in 2016. Two culturally-significant monasteries, Jambay and Kurjay Lhakhang – a popular among tourists are located in Bumthang but not near or close to Chumey TTI or the Chumey Central School.

119. Total student enrollment was 3,992 (2,026 females), 258 teachers (87 females), 10 non-formal education instructors (4 females), and 98 non-formal education learners (63 females).

120. There are 46 km Dzongkhag roads, 1.7 km Thromde roads, 17.87 km gewog connectivity roads, and 182 km farm roads. Bumthang is well connected to telephone, cable television, and internet.

4.4.5 Trashigang

121. *Physical environment.* Trashigang Dzongkhag is bordered in the west by Mongar Dzongkhag, in the south by Samdrup Jongkhar and Pemagatshel Dzongkhag, in the north by Trashi Yangtse Dzongkhag. It is the largest Dzongkhag with a total area of 3,066 km^2 in Bhutan.[26] The elevation ranges from 600 masl in the valley with human settlements to as high as 4,500 masl.

122. *Climate. The climate is mainly temperate with annual maximum temperature of 34°C in* July/August and minimum temperature of 0°C in December/January. The annual rainfall varies *between* 1,000 mm to 2,000 mm/year.

123. *Geology.* The geology of Trashigang is similar to Bumthang that is typical of eastern Bhutan characterized by pre-Cambrian to tertiary series of meta-sedimentary migmatites and granitoid *rock*, soils are rocky, well-drained and acidic with pH of 5.5.

124. *Water resources.* Drangme Chhu River is one of the largest rivers in Bhutan draining the *Dzongkhag* and providing water for drinking, irrigation and agricultural, and industrial purposes.

125. *Natural hazards.* Trashigang is affected by natural hazards frequently. Similar to other major rivers in Bhutan, the glacial lakes-fed Drangme Chhu River is subject to climate variability and *extremes*. According to the Department of Disaster Management (DDM), the recent torrential rains in 2016 caused extensive flooding in the six eastern Dzongkhags (Mongar, Trashigang, Trashi Yangtse, Pemagatshel, Lhuntse, and Samdrup Jongkhar) resulting in the loss of 9 lives; 29 houses washed away completely; 26 houses totally collapsed and 107 houses partially collapsed; 161 acres of paddy land damaged and 503 acres of dry land washed away and; 39 irrigation channels damaged.

126. Windstorms occurrences are frequent, widespread, and of increasing intensities in eastern Bhutan. The *roofs* of traditional mud and stone-built houses across Bhutan continue to be broken or completely blown away, damaging homes and threatening occupant's lives due to windstorms.

[26] Trashigang Dzongkhag at a glance 2017, http://www.nsb.gov.bt/publication/download.php?id=1292.

127. *Biological environment*. Trashigang is densely forested with broadleaf and conifer forests which stretches from 600 masl along the Drangme Chhu River to conifer and alpine forests at 4,500 masl. The *forest* types are generally classified as sub-tropical broadleaf and chir pine (*Pinus roxburghii*), temperate warm and cool mixed broadleaf forests at mid-elevations grading into pure conifer forests and alpine scrub and pastures at the higher elevation.

128. Trashigang accommodates the Sakteng Wildlife Park, which is home to people of nomadic tribes- Brokpa. The park is characterized by thick carpets of rhododendron trees and bushes which offers habitats and ecosystems for snow leopards, red pandas, Himalayan black bear, barking deer, Himalayan red fox, the hoary-bellied Himalayan squirrel. Bird species include the Assamese macaw, blood *pheasant*, grey backed shrike, grey headed woodpecker, common hoopoe, Rufous vented-tit and dark breasted rose finch. Plants include Bhutan's national flower, the Blue poppy, rhododendrons, primulas and Gentiana all that transform the park into a splendid colour during spring time. There are also many important medicinal plants with high medicinal export values e.g., Cordyceps.

129. *Socioeconomics and land use.* The population is 71,655 (35,309 females) with a population density of 23.4 km^2. Total labour force population is 17, 996 (8,411 females) in 2014 as 2016 figures are not available. There were 106 individuals unemployed with an estimated *unemployment* rate of 0.6%. The population engaged in agricultural farming is 69.3% (2014) and labour force participation at 67.4% (2014). Total students enrollment was 11,407 (5,740 females) in 2016. There were 637 teachers (175 females); 34 non-formal education teachers (27 females), and 359 non-formal education learners (242 females). There are two tertiary institutes: Sherubtse College and an new upcoming college in Youngphula under the Royal University of Bhutan, seven central schools, a higher secondary schools, three middle secondary schools, seven lower secondary schools, 33 primary schools, 3 extended class rooms, 34 non-formal education centers, and 20 early child care and development centers.

130. Rural water supply coverage is 98.9% with rural population access to safe drinking water at 98%. Rural *population* access to improved water and sanitation facilities is 91.6%. The solid waste management (storage, transport and disposal) is done by the Dzongkhag Environment Committee in collaboration with other agencies.

131. There *are* 351 km Dzongkhag roads, 51.1km); 14 km Gewog connectivity roads, 554 km farm roads, and 141 km forest roads. Trashigang is well connected with telephone, and cable TV. Dzongkhag is predominantly dry land (4,170 acres), irrigated paddy land (5,046.5 acres); irrigation channels (37.5 km), with two agricultural extension centers.

49. The Dzongkhag houses the historic Trashigang Dzong built by the highly revered Shabdrung lama in pre-*historic* times. The Dzong houses religious monuments and culturally and spiritually-significant artifacts such as Guru Tshengye, Geoenkhang for Mahakala and Mahakali, Dupthob Thangthong Gyalpo and other great Buddhist saints. There were 1,817 tourists who visited Trashigang in 2016. The Dzong is located far from the Rangjung TTI.

4.4.6 Trashiyangtse

132. *Physical environment.* Trashiyangtse was created in 1992 when Trashigang was separated into two. It is located in the northeastern part of Bhutan bounded by Trashigang and

Mongar in the south. It has an area of 1,438.8 km^2 and at elevation ranging from 500 masl in the valley up to 5,401 masl.[27]

133. *Climate.* Monthly average temperature ranges from 21.95^{o}C in August to 7.7^{o}C in January. Average monthly precipitation is highest in September at 326.3 mm to nothing in November.

134. *Geology.* Trashiyangtse has similar geologic features as Trashigang.

135. *Biological environment*. Trashiyangtse hosts Kulong Chu Wildlife Sanctuary and Bumdeling Wildlife *Sanctuary*.

136. *Natural hazards*. Similar to other *dzongkhags*, Trashiyangtse is also vulnerable to natural hazards. In 2004, due to heavy rainfall, flooding affected six eastern *dzongkhags* which include *Trashiyangtse* as one of the most affected. There were nine lives lost, 29 houses completely washed away, 26 houses collapsed and 107 houses partially damaged, 161 acres of wetland and 503 acres of dry land washed away, and 39 irrigation channels damaged.

137. *Water resources.* Kulong *Chhu* River provides water for Trashiyangtse for various uses.

138. *Socioeconomics and land use.* The total population in 2016 is 20,874 (10,588 females) with population density of 14 persons per km^2. Average household size is 4.3. Coverage of rural water supply is 99%. Rural population with access to safe drinking water supply is 99% and access to improved sanitation is 93%. Households are almost 100% electrified.

139. Unemployment rate is 2.8% and labour force participation rate is 57.2%. Number of people working is 8,132 (3,755 females) and those engaged in agriculture is 67.1%.

140. Community forest consists of 6,490.5 acres while protected areas cover 375,607 acres which are mainly the two *national* parks. Forest cover is 76%.

141. Literacy rate is 60.4%. Total school enrollment is 4,976 (2,660 females) and the teacher to student *ration* is 1:15.

50. Land *registration* by type includes dry land (2,400 acres), wet land (10,813 acres), orchard (0.5 acre), and irrigation channels (153.76 km). There are 175 poultry farms in 2016.

[27] Trashiyangtse at a glance 2017, http://www.nsb.gov.bt/publication/download.php?id=1279.

V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

142. The potential environmental impacts of STEP UP are mainly during the construction phase which are temporary, of short duration, localized and can be easily mitigated through the implementation of the *environmental* management plan (EMP) and environmental monitoring plan (EMoP), and compliance by the Contractor to the approved building design and relevant regulations on building construction, occupational and environmental health and safety.

5.1 Pre-construction and design phase

5.1.1 Output 1 – new buildings for TTIs

143. At this stage, surveys and detailed design of the new Thimphu TTI and the additional buildings (*hostels*, workshop and classrooms) for Samthang TTI will be finalized by the Design & Supervision Consultant that will be engaged by the project during implementation. Detailed designs of each building will be undertaken based on the requirements of Bhutan Building Rules (BBR) 2017[28], Thimphu Thromde Development Control Regulations (DCR) 2016, and Thimphu Structure Plan 2002-2027.

5.1.2 Output 3 – new single-storey building as TVE labs for seven secondary schools

144. The typical basic design of the 13 single-storey TVE labs for the seven secondary schools is given in **Figure 4.2** and **Annex 4**. The designs were prepared by the MOE through the School Planning and Building Division (SPBD) in consultation with the School Planning and Coordination Division (SPCD). However, the final design may be adjusted to blend with the existing structures within the premises of the seven secondary schools, and will depend on the location and area available. The adjustments will be consistent with building codes and regulations in Bhutan.

145. The main associated risks and impacts in these interventions are insufficient building design and non-*compliance* to the requirements provided for in the Thimphu Thromde DCR 2016, Thimphu Structure Plan 2002-2027, and BBR 2017. This could result to limitations and inappropriate design without adequate consideration for seismicity and other natural hazards including climate change.

146. Bhutan has no seismic design code of its own and a detailed and comprehensive seismic zonation has not *yet* been conducted. Given its proximity to northeast India, which is in the "most active" seismic Zone V according to the Bureau of Indian Standards (BIS), it indicates that the majority of Bhutan is in either Zone IV or Zone V based on maximum credible earthquake. From this assumption, Bhutan adopted the BIS building codes for reinforced concrete building since 1997.[29,30] Specifically, BIS 1893:2002 (Criteria for Earthquake Resistant Design of Structures) is referred to in the analysis and design of new buildings in Bhutan. **Figure 5.1** shows the seismic zone based on BIS zoning.

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[28] Bhutan Building Rules 2017 (Replaces the Bhutan Building Rules 2002 and Rural Construction Rules 2013), www.mowhs.gov.bt/wp-content/uploads/2017/05/Bhutan-Building-Rules.pptx

[29] World Bank. Seismic Risk Assessment in Thimphu Bhutan.nda.

[30] Seismic zoning is a process of subdividing areas based on expected of ground motion during an earthquake which is expressed in terms of peak horizontal ground acceleration (PGA) or peak ground velocity (PGV). Seismic zone IV has PGA of 0.25g and Zone V is given a PGA of 0.4g (An Overview of Seismic Zonation Studies in India. Mohapatra, A. K and Mohanty, W. K., 2010. Indian Geotechnical Conference – 2010, GEOtrendz).

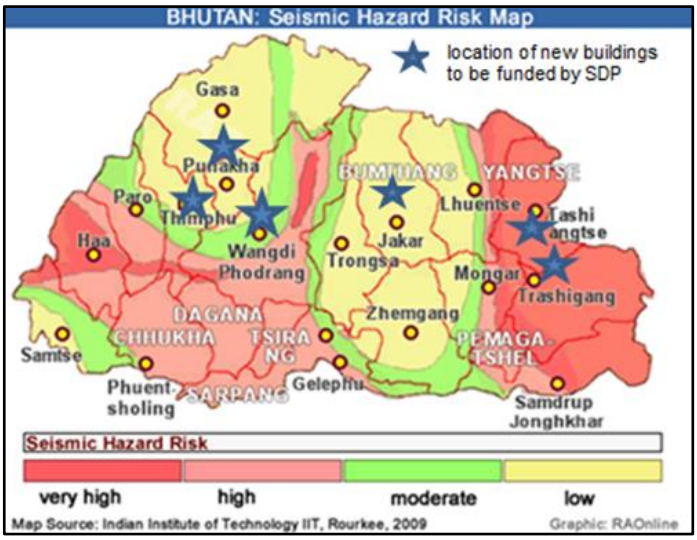


Figure 5.1 Location of new buildings to be funded by STEP UP

147. Of the new buildings to be funded by STEP UP, five TVE labs for secondary schools will be located in a very high seismic hazard risk according to Figure 5.1. However, these new TVE labs will be one-storey building designed by SPBD, MOE and has considered these risks. In addition, the MOE requires schools to have a Disaster Management Plan, designate a Disaster Coordinator, and create a Disaster Management Committee.

148. To minimize these risks, the Design & Supervision consultant during implementation and under the *supervision* of the PMU in MOLHR and MOE will ensure that the final building design will comply with mitigation measures to risks of earthquake, windstorms, and flooding; BBR 2017, Thimphu Thromde DCR 2016, Thimphu Structure Plan 2002-2027, and the government technical design standards for natural hazards. Given the elevation challenges in Bhutan, the Design & Supervision consultant will explore the possibility of designing the buildings as "green" based on the provisions of Bhutan Green Building Design Guidelines 2013.

149. At this stage also, the location of borrow areas, sources of construction material, and the sites of *construction* camps and stockyard/warehouse will be identified and finalized in consultation with the PMUs, Thimphu Thromde, and NEC. Bidding documents and civil works contracts will have special conditions on environment, health and safety as well as inclusion of the EMP as separate annex.

150. The MOE and MOLHR have no capability on safeguards implementation according to SPS 2009. The Environmental Safeguard consultant that will be engaged during implementation will conduct *orientation* training on the environmental requirements of the government and ADB to the designated staff of MOE and MOLHR who will be involved in project implementation and the representatives of the Contractors.

5.2 Construction phase

151. Environmental Codes of Practice (ECoP) relevant during construction phase are given in **Annex 5**. Contractors will be required to comply with these ECoPs as well as the EMP.

152. Construction phase will involve recruitment of workers and staff, mobilization of Contractors, equipment and machineries, site preparation, civil, mechanical and electrical works. Prior to constructions works, the PMUs will ensure that the Contractor will include the responsibility for compensation of *any* damage, loss or inconvenience resulting from failure to comply with regulations. A construction management plan (CMP) will be required from the Contractor delineating how the potential environmental impacts during construction will be addressed. The workplan will cover traffic control, work schedule, waste management, noise and dust control, occupational health and safety and community safety risks.

5.2.1 Construction management plan requirement

153. A CMP will be required from the Contractors of both Output 1 and Output 3 to help avoid executing unplanned activities and will guide the smooth implementation of earth-moving works, construction of the buildings, civil, mechanical, and electrical works including restoration of the site and the existing access roads. The CMP will cover work scheduling, occupational and community health and safety, temporary pedestrian and traffic management, spoils disposal and construction waste, noise and dust control, drainage and stormwater management, materials storage and management, and emergency/disaster preparedness. The CMP will also identify locations of temporary road crossings (if needed) accommodating children, elderly, and persons with disability. The emergency/disaster preparedness will include critical information for workers on where to go, what to do, and what not to do. An emergency survival kit will be provided and emergency contact details will be posted in billboards clearly at the construction sites.

5.2.2 Recruitment/hiring of staff and presence of workers on-site

154. Job opportunities for both skilled and unskilled workers will be created during construction phase. During recruitment, there is potential for conflict over transparency, migration of workers, and foreign workers. Hiring of local labour will be priority and foreign workers will be considered if there is insufficient local labour. Relevant provisions on recruitment and working conditions as set forth in the Regulations on Working Conditions 2012 issued by the MOLHR will be complied with by the Contractors.

155. Presence of workers may increase demand for services like food, temporary housing, etc. This will create *opportunities* for small-scale business to local residents. PMUs of MOLHR and MOE will monitor the recruitment of workers and staff to ensure transparency and avoid local conflicts.

5.2.3 Orientation to workers

156. Prior to any construction works, the PIUs of MOE and MOLHR together with the Environmental Safeguard consultant will hold a briefing for workers and staff of the Contractors about the environmental requirements of the government and ADB that need to be complied. This orientation aims to create awareness on their responsibility for implementing the EMP, compliance, effective record keeping, and environmental reporting. The briefing will include awareness on communicable disease like tuberculosis and about HIV/AIDS to prevent potential incidence in the workplace.

157. To prepare for emergency, a response team and Disaster Coordinator to guide during emergency/disaster situation will be created and to inform workers that mock drills will be conducted regularly. Participation of workers and staff to mock drills will be mandatory. Aside

from the mock drills, training on proper response during emergency will be conducted at least annually throughout the construction phase.

5.2.4 Siting of construction stockyard, labour camps, sourcing and transport of construction materials

158. To avoid the danger of sourcing materials from illegal providers, construction materials will be sourced only from providers approved by the government. Sand and stones will be procured from the Natural Resource Development Corporation Limited, authorized supplier of sand in Thimphu. Siting of construction camps will be selected in consultation with the PIUs as improper location can cause inconvenience to workers. Construction camps and stockyard will not be located within the Serbithang site as the flat area is limited.

159. Should a Contractor decide to operate quarry, necessary permits and clearances from relevant agencies of the government will be obtained prior to start of operation. The Contractor will ensure that the quarry, to provide materials in MOLHR and MOE construction sites, is maintained in stable condition, appropriately landscaped, and if taken from the river, should not disrupt the flow of river or damage the river banks causing erosion.

160. Stockyard and construction sites will be properly enclosed and gated (with designated security personnel) to prevent entry of unauthorized persons.

5.2.5 Demolition of existing structures in Serbithang site for Thimphu TTI

161. In Output 1, there are three existing structures at the Serbithang site for the Thimphu TTI. These structures were used by the Thimphu Thromde for their pilot compost plant. The two structures were for compost operations and one building for the staff of Thimphu Thromde. These three structures will be demolished. Given the type and characteristics of the buildings that will be demolished (i.e., one storey, refer to Figure 4.4), no blasting or wide-scale demolition works will be involved.

162. Demolition works will generate waste, may increase dust and noise level, and may pose occupational and community safety risks. The Contractor will prepare a demolition plan and will secure demolition permit from the Thimphu Thromde. Demolition plan will include information such as: location of the site, overall height of the structure above ground level and the least distance from the structure to the site boundary, type of building and the structural support including materials of its construction, proposed method of demolition, handling and disposal of demolished materials, duration of demolition works, safety and emergency arrangements. Demolition works will not commence prior to the issuance of the required permit from the Thimphu Thromde. The PIUs of MOLHR will ensure compliance of the Contractor.

163. Similarly, the site will be enclosed to contain dust and minimize noise. Workers who will be involved in *demolition* works will be provided with safety gear and personal protective equipment (PPE) and demolition works will be done during daytime only.

164. PMUs will ensure that ambient air quality limits set by the IFC-WB EHS General Guidelines 2007 (Table 1.1.1) will not be exceeded during construction phase. Noise generating activities will be limited to daytime hours only. Daytime is described in Bhutan Environmental Standards 2010 as starting at 6:00 AM and ends at 10:00 PM while in IFC-WB EHS General Guidelines 2007 it starts at 7:00AM until 10:00PM.

165. Environmental Standards 2010 issued by the NEC are less stringent compared to the IFC-WB EHS General Guidelines 2007. The ADB's SPS 2009 provides that when host country regulations differ from the levels and measures set by the IFC-WB EHS General Guidelines 2007, host country will achieve whichever is more stringent. In this case, the IFC-WB EHS General Guidelines 2007 will be the relevant limits that Contractor needs to comply.

5.2.6 Site preparation, vegetation and land clearing, and other excavation works

166. Prior to site preparation, the Contractor will consult/coordinate with respective agencies of the government to identify the location of sewers, drains, water pipes, electricity and telecommunication cables, and other services; and structures that may be affected/encountered during land clearing. Earthmoving works, excavations, vegetation clearing, and opened land areas in Serbithang, Samthang, and construction sites for the 13 TVE labs in secondary schools may increase dust levels and vehicular emissions as well as noise levels from the use of heavy equipment and construction vehicles. These movements may cause disturbance and inconvenience to local residents. Excavation works may be potential for "chance find" of physical cultural resource (PCR). Rain events may result to localized flooding and erosion. There will be loss of some evergreen trees in Serbithang as well as in Punakha and Khuruthang (about 12 trees). Associated works during site preparations may pose health and safety risks to workers and community as well as generation of waste from vegetation clearing.

167. Water will be sprayed at least twice a day (or as needed) to opened land areas to contain dust and adequate enclosures will be provided by the Contractor in areas where dust is generated. Trucks transporting materials that generate dust will be covered also. As well, opened land at the construction sites will be covered with tarpaulin or other appropriate cover during non-working time. Contractors will be required to keep construction vehicles properly tuned up and no smoke belching will be allowed.

168. Construction activities that generate noise will be done only during daytime but will be adjusted contingent to weather and season. Drivers will be required to observe low speed and there will be no blowing of horns or whistle unless absolutely necessary. Noise level limit of 65 dB(A) during daytime and 55 dB(A) at nighttime as set by NEC Environmental Standards 2010 will be complied with by the Contractors. Workplace noise level is 75 dB(A) at any time. Workers will be provided with earmuffs or rotated every two hours to activities with less noise generation.

169. A staff from the Contractor will be assigned to maintain the flow of traffic to avoid inconvenience to local residents and secondary students. Contractors will ensure that daily activities of secondary students will not be affected during construction of the 13 TVE labs. Contractor will coordinate with the PIUs of MOE and the Principals on work schedule in the 13 TVE labs. If needed, the Contractor will let the local residents in Serbithang and Samthang know of the work schedule to make them aware of the scale of activities and potential disturbance.

170. The Contractor will provide adequate garbage bins and will require workers to segregate waste for easier collection and disposal to Memelakha dumping site and other location identified by the Thimphu Thromde or the Environment Sector of the Dzongkhags. Good housekeeping at the construction sites will be enforced at all times. The PIUs and the Environmental Safeguard consultant will monitor compliance.

171. A "chance find" procedures given in Annex 1 will be followed by the Contractors in the event a PCR is encountered. Sufficient lights, clear and visible warning signs and danger signals

will be provided to prevent accidents. Toolbox meetings will be held prior to start of construction works to remind workers daily of the importance of observing safety rules and procedures.

172. Appropriate scaffoldings will be installed and wearing of safety gears and clothes by workers will be mandatory. Sanitary facilities, safe drinking water, first aid kits, emergency survival kits, and fire-fighting units will be provided by the Contractor at the construction sites. Given the distance and condition of roads in Samthang, and Serbithang, a life-saving apparatus will be made available at the construction sites. The Contractor will assign a nurse or health care practitioner to make rounds at the construction sites at least once a month to check on the sanitary and health condition of workers.

173. The PIU of MOE and MOLHR, and the Environmental Safeguard consultant will ensure that the Contractor will implement the EMP and the CMP approved by the PMU.

5.2.7 Operation of construction camps

174. Operation of construction camps will generate sewage and other waste from workers. A mix of local and foreign construction workers may cause conflict. To mitigate these impacts, sanitary facilities, safe drinking water, adequate lighting, first aid, garbage bins, and fire extinguishers will be provided at *the* construction camps. Good housekeeping will be followed at all times. Workers will be made to understand that safety rules and procedures at the labour camps will be strictly enforced and any violation will be dealt with accordingly. ECoP on Management of Construction camps will provide guidance to Contractors on the requirements. The PIU and the Environmental Safeguard consultant will monitor the condition of labour camps regularly.

5.2.8 Maintenance of construction vehicles and fuel depot

175. Fuel depot will not be allowed at Serbithang and in 13 sites for TVE labs in secondary schools. There is limited space to maneuver tankers in Serbithang and the scale of construction works in TVE labs does not justify keeping a fuel depot. It will be a fire hazard and since the TVE labs will be within the existing secondary schools, this will not be allowed. The Contractor will be required to consult with the PIU in this regard to ensure construction works will not be disrupted. Fire-fighting units will be provided by the Contractor in all construction sites (i.e., Serbithang, Samthang, and in seven secondary schools where 13TVE labs will be constructed).

5.2.9 Construction of the new buildings

176. Potential impacts will be non-compliance to relevant regulations/codes/standards on civil, mechanical, and electrical. The associated works may be potential for accidents due to working on heights in Serbithang and Samthang as well as non-observance of workers to safety rules and *procedures* such as not wearing of PPE and safety belts, etc. Construction of buildings will also generate waste and may pose occupational and community safety risks.

177. The Design & Supervision consultant, the PIU, and the Environmental Safeguard consultant will monitor compliance of the Contractor to codes/standards/regulations in accordance with the final approved building design *particularly* the new Thimphu TTI and Samthang TTI. The Engineering Sector of the Thimphu Thromde and the respective *Dzongkhags* will conduct building inspection from time to time as the construction progresses.

5.2.10 Clean-up of construction sites after completion of construction works

178. There may be a possibility for improper disposal of construction debris and other wastes. Adjacent properties in Serbithang may be potentially damaged including sewers, stormwater drains, and other utilities in Samthang, and the sites in secondary schools.

179. The Contractor will reinstate all areas that may be potentially damaged during construction stage to pre-project conditions. The Contractor will secure all relevant permits for disposal of construction debris from the Thimphu Thromde and the *Dzongkhag* administration in Punakha, Wangdue Phodrang, Bumthang, Trashigang, and Trashiyangtse. The Engineering Sector of Thimphu Thromde and the five *Dzongkhags* will inspect the buildings to ensure compliance with relevant regulations.

5.3 Post-construction phase

180. At this stage, potential impacts are mostly beneficial as the trainees and secondary school students will *get* to use and enjoy the comfort of the new TTI, hostels, classrooms, workshops, and the TVE labs. In addition, with the tools and equipment upgrade provided by STEP UP to the five TTIs and basic tools for the TVE labs in the seven secondary schools, the trainees and secondary students will be able to experience the benefits of new learning associated with these new equipment.

5.3.1 Use and/or occupancy of new buildings

181. Potential impacts associated with post-construction include the improper use and lack of care to the new buildings, generation of waste, and incidence of emergency or natural disaster.

182. To mitigate these potential impacts, the MOE and the MOLHR through the TTI management and the school management of the seven secondary schools will conduct orientation and awareness briefing to staff, trainees, and students on the proper management and care of the new buildings and upgrade of tools and equipment. Maintain and enhance the efforts on waste management through the Waste Management Coordinators in the TTIs and the secondary schools. A Waste Coordinator will be designated if there is none yet. Conduct yearly training/orientation to new trainees and students on waste management, proper collection and disposal. The TTIs and secondary schools are currently doing waste management such as Babesa MSS, Samthang TTI, etc. that benefits the students and schools.

183. Thimphu TTI will explore ways and strategies of “greening” their new campus as showcase of best practice in Bhutan. The new buildings will include the use of energy-efficient lights and appliances, double glazed windows to reduce energy consumption, pre-fabricated doors and windows, etc. Any efforts in advancing this objective will be included in the environmental monitoring reports to be submitted to ADB. Also, to look for ways to implement more effectively the principles of reduce, reuse and recycle.

5.3.2 Potential incidence of emergency or natural disaster

184. Bhutan is vulnerable to several natural hazards such as earthquake, GLOF, flash flood, windstorms, forest fire, and landslides that posed varying degrees of threat to human lives, livelihoods, and properties. **Table 5.1** shows the disaster statistics from 2000-2015.

Table 5.1 Disaster Events, 2000-2015

Disaster types	Total Disaster	Total Casualties	Damages
Earthquake	8	13	12,053 rural houses affected
Flood and windstorm	4	70	3,778 homes affected
Land Slide	7	5	Highways disrupted and 28 acres of wetland affected
Fire in human settlements	7	3	150 houses and Wangdue Phodrang Dzong burnt down
Total	**26**	**91**	
Source: DDM			

185. The government relies on the BIS building codes (BIS 1893:2002) as guide in constructing reinforced concrete buildings. These codes will be referred to and followed in the design of the Thimphu TTI, additional buildings for Samthang TTI, and the 13 TVE labs. MOE requires schools to have a Disaster Coordinator and the preparation of a School Disaster Management Plans. To reduce the impacts of earthquake risks, all the TTIs will be required to prepare a Disaster Management Plan identifying evacuation sites and outlining procedures for implementation. A Disaster Coordinator needs to be assigned if there is none yet. TTIs need to create awareness to trainees on emergency preparedness through mock earthquake drills conducted yearly preferably during the start of school term where there are new trainees. Clear and visible posters will be posted to classrooms, workshops and hostels. An information campaign about earthquakes will be a continuous activity in the TTIs. Information on how TTIs addressed emergency preparedness will be included in the environmental monitoring report submitted to ADB.

186. On the risks of GLOF, Punakha –Wangdue valley is considered as one of the most GLOF-vulnerable areas in Bhutan. The Pho Chhu River flows into the Punatshang Chhu River where Punakha, Khuruthang, and Samthang are located. Three different hazard zones based on the degree of risk exposed to GLOF were identified: red, yellow and blue described below:

- **Red Zone** - represents high risk areas where most probably water level will reach and the areas will be submerged in case of the worst case scenario. This is a restricted zone where in case of worst case GLOF in future, the structures will be submerged under water.
- **Yellow Zone** - represents medium risk areas where most probable indirect impact of GLOF can occur during the worst case scenario. Future developmental activities should be planned accordingly.
- **Blue Zone** - represents the areas that are found safe from the worst case of GLOF.

187. The worst case scenario was based on the future occurrence of GLOF with 53 million m^3 of water (combination of Rapstreng and Thorthormi Tso). **Table 5.2** shows the hazard zone and evacuation site.

Table 5.2 Details of Evacuation Sites[31]

TTI/Secondary School (Hazard Zone)	Distance to the Proposed Evacuation Site	Direction to move to avoid GLOF	Time Estimated on normal walk	Evacuation Area No. & Elevation	Remarks
Samthang TTI (Yellow)	50 m to 100 m	East	Less than 1 minute (min)	EVA* No. 24 and at 1,218 m	Driving training ground and other structures at 3m below the road are in red zone
Khuruthang TTI First 3 permanent building, 1 pump house 1 temporary house (Red Zone)	150 m to 200 m	N30ºW	2.5 mins	EVA No.21 1,221 m (Khuruthang Middle Secondary School Compound)	Alternative exit 200 m due N35°W in 2.5 minute walk to same site.
Kuruthang TTI Main complex 8 buildings) (Red Zone)	200 m to 250 m	West	3 mins to 4 mins	EVA. No.22 1,231m (Located above taxi/bus parking)	All infrastructures fall within red zone. Accessibility to the EVA site is poor due to fencing of compound
Punakha CS teachers quarters and supporting staff's quarters Red Zone)	120 m	S70ºW	1.5 mins	EVA. No 12 1,236 m Located at basketball court	These houses are occupied by school teachers. (Photo 24)
Bajothang HSS (Red and Yellow)	200 m to 300 m	N35ºW to N45ºW	3 mins to 4 mins	EVA No. 28 1,227m (Abandoned paddy field above the road)	Wire fenced around school compound may create problem for freely escaping at time of emergency.(Photo16)

*EVA - evacuation

[31] Department of Disaster Management and Department of Geology and Mines. Hazard Demarcation Report. Samthang_page 14 and 15. Nda.

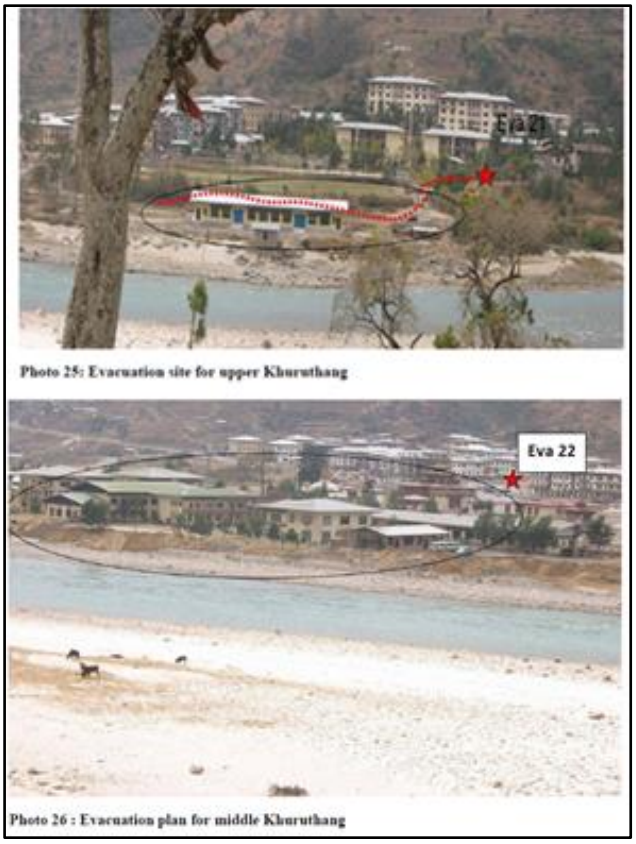


Figure 5.2 Evacuation sites for Khuruthang TTI

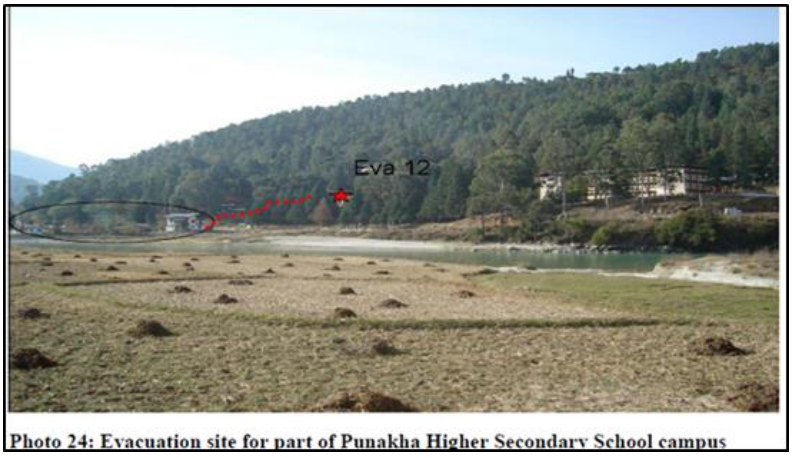


Figure 5.3 Evacuation site for Punakha CS

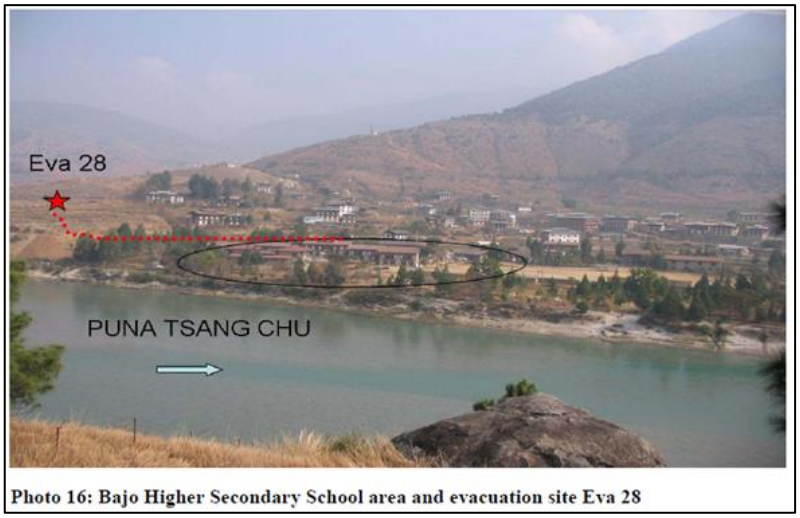


Photo 16: Bajo Higher Secondary School area and evacuation site Eva 28

Figure 5.4 Evacuation site for Bajothang HSS

188. Samthang TTI is located in the yellow zone. All the existing structures are located above the road and are considered safe in the event of flooding. Khuruthang TTI is in the red zone. Only tools and equipment upgrade will be provided to Khuruthang TTI.

189. The government has done measures to minimize the risks of impacts to Punakha-Wangdue valley such as automated early warning system, river retaining walls along the Punatshang Chhu River in the stretch along the Khuruthang TTI and in Samthang TTI, and information drive to create awareness of the risks and danger. There are 6 remote automatic water level monitoring stations and automatic weather stations, and 17 sirens located within the Punakha-Wangdue Valley to warn vulnerable communities along the Punatshang Chhu River in the event of flooding. The siren stations are placed high above the population centers for maximum sound projection. Evacuation sites (see Table 5.2) have been identified to ensure that people know where to go in the event of flooding.

190. There are a total of 23 organizations involved in different aspects of disaster risk reduction in Bhutan. This comprises of 13 government organizations, four state-owned enterprises like the Bhutan Power Corporation, four international organizations like Japan International Cooperation Agency, and two national NGOs like Loden Foundation.

191. To sustain awareness on emergency preparedness such as earthquake and GLOF, trainees and secondary students will have regular mock drills and to ensure that there is an updated and working Disaster Management Plan.

5.3.2 Replacement of new tools and equipment in five TTIs

192. The old and obsolete tools and equipment from the existing Thimphu TTI in Changzamtog, Thimphu; Samthang TTI, Chumey TTI, Khuruthang TTI, and Rangjung TTI will be replaced with upgrades. Potential impacts will be improper disposal of the replaced tools and equipment. Lack of inventory/tracking of these tools may not have a record or list of those for disposal.

193. To ensure proper disposal and management of replaced tools and equipment, the Principals together with the school management will prepare an inventory or list that will show tools and equipment reused/recycled or sold, those disposed to designated disposal sites, and

those turned over to the Department of National Properties. This list will be included in the environmental monitoring report to be submitted to ADB once a year. Environmental monitoring reports are publicly disclosed to ADB website.

VI. ANALYSIS OF ALTERNATIVES

194. Several factors were considered in selecting the sites for the interventions proposed such as need of the TTIs for new infrastructures, demand for the courses to prepare the youth for future employment, safety of students, need for upgrading of courses to meet emerging requirements and technology, availability of funding, etc. Both the "no project" and "with project" options have been studied.

6.1 "No project" option

195. The "no project" option means that the area in Serbithang will remain as the pilot site for composting in Thimphu Thromde and more empty spaces in Samthang TTI in Wangdue Podrang. Given the limited availability of less rugged terrain in Bhutan suitable for development, no alternative site for the new Thimphu TTI was considered. For the Samthang TTI, there is available land within the existing site owned by MOLHR, thus, no alternative sites were considered. **Table 6.1** presents a comparison of "with project" and "no project" options.

Table 6.1 Comparison of "with project" and "no project" options

Description	"With Project" Option	"No Project" Option
Creation of jobs/employment	There will be demand for skilled and non-skilled workers during construction of the new buildings.	Limited or no possibility for job creation
Potential impacts to ecologically-sensitive areas	No protected areas or national parks near or adjacent to Serbithang, Thimphu and Samthang TTI. TVE labs will be within the existing secondary schools	Existing environmental condition will be the same
Potential impacts to terrestrial flora and fauna	Some vegetation (trees and shrubs) in Serbithang for the new Thimphu TTI will be cleared. Samthang TTI site has some shrubs planted by administration. For the secondary schools, there would be about 6 trees that may be cleared in Punakha Central School to give way for the TVE lab and 6 trees in Khuruthang MSS.	Existing environmental condition will be the same
Disruption to local residents during construction	There is a potential for traffic congestion to occur as there is only one major road access to the sites in Serbithang and in Samthang TTI, Wangdue Phodrang. If needed, re-routing may be done in consultation with Thimphu Thromde, Dzongkhags and Road Safety and Transport Authority.	Traffic may also happen
Disruption to secondary classes during construction	Site selected by the MOE considered and ensured that there will be minimal disruption to students.	No impact
Opportunities for the youth to have more options for technical training	There will be variety of courses, training, and private sector connection to ensure that the chances of trainees' employability will be improved.	None

6.2 "With project" options

6.2.1 Site for Thimphu TTI

196. There was no alternative site considered for Thimphu TTI as there is limited availability of the government land for development. Serbithang is about 10 km away from the main town, Thimphu. The total available land allocated for the National Biodiversity Centre (NBC) is 11.77 acres. Three acres was used by Thimphu Thromde for compost making. Following complaints from the public on bad odour coming from the compost, the operations were relocated to Memelakha (about 10 km along the Thimphu-Wangdue Phodrang highway). This available land has been reallocated to MOLHR for infrastructure under the skills development project. The current site of the Thimphu TTI in Changzamtog, Thimphu is being rented by the government and the space is small for the needs of the trainees. The new Thimphu TTI is consistent with the land use approved in the Serbithang Local Area Plan (LAP).

6.2.2 Samthang TTI

197. No alternative site was considered as there are available spaces within the premises. As the new buildings are for hostel, workshop, and classroom, it is in the best interest of the trainees to have them within the premises. While there are other spaces below the road, these areas have been assessed as "red zone" in the event of GLOF. The red zone is 1- 2 m below the road. The proposed site for the new buildings will be in yellow zone and about 200 m away from the red zone.

6.2.3 TVE laboratories for selected secondary schools

198. Criteria considered in selecting the proposed sites for the TVE labs to be constructed within the existing secondary schools are environmental and social factors which include the following:

(i) minimal disruption to students during classes when construction is ongoing;
(ii) should be more than 30 m from the edge of a river or major stream/edge of gullies;
(iii) should be more than 15 m from the edge of all natural rivulets/gulleys and natural drainage channels;
(iv) will not entail major site/land development like backfilling or cutting of slopes;
(v) should not cause clearing of trees and/or avoidance of trees; and,
(vi) easy access during construction.

a. Punakha Central School

199. Two TVE labs are earmarked for the Punakha Central School to provide for the courses on mechanical (arc and gas welding) and electrical (house wiring). The school management and the School Planning and Building Division (SPBD) of the MOE identified two sites for the proposed TVE labs within the existing school campus of about 54.54 acres. While the campus area is relatively large, there are few options suitable for development due to the steep topography and presence of existing school facilities.

200. During the site visit in December 2017, the two sites identified are relatively flat located above the existing highway. It is about 150 m away from the Punatsang chhu (river). The other

site near the boys' hostel can accommodate only one laboratory while the other location below the girls' hostel can accommodate both the laboratories.

201. The location near the girls' hostel is recommended as it can accommodate both the laboratories. However, it is recommended that the location be moved farther away from the existing girl's hostel towards the south-east in order to maintain some open space in front of the girl's hostel and also to avoid the sheer drop to the highway below. The proposed site will affect six trees.

Identified location below the boys' hostel

Identified location infront of the girls' hostel

Recommended location

b. Khuruthang MSS

202. For Khuruthang MSS, two TVE labs will be provided also to accommodate mechanical and electrical elective courses.

The school management and SPBD have identified two sites within the existing school campus.
203. During the field visit in December 2017, the two sites identified are relatively flat located above the existing highway. It is about 140 m away from Punatsangchhu River. One of the sites has been identified towards the south-west portion of the school campus and would entail cutting down of about six trees. The other one is located towards the north of the campus and is adjacent to an access road near the school toilet. This location is recommended. However, the existing underground water supply line has to be identified and avoided.

c. Bajothang HSS

204. The Bajothang HSS will have one TVE lab for automobile. The school management and SPBD have identified sites for the proposed TVE lab within the existing school campus. The identified locations are relatively flat but in close proximity of the Punatsang chhu (river) within a distance of about 30 m which is considered to be environmentally sensitive and high hazard. Therefore, an alternative location was identified during the site visit in December 2017 also within the school campus. This location is near the existing Punakha-Bajo highway and is about 240 m from the river.

VII. INFORMATION DISCLOSURE, CONSULTATION, AND PARTICIPATION

7.1 Introduction

205. Consultations are required both by national environmental regulations as well as ADB's SPS 2009. This process aims to involve key stakeholders throughout the project implementation and to know their concerns and perceptions about the project. Consultations are opportunities to ensure public participation, provide information about the project, and to know their perceptions and/or concerns prior to project implementation.

7.2 Methodology

206. Letter from the MOLHR were sent to Thimphu Thromde and Dzongkhag Administration of Wangdue Phodrang in January 2018 to inform them of the consultations for the project. Two consultations were undertaken on 31 January 2018 at Serbithang and on 2 February 2018 at Samthang TTI. Only primary stakeholders attended the consultations.

207. One-on-one interviews were also conducted in Serbithang on 31 January 2018 for a total of seven respondents and in Samthang, there were seven respondents also interviewed on 2 February 2018.

7.3 Consultations during the preparation of the IEE

208. A total of 15 persons were consulted for the two events on 31 January 2018 and on 2 February 2018. **Table 7.1** presents the summary of consultations in Serbithang while **Table 7.2** gives the summary for Samthang TTI. List of participants are given in **Table 7.3** and photographs of consultation in **Figure 7.1**.

Table 7.1 Summary of consultation, Serbithang

Stakeholder	Issues/benefits raised	Response from MOLHR/TTI/Project Team
Residents	Limited awareness about the project to Serbithang resident communities	More information will be made available at the MOLHR website as soon as the interventions are finalized. Consultations will be part of project implementation.
	How the project activities will benefit the communities is unclear?	It is expected that jobs will be created for skilled and non-skilled workers associated with the construction phase. Local hiring will be a priority but there may be a chance to have foreign workers as well.
	Narrow access road to the proposed Serbithang TTI may cause traffic, noise and air pollution temporarily during construction	To avoid potential traffic congestion, a traffic management plan will be required from the Contractor(s). Delivery of construction materials will not be carried out during rush hour. Vehicles transporting materials that generate dusts will be covered. If needed, re-routing can be done from the Royal Thimphu College in

Stakeholder	Issues/benefits raised	Response from MOLHR/TTI/Project Team
		consultation with the Thimphu Thromde.
Residents	Presence of unemployed youth creating mischiefs/crimes in the area	Jobs that may be created for unskilled workers during construction will consider priority for local hiring priority. MOLHR will require the Contractor(s) to consider available local labour.
	Noise pollution from the nearby populated dog rehabilitation centre	Possibility of acquiring the dog rehabilitation centre by MOLHR for campus expansion (if needed)
	The existing drinking water scarcity due to limited sources and contamination is likely to exacerbate during construction and subsequent increase in population	Will explore additional water sources in coordination with the Thimphu Thromde. If needed, Contractor(s) will be required to provide their own water supply during construction.
	Increase in population likely to create pressure on surrounding natural resources e.g., firewood collection from uphill forests.	There are regulations for collection and use of firewood by concerned agencies (Department of Forest and Park services/institutions/residents) and these regulations will be complied with.
	Motor vehicle thefts of residents by miscreants	During construction, there will be security personnel to monitor miscreants. The site is fenced and no unauthorized public access will be allowed.
	Migrant workers likely to create poor sanitation and waste disposal, sexual crimes with local women during construction.	Contractor(s) will be required by MOLHR to provide sanitary facilities and safe drinking water to workers. Security personnel will be posted to prevent mischief. Workers orientation will be conducted by MOLHR prior to any construction works.
	Project activities is expected to bring benefits e.g., employment through skill development to unemployed youths particularly for class 10 & 12 dropout students from local to national level	---
Residents	Cumulative benefits on income generation and poverty reduction of poor parents	---
	Bad odour from the previous compost-making plants owned by Thimphu Thromde	Translocation of compost -making plants to Memelakha (12 km away from Serbithang)
	Will benefit unpaid domestic women workers from business during construction and beyond from TTI institutions, students & teachers	---

Table 7.2 Summary of consultation, Samthang TTI

Stakeholder	Issues/Benefits Raised	Response from MOLHR/TTI/Project Team
Samthang TTI	Construction of hostels, classrooms and dormitories will benefit students intake	Will increase the students' intake capacity of TTI with 140 student's enrollment in 2018.
	New land will not be acquired.	The institute's total Government land area of 28 acres will be utilized
	Construction of new infrastructure will have: • National benefits (driver training, automobile, heavy earth movers, heavy vehicle driving students) • Facilitate review of courses once in 2-3 years	• TTI to start advanced training on new courses and technology. • Courses on hybrid electric cars and heavy earth movers training is expected to commence by 2020
	Environment benefits are: • Conducive class rooms for teaching & training solving the current congested classrooms and hostel accommodation	---
	Drinking water quality has not been tested as safety measures against contamination although treatment plant exists	Drinking water will be tested to check quality. Storage tank capacity need to increase for new hostel as measures in EMP
	Flood risk to construction during torrential rains and outbreak of Glacial Lake Outburst Foods (GLOF) during flood extremes	Construction of new building (workshop/MPH is 150 m and hostel 200 m) away from the river bank edge. Water level monitoring over the past years have indicated that the level has not crossed the green level.
	Football, archery ground and, driving track may be affected during flood extremes	Current river protection gabion wall exists in certain areas, which may be extended below the football & archery ground with natural grass. e.g., bamboo as cost effective measures
	Low level of replacement capacity on migrant skilled construction workers	TTI plans to replace the migrant workers by NC-II & III graduates gradually on automobile
Nearby Residents/local communities	TTI development is expected to provide business opportunities (shops, rental, restaurants, local vegetables outlets)	----
	Poor and economically disadvantage families, e.g. parents of school dropouts (class 10 and 12) who cannot afford to educate their children for higher studies	TTI enrollment to give priority to poor socioeconomic background students and contribute to national poverty reduction target.
	Temporary air pollution is expected during construction period	Mitigation measures to reduce air and noise pollution during construction to be included in the EMP
	Temporary waste management issues are expected.	Samthang TTI collects every Saturday and dispose of to its landfill site and at times to Punakha Dzongkhag/municipality site as measures to be included in EMP

Stakeholder	Issues/Benefits Raised	Response from MOLHR/TTI/Project Team
	Solid waste storage and disposal issue is expected during construction temporarily	Dumping sites have been identified. Additionally, Dzongkhag/Thromde landfill sites will also be used. These measures will be included in the EMP.
	TTI students renders public services during automobile breakdowns, which in-turn provide students on-the-job capacity development	----

209. After consultations, one-on-one interviews were conducted as well and **Table 7.2** shows the outcome.

Table 7.2 Outcome of interviews

Description	Serbithang	Samthang
Date of interview:	31 January 2018	2 February 2018
Profile of respondents	75% women and 25% men Occupation - farmers and housewives Age - ranges from 30-60 years old Residency – lived in Serbithang for 21-30 years and 2-5 years	60% women and 40% men. Occupation – carpenters, farmers, ex-development workers (e.g., engineer) Age – ranges from 23 to 58 years old Residency – lived in Samthang for more than 30 years,11-20 years, 2-5 years
Project awareness and interest	• Unaware of the project • 50% of respondents interested to know more • 50% think project is important	• 89% of respondents knew about the project through the TTI/MOLHR while 20% not aware • Respondents interested to know more and think project is important
Potential adverse impacts	• 50% of respondents think it will create disturbance (noise) due to increased population in the area • 25% think it will affect the scarce availability of community drinking water • Another concern is potential traffic in access road during construction	• 40% of respondents think increased number of young trainees may likely to indulge in substance abuse (e.g., smoking, drinking, fighting, lure local children into youth's bad habits) • Construction works will create noise • Construction works may trigger forest fire outbreaks in dry areas
Solution to address the issue	Respondents proposed widening of access road, discipline the trainees, and strict safeguards compliance	• 60% of respondents suggested TTI authority to disciple trainees, create awareness through advocacy programs • Contractors to enforce rules and regulations to reduce risks of construction works
Positive impacts	• 75% of respondents believe there will be more employment and business opportunities	• 40% of respondents believe jobs will be created for youth and will produce skilled labour • Likely to bring business opportunities like restaurants and small retail shops for local people
Construction safety	Not a major concern as they feel safe to implement construction activities with safeguards in place	It is safe to implement project-related construction activities with safeguards in place
Available project information	• 75% of respondents would like more info through consultations with EAs, social media (WeChat,	• 80% of the respondents would like more information

Description	Serbithang	Samthang
	Facebook) or through Thimphu Thromde meetings • Others – no need	• 40% would like to get info through Dzongkhag and Gewog meetings, social media (WeChat, Facebook), workshops or through newsletters • 20% - no need

Table 7.3 List of participants of public consultations

No.	Name	Gender	Designation	Organization	Signature
Date: 31 January 2018 Location: IMS Hall, Serbithang					
1	Dorji Chezom	Female	Resident	Serbithang	Signed
2	Aum Karma	Female	Resident	Serbithang	Signed
3	Phub Tshering	Male	Resident	Serbithang	Signed
4	Tshering Zangmo	Female	Resident	Serbithang	Signed
5	Kinley Chezom	Female	Resident	Serbithang	Signed
6	Dawa Zangmo	Female	Resident	Serbithang	Signed
7	Chimi Tshering	Female	Resident	Serbithang	Signed
8	Mincha Wangdi	Male	Resident	Serbithang	Signed
9	Yeshey Choden	Female	Dy. Chief Engineer	DTE, MoHLR	
10	Sherab Dorji	Male	Store In-charge	Thimphu TTI	
11	Chimmi Tshewang	Male	Instructor	Thimphu TTI	
12	Tshering Choden	Female	Gender Consultant	ADB	
13	Norbu Dema	Female	TVET Consultant	ADB	
14	Mani Ram Moktan	Male	Environment Consultant	ADB	
Date: 2 February 2018 Location: TTI Samthang					
1	Tshewang Lhamu	Female	Resident	Samthang	Signed
2	Gem Lham	Female	Resident	Samthang	Signed
3	Samgay Wangmo	Female	Resident	Samthang	Signed
4	Kinzang Wangdi	Male	Resident	Samthang	Signed
5	Drukpa Kinley	Male	Resident	Samthang	Signed
6	Tandin	Male	Instructor	Samthang TTI	
7	Chimi Rinzin	Male	Store Assistant	Samthang TTI	
8	Sangay Tshewang	Male	Principal	Samthang TTI	
9	Choki Wangmo	Female	Officer	DTE, MoHLR	
10	Mani Ram Moktan	Male	Environment Consultant	ADB	

7.4 Consultations and information disclosure during project implementation

210. Consultation will continue throughout the project cycle. As part of information disclosure, project brief will be posted in the website of MOE and MOLHR. As well, a one-page flyer on project brief both in English and Dzongkha will be made available to interested individual at the offices of MOLHR, MOE, and at the construction sites. The one-page flyer or Q&A will include details on the grievance redress mechanism to be established in the project.

Consultation in IMS Hall, Serbithang on 31 January 2018

Consultation in TTI Samthang, 2 February 2018

Figure 7.1 Photographs of consultations

VIII. GRIEVANCE REDRESS MECHANISM

211. Grievance redress mechanism (GRM) is a process of receiving complaints from affected people on the environmental performance of the project, in reviewing, and in facilitating the resolution.

8.1 Handling complaints based on the Regulation for Environmental Clearance of Projects (RECOP) 2016

212. RECOP 2016 defines the responsibilities and procedures for the implementation of the Environmental Assessment Act 2000 regarding projects subject to the environmental assessment process. Part of Chapter IX (Miscellaneous Provisions) covers handling of complaint redressal on projects following issuance of the environmental clearance. **Figure 8.1** presents the process of filing complaints.

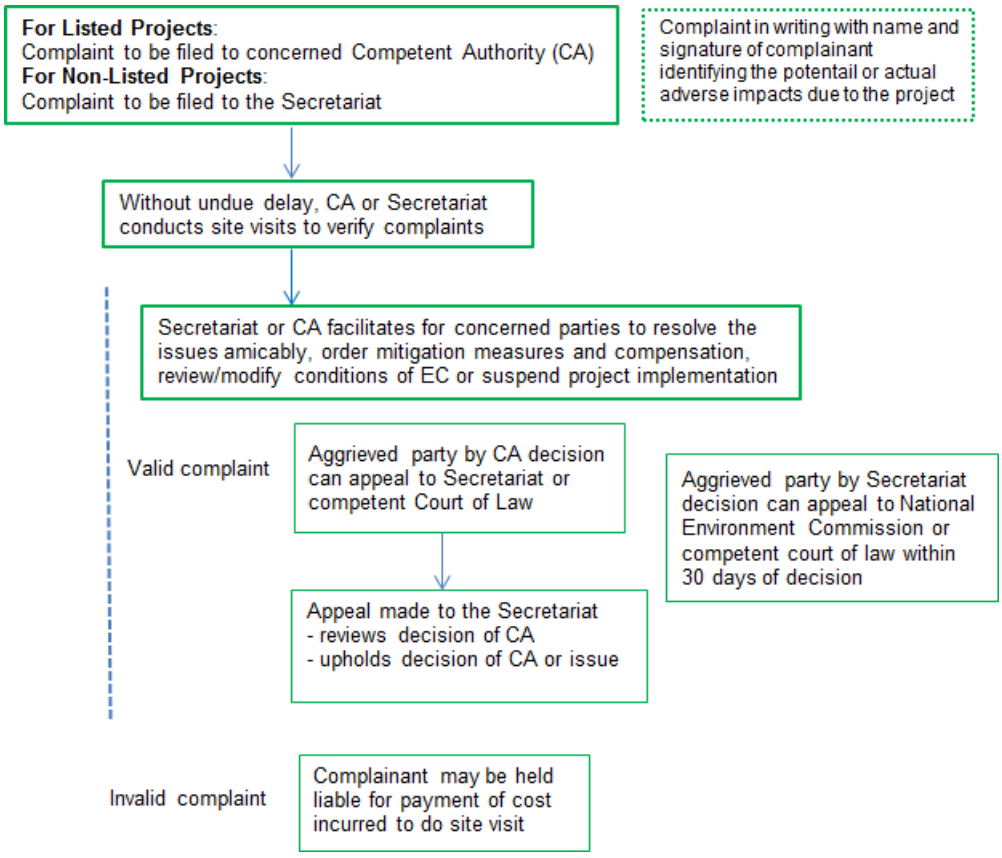


Figure 8.1 NEC Procedure in filing complaint after EC issuance

8.2 Handling complaints based on SPS 2009

213. PMU, MOLHR and PMU, MOE will set-up a GRM and create a grievance redress committee (GRC) as soon as the grant becomes effective. The GRM aims to resolve complaints due to the project in a time-bound and transparent manner.

214. **Structure** Members of the GRC will consist of: (1) PMU Head (Project Director), (2) representative from the local government based on nature of complaints directly relevant to the

Local Government, and (3) representative of Contractor(s). The project environmental consultant will act as the secretary of the GRC. Depending on the complaints, the representative from the Local Government may not be able to be present at all GRC meetings.

215. The GRC will be responsible in resolving complaints submitted against the project, meet once a month to review complaints received (if any) by the PMUs, maintain a record of complaints received and resolved, and advise the complainant on the decision made.

216. **Procedure.** Complaint can be lodged either in writing or by phone. A complaint form is given in **Annex 6**. Transparency will be maintained on the grievances received and their resolution. Affected persons can seek redress to their *complaints* in three levels (see **Figure 8.2**): (i) through the PIU or through the site engineer of the Contractor, (ii) through the GRC, and (iii) the NEC Secretariat or the appropriate courts of law. The three-tier entry points include:

(i) **First level – PIU Head** Complaint to be resolved at the PIU level (i.e., site engineer, TTI Principal, contractor engineer) within seven days and advise the Complainant accordingly.

(ii) **Second level - GRC** If complaint is not resolved at the first level, the Complainant can submit the complaint to the GRC chaired by the PMU Head-Project Director. The GRC will review the submission and make a decision within 10 days. The Complainant will be informed of the decision in person, by mail or by phone.

(iii) **Third level – Appropriate Courts of Law** If the complaint remains unresolved, this will be referred by the GRC to the appropriate courts of law.

217. The complainant is not restricted to seek redress through the legal system at any point in the GRM process.

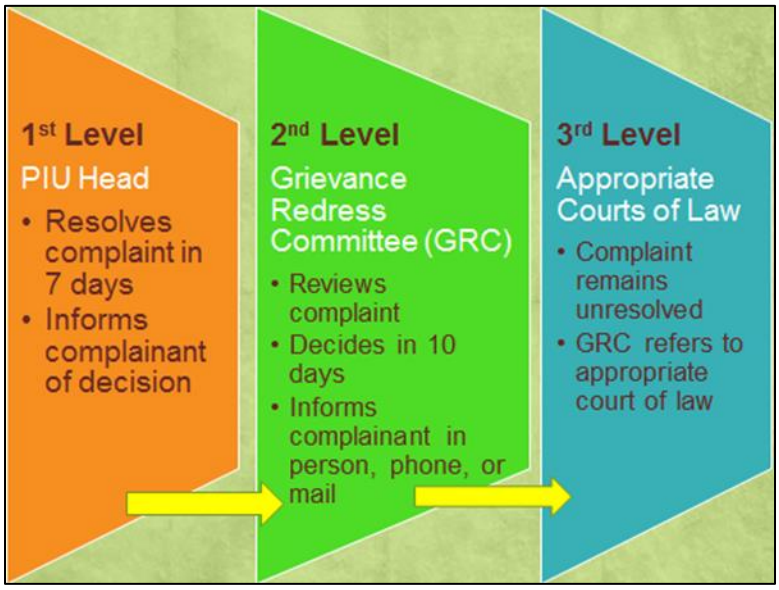


Figure 8.2 Three-tier grievance redress mechanism

218. A record of all complaints received including contact details of the complainant, date the complaint was received, nature of grievance, decisions and date, and date the complainant was

informed of the decision. Grievances filed and resolved will be summarized and included in the semi-annual monitoring reports submitted to ADB during construction stage and annually during post-construction/operation stage.

219. **Information disclosure.** The PMUs will disclose details on GRM through their websites as well as in the billboards at the construction sites. Details will include the contact person, a hotline phone number, and a simplified flowchart on how to *file* a complaint.

IX. ENVIRONMENTAL MANAGEMENT PLAN

220. The environmental management plan (EMP) presents a summary of the environmental impacts and measures that will be undertaken to minimize the adverse impacts. The EMP also includes the monitoring plan and institutional arrangements needed. **Table 9.1** presents a summary of the EMP for MOLHR (i.e., Output 1) while **Table 9.2** presents the EMP for MOE (i.e., Output 3).

9.1 Monitoring

221. Environmental monitoring will be a time-bound process to ensure that the possibility of non-compliance to the EMP by the Contractor, if any will be avoided and/or immediately addressed. Results of the monitoring will be submitted to ADB twice a year during construction and annually post-construction as required by SPS 2009. **Table 9.3** gives the environmental monitoring plan for MOLHR and **Table 9.4** presents the environmental monitoring plan for MOE.

9.2 Implementation Arrangements

222. PMUs of MOLHR and MOE will set up the PIU and identify staff responsible for management at the project level (i.e., construction of buildings) and safeguards compliance monitoring of the Contractor during construction stage. The Project will engage an Environmental Safeguard consultant to provide the needed technical support on safeguards compliance to the requirements of the Environment Division, Thimphu Thromde, the DEC of *Dzongkhags* within the project area, and ADB.

223. Similarly, the Contractor will recruit an Environmental Consultant who will be primarily responsible for ensuring that the EMP is properly implemented during construction. The Contractor's Environmental Consultant will coordinate and interact with the Project's Environmental Safeguard Consultant and the PIU on compliance to ADB requirements, relevant government agencies and local authorities on clearances (as needed). In addition, the Contractor's Environmental Consultant will prepare the environment section of the Project's Quarterly Progress Report (QPR) submitted by the Contractor to the PIU/PMU for review. The environment section in the Project's QPR will be reviewed and summarized by the Project's Environmental Safeguard consultant and submitted as environmental monitoring reports to ADB at least twice a year during construction (see **Annex 7** for the format of environmental monitoring report during construction phase and **Annex 8** for the format during post-construction). The semi-annual environmental monitoring reports will be reviewed by ADB and will be disclosed to their website. The disclosure of environmental monitoring reports is required by SPS 2009 and PCP 2011. MOLHR and MOE will submit the environmental monitoring reports starting from the date the grant will become effective.

224. In the event there will be a change in the design or site of the buildings identified before grant approval, this IEE will be updated/revised and submitted ADB prior to any construction works. The Project's Environmental *Safeguard* consultant will revise and/or update the IEE. The revised and/or updated IEE will be submitted to ADB for review and subsequently, re-posted to ADB website.

225. Before any construction work, the Contractor will be informed by the PMUs/PIUs on their responsibility to comply with the EMP and the requirements of ADB. The Project Environmental Safeguard consultant will provide the technical support needed by the PMUs/PIUs. Specific responsibilities of the Contractor in the EMP will be monitored by their Environmental Consultant

for compliance. Overall compliance of the Contractor to the EMP and ADB requirements will be supervised by the PIUs and/or Project Environmental Safeguard consultant.

51. In the event of non-compliance to the EMP or environmental covenant in the grant agreements, the Project Environmental Safeguard consultant will prepare a corrective action plan (CAP) describing the *process* and time-bound actions that will be undertaken to ensure compliance. The CAP will be submitted by the PMU(s) to ADB for review and will be disclosed to their website.

Table 9.1 Environmental Management Plan for MOLHR (Output 1)

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
Design and Pre-Construction Stage					
Surveys and detailed design of new Thimphu TTI and additional new buildings for Samthang TTI	• Seismicity and other natural hazards risks in Bhutan including climate change	• Building design will comply with earthquake risks and government technical design standards for natural hazards, BBR 2017, DCR 2016, etc. • Explore the possibility of designing the buildings as "green" based on Bhutan Green Building Design Guidelines 2013 • Obtain the required clearances and permits prior to construction works • Identify borrow areas, and sources of construction materials, sites for construction camps.	Included in project cost	PIU, Design and Supervision consultant	PMU, Environmental Safeguard consultant
	• Lack of technical capacity on safeguards at MOLHR	• Designated staff will undergo training on environmental compliance monitoring to create awareness and enhance capacities to ensure smooth project implementation • Engage an intermittent consultant on safeguards	PMU Budget	PIU, Environmental Safeguard consultant	PMU, ADB Project Team
Construction Stage					
Prepare construction management work plan	• Avoid effects of Contractor(s) unplanned activities • Smooth work implementation	• Temporary pedestrian and traffic management plan to minimize disturbance from vehicular traffic and workers • Identify locations of temporary road crossings (if needed) accommodating children,	Included in the project cost	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		elderly and persons with disabilities • Community and safety plan			
		• Spoils disposal and construction waste management plan			
		• Noise and dust control plan			
		• Drainage and stormwater management plan			
		• Materials management plan			
		• Emergency/disaster preparedness plan to know what to do and what not to do, and where to go • Prepare emergency survival kit • Provide list of contact details during emergency (police, hospital, nearest doctor, fire truck, ambulance) to workers or post in billboards at construction site			
Orientation for contractor(s) and workers	• Awareness of workers on the environmental requirements and their responsibility • Understanding of Contractor(s) of their responsibility in implementing the EMP, compliance to ADB requirements and the government • Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents	• Conduct briefing of Contractor(s) on EMP, records management, and reporting • Identify critical areas to be monitored and the required mitigation measures • Create awareness of sexually-transmitted diseases such as HIV/AIDs	Included in the Contractor cost	PIU, Environmental Safeguard consultant	PMU, ADB Project Team (if needed)
Prepare for emergency situation	• Awareness of workers on emergency or disaster	• Create response team and designate a Disaster Coordinator to guide during emergency • Conduct mock drills regularly • Provide training or orientation on proper			

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		response during emergency			
Siting of construction stockyard and labor camps	• improper location can cause inconvenience to workers	• Construction camps and stockyard will not be located within the site as the flat area is limited • No labor camps close to residential areas in Serbithang • Minimize number of workers in the camp • Location of the construction camps will be selected in consultation with PIU	---	PIU, Contractor	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Hiring of project staff and workers	• Conflict due to potential workers' migration • Lack of local support to the project • Dispute over transparency in hiring	• Contractor(s) will be required to use local labour for manual work and eligible local workforce for clerical and office jobs	---	Contractor, PIU	PMU, Environmental Safeguard consultant
Presence of workers at construction sites	• Increase in demand for services such as food, temporary housing, etc. • Create opportunities for small-scale business to provide services such as food, temporary housing, etc.	• None required	---	Contractor	PIU, PMU
Tree cutting at Serbithang, Khuruthang, Punakha, and Samthang	• Injury to workers due to improper handling/conducting of work • Loss of vegetation	• Secure permit to cut trees from Thimphu Thromde and DoFPS • Clear trees based on procedures from Forest and Nature Conservation Rules (2006) • Replant tree: one tree per every 100 m^2 of land	Included in the costs of Contractor	Contractor	PIU, PMU, Environmental Safeguard consultant
Demolition of existing structures in Serbithang site for Thimphu TTI	• Generation, collection and disposal of waste • Increase dust and noise level • Transport of demolition debris • Occupational and community safety risks	• Secure demolition permit from Thimphu Thromde • Prepare demolition plan for approval of Thimphu Thromde • Provide enclosures during demolition to contain dust and minimize noise	Included in the costs of Contractor	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Debris/dismantled structures/equipment will be disposed of in designated landfill and/or controlled dumpsite • Provide personal protective equipment and safety gears to workers • Conduct demolition works during daytime only			
Sourcing and transport of construction materials	• Danger of materials being sourced from illegal quarries or sand mining	• Construction materials, to be sourced only from government-approved and operating quarries. • Sand will be procured from the Natural Resource Development Corporation Ltd. (NRDCL), authorized supplier of sand in Thimphu • Maintenance of material transport vehicles; covering of materials; and spraying of water along haulage route. Water spraying can be done by tanker at least twice a day or as needed	Included in the costs of Contractor	Contractor, PIU	PMU, Environmental Safeguard consultant
• Site preparation, vegetation and land clearing, and other excavation works	• Disturbance and inconvenience to people due to traffic, increased noise and dust levels, and disposal of waste • Emissions from heavy equipment machinery and construction vehicles	• Construction management plan will be strictly implemented • Use of proper safety clothes/equipment during site preparation works • Provide enclosures to contain dust and minimize noise	Included in the costs of Contractor	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Potential chance find during site excavation	• Chance find procedures in Annex 1 will be followed			Environmental Safeguard consultant
	• Potential safety risks to community	• Provide fence or barricade (as appropriate), sufficient lights, clear warning signs and danger signals, and take all precautions identified in the community and safety plan • Assign security personnel to prevent accidents, trespassing, and pilferage			PMU, Environmental Safeguard consultant, Design and Supervision consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Contractor(s) to direct drivers to strictly follow road regulations			
	• Interference with road crossings	• Danger and clearly visible warning signs will be posted at designated sites • Scaffoldings will be placed over road crossing points • Construction vehicles to strictly follow road regulations • Implement temporary pedestrian and traffic management plan			PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Potential health and safety risks to workers	• Provide workers with hard hat, safety shoes and belts • Coordinate with nearest hospital for arrangements in case of accidents • Assign nurse or medical staff to make weekly rounds at sub-station sites • Set up first aid treatment within construction sites and field office • Observance and compliance with relevant safety measures required by law and best engineering practices • Provide communication devices to designated workers			PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Erosion and localized flooding • Loss of habitat and some mature trees of economic value such as evergreen	• Construction work schedule will consider weather to minimize potential for erosion and localized flooding • Only minimal vegetation will be cleared since sites have been modified • Landscaping/replanting of trees at the sites will be done after completion of construction works (one tree per 100m^2 of land) • Implement spoils disposal plan and construction waste management plan			PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Heavy equipment and construction	• Construction vehicles will be maintained to minimize vehicular emissions			PMU, Environmental Safeguard

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
	vehicles may increase vehicular emissions • Transport of construction materials to construction sites may increase dust level • Earthmoving works, excavations, and opened land areas in Serbithang and Samthang may increase dust levels • Increase in noise level and vibration from excavation and heavy equipment and construction vehicles	• Enclose construction sites temporarily to contain dust dispersion • Warehouse for construction materials onsite will be provided to reduce trips of material delivery • Contractor(s) will be required to maintain construction vehicles and heavy equipment machineries regularly to reduce emissions • Opened land areas or sources of dust will be sprayed with water (as needed) • Transport of dust-generating materials will be covered • Observance of low speed by vehicles to reduce noise • Noise-generating works will be done between 7AM and 5PM only. Noise generation will ensure that it will comply with ambient noise limit of 65 dB(A) during daytime and 55 dB(A) at nighttime (Environmental Standards 2010). • Construction sites will be covered with acoustic screens and machineries will be temporarily enclosed to control noise • Require Contractor(s) to maintain and tune-up construction vehicles to reduce noise and no blowing of horns • Observe/comply with traffic management plan			consultant, Design and Supervision consultant
Operation of construction camps	• Generation of sewage from construction workers • Solid waste generation from workers and construction works	• Provide sanitary facilities to workers and safe drinking water • Implement drainage and stormwater management plan • Construction/workers camps will be provided with sufficient garbage bins.	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Enforce good housekeeping at all times			
Maintenance of construction vehicles and fuel depot	• Potential for oil spill and soil contamination • Fire hazard	• Maintenance of vehicles will not be done at the construction site • Fuel depot will not be allowed in Serbithang due to limited space to maneuver for tankers • Fire-fighting system will be provided at the construction sites	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Construction of buildings (mechanical, civil, and electrical works)	• Non-compliance to relevant regulations • Potential accidents due to working on heights • Occupational and community safety risks • Generation of waste	• Monitor compliance to codes/standards/regulations • Provide PPE to workers • Provide first aid kits and firefighting system • Conduct toolbox meeting prior to start of work • Conduct work only from 7AM to 5PM • Provide enclosures to noise-generating works and equipment	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Clean up of construction sites after completion of construction works	• Improper disposal of construction debris • Potential damage to adjacent property	• Temporarily affected land and structures will be restored to pre-project conditions. • Secure permit from Thimphu Thromde for disposal of construction debris	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Post-construction stage					
Use and/or occupy new Thimphu TTI and new additional buildings in Samthang TTI	• Improper use and lack of care to the new buildings and equipment	• TTI management and authority to conduct orientation and awareness briefing to staff and trainees on how to look after their facilities and equipment properly	Include in the operation cost of the TTI	Principals together with school management – Thimphu TTI and Samthang TTI	• Department of Technical Education, MOLHR • ADB, if needed
	• Generation of waste	• Designate waste management coordinator (if there is none yet) to address waste management • Prepare/draft waste management plan with time-bound targets • Conduct yearly training/orientation to trainees on waste management, proper collected, and disposal	Include in the operation cost of the TTI	Principals together with school management – Thimphu TTI and Samthang TTI	• Department of Technical Education, MOLHR • ADB, if needed

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Explore ways/measures to implement effectively the principles of reduce, reuse and recycle. • Identify ways and strategies of "greening" Thimphu TTI as a showcase of best practice in Bhutan			
	• Potential incidence of emergency or natural disaster	• Prepare emergency/disaster preparedness plan and procedures • Designate staff as Disaster Coordinator • Conduct training/orientation/drills on safety and emergency awareness • Provide clear and visible emergency warning signs	---	Principals together with school management – Thimphu TTI and Samthang TTI	• Department of Technical Education, MOLHR • ADB, if needed
Replacement of new tools and equipment	• Improper disposal of used/replaced tools and equipment in five TTIs • Lack of inventory/tracking of tools and equipment disposed/replaced	• Prepare inventory of tools and equipment turned over to Department of National Properties • Prepare list of tools and equipment reused/recycled or disposed to designated disposal sites.	---	Principals together with school management – Thimphu TTI and Samthang TTI	• Department of Technical Education, MOLHR • ADB, if needed

Table 9.2 Environmental Management Plan for MOE (Output 3)

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
Design and Pre-Construction Stage					
Surveys and detailed design of 13 TVE labs for seven secondary schools	• Seismicity and other natural hazards risks in Bhutan including climate change	• Building design will comply with earthquake risks and the government technical design standards for natural hazards, BBR 2017, DCR 2016, etc. • Explore the possibility of designing the buildings as "green" based on Bhutan Green Building Design Guidelines 2013 • Obtain the required clearances and permits prior to construction works	Included in project cost	PIU, Design and Supervision consultant	PMU, Environmental Safeguard consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Identify borrow areas, and sources of construction materials, sites for construction camps.			
	• Lack of technical capacity on safeguards at MOE	• Designated staff will undergo training on environmental compliance monitoring to create awareness and enhance capacities to ensure smooth project implementation • Engage an intermittent consultant on safeguards	PMU Budget	PIU, Environmental Safeguard consultant	PMU, ADB Project Team
Construction Stage					
Prepare construction management work plan	• Avoid effects of Contractor(s) unplanned activities • Smooth work implementation	• Temporary pedestrian and traffic management plan to minimize disturbance from vehicular traffic and workers • Identify locations of temporary road crossings (if needed) accommodating children, elderly and persons with disabilities • Community and safety plan	Included in the project cost	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
		• Spoils disposal and construction waste management plan			
		• Noise and dust control plan			
		• Drainage and stormwater management plan			
		• Emergency/disaster preparedness plan to know what to do and what not to do, and where to go • Prepare emergency survival kit • Provide list of contact details during emergency (police, hospital, nearest doctor, fire truck, ambulance) to workers or post in billboards at construction site			
		• Materials management plan			
Orientation for contractor(s) and workers	• Awareness of workers on the environmental requirements and their responsibility • Understanding of Contractor(s) of	• Conduct briefing of Contractor(s) on EMP, records management, and reporting • Identify critical areas to be monitored and the required mitigation measures	Included in the Contractor cost	PIU, Environmental Safeguard consultant	PMU, ADB Project Team (if needed)

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
	their responsibility in implementing the EMP, compliance to ADB requirements and the government • Provide HIV-AIDS education and disease prevention awareness talks to the contractor and their site agents	• Create awareness of sexually-transmitted diseases such as HIV/AIDs			
Siting of construction stockyard and labor camps	• improper location can cause inconvenience to workers	• Construction camps and stockyard will not be located within the site as the flat area is limited • No labor camps close to residential areas in • Minimize number of workers in the camp • Location of the construction camps will be selected in consultation with PIU	---	PIU, Contractor	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Hiring of project staff and workers	• Conflict due to potential workers' migration • Lack of local support to the project • Dispute over transparency in hiring	• Contractor(s) will be required to use local labour for manual work and eligible local workforce for clerical and office jobs	---	Contractor, PIU	PMU, Environmental Safeguard consultant
Presence of workers at construction sites	• Increase in demand for services such as food, temporary housing, etc. • Create opportunities for small-scale business to provide services such as food, temporary housing, etc.	• None required	---	Contractor	PIU, PMU
Tree cutting in some secondary school sites (i.e., Punakha, Khuruthang, etc.)	• Injury to workers due to improper handling/conducting of work • Loss of vegetation	• Secure permit to cut trees from *Dzongkhag* Environment Committee (Thimphu Thromde, Wangdue Phodrang, Punakha, Trashigang, Bumthang, Trashiyangtse) • Clear trees based on procedures from Forest	Included in the costs of Contractor	Contractor	PIU, PMU, Environmental Safeguard consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		and Nature Conservation Rules (2006) • Replant trees within secondary school sites			
Sourcing and transport of construction materials	• Danger of materials being sourced from illegal quarries or sand mining	• Construction materials, to be sourced only from government-approved and operating quarries. • Sand will be procured from providers approved by the government • Maintenance of material transport vehicles; covering of materials; and spraying of water along haulage route. Water spraying can be done by tanker daily or as needed	Included in the costs of Contractor	Contractor, PIU	PMU, Environmental Safeguard consultant
• Site preparation, vegetation and land clearing, and other excavation works	• Disturbance and inconvenience to people due to traffic, increased noise and dust levels, and disposal of waste • Emissions from heavy equipment machinery and construction vehicles	• Construction management plan will be strictly implemented • Use of proper safety clothes/equipment during site preparation works • Provide enclosures to contain dust and minimize noise	Included in the costs of Contractor	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Potential chance find during site excavation	• Chance find procedures in Annex 1 will be followed			Environmental Safeguard consultant
	• Potential safety risks to students and community	• Provide fence or barricade (as appropriate), sufficient lights, clear warning signs and danger signals, and take all precautions identified in the community and safety plan • Assign security personnel to prevent accidents, trespassing, and pilferage • Contractor(s) to direct drivers to strictly follow road regulations			PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Interference with road crossings	• Danger and clearly visible warning signs will be posted at designated sites • Scaffoldings will be placed over road crossing points • Construction vehicles to strictly follow road regulations			PMU, Environmental Safeguard consultant, Design and Supervision consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
		• Implement temporary pedestrian and traffic management plan			
	• Potential health and safety risks to workers	• Provide workers with hard hat, safety shoes and belts • Coordinate with nearest hospital for arrangements in case of accidents • Assign nurse or medical staff to make weekly rounds at sub-station sites • Set up first aid treatment within construction sites and field office • Observance and compliance to relevant safety measures required by law and best engineering practices • Provide communication devices to designated workers			PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Erosion and localized flooding • Loss of habitat and some mature trees of economic value such as evergreen	• Construction work schedule will consider weather to minimize potential for erosion and localized flooding • Only minimal vegetation will be cleared since sites have been modified • Landscaping/replanting of trees at the sites will be done after completion of construction works • Implement spoils disposal plan and construction waste management plan			PMU, Environmental Safeguard consultant, Design and Supervision consultant
	• Heavy equipment and construction vehicles may increase vehicular emissions • Transport of construction materials to construction sites may increase dust level • Earthmoving works, excavations, and opened land areas in construction sites	• Construction vehicles will be maintained to minimize vehicular emissions • Enclose construction sites temporarily to contain dust dispersion • Warehouse for construction materials onsite will be provided to reduce trips of material delivery • Contractor(s) will be required to maintain construction vehicles and heavy equipment machineries regularly to reduce emissions			PMU, Environmental Safeguard consultant, Design and Supervision consultant

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
	may increase dust levels • Increase in noise level and vibration from excavation and heavy equipment and construction vehicles	• Opened land areas or sources of dust will be sprayed with water (as needed) • Transport of dust-generating materials will be covered • Observance of low speed by vehicles to reduce noise • Noise-generating works will be done between 7AM and 5PM only. Noise generation level will ensure that it will meet the ambient noise limit of 65 dB(A) at daytime and 55 dB(A) at nighttime (Environmental Standards 2010) • Construction sites will be covered with acoustic screens and machineries will be temporarily enclosed to control noise • Require Contractor(s) to maintain and tune-up construction vehicles to reduce noise • No blowing of horns • Observe/comply with traffic management plan			
Operation of construction camps	• Generation of sewage from construction workers • Solid waste generation from workers and construction works	• Provide sanitary facilities to workers and safe drinking water • Implement drainage and stormwater management plan • Construction/workers camps will be provided with sufficient garbage bins. • Enforce good housekeeping at all times	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Maintenance of construction vehicles	• Potential for oil spill and soil contamination • Fire hazard	• Maintenance of vehicles will not be done at the construction site • No fuel storage will be allowed within the premises of secondary schools • Fire-fighting system will be provided at the construction sites	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Construction of TVE labs (mechanical,	• Non-compliance to relevant regulations	• Monitor compliance to codes/standards/regulations	Included in	Contractor, PIU	PMU, Environmental Safeguard

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
civil, and electrical works)	• Potential accidents due to working on heights • Occupational and community safety risks • Generation of waste	• Provide PPE to workers • Provide first aid kits and fir-fighting system • Conduct toolbox meeting prior to start of work • Coordinate with secondary school management of work schedule • Conduct work only from 7AM to 5PM • Provide enclosures to noise-generating works and equipment	Contractor costs		consultant, Design and Supervision consultant
Clean up of construction sites after completion of construction works	• Improper disposal of construction debris • Potential damage to adjacent property	• Temporarily affected land and structures will be restored to pre-project conditions. • Secure permit from Thimphu Thromde and relevant *dzongkhags* for disposal of construction debris	Included in Contractor costs	Contractor, PIU	PMU, Environmental Safeguard consultant, Design and Supervision consultant
Post-construction stage					
Use and/or occupy new TVE labs	• Improper use and lack of care to the new TVE labs, equipment and tools	• Secondary school management and authority to conduct orientation and awareness briefing to staff and trainees on how to look after their new workshop and tools properly	Include in the operation cost of secondary schools	PIU, Principals together with school management and SPBD	• PMU • ADB, if needed
	• Generation of waste	• Designate waste management coordinator (if there is none yet) to address waste management • Prepare/draft waste management plan with time-bound targets • Conduct yearly training/orientation to trainees on waste management, proper collected, and disposal • Explore ways/measures to implement effectively the principles of reduce, reuse and recycle. • Identify ways and strategies of “greening” secondary schools as a showcase of best practice in Bhutan	Include in the operation cost of the TTI	PIU, Principals together with school management, Waste Coordinators	• PMU
	• Potential incidence of	• Prepare emergency/disaster	---	PIU, Principals	• PMU

Project Activity	Potential Environmental Impacts	Mitigation/Enhancement Measures	Estimated Cost	Implementing Unit	Supervising and Monitoring Unit
	emergency or natural disaster	preparedness plan and procedures • Designate staff as Disaster Coordinator • Conduct training/orientation/drills on safety and emergency awareness • Provide clear and visible emergency warning signs		together with school management, Disaster Management Coordinators	
Maintenance of TVE labs	• Improper use and handling of basic tools • Potential accidents due to improper handling of tools • Lack of manuals required for the tools	• Conduct orientation on proper handling of tools • Provide safety gear, if needed • Provide fire extinguisher and emergency shower/eye wash	---	Principals together with school management, PIU	• PMU

Table 9.3 Environmental Monitoring Plan for MOLHR (Output 1)

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
Construction	Generation of waste during demolition	• Serbithang	• Volume of demolition debris for disposal • Number of trips of haulers	Twice a month	Contractor	PIU, Environmental Safeguard consultant
	Increase in dust level during demolition	• Serbithang	Frequency of water spraying Ocular inspection	Daily	Contractor	PIU, Environmental Safeguard consultant
	Availability of project information	• MOLHR Office • Construction site office in Serbithang and Samthang	One-page flyer or Project Q&A	Quarterly	PIU	Environmental Safeguard consultant, PMU
	Local recruitment of workers and staff	Thimphu TTI-Serbithang, and Samthang TTI	Number of local workers and staff recruited	Monthly	Contractor, PIU	PMU
	Training/orientation of all workers on health and safety best practices	Construction sites at Serbithang and Samthang	Number of participants	Semi-annually	Environmental Safeguard consultant, Contractor, PIU	PMU
	Orientation of Contractor(s) and workers on issues like HIV/AIDS, compliance	Construction sites at Serbithang and Samthang	Number of participants	Once before construction, and as needed	Environmental Safeguard consultant, PIU	PMU, ADB Project Team

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
	to EMP and ADB requirements, etc.					
	Spraying of water to opened land areas and before movement of construction vehicles	Serbithang site and approach road, Samthang site and community road access to Samthang TTI	Ocular inspection/spot checks	• Weekly at road easements (or as needed) • Every day at construction sites during dry season	Contractor	Environmental Safeguard consultant, PIU
	Solid waste management	Construction sites at Serbithang and Samthang	Volume of waste disposed Ocular inspection/spot checks	Every week	Contractor, PIU	Environmental Safeguard consultant
	Danger and warning signs for safety of workers and the public	• Construction sites at Serbithang and Samthang • Access roads	Ocular inspection/spot checks	Once a month	Contractor, PIU	Environmental Safeguard consultant
	Announcement to the public of works schedule	Community or village close to Serbithang site and Samthang	Work schedule log sheet	As needed	Contractor	Environmental Safeguard consultant, PIU
	Erosion control measures such as silt traps	Construction sites at Serbithang and Samthang	Ocular inspection	Once a month	Contractor, PIU	Environmental Safeguard consultant
	Smoke belching construction vehicles	• Construction sites at Serbithang and Samthang • Access roads	Ocular inspection/spot checking	Weekly	Environmental Safeguard consultant, Contractor	PIU
	Proper storage and management of all construction materials and wastes	Construction sites at Serbithang and Samthang	Number of vehicles Ocular inspection/spot checking	Weekly	Contractor, PIU	Environmental Safeguard consultant
	Dust and noise level	Construction sites at Serbithang and Samthang	Frequency of water spraying Ocular inspection/spot checks	Weekly	Environmental Safeguard consultant, Contractor	PIU, PMU
	Use of personal protective equipment (PPE) and safety gear	Construction sites at Serbithang and Samthang	Ocular inspection/spot checks	Twice a week	Environmental Safeguard consultant, Contractor	PIU, PMU
	Condition of sanitary facilities and safe drinking water	Labour camps	Ocular inspection/spot checks	Weekly	Environmental Safeguard	PIU, PMU

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
					consultant, Contractor	
	Good housekeeping	• Construction sites at Serbithang and Samthang • Labour camps	Ocular inspection/spot checks	Twice a week	Environmental Safeguard consultant, Contractor	PIU, PMU
Post-construction	Orientation of trainees on care and maintenance of the building	Thimphu TTI and Samthang TTI	Number of trainees	Annually (at start of each term)	TTI Management	PIU, PMU
	Orientation of trainees on safety and proper handling of tools and equipment	Thimphu TTI and Samthang TTI	Number of trainees	Annually (at start of each term)	TTI Management	PIU, PMU
	Good housekeeping (also garbage collection and disposal)	Thimphu TTI and Samthang TTI	Ocular inspection/spot checks	Every two weeks	Waste Coordinator	TTI Management, PIU
	Condition/maintenance of fire extinguishers/fire-fighting units/fire alarms	Thimphu TTI and Samthang TTI	Ocular inspection/spot checks	Quarterly	Waste Coordinator	TTI Management, PIU
	Safety/emergency/disaster manual and procedures	Thimphu TTI and Samthang TTI	Check manuals	Annually	Principals/TTI Management	PIU, PMU
	Orientation/training/drills on emergency/disaster preparedness	Thimphu TTI and Samthang TTI	Number of trainees	Semi-annual	Principals/TTI Management	PIU, PMU
	Greening program/grounds maintenance	Thimphu TTI and Samthang TTI	Types of plants, area planted	Annually	Principals/TTI Management	PIU, PMU
	Condition of safety gears and emergency equipment	Thimphu TTI and Samthang TTI	Ocular inspection/spot checks	Semi-annual	Principals/TTI Management	PIU, PMU
	Tools and equipment for disposal due to replacement of new tools and equipment	Thimphu TTI, Samthang TTI, Khuruthang TTI, Rangjung TTI, Chumey TTI	Number of tools and equipment	Semi-annual	Principals/TTI Management	PIU, PMU
	Disposal of old/obsolete tools and equipment	Thimphu TTI, Samthang TTI, Khuruthang TTI, Rangjung TTI, Chumey TTI	Number of tools and equipment sold for reused or turned over to Department of National Properties	Semi-annual	TTI Management	PIU, PMU
	Building condition • Roof • Electrical panel and wiring	Thimphu TTI and Samthang TTI	Ocular inspection/spot checks for cracks, signs of water leaks,	Semi-annual	TTI Management	PIU, PMU

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
	• Door handles, windows, hinges and closures • Walls and ceilings • Fume hoods • Stairways and fire exit/escape • Storm water drains		damage, fire hazards, etc.			

Table 9.4 Environmental Monitoring Plan for MOE (Output 3)

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
Construction	Local recruitment of workers and staff	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Number of local workers and staff recruited	Monthly	Contractor, PIU	PMU
	Training/orientation of all workers on health and safety best practices	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Number of participants	Semi-annually	Environmental Safeguard consultant, Contractor, PIU	PMU
	Orientation of Contractor(s) and workers on issues like HIV/AIDS, compliance to EMP and ADB requirements, etc.	Construction sites at seven secondary schools (Babesa MSS, Bajothang	Number of participants	Once before construction, and as needed	Environmental Safeguard consultant, PIU	PMU, ADB Project Team

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
		HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)				
	Spraying of water to opened land areas and before movement of construction vehicles	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Ocular inspection/spot checks	• Weekly at road easements (or as needed) • Every day at construction sites during dry season	Contractor	Environmental Safeguard consultant, PIU
	Solid waste management	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Ocular inspection/spot checks	Every week	Contractor, PIU	Environmental Safeguard consultant
	Danger and warning signs for safety of workers and the public	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung	Ocular inspection/spot checks	Once a month	Contractor, PIU	Environmental Safeguard consultant

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
		CS, Chumey CS)				
	Announcement to the public of works schedule	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Work schedule log sheet	As needed	Contractor	Environmental Safeguard consultant, Principals of secondary schools, PIU
	Erosion control measures such as silt traps	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Ocular inspection	Once a month or as needed	Contractor, PIU	Environmental Safeguard consultant
	Smoke belching construction vehicles	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Ocular inspection/spot checking	Monthly	Environmental Safeguard consultant, Contractor	PIU
	Proper storage and management of all construction materials and wastes	Construction sites at seven secondary schools (Babesa	Ocular inspection/spot checking	Monthly	Contractor, PIU	Environmental Safeguard consultant

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
		MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)				
	Dust and noise level	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Ocular inspection/spot checks	Twice a month	Contractor, PIU, Principals of secondary schools	PIU, PMU, Environmental Safeguard consultant
	Use of personal protective equipment (PPE) and safety gear	Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS)	Ocular inspection/spot checks	Weekly	Contractor, PIU	Environmental Safeguard consultant, PMU
	Condition of sanitary facilities and safe drinking water	• Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS,	Ocular inspection/spot checks	Twice a month	Contract, PIU	Environmental Safeguard consultant, PMU

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
		Rangjung CS, Chumey CS) • Labour camps				
	Good housekeeping	• Construction sites at seven secondary schools (Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS) • Labour camps	Ocular inspection/spot checks	Twice a month	Environmental Safeguard consultant, Contractor	PIU, PMU
Post-construction	Orientation of secondary students on care and maintenance of the building	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Number of secondary students trained	Annually (at start of each term)	PIU, Principals	Environmental Safeguard consultant, PMU
	Orientation of secondary students on safety and proper handling of tools and equipment	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Number of secondary students trained	Annually (at start of each term)	PIU, Principals	Environmental Safeguard consultant, PMU
	Good housekeeping (also garbage collection and disposal)	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS,	Ocular inspection/spot checks	Every two weeks	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
		Baylling CS, Rangjung CS, Chumey CS				
	Condition/maintenance of fire extinguishers/fire-fighting units/fire alarms	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Ocular inspection/spot checks	Quarterly	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU
	Safety/emergency/disaster manual and procedures	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Check manuals	Annually	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU
	Orientation/training/drills on emergency/disaster preparedness	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Number of secondary students trained	Semi-annual	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU
	Greening program/grounds maintenance	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Types of plants, area planted	Annually	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU
	Condition of safety gears and emergency equipment	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang	Ocular inspection/spot checks	Semi-annual	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU

Project Stage	Parameter/Indicator	Location	Method of Measurement	Frequency	Responsibility	
					Implementation	Supervision
		MSS, Baylling CS, Rangjung CS, Chumey CS				
	Condition of TVE labs • Roof • Electrical panel and wiring • Door handles, windows, hinges and closures • Walls and ceilings • Fume hoods • Stairways and fire exit/escape • Storm water drains	Babesa MSS, Bajothang HSS, Punakha CS, Khuruthang MSS, Baylling CS, Rangjung CS, Chumey CS	Ocular inspection/spot checks for cracks, signs of water leaks, damage, fire hazards, etc.	Semi-annual	Waste Coordinator, Principals, PIU	Environmental Safeguard consultant, PMU

X. CONCLUSION AND RECOMMENDATION

226. The project aims to create awareness of TVET to secondary school students by providing TVE laboratories, elective courses, thematic clubs, etc. and to support the TTIs in Bhutan through infrastructure *upgrade*, provision of new tools and equipment upgrade, and capacity building. These interventions are expected to improve access to opportunities of skills development and, thus, enhance chances for employment. MOLHR and the MOE will be the executing agencies who will ensure that project implementation complies with the regulations, safety and disaster standard requirements, and building codes of the government.

227. Interventions with environmental implications include the construction of the new Thimphu TTI, additional new buildings such as hostels, workshops and classrooms in Samthang TTI, and construction of 13 new TVE laboratories for seven secondary schools as part of TVET introduction. Due to potential environmental impacts, ADB classified the project as category B based on SPS 2009. An IEE was prepared following the requirements of SPS 2009.

228. Potential environmental impacts are mainly during construction stage such as increased noise and dust levels due to site preparation and construction of the new buildings, occupational and community safety risks associated with civil, mechanical and electrical works. Other impacts include potential *traffic* congestion in the access roads to Serbithang at Ngabiphu Lam and in Samthang along *the* Thimphu-Wangdue Phodrang Highway including access to the seven secondary schools, presence of construction workers, and potential disturbance and/or inconvenience to daily activities of secondary students as the sites of the TVE labs are within the existing school premises.

229. These impacts are temporary, of short duration and can be easily mitigated by compliance to the EMP, the relevant regulations of the government and the requirements of ADB. An EMP and EMoP were prepared as part of the IEE. Its implementation and compliance by the Contractor(s) will be monitored by MOE and MOLHR. Design of the new buildings and construction will be undertaken and supervised by a Design and Supervision Consultant to be engaged during implementation.

230. Stakeholders in Serbithang for Thimphu TTI and in Samthang TTI were consulted on 31 January 2018 and on 2 February 2018. Relevant agencies such as NEC, Thimphu Thromde, and DoFPS were also consulted during the preparation of the IEE. Residents are generally supportive of the project but would like to have more information as the project progresses. With the project, they are expecting *that* jobs will be created as well as opportunities for small-scale business for local people. A GRM will be set up by the PMU consistent with the requirements of SPS 2009. A project brief in English and in *Dzongkha* with details on the GRM will be made available at the offices of MOE and MOLHR or in their websites. Public consultations will continue in varying degrees throughout the project implementation.

231. This IEE will be disclosed at the ADB website in accordance with SPS 2009 and PCP 2011. The MOE and the MOLHR will secure all the relevant clearance and permits required for the project prior to any construction works. ADB will monitor implementation through project review and environmental monitoring reports to be submitted by MOE and MOLHR. The environmental monitoring reports will be publicly disclosed in the ADB website as required by SPS 2009 and PCP 2011.

ANNEX 1
"Chance Find" Procedures for Physical Cultural Resources

A. Introduction

1. The procedures describe below provide guidance on the measures to be done in case an accidental discovery or chance find, or an encounter with a physical cultural resource (PCR) occurred during the construction phase of the following:

a) new Thimphu TTI in Serbithang, Thimphu;
b) additional new hostel and workshop for Samthang TTI in Wangdue Phodrang; and,
c) new 13 TVE labs for secondary schools: Babesa MSS in Thimphu Thromde, Khuruthang MSS and Punakha CS in Punakha, Bajothang HSS in Wangdue Phodrang, Rangjung CS in Trashigang, Chumey CS in Bhumtang, and Baylling CS in Trashiyangtse.

2. These chance find procedures will be finalized (if needed) as Physical Cultural Resources Plan (PCRP) by the MOLHR, MOE, and the Contractors in consultation with the Department of Culture (DoC), Ministry of Home and Cultural Affairs to ensure compliance to the Movable Cultural Property Cultural Property Act of Bhutan 2005 and Movable and Immovable Property Act 1999, Cultural Heritage Act of Bhutan 2016. The PCRP will be included in the EMP and Construction Management Plan (CMP) that will be required from the Contractor. These procedures aim to identify and promote the preservation, protection, recovery and recording of any PCR that may be discovered or exposed during excavation of foundation works, other earthmoving works, and ground alteration (where required).

B. Orientation and/or Briefing of Workers

3. The Contractor(s), with technical support from the DoC (or the staff of Cultural or Environment Sector of Dzongkhags), PMUs (MOLHR and MOE), and PIUs (Thimphu TTI, Samthang TTI, and SPBD) will conduct an orientation/awareness training for all workers, particularly those who will be involved in earth movements and excavation on how to recognize artifacts that they may potentially encounter or discover. The Contractor(s) will be responsible for creating awareness to construction workers and staff on the government and ADB requirements for any unanticipated impacts such as discovery of a PCR.

4. Given that the locations and areas, where earthmoving works will be required are known, chance find may be remote. However, as a precautionary measure, Contractor(s) need to be made aware of the chance find procedures and the requirements of the government and ADB.

C. Procedures

a. General

5. In case a PCR was encountered during excavation, construction activities including traffic within a 30.5-meter radius in the area will be stopped immediately by the Contractor(s). The discovery will be reported by the site engineer or representative of Contractor to PMU (MOLHR or MOE) or the Safeguards Consultant. The site or area discovered will be marked or demarcated using a global positioning system (GPS) unit to determine the exact coordinates and photographs will be taken. The construction supervision staff from the Contractor and site engineer/staff from the PMU (MOLHR or MOE) will secure the site to prevent damage, loss or pilferage of removable

objects. The site engineer of PMU (MOLHR or MOE) will be responsible for coordinating with the DoC or the staff from Cultural Sector or Environment Sector of the Dzongkhags.

6. If the encounter involves removable items, a security person will be posted until the representative of DoC (or staff from Cultural Sector or Environment Sector of the Dzongkhags) arrives to assess and determine its value. The DoC staff (or staff from Cultural Sector or Environment Sector of the Dzongkhags) will be responsible in determining the appropriate course of action. Further excavation or earth moving works may be conducted at the distance and demarcation area recommended by the DoC staff.

7. If the chance find will have significant cultural value, this may entail consequent changes in the lay-out particularly if the discovery is considered or assessed as remains of cultural or archeological importance that is not removable.

8. The Contractor(s) will not be entitled for compensation due to work stoppage as a result of the discovery and its associated subsequent actions.

b. Assessment and Recovery

9. Appropriate heavy equipment such as wheel loader will be made available to recover the excavated material from the excavation site to allow the geologist onsite or the DoC staff to inspect, recover or conduct sampling. A safe storage area will be provided to protect the discovered object. If the chance find is part of a large artifact, deposit or structure, the inspection or recording will include photography and video on an "as-is, where is" manner. The exact location will be recorded using a GPS unit.

c. Resumption of Work

10. The Contractor(s) can continue with excavation and construction works within the affected area only after the DoC staff has given clearance. All the discovered objects of value will be given to the government.

D. Reporting

11. The Contractor(s) with technical support from the Safeguards Consultant will prepare a “Chance Find” Report within a week showing the date and time of discovery, specific location, description of the PCR, and interim protection measures implemented. This Report will be submitted to PMU (MOLHR or MOE) who will provide it to the DoC or Ministry of Home and Cultural Affairs. The chance find including measures on how it was dealt with will be included in the semi-annual environmental monitoring reports submitted to ADB.

ANNEX 2
Terms of Reference
Project Implementation Arrangements

<table>
<tr><th>Title</th><th>Description</th></tr>
<tr><td>Project Steering Committee</td><td>Provides strategic guidance, oversight to the Project and will ensure coordination across all implementing agencies of MOE and MOLHR.

Will invite representatives from the private sector associations/committees depending on the meeting agenda. Engagement with private sector at the PSC level is expected to address skills gaps, skills requirements and emerging technology. A representative from ADB may also be invited to attend the steering committee meeting as observer

PSC Composition
1. Secretary, MOLHR (Chair)
2. Secretary, MOE (Co-chair)
3. Director, Department of School Education
4. Director, Department of Employment
5. Director, Department of Occupational Standards
6. Representative from GNHC (ADB focal person)
7. Representative from MoF (ADB focal person from DMEA)
8. Chief Planning Officer, Policy & Planning Division, MOLHR
9. Chief Planning Officer, Policy & Planning Division, MOE
10. Director, Department of Technical Education (Member Secretary)
11. Representative from Private Sector (associations/sector committees) as special invitee
12. ADB representative may be invited as observer

The PSC mandate will include decisions on overall policy direction and approve; annual work plans and budgets, progress reports including financials reports, audit reports, and resolve any major issues pertaining to the project. PSC will undertake review of the project progress to ensure timely implementation of all components and provide guidance to address any shortfalls.</td></tr>
<tr><td colspan="2">Support Department/Agency
Department of Occupational Standards: As the competent authority on setting standards for TVET, national level assessment and certification will support both the MOLHR and MOE to aligning the courses introduced in the TTIs and the vocational elective in the Schools to BVQF.</td></tr>
<tr><td colspan="2">Project Communication Protocol & Coordination between the PMUs
All the PIUs will report to the respective PMUs on progress (physical and financial), implementation issues or emerging opportunities. The PMU in MOLHR will coordinate with PMU in MOE to consolidate reports, reconcile fund and process withdrawal applications for release of fund. The reporting to, and convening of PSC will be through the PMU in MOLHR.

All audit reports and consolidated semiannual/annual progress reports and critical issues will be reported to the PSC before onward submission to MoF and ADB. However, the PMUs and ADB may interact on as-need basis seeking clarifications, updates, and resolving issues mostly on ADB procurement and reporting requirements.</td></tr>
<tr><td>PMU, MOLHR</td><td>Director, DTE will be the overall project director for the project. He will be supported by: (i) Project Manager (full time dedicated), (ii) Finance/accounts person (full time dedicated), (iii) Procurement officer (full time dedicated), (iv) Curriculum expert, (v) Standards expert, and (vi) Employment services

Under the guidance and oversight of Project Director, the PMU will be responsible for the day-to-day management, monitoring, and coordination for implementing the project. The PMU will have a fulltime dedicated Project Manager, fulltime Project Accountant, procurement officer engineer and further strengthened with officials from different departments of MOLHR and external experts (project coordination & management support, M&E, procurement, gender, and safeguards attached to the PMU).</td></tr>
</table>

Title	Description
PMU, MOE	PMU will be established in the Department of School Education (DSE). Director, DSE will the Project Director and will be supported by: (i) Project Manager (full time dedicated), (ii) Finance/accounts officer (full time dedicated), and (iii) Procurement officer (full time dedicated). The PMU in DSE will be responsible for the management, monitoring and coordinating the implementation of all the activities under output 3 on Orientation of Secondary Education to TVET. The PMU will have a fulltime dedicated Project Manager, fulltime Project Accountant, procurement, and further strengthened with officials from different departments of MOE and the pool of experts.
PIU, MOLHR	PMU in MOLHR will be supported by the PIUs established in the implementing Divisions/Departments and these include: Royal Institute for Tourism and Hospitality (RITH), Department of Employment and Human Resources (DoEHR), and the Department of Occupational Standards (DOS) • **Human Resource and Skills Development Division (HRSDD) of DoEHR** will be responsible for implementing the targeted training of 1,000 youths under the project through various partnership modalities with the private sector and other training providers. • **Standards and Qualifications Division of DOS** will be responsible for the standards development and alignment based on Bhutan Vocational Qualifications Framework (BVQF) • **RITH** will be responsible for training 250 students targeted in culinary and hospitality to be implemented based on an agreement drawn up between MOHLR (client agency) and RITH (as entrusted agency). • **PIUs for Thimphu TTI (Construction) and Samthang TTI (Construction)** - Responsible for all managing and monitoring civil works at Thimphu and Samthang TTIs.
PIU, MOE	PMU in MOE will be supported by the following PIUs: • **REC** will be responsible for all activities pertaining to curriculum mapping/development for pre-vocational orientation clubs and for the elective vocational subjects. • **SPDB** will be responsible for all the construction works related to the 13 new TVE labs. • **Career Education and Counselling Division (CECD)** under the DYS will implement the career guidance and counselling.
Design and Supervising Firm	All civil works under MOLHR will be supervised and monitored on a daily basis by the Design and Supervising firm. Main functions are as follows: • Full time supervision of the construction works at Thimphu TTI and Samthang TTI • Approves contractors' work program, method statements, material sources, and safety plan. • Approves and/or issues working drawings, approving the setting out of the works, and giving instructions to the contractor(s). • Inspects materials and works to ensure compliance to specifications and will give immediate notice to the contractor(s) in the event of non-compliance. • Certifies work volume and interim certificates for progress payments. • Assists the MOLHR representative in the maintenance of consolidated project accounts, and preparation of financial statements and withdrawal applications for submission to ADB. • Reviews and recommends to the MOLHR variation orders, extensions of time, claims, and other matters that may come from each contractor. • Prepares, at the completion of contracts, a consolidated project completion report in a format provided by ADB. • Provides the MOLHR and MOE with complete records, and inception, monthly, and completion reports.

ANNEX 3
Terms of Reference
Environmental Safeguard Consultant (PMU)

Environment Specialist (National, 4 person-months within 24 months, intermittent)

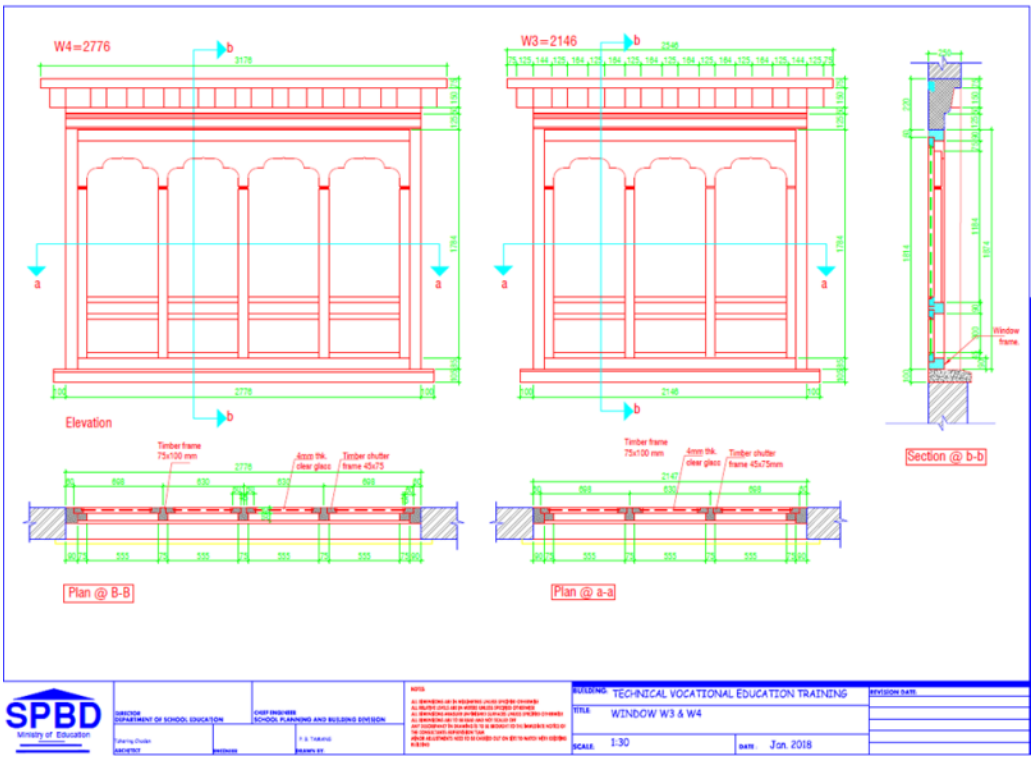
1. Preferably a post-graduate degree in environmental engineering, environmental sciences or equivalent discipline with a minimum of 7 years in environmental management and monitoring and in oversight of project implementation and compliance. A strong knowledge of environmental regulations and requirements in Bhutan as well as the environmental requirements of ADB following the Safeguard Policy Statement (SPS) 2009 will be mandatory. The candidate should have good communication skills (oral and written), a good team player with strong organizational and problem solving skills.

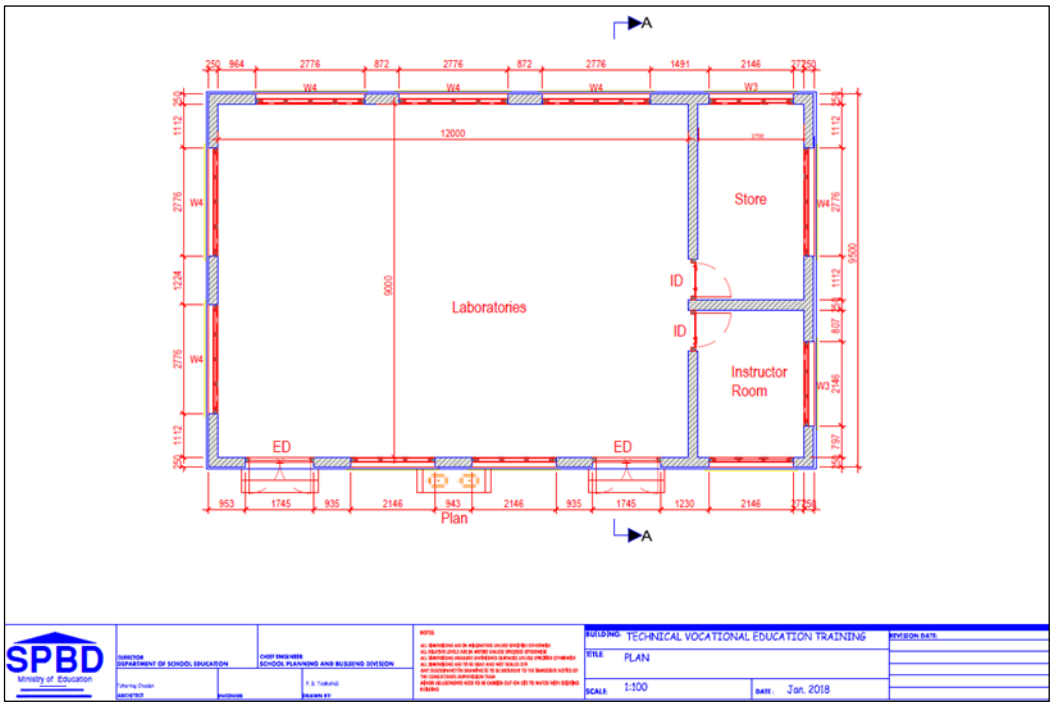
2. Duties and tasks include, but not limited to the following:

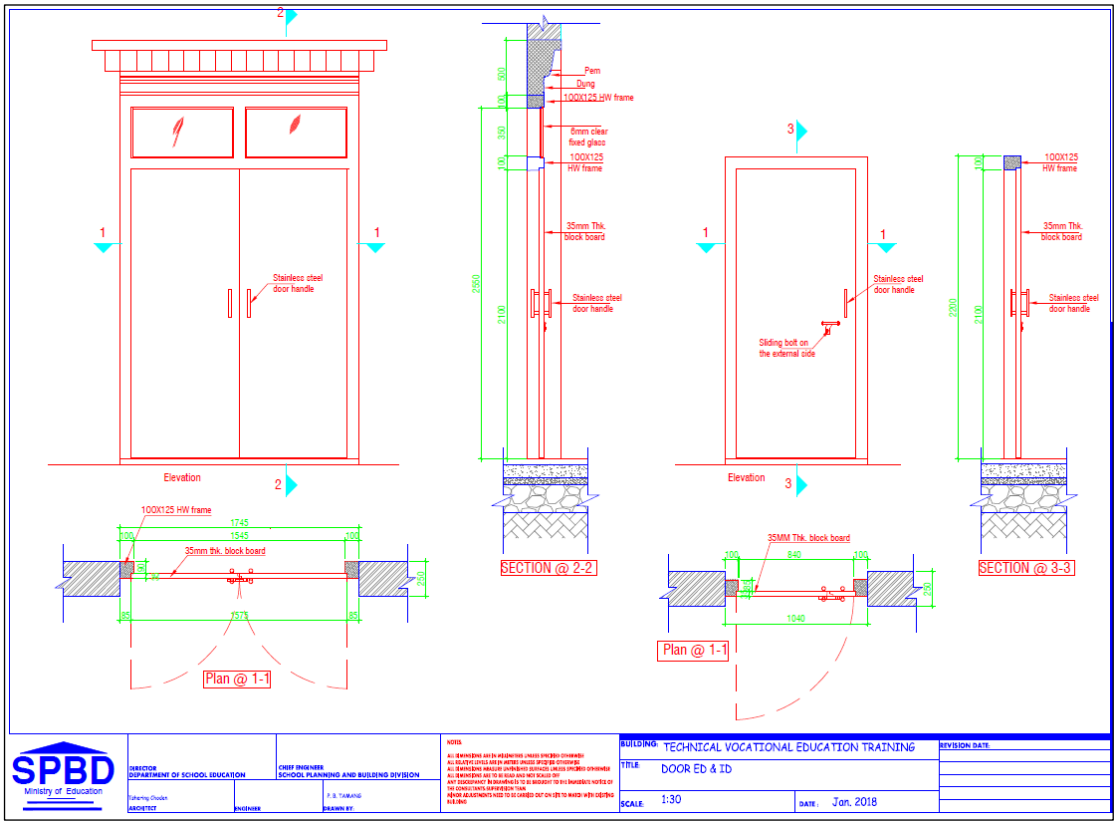
(i) Provide technical support to ensure that all environmental requirements of the government and ADB including health and safety requirements are properly incorporated in the design and construction of the new Thimphu Technical Training Institute (TTI), the additional new buildings in Samthang TTI, 13 TVE laboratories for seven secondary schools and various interventions in other TTIs;
(ii) Revise/update the IEE and environmental management plan (EMP), if needed;
(iii) Prepare site-specific EMP if needed to ensure project implementation comply with the government and ADB requirements;
(iv) Ensure that the EMP is included in the bid documents and civil works contracts;
(v) Implement system for monitoring the environmental safeguards; conduct regular site visits construction sites to monitor compliance to EMP including adherence to occupational health and safety provisions and core labor standards.
(vi) Conduct consultations to residents living close to Serbithang site for Thimphu TTI and in Samthang TTI. Determine if there is any concern during construction;
(vii) Organize an orientation workshop for MOLHR, MOE, and representatives of the Contractor(s) involved in project implementation on ADB Safeguards Policy Statement 2009, government environmental laws and regulations, and ADB environmental reporting. The Waste Coordinators of the seven secondary schools and the counterpart staff from MOLHR staff will be trained on how to prepare and submit the environmental monitoring report to ADB after construction.
(viii) Assist in obtaining the required environmental clearances and permits for projects prior to start of construction works.
(ix) Assist in the orientation of contractors, PMU and PIU on EMP implementation, environmental monitoring requirements, and to take immediate action in the event of unexpected adverse impacts or ineffective mitigation measures found during implementation.
(x) Enforce and monitor compliance with all government rules and regulations regarding site and environmental clearances as well as any other environmental requirements (e.g., permits), as relevant.
(xi) Oversee implementation of EMP during construction, including environmental, health and safety monitoring of contractors.
(xii) Coordinate with environmental staff or consultant of Contractor, and the PIUs/PMUs on mitigation measures involving the community and affected persons.

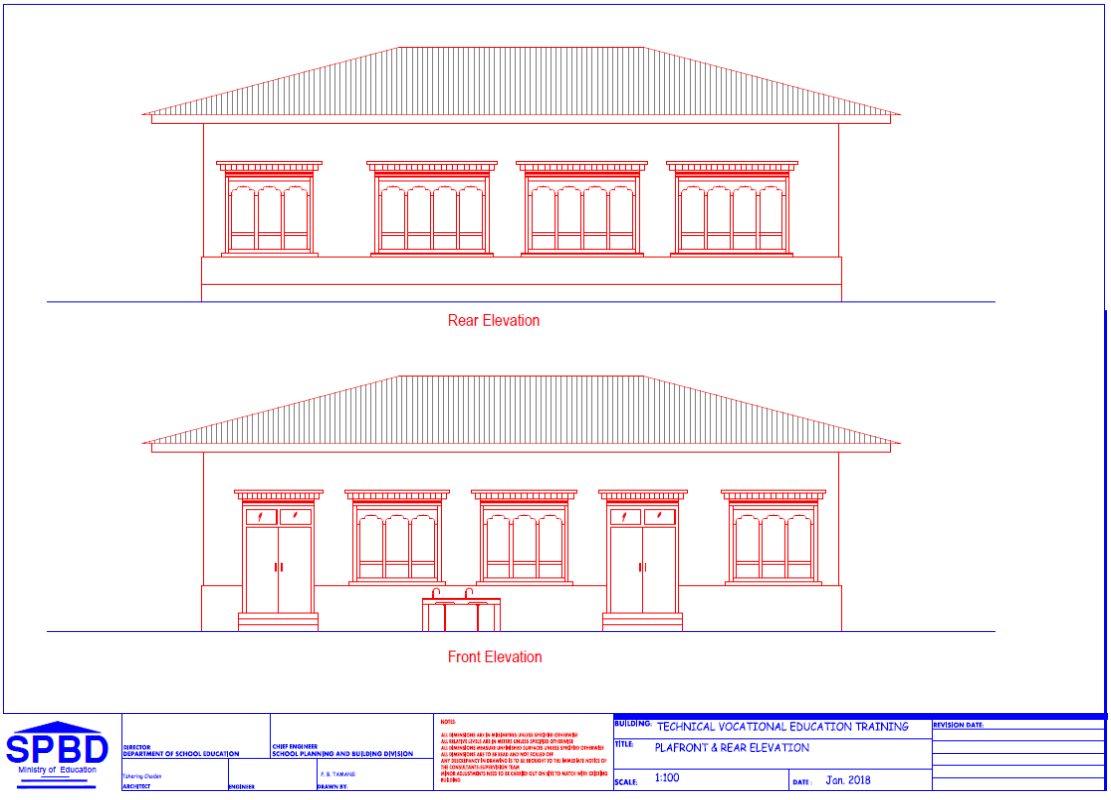
(xiii) Take corrective actions when necessary to ensure environmental impacts are adequately mitigated by concerned parties.
(xiv) Assist the PMU in reviewing compliance reports by contractors and submit regular environmental monitoring reports to the PMU or any other environmental compliance reports;
(xv) Address any grievances through the grievance redress mechanism in a timely manner as per the IEEs. Prepare record of such grievances for inclusion in the quarterly progress reports.
(xvi) Prepare the semi-annual environmental monitoring reports to be submitted to ADB; and,
(xvii) Any other relevant works that may be assigned by PMU/PIU.

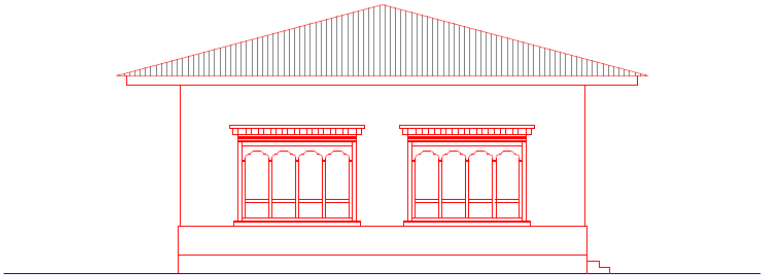
ANNEX 4
Typical Design of TVE laboratories for Seven Secondary Schools



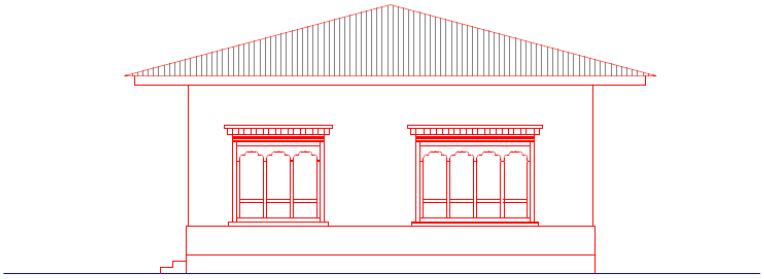



Elevation
Stainless steel door handle
100X125 HW frame
35mm thk. block board
Plan @ 1-1
Perm Dyng
100X125 HW frame
5mm clear fixed glass
35mm Thk. block board
Stainless steel door handle
SECTION @ 2-2
Sliding bolt on the external side
35MM Thk. block board
SECTION @ 3-3
SPBD
Ministry of Education
DIRECTOR DEPARTMENT OF SCHOOL EDUCATION
CHIEF ENGINEER SCHOOL PLANNING AND BUILDING DIVISION
BUILDING: TECHNICAL VOCATIONAL EDUCATION TRAINING
TITLE: DOOR ED & ID
SCALE: 1:30
DATE: Jan. 2018
REVISION DATE:


Rear Elevation
Front Elevation
SPBD
Ministry of Education
DIRECTOR DEPARTMENT OF SCHOOL EDUCATION
CHIEF ENGINEER SCHOOL PLANNING AND BUILDING DIVISION
BUILDING: TECHNICAL VOCATIONAL EDUCATION TRAINING
TITLE: PLAFRONT & REAR ELEVATION
SCALE: 1:100
DATE: Jan. 2018
REVISION DATE:



Left Side Elevation



Right Side Elevation

SPBD
Ministry of Education

DIRECTOR
DEPARTMENT OF SCHOOL EDUCATION

CHIEF ENGINEER
SCHOOL PLANNING AND BUILDING DIVISION

Tahering Chedan
ARCHITECT

ENGINEER

P. B. TAMANG
DRAWN BY

NOTES:

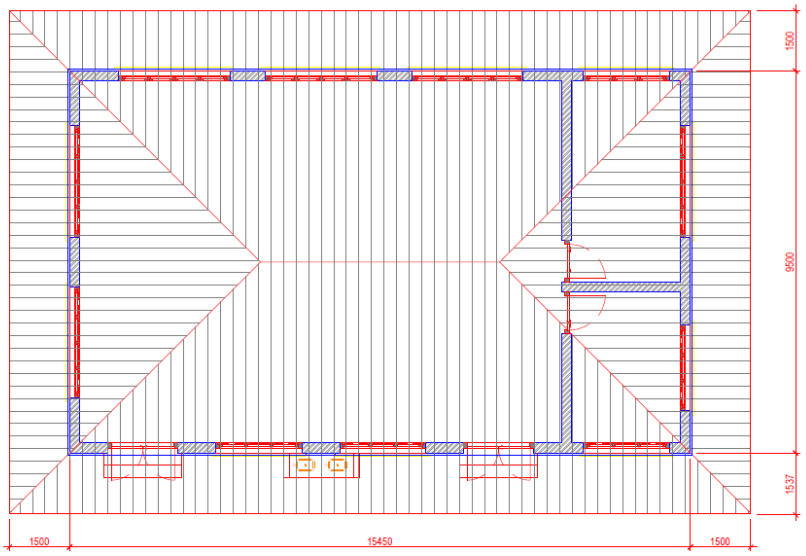
BUILDING: TECHNICAL VOCATIONAL EDUCATION TRAINING

TITLE: RIGHT & LEFT SIDE ELEVATION

SCALE: 1:100

DATE: Jan. 2018

REVISION DATE:



Roof Layout Plan

SPBD
Ministry of Education

DIRECTOR
DEPARTMENT OF SCHOOL EDUCATION

CHIEF ENGINEER
SCHOOL PLANNING AND BUILDING DIVISION

Tshering Dorjee
ARCHITECT

ENGINEER

P. B. TAMANG
DRAWN BY:

NOTES:

BUILDING: TECHNICAL VOCATIONAL EDUCATION TRAINING

TITLE: ROOF LAYOUT PLAN

SCALE: 1:75

DATE: Jan. 2018

REVISION DATE:

ANNEX 5
Environmental Codes of Practice
Construction Phase

Area of Concern		Project Activity	Management Guidelines
ECoP 1.0	Construction/Labour Camp Management	• Site selection, setting-up, development, management, and restoration of labour camp	The Contractor will do the following: • Identify the possible sites avoiding areas close to settlements (should be beyond 500 m) • Consult with Thimphu Thromde/Environment and Engineering Committee of *dzongkhags* and local government units on possible sites • Consult with local residents close to the possible labour camp site • Site for labour camps will be finalized in consultation with PMU/PIU • Prepare construction/labour camp management plan for approval by the PMU/PIU outlining measures to address adverse impacts from setting-up to restoration/closure • Secure permits/clearance from the Thimphu Thromde and respective units in dzongkhags relevant to setting-up of labour camps • Provide a written no-objection letter from the landowner or government authority of the selected site, describe land requirement and extent of usage, photo documentation, and details of restoration upon closure of camps • Coordinate with local authorities on the set-up of the labour camps to ensure monitoring and surveillance on public health, safety and security given that foreign workers will be engaged.
		• Provision of facilities at the construction camp	Contractor will provide the following at the construction camp: • Temporary accommodation – this will be at no cost to the workers • Sufficient supply of safe drinking water – will be marked “drinking water” in Dzongkha and English where location will be minimum 6 m away from any urinal, latrine, open drain or washing facility • Sanitary facilities – toilets will be separately provided for male and female workers. One latrine for every 20 females, and one latrine for every 25 male workers. Urinals for men should

Area of Concern		Project Activity	Management Guidelines
			not be less than 60 cm in length. Latrines should be secured, adequately lighted, and maintained in sanitary condition with adequate water supply. • Arrangements for waste disposal - Appropriate measures shall be taken to ensure wastes are properly collected and disposed of within the labour camps, and observe waste segregation at source with proper coding. • Firefighting facilities – portable fire extinguishers or sand baskets at easily accessible sites; mark areas that susceptible to fires with clear and visible warning signs; train workers on the use of the firefighting equipment, and conduct drills to prepare for emergency • First aid treatment facility – designate a person responsible (a nurse or first aid expert) who will be readily available during work hours to assist in case of emergency; arrangement will be made with the nearest hospital for injured worker or for sudden illness; maintain stock of medicines; conduct health screening of workers coming from other areas • Fuel for cooking – provide alternative fuel such as kerosene to prevent use of fuel wood by workers
		• Awareness to health and hygiene	Contractor will do the following: • Train workers on basic sanitation, health care issues, hazards, and safety. • Conduct orientation to workers regularly on sexually transmitted diseases such as HIV/AIDS • Maintain drainage facilities within the labor camp to prevent water-borne diseases, regularly spray mosquito repellant during the rainy season • Conduct regular orientation on personal hygiene and waste disposal • Inform district health authorities on the location of the labour camp and number of workers residing in the labour camps
		• Maintain safety and security at all times	The Contractor will ensure the following: • Provide security personnel and enclosures to prevent unauthorized access to the camp area. • Keep a registry of entry and exit of people within the camp all the time

Area of Concern		Project Activity	Management Guidelines
			• Post emergency contact number clearly and visibly at strategic locations within the labour camp
		• Restore labour camp after completion of construction works	Contractor shall do the following after completion of construction works: • Remove all temporary facilities from the construction camp • Spray water to contain generation of dust during demolition works • Dismantle camp in phases to ensure order • Give prior notice to workers of demolition schedule • Ensure noise levels during dismantling comply with the limits • Dispose waste and other construction debris at designated sites • Restore site to pre-project condition
ECoP 2.0	Community and occupational health and safety	• Construction works at the two TTIs and seven secondary schools	The PIU and the Contractor shall inform the community of the following: • Location of the labour camps, borrow areas and quarry areas (if required), scope of work, time of construction/work schedule, re-routing of traffic (if required), possible health concerns (exposure to dust, noise, and vibration), location and use of first aid kits, location/name/phone numbers of nearest hospital/doctor/clinic Contractor will do the following: • Set-up a health and safety committee and designate a Safety Officer • Provide workers with personal safety equipment (PPE) such as footwear, gloves and eye protection devices, helmets, etc. • Prepare an emergency action plan if construction workers are more than 200 persons • Maintain PPE properly by cleaning dirty ones and replace damaged sets. • Provide adequate lighting, drainage systems to prevent water stagnation, and adequate space to administer first aid • Implement appropriate standards of safety to all workers and site visitors to comply with the national requirements and the World Bank-IFC

Area of Concern		Project Activity	Management Guidelines
			Environmental, Health and Safety Guidelines 2007 • Conduct toolbox meetings prior to start of construction works. Record names of workers present during the meetings. Worker not joining toolbox meeting will not be allowed to work. • Enforce safety procedures and provide training on PPE to workers • Designate someone to deal with community and occupational health and safety • Inform the relevant local authority prior to start of construction works and setting up of labour camps to ensure surveillance on public health and security concerns. • Clear and visible danger and warning signs shall be placed as soon as construction begins and will remain until works are completed. • Keep a record of workers and place assigned
		• Child labor	Contractor will not hire children below 14 years old[34]
		• Training and record keeping	The Contractor will: • Keep a record of occupational accidents, diseases, and injuries • Prevent work-related accidents or injury by minimizing workplace hazards consistent with international best practice • Ensure health care facilities and first aid kits are readily available • Train construction workers about general health and safety practices, and on specific hazards related to their work
		• Security of construction sites	Contractor will ensure that: • Security personnel will be deployed to prevent unauthorized entry into the construction sites • All the tools, equipment and construction materials at the site are accounted for, identified, clearly labeled/marked, and recorded • Maintain a record of tools' serial numbers and check inventory on a regular basis

[34] ADB-ILO. Core Labor Standards Handbook, October 2006. Manila.

Area of Concern		Project Activity	Management Guidelines
			• Implement an inventory system where tools and equipment are checked in and out, securely stored when not in use to prevent theft • Provide proper fencing of construction site perimeter with secured chain and lock • Construction sites will have controlled access points to allow for close monitoring of entry and exit from the site • Workers will have proper identification while within the site • Employees or workers required to have access to the site after working hours will be notified with the PIU/PMU and local authorities • Job sites are adequately lighted with floodlights operating on sensors where appropriate • Pre-employment investigations are conducted to verify previous employment, references (if needed), education and criminal background
ECoP 3.0	Managing air quality	• Use of construction vehicles and machinery	Contractor will do the following: • Prepare air quality management plan as part of the overall construction management plan and consult PMU for concurrence • Keep construction vehicles in good working condition and limit idling time of not more than 2 minutes • Cover trucks and other vehicles transporting materials that generate dust • Implement speed limits on vehicular movement within the construction sites • Sprinkle water to crushers and orient/educate workers to follow good practices while material handling in concrete-mix plant
		• Construction activities	The Contractor will do the following: • Spray water regularly (or as needed) to unpaved and opened land areas, material stockpiles, and access roads to minimize dust dispersion • Dust-generating construction activities will be enclosed to contain dust dispersion • Workers assigned to activities generating high dust level will be

Area of Concern		Project Activity	Management Guidelines
			provided with PPE such as masks, goggles, etc. • Must ensure that there will be minimum generation of dust and waste while unloading the materials from trucks • Materials generating dust such as sand and gravel will be covered particularly during non-working hours. • Re-vegetate opened areas (if possible) to limit area of exposed land • Stock cement and other dust-generating materials in silos or covered area/space • Provide area for mixing and loading of construction materials. • Burning of solid waste within the construction site will not be allowed. • Batching plant will be located upwind of the construction sites.
ECoP 4.0	Managing noise and vibration	• Vehicular traffic	The Contractor will ensure: • Regular upkeep and maintenance of construction vehicles to minimize generation of unwanted noise • Drivers of construction vehicles to comply with speed limits, use of horns only when necessary, diversion routes to minimize traffic, observe loading and unloading procedures, and to minimize unnecessary noise at the construction sites • Prepare a noise and vibration management plan for approval by the PIU/PMU
		• Use of construction machinery and equipment	The Contractor will ensure: • Enclosure and/or isolation of noise-generating machinery and equipment to contain noise levels • Identify and organize all noise-generating activities to minimize increase in ambient noise levels • Proper and regular maintenance of equipment and machinery to avoid unwanted generation of noise • Minimizing/avoiding the use of alerts, horns, bells, or sirens unless absolutely necessary like emergency
		• Construction works	Contractor will ensure that: • Nearby local residents are notified of noise generating activities, time and duration

Area of Concern		Project Activity	Management Guidelines
			• Operators of heavy equipment and machineries will be educated/oriented on construction techniques to reduce generation of noise • Temporary noise barriers or enclosures are installed, where needed • Blasting is avoided to the extent possible • Onsite deliveries will be planned to minimize noise from delivery trucks • Noise-generating activities will be conducted only during daytime • Schedule of noise-generating activities and deliveries of materials will be coordinated with the School Management of the seven secondary schools to ensure minimal disruption to students and school activities
ECoP 5.0	Borrow areas	• Identify location of borrow or quarry area	Contractor will be required to do the following: Pre-construction stage • Consult with landowners if private land will be involved. Some areas to be avoided will be close to settlements, environmentally-sensitive areas, irrigated agricultural land, and grazing land. • After assessment of the suitability of the area, finalize borrow area plan in consultation with PIU and PMU of MOLHR and MOE • Submit to PIU/PMU, agreement or written no objection certificate from the landowner, extent of borrow area and duration of the agreement, photographs of the borrow area prior to use, details of site restoration • Identify new borrow and quarry areas in consultation with the PIU/PMU, if required. • Obtain relevant permits required by the Thimphu Thromde and the Dzongkhags

Area of Concern		Project Activity	Management Guidelines
		• Operation of borrow areas	The Contractor will: • Reuse excavated or disposed material available in the project to the maximum extent possible. • Keep top soil for site restoration and landscaping. • Borrow areas will not be dug continuously to prevent embankment slippage and soil erosion • Borrow area will be maintained and left in a stable condition without steep slopes and should be either refilled or drained, and landscaped by appropriate planting. • Maintain erosion and drainage control in the vicinity of all borrow pits and ensure that surface drains will not affect the adjacent land/properties. This will be monitored by the PIU/PMU. • Control dust in the borrow area by spraying water regularly • Reclaim borrow area at least within one month after earthworks are completed
ECoP 6.0	Waste Management	• Generation of waste at construction sites	Contractor will do the following: • Identify the activities that will generate waste and identify location for disposal • Develop site-specific waste management plan for different waste streams prior to start of construction works • Orient/educate workforce on disposal of waste, the location of disposal site and specific requirements for management of these sites • Wastes that cannot be re-used will be disposed of safely at designated sites like Memelakha landfill • Minimize generation of waste by implementing 3Rs (Reduce, Re-use, Recycle), and segregate waste at source • Waste will be transported in fully covered trucks to prevent spillage along the way • Provide appropriate bins/containers for waste at construction sites • Conduct orientation to workforce on waste management practices • Require workers to observe good housekeeping at all times

Area of Concern		Project Activity	Management Guidelines
		• Handling of hazardous waste	Contractor will ensure that: • Chemical wastes are stored in sealed container and properly labeled • All chemical containers such as paints are labeled properly for easy identification • Material Safety Data Sheets (MSDS) of all chemicals onsite during construction are maintained and properly recorded • Chemical and other hazardous materials are stored in bunded place or in an area lined with impervious material to prevent soil contamination and away from drainage system • Store sufficient stock of absorbent materials for used chemicals or spent lubricants, lube oil, etc.
ECoP 7.0	Water Management	• Water for construction	Contractor will ensure that: • An assessment of water requirements and availability of water supply is conducted • Consultations with local community in case of community water source and coordination with Thimphu Thromde • Work out arrangements to ensure adequate supply of water for construction activities and use of construction workers • Potable water for drinking purposes of construction workers shall meet requirements of Bhutan Drinking Water Quality Standards 2016
		• Discharges from construction sites	Contractor will ensure that: • Temporary drainage system is installed where needed such as around the storage of construction materials • Temporary sediment basin where needed is installed to capture sediment-laden run-off • Construction materials are stockpiled away from drainage system • Solid and liquid wastes will not enter waterways by collecting spoils, concrete cuttings, etc. • Ready-mix concrete agitators and concrete handling equipment are washed at designated areas away from drainage systems
ECoP 8.0	Demolition of Structures	Removal of three buildings in Serbithang for the new Thimphu TTI	Contractor will ensure that:

Area of Concern		Project Activity	Management Guidelines
			• Demolition plan is prepared and appropriate permits from Thimphu Thromde are obtained prior to any demolition works • Notify nearby residents at least a week before the start of demolition activities • Dust-control and noise containment measures will be implemented • Plan/organize hauling of demolition debris to avoid traffic and inconvenience to local residents • Identify materials that can be recovered, reused, and recycled, whenever possible; • Implement stabilization measures (if needed) to prevent soil erosion • Dispose of demolition debris properly and in designated areas following requirements of Thimphu Thromde

ANNEX 6
Complaint Form for Grievance Redress Mechanism

Complaint/Suggestion/Comment Form				
Grant No.: _____BHU: Skills Training and Education Pathways Upgradation Project				
Please provide the following information:				
		Date of Filing:		
Name of Person/Organization:				
Contact Details:				
Address				
Telephone/Mobile Phone				
Email (if available)				
Signature of Person Filing Complaint				
Representative in filing this complaint?	Yes			
Please provide details	Name			
	Address			
	Telephone			
	No			
	Not applicable			
Complaint/Suggestion/Comment (*Please provide details as appropriate: what happened, how and why it happened, when and where, how many times it occurred*)				
Please describe any inconvenience/harm caused or may have been caused				
Please provide suggestion to resolution of your complaint (if any)				
Please let us know how you prefer to be contacted	Mail or email			
	Phone			
	Meeting			
Contractor/PIU/PMU Use only				
Recorded by (Name of designation of Contractor/PIU staff)				
Reviewed by (Name and designation of Contractor/PIU staff)				
Action(s) taken to resolve the complaint/comment/suggestion				
	No action needed			
Action/decision disclosed to Complainant	Yes	No	Not required	
	Date			
Manner of disclosure	Mail			
	Phone			
	Meeting			
	Not required			

PMU Environmental Safeguard Form 1 - GRM

ANNEX 7
Format of Environmental Monitoring Report during Construction Phase

Environmental Monitoring Report

Reporting Period {From Month, Year to Month, Year}
Date {Month, Year}

BHU: Skills Training and Education Pathways Upgradation Project

Prepared by the Ministry of Labor and Human Resources and Ministry of Education for the Asian Development Bank

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ANNEX 8
Format of Environmental Monitoring Report during Post-Construction

Environmental Monitoring Report

Reporting Period {From Month, Year to Month, Year}
Date {Month, Year}

BHU: Skills Training and Education Pathways Upgradation Project

Prepared by the Ministry of Labor and Human Resources and Ministry of Education for the Asian Development Bank

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