

Initial Environmental Examination

July 2018

Bhutan: Health Sector Development Program

Prepared by PricewaterhouseCoopers Private Limited, India for the Asian Development Bank.

CURRENCY EQUIVALENTS

(as of 9 August 2018)

Currency unit	–	ngultrum (Nu)
Nu1.00	=	\$0.01460
\$1.00	=	Nu68.4675

ABBREVIATIONS

ADB	–	Asian Development Bank
BHTF	–	Bhutan Health Trust Fund
BHU	–	Basic Health Unit
DHO	–	district health officer
DMS	–	Department of Medical Services
DNP	–	Department of National Properties
EARF	–	environmental assessment and review framework
ECOP	–	Environmental Codes of Practice
EHS	–	environmental, health, and safety
EMP	–	environmental monitoring plan
GDP	–	gross domestic product
HCF	–	health care facility
HIDD	–	Health Infrastructure Development Division
HIS	–	health information system
IEE	–	initial environmental examination
JDWNRH	–	Jigme Dorji Wangchuck National Referral Hospital
MOAF	–	Ministry of Agriculture and Forest
MOH	–	Ministry of Health
MWHS	–	Ministry of Works and Human Settlement
NCD	–	noncommunicable disease
NEC	–	National Environment Commission
NECS	–	National Environment Commission Secretariat
NHP	–	National Health Policy
NICHWMP	–	National Infection Control and Healthcare Waste Management Program
NSB	–	National Statistics Bureau
PHC	–	primary health care
PMPSU	–	Project Management and Policy Support Unit
PPE	–	personal protective equipment
REA	–	rapid environmental assessment
SDP	–	sector development program
SPS	–	Safeguard Policy Statement
WHO	–	World Health Organization

WEIGHTS AND MEASURES

C	–	Celsius
km	–	kilometer
km ²	–	square kilometer
masl	–	meters above sea level
m	–	meter
m ²	–	square meter
mm	–	millimeter
PM10	–	particulate matter 10 micrometers

NOTE

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

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I. INTRODUCTION

A. Project Background

1. Bhutan has made significant investments to develop its health system from a relatively low base and has achieved remarkable progress in key health outcomes over the past several decades. Average health indicators improved from among the poorest in the world to mostly achieving the Millennium Development Goals. Bhutan's total health expenditure is at 3.6%¹ of the gross domestic product (GDP), which is predominantly government financed (approximately 75.0%). Household out-of-pocket expenditure is relatively low (estimated 25% of the total health expenditure), implying a fair level of equity and financial protection. Coverage of health facilities is also extensive, with 96% of the population living within a 3-hour walk from a nearest health facility. This is a laudable feat in physical access to health facilities for a country challenged with difficult terrain, and scattered, remote populations.

2. Despite these impressive gains in key health outcomes, and high government priority given to health, challenges remain in Bhutan's health sector performance. These include regional disparities in health status (e.g., under-five mortality rate is 81 in rural and 41 in urban; deliveries by skilled birth attendance is 90% in urban and 54% in rural), and district-wide variations in health outcomes and service coverage. The sector also needs to evolve to effectively deal with growing health security threats and epidemiological and demographic transitions, including the increasing burden of noncommunicable diseases (NCDs), and rapid urbanization with increasing rural-urban migration. The long-term sustainability of health care financing needs critical attention, given rising population expectations and the planned introduction of new technologies and services.

3. To help address these issues, the Asian Development Bank (ADB) will provide a \$20 million grant to the Government of Bhutan to further strengthen its overall health system through (i) enhanced health information systems (HIS), (ii) improved access to quality health services in peripheral regions, and (iii) enhanced financial sustainability. The assistance is aligned with priorities in the Ministry of Health (MOH)'s National Health Policy (NHP) and will support implementation of the upcoming Twelfth Five-Year Plan (2018–2022). It will be delivered through a sector development program (SDP) modality with three outputs.

B. Purpose and Structure of the Report

4. As required by ADB, an initial environmental examination (IEE) has been prepared and is in line with the environmental assessment and review framework (EARF) which provided the general policies, guidelines, and procedures to be integrated into all infrastructure and civil works under SDP. The IEE assesses the environmental impacts of SDP and proposes measures to mitigate any negative impacts. The IEE has been prepared following the procedures described in the EARF for SDP. The methodology used for the preparation of IEE is presented in Section IV and a brief overview is as follows:

- (i) review of project-related documents and literature relevant to the project.;
- (ii) site visits to a sample of health care facilities (HCFs) to review the existing environmental conditions and develop baseline information for project areas;
- (iii) consultation with local and national authorities to discuss project components, benefits, and impacts;

¹ Final Report: Review of Trends in Health Spending, National Budgets and the Future Funding Gap, MOH (RGOB) and WHO.

- (iv) analysis of typical environmental impacts of project components and identification of suitable mitigation measures to ameliorate potential impacts; and
 - (v) review and develop institutional arrangements and capacity building needs for implementation of environmental management and monitoring.
5. The purpose of the IEE is to discuss and present the following:
- (i) environmental impacts relating to the location, design, construction, and operation of all physical works, as well as operation of the healthcare facility on completion;
 - (ii) mitigation measures with respect to the identified adverse impacts; and
 - (iii) formulation of an environmental management plan (EMP).
6. The structure of the IEE report is as follows:
- (i) **Introduction.** This section entails a brief background to the project, objective of the IEE, a summary of applicable legal and administrative framework, and standards in the country. It also provides a brief description of the project and its relevant sub-components.
 - (ii) **Description of environment.** This section details all physical, ecological, social, and cultural resources of the country and districts where major civil work is to be undertaken. The section also presents reference baseline on health care and waste management.
 - (iii) **Screening of potential environmental impacts.** This section describes the screening process and criteria used.
 - (iv) **Findings of environmental assessment:** This section presents the expected impact on environment during its various phases of civil works to be carried out during the project. It also enlists the impact areas which may not have any significant impact on the environment.
 - (v) **Institutional arrangements and environmental management plan.** This section proposes the institutional arrangements and capacity development areas for effective management of environment. It also provides guidelines on environment management and monitoring during the implementation phase of the project.
 - (vi) **Public consultation and disclosure.** The findings from the public consultations and disclosures during the IEE phase are presented in this section. The section also details out the grievance redressal mechanism.
 - (vii) **Findings and recommendations.** This section summarizes the overall findings and recommends measures for effective environmental management.

C. Applicable Policy, Legal and Administration Framework, and Standards

1. Assessment of the Legal Framework

7. An assessment of the legal environmental framework has been conducted by ADB and described in the Bhutan Country Environmental Analysis 2004 report. Many similar EARF documents on projects in Bhutan have also been prepared and therefore an assessment of the legal environment framework will not be further described in this section. The implementation of the project-related infrastructural and procurement works will be governed by ADB Safeguard Policy Statement (SPS, 2009) and all national laws, acts, regulations, and guidelines of the Government of Bhutan.

2. Safeguard Requirements of the Government of Bhutan

8. Sustainable development is enshrined in the government's National Environment Strategy for Bhutan (1998), which aims to maintain a balance between environment and development. The Environmental Assessment Act (2000), which requires that all environmental concerns are fully considered prior to the formulation of new projects and it establishes procedures for assessing the potential impacts of plans, policies, programs, and projects. The act mandates that an environmental clearance from a competent authority should be conducted as a pre-requisite for a project.

9. The environmental clearance procedure is described in the Regulation for the Environmental Clearance of Projects (2016), and specific guidance is given in a series of sectoral guidelines, prepared in 1999 and revised with ADB assistance in 2006. According to the Environment Assessment Act, the proponent is required to submit an environmental clearance application to a designated competent authority wherein all environmental concerns are fully considered and documented.

10. When developmental projects are in the Thromde (municipality), the project is governed by the Thromde Act of Bhutan (2007), and the Thromde Rules (2011) and the designated competent agency to grant development and environment clearance is the Thromde. Where development projects such as construction of Basic Health Units (BHUs) in rural areas or where small improvement works within rural HCFs are proposed, the designated competent authority is the district environmental officer and must abide by Rural Construction Rules (2013) for the Ministry of Works and Human Settlement (MWHS).

11. All construction works within Thimphu city limits must be in line with the (i) Thimphu Structural Plan (2004), (ii) Thimphu Municipal Development Control Regulations (2004), and (iii) Bhutan Building Rules (2002) which apply to all urban areas. In rural areas, Rural Construction Rules (2013) apply. These rules dictate the maximum plot sizes and maximum building heights so that aesthetic, as well as environmental impacts, on neighboring areas are minimized. The MWHS has released the Bhutan Green Building Design Guidelines in 2013 which provides guidance to architects, engineers and builders on practical green building design and construction principles and solutions that can be adopted in Bhutan. It promotes the use of low energy local construction methods and natural resources coupled with designs that was adapted to respond to local climatic environment combined with vernacular architecture in Bhutan. NHP (2011) provides guidance to MOH to achieve its national and international health goals as guided by the constitution. The design and minimum requirements for the satellite clinics is guided by the 2009 Bhutan Services Standards for BHUs and satellite clinics. Other relevant regulations and standards are the Water Regulation of Bhutan (2014) and the Environmental Standards (2010) that regulate the water and ambient air quality standard.

12. Under the Thromde Act and Rules, development applications are categorized as (i) major, (ii) minor, (iii) those that can be routed through the green channel, or (iv) those considered as development priority. Where development work is undertaken on behalf of the government, by a government agency, the construction clearance for the project can be processed through the "priority channel". Through this channel, the construction approval is granted within 5 working days (excluding the time taken to seek clearance from the Bhutan Power Corporation for electrical connections) of submission of all the required architectural, structural, electrical, and water supply and sanitation drawings. All government works are guided by the Procurement Rules and Regulations (2009), and therefore procurement of all equipment and construction works will follow government standard bidding processes.

13. As per the Disaster Management Act of Bhutan (2013), to reduce the risks from disaster, the Department of Disaster Management has prepared Dzongkhag Disaster Management Planning Guidelines to guide the Dzongkhags, through the Dzongkhag Disaster Management Committees, to develop and implement a Dzongkhag Contingency Plan. Most Dzongkhags are now undertaking the planning process that includes hazard mapping to identify the most hazard-prone areas of the Dzongkhag so that future development interventions and risk mitigation measures can be planned accordingly. A national Health Emergency and Disaster Contingency Plan has been developed to respond to public health emergencies and disease outbreak. A Health Emergency Operation Centre has been established to ensure effective communication and coordination for emergency response and disaster management.

14. Bhutan has several acts and rules related to waste management such as the Waste Prevention and Management Act of Bhutan (2009) and Waste Prevention and Management Regulation (2012), that promote the principles of 3Rs (reduce, reuse, and recycle). The act and regulation discuss waste reduction at the source; promoting segregation, reduction, recycling and disposal of waste in an environmentally sound manner. The act is enforced through the Waste Prevention and Management Guideline (2012). The National Environment Commission Secretariat (NECS) is responsible for implementing the provisions outlined in the act and the guidelines. According to these guidelines, medical waste is categorized into general, pathological, infectious, sharps, pharmaceutical, chemical, radioactive waste, and pressurized containers. Table 1 provides details of different categories of waste.

Table 1: Categories of Medical Waste as per the GOB Waste Management Regulation

Type of waste	Description of Waste
General waste	Waste free of pathogenic microorganisms or hazardous substances. Therefore, waste is harmless and does not need special handling or treatment
Infectious waste	Contains potentially pathogenic organisms which have the potential to cause infections. Wastes include, laboratory cultures stocks, live or attenuated vaccines, human and animal cell culture, infectious agents from research laboratories, wastes from biological, toxins, dishes and devices used for transfer of cultures, used syringes and contaminated materials
Sharps waste	Suture needles, scalpel blades, lancets, broken vials / ampoules/ pipettes/glasses, knives and infusion sets
Pathological waste	Body parts and tissues, body fluids, dead fetuses, placenta, blood and blood products.
Pharmaceutical waste	Unused, contaminated expired drugs, vaccines, serum and recalled (quality failed) medicinal products. medicine returned by patients
Genotoxic waste	Cytotoxic drugs, highly toxic and may contain mutagenic, teratogenic or carcinogenic properties
Chemical waste	Laboratory reagents, X-ray film developer, disinfectants and others like Deltamethrin etc.
Radioactive waste	Radioactive substances used for diagnostic or therapeutic purposes. Blood, urine and feces of patients on treatment or tested with radionuclides
Pressurized containers	Gas cylinders (anesthetic gas, oxygen, compressed air in health facilities) stored in pressurized cylinders, cartridges, aerosols and cans
Heavy metals	Mercury from broken thermometers and mercury sphygmomanometer, dental amalgam, cadmium from batteries, tube lights and bulbs
E-wastes	Printer cartridges, computers etc.

Source: Waste Management Regulation, 2012 and Waste guideline, 2017, Government of Bhutan

15. There are 2014 guidelines on pharmaceutical waste issued by the Drug Regulatory Authority and endorsed by the NECS. The guidelines outline the process for collection, segregation, transportation, storage, disposal, and recording of pharmaceutical waste from HCFs as well as private pharmacies. Further, as per the Bhutan Medicines Rules and Regulations (2012), the firms are mandated to segregate and record the quantity of waste generated from the firm and store them separately until disposal. The sale and distribution of expired medicines is prohibited by the 2003 Medicine Act. Since not much waste is generated from the private pharmacies, disposal is only carried out once a year. Non-hazardous waste is managed at individual health facility level and hazardous waste is sent to the medical store in Phuentsholing for disposal. The Drug Regulatory Authority has a memorandum of understanding with the Penden Cement Authority in Gomtu to be able to incinerate hazardous pharmaceutical waste.

16. In 2004, the MOH set up the National Infection Control and Health Care Waste Management Program (NICHWMP) to address the need for efficient infection control and waste management as well as build the capacity of the health workers to prevent hospital-acquired infections. Each HCF is required to send quarterly and annual compliance reports to MOH and the MOH in turn is responsible for reporting to NECS. The responsibility in the MOH for waste management is as follows:

- (i) At the national level, the High-Level Committee provides technical guidance to the NICHWMP.
- (ii) At regional referral hospitals, there is an infection control team who implement infection control and waste management practices.
- (iii) At the hospitals there is a committee who implement infection control and waste management practices.
- (iv) At the primary level, each BHU has a health worker who is an infection focal person and is responsible for infection control and waste management practices.

17. The Waste Prevention and Management Act of Bhutan (2009) and Chapter IV of the Waste Prevention and Management Regulations (2012) indicates that the municipal authority is responsible for waste management, transport, and disposal at designated sites and for developing public-private partnerships for waste management. Dumping of any kind of waste is punishable by law, all waste needs to be approved by the Environmental Division of the Thromde who will identify the appropriate disposal site in consultation. The Dzongkhag Tshogdue and Thromde Tshogdu are responsible for waste management in district towns and Dzongkhag. They review and approve waste management facilities, landfill locations and approve collection of waste management services.

18. The Department of Information Technology and Telecoms under the Ministry of Information and Communications is responsible for information and communication technology policies, regulations, standards, and legislation; and supporting the development of reliable information and communication technology infrastructure. It is responsible for ensuring the minimization, storage, treatment, and disposal of e-waste in Bhutan. As per standard practice, across all government institutions, all health facility staff are required to send redundant electronic equipment to the Department of National Properties (DNP) where it is disposed of.

3. Safeguard Requirements of ADB

19. ADB's SPS (2009) requires the consideration of environmental issues in all projects and that all impacts are identified and assessed. It also requires that plans are developed and implemented to avoid, minimize, mitigate, or compensate for potential adverse impacts.

20. The nature of the assessment required for a project depends on the significance of its environmental impacts, which are related to the type and location of the project, the sensitivity, scale, nature and magnitude of its potential impacts, and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts and are assigned to one of the following categories:

- (i) **Category A:** Projects that could have significant environmental impacts that are irreversible, diverse, or unprecedented and affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- (ii) **Category B: Projects where the environmental impacts are less adverse than those of Category A projects. The impacts are site-specific, few, if any are irreversible, and in most cases can be mitigated. An IEE is required.**
- (iii) **Category C:** Projects which are unlikely to have adverse environmental impacts. No environmental impact assessment or IEE is required, although environmental implications are reviewed.
- (iv) **Category FI:** Projects involving investment of ADB funds to or through financial intermediaries (FI).

a. Pollution prevention

21. Pollution prevention control techniques and practices must be consistent with international good practices as reflected in internationally recognized standards such as International Finance Corporation's Environmental, Health, and Safety (EHS) Guidelines and standards. These must be applied during the design, construction, and operation of the project. When national regulations differ from these levels and measures, the borrower/client will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the borrower/client will provide full and detailed justification for any proposed alternatives.

b. Consultations, participation, and information disclosure

22. The project management must conduct meaningful consultation with all stakeholders early in the project and throughout the project cycle. Public consultation and information disclosure with stakeholders will be covered in the social impact assessment report. The SPS (2009) requires that all relevant information such as resettlement framework/plan must be submitted to ADB for disclosure on ADB's website. In the situation where no resettlement involved, the final IEE and the environmental monitoring reports must be submitted to ADB and made available to other stakeholders.

4. International Regulations

23. Bhutan is a member of the World Health Organization (WHO) and is obligated to fulfill the 2005 International Health Regulations. Bhutan became a party to several multilateral environmental agreements listed below with the year of ratification:

- (i) United Nations Framework Convention on Climate Change - ratified in 1995;
- (ii) United Nations Convention on Biological Diversity in 1992, ratified in August 1995;

- (iii) Convention on International Trade in Endangered Species of Wild Fauna and Flora in 2004;
- (iv) Kyoto Protocol to the United Nations Framework Convention on Climate Change in 2005;
- (v) Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal in 2004;
- (vi) United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Convention in 2001;
- (vii) International Plant Protection Convention in 1994;
- (viii) The Final Act and the Law of Sea Convention in 1982;
- (ix) Statute of the Centre for Science and Technology of the Movement of Non-Aligned Countries and other Developing Countries in 1985;
- (x) Statutes of the International Centre for Genetic Engineering and Biotechnology in 1985;
- (xi) Vienna Convention for the Protection of the Ozone Layer and Montreal Protocol on Substances that Deplete the Ozone Layer in 2004; and
- (xii) United Nations Convention to Combat Desertification in 2004.

24. World Bank Group's Environmental, Health, and Safety Guidelines. The aim of the guidelines is to ensure that projects should incorporate the necessary precautions to avoid, minimize, and control adverse impacts to human health, safety, or the environment from wastewater or emissions to air. Where this is not possible, the generation and release of emissions of any type should be managed through regulatory requirements. The guidelines cover air emissions and ambient air quality, energy conservation, wastewater and ambient water quality, waste management, noise, community and occupational health and safety, and construction and decommissioning of projects. The general content of these guidelines will be considered for construction of new facilities as well as renovation of health facilities in the target districts. The EHS guidelines are included in Appendix 7.

II. DESCRIPTION OF THE PROJECT

A. Program Rationale

25. The Constitution of Bhutan, states that “*the State shall provide free access to basic public health services in both modern and traditional medicines*” and that “*the State shall endeavor to provide security in the event of sickness and disability or lack of adequate means of livelihood for reasons beyond one’s control.*” Bhutan’s NHP (2011), envisions, building a “*healthy and happy nation through a dynamic professional health system, attainment of highest standard of health by the people within the broader framework of overall national development in the spirit of social justice, and equity*” (MOH, 2011). Health therefore, holds a prominent place in Bhutan’s economic development and health financing is predominantly driven by government budget.

26. The Bhutan Health Sector Development Program builds upon a previous project financed by the Government of Bhutan and the ADB from 2000 until 2005 to strengthen health sector reforms including the establishment of the Bhutan Health Trust Fund (BHTF). The government is facing challenges to sustaining its commitment to free health care for all citizens as constraints on fiscal spending had led to a decrease in health expenditure as proportion of gross domestic product and there are less external resources available for health. This is within the context of increasing health care costs from the rise in NCDs, technological advances, and rising patient expectations. There is a need therefore, to improve the efficiency and equity of current health care spending and service delivery to achieve further progress in better health outcomes. The proposed SDP is aligned with the priorities of the government’s Twelfth Five-Year Plan (2018–2023) and will (i) promote efficiencies by improving HIS, including better patient information and disease surveillance; (ii) strengthen the BHTF to enable it to become an additional source of finance for the health sector and thereby promote more equitable public health care financing; and (iii) support more cost-effective primary health care (PHC), in particular, in peripheral areas.

B. Program Design

27. The SDP is being financed through a grant of \$20 million to the Government of Bhutan for a period of 5 years. The SDP will be delivered through three outputs.

1. Output 1: Disease Surveillance and Health Information System Enhanced

28. The output will assist MOH in developing and implementing the e-health strategy, which envisions the provision of safe and secure health care supported by a responsive, real-time HIS for personal care, program management, and public health. The output intends to improve health sector efficiency and address routine data needs beyond individual fragmented system. It will facilitate development of and implementation of the strategy and common interoperable technology for improved disease surveillance, effective tracking of patients, and reduced duplication of services and monitoring of various MOH programs and sector objectives.

2. Output 2: Health Sector Financing Enhanced

29. The output will provide more resources to increase the capitalization of the BHTF to meet its need to increase spending on essential drugs and vaccines. The BHTF was established to ensure sustainable financing for essential drugs, vaccines, and vaccination supplies. However, the cost of vaccines, new vaccines, and essential drugs are predicted to increase, while at the same time donor assistance for vaccines has been declining. Both the government and the project will provide funds to the BHTF to support increased capitalization and promote reforms to increase

the efficiency and effectiveness of the fund. Discussions on how to finance the health sector more strategically and equitably will be encouraged through the commissioning of various policy papers culminating in the development of a draft national health bill with relevant health financing chapters.

3. Output 3: Health Services in Peripheral Area Strengthened

30. The output is an investment component of the SDP. Resources will be used to support MOH efforts to ensure better utilization and quality of PHC services in peripheral areas. Five satellite clinics will be built in rapidly urbanizing areas of Thimphu and Phuentsholing to increase the availability of PHC services for the population and to increase the efficiency of the health system by reducing the use of tertiary hospitals for primary care. PHC will be strengthened across the country with the provision of essential equipment to maintain the cold chain for immunization, transportation of samples, and screening material for NCDs. Alongside providing equipment to improve service delivery, monitoring of health facilities against standards to ensure quality would also be undertaken.

C. Civil Works in the Sector Development Program

31. Output 3 has two civil work sub-components, for which an IEE is needed. The sub-components include:

1. Construction of Five New Satellite Clinics in Thimphu (Mothithang, Taba Babesa, Debsi) and Phuentsholing

32. The location of the three satellite clinics has been selected (i.e., Mothithang, Taba, and Babesa at Thimphu Thromde) to reduce the outpatient load from the Jigme Dorji National Referral Hospital (JDWNRH) at Thimphu city. The location for the satellite clinic at Thimphu Dzongkhag (i.e., Debsi) and at Phuentsholing will be selected during SDP implementation period (tentatively by the second year).

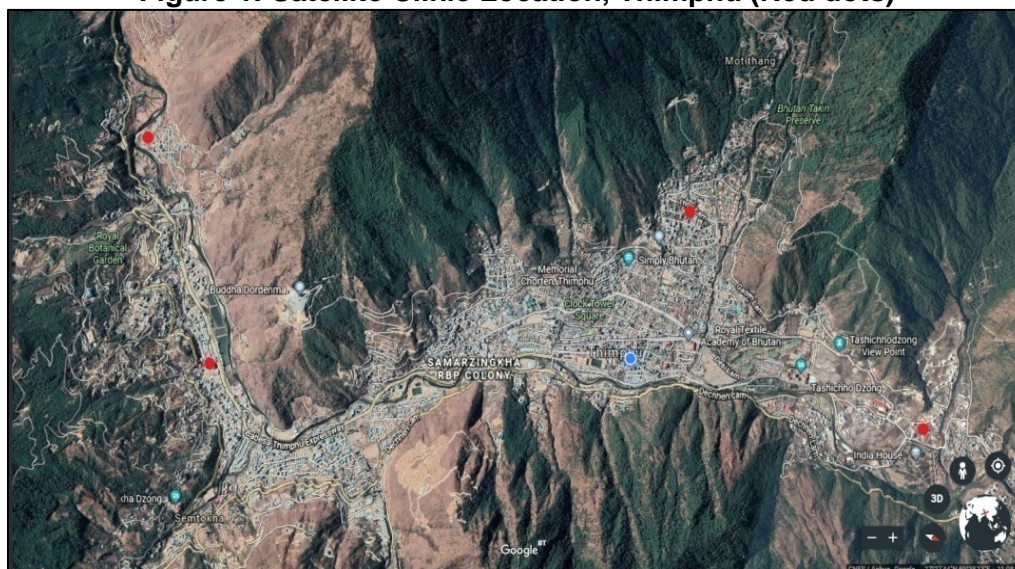
33. The clinics will provide services for:

- (i) general examination including patient history and physical examination;
- (ii) clinical management including—basic investigation and rational prescribing;
- (iii) growth monitoring and nutrition;
- (iv) health education;
- (v) reproductive health services (mother and child care, which includes antenatal care, post-natal care, immunization and child growth monitoring, family planning services, etc.);
- (vi) minor operating services;
- (vii) basic eye treatment and primary eye care;
- (viii) basic laboratory services for urine and stool routine examination, pregnancy tests, blood or hemoglobin, sugar and grouping and rapid blood tests for malaria parasite, and dengue;
- (ix) basic oral services such as minor extractions and treatment of toothaches; and
- (x) epidemic and emergency and pharmacy services.

Table 2: Details of the Satellite Clinics

No.	Location	Jurisdiction	Area	Remarks
1	Mothithang,	Thimphu Thromde	1215 m ² (30 decimal)	Single-storied building with parking
2	Taba	Thimphu Thromde	1215 m ² (30 decimal)	Double-storied, with parking
3	Babesa	Thimphu Thromde	722 m ² (18 decimal)	Double-storied, public parking
4	Debsi	Thimphu Dzongkhag	Sites to be determined	The design will be done as per the size and location of the selected site
5	Phuentsholing	Phuentsholing Thromde		

Source: Government of Bhutan, Ministry of Health

Figure 1: Satellite Clinic Location, Thimphu (Red dots)

Source: Google map image of the site.

Figure 2: Mothithang Satellite Clinic Location

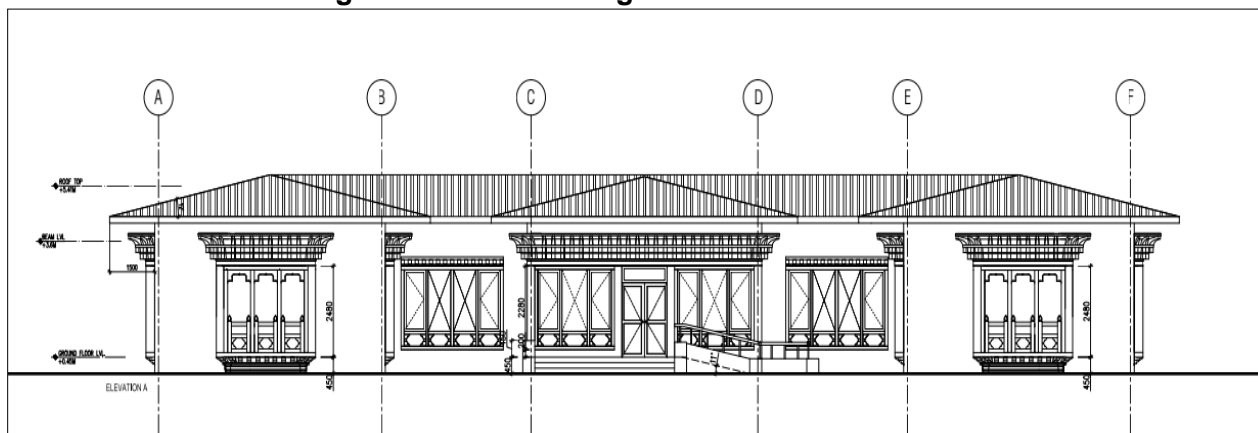
Source: Google map image of the site.



Source: Asian Development Bank.

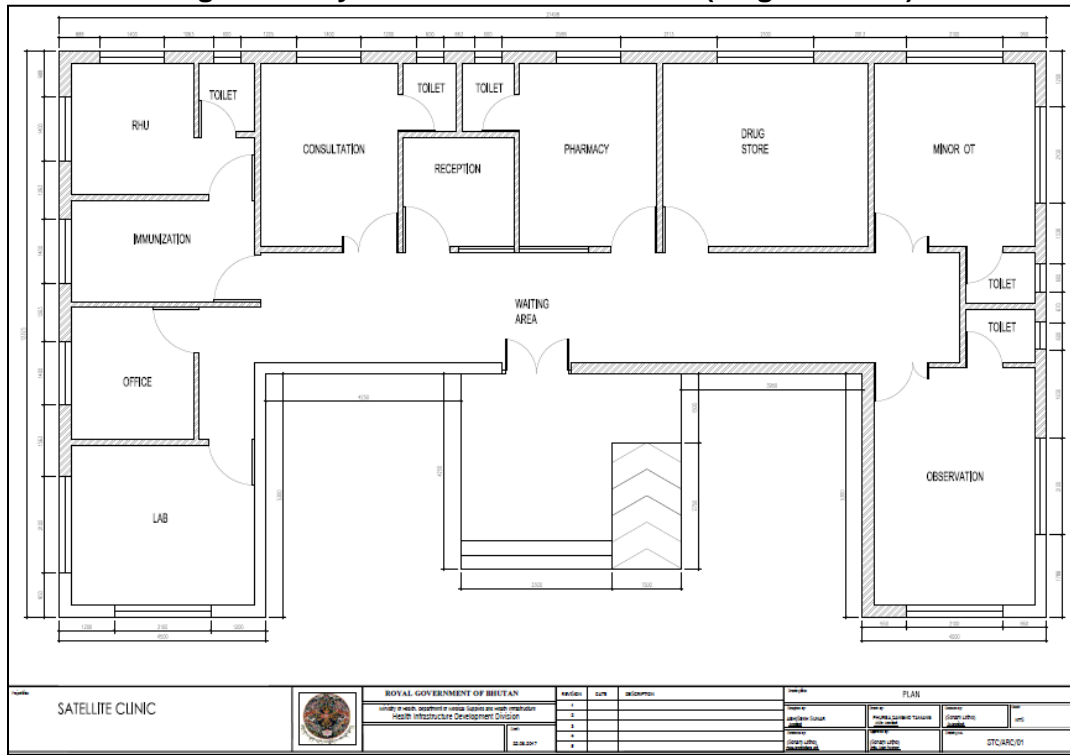
34. The new satellite Clinic in Mothithang will be located below the Mothithang High School and opposite to the Early Childcare Centre. The land is very spacious with access on two sides, and ample space for parking. The clinic here is proposed as a single-storied structure. It falls under the local area plan for the area “Above Doebum Lam/ Royal Boulevard above golf course including Kawangjangsa till Kawang Daju, Kawang Damisa, Changangkha and Mothithang”.

Figure 3: External Image of the Satellite Clinic



Source: Government of Bhutan, Ministry of Health.

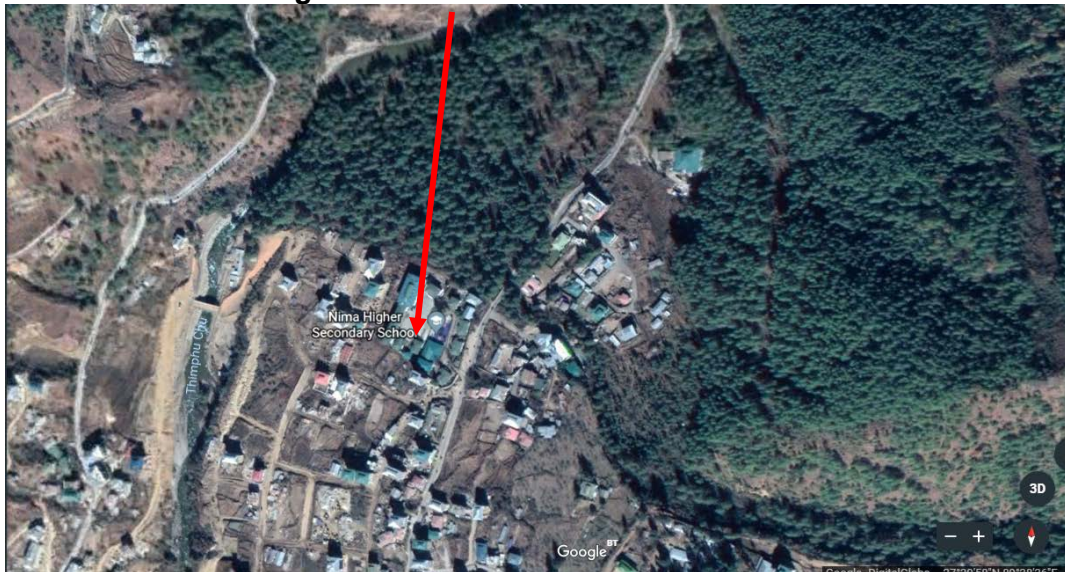
Figure 4: Layout of the Satellite Clinic (single-storied)



Source: Government of Bhutan, Ministry of Health.

35. The new satellite clinic in Taba will be located across Nima High School along the Thimphu to Dechhencholing road. This location is ideal as the clinic will be easily accessible for the catchment populations of Taba, Dechhenling, and Kabisa. The site falls under the Taba local area plan.

Figure 5: Taba Satellite Clinic Location

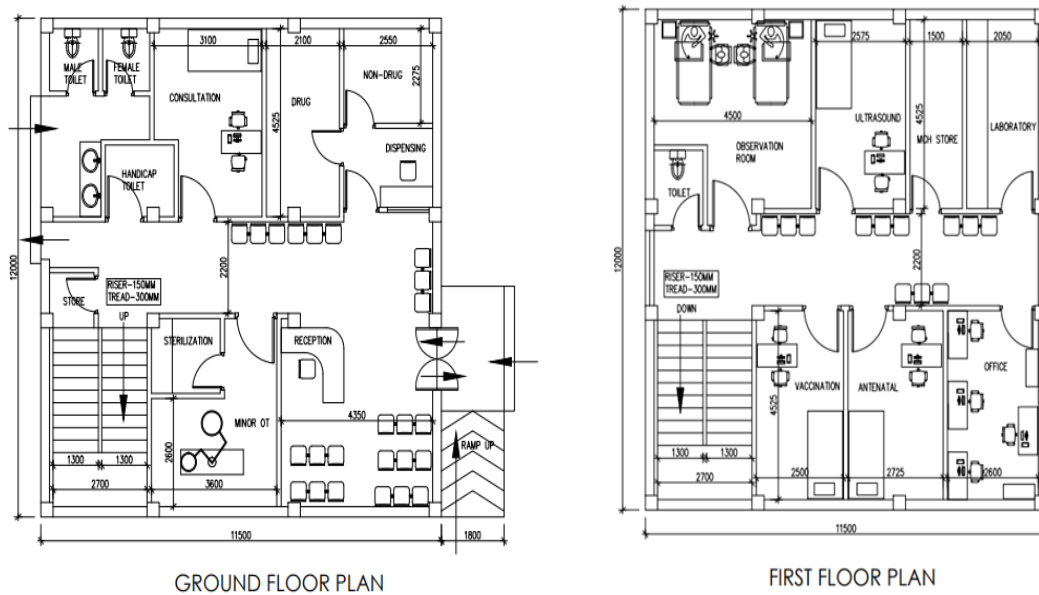


Source: Google map image of the site.



Source: Asian Development Bank.

Figure 6: Layout of the Satellite Clinic (double storied)



Source: Government of Bhutan, Ministry of Health.

Figure 7: Babesa Satellite Clinic Locations

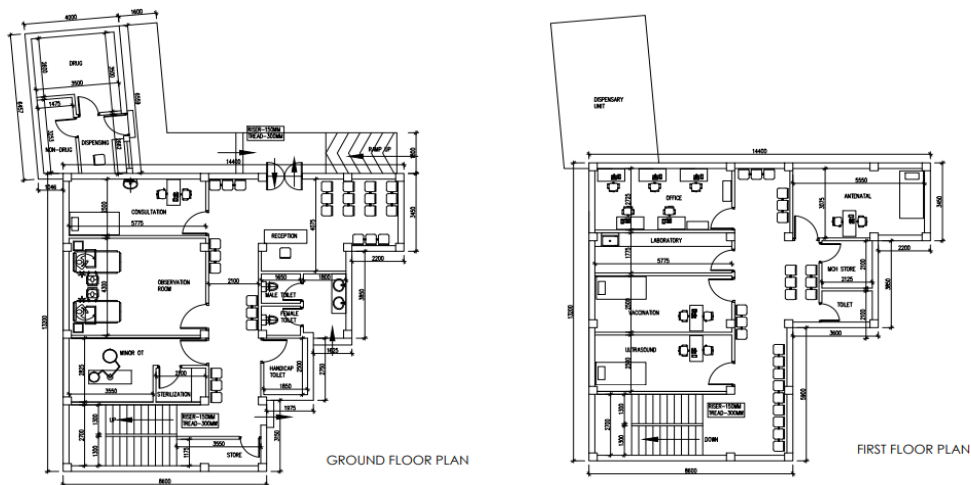


Source: Google map image of the site.



Source: Asian Development Bank.

Figure 8: Layout of the Satellite Clinic (Babesa) (double-storied)



Source: Government of Bhutan, Ministry of Health.

36. The new satellite clinic in Babesa will be located behind the Thimphu express way. The allocated land is accessible to the communities of Babesa, Olakha, and Changzamtog and is centrally located to cater to the neighboring population. However, due to limited space, the clinic will be designed as a double-storied structure (refer to Figure 8). There should be adequate parking along the access road to the clinic. It falls under the Babesa local area plan.

37. The site for the BHU in Debsi and Phuentsholing will be identified later during the project implementation.

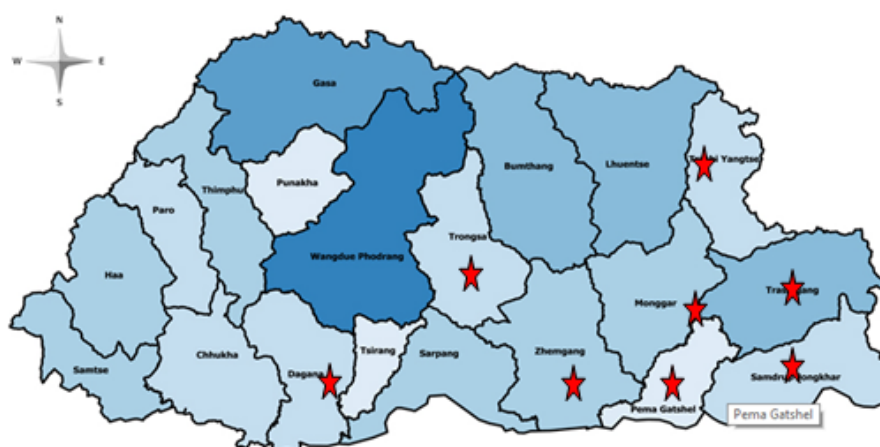
2. Renovation Works for Hospitals, BHU-Is, and BHU-IIs

38. Renovation works include construction of:

- (i) deep burial pits for all BHU-IIs;
- (ii) waste storage rooms for Hospitals and BHU-Is;
- (iii) new toilets for men and women, at BHU-IIs where they do not exist; and
- (iv) water reservoir at BHU-IIs to ensure 24-hour running water and water source protection (through construction of a simple fence).

39. The infrastructural improvements will be made at hospitals, BHU-Is, and BHU-IIs in selected eight districts, i.e., Dagana, Mongar, Pemagatshel, Samdrup Jongkhar, Trashigang, Trashigang, Trongsa, and Zhemgang districts.

Figure 9: Map of the Districts of Bhutan*



*Map not up to the scale

Source: Government of Bhutan, National Statistics Bureau. 2017. Thimphu.

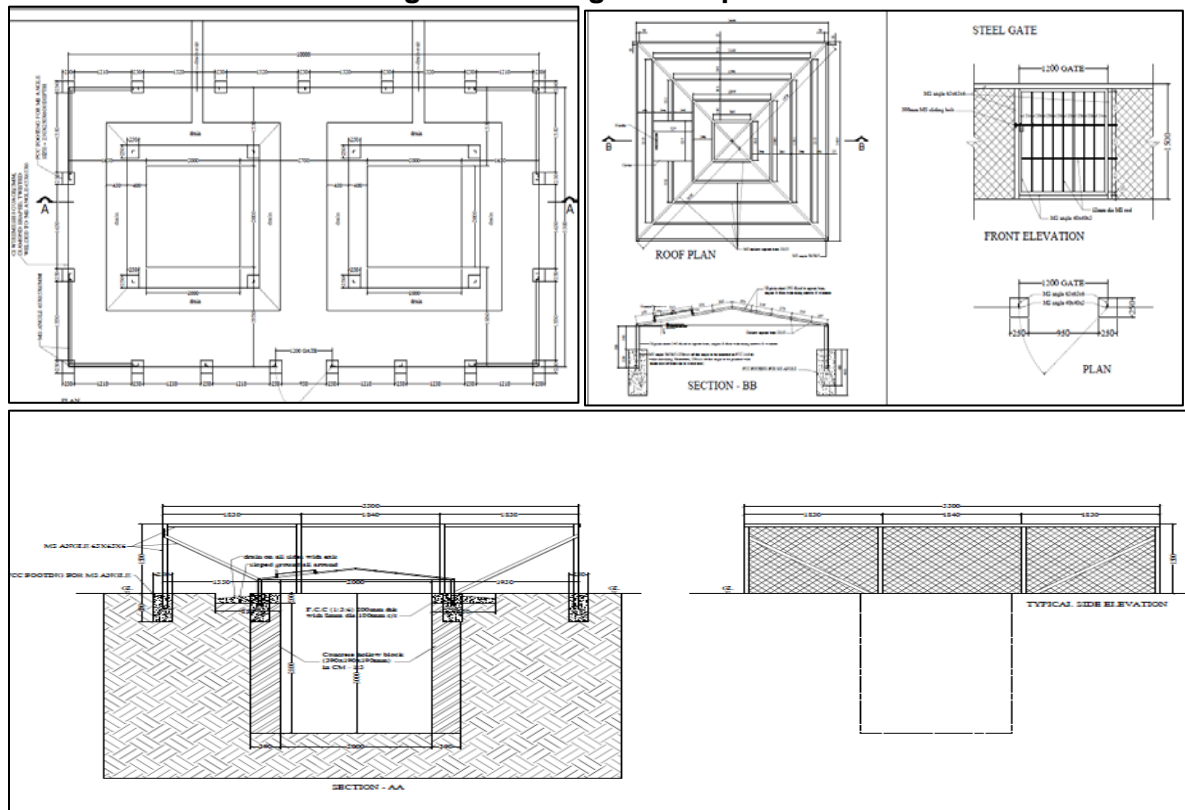
40. **Construction of deep burial pits.** The deep burial pit is designed as a two-chambered structure (390x190x190mm). The construction work will involve clearing, uprooting, and disposal of vegetation followed by excavation of the pit (depth >300mm, width >1.5m, area >10 Sq.m) and disposal of excavated soil, construction of pit walls with concrete, drainage, construction of roof, and fencing. A model deep burial pit (Phuentsholing) has been depicted at Figure 10. Refer Figure 11 for the design layout of the pit.

Figure 10: Model Deep Pit Burial at Phuentsholing



Source: Asian Development Bank.

Figure 11: Design of Deep Burial Pit



Source: Government of Bhutan, Ministry of Health.

41. **Construction of waste storage room.** Waste storage room will be a single-roomed facility for both hospitals and BHU-Is. The rooms will be larger for 20–40 bedded HCFs and smaller for facilities with 10-bedded facilities (keeping in view amount of waste load generated). The waste storage facilities will comprise of separate provision for infectious and non-infectious

waste. Refer to Figure 12 for a model storage house (Phuentsholing Hospital). The design layout has been prepared by the Health Infrastructure Development Division (HIDD) (Department of Medical Supplies and Health Infrastructure, MOH) in consultation with the national expert.

Figure 12: Model Waste Storage House



Source: Asian Development Bank.

D. Project Category

42. The infrastructure development works to be implemented are small-scale and specific to the location. They are expected to be completed in a short duration (approximately a year and half). As per the safeguard assessment there are no major social or environmental concerns and impacts can be easily mitigated. However, the operation of all HCFs results in generation of both hazardous and non-hazardous waste that contain pathogenic microorganisms. They can be easily transmitted by direct contact, in the air or by vectors, resulting in nosocomial infections, putting the health of health care workers and patients at risk. Keeping this in consideration the project has been categorized as **Category “B”** based on ADB’s SPS (2009).

III. DESCRIPTION OF THE ENVIRONMENT (PROJECT AREA)

A. Physical Resources

1. Location, Size, and Topography

43. Bhutan is located in South Asia between India and People’s Republic of China with a total area of 38,394 km². Administratively it is subdivided into 20 Dzongkhags (districts) and 205 Gewogs (blocks). (National Statistics Bureau, 2017).

44. Thimphu and Chukha Dzongkhags (Phuentsholing is a Dungkhag/sub-district under Chukha Dzongkhag) are located in the western and southwest part of the country respectively. Thimphu is spread over an area of 1,795.8 km² and consists of eight Gewogs. Thimphu Thromde (City) is the capital of Bhutan occupies an area of 26 km². Chukha Dzongkhag covers an area of 1,879.5 km² with eleven Gewogs. The Phuentsholing Thromde (City) covers an area of 19.68 km² and borders the Indian town of Jaigaon, West Bengal.

45. Bhutan has a wide range of geographical terrain from high permanent snow-capped mountain peaks, glaciers, and steep gorges carved out by fast flowing rivers, to fertile cultivated valleys and terraced basins in the lower plains. The elevation ranges from 160 masl to 7,000 masl. Thimphu Dzongkhag is spread over an altitudinal range between 2,248 to 2,333 m while the

altitude ranges from 200–3500 m in Chukha Dzongkhag. Phuentsholing elevations range from 190–320m.²

2. Geology and Soils

46. Bhutan is divided into two broad geological zones, the Lesser Himalayan belt along the southern and south-eastern border and the Tethyan belt in remaining parts. The Lesser Himalayan formation includes a wide range of sedimentary and low grade metamorphic rocks including argillite, metargillite, sandstone, quartzite, limestone, dolomite, and gypsum. The Tethyan formation mainly includes stronger gneisses that accounts for more than 70% of the country's bedrock, schists, and marble. The country enjoys a relatively high degree of stability, compared to other locations in the Himalayas.

47. The geological formation of the Thimphu Dzongkhag region mainly consists of highly metamorphosed gneisses, schist, subordinate quartzite, calcium silicate rocks, and marbles. These formations belong to the pre-Cambrian age (600 million years ago).³

48. Chukha district falls in the Lesser Himalayan belt with tectonically active sedimentary and meta-sedimentary rocks, gneiss, schist, quartzite and limestone. The "main central thrust" area falls close to Phuentsholing. Hence, it is underlain mostly with schistose rocks. Most of the soil in and around the town is of weaker phyllites. This makes the soil texture very fine and hence the slopes very unstable.

49. While there are no historical records, due to its proximity to the north eastern parts of India, which are in the 'most active', seismic Zone V, indicates that Bhutan is also in zone IV or V. Thimphu and Phuentsholing have been part of those towns that were affected by large earthquakes such as the 1980 earthquake that had its epicenter in Sikkim.⁴

3. Hydrology

50. Bhutan has four major river systems. These include (i) the Drangme Chhu that flows southwesterly and has three major tributaries: the Drangme Chhu, Mangde Chhu, and Chamkhar Chhu; (ii) the Puna Tsang Chhu which is fed by snow and glacier and flows as the Mo Chhu and Pho Chhu, through Punakha, where they join to form the Puna Tsang Chhu and then continues to flows south into Indian state of West Bengal.; (iii) the Wang Chhudrains Ha, Paro, and Thimphu valleys, and continues through the foothills before it finally drains into West Bengal; and (iv) the Amo Chhu flows through Ha, Phuentsholing and finally drains into West Bengal.

51. Thimphu lies in the valley of the Wang Chhu, which is 370 km long and flows southeasterly into West Bengal draining Ha and Paro as well. The smallest river system, the Torsa Chhu, known as the Amo Chhu in its northern reaches, flows swiftly through western Bhutan before broadening near Phuentsholing and then flowing into India.

4. Climate

² Government of Bhutan, National Statistics Bureau. 2016. *Chukha Dzongkhag at a Glance*, <http://www.nsb.gov.bt>. Thimphu.

³ Government of Bhutan, Ministry of Works and Human Settlement. 2004. *Thimphu Structure Plan*. Thimphu.

⁴ Government of Bhutan, Ministry of Home and Cultural Affairs. *National Disaster Risk Management Framework: Reducing Disaster Risks for a Safe and Happy Bhutan*. Thimphu.

52. There are three climatic zones in Bhutan detailed in Table 3. Thimphu falls in the Central Belt while Phuentsholing falls within the Southern Belt.

Table 3: Climatic Zones in Bhutan

Belt	Altitude	Climate	Temperatures
Southern Belt	150–2,000 m	Sub-tropical climate, high humidity and heavy rainfall	15°–30°C all year round
Central Belt	2,000–4,000 m	Cool winters, hot summers and moderate rainfall	15°–36°C (June to September) and –4°–15°C (winter season)
Northern Belt	Above 4,000 m	Cold winter and cool summer	

Source: National Environment Commission, 2016, Royal Government of Bhutan

53. Bhutan receives about 70% of the precipitation during monsoons while pre-monsoon accounts to 20%. The annual precipitation ranges widely in various parts of the country. The northern region gets about 40 mm of annual precipitation, mostly in the form of snow. The temperate central valley gets a yearly average of about 1,000 mm of rainfall while the southern region gets about 1,500 mm of rainfall annually. The monsoons last from late June through late September. (National Environment Commission [NEC], 2016)

54. In Thimphu, the winter temperatures range from –7°C degrees to 30°C and summer temperatures range between 9°C to 30°C. The total annual rainfall ranges from 711–1,030 mm depending on the location. Due to its altitude, Phuentsholing is much warmer, summers are hot, and temperatures can go up to 35°C and winter temperatures fall to 8°C.

5. Air Quality

55. Air pollution is becoming one of the emerging issues that have serious risk to human and environment. At the national level there has been an increasing trend in particulate matter 10 micrometers (PM10) concentrations since 2004 (NEC, 2016) and in some cases have started to exceed national permissible levels (maximum permissible limits are 75–100 $\mu\text{g}/\text{m}^3$).⁵ Air quality is deteriorating, particularly in urban centers, industrial areas, and along the southern border of the country. This is mainly due to increasing number of vehicles, polluting industries, emissions from open fires construction sites, and transboundary air pollution.

56. The NEC report on air quality status for Thimphu over 2011–2012 reported that PM10 levels had doubled since 2007 and are increasing each year.⁶ Pollution is higher in winter during the dry seasons compared to summer. Air quality is also an issue for Phuentsholing because of the industrial complex at Pasakha. The levels of PM10 there have already exceeded the national permissible levels. Phuentsholing is also at risk of transboundary air pollution since it shares its boundary with India.

B. Ecological Resources

57. Of the country's total land area, 70.46% remains under forest cover. More than half of the country's landscape (51.40%) is protected area divided into 10 formally-protected areas viz., five national parks, four wildlife sanctuaries, and one strict nature reserve and biological corridor.⁷ To

⁵ Government of Bhutan, National Environment Commission. 2010. *Ambient Air Quality Standards for Bhutan*. Thimphu.

⁶ Government of Bhutan, National Environment Commission. 2013. *Brief report on air quality status over 2011 and 2012*. Thimphu.

⁷ Government of Bhutan, National Environment Commission. 2016. *Bhutan State of the Environment Report*. Thimphu.

date, more than 6,000 species of vascular plants, non-vascular plants, fungus, 200 species of mammals, 700 species of birds, 185 species of herpetofauna⁸ have been recorded in the country, with much of the country still unexplored. Given its small size and the high biodiversity, Bhutan has been recognized as a biodiversity hotspot.

58. Like much of the rest of Bhutan, Thimphu contains a high proportion of forest mostly temperate broadleaf forest between 2,000–3,000 m and conifer at both higher and lower altitudes. The Jigme Dorji National Park is the closest protected area to the project site and its southern boundary is located more than 30 km away. The forests of Thimphu Valley are classified as temperate forests mostly dominated by blue pine trees, some spruce, and oak. Even as an urban city, there are records of wildlife species such as bears, leopards, wild pigs, sambar, and barking deer in the periphery.

59. Due to its altitude, much of Chukha (and Phuentsholing) is covered with broadleaf forest, with mixed conifer and blue pine forest at higher altitudes.

C. Economic Resources

60. The country is in the medium Human Development Index category and has made great strides in economic development. The GDP per capita in 2016 was \$2,879.07, with a GDP growth rate of 7.99%. In terms of education, the general literacy rate in 2017 was 66%, which increased from 63% in 2012. The youth literacy rate was 93.1% in 2016 with 88.4% having completed high school education.⁹

61. Infrastructure is better developed in the towns than in the rural areas, because of the difficult mountainous terrain, and the proportionally high cost of providing services to scattered communities. All Dzongkhags have an administrative center that is housed in the Dzong that comprises of the governor with all sector heads (planning officer, land records, agriculture, livestock, education, environment, and infrastructure). In addition to this, there are other government offices such as research centers, forest offices, veterinary hospitals, animal husbandry centers, and public facilities such as police stations, post offices, schools and health care centers. The towns also have corporate offices such as telecommunication (Bhutan Telecommunications), postal services (Bhutan Post), power transmission services (Bhutan Power Corporation) as well as banks (Bhutan National Bank, Bank of Bhutan, Bhutan Development Banking Corporation)

62. There is also an extensive network of schools and other educational institutions spread throughout the country. The government provides free basic education for all. There are also several vocational training institutes and teacher training institutes.

63. Both Thimphu and Chukha Dzongkhags have their gewog centers, district forest, range offices and outposts, agriculture, livestock and veterinary centers, as well as other public facilities.

D. Social and Cultural Resources

⁸ Government of Bhutan, Ministry of Agriculture and Forests. 2014. *Biodiversity Action Plan for Bhutan*. Thimphu.

⁹ Government of Bhutan, National Statistics Bureau. 2016. Retrieved from <http://www.nsb.gov.bt/main/indicator.php>. Thimphu.

64. The estimated total population of country is 692,895 of which 34% reside in urban areas and 66% in rural areas. The national population growth rate (in 2005) was 1.3% and the average number of households was 4.6.¹⁰ In 2015, Thimphu had a total population of 116,012 people with 62,365 males and 53,647 females and a population density of 64.6 per km² (NSB, 2016). Chukha has a total population of 88,342 people with 50,020 males and 38,322 females and a population density of 47 per km².¹¹

65. The population of Bhutan includes many ethnic groups such as the Sharchops from the east, Ngalongs from the west, Khengpas from the central region, nomads from the north, and Lhotshampas from the south. These (and others) are all found in Thimphu and Chukha Dzongkhags. Because of the mix of ethnicities, a wide variety of dialects are spoken, of which Dzongkha, Khengkha, Sharchop, and Nepali are the most common. In both Thimphu and Phuentsholing, Hindi is also commonly spoken.

E. Reference Baseline on Health Care and Waste Management

1. Health Care Services

66. Health services in the country are available through a three-tier structure viz., primary, secondary, and tertiary. Traditional and allopathic medicine services are fully integrated and delivered less than one roof. Each health facility is equipped as per a standard equipment list, which is specific to the category of that facility. Primary care service is supported by secondary and tertiary care services through referral or self-referral. In terms of geographical distribution, 48% of the hospitals are located in the western region, 29% in the eastern region, and 23% in the central region as of 2015. The distribution of health workforce is linked to the type of HCF, which in turn is linked to the catchment population.

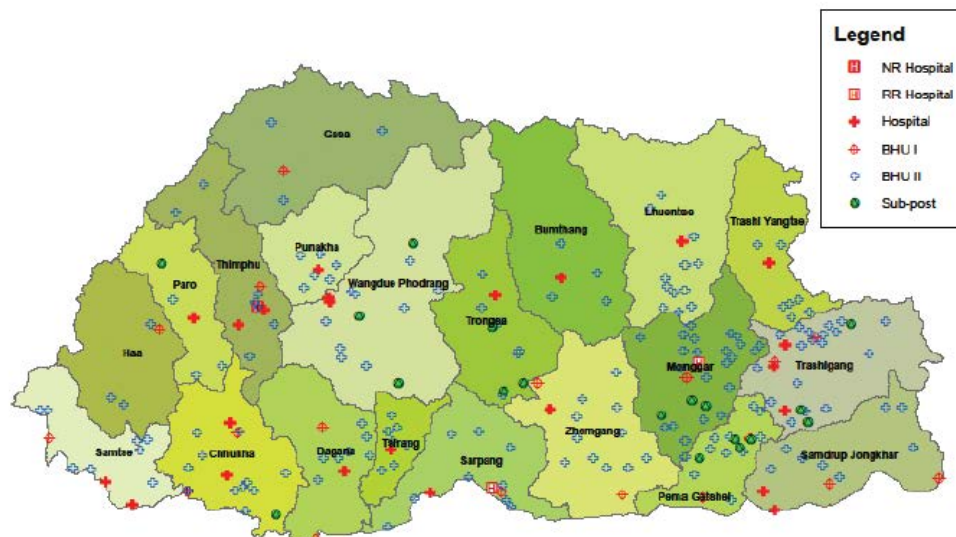
67. The distribution of health care centers across the country is at three tiers/levels:

- (i) **Primary level.** There are currently 23 BHU-Is, 184 BHU-IIs, 28 sub-posts, 562 outreach clinics, and 54 indigenous units. At the community level, the village health workers act as a bridge between health services and the community.
- (ii) **Secondary level.** There are 28 district hospitals and one indigenous hospital in Thimphu. Other selected hospitals provide very little specialized services due to either shortage of specialized health professionals or lack of proper infrastructure. Five hospitals (Dampchu, Wangdue [Bajo], Samtse, Dewathang, and Gelephu) are being reconstructed.
- (iii) **Tertiary level.** There are two regional referral hospitals and one national referral hospital that provide specialized services.

Figure 13. Distribution of Health Facilities in Bhutan, 2016

¹⁰ Government of Bhutan, National Statistics Bureau. 2017. *Statistical Yearbook of Bhutan, 2017*. Thimphu.

¹¹ Government of Bhutan, National Statistics Bureau. 2016. *Chukha Dzongkhag at a glance*. <http://www.nsb.gov.bt>.



Source: World Health Organization.

2. Waste Generation from Health Care Facilities

68. A WHO study on medical waste from eight countries (India, Nepal, Myanmar, Maldives, Thailand, Bangladesh, Sri Lanka, and Bhutan) reported that the average medical waste generated is approximately 0.693kg/bed/day.¹² Presently, Bhutan generates about 428 tons of hospital waste per year (Annual Program Report 2015¹³). The actual waste generated will be higher as the data does not account for organic waste (pharmaceutical waste). Over a period of 1 year, the total waste generated from all HCFs up to BHU-II increased by 13.2%, i.e., from 378 tonnes to 428 tonnes in 2016 (Annual Health Program Report, 2016). Waste has been increasing by about 15%–20% (MOH, 2016a) and is expected to continue to increase over the years as the range of services increase.

69. The actual quantity of waste generated from the HCF depends on the size of the hospital (which in turn depends on the catchment population and actual number of patients visiting the facility) and the scope and types of services provided by the health facility.

70. The larger referral and district hospitals at the tertiary level generate more waste as they have specialty wards, private rooms, operation theatres, intensive care units, and provide various specialized services, treatments, and laboratory tests. The total waste generated from January to November 2017 for JDWNRH was 158,177.60 kgs or 158 tons, which is 37% of the total health care waste of the country. On the other hand, a small BHU-II (that only provides basic treatment and emergency care, and mostly refers emergencies and complicated cases to higher levels), generates about 10% of the waste of JDWNRH. Table 4 presents total waste generated by HCFs in 1 year (2016–2017).

Table 4: Waste Generated in 1 year (2016 or 2017) from each Health Care Facility

¹² World Health Organization. 2017b. Report on health-care waste management (HCWM) status in Countries of the South-East Asia Region (SEA Region), April 2017.

¹³ Government of Bhutan, Ministry of Home and Cultural Affairs. 2016. *Medical waste report, 2016*. Thimphu.

Health Facility	# beds	Total Patients in 2016*	Total Waste (kgs)
JDWNRH	350	510,109	145,397.10
District Hospital Samdrup Jongkhar	60	31,147	3,198.50
District Hospital Pemagatshel	20	20,527	1,835.00
BHU-I Samdupcholing	10	15,686	1,573.50
BHU-I Nganglam	10	18,963	519.5
BHU-II Dungmin	3	1,745	50.76
BHU-II Martshala	10	5,379	205.7
BHU-II Orong	3	8,652	219.5
Satellite Clinic Mothithang	0	17,418	130.34
Satellite Clinic Hejo	0	15,011	289.6

*Source: Government of Bhutan, Ministry of Health. 2017. *Annual Health Bulletin, 2017*. Thimphu.

71. The medical waste report of 2016 found that 60% of the waste from HCFs is general waste and 40% is infectious waste. The reasons for the high level of infectious waste are due to lack of compliance in waste segregation at source and lack of designated area and storage space for segregation and storage and separate disposal areas.

72. It is mandatory for each HCF to record the quantity and types of waste generated each month, but most HCFs lack a separate weighing scale for waste. Table 5 presents the percentage of different categories of waste generated by HCFs at different levels.

Table 5: Percentage of Waste Type Generated at Different HCFs for 2016

Health Facility	General waste	Infectious waste	Sharps	Organic waste	Total
JDWNRH	66.3%	33%	1.0%	0	100
District hospital Pemagatshel	52.0%	27%	5.6%	14.9%	100
District Hospital, Samdrup Jongkhar	23.9%	51%	10.4%	14.4%	100
BHU I Nganglam	34.9%	48%	9.3%	7.9%	100
BHU I Samdupcholing	68.6%	27%	2.4%	1.5%	100
BHU II Dungmin	79.8%	11%	9.6%	0	100
BHU II Martshala	21.9%	42%	9.0%	27.2%	100
BHU II Orong	31.6%	52%	7.0%	9.5%	100
SC Mothithang	46.6%	45%	8.0%	0	100
SC Hejo	42.5%	19%	38.7%	0	100

Source: Asian Development Bank.

3. Health Care Waste Minimization

73. **Pharmaceutical waste.** It is minimized by procuring drugs centrally and distributing by the central medical store. Each health facility is required to maintain an inventory of medical stocks and submit their annual requirements based on past usage, so it is not common to find surplus or expired stock. In the national referral hospital, the pharmacy is responsible for maintaining stock of all medicine, replacing them and returning expired medicines to the medical store. Pharmaceutical waste is also minimized through in-house circulation of medical supplies between the HCFs in a district, for example, if one HCF is low on stock, it can receive from another HCF that has a surplus.

74. **Organic and plastic waste.** At the level of individual health facilities, initiatives to reuse organic waste have been initiated. These include linking local farmers to collect organic waste

(e.g., JDWNRH and Deothang Hospital). Where possible, the larger hospitals (e.g., JDWNRH, Pemagatshel, Phuentsholing, and Samdrup Jongkhar) sell their plastics to local scrap collectors. To promote waste recycling even further, the MOH recently signed an agreement with a local recycle agent to collect cardboard boxes, paper, and plastic from selected HCFs in different districts.

4. Health Care Waste Segregation

75. Waste segregation is practiced in all HCFs through a color-coded segregation system. Under the system, waste is segregated as:

- (i) **Dry waste** – Green bins/buckets and labeled as ‘general waste’;
- (ii) **Biodegradable waste** – Blue buckets (JDWNRH);
- (iii) **Infectious waste** – Red buckets labeled “infectious waste”;
- (iv) **Sharps** – Yellow/white cardboard boxes;
- (v) **Chemotherapy waste** – Red bucket labeled ‘Biohazard’ (only JDWNRH);
- (vi) **Pharmaceutical waste** – carton boxes; and
- (vii) **Chemicals** – bottles/containers.

76. In the larger hospitals such as JDWNRH in Thimphu, general waste is segregated into domestic waste and organic waste (mostly from the kitchen), while in other hospitals such as Phuentsholing, Samrup Jongkhar, Pemagatshel, Deothang, the general waste is further segregated into paper, plastics, cardboard, and bottles.

77. However, the WHO study found that only 30% of the HCFs segregate waste despite it being mandated by law. Some of the reasons for not being able to segregate are:

- (i) too many patients and high workload (JDWNRH);
- (ii) lack of compliance and/or awareness among new staff or interns and students or patients;
- (iii) lack of municipal facilities or vendors to collect segregated waste;
- (iv) segregated waste is dumped together into the municipal trucks; and
- (v) disposal of infectious and general waste at BHUs is in the same pit.

5. Health Care Waste Collection and Transportation

78. Intramural waste collection in red and green biodegradable plastic bags is carried out daily each morning and evening by the cleaners in the larger hospitals and every two to three days in the smaller HCFs. A few hospitals have trolleys to transport the waste. The JDWNRH uses an old ambulance to transport the waste to the onsite-storage area within the premises. Placenta is collected after each delivery and hand carried in plastics to the burial pit.

79. For extramural collection, the municipal compactor truck pick up the waste depending on the arrangements between the hospital and the municipality (twice a day from the JDWNRH, once a day to two times a week at the district hospitals and satellite clinics).

80. At all other HCFs not located within a municipality, the waste is hand-carried to the waste disposal pit.

6. Health Care Waste Storage

81. The Phuentsholing hospital storage house is the model for medical waste management and there are plans to replicate this in nine health facilities (JDWNRH, Mongar, Gelephu, Wangdue, Damphu, Deothang, Samtse, and Ha). In the JDWNRH, for example, a storage site has been designated within the hospital campus in a municipal dumpster. Within the same area, there are two old, single-storied unused cottages; the first is used as the mortuary, and the latter as the storage area for the chemotherapy waste.

82. Currently, all other HCFs lack a designated, covered storage area and therefore waste or bulky pressurized containers are stored, wherever possible outside or in unused rooms until collected by the municipality or disposed. BHUs do not have designated waste storage areas. At the satellite clinics in Thimphu, sharp boxes are transported to the nearest BHU (Hongtso) for disposal. Table 6 presents the existing storage practices in the different categories of HCFs.

Table 6: Waste Storage in Various Tiers of HCFs

Waste categories	JDWNRH	District Hospital	BHU I	BHU II	Satellite Clinics
General waste-	In municipal dumpsters in designated storage site	No designated storage area	No designated storage area	No designated storage area	No designated storage area
Organic waste	No storage, it is collected daily by pig farmer	No storage	No storage	No storage	No storage
Infectious waste	in designated storage site	No storage	No storage	No storage	No storage
Pathological waste	in designated storage site	No storage	No storage	No storage	No storage
Sharp boxes	in designated storage site	No storage	Store room	Store room	Store room/ unused toilet

Source: Asian Development Bank.

7. Hazardous Waste Treatment

83. According to the waste regulations, implementing agencies must ensure appropriate pre-treatment to stabilize or inactivate hazardous waste prior to disposal. The most common practice of waste treatment is by autoclaving at the larger hospitals and satellite clinics. At the JDWNRH and Phuentsholing hospitals, waste is placed in heavy duty autoclaves, then segregated into tubes, syringes for recycling, and shredded prior to disposal along with general. Testing of treatment technologies to ensure standards is not practiced.

84. All other smaller HCFs such as BHU-IIs use chlorine for disinfection of waste prior to disposal as they do not have a waste autoclave. If there is an autoclave in BHU-IIs then it is used for both, sterilization of equipment as well as for waste treatment. Most HCFs (apart from the larger hospitals) lack needle cutters and sharp shredders and therefore these are not treated prior to disposal. Table 7 present health care waste treatment at various HCFs.

Table 7: Health Care Waste Treatment

No	Waste category	JDWNRH	District Hospital	BHUs	Satellite clinics
1	Infectious waste	Waste autoclave	Bleached	Bleached	Autoclaved
2	Pathological waste	Waste autoclave	None	None	Autoclaved
3	Sharps	Waste autoclave then shredded	None	None	Autoclave in autoclave used for equipment

Source: Asian Development Bank.

8. Health Care Waste Disposal

85. **General waste.** For those HCFs within a municipality, the municipality trucks pick up the general waste and dispose them at the municipal landfill site. Where there are no municipal disposal facilities, the most common means of disposal is on site burning or burial in the pit.

86. **Recyclable waste.** It is sold to dealers through an arrangement between the ministry and the dealers.

87. **Infectious and pathological waste.** The biggest issue with waste disposal is the lack of proper burial pits in most BHUs. Although deliveries are not very common, still there is a need to safely dispose all infectious and pathological waste. Due to the lack of such pits, the local people have been digging pits either on the BHU premises or near their homes for disposing of placenta. This is the practice at BHUs in Norbugang, Nganglam and Samdupcholing, and Martshala.

88. **Sharps.** The satellite clinics transport their sharps to Hongtso BHU where it is burnt as is the case with most BHUs. At the larger hospitals, the sharps are cut prior to disposal.

89. **Pressurized cylinders.** Pressurized oxygen cylinders are sent back to be filled up by the medical store, while gas cylinders are refilled from the gas depot.

90. **Chemotherapy waste.** Chemotherapy waste from JDWNRH is taken by the old ambulance to be burnt in the incinerator at Gedu each month. Radioactive waste storage and transportation is supposed to be implemented as per the guidelines prescribed the International Atomic Energy Agency or as notified by the NEC, but this is not clearly defined.

91. **e-Waste.** As per standard practice with all government institutions, all HCFs are required to return electronic equipment to DNP via the respective department or district health officer (DHO), where it is stored/sold/disposed by the DNP.

Table 8: Waste Disposal at Various Health Care Facilities

Waste categories	JDWNRH	District Hospital	BHU-I	BHU-II	Satellite Clinics
General waste	Municipal	Municipal/ Burn in pit (PG)	Burned in pit	Burned in pit	Municipal waste
Organic waste	Pig farmer	Farmer/pit	Dumped in Pit	Dumped in Pit	Municipal waste
Infectious waste	Municipal waste after treatment	Municipal waste after treatment	Deep Open Pit	Deep Open Pit	Municipal waste after treatment
Pathological waste	Deep pit burial	Deep pit burial	Deep Open Pit	Deep Open Pit	Municipal waste after treatment
Sharps	Shredded, municipal waste	Autoclave/ deep pit burial	Burn/ Deep pit burial	Burn/ Deep pit burial	Burnt at BHU
Hazardous waste (chemotherapy)	Incineration	Deep Open Pit	None	None	None
Pharmaceutical waste	Handed over to pharmacy and MSD	Deep Open Pit	Deep Open Pit	Deep Open Pit	None

Source: Asian Development Bank.

92. The waste burial pits in a few selected HCFs are permanent, enclosed, sealed structures made of concrete and roofed. However, at the primary level, most HCFs burial pits are basically deep pits dug into the ground with no sealing, lining, roof, or cover.

93. Pharmaceutical waste is categorized as controlled drugs or under the Narcotic Drugs and Psychotropic Substances and Substance Abuse Act of Bhutan 2015. They are required to be destroyed beyond reclamation, and their destruction should be witnessed by authorized personnel from the concerned agencies. In the district and remote hospitals, pharmaceutical waste, mostly comprising of expired medicines are buried or burnt in the presence of the district or gewog committee comprising of health and district and community representative.

94. MOH is in the process of developing an agreement with the Bhutan Food and Agriculture Regulatory Authority and the Ministry of Agriculture and Forests to use their newly installed incinerators at Samtse, Gelephu, Samdrup Jongkhar (there are plans to construct two more at Nganglam and Phuentsholing) for the incineration of pharmaceutical waste (MOH, 2016).

9. Wastewater Collection, Treatment, and Disposal

95. There are no guidelines on wastewater treatment and disposal. The most common method of treatment of chemicals is by dilution prior to disposal into the drains and sewer. Wastewater from a few HCFs that are located and connected to the city sewerage system in Thimphu and Phuentsholing end up in the open city sewerage ponds where it is treated and released into the river. Apart from these, all other HCFs dispose their wastewater directly into the drains or soak pits near the facility. One or two HCF (e.g., Nganglam BHU-I) have a separate drainage pipe in the x-ray room that is connected to a concrete pit. There is a need to assess the sources and quantities of liquid waste generated and to review current procedures for treatment of hazardous wastewater especially, infectious and chemical liquids.

IV. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS

A. Rapid Environmental Assessment

97. The ADB safeguards policy requires that all project activities need to be carefully assessed and considered to avoid and/or minimize negative social (including public health and occupational health) and environmental impacts.

98. To identify potential environmental impacts of the project components, the initial environmental screening was first carried out using the ADB rapid environmental assessment (REA) forms to screen the proposed activities. (Refer Appendix 1 for the REA Checklist).

99. While the sub-components are aimed at bringing positive impacts for the population and the environment, the REA categorized this project as Category B because the project involves the generation of medical solid and liquid waste. This requires proper management to minimize the risk of infection to patients, healthcare personnel as well as waste handlers.

100. The ADB safeguard policies require that the project's activities need to be carefully considered to avoid and/or to minimize the negative impacts on the natural environment and social environment (including environmental public health and occupational health), and to provide appropriate measures to mitigate such impacts.

B. Environmental Assessment Methodology

101. The environment assessment methodology included the following:

- (i) Collection of baseline information on project areas.
- (ii) Review of relevant acts, policies, strategies and guidelines.
- (iii) Assessment of environment status and current practices to understand the possible environmental impact of the project. This also includes categorization of project as per ADB's requirements.
- (iv) Review of architectural drawings for the new satellite clinics. The infrastructure consultants to assess suitability and adequacy of structure for delivery of standard services, to cater to increase in patient numbers in the future and to incorporate environmental, social, gender and health, and safety concerns such as parking, storage, separate toilets, segregation and management and disposal of all waste.
- (v) Consultations with focal persons in the MOH, DHOs, health assistants, head of nursing, waste in-charge (JDWNRH), head of infection control and waste management program, architects, engineers and infrastructure consultants involved in designing the satellite clinics. The consultations also included representatives of the local community, patients and staff working at the waste management site in JDWNRH.
- (vi) Identification of potential environmental impacts arising from current practices or from the newly proposed activities.
- (vii) Review of institutional arrangements and capacity for implementation of environmental management and monitoring.
- (viii) Field visits were also conducted to HCFs that were considered representative of other targeted HCFs in the country. Sites and HCFs visited include the following: (a) national referral hospital in Thimphu; (b) district hospitals in Paro, Deothang, Samdrup Jongkhar, Pemagatshel and Phuentsholing; (c) three BHUs each in Samdrup Jongkhar and Pemagatshel and one each in Paro and Ha; (d) existing

satellite clinics in Hejo and Mothithang, Thimphu; and (e) new satellite clinic locations in Mothithang, Babesa and Taba in Thimphu and potential locations in Debsi and Phuentsholing.

C. Screening of Environmental Impacts of Project Components

102. The degree of impact of the sub-components was determined by looking at the current land use, ownership, existing degree of disturbance, uniqueness of land and surrounding community, and land use.

103. The criteria used for the environmental assessment is based on:

- (i) spatial scale of the project (site, local, regional, national or international);
- (ii) period for the impacts (short, medium, or long term);
- (iii) magnitude of the impact (small, medium, or large);
- (iv) importance to local human populations;
- (v) compliance with international and national environmental policies, laws, rules, regulations, and guidelines;
- (vi) compliance with ADB policies, regulations, and guidelines.

104. Impacts were categorized into no impacts, positive, negative or unknown impacts as shown in Table 9.

Table 9: Categorization of Impacts

Criteria	Category	Symbol
If the project activity is physically removed in space or time or if the impact is too small or negligible	No impact	0
MINOR IMPACT -Impacts range from being negligible to major impacts but do not meet the criteria for a major impact, maybe positive or negative	Positive	+
	Negative	x
MAJOR IMPACT - The project has the potential to affect the environment based on space, time, magnitude of change and compliance with standard regulations	Positive	++
	Negative	xx
UNKNOWN IMPACT - The magnitude of the impact cannot be predicted because a) the nature and location of the activity is uncertain, b) the occurrence of the environmental component within the study area is uncertain, c) the time scale of the effect is unknown or d) the spatial scale over which the effect may occur is unknown	Unknown	?

Source: Adapted from Asian Development Bank's Safeguard Policy Statement (2009).

105. These have been adapted from the ADB SPS (2009).

V. FINDINGS OF THE ENVIRONMENTAL ASSESSMENT

A. Potential Environmental Impacts and Mitigation Measures

1. Pre-Construction Phase

106. The project sites (Mothithang, Taba, and Babesa) are not located in any critical habitat, protected area, biological corridor, watershed, wetland or heritage, religious or archaeological site and therefore impacts on any rare, endangered or threatened species or habitats are not anticipated. The potential environmental impacts expected during the pre-construction phase are mostly due to the design and location of the satellite clinics.

107. All the satellite clinics are located within the Thimphu city limits and therefore not located near any restricted or protected area. All development within the city limits is regulated as per the Thimphu Thromde Development Control Regulations (2016) which prescribes the maximum permissible plot coverage as per plot size, setback and permissible height for any building as per the plot location.

108. The Thromde is the regulatory authority responsible for ensuring that the municipal development control regulations are enforced, they will be responsible for ensuring that all the above provisions are considered when allocating the land for the clinic.

109. During the assessments and consultations, the draft designs and drawings were assessed and discussed with the environmental, architectural, and engineering teams to ensure the following:

- (i) The design of new HCFs is in line with Bhutan Services Standards for satellite clinics and BHUs. Apart from maximizing the allocated land/space granted by the Thromde, the design must also allow the HCF to cope with increasing number of patients in the future.
- (ii) The design of the waste storage spaces is as per the standard approved designs by MOH and in line with the waste management protocols (space for segregation and safe storage without spillage/mixing of waste until disposal, adequate ventilation, concrete floors) and based on the quantity and types of waste generated.
- (iii) The deep burial pit is designed for the future, with two pits. These pits will be lined with concrete wall to minimize leakage and roofed to prevent release of odor with adequate drainage to prevent surface runoff. Also, the pits will be appropriately fenced to keep away any trespassers and/or stray animals.
- (iv) Incorporation of design to provide facilities for the differently-abled (ramps, separate toilets) and provision for additional toilets (for patients) outside the clinics.

110. Activities during pre-construction include site selection, approval of architectural drawings, and tender and hire of contractors. The activities are not expected to result in environmental impacts due to the following reasons:

- (i) The site has been pre-selected by the Thimphu Thromde (municipality) which is responsible for controlling land use to ensure that these are not located in environmentally or socially sensitive areas.
- (ii) A prerequisite for construction approval is that all new constructions must comply with the building rules, urban development plans, architectural guidelines, and

other municipal requirements. This would ensure that construction is as per standard design and takes into consideration waste, sewerage, sanitation. This check and balance is maintained by the Thromde. Construction must follow Thromde Development Control Regulations (2016) and should not be located within 15 m of natural streams, waterways, and on hillsides with more than 30% slope, in paddy fields and agricultural areas or in areas designated as environmental conservation precincts where no development is permitted.

- (iii) There are already standard national bidding processes approved by the Ministry of Finance that will be followed by MOH for the selection of a competent contractor.
- (iv) All sites are easily accessible through existing access roads, thus there will be no requirement for new access road construction, additional land, or land encroachment issues.

111. There are therefore no significant environmental impacts due to location and design. MOH will ensure that all necessary government permits will be secured during pre-construction phase. During this phase, training programs on ADB's safeguards requirements and construction good practices are recommended.

2. Construction Phase

112. The construction period is one where the project interacts physically with the environment. During this phase the construction of new Satellite Clinics and improvement works will be carried out. The construction work is not expected to have significant impacts on parameters are listed in Table 10.

Table 10: Fields in Which Construction is Not Expected to Have Significant Impacts

Field	Rationale
Climate	Short-term production of dust is the only effect on atmosphere
Forest Cover and Biodiversity	All selected sites are within the periphery of Thimphu City and therefore will not impact forest cover, protected areas, critical habitats or endangered species
Geology and seismology	Excavation will not be large enough to affect these features and the approval process requires that building designs incorporate seismic risks
Rivers	None of the satellite clinics are close to rivers or major streams
Industries	There are no major industries in any area
Tourism	There are no large hotels or tourist attractions in the vicinity
Population and communities	Construction will not affect population numbers, location or composition
Religious and Cultural Sites	None of the Satellite Clinics are in close proximity to any religious or cultural site

Source: Asian Development Bank.

113. The implementation of construction work is not expected to cause major negative impacts spatially or temporarily due to the following reasons:

- (i) Since the land has been pre-identified by Thromde, there will be no impact on people and no resettlement is required. Also, there are no sensitive receptors (e.g., endangered species) or habitats in the vicinity of the new construction sites.

- (ii) All building designs must be in line with the Thimphu Thromde Development Control Regulations (2016), Bhutan Building Rules (2002), and Rural Construction Rules (2013) wherein the maximum plot sizes, set back and maximum building heights are specified and impacts on neighboring areas are minimized.
- (iii) The area coverage is very small, and the buildings are at the most two-storied. Therefore, the building should not require significant quantities of resources (timber, water, construction material).
- (iv) Construction impacts will be limited to the immediate and its surrounding and therefore the zone of impact is very small (less than 1 km²). Excavation work is also localized and will only occur during foundation work.
- (v) The construction work itself is relatively straightforward and can be completed in a fairly short time as the structure is small and up to two floors only.
- (vi) The construction work will be contracted out as per prevailing government procedures and the contractor will therefore be accountable for managing the construction sites responsibly and to deliver quality structures within the stipulated period.
- (vii) Environmental Codes of Practice (ECOP), once approved by MOH, will be included as part of the terms and conditions of the contract agreement.
- (viii) A supervision team/firm will be hired to monitor and supervise the construction work. Responsibilities of the supervision team and the contractor will be clearly delineated.

114. There will still be temporary, localized, and minor environmental impacts during site clearance, excavation, material transportation, storage, and construction works due to generation of emissions, smoke and dust, construction noise, and increase in traffic and congestion. The activity itself will have impacts on the health and safety of workers, if proper construction standard and safety procedures are not followed. This may result in the generation of construction and domestic waste from worker camps.

115. This project contributes positively by reducing traffic congestion and noise in the city center by diverting away patients from the JDWNRH. The most common pollutant involved in fugitive emissions is dust or particulate matter that is released during transportation and open storage of solid materials, and from exposed soil surfaces, including unpaved roads. The national ambient air quality standards require that Respirable Particulate Matter (PM₁₀) must be less than 75 µg/m³ for 24-hour average and 50 µg/m³-yearly average for sensitive areas such as schools and hospitals. The NEC State of the Environment (2016) report states that while levels are still within the national permissible limits for mixed area, it is already exceeded WHO guidelines (50 µg/m³ 24-hour average, and 20 µg/m³ yearly average) since 2009 and European Union directives for annual average levels of PM₁₀ emission since 2010. The International Finance Corporation guidelines state that where projects are located within poor quality air sheds should ensure that any increase in pollution levels is as small as feasible and specific provisions for minimizing emissions and their impacts in poor air quality areas should be established on a project-by-project basis.

116. However, air pollution varies with seasons being highest between November to March as kerosene and wood stoves are used for warming. One major cause of air pollution is the increasing number of vehicles, which require interventions at the policy level. Since it will be difficult to separate changes or impacts on ambient air quality specifically from the project, mitigation measures will aim to reduce air pollution and generation of dust from the source.

117. All the three satellite clinic sites are located near the residential buildings. The site at Mothithang and Taba are located just one street away from the high school. Also, there is an Early Childhood Care and Development Centre close to the Mothithang site. Therefore, it is expected that as the work commences, there will be disturbance to the school and the Early Childhood Care and Development Centre from construction noise, dust, congestion due to increase in traffic, and increase in workers in the neighborhood. These are not expected to be major impacts, because the Mothithang School itself has been in the process of reconstructing its buildings in the past few years. Still efforts should be made to reduce the level of disruption as far as possible. To achieve this, the implementing agency (district health office or Urban Health Planning Office) will require to inform the school authorities (via an official letter), of the purpose, nature, duration, extent, and timing of work near their school. The contractor should also make sure that truck movements along the school road during morning drop off (7:30 a.m.–8:00 a.m.) and evening (2:30 p.m.–4:00 p.m.) pick up times are avoided to minimize traffic congestion and risk of accidents to parents and students.

118. Currently there are numerous ongoing constructions in the city, so the addition of about 100 plus additional workers (for all three sites) will not significantly have any social impacts on the residential communities. Whenever possible, the government has always tried to encourage private contractors to hire national vocationally trained staff and this should be continued. However, to avoid causing any social disruptions, workers must be made aware of required behavior (rules to avoid playing loud music, fighting within themselves, or drunken behavior) and prohibited from lighting fires to minimize fire risks.

119. To protect the health of workers and the host community, a prerequisite for all contractors is screen migrant workers at their point of origin for more virulent and contagious diseases, such as HIV/AIDS, tuberculosis, and malaria. Also, to ensure the safety of worker, contractors are required to follow the Occupational Health and Safety Plan¹⁴ which includes providing personal protective equipment (PPE) for all workers and following standard procedures for accidents. The existing satellite clinic in Mothithang is close to the existing clinic so it will be easy for workers to access the satellite clinic for outpatient department care but for other sites, additional measures may include maintaining a first aid kit on site and briefing on work safety at the work site.

120. Workers must be provided with temporary housing with electricity for lighting, cooking (or gas) or heating, drinking water, and temporary sanitation facilities.

121. The construction team will at the most comprise of small teams of 50–60 workers, and work should be staged so that, as one team completes a task, the next team can be brought to the site, (e.g., stoneworkers, masons, tilers, woodwork, painters, electrician, plumbers etc.) so the site can accommodate the workers comfortably.

122. The land allocated for the construction work is large enough to accommodate heavy vehicles, machinery, storage, and labor camps but if required, the contractor can lease land from the Thromde for additional space in the neighborhood. Arrangements must be made to collect, segregate and temporarily store solid waste. All excavated soil must be dumped at a site pre-approved by the Thromde. To minimize any risk of accidents to the host community and travelers, the site must be cordoned to exclude public from the site and signboards installed to notify passers-by of ongoing work.

¹⁴ Government of Bhutan, Ministry of Labor and Human Resources. 2006. *Occupation, Health, and Safety in Construction, Manufacturing, Mining and Service Industries*. Thimphu.

123. Once the construction is over, the contractor will be responsible for ensuring decommissioning of all worker camps. All temporary structures will be dismantled/demolished, septic tanks and soak pits covered with an adequate amount of soil and construction materials and debris removed from the site before handing it back to the Thromde.

3. Operation Phase

124. Once the satellite clinics are in operation, these are expected to divert patients to the JDWNRH and reduce traffic congestion and noise in the city center.

125. While the operation of the clinic will not cause any negative environmental impact on air pollution or noise, it is expected to generate an increasing amount (with increasing number of patients) of solid and liquid health care waste. Pathogenic microorganism present in health care waste can easily be transmitted by direct contact, in the air or by vectors, resulting in nosocomial infections (hospital-acquired infections), putting the health of health care workers and patients at risk. Wastewater may be contaminated if these originate from laboratories, pharmaceutical, and chemical stores or from cleaning activities, autoclaving, microwave irradiation, and chemical disinfection. Thus, prevention and control of infections entails ensuring that sources of infection, such as staff/workers, patients, or the environment is protected. Therefore, waste management during operation includes proper management to minimize infection risks to health care personnel, patients, waste workers, and the general public.

126. MOH has already designated focal persons on waste management and monitoring for every HCF and the newly developed solid waste as well as wastewater treatment guidelines outlines the procedures for all HCFs to follow to minimize infection and safely manage waste. The project will strengthen waste management in the eight districts through the provision of waste storage facilities, equipment, and construction of well-designed burial pits.

127. Procurement and distribution of medicines and non-medical equipment to all the health centers is as per the annual requirement by centers. The annual requirement is based on the previous year's utilization. In majority of the cases there is never an excess stock of the medicines rather they are mostly in shortage. In case of excess stock or stock nearing expiry (within 6 months) the health facilities based on usage and demand re-distribute medicines within themselves (from one facility to another) to avoid wastage. Also, they may be returned to the district health office to be utilized before expiry, thereby minimizing waste.

128. Currently only core Thimphu town (30%) is connected to the sewerage network and to the centralized wastewater treatment plant in Babesa (MWHS, 2018). The satellite clinics will be connected with septic tanks until these are connected by the Thromde to the centralized wastewater treatment plant (there is another wastewater treatment plant in Taba under construction). Therefore, no waste water treatment plants will be constructed for any of the satellite clinics. To remove the sewage, the Thromde (which has the technical expertise) has two cesspool trucks to provide desludging services from the septic tanks to the sewerage network. The project will address wastewater treatment at both newly constructed toilets and renovation works in districts by providing septic tanks and adequate drainage at all sites. Each HCF will identify the source, types, and quantity of wastewater generated. All HCFs will submit their annual waste generation data to the NICHWMP that will prepare wastewater treatment guidelines for all HCFs. In the meantime, the HCFs will follow the World Bank's EHS guidelines for HCFs and the mitigation measures outlined in the EMP.

129. Waste management depends on the type of HCF, the services delivered, and the types and quantities of waste generated as well as the types of facilities available onsite or outside within the municipality. The satellite clinics are all located within the municipality will segregate the general waste into biodegradable and non-biodegradable into separate labeled containers or bags at the point of generation, which will then be collected and transported to the landfill/composting site accordingly. General waste that can be reused or recycled will be sold to recycling dealers pre-identified by MOH. Infectious waste will be collected, segregated at source in color coded containers, labeled, treated, stored, and disposed as per the guidelines on NICHWMP as well as the guideline for disposal of pharmaceutical waste that promotes pre-treatment of waste prior to disposal to reduce and eliminate risk of infection to humans and degradation of the environment.

130. The BHUs located in the Dzongkhags are away from the municipal areas and do not have access to transportation or disposal facilities. Such facilities must decontaminate equipment and treat infectious waste prior to disposal with general waste as per the guidelines.

131. Wastewater management includes water conservation, wastewater treatment, and storm water management. The World Bank EHS guidelines recommend that all facilities should assess the quality, quantity, and sources of wastewater including the locations/rooms, routes, drainage systems, and discharge points. This can help in better planning, implementation, and segregation of liquid effluents so that the volume of water requiring specialized treatment can be limited. The MOH must work towards preparation of wastewater management guidelines for all HCFs based on an assessment of the sources, types (hazardous/non-hazardous), and quantities of wastewater generated. Once approved, it should be adopted and individual HCF should prepare their own site-specific liquid waste segregation, collection, storage, pre-treatment, and disposal program.

132. Bhutan is prone to many natural disaster hazards due to its location in the fragile geological conditions, active seismic zone, and steep terrains conditions. These hazards include earthquake, windstorm, forest fire or structure fire, landslides, epidemic diseases, and drought. The Glacial Lake Outburst Floods in 1994, earthquakes in 2009 and 2011, windstorm in 2011 and 2013, and Cyclone Alia in 2009 are some of the recent climate disasters in Bhutan causing huge damages. The National Action Plan for Earthquake Safety of Health Facilities is aimed to reduce future losses in health facilities due to earthquakes and other natural hazards. There is a National Action Plan for Earthquake Safety of Health Facilities (2013) that require standard guidelines with measures to protect critical utility systems, such as the backup electrical power system, and critical medical equipment from extreme weather conditions and earthquake hazards.

133. The operation of all HCFs should be further supported by the following measures/activities:

- (i) Manage medical waste as per waste prevention and management regulations, that promote the principles of 3Rs (reduce, reuse, and recycle) through waste reduction at the source; promoting segregation, reduction, recycling and disposal of waste in an environmentally sound manner.
- (ii) Promote water use efficiency to reduce the amount of wastewater generation.
- (iii) Incorporate the recurrent costs of infection control and waste management practices (e.g., plastic bags, containers/bins, closed jars or puncture-resistant jars for collection, disinfection or transportation, autoclave bags, safety boxes for sharps, needle cutter, plastic shredder, equipment maintenance, fridge, autoclave), materials for encapsulation, and disinfection.

- (iv) Ensure regular supply of PPE such as gloves, masks for personnel handling medical waste and ensure that standard protocols and precautions such as hand hygiene, decontamination, disinfection, housekeeping, and post exposure treatment are followed.
- (v) Conduct orientation for new staff and annual refresher training for all health care workers involved in handling, treatment, and disposal of infectious waste at the time of induction and thereafter at least once every year.
- (vi) Conduct training for staff on the infection prevention and waste management guidelines including wastewater management guidelines and provide ready reminders by displaying written instructions for personnel.
- (vii) Educate the public through posters on the risks of improper waste disposal, infection control, and waste management.
- (viii) Conduct regular check-up of personnel dealing with infectious waste and provide immediate treatment for personnel who may be infected.
- (ix) Clear delineation of responsibilities for health care waste management. The same staff must be responsible for accurate recording and monitoring of the total waste generated, treated and disposed as well as a record of all accidents from waste handling and treatment given to infected personnel.
- (x) Since there are no facilities to manage radioactive or chemical wastes, develop procurement procedures or take back mechanism with suppliers to manage wastes stemming from their supplies.
- (xi) Conduct regular management review of staff capability and practices and conduct regular check and maintenance of all equipment and validation of treatment technology (e.g., autoclaves).
- (xii) Review and evaluate the health care waste management system, practices, and trends in waste generation after 3 years so that appropriate measures can be introduced.

VI. INSTITUTIONAL ARRANGEMENTS AND ENVIRONMENTAL MANAGEMENT PLAN

A. Institutional Arrangements for Project Execution

134. The subproject will be managed and implemented within the institutional framework that already exists in Bhutan for the provision of health services. The main agencies and their roles will be as follows (refer Table 11 for detailed description of the responsibilities of key agencies involved in the program implementation):

135. MOH is the executing agency responsible for management, coordination, and execution of all activities funded under the grant.

136. The Planning and Policy Division will put in place a Project Management and Policy Support Unit (PMPSU) for the implementation of the project. The PMPSU will undertake the following activities: (i) coordinate and monitor all project activities with respective implementing agencies to ensure timely implementation of all project activities, and (ii) prepare and submit progress implementation and compliance reports on all project sub-components (after compilation from the implementing agencies) to ADB every quarter for both construction and operation phase.

Table 11: Institutional Responsibilities for the Proposed Environmental Management Plan

No	Agency	Responsibilities
1	Asian Development Bank	Sign grant agreement with Royal Government of Bhutan Review of IEE and EMP implementation Disclosure of monitoring reports on ADB's website
2	Ministry of Health: Planning and Policy Division (PPD)	Executing Agency (EA) responsible for management, coordination and execution of all activities funded under the grant The PPD will form the Project Management and Policy Support Unit. The PMPSU will coordinate all project activities, ensuring timely implementation as well as preparation and submission of reports to ADB
3	Health Infrastructure Development Division (HIDD) under the Department of Medical Supplies and Health Infrastructure (DOMSHI)	Responsible for- -the architectural and structural design and for seeking approval to proceed with the construction from Thromde. - Coordinating with DHO and District Engineer for selection of site for construction of burial pits, toilets and water reservoirs and also for development of BOQs. -Tendering and appointing a Construction Contractor (CC) to execute the infrastructure works. The PMPSU will provide a Project supervision team to HIDD that will oversee the construction works in terms of quality control, timely completion and monitoring and reporting. Upon completion of construction work, the HIDD will apply for Occupancy certificate from the Thromde after which it will hand over the structure to the Department of Medical Services
3	The Department of Medical Services (DMS)-Urban Health, District Health Services the Infection Control and Waste Management Program	The DMS will process for the procurement of equipment and furniture as per requirement and hand over the new Clinics located within the municipality to the Thromde and the ones located in the Dzongkhag (to be identified at Debsi) to the DHO for operation.
4	Dzongkhag Administration DHO and DE and BHU in-charge	For all renovations works at the BHUs, at the Dzongkhag, the DHO, working within the structure of the local government, will work with the District Engineer. Both officers will coordinate with HIDD for selection of site (for burial pits, new toilets, water reservoirs, etc.), development of BOQs and will ensure quality control, timely completion and monitoring and reporting to the MOH. Once completed, the facility will be handed over to the BHU in-charge for operation and maintenance
5	Thromde	Ensure that construction of the Satellite Clinics are as per approved structural drawings and specifications, May be responsible for operation of the satellite clinics in the municipality; Responsible for waste management in the Municipality
6	DIT/DNP	Coordination of e-waste disposal collected from all HFs
7	MOH for operation phase	The National Medical Waste Management and Monitoring Committee within MOH is required to send its final annual compliance and monitoring status report to the National Environment Commission Secretariat with a copy to the Ministry of Health.

Source: Asian Development Bank.

137. The project implementation, supervision, and environment monitoring and evaluation mechanisms presented below entails all the sites including the ones which will be identified later (i.e., at Debsi in Thimphu Dzongkhag and at Phuentsholing). However, once the sites are identified, the PMPSU will contract an environment expert to carry out a separate IEE and if required, develop/modify implementation, supervision, and monitoring plan for the new sites.

1. Project Implementation and Supervision

a. Construction of satellite clinics in Thimphu (Mothithang, Taba and Babesa) and Phuentsholing

138. During the construction stage, the contractor will be responsible for mitigating all environmental impacts related to construction activities which will be monitored by the PMPSU. The EMP will be included in the bidding documents for the construction package as the ECOP so that it serves as a condition of contract. During construction, the contractor will be responsible for regular monitoring to ensure that work is executed as per the terms and conditions of the contract document and the ECOP. The contractor will be responsible for routine monitoring through visual observation and maintenance of daily logs/record by the site supervisor.

139. The Department of Medical Supplies and Health Infrastructure, through HIDD, will engage a team of two (project supervision team) who will be responsible for supervision to ensure quality control and monitor implementation of the EMP and/or the ECOP by the contractor during construction.

b. Construction of satellite clinic in Debsi (Thimphu Dzongkhag) and improvement works in the districts (BHU-IIs)

140. The DHO and the district engineer will be responsible for coordinating with HIDD and PMPSU for selection of site, its confirmation, estimation, development of BOQs, etc. for improvement or renovation work at BHU-IIs.

141. PMPSU will contract an environment expert to conduct a detailed environmental assessment for the selected site and provide environment management and monitoring plan for pre-construction, construction, and operation phase of the satellite clinic.

142. Supervision of construction of satellite clinic in Debsi will be done by the supervision team in coordination with the district engineer. For the renovation work at BHU-IIs, the supervision will be undertaken by the district engineers (with oversight from DHOs) according to contract agreements which includes the ECOP. The DHO will report on the construction performance to MOH through the Department of Medical Services (DMS).

2. Mechanisms for Implementation of the Environmental Management Plan and Environmental Monitoring

a. Pre-construction phase

143. Before the initiation of construction, it would be ideal if baseline air quality data could be undertaken to differentiate between existing ambient conditions and project-related impacts. However, it will be very difficult to separate impacts on ambient air quality from the project as the project sites are located within the city boundaries where construction activities and vehicular traffic is quite heavy especially during winter months when more bukhari/ traditional wood burning stoves are used. Also, it will be difficult to match the period/season of air quality data collection as the design period and technical assistance preparation phase only covered the winter season.

144. There is no need to conduct environmental monitoring during pre-construction apart from ensuring that the required permits and building clearances are obtained.

b. Construction phase

i. Satellite clinics in Thimphu and Phuentsholing (urban satellite clinics)

145. ECOP are the responsibility of the contractor, who will therefore be responsible for daily monitoring through visual observation and maintenance of daily logs/record by the site supervisor (routine monitoring).

146. The Environmental Division within the Thromde offices in Thimphu and Phuentsholing are responsible for all environmental matters within the municipal boundaries. This includes assessment of environmental impacts arising from construction work, town sanitation, identification (with urban planners) muck disposal sites, domestic and construction waste disposal, as well as all matters pertaining to disasters and compliance with environmental terms and conditions issued with the development consent granted for the construction work.

147. Since the ministry do not have dedicated personnel for overseeing environmental aspects, the PMPSU (the Project Supervision Team) will coordinate with the district Environment Officers of the Environment Division within the two Thromdes to conduct monitoring through quarterly site visits, to assess any environmental impacts caused by the project activities, and compliance with Thromde rules and guidelines. The Thromde Environment Division will provide the necessary guidance to choose appropriate mitigation measures should the need arise. This will be requested on a quarterly basis so that any unforeseen environmental impacts can be mitigated as soon as possible.

ii. Construction of satellite clinic in Thimphu Dzongkhag and BHU-II improvement works in the districts

148. The ECOP are the responsibility of the contractor, who will therefore be responsible for routine monitoring through visual observations and maintenance of records.

149. For the construction of satellite clinic in Thimphu Dzongkhag, the Project Supervision Team will coordinate with the Environment Officer in the district (with support of DHO) to conduct monitoring every quarter through site visits to assess environmental conditions as well as compliance with the EMP. For BHU-II improvement work, the respective DHO will coordinate with the Environment Officers in the districts for monitoring. Overall, the Environment Officer will provide the necessary guidance to choose appropriate mitigation measures should the need arise. This will be requested on a quarterly basis so that any unforeseen environmental impacts can be mitigated as soon as possible.

c. Operation phase for all sub-components

150. The area of concern during the operation phase of the satellite clinics and the BHUs is to prevent patients, public and health care and waste handlers from health care associated infections through:

- (i) Infection prevention control measures and practices such as use of PPE, disinfection, hygiene, infection surveillance, training and capacity building; and
- (ii) Proper waste management strategies including waste minimization, segregation, collection, treatment and safe disposal of solid and liquid medical waste.

151. A requirement of the EMP is that all HCFs follow the NICHWMP, as well as the guideline for disposal of pharmaceutical waste. The EMP also recommends supporting measures which will be discussed under capacity building.

152. The DMS, with its Urban Health Program, District Health Services Program, and NICHWMP will be responsible for operational aspects of the satellite clinic. Quarterly compliance reports will be submitted by the BHU in-charge (health assistant) to the Infection Program.

153. For the planned (planned during second or third year of the project) satellite clinic in Debsi, the DHO, will be responsible for overall operation and maintenance which he/she will oversee through the BHU in-charge or the health assistant. At the BHU-II level, infection control and waste management is the responsibility of the designated infection focal person who will implement the guidelines and submit quarterly compliance reports to the NICHWMP in DMS, through the DHO.

3. Midterm and Final Evaluation

154. The project will be subjected to midterm and final evaluation to assess project implementation, achievements, and compliance with the EMP by DMS. The findings of the evaluation will be used to better manage the project to mitigate any unmitigated adverse impact.

4. Capacity Development

155. Capacity building of all the relevant personnel will be essential to effectively implement and monitor environment safeguards for civil works to be done under the program sub-component. During the operational phase of the health facility, building the capacities of health worker for implementation of the infection control and waste management guidelines in all HCFs will be pertinent. The NICHWMP of the DMS will implement capacity building measures through trainings and meetings or even exposure trips to other model HCFs that are successfully handling medical waste. The following capacity building interventions are recommended:

- (i) Training workshop on Infection Control and Waste Management for health care personnel and Thromde staff. It is proposed that the Infection Control and Waste Management Program may conduct a series of workshops in 4 regions (east, west, north, and south) to adequately cover the participants from the various districts.
- (ii) Provision of training for the all new recruits prior to being assigned to the new satellite clinics in Thimphu, and the BHUs on infection control and waste management.
- (iii) Training on ADB requirements, including EMP implementation and environment monitoring will be conducted for relevant personnel i.e., supervision team, district engineers, DHOs, and Environment Officers.
- (iv) It is further proposed to develop practical guidelines on wastewater treatment and management. The NICHWMP may take lead and hold national-level workshop involving relevant stakeholders to undertake the guideline development process.

B. Environmental Management Plan

156. Table 12 presents the proposed EMP for the project, which provides a management framework during all phases. The EMP broadly describes location specific: (i) potential negative impacts, (ii) probable intensity of impact, (iii) duration of the impact, (iv) activities to mitigate the impacts, and (v) responsibility (for implementation of the activities). It does not show specific

parameters to be measured because as indicated above, most measures will be checked by simple observation, by checking of records, or by interviews with residents or workers.

Table 12. Environmental Management Plan

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
PRE-CONSTRUCTION PHASE						
Non-integration of environmental requirements into the project "life-cycle" and Limited delivery of health services	L	T	<ul style="list-style-type: none"> Design of new healthcare facility as well as Burial pits must be as per in line with Bhutan Services Standards for Satellite Clinics and BHUs Training of Project staff and Health officials on Environmental safeguards and ADB requirements, EMP implementation and environmental monitoring Review and integration of ECOPS in Contract document and clear delineation of responsibilities between project supervision and contractor Training in WHS during induction of all new workers 	PMPUSU, DOMSHI	All sites	0
CONSTRUCTION PHASE						
Increase in air emissions from vehicular (CO, NOx, SO2, PM and VOCs) movement during drop off of materials at construction sites and increased in vehicular traffic	L	T	<ul style="list-style-type: none"> Emissions from on-road and off-road vehicles should comply with national or RSTA regulations 	Contractor	All sites	0
Pollution from fires lit in worker camps or from burning debris	L	T	<ul style="list-style-type: none"> Contractor shall supply kerosene or LPG at camps and restrict use of firewood for cooking and heating, Prohibit Open burning of solid wastes within municipality and enforce strictly¹⁵ 	Contractor	All sites	0
Increase in dust from excavation work or dust may blow from construction work or from open piles of materials stored such as sand	L	T	<ul style="list-style-type: none"> Stockpile and reuse excavated material, Remove all excess excavated soil within 2 weeks of excavation at pre-approved site Use dust control methods, such as sprinkling water on newly excavated area* <ul style="list-style-type: none"> Use of water suppression for control of loose materials on paved or unpaved road surfaces*. 	Contractor	All sites	0

¹⁵ In line with IFC, EHS guidelines.

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
			<ul style="list-style-type: none"> - Cordon off work area, especially excavated area to reduce dust from being carried by wind, - Cover stockpiles of sand or other loose material* to prevent it being carried off on windy days 			
Noise pollution						
Disturbance due to use of installation equipment/electrical and construction works	L	T	<ul style="list-style-type: none"> • Ensure that Noise impacts do not exceed the levels 55dB during daytime and 45 dB at night* through the following; • Carrying out excavation work only during daytime* , • Select equipment with lower sound power levels* • Notify the school, early daycare center and community of work scheduling 	Contractor	All sites	0
Disturbance due to workers playing loud music	L	T	<ul style="list-style-type: none"> • Prohibit workers from playing loud music early morning and evenings 	Contractor	All sites	0
Water pollution						
Pollution of water sources, streams or other surface and underground water	L	T	<ul style="list-style-type: none"> • Prohibit disposal of solid and liquid waste into nearby streams or water bodies • Store all chemicals, fuel, paint and corrosives in a designated area in leak proof containers with lids or under roof away from rainwater, • Construct and connect site drains to the nearest public storm water drain, prevent surface runoff and contamination from worksites • The deep burial pits should be at least 50 meters away from habitation, residential areas and water sources. • The area should not be prone to flooding or erosion. • The bottom of the pit should be at least 1.5 meters above ground water level to prevent pollution of ground water. • 	Contractor	All sites	0
Soil contamination	L	P	<ul style="list-style-type: none"> • The entire pit should be lined with a 30cm layer of compacted clay or any other suitable low permeability material • 	Contractor	BHUs	0
Foul Odor						
Generation of odor from accumulation of organic waste or sewage	L	P	<ul style="list-style-type: none"> • Provide waste bins and a designated area to segregate and store organic waste 	Contractor	All sites	0

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
			<ul style="list-style-type: none"> Provide sewage facilities 			
There may be localized odor generated	L	T	<ul style="list-style-type: none"> Ensure that storage rooms have adequate ventilation 	Contractor	All sites	0
Generation of odor from accumulation of waste	L	T	<ul style="list-style-type: none"> Maintain cleanliness of the premises and surrounding 	Contractor	All sites	0
Soil Contamination and Erosion						
Soil may be contaminated from spillage of chemicals, paint or due to improper waste management	L	T	<ul style="list-style-type: none"> Store all chemicals, fuel, paint and corrosives in a designated area in leak proof containers with lids or under roof away from rainwater, <ul style="list-style-type: none"> Minimize work area when dealing with corrosives, Make appropriate arrangements and transport excavated soil and construction debris, without spillage to pre-approved dump site Inspect and clean all drains monthly especially during the monsoons repair all damaged drains Dispose all rubbish and silt removed from drains with other excavated/construction waste 	Contractor	All sites	0
Worker Health and Safety						
Risk of diseases can be introduced into host communities	L	T	<ul style="list-style-type: none"> Ensure that all migrant workers are screened for HIV/AIDS/ STD/ TB Ensure migrant workers are oriented on the HIV/STI testing centers and related services. 	Contractor	All sites	0
Environmental impacts from improper siting of worker camps	L	T	<ul style="list-style-type: none"> Locate labor camps in pre-approved sites only 	Contractor	All sites	0
Environmental impacts from worker camps	L	T	<ul style="list-style-type: none"> Provide workers with adequate housing facilities with <ol style="list-style-type: none"> Drinking water Electricity Sanitation facilities with soak pits/septic tanks 	Contractor	All sites	0
Risk of accidents at the workplace	L	T	<ul style="list-style-type: none"> Implement a health and safety plan that includes <ul style="list-style-type: none"> Provision of PPE to all workers Maintain a first aid kit on sites Display emergency contact numbers on site 	Contractor	All sites	0

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
			<ul style="list-style-type: none"> - Conduct orientation/awareness meeting for new recruits - Provide transportation facilities for workers in case of medical emergency - Designate a focal person on site to prepare and ensure procedures are in place in case of accidents, disaster or any other emergency - Document all accidents, the cause and measures taken 			
Public Health and Safety						
Disturbance and risk to public health safety	L	T	<ul style="list-style-type: none"> • Implement a public health and safety plan that includes <ul style="list-style-type: none"> - Provide information to the public and neighboring schools/institutions about the construction work and schedule via meetings or notification - Post signboards to notify passers-by of ongoing work - Cordon off all work sites to exclude public from the workplace - Instruct workers in advance on required behavior especially in the districts - Record and document all accidents to public and measures undertaken - Develop and follow standard procedures to record and respond to complaints* within 7 days 	Contractor	All sites	0
Impeded access along access roads and footpaths	L	T	<ul style="list-style-type: none"> • Avoid storing or spillage of any construction material or waste along access roads or footpaths 			
Trucks bringing materials may impeded access or create congestion to the neighboring school and community	L	T	<ul style="list-style-type: none"> • Reduce project traffic* during early morning school drop off or pick up times (7.30-8AM and 2.30-4PM). • Unloading of construction materials should be carried in a manner and time to avoid blockage of roads/paths/access 	Contractor	All sites	0
Fire Hazards and Disaster						
Fire hazards and natural emergencies	L	P	<ul style="list-style-type: none"> • Use only licensed/qualified or experienced electricians for wiring, installation of electrical equipment, <ul style="list-style-type: none"> - Provide and keep at least one fire extinguisher, water hose, torch light on site for emergencies - Ensure that workers/staff are aware of emergency numbers for Police, Fire and Ambulance 	Contractor	All sites	0

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
			<ul style="list-style-type: none"> - Conduct mock drill for emergencies - 			
Impact on aesthetics and risk of illness, and fire hazards due to construction waste or camps	L	T	<ul style="list-style-type: none"> • Remove all waste daily to minimize pile up of fuel for fires 	Contractor	All sites	0
Risk to workers from natural disasters	L	P	<ul style="list-style-type: none"> • Emergency procedures should be clearly posted at appropriate locations 	Contractor	All sites	0
Risk of damage to property during construction	L	T	<ul style="list-style-type: none"> • Compensate and or restore any private/government property damaged during construction to the satisfaction of the owner/Thromde 	Contractor	All sites	0
Unanticipated environmental impacts	L	P	<ul style="list-style-type: none"> • Institute procedures to deal with unanticipated or chance find impacts 	PMPSU	All HCFs	0
Impact on aesthetics, congestion, from improper site closure	L	T	<ul style="list-style-type: none"> • At the end of the construction period, proper decommissioning of works (Dismantle worker camps and clear the site of all construction and domestic debris, seal soak pits/temporary toilets) after completion of construction 	Contractor	All sites	0
OPERATION PHASE						
Generation of all types of SOLID healthcare waste	M	P	<ul style="list-style-type: none"> • Implement collection and segregation, treatment and disposal of waste as per infection prevention and waste management guidelines • Practice the 3Rs (Reduce, Reuse and Recycle) of solid and liquid waste (e.g. reuse paper, cardboard and other packaging material. Recycle cardboard, glass, aluminum and plastic, compost food waste) • Waste minimization, including inventory, sharing with other HCFs and stock management practices • Develop procurement procedures or take back mechanism with suppliers to manage wastes stemming from their supplies • Clear delineation of responsibilities for healthcare waste management. The same staff must be responsible for 	DHO /HCF In-charge MOH	All HCFs	0

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
			<p>accurate recording and monitoring of the total waste generated, treated and disposed as well as a record of all accidents from waste handling and treatment given to infected personnel.</p> <ul style="list-style-type: none"> • Conduct regular management review of staff capability and practices • Review healthcare waste management system, practices and trends in waste generation after 3 years 			
Foul odor during operation			<ul style="list-style-type: none"> • For the burial pits- After every load of wastes, it should be fully covered with soil 			
Improper wastewater management	M	P	<ul style="list-style-type: none"> • All SC and newly constructed toilets in the districts will be provided with septic tanks that are connected to the toilets, until the connections to the local wastewater treatment plant is feasible/provided by the Thromde, for instance at Taba and Mothithang. • Regular checking of the septic tanks and removal of sludge by the Thromde (Thromde has two cesspool trucks and the expertise to provide de-sludging services from these septic tanks to the sewerage network). • Identify sources, types, hazards of wastewater in the HCF, monitor and trends and prepare simple wastewater management plan for the HCF. • Preparation of wastewater treatment guidelines for all HCFs, while in the meantime, follow WB EHS guidelines for HCFs • Restrict discharge of chemical and pharmaceutical wastes—such as photographic chemicals, aldehydes, colorants, and antibiotics—into the sewer drain. • Chlorine-based disinfectants should be diluted to reach a concentration of less than 0.5% of active chlorine. • Liquid pharmaceuticals in vials (but not cytotoxic materials) could be crushed in a closed bucket, mixed with sawdust and encapsulated. • Assess and monitor types of quantities of liquid waste generated and submit annual report to IC&WMP. 	IC &WMP	All HCFs	

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
Non-implementation of waste guidelines	M		<ul style="list-style-type: none"> Incorporate the costs of providing infection control and waste management equipment or materials into annual budget 	DHO /HCF In-charge	All HCFs	0
Risk of infection to healthcare staff and waste handlers	M	P	<ul style="list-style-type: none"> Provide personal protective gear such as gloves, masks for personnel handling medical waste, Ensure that standard protocols and precautions such as hand hygiene, decontamination, disinfection, housekeeping and Conduct regular checkup of personnel dealing with infectious waste and provide immediate treatment for personnel who may be infected 	DHO /HCF In-charge	All HCFs	0
Lack of staff awareness on Healthcare waste management	M	T	<ul style="list-style-type: none"> Conduct orientation for new staff and annual refresher training for all healthcare workers involved in handling, waste at the time of induction and thereafter at least once every year. Training in WHS during induction of all new workers including awareness on “Infection prevention and waste management guidelines and wastewater management guideline” Display written instructions for personnel on waste management protocols 	DHO /HCF In-charge	All HCFs	
Lack of public awareness and risk of infection to public from healthcare waste	L	P	<ul style="list-style-type: none"> Educate the public through posters on the risks of improper waste disposal, infection control and waste management Restrict public access to waste storage and burial and disposal areas 	HCF In-charge	All HCFs	
Generation of pollution from use of cleaning chemicals	L	T	<ul style="list-style-type: none"> Promote waste minimization such as using microfiber mops and cloths rather than chemicals, in general areas such as general toilets, stores, offices etc. 	HCF In-charge	All HCFs	
Inadequate waste storage	L	T	<ul style="list-style-type: none"> Waste storage areas should be sized to the quantities of waste generated and designed with impermeable floors and partitioned 	HCF in charge	All HCFs	0

Potential Negative Impacts	Sig	Dur	Mitigation Activities and Method	Implementation responsibility	Location	Residual Impact
Lack of disposal facilities for sharps for Satellite Clinics	L	T	<ul style="list-style-type: none"> Facilitate disposal for sharps and pathological waste with relevant authorities such as JDWNRH 	HCF in charge	All HCFs	0
Use of ineffective equipment	L	T	<ul style="list-style-type: none"> Conduct regular check and maintenance of all equipment, Conduct validation of treatment technology (e.g. autoclave) 	HCF in charge	All HCFs	0
Disaster and natural hazard risks			<ul style="list-style-type: none"> As per the National Action Plan for Earthquake Safety of Health Facilities, 2013), The National Health Emergency and Disaster Contingency Plan and linkages with the Health Emergency Operation Centre (HEOC) to ensure effective communication and coordination for emergency response and disaster management. Identify earthquake hazards in the Healthcare facilities including risks to equipment, medicines and furnishing and implement measures to protect important equipment and medicines during such events 	HCF in charge in collaboration with DHO	All HCFs	0

*as recommended by the IFC EHS guidelines

Sig = Significance of Impact (L = low; M = Moderate; S = Significant). Dur = Duration of Impact (T = Temporary; P = Permanent)

This column shows impacts remaining after mitigation: 0 = zero impact (impact successfully mitigated);

IC & WMP=Infection control and waste management program.

Source: Asian Development Bank.

C. Environmental Monitoring Plan

157. Table 13 presents EMP for the preconstruction, construction, and operation stages of the project components. The EMP describes (i) mitigation measures, (ii) parameter, (iii) location, (iv) measurement method, (iv) frequency of monitoring, and (v) responsibility (for both mitigation and monitoring). Most measures can be checked by simple observation or by interviews with residents or workers.

158. Table 13 shows that during the construction stage, most mitigation activities are the responsibility of the construction contractors employed to build the infrastructure. Responsibility will be assigned via the contracts through which they are appointed (prepared by HIDD during the pre-construction and design stage). Appendix 4 is the ECOP for construction and Appendix 5 provides a construction site checklist that can be used to review conditions at the construction site and identify any environmental impacts or risks to the health and safety of workers and the public.

159. Mitigation when the system is operating is the responsibility of either the Thromde once these are handed over to or the Urban Health Program and the Infection Control Program of the DMS. For the BHUs, mitigation during operation is the responsibility of the DHO.

Table 13: Environmental Monitoring Plan

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
Pre-construction phase						
Construction phase						
<ul style="list-style-type: none"> Emissions from on-road and off-road vehicles should comply with national or RSTA regulations 	Smoke and dust emission	All sites	Contractor/ Machine owner	Visual observations Emission test certificate	PST/DHO	Quarterly
<ul style="list-style-type: none"> Contractor must supply kerosene, LPG or electricity in worker camps and restrict use of firewood for cooking and heating, Prohibit Open burning of solid wastes, whether hazardous or nonhazardous and enforce strictly¹⁶ Stockpile and reuse excavated material, Remove all excess excavated soil within 2 weeks of excavation at pre-approved site Use dust control methods, such as 	<ul style="list-style-type: none"> Smoke and air emission Visible dust levels in the construction area Number of fires in worker camps or from burning debris 	All sites	Contractor	Visual observation, CC records	PST/DHO	Quarterly

¹⁶ In line with IFC, EHS guidelines.

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
sprinkling water on newly excavated area* <ul style="list-style-type: none"> • Use of water suppression for control of loose materials on paved or unpaved road surfaces*. • Cordon off work area, especially excavated area to reduce dust from being carried by wind, • Cover stockpiles of sand or other loose material* to prevent it being carried off on windy days 						
<ul style="list-style-type: none"> • Ensure that Noise impacts do not exceed the levels 55dB during daytime and 45 dB at night* through the following • Carrying out excavation work only during daytime* • Select equipment with lower sound power levels* • Notify the school, early daycare center and community of work scheduling • Prohibit workers from playing loud music early morning and evenings 	<ul style="list-style-type: none"> • Noise level • Number of complaints of disturbance • Number of notifications • Excavation hours 	SC and BHU sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> • Prohibit disposal of solid and liquid waste into nearby streams or water bodies • Store all chemicals, fuel, paint and corrosives in a designated area in leak proof containers with lids or under roof away from rainwater, 	<ul style="list-style-type: none"> • Pollution of streams and waterbodies • areas with spills • Number of drain connections constructed • Storage of chemicals/paints/corrosives 	All sites	Contractor	CC records, visual observation	PST	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
<ul style="list-style-type: none"> Construct and connect site drains to the nearest public storm water drain, prevent surface runoff and contamination from worksites 						
<ul style="list-style-type: none"> Store all chemicals, fuel, paint and corrosives in a designated area in leak proof containers with lids or under roof away from rainwater, <ul style="list-style-type: none"> Minimize work area when dealing with corrosives, Make appropriate arrangements and transport excavated soil and construction debris, without spillage to pre-approved dump site Inspect and clean all drains monthly especially during the monsoons repair all damaged drains Dispose all rubbish and silt removed from drains with other excavated/construction waste 	<ul style="list-style-type: none"> Storage of chemicals/paints/corrosives Number of areas with spills and Soil contamination and waste dumped 	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> Ensure that the bottom of the burial pit is at least 1.5 meters higher than the ground water and lined with concrete, 	<ul style="list-style-type: none"> Soil contamination Number of pits constructed as per recommendation Number of spills/leakages from pit 	Burial pit sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> Provide waste bins and a designated area to segregate and 	<ul style="list-style-type: none"> Generation of foul odor Number of waste bins 	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
<ul style="list-style-type: none"> store organic waste • Provide sewage facilities, • Ensure that storage rooms are ventilated • Maintain cleanliness of the premises and surrounding 	<ul style="list-style-type: none"> • Method/Type of sewage disposal • Number of cleaning and ventilation • Number of cases of foul odor 					
<ul style="list-style-type: none"> • Ensure health and safety of workers through <ul style="list-style-type: none"> - Ensure that all migrant workers are screened for HIV/AIDS/ STD/ TB - Locate labor camps in pre-approved sites only - Provide workers with adequate housing facilities with <ul style="list-style-type: none"> a. drinking water b. electricity c. sanitation facilities with soak pits/septic tanks -Provision of PPE to all workers -Maintain a first aid kit on sites -Display emergency contact numbers on site -Conduct orientation/awareness meeting for new recruits -Provide transportation facilities for workers in case of medical emergency 	<ul style="list-style-type: none"> • Number of workers screened for health risks • Number of location and type of worker camps facilities provided • Number of workers with PPE • Number of First aid kit on sites • Number of Emergency displays • Number of orientation/ awareness meeting • Number of emergencies at site • Designation of focal person • Number of Health and safety measures in place • Number of accidents and measures taken 	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
<p>-Designate a focal person on site to prepare and ensure procedures are in place in case of accidents, disaster or any other emergency</p> <p>-Document all accidents, the cause and measures taken</p>						
<ul style="list-style-type: none"> • Implementation of the health and safety plan that includes <ul style="list-style-type: none"> -Providing information to the public and neighboring schools/institutions about the construction work and schedule via meetings or notification -Post signboards to notify passers-by of ongoing work -Cordon off all work sites to exclude public from the workplace -Instruct workers in advance on required behavior especially in the districts • Avoid storing or spillage of any construction material or waste along access roads or footpaths • Reduce project traffic* during early morning school drop off or pick up times (7.30-8AM and 2.30-4PM). 	<ul style="list-style-type: none"> • Public health and safety • Number of communication measures, • Number of signboards • Number of awareness meetings • Number of or length of barriers to exclude public from site • Number of and cause of accidents/s pills • Number and types of Health and safety measures implemented 	SC and BHU sites	Contractor	CC records, visual observation	PST/DHO	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
<ul style="list-style-type: none"> Unloading of construction materials should be carried in a manner and time so as to avoid blockage of roads/paths/access 						
<ul style="list-style-type: none"> Record and document all accidents to public and measures undertaken Develop and follow standard procedures to record and respond to complaints* within 7 days 	<ul style="list-style-type: none"> Public health and safety Number of accidents Number of grievances 	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> Use only licensed/qualified or experienced electricians for wiring, installation of electrical equipment, Provide and keep at least one fire extinguisher, water hose, torch light on site for emergencies Emergency procedures should be clearly posted at appropriate locations Ensure that workers/staff are aware of emergency numbers for Police, Fire and Ambulance Conduct mock drill for emergencies 	<ul style="list-style-type: none"> Number of Fire hazards and Disasters Number of emergency procedures instituted Number of displays/notices/drills 	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> Remove all waste daily to minimize pile up of fuel for fires 	Aesthetic impacts	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> Dismantle worker camps and clear the site of all construction and domestic debris, seal soak pits/temporary 	Decommissioning of construction works	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
toilets after completion of construction						
<ul style="list-style-type: none"> Compensate and or restore any private/government property damaged during construction to the satisfaction of the owner/Thromde 	Number of damage/accidents	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly
<ul style="list-style-type: none"> Institute procedures to deal with unanticipated or chance find impacts 	Number of Chance findings	All sites	Contractor	CC records, visual observation	PST/DHO	Quarterly

PST= Project Supervision Team.

Operation phase

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
<ul style="list-style-type: none"> Implement collection and segregation, treatment and disposal of waste as per infection prevention and waste management guidelines including wastewater management guidelines; Waste minimization and stock management Develop procurement procedures or take back mechanism with suppliers to manage wastes stemming from their supplies Clear delineation of responsibilities for healthcare waste management. Conduct regular management review of staff capability and practices, Review healthcare waste management system, practices and trends in 	<ul style="list-style-type: none"> Quantities of waste generated, segregated, reused, recycled, returned to supplier, composted and disposed/burnt /buried Number of review meetings 	All sites	HA	Waste inventory Medical stock management practices Site observations HCF waste report Review reports	DHO, IC & WMP	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
waste generation after 3 years						
<ul style="list-style-type: none"> Follow approved protocols on wastewater collection, pre-treatment and disposal Inspect and clean all drains monthly especially during the monsoons repair all damaged drains Conduct wastewater monitoring to assess, sources and trends (types and quantities generated) 	<ul style="list-style-type: none"> Wastewater collection, treatment and disposal Number or % staff complying with guidelines 	All sites	HA	Site observations wastewater report	DHO, IC&WMP	Quarterly
<ul style="list-style-type: none"> Incorporate the costs of providing infection control and waste management equipment or materials into annual budget 	Annual budget provision	All sites	HA	Budget requirements	DHO, IC&WMP	Quarterly
<ul style="list-style-type: none"> Provide personal protective gear such as gloves, masks for personnel handling medical waste, Ensure that standard protocols and precautions such as hand hygiene, decontamination, disinfection, housekeeping Conduct regular checkup of personnel dealing with infectious waste and provide immediate treatment for personnel who may be infected 	<ul style="list-style-type: none"> Number of PPE provided Number of staff using PPE Number of staff following protocols Number of infections and post exposure treatment Number of checkups of personnel 	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly
<ul style="list-style-type: none"> Conduct orientation for new staff and annual refresher training for all healthcare workers involved in handling, waste at the time of induction and thereafter at least once every year. 	Number of orientation trainings/awareness meetings conducted, Number of participants	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
<ul style="list-style-type: none"> Conduct awareness on "Infection prevention and waste management guidelines, and wastewater management guideline" Display written instructions for personnel on waste management protocols 						
<ul style="list-style-type: none"> Educate the public through posters on the risks of improper waste disposal, infection control and waste management Restrict public access to waste storage and burial and disposal areas 	<ul style="list-style-type: none"> Number of posters Number of measures instituted to restrict public access 	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly
<ul style="list-style-type: none"> Promote waste minimization such as using microfiber mops and cloths rather than chemicals, in general areas such as general toilets, stores, offices etc. 	<ul style="list-style-type: none"> Number of waste minimization measures initiated 	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly
<ul style="list-style-type: none"> Waste storage areas should be sized to the quantities of waste generated and designed with impermeable floors, partitioned and well ventilated, 	<ul style="list-style-type: none"> Number of waste storage areas constructed as per approved design 	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly
<ul style="list-style-type: none"> Facilitate disposal for sharps and pathological waste with relevant authorities such as JDWNRH 	<ul style="list-style-type: none"> Number of meetings to facilitate sharp disposal 	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly
<ul style="list-style-type: none"> Conduct regular check and maintenance of all equipment, Conduct validation of treatment 	<ul style="list-style-type: none"> Number and type of maintenance work Number and results of validation 	All HCFs	HA	Observation HCF records and progress reports	DHO, IC & WMP	Quarterly

Mitigation Measures	Indicators	Location	Implementation Responsibility	Monitoring Method	Monitoring	Frequency
technology (e.g. autoclave)						

*as per IFC's EHS guidelines
Source: Asian Development Bank.

1. Monitoring and Reporting

160. Monitoring and reporting will be undertaken during project implementation to ensure that the procedures are being adequately implemented and to identify any modifications or corrective action that may be required to improve the efficiency of the EMP throughout the project implementation process.

161. The environmental reporting will cover environmental effects monitoring to assess the impacts of the sub-project on ambient environmental conditions as well as environmental performance monitoring to evaluate compliance with the operating procedures, national standards and requirements of the EMP.

Table 14: Mechanism for Monitoring and Reporting

Satellite Clinics in Thimphu and Phuentsholing (Urban Satellite Clinics)

Phase	Responsibility for Implementation	EMP Performance Monitoring	Environmental Compliance Monitoring
Procurement /Construction phase	Contractor to submit progress report to HIDD/DOMSHI when submitting bill	Project Supervision Team/HIDD/DOMSHI (every quarter)	DEO Thromde (every quarter)
Operation phase	In-charge (Health Assistant)	IC & WMP, DMS	

Source: Asian Development Bank.

Construction of Satellite Clinic in Thimphu Dzongkhag and Improvement Works in the Districts

Activity	Implementation	EMP Performance Monitoring	Environmental Compliance Monitoring
Procurement /Construction phase	Contractor to submit progress report to DHO when submitting bill	Project Supervision Team in coordination with DHO and District Engineer	DEO Thromde, and DEO, Dzongkhag
Operation phase	Infection focal person	DHO	IC & WMP, DMS

Source: Asian Development Bank.

162. During the site visits (satellite clinics) to assess compliance monitoring, the Project Supervision Team will assess the site conditions to assess the level of air, noise, water, and soil pollution, as well gauge occupational health and safety practices, traffic and congestion issues as well as hazards to public health and safety. The ECOP will be used to review conditions at the construction site and identify any environmental impacts or risks to the health and safety of workers and the public.

163. The environmental reporting will cover environmental effects monitoring to assess the impacts of the sub-project on environmental conditions as well as environmental performance monitoring to evaluate compliance with the operating procedures, national standards, and requirements of the EMP. Reporting of EMP implementation will take place every 3 months/quarterly. The project management, under the HIDD, will report to the DMS on the implementation progress which in turn will be submitted to the PMPSU that will consolidate these reports, together with the results of the central level monitoring for submission to ADB during construction and operation phases.

164. In the event of noncompliance during project implementation, ADB and the executing agency will agree on a time-bound corrective action plan. The measures for the corrective action plan will be budgeted by the executing agency depending on the cost of measure required.

2. Environmental Management Budget

165. Most of the mitigation measures require the contractors to adopt good site practice, which should be part of their normal procedures already, so there are unlikely to be major costs associated with compliance. Regardless of this, any costs of mitigation by the contractors are included in the budgets for the civil works and do not need to be estimated separately here.

166. The environmental management cost includes supervision cost of monitoring compliance with the contract agreement and the ECOP at the level of the individual project sub-component, i.e., during the construction works. Cost during the operation of the HCFs, include the cost of capacity building and developing and implementing standard wastewater management guidelines. The costs of these are shown in Table 15 with details of the calculations shown in footnotes beneath the table. The figures show that the total cost of environmental management and monitoring for the subproject (covering design, construction and the first 3 years of operation) is \$56,413.

Table 15: Environmental Management and Monitoring Costs (USD)

S.No.	Item	Quantity	Unit cost (USD)	Total cost (USD)
1	<i>Project Supervision and EMP mitigation*</i>			
1.1	Civil Engineer	48 person-months	550	37,010
1.2	Electrical Engineer	48 person-months	550	27,010
2.	<i>Training on ADB safeguard, EMP implementation, environment monitoring and contractors training (half day only)*</i>			1,562
3	<i>Trainings for staff on WHS and infection prevention and waste management guidelines**</i>			
3.1	Trainings to be conducted in all 10 districts	4	1563	6,252
3.2	Training for Satellite Clinic staff in Thimphu	1	1172	1,172
4	<i>National Level workshop on wastewater guidelines (include designers and focal persons from MOH, DHO from Thimphu)**</i>	1	1172	1,172
	TOTAL			74,178

*from PMPSU budget

** from MOH Budget

Source: Asian Development Bank.

VII. PUBLIC CONSULTATION AND DISCLOSURE

A. Project Stakeholders

167. The key stakeholders have been identified and consulted during preparation of this IEE, and any others that are identified during project implementation will be brought into the process in the future. Primary stakeholders include:

- (i) MOH;

- (ii) DHO;
- (iii) staff of the satellite clinics and BHUs;
- (iv) residents of neighboring community;
- (v) patients that will utilize the clinic or the community members in the catchment of the proposed satellite clinic/existing BHU-II where renovation work is to commence; and
- (vi) village health workers.

B. Consultation and Disclosure to Date

168. Public consultation was conducted during preparation of the IEEs to discuss the project and involve stakeholders in planning the mitigation measures and developing the EMP. Visits to the new proposed sites were conducted with MOH, Thimphu District, and Thromde staff, and discussions were conducted with architects and engineers designing the satellite clinic and the NICHWMP. Also, field visits and meetings were held with MOH, DHOs, and health care workers at the district hospitals and BHU-IIs were conducted.

169. Consultations undertaken between November 2017 and January 2018 as part of the IEE process is listed in Appendix 6. A total of 53 people was consulted (14 females, 39 males). For this IEE, observations during the field visit detailed in Appendix 7 are mostly environment-related. Social and gender consultations and observations are reported separately in the social impact assessment and gender reports.

170. The purpose of disclosure and consultation was to get the acceptance of the project from the key stakeholders and seek their suggestions and possible concerns on health and environment. During each meeting, the purpose and background of the meeting was briefed to the health officer, and to explain the role of all the individual (infrastructure, environment, social, gender, and communication) consultants, to the assessment of the existing hospitals and BHUs in the periphery of the country.

171. The medical officers/health officers provided background information on the history and status of the hospital/BHU facilities and the current constraints and issues being faced in the delivery of services. Physical assessment of the facilities was conducted along with some discussions with patients or their attendees. This provided the basis to identify the scope of proposed project interventions. The BHU and hospital staff hope that their concerns on the lack of equipment to safely manage and dispose waste (lack of weighing scale, autoclaves, storage areas and burial pit, water scarcity, and training needs) are incorporated into the project. Their suggestions were incorporated into the project design especially for renovation works in the eight districts.

172. Meeting with the Dungpa of Nganglam was also conducted during the field visit wherein the team members were briefed on the dungkhag and future proposed activities in terms of town planning, municipality, and proposals for extension of the health facility.

C. Future Consultation and Disclosure

173. MOH will extend and expand the consultation and disclosure process significantly during implementation of the project. Structured consultation meetings with the institutional stakeholders such as Thromde, DHOs, Dzongkhag Administration (where necessary) and village representatives to discuss and approve key aspects of the project. The public consultation

process will be documented and incorporated in the environmental assessment and progress reports.

174. MOH will provide relevant environmental information including the IEE and environmental monitoring reports in a timely manner, in a form and language easily understood by affected people and stakeholders on the MOH website and official social media pages. The IEE will also be submitted to ADB for review prior to disclosure to the ADB website and any additional public consultation held during operation phases will be reported in the environmental reports and submitted prior to disclosure on the ADB website.

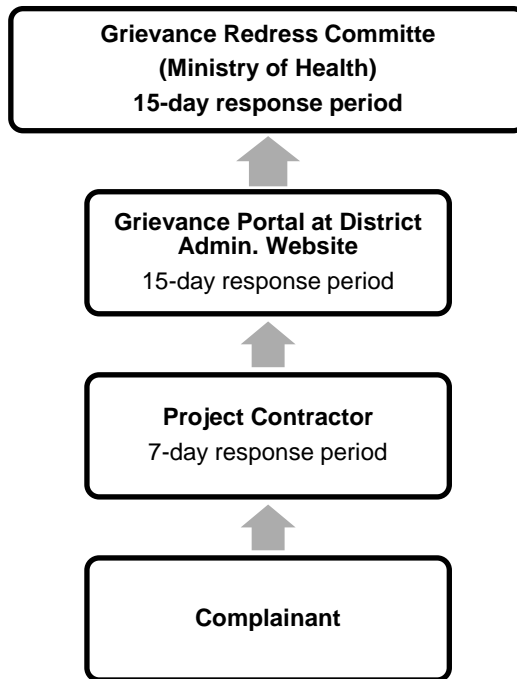
D. Grievance Redress Mechanism

175. Affected person(s), if any, or person(s) who do not agree with the plans, activities, or outcomes will have the right to file complaints and/or grievance regarding the new construction and improvement works. Such persons will be able to express their grievances through a grievance redress mechanism that will be instituted under the PMPSU in the ministry and at the Dzongkhag. The grievance redress process will provide enough opportunity for such persons to articulate complaints before and during the implementation of construction and improvement works and ensure that MOH adequately responds to peoples' views on planning and implementation of the construction and its associated activities

176. A three-tier grievance redress mechanism will be followed.

- (i) **First-tier.** The complainant(s) must submit their grievance or in written form directly to the project contractor. The project contractor, if it is within his scope, will facilitate solutions or within 7 days provide a response (in writing) to the complainant(s) justifying his inability to address the grievance. Refer Appendix 4 for sample grievance form.
- (ii) **Second-tier.** If the complainant(s) is not satisfied with the decision or response he/she receives from the project contractor, he/she can take the written response from the project contractor and submit his/her written complaint/appeal to the Dzongkhag. This can be done via the grievance portal on the district webpage of Samdrup Jongkhar, Pemagatshel, Dagana, Trashigang, Trongsa, and Zhemgang districts. The Dzongkhag will discuss the issue with the DHO who will try to address it through the district PMPSU committee and facilitate a solution or a response within 15 days.
- (iii) **Third-tier.** Again, if the complainant is not satisfied with the decision of the Dzongkhag PMPSU committee or he/she does not receive a response within 15 days of submitting the grievance, the complainant can submit his appeal to the Grievance Redress Committee in MOH. MOH will record, review, and discuss the issue with the complainant(s) and the project contractor to address the grievance and facilitate solutions, or respond (in writing) otherwise, within 15 days.

Grievance Redress Mechanism



Source: Asian Development Bank.

177. ADB has adopted an accountability mechanism whereby people adversely affected by ADB-financed projects can file a request for compliance review by ADB's compliance review panel or express their concerns to the special project facilitator that assists in finding solutions to the problem.

VIII. FINDINGS AND RECOMMENDATIONS

A. Findings

178. In accordance with ADB's SPS (2009), Category B projects are those judged to have some adverse environmental impacts, but these are of lesser degree and significance than those for Category A, so an environmental impact assessment is not required.

179. For Category B projects, an IEE is regarded as the final assessment report.

180. The terms of reference initially categorized this project as a Category B project based on the anticipated potential environmental impacts during the concept document. In accordance with the ADB's SPS (2009), a Category B project's potential environmental impacts are less adverse and fewer in number than those in category A. The impacts are also site-specific and very few are irreversible. Most of the impacts can be readily addressed through mitigation measures. To examine this categorization, the ADB's sector-based REA checklist was used along with visits to the project sites to see how the proposed components will be implemented and through discussions with the project proponents.

181. The sensitivity and magnitude of the potential environmental impacts as a result of the project type, location, and scale (during construction and operation) was assessed. Based on the project's most environmentally-sensitive component, in this case, health care waste generation, the project was found to be suitably considered as Category B. As a requirement for all Category B project, an IEE has been prepared.

182. The process described in this document has assessed the environmental impacts of all elements proposed under the project. Potential negative impacts were identified in relation to both construction and operation of the infrastructure, but it was not considered that there would be any significant impacts due to the project design or location. The major negative impacts that will occur are summarized below.

1. Pre-Construction Phase

183. No environmental impacts are expected to arise during this phase because the land required for the satellite clinics have been allocated by the Thromde, which is also the competent agency responsible for reviewing the architectural and structural drawings, to ensure that all the requirements as per the building standards have been adhered to. The design phase has also already incorporated certain changes in the outline designs for the infrastructure such as parking, waste storage, and provision of toilets, which means that the number of impacts and their significance has already been reduced by amending the design.

2. Construction Phase

184. During the construction phase, environmental impacts are not expected to be significant because any impact on air, noise and water will occur mainly at sites where construction work is done, and will be temporary (such as congestion, noise) and limited to the construction period which is about a year. The Thromde has its own system of check and balance to monitor that all construction work progresses as per approved drawings and specifications. Other construction impacts are mostly related to the risk of accidents from improper use of equipment, lack of safety gear and risk of diseases and infection among workers if adequate facilities are not provided. As per construction norms, all contractors are required to provide adequate housing facilities for their

workers and to ensure medical screening prior to hiring migrant workers. Mitigation measure to minimize accidents and to ensure the safety of the public as well as workers, contractors will be required to cordon off the work area and to provide workers with PPE as per the Occupational Health Safety Regulations.

3. Operation Phase

185. The main source of environmental impact and risk of infection is the generation of health care waste for which mitigation measures in terms of structural measures (storage space, construction of burial pits, fencing), management measures (application of infection control and waste management procedures such as segregation, collection storage, treatment, and disposal) along with provision of waste equipment would be made. The provision of waste equipment will help to treat and reduce the quantities of infectious waste. Through these measures, potential negative impacts will be reduced in turn reducing the risk of infections to patients and health care and waste workers/handlers.

B. Recommendations

186. It is recommended that provision of new infrastructure and equipment be complemented with staff training on standard operation and maintenance practices to ensure that equipment lasts longer. Workers and patients also must be made aware of the importance of hygiene and ways to prevent the risk of infections, as well as the importance of waste management principles and practices and the importance of safe and environment-friendly waste disposal.

187. Wastewater treatment in all HCFs is non-existent. Standards and guidelines on health care waste water are yet to be prepared. Further information needs to be collected from HCFs to determine the extent of wastewater generation and its impacts so that appropriate levels of management practices can be developed as per generation from various tiers of facilities and in line with environmental standards. The project could help by providing assistance in reviewing and preparation of wastewater treatment guidelines.

C. Other Recommendations

188. It is recommended that once site for Thimphu Dzongkhag at Debsi and for Phuentsholing is identified, a detailed environmental screening and assessment process should be undertaken as per ADB guideline. The project implementation arrangements, environmental management, monitoring, and evaluation presented for these locations in this IEE (presented in Section VI- Institutional Arrangements and Environmental Management Plan) are indicative and may be modified as per findings from the assessment.

IX. CONCLUSION

189. The environmental impacts of the proposed project have been assessed by the IEE reported in this document, conducted according to ADB guidelines.

190. The new satellite clinics should provide major benefits for the recipient households and communities through increasing the availability of primary health care services in urban areas and reducing people and traffic congestion at the JDWNRH, thereby allowing it to focus on patients with serious ailments.

191. The project will improve waste management at BHUs in peripheries especially those that do not even have rudimentary facilities or equipment for waste collection, storage, or safe disposal. The burial pits will greatly benefit patients and their caregivers who have been compelled to resort to individual means to dispose of placenta. These small-scale interventions and supply of much needed equipment will yield major improvements and great benefits in strengthening infection prevention and waste care management once the construction is complete and in operation.

192. The overall conclusion of this process is that there should be no significant negative environmental impacts as a result of location, design, construction, or operation of the subproject if the appropriate mitigation, compensation, and enhancement measures are implemented in full. There should in fact be some substantial social benefits to the public, reduction in patient traffic and overcrowding at the general hospital, improvement in delivery of services, and improvements in infection control and health care waste management.

193. To ensure that all anticipated environmental impacts are addressed, MOH should ensure that all mitigation measures in the EMP proposed are implemented in full, as described in this document.

194. There are no uncertainties in the analysis, and no additional work is required to comply with ADB procedure or national law. There is thus no need for further study or environmental assessment.

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APPENDIX 1: RAPID ENVIRONMENTAL ASSESSMENT CHECKLIST**Instructions:**

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (SDES), for endorsement by Director, SDES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

Country/Project Title: Bhutan / 51141/ Health System Strengthening Program

Sector Division: Human and Social Development Division, SARD

Screening Questions	Yes	No	Remarks
A. Project Siting Is the Project area adjacent to or within any of the following environmentally sensitive areas?		X	
▪ Cultural heritage site		X	
▪ Legally protected Area (core zone or buffer zone)		X	
▪ Wetland		X	
▪ Mangrove		X	
▪ Estuarine		X	
▪ Special area for protecting biodiversity		X	
B. Potential Environmental Impacts Will the Project cause...			
▪ Impairment of historical/cultural areas; disfiguration of landscape or potential loss/damage to physical cultural resources?		X	
▪ Disturbance to precious ecology (e.g. sensitive or protected areas)?		X	
▪ Alteration of surface water hydrology of waterways resulting in increased sediment in streams affected by increased soil erosion at construction site?		X	
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?		X	
▪ Increased air pollution due to project construction and operation?	X		This project contributes positively by reducing traffic congestion and noise in the city center by diverting away patients from the hospitals. This potential impact during construction period will be mitigated by restricting truck movement during peak traffic

Screening Questions	Yes	No	Remarks
			periods. Construction equipment and vehicles are required to have passed the Road safety and transport emission tests.
<ul style="list-style-type: none"> ▪ Noise and vibration due to project construction or operation? 	X		The construction work can be completed in a fairly short time as the structures are small. This potential impact during construction period will be mitigated by restricting work to day time.
<ul style="list-style-type: none"> ▪ Involuntary resettlement of people? (physical displacement and/or economic displacement) 		X	
<ul style="list-style-type: none"> ▪ Disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups? 		X	
<ul style="list-style-type: none"> ▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases from workers to local populations? 		X	Contractors are required to follow the Worker and Occupational Health and Safety Plan which includes pre-screening of workers, provision of Workers housing, lighting, drinking water and sanitation facilities.
<ul style="list-style-type: none"> ▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents? 		X	
<ul style="list-style-type: none"> ▪ Social conflicts if workers from other regions or countries are hired? 		X	There has been no history of such conflicts for any infrastructure projects till date.
<ul style="list-style-type: none"> ▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)? 		X	The nature of the work is so small that at any particular site, no more than 100 workers are anticipated. Provisions will be made for water supply and sanitation for workers.
<ul style="list-style-type: none"> ▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation? 	X		All construction activities carried out under the project will comply with the General Rules and Regulation on Occupational Health and Safety (OHS) in Construction, Manufacturing, Mining and Service Industries, promulgated in 2006 by the Ministry of Labour and Human Resources, Royal Government of Bhutan. In addition to this, the Infection Prevention and Control and Medical Waste Management guidelines will be followed. Also, environmental codes of practice will be part of the contract agreement with the contractor. Training and awareness programs on OHS and waste management incorporated under the project.
<ul style="list-style-type: none"> ▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation? 	X		The national occupational health and safety (OHS) guidelines will be followed.
<ul style="list-style-type: none"> ▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their 	X		Construction sites will be fenced and safety signages will be placed where needed. The new infrastructure will be part of the Thimphu Dzongkhag disaster management

Screening Questions	Yes	No	Remarks
failure could result in injury to the community throughout project construction, operation and decommissioning?			contingency plan. As a requisite fire safety measures such as fire extinguishers on site will be installed
▪ Generation of solid waste and/or hazardous waste?	X		Proper waste management measures will be implemented during construction. The Infection Prevention and Control and Medical Waste Management guidelines will be followed for clinical wastes during operation.
▪ Use of chemicals?		X	Same as above
▪ Generation of wastewater during construction or operation?		X	Same as above

A CHECKLIST FOR PRELIMINARY CLIMATE RISK SCREENING

Country/Project Title: Bhutan / 51141/ Health System Strengthening Program

Sector: Health

Subsector: Disease control of communicable disease - Health care finance - Health system development

Division/Department: Human and Social Development Division, SARD / South Asia Department

Screening Questions	Score	Remarks ¹⁷
Location and Design of project Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather-related events such as floods, droughts, storms, landslides?	0	Not likely. None of the existing health care facilities sites are located in areas that could be vulnerable to changes in climate or located in close proximity to rivers where there might be risks of flashfloods. RBOG construction rules ensure that new land for satellite clinics are also not located in environmentally sensitive areas. Standards for deep burial pit construction will be followed (refer 'Other Comments' for details). All designs must be in line with the Thimphu Thromde Development Control Regulations, 2016, Bhutan Building Rules – 2002. Rural Construction Rules 2013 wherein the maximum plot sizes, set back and maximum building heights are specified.
Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc.)?	0	Not likely, as the designs are as per standard building codes and Basic Health Unit (BHU) construction guidelines.

¹⁷ If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project Outputs.

Screening Questions		Score	Remarks ¹⁷
			All designs must be in line with the Development Control Regulations – 2016, Bhutan Building Rules – 2002, Traditional Architectural Guidelines, relevant codes of practice for Structural, Electrical, Plumbing and Sanitation design.
Materials and Maintenance	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	0	Not likely. All structural designs shall comply with minimum standards and specifications that take into consideration earthquake resistance, seismic risks, and fire proof materials. Bhutan has the National Adaptation Program of Action, wherein vulnerability assessments and identification of climate related hazards are identified every four years.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	0	Not likely. There may be a minor increase in repair costs. There is a National Action Plan for Earthquake Safety of Health Facilities that require standard measures to be in place to protect critical utility systems, such as the backup of the electrical power system to ensure critical medical equipment will function during extreme weather conditions and earthquakes.
Performance of project outputs	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	Not likely. Major climate change impacts on health in Bhutan include: (i) increase in the geographic range and incidence of vector-borne diseases, particularly malaria and dengue; and (ii) increase in the incidence of water borne diseases. Changing disease patterns will affect the project but at the same time the project will be investing in improving disease surveillance which will help to mitigate this impact. Bhutan is one of the 7 countries taking part in the Global pilot project on “Climate Change Adaptation to Protect Human Health” (see additional comments below).

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include

providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

Result of Initial Screening (Low, Medium, High): LOW RISK

Other Comments:

Environment Designs: There are standard RGOB approval processes for the design and approval of new construction, such as the satellite clinics, wherein the competent authority screens all potential projects to ensure that these are in line with the city development strategy, zoning and structural plans. The city development strategy has already taken into consideration the population carrying capacity, geology, topography, climate and hydrology and additional requirements for water, sanitation and electricity.

The Engineering Adaptation and Risk Reduction Division of the Department of Engineering Services at the Ministry of Works and Human Settlement has prepared “Bhutan Green Building Design Guidelines” in 2013 which provides guidelines on how to introduce simple and practical green building designs and construction principles that can be adopted in Bhutan. The guidelines promote the use of low energy local construction methods with designs that are adapted to respond to the local climatic environment combined with vernacular architecture of Bhutan (Ministry of Works and Human Settlement, 2013).

Disaster management: Bhutan has a National Emergency Operations Centre (NEOC) that is linked to the districts. The NEOC is responsible for disaster surveillance, tracking and ensuring real-time warning to the Districts. In each district, there is a Dzongkhag Disaster Management Committee (DDMC) responsible for implementing cross sectoral risk reduction initiatives and developing capacities to respond to disasters in their respective area. The Dzongkhag Emergency Operation Centers (DEOCs) and the Disaster Management Committee is responsible for mobilizing the requisite assistance to affected areas (source: DOLG, 2013).

Recognizing the importance of having functional healthcare facilities to provide medical care to people affected by hazardous events and to minimize damage to buildings and critical equipment, the National Action Plan for Earthquake Safety of Health Facilities was prepared in 2013. In addition to the national action plan, a national Health Emergency and Disaster Contingency Plan has also been developed to guide the response to public health emergencies and disease outbreaks and a Health Emergency Operation Centre has been established to ensure effective communication and coordination of any emergency response.

Adaptation in Health: Bhutan is one of the seven countries taking part in the global pilot project on “Climate Change Adaptation to Protect Human Health.” The Environmental Health Unit of the Environmental Health Program under the Department of Public Health coordinates the project which has three main activities: (i) enhanced risk assessment and integrated surveillance for effective management of climate sensitive health risks, (ii) improve capacity of community and health sector institutions to respond to climate-sensitive health risks and (iii) implement emergency preparedness and disease prevention measures in areas of heightened health risk due to climate change

Prepared by: _____

APPENDIX 2. ENVIRONMENT CATEGORIZATION

Date: _____

A. Instructions

(i) The project team completes and submits the form to the Environment and Safeguards Division (RSES) for endorsement by RSES Director, and for approval by the Chief Compliance Officer (CCO). OM F1/OP on *Safeguard Review Procedures* (paras. 4-7) provides the requirements on environment categorization.

(ii) The classification of a project is a continuing process. If there is a change in the project components or/and site that may result in category change, the Sector Division submits a new form and requests for recategorization, and endorsement by RSES Director and by the CCO. The old form is attached for reference.

(iii) In addition, the project team may propose in the comments section that the project is highly complex and sensitive (HCS), for approval by the CCO. HCS projects are a subset of category A projects that ADB deems to be highly risky or contentious or involve serious and multidimensional and generally interrelated potential social and/or environmental impacts.

B. Project Data

Country/Project No./Project Title I.: I. Bhutan / 51141/ Health System Strengthening Program

I. /.

I. Department/ Division I.: I. SARD/ SAHS

Processing Stage I.: I. Concept Paper

I. Modality I.: /.

[] Project Loan [] Program Loan [] Financial Intermediary [] General Corporate Finance
 [] Sector Loan [] MFF [] Emergency Assistance [X] Grant
 [] Other financing modalities:

C. Environment Category (please tick one category based on the set of criteria in **OMF1** (paras. 6-7))

[X] New [] Recategorization — Previous Category []

Category A

Category B

Category C

Category FI

D. Basis for Categorization/ Recategorization (please. attach supporting documents):

[] REA Checklist
 [X] Project and/or Site Description
 [] Other: _____

E. Comments

Project Team Comments

The civil works in the project will involve (i) construction of five new Satellite Clinics in urban areas and (ii) renovation of existing public health center (PHC) facilities in selected districts. Existing PHC facilities will be renovated through constructing toilets, water storage facilities, burial pits, and by providing equipment to manage health care waste.

The Satellite Clinics will not be located in environmentally sensitive locations and will be on vacant government land. The projected impacts from the construction of satellite clinics include generation of dust and noise, solid waste, waste water, and clearing of shrubs. During the operational phase of the Satellite Clinics, infectious healthcare waste and sharps are expected to be generated which require management to minimize the spread of infection to the public and healthcare personnel and contamination of water and soil. These impacts can be readily mitigated by applying engineering measures, good housekeeping practices, and compliance with Thromde Act of Bhutan 2007, Thromde Rules 2011, Bhutan Building Rules 2002,

SDES Comments

Waste Prevention and Management Act 2009, Waste Prevention and Management Regulation 2012 as well as IFC's EHS Guidelines on pollution prevention.

To facilitate compliance with ADB SPS requirements, an EARF has been prepared and an IEE for the land sites that have already been identified for new satellite clinics and for the renovation activities in the existing PHC facilities. As part of the IEE an EMP has been developed which will be used to monitor the environmental impacts. An environmental code of practice has been developed to be inserted in the contract for the contractors for the construction stage and which the RGOB will monitor. An IEE will be conducted for the satellite clinics in Debsi and Phuentsholing when land is identified.

For the PBL component, a policy matrix with assessment of environmental impacts for each policy action has been prepared. There are no anticipated adverse impacts from the policy actions. Old IT hardware will be disposed of following national policies.

F. Approval

Proposed by: Hayman Win, Senior Health Specialist		Endorsed by:	
Project Team Leader, SARD/SAHS		Director, SDES	
Date:		Date:	
Endorsed by: Sungsup Ra		Approved by:	
Director, SAHS			Highly Complex and Sensitive Project
Date:		Chief Compliance Officer	
		Date:	

APPENDIX 3: ENVIRONMENTAL SCREENING OF PROJECT COMPONENTS

Potential impact	Pre-construction	Construction	Operation	Potential impacts and mitigation All mitigation measures will be included in EMP
Impacts on the Environment				
Dust and emission generation	O	X	O	-Air emissions from vehicular movement during drop off of materials at construction sites and increase in air pollution due to construction traffic; -Pollution from fires lit in worker camps or from burning debris; -Increase in dust from excavation work and cleared land; -Dust may blow from construction work or from open piles of materials stored such as sand
Noise	O	X	O	Minor disturbance due to traffic noise during material transportation and storage; excavation works, use of installation equipment/electrical and construction works or from workers playing loud music
Odor	O	X	X	Generation of odor from accumulation of organic waste, improper sewerage disposal or burning of waste; Generation of odor from accumulation of organic waste
Water	O	X	O	Water requirement for drinking and washing for workers camps and construction work
Soil	O	X	X	Soil contamination from spillage of chemicals or paints or improper waste management Soil and water pollution due to improper disposal of wastewater
Impacts on public and workers				
Congestion	O	++ x	O	The new Satellite Clinics will contribute significantly from reducing traffic and congestion towards the JDWNRH. However, during construction there may be impeded access and congestion to the neighborhood from increase in traffic and trucks
Worker health and safety	O	X	X	Environmental impacts from construction worker camps, Risk of transmission of diseases and accidents at the workplace, Risk of spread of infection from improper waste management during operation of clinic

Potential impact	Pre-construction	Construction	Operation	Potential impacts and mitigation All mitigation measures will be included in EMP
Public health and safety		X	X	Construction hazards causing risk to the public Risk of diseases due to social and sexual contact with non-national workers Risk of spread of infection from improper waste management during operation of clinic
Solid Waste generation	O	X	X	Safety and health hazard to the public and workers if waste (from worker camps, construction waste or waste from operation of clinics) is not managed well Disposal of used and old equipment such fridges and autoclaves
Wastewater	O	X	X	Risk of disease outbreaks and impacts on public if hazardous wastewater is not treated before disposal

APPENDIX 4: ENVIRONMENTAL CODES OF PRACTICE FOR CONSTRUCTION

Component	Mitigation Measure
Quality control and fire safety	Use qualified/licensed Plumber/Electrician for sanitation, water supply plumbing and electrical installations
Dust and emission generation	<p>Ensure that emissions do exceed national ambient quality guidelines and standards. Supporting measure to minimize air emissions and generation of dust,</p> <ol style="list-style-type: none"> 1) Ensure construction equipment and vehicles are maintained in good condition and have passed RSTAs emission test, 2) Contractor should supply kerosene or LPG at camps and restrict use of firewood for cooking and heating, 3) Prohibit Open burning of wastes and enforce strictly within municipality 4) Remove excavated soil as soon as possible and dump it at pre- approved Thromde site; 5) Cordon off the area to reduce dust from spreading to neighboring areas; 6) Sprinkle water on exposed work sites to minimize dust; 7) Cover stockpiles of sand to avoid this being carried off on windy days
Fire and disaster	<ol style="list-style-type: none"> 1) Use licensed/qualified or experienced electricians for wiring, installation of electrical equipment, 2) Provide and keep at least one fire extinguisher, water hose, torch light on site for emergencies 3) Ensure that workers/staff are aware of emergency numbers for Police, Fire and Ambulance 4) Conduct mock drill for emergencies 5) Remove all waste daily to minimize pile up of fuel for fires 6) Emergency procedures should be clearly posted at appropriate locations
Noise	<p>Ensure that Noise impacts do not exceed the levels 55dB during daytime and 45 dB at night* through the following;</p> <ol style="list-style-type: none"> 1) Carry out excavation work and noisy activities to daytime hours only 2) Select equipment with lower sound power levels* 3) Notify the school, early daycare center and community of work scheduling and expected construction period, 4) Prohibit workers from playing loud music early morning and evenings
Odor	<ol style="list-style-type: none"> 1) Provide waste bins and a designated area to segregate and store organic waste 2) Provide sewage facilities 3) Prohibit burning of waste especially plastics 4) Regular removal of waste from site 5) Ensure that storage rooms are ventilated 6) Maintain cleanliness of the premises and surrounding
Stream and waterbody protection	<ol style="list-style-type: none"> 1) Maintain a distance of 15m is maintained from streams and waterbodies 2) Prohibit disposal of solid and liquid waste into nearby streams or water bodies 3) Store all chemicals, fuel, paint and corrosives in a designated area in leak proof containers with lids or under roof away from rainwater, 4) Prevent surface runoff and contamination from worksites 5) Construct and connect site drains to the nearest public storm water drain 6) Locate labor camps in pre-approved sites only
Water requirement	<ol style="list-style-type: none"> 1) Water required for construction must be sourced with approval from Thromde 2) Provision must be made to store water in case of shortage 3) Restrict dumping construction waste or any disinfectants into any water body 4) Domestic drains must be constructed as per standards and connected to the nearest covered or open public storm water drain
Soil	<ol style="list-style-type: none"> 1) Store all chemicals, fuel, paints in designated storage areas to reduce the risk of spillage 2) Keep corrosive and toxic materials in sealed containers 3) Minimize and contain work areas especially when dealing with corrosives 4) Collect containers, oily rags, used oils, paints and disposed off as per Municipal rules

Component	Mitigation Measure
	<ol style="list-style-type: none"> 5) provide waste bins and designate a waste collection and storage area, that is not easily damaged by dogs 6) Ensure that the bottom of the burial pit is at least 1.5 meters higher than the ground water and lined with concrete, 7) Make appropriate arrangements and transport excavated soil and construction debris, without spillage to pre-approved dump site 8) Inspect and clean all drains monthly especially during the monsoons repair all damaged drains and dispose all rubbish and silt removed from drains with other excavated/construction waste
Congestion	<ol style="list-style-type: none"> 1) Reduce project traffic* during early morning school drop off or pick up times (7.30-8AM and 2.30-4PM) 2) Unloading of construction materials should be carried in a manner and time so as to avoid blockage of roads/paths/access
Worker health and safety	<ol style="list-style-type: none"> 1) Contractor must provide adequate housing facilities for workers that includes drinking water, electricity/kerosene/gas with proper drainage and sanitation/temporary toilets 2) Screen workers at their point of origin for the more virulent and contagious diseases, including HIV/AIDS, TB and malaria 3) First aid kit should be readily available to workers 4) Provide workers with Personal Protective Equipment (PPE) such as helmets, gloves, glasses, and boots and ensure workers use them while working 5) Conduct orientation/awareness meeting for new recruits and safety awareness for all site personnel; 6) Document procedures to be followed for accidents and document all accidents, causes and measures taken 7) Ensure fire safety at site by providing fire extinguishers 8) Display emergency contact numbers on site 9) Provide transportation facilities for workers in case of medical emergency 10) Designate a focal person on site to prepare and ensure procedures are in place in case of accidents, disaster or any other emergency
Public Health and safety	<ol style="list-style-type: none"> 1) Provide information to the public and neighboring schools/institutions about the construction work and schedule via meetings or notification 2) Post signboards to notify passers-by of ongoing work 3) Cordon off all work sites to exclude public from the workplace 4) Instruct workers in advance on required behavior especially in the districts 5) Record and document all accidents to public and measures undertaken 6) Develop and follow standard procedures to record and respond to complaints* within 7 days 7) Safely store all construction waste on the site and not along the road, or on top of drains and footpaths
Decommissioning	Dismantle worker camps and clear the site of all construction and domestic debris, seal soak pits/temporary toilets after completion of construction
Damage to property	Restore any private/government property damaged during construction to the satisfaction of the owner/Thromde
waste generation at construction site	<ol style="list-style-type: none"> 1) Remove all construction waste and transport it to landfill site without spillage; 2) Provide appropriate bins for waste collection and storage (plastics, paper, organic, construction waste) 3) Contractor will be required to dismantle worker camps and clear the site of construction debris around the building and or on the abutting road and or adjoining property after completion of construction works 4) Make appropriate arrangements for disposing of construction debris with approval of Thromde

APPENDIX 5: CONSTRUCTION SITE CHECKLIST

The checklist is to be used to review conditions at the construction site and identify any environmental impacts or risks to the health and safety of workers and the public.

No.	Parameter	Description	Y/N	Remarks
1	Quality control	Is the contractor using experienced/qualified/licensed Plumbers and Electricians		
2	Air and dust pollution	<p>Is there any sign of waste/wood being burnt onsite</p> <p>Have the construction equipment and vehicles passed RSTAs emission test,</p> <p>What are the workers using for cooking and heating</p> <p>Is waste being burnt on site?</p> <p>Where is the excavated soil stored</p> <p>Has it been dumped? where?</p> <p>Was this a pre- approved Thromde site;</p> <p>Is the site cordoned off</p> <p>Are there exposed work sites generating dust?</p> <p>What is being don't to minimize dust;</p>		
3	Noise	Have there been any complaints of congestion and disturbance by neighborhood community		
4	Odor	Is there any foul odor being emitted on site. If so what is the cause		
5	Water availability	Are there any water shortage problems and if so are there any water storage facilities on site		
6	Water pollution	Is the site close to any stream? If so how close is the stream?		
		Is there any sign of water pollution i.e. dumping of construction or domestic waste into any water body/stream		
		Does the site have proper drainage connecting to the nearest public drain		
7	Soil erosion/degradation	Has the excavated soil been removed from site Where has the soil been dumped?		
Occupational health and safety				
1	Number of construction workers employed 1. national 2. non-national			

No.	Parameter	Description	Y/N	Remarks
2		Number of Non-national workers that have undergone health screening		
3		Number of workers that have fallen ill in the last 3 months		
4		Is there a First aid kit readily available on site?		
5		Number of accidents that occurred on site in the last 3 months		
6		Location of worker camp		
7		Does the worker camp have? 1. Drinking water 2. Electricity 3. sanitation		
8		Number of workers provided with Personal Protective Equipment (PPE) 1. helmets, 2. gloves 3. boots		
9		Number of workers using the PPE while working If not- state reason		
10		Number of safety meeting/training conducted in the last 3 months		
11		What measures have been taken to ensure fire safety at site (e.g. fire extinguishers)		
12		Are there any fire hazards at the worker camps and construction site?		
Storage of construction material, oils, chemicals and corrosive materials				
1		Where is construction material stored		
2		Is there any spillage of construction material on the access road or, walkway		
3		Are oils, chemicals and corrosive materials, stored in sealed containers? Is there a designated area for storing oils, chemicals and corrosive materials		
Public safety and traffic congestion				
1		Has there been any traffic congestion due to material transportation to site		
2		Does the site have a barricade around site		
3		Does the site have a sign to notify the public of the type and work duration		
4		Is there any material stored on the access road, or on top of drains and footpaths		

No.	Parameter	Description	Y/N	Remarks
6		Rate the cleanliness of the construction site on a scale from 1 to 10 and write comments on remarks for ranking		
Fire hazard				
1		What measures have been undertaken to deal with fire and disaster emergencies such as types of equipment on site, display of emergency numbers and procedures for Police, Fire and Ambulance, awareness of workers on emergency procedures		
Waste management at site				
1		Is there a designated site for waste storage?		
2		Are there separate bins for waste collection and storage area		
3		Where is construction waste stored		
4		Where is construction waste disposed?		
Damage to Public and private property and site closure				
1		Is there any damage to private/government property		
2		How was the damage been repaired?		
3		Have all worker camps and site offices been dismantled?		
4		Has the site as well as the adjoining property/access roads/walkways been cleared of all materials as well as domestic and construction waste?		

Record of illness among workers

Type of ailment Cause actions undertaken

- 1.
- 2.
- 3.

List the accidents that occurred on site in the last 3 month

Type of accident Cause measures undertaken

- 1.
- 2.
- 3.

**APPENDIX 6: LIST OF PERSONS MET AND CONSULTED WITH
DURING IEE PREPARATION**

Location	Organization	Name and Designation
Thimphu	Ministry of Health	Ms. Sonam Yangchen, PPD (F) Mr. Karma Tenzin, PPD (M) Mr. Sonam Letho, Architect, Health Infrastructure & Development Department (HIDD) (M) Mr. Abhishek Sunar, Engineer, HIDD (M) Ms. PemZam, Focal officer, Infection control, MOH (F)
Thimphu	JDWNRH	Sr. Chime, Head of Nursing, Waste management (F)
Thimphu	Satellite Clinic	Mr. Ratnalal Dahal, HA, Mothithang SC (M) Ms. Sonam Yangchen, HA, Hejo SC (F) Mr. Pasang Dorji, HA, Hejo SC (M)
Thimphu	Thromde	Mr. Kesang Dorji, Urban Planner (M)
Thimphu	Dzongkhag	Mr. Amber, Health Assistant (M)
Paro	District Hospital	Mr. Karma Chedup, District Health Officer Karma Chedup (M)
Paro, Drugyel	BHU – II	Purna Bahadur Baniya, HA, Drugyel (M)
Ha, Dawakha	BHU – II	Inda Tshering, HA, Dawakha (M) 2 Female nurses (F)
Pemagatshel	District Hospital Pemagatshel	Dr. Bhim, Chief Medical Officer (M) Mr. Dorji Lhendup, Hospital ADM (M)
Nganglam	BHU-I	Dasho Dungpa, Nganglam Dungkhag (M) Mr. Dorji Phuntsho, Indigenous + nutrition (M)
Dungmaed	BHU-II	Mr. Tashi Wangdi, HA, Dungmin BHU (M) Mr. Nidup Zangpo, Indigenous menpa, Dungmin BHU (M)
Norbugang	BHU-II	Mr. Dorji Lhendup, Hospital ADM, Pemagatshel (M) Mr. Tshewang Dorji, HA, Norbugang BHU (M) Ms. Tshering Pelzom, caretaker, Norbugang BHU
SamdrupJongkhar	District Hospital	Dr. Kezang Wangay, Chief medical officer (M) Mr. Tshering Penjor, ADM Hospital (M) Mr. Nawang Chopel, HMT Focal person (M) Ms. Sangay Lhamo, Officiating Ward Incharge (F) Sister Tshering Yangden, HA (F) Sister Dema Yangzom, Incharge, MCC (F)
Deothang	Hospital	Dr. Deepsi Kafley (F) Mr. Kanal Dev Khaitiwara, HA (M) Ms. Chhimi Tshering, Clinical Nurse (F) Mr. Sherab Norbu, Infection Control (M) Ms. Phurba Zangmo, Adm Assistant (F)

Location	Organization	Name and Designation
Samdupcholing	BHU-I	Mr. SangayT shedup, Clinical officer (M) Mr. Durga Prasad Sharma, Brother Nurse Incharge (M) Mr. YentenDorji, Staff Nurse (Infection) (M)
Martshala	BHU-II	Mr. Tenzin Wangda, HA (M) Mr. Sangay Rinchen, HA (M) Ms. Nima, HA (F) Mr. Kesang Norbu, Tshogpa, Orong (M) Mr. Jigme, Gup, Orong (M)
Martshala	BHU-II	Mr. Pelzang Wangchuk, MP, Martshala (M) Mr. Pirtha-Singh Chettri, HA (M) Mr. Ugyen Rinzin, HA (M) Mr. Nawang Choejey, Mangmi, Martshala (M) Mr. Tendril Zangpo, Tshogpa, Martshala (M) Mr. Choejey Norbu, Public Representative, Martshala (M) Mr. Sonam Gyeltshen, Village Health Worker, Martshala (M) Mr. Sangay Dorji, Indigenous Menpa (M)
Phuentsholing	District Hospital	Ms. Pem Choden, Adm (F)

APPENDIX 7: REPORT ON FIELD VISIT TO HEALTH CARE FACILITIES

A. Observations of the Visits to Various Health Care Facilities

1. Health services in the country are available through a three-tier structure—primary, secondary, and tertiary. Traditional and allopathic medicine services are fully integrated and delivered under one roof. Each health facility is equipped as per a standard equipment list, which is specific to the category of that facility. Primary care service is supported by secondary and tertiary care services through referral or self-referral. Health information and ambulance service can be obtained from the Health Help Centre.

2. In terms of geographical distribution, 48% of the hospitals are in the western region, 29% in the eastern region, and 23% in the central region as of 2015. The distribution of health workforce is linked to the type of health care facility, which in turn is linked to the catchment population.

3. The distribution of health care centers across the country is in three tiers/levels. A visit to one health care facility was conducted from November to early January 2018. A description of the facility visited is provided under each level.

4. **Primary level.** There are currently 23 Basic Health Unit Grade I (BHU-Is), 184 BHU-IIs, 28 sub-posts, 562 outreach clinics, and 54 indigenous units. At the community level, the village health workers act as a bridge between health services and the community.

1. Basic Health Unit Grade I

5. **Nganglam BHU I.** The BHU located in Nganglam town was constructed in 1998. The total land owned is about 1 acre. The total catchment population is 1,445, excluding Yanbari and Daksa and it caters to patients from norbugang, chokorling, dechenling, borangju sub post, mikuri, panbang and even yanbari and daksa from monger. The BHU has one doctor, nine nurses, four health assistant, one eye technician, two lab, two EMT (one male, one female) x-ray technician, plus 38 support staff. The BHU is 10 bedded (in two rooms) and the average patient numbers per day in winter is 150 and increases up to 200 in summer. The BHU has four village health workers. In 2016, the BHU had a total of 18,963 patients (both old and newly registered).

6. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded;
- (ii) waste storage facility- sharps and expired medicines kept in store room;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- None;
- (v) waste is burnt openly outside within the premise; and
- (vi) burial pit- Yes.

7. The waste is burnt in a shed but since the BHU is located within the town, the neighboring community is exposed to the smoke each time the waste is burnt. There is no designated municipal waste collection system or landfill site at the moment.

8. Due to the high patient load, the staff find it hard to cope with the high number of patients especially in summer when the beds are inadequate for all patients.

9. **Samdupcholing BHU I.** It is in Samdupcholing, about 50 km from Samdrup Jongkhar town. It was established in 1998 and is a single, old-storied structure that was upgraded from a BHU-II. This 10-bedded BHU treats about 1,300–1,400 patients per month in summer which increases to 1,700 in summer, with patients coming from as far as 10 km away by road. The BHU owns 7 acres, and it houses an outdoor gym, but has only six staff quarters which is inadequate to house the 27 staff. In 2016, the BHU had a total of 15,686 patients (both old and newly registered). Patients from this BHU are referred to Deothang, Samdrup Jongkhar depending on the nature of the case.

10. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded;
- (ii) waste storage facility- sharps and expired medicines kept in store room;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- None;
- (v) waste is burnt openly outside within the premise; and
- (vi) burial pit- None.

2. Basic Health Unit Grade II

11. **Martshala BHU II.** It is located 19 km from Samdupcholing and 81 km from Samdrup Jongkhar town along an untarred road from Samdupcholing. It was recently established in 2013 and is very spacious compared to other BHUs as it has 19 rooms plus staff quarters over 2 acres. The BHU caters to a total of 472 households with a residing population of 2,254. The most distant village, Sarjung, is 27 km away and about a 4-hour walk. There is an outpost at Sarjung with 1 ha but this only comprises of a single structure with not much equipment. In a month, the 10-bedded BHU has 4–5 patients in a month, and outpatient numbers range from about 20–30 in winter to 50–80 in summer. The BHU is staffed by two health assistant (no female health assistant), one Menpa and one caretaker, and these are housed in four staff quarters and one caretaker with one empty quarter. In 2016, the BHU had a total of 5,379 patients (both old and newly registered).

12. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded;
- (ii) waste storage facility- sharps and expired medicines kept in store room;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- None;
- (v) waste is burnt in a makeshift shed within the premise; and
- (vi) Burial pit- None.

13. A male patient said that they were compelled to take the placenta because the BHU did not have any facilities for burial. The staff said that due to power/electrical failures in summer, they would like to request for a fridge (like the one in Samdupcholing BHU-I) that can work on kerosene/gas, as well as electricity.

14. **Orong BHU-II.** It is located 12 km from the Trashigang-Samdrup Jongkhar in Oronggewog, 68 km from SJ. Established in 1992, it caters to 601 HH with a population of 2,897. In 2016, in the last year, 1,295 males and 1,502 females were treated. The BHU has two male health assistants, one female, one caretaker, and one ambulance driver. The BHU has three beds for inpatients including delivery. Inpatients are high when the neighboring school is open and usually has around two inpatients in a month. Inpatients are only kept for 2 days, otherwise referred to Samdrup Jongkhar or Deothang Hospital. Average patient numbers are between 20–

30 in winter but goes up to 50–60 in summer. In 2016, the BHU had a total of 8,652 patients (both old and newly registered).

15. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded;
- (ii) waste storage facility- None;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- None;
- (v) waste is burnt in a pit within the premise; and
- (vi) burial pit- None.

16. The staff said that the most important issue for the BHU is the lack of road access from the main road to the BHU. Due to this, although the distance is less than 300 m, it is sometimes very difficult for serious patients who must be carried from the road to the BHU.

17. **Dungmaed BHU II.** It is located 63 km from Pemagatshel and is located mid-way between Nganglam and PG. It was established in 1979, but recently moved to its new structure 2012, with staff quarters. The BHU caters to a total of 141 hh with a population of 418 in the last year. The furthest patients are located about four hours away from Wongborang. The BHU has two health assistants, one menpa, and one caretaker, all of whom are male. The BHU has three beds for inpatients and on an average of 10 patients are seen in a day in summer, which drops to 5–6 in winter. In 2016, the BHU had a total of 1,745 patients (both old and newly registered).

18. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded;
- (ii) waste storage facility- None;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- None; and
- (v) waste is burnt in a pit within the premise.

19. **Norbugang BHU II.** This BHU is located 28 km from Nganglam and is located mid-way between Nganglam and Panbang in Pema Gatshel district. It was established in 2003 and has staff quarters as well and the total land owned is 80 dc. The BHU has three beds for inpatients and caters to a total of 196 hh and had 639 patients (311 male and 328 patients) in 2016. Patient numbers in summer range from 35–50 and drop down to 10 during winter. Patients from this BHU are referred to the BHU-I in Nganglam. The ward only has two beds. In 2016, five deliveries were successfully conducted. In 2016, the BHU had a total of 2,459 patients (both old and newly registered).

20. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded;
- (ii) waste storage facility- None;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- None; and
- (v) waste is burnt in a pit within the premise.

21. Observation. The BHU is maintained very well, both inside and outside, to ensure cleanliness and hygiene.

3. Secondary Level

22. At the secondary level, there are 28 district hospitals and one indigenous hospital at Thimphu. Other selected hospitals provide very little specialized services due to either shortage of specialized health professionals or lack of proper infrastructure. Five hospitals (Damphu, Wangdue [Bajo], Samtse, Dewathang and Gelephu) are being reconstructed. The district hospital in Samdrup Jongkhar town was established in 1980s, by Dantak Project (BRO, Govt. of India) and later handed over to the Government of Bhutan. It occupies an area of 6.4 acres and while it is 20-bedded, physically it has 37 beds, which in summer becomes very congested. There are 77 (medical staff; 51- adm-11+ 15 support staff). Patient numbers in winter range from 2,000–3,000 in winter but go as high as 500 in summer especially if there are outbreaks such as dengue. In 2016, the hospital had a total of 31,147 patients (both old and newly registered).

23. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded. The Deothang Hospital further segregates the general waste into plastics and cardboards/paper;
- (ii) waste storage facility- None;
- (iii) waste autoclave- None;
- (iv) weighing scale specifically for waste- Yes;
- (v) waste is burnt in a pit within the premise;
- (vi) burial pit- Yes; and
- (vii) some BHUs face water shortage problems (e.g., in Pema Gatshel) which hampers ensuring hygienic conditions.

24. The district hospital at Pema Gatshel is in Shumargewog. It was established in 1993 and functioned as a leprosy hospital for several years. The total land is 10.13 acre but most of these is on steep slope. The average patient numbers range from 30–40 in winter and go up to 80–90 during summer). The 20-bedded hospital has six wards and is staffed by three doctors, 12 nurses, and support staff. In 2016, the hospital had a total of 20,527 patients (both old and newly registered).

25. Environmental aspects

- (i) Waste is segregated at source, weighed and recorded
- (ii) Waste storage facility- None
- (iii) Waste autoclave- None
- (iv) Weighing scale specifically for waste- Yes
- (v) Waste is burnt in a pit within the premise
- (vi) Burial pit- Yes, with cover and enclosed within a fence

4. Tertiary Level

26. At the tertiary level, there are two regional referral hospitals and one national referral hospital that provide specialized services.

27. **National level.** The Jigme Dorji Wangchuck National Referral Hospital (JDWNRH) was established in 1972 as a general hospital and expanded with additional specialty services and renamed as named JDWNRH in 1994. The hospital has 350 beds and is the apex hospital for all 20 Dzongkhag hospitals. In 2016, the hospital had a total of 510,109 patients (both old and newly registered)

27. Environmental aspects:

- (i) waste is segregated at source, weighed and recorded, organic waste is sent for composting;

- (ii) waste storage facility- separate for chemo waste and infectious waste and waste to be sent for incineration to Gedu;
- (iii) waste autoclave- Yes, 2 numbers but only one is functional;
- (iv) weighing scale specifically for waste- Yes;
- (v) waste is disposed through the municipal system with waste trucks collecting the waste twice a day; and
- (vi) burial pit- Yes-two chambers;

289. **Satellite Clinics.** To decongest the JDWNRH from overcrowding of patients, two satellite clinics were established in Thimphu in Jungshina and Mothithang satellite clinics in 2002, with the aim of decongesting the hospital and to evenly spread patient flows for primary health services. Although initially established to provide basic services similar to outreach clinics and sub-posts, these were quickly converted the level of BHU-II due to the overwhelming increase in outpatient department (OPD) cases where outpatient treatments for minor ailments comprise more than 80% of the clinic load.

30. **Mothithang Satellite Clinic.** The Mothithang Satellite Clinic is located in Mothithang behind the Royal University of Bhutan. It was established in 2002, but only recently moved to its present location 3 months ago. The clinic is housed in a rented, single-storey structure, adjacent to a day care center that belongs to the same house owner. The clinic services the communities from Mothithang, Changangkha, Kawajangsa, Kuengacholing, Phajoding, Chokortse, neighboring Gomdeys, as well as people who have offices in the neighboring area.

31. The clinic has five rooms for OPD, maternal and child health, office, medicine store, dressing room/injections/pap smear, and one toilet. There are three staff (one male and two female health workers) and one caretaker. Most of the constraints faced are due to location and size of infrastructure.

- (i) There is a narrow single lane access to the clinic and the parking is shared with the day care center. On busy work days and when the center is open, it gets very noisy and congested with high risk of accidents.
- (ii) Due to inadequate rooms, it is not possible to keep medicines separate from chemicals, also the single toilet is used by both patients and staff.
- (iii) Some of the rooms are too small and are used for dual purposes, e.g., for checking patients/dressings, autoclaving, or to conduct pap smear therefore there is no privacy for patients either.
- (iv) As the clinic is closed after 3:00 p.m., and staff do not live nearby, the caretaker takes care of the property.
- (v) Since the clinic is provided with drugs for a BHU-II, they cannot cater to patients who need medication for diabetes, blood pressure, and other ailments and have to send them to JDWNRH. Most patients are not aware of this and once they come to the clinic, they have to be turned away or directed to the hospital, which is difficult especially if patients are old or not able to afford taxis.

29. **Hejo Satellite Clinic.** The Hejo Satellite Clinic is located in Hejo behind the Crematorium. It was established in 2002 and also, recently moved to its present location in 2010. The clinic is housed in a rented three-storied building that is accessible by a dirt road. The clinic services the communities from Taba, Jungshina, Pamtsho, Dechheling, Hejo, Langjophakha, Zilukha, Samteling, and Babena as well as people who have offices in the neighboring area. The clinic has between 60–90 OPD patients a day and about 18,000 in a year.

30. The clinic has six rooms for OPD, maternal and child health, office, medicine store, dressing room/injections, and kitchen that doubles as the autoclave room. There are two toilets but only one is functional while the other is used as a store. The corridor below the stairs has been closed off with cardboard for pap smear. There are three staff (one male and two female health workers) and one caretaker. Some of the constraints faced are summarized below.

- (i) The access road although untarred is wide enough but parking tends to be a problem on busy days.
- (ii) The lack of waiting room/spare makes it difficult to tend to patients especially on when it is crowded and there is no patient privacy.
- (iii) The single toilet is used by both patients and staff and the water supply is sometimes irregular in summer especially if the supply is blocked. Since it is not from the municipality, it is also dirty and untreated in summer.
- (iv) As the clinic is closed after 3:00 p.m., neither the staff nor the caretaker live nearby to ensure security of the premises.
- (v) In the past, it was easier to get refill of medicines from the JDWNRH but now because of the annual requisition process, it is not possible to get more provisions if medical supplies run out, and each clinic mobilizes these from other clinics.

31. Currently, the main environmental issues with these clinics are due to the current location (e.g., Mothithang Satellite Clinic has a very narrow access and small parking that is shared with the adjacent daycare center, resulting in congestion) and size of the rented apartment, which is designed to be residential home rather than a health care facility. The clinic currently operates from a rented apartment/house that are not designed for a medical facility and lack waiting areas with limited treatment or storage rooms

32. Given the demand for housing and the unavailability of suitably sized apartments, the clinics will continue to operate as before and face issues of congestion, lack of patient privacy and storage space, and disposal issues for sharps which are currently taken to the nearest BHU at Hongtso.

33. Sharps in the past were taken to the JDWNRH for incineration but since the satellite clinics have come under the administration of the district, these are no longer accepted by the hospital, which is already struggling to deal with their own waste issues. Sharp boxes are stored in the unused toilet and when there are adequate number of boxes to fill a car, or when there is free private transportation available then these are transported to Hongtso BHU where it is burnt.

B. Common Observations

37. Most BHUs do not have and require the following for effective waste management

- (i) weighing scales specifically for waste;
- (ii) waste autoclave;
- (iii) needle cutters;
- (iv) no municipal facilities for waste disposal so waste is burnt on site;
- (v) no burial pits for disposal of infectious waste or placenta; and
- (vi) no designated separate storage area for waste.

34. Waste segregation is conducted at the source of generation, but the eventual disposal site is the same due to lack of municipal or disposal facilities or recycling agents

C. Other Observations

35. **Staffing versus patients.** According to the service standards, the numbers and types of staff is based on the category of the health facility and not necessarily to cater the number of patients, which in turn depends on the location of the health facility.

40. Also, larger hospitals such Deothang, Samdrup Jongkhar and Phuentsholing are facing problems due to inadequate staff quarters and many are living away from the hospital and some across the border (e.g., Phuentsholing)

36. **Female staff.** All BHUs do not have a female health assistant due to problems in retaining them in rural and semi-urban areas. In 2015, there were 264 female health assistants against 284 male health assistants. However, 74 of 207 BHUs did not have a female health assistant.¹ To motivate women to work in remote areas, the Ministry of Health has started deputing two health assistants. Another way to motivate staff is to provide incentives in terms of training and exposure.

37. **Information on waste generated.** The actual waste generated from health care is much more than reported because the data does not include other waste such as pathological waste, pharmaceutical, e-waste, chemicals, and pressurized containers.

38. Staff are aware of the importance of proper health care waste management and methods of disinfection but implementation as per guidelines is hindered due to lack of equipment, lack of space for storage or treatment of waste, and lack of training on wastewater management. For example, it is mandatory to record weight of waste generated each month and to submit quarterly waste reports to the Ministry of Health. However, most health care facility (except JDWNRH) use the same weighing scale provided for weighing waste, while a few estimates the weight of the waste.

39. For infection control, it is important that staff have access to hot water in cold climates such as Dawakha, Ha. Some BHUs have geysers but these are non-functional in most BHUs.

45. **In-house circulation of medical supplies.** Each health facility maintains an inventory of all medical stock and satellite clinics have almost no expired or rejected medicines because six months before expiry, the clinics circulate the medicines within themselves (from one clinic to another) to avoid wastage. Also, as the annual requirement is based on the previous year's usage, medicines are hardly in excess rather in shortage instead. Thus, all medicines are either distributed to other BHUs or returned to the district health office to be utilized before expiry, thereby minimizing waste.

¹ World Health Organization, 2017. The Kingdom of Bhutan health system review. Health systems in transition. Vol-7, Number-2.

APPENDIX 8: AMBIENT AIR QUALITY STANDARDS, 2010 (NATIONAL ENVIRONMENT COMMISSION)

Table A8.1: Ambient Air Quality Standards (Maximum permissible Limits in $\mu\text{g}/\text{m}^3$), NECS Bhutan

Parameter	Industrial Area	Mixed Area*	Sensitive Area**
<i>Total Suspended Particulate Matter</i>			
24 Hour Average	500	200	100
Yearly Average	360	140	70
<i>Respirable Particulate Matter (PM 10)</i>			
24 Hour Average	200	100	75
Yearly Average	120	60	50
<i>Sulfur Dioxide (SO₂)</i>			
24 Hour Average	120	80	30
Yearly Average	80	60	15
<i>Nitrogen Oxides (NO_x)</i>			
24 Hour Average	120	80	30
Yearly Average	80	60	15
<i>Carbon Monoxide</i>			
8 Hour Average	5000	2000	1000
1 hour Average	10,000	4000	2000

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

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

Table A8.2: Motor Vehicle Emission Standards

Parameter	Measuring System	Maximum Permissible Limit (%)	Unit
Diesel vehicle	Bosch	80	Hertz Smoke Unit (HSU)
Gasoline vehicle	Normal	5.0	Volume CO

Table A8.3: Environmental Standard for Noise

Land use Category	Day (dB)	Night (dB)
Industrial	75	70
Commercial	65	55
Rural/Residential	55	45

Table A8.4: Effluent Discharge standards

	Parameters	Generic NEC standards mg/l	WHO mg/l
1	Ammoniacal nitrogen	10	
2	Arsenic	0.1	
3	Biochemical Oxygen Demand (BOD)	30.0	30
4	Boron	1.0	
5	Cadmium	0.05	
6	Chemical Oxygen Demand	150	125
7	Chloride	500	
8	Chromium	0.5	
9	Chromium hexavalent	0.1	
10	Color and odor		
11	Copper total	0.1	
12	Cyanide	0.1	
13	Fluoride	2	
14	Phosphate	3	2
15	Nitrate	10	10
16	Iron	2	
17	Lead	0.1	
18	Manganese	0.5	

	Parameters	Generic NEC standards mg/l	WHO mg/l
19	Mercury	0.001	
20	Nickel	0.1	
21	Oil and Grease	5	10
22	pH	6.5-8.5	6-9
23	Phenolic compounds	0.5	
24	Selenium	0.05	
25	Sulphate	500	
26	Sulphide	1.0	
27	Total Dissolved Solids	1500	
28	Total Suspended Solids	80	50
29	Temperature (degree C)	<3	
30	Total Kjeldahl Nitrogen	20	
31	Total residual Chlorine	0.5	
32	Zinc	3.0	

Table A8.5: WHO Ambient Air Quality Guidelines (Source, IFC, EHS Guidelines, 2007)

Parameter	10-minute	24-Hour Average	Yearly Average
<i>Particulate Matter</i> (PM 2.5) µg/m ³		75 (interim target 1) ¹ 50 (interim target 2) 37.5 (interim target 3) 25 (guideline)	35 (interim target 1) 25 (interim target 2) 15 (interim target 3) 10 (guideline)
<i>Respirable Particulate Matter</i> (PM 10) µg/m ³		150 (interim target 1) 100 (interim target 2) 75 (interim target 3) 50 (guideline)	70 (interim target 1) 50 (interim target 2) 30 (interim target 3) 20 (guideline)
Sulfur Dioxide (SO ₂)	20 (guideline) ² 500 (guideline)	125 (interim target 1) 50 (interim target 2)	
Nitrogen Oxides (NO _x)			40 (guideline) 200 (guideline)

**Table A8.6: WHO Wastewater and Ambient Water Quality:
Indicative Values for Treated Sanitary Sewage Discharge**

	Pollutant	Unit	Guideline value
1	pH	pH	6-9
2	BOD	mg/l	30
3	COD	mg/l	125
4	Total Nitrogen	mg/l	10
5	Total Phosphorus	mg/l	2
6	Oil and Grease	mg/l	10
7	Total Suspended Solids	mg/l	50
8	Total Coliform bacteria	mg/l	400 ³

Table A8.7: WHO Noise Level Guidelines

Land use Category	Day (dB)	Night (dB)
Residential; institutional; educational	55	45
Industrial; commercial	70	70

¹ Interim targets are provided by the World Health Organization in recognition of the need for a staged approach to achieving the recommended guidelines.

² Ambient air quality standards are levels established and published through national legislative and regulatory processes, Ambient quality guidelines refer to ambient quality levels primarily developed through clinical, toxicological, and epidemiological evidence (such as those published by the World Health Organization).

³ Not applicable for centralized, municipal, waste treatment systems.