

# Initial Environmental Examination

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## Bhutan: Green and Resilient Affordable Housing Sector Project – Amochhu, Phuentsholing

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## CURRENCY EQUIVALENTS

(as of 20 August 2021)

Currency unit	-	Bhutanese Ngultrum (Nu)
Nu1.00	=	\$0.01
\$1.00	=	Nu74.43

## ABBREVIATIONS

ADB	- Asian Development Bank
AIDS	- acquired immunodeficiency syndrome
BBR	- Bhutan Building Regulation
BHU	- Basic Health Unit
BOQ	- bill of quantities
BPC	- Bhutan Power Corporation
CA	- Competent Authority
COVID-19	- corona virus disease
DCR	- Development Control Regulation
DDMC	- Dzongkhag Disaster Management Committee
DEC	- District Environment Committee
DOFPS	- Department of Forest and Park Services
DYT	- Dzongkhag YargayTshogdue
EA	- executing agency
EC	- environmental clearance
EIA	- environmental impact assessment
EMP	- environmental management plan
FNCA	- Forest and Nature Conservation Act
FNCR	- Forest and Nature Conservation Rules
FYP	- five-year plan
GBV	- gender-based violence
GRC	- Grievance Redress Committee
GRM	- grievance redress mechanism
HEMC	- Health Emergency Management Committee
HIV	- human immunodeficiency virus
IEE	- initial environmental examination
MOAF	- Ministry of Agriculture and Forest
MOF	- Ministry of Finance
MOLHR	- Ministry of Labor and Human Resources
MOWHS	- Ministry of Works and Human Settlement
NC19TF	- National COVID-19 Task Force
NDMA	- National Disaster Management Authority
NEC	- National Environment Commission
NECS	- National Environment Commission Secretariat
NEPA	- National Environment Protection Act
NGO	- nongovernment organization
NHDCL	- National Housing Development Corporation Limited
NKRA	- national key result area
NIOSH	- National Institute of Occupational Safety and Health
NLCS	- National Land Commission Secretariat
NMC	- National Mushroom Centre
NRDCL	- Natural Resources Development Corporation Limited

NSB	- National Statistical Bureau
NCWC	- National Commission for Women and Children
OHS	- occupational health and safety
O&M	- operation and maintenance
PAVA	- Property Assessment and Evaluation Agency
PIC	- project implementation consultant
PIU	- project implementation unit
PMU	- project management unit
PPE	- personal protective equipment
PSC	- Project Steering Committee
REA	- rapid environmental assessment
RECOP	- Regulation for Environmental Clearance of Projects
RGOB	- Royal Government of Bhutan
SDG	- Sustainable Development Goal
SOP	- standard operating procedure
SPS	- safeguard policy statement
WHO	- World Health Organization

### **WEIGHTS AND MEASURES**

km	- kilometer
m	- meter
km <sup>2</sup>	- square kilometer
m <sup>2</sup>	- square meter

### **NOTE**

In this report, "\$" refers to United States dollar.

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## EXECUTIVE SUMMARY

The Green and Resilient Affordable Housing Sector Project (GRAHSP) will assist the Royal Government of Bhutan (RGOB) establish infrastructures (i.e., shelters and recycled waste livelihood facilities) and provide services [i.e., business development, child care centers (crèches), integrated services for survivors of gender based violence] for vulnerable women (victims/survivors of violence, poor working mothers caring for children and marginalized informal sector workers) in target municipalities (*Thromde*) while also adopting climate adaptation and disaster risk reduction in housing projects. The project will (i) serve as a strategic entry point towards transforming the current urban planning framework in Bhutan, within the broader context of livable cities aimed at achieving social development objectives, including Sustainable Development Goal 5 under the United Nations, (ii) demonstrate and institutionalize technology application in construction as a means to achieve sustainability and disaster-resilient human settlements; and (iii) show that partnership between RGOB, municipalities, private land developers, and corporations is a key to development of a comprehensive and sustainable housing program.

**Subproject Scope.** This initial environmental examination (IEE) report has been prepared for the Amochhu Subproject (subproject), which is one of the 9 subprojects to be financed under the project. This subproject involves construction of 5 five-storey residential buildings comprising of 120 units, with internal access road and parking. Expectedly, 120 families will benefit from this subproject, and this translates to around 600 beneficiary citizens (i.e., approximately 5 members per family). This housing complex will be constructed within a 2.27-acre (approximately 0.92 hectare) residential plot located in Bangay, Amochhu, which is about 3km from the center of Phuentsholing town. The table below summarizes in detail the components of the subproject.

**Details of the Housing Complex (Amochhu, Phuentsholing)**

Sl. No.	Building Type	Number of Buildings	Total Number of Units	Remarks
1	Category III (Type 2)	1	24 (1 building x 6 floors per building x 4 unites per floor)	Plinth Area(1 <sup>st</sup> Floor): 389.9 m <sup>2</sup> (4,195.32 ft <sup>2</sup> )  Unit Area: 97.48 m <sup>2</sup> (1,048.83 ft <sup>2</sup> )
2	Category IV (Type 2)	3	72 (3 buildings x 6 floors per building x 4 units per floor)	Plinth Area(1 <sup>st</sup> Floor): 308.64 m <sup>2</sup> (3,320.97 ft <sup>2</sup> )  Unit Area: 77.16 m <sup>2</sup> (830.24 ft <sup>2</sup> )
3	1 BHK (1 Bedroom, hall, kitchen)	1	24 (1 building x 6 floors per building x 4 unites per floor)	Plinth Area(1 <sup>st</sup> Floor): 220.7 m <sup>2</sup> (2,374.73 ft <sup>2</sup> )  Unit Area: 55.19 m <sup>2</sup> (593.844 ft <sup>2</sup> ) (Including balcony)
	Total	5	120	
Facilities				

4	Internal road and parking	To fit 48light vehicles and 25 two-wheelers (cumulative area of 1,363.95 m <sup>2</sup> )
5	Other facilities <ul style="list-style-type: none"> <li>• Drinking water storage tanks</li> <li>• Rain water harvesting tank</li> <li>• Pedestrian footpath</li> <li>• Recreational area/Green space</li> </ul>	

**Categorization.** ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB Safeguard Policy Statement (SPS), 2009. Initial step was to categorize the subproject based on its likely impacts of its most environmentally sensitive component(s) at all phases of implementation. Using ADB's Rapid Environmental Assessment checklist, the subproject is classified as Category B for Environment per ADB SPS as no significant impacts are envisaged. Accordingly, this IEE has been undertaken to assess in more detail the likely environmental impacts of the subproject and to provide an environmental management plan (EMP) specifying the required mitigation and monitoring measures to ensure that these impacts are managed to acceptable levels. This IEE also emphasizes the need to incorporate pollution prevention and control technologies during the design, construction, and operation of the subproject, and adhere to relevant national laws, rules and regulations, as well as internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. With regard to national environmental assessment requirement, the Regulation for Environmental Clearance of Projects, 2016 (RECOP) provides the procedures for the categorization and issuance of environmental clearance for projects. Accordingly, the subproject is classified under RECOP as a Blue Category undertaking, and likewise requires the preparation of IEE by the proponent and subsequent approval by relevant competent authority prior to issuance of an environmental clearance.

**Description of the Environment.** The proposed site of the housing subproject is located in Bangay, Amochhu along the Phuentsholing-Samtse highway, which is considered a built-up area with existing residential, commercial and institutional establishments around. As it is along major roads in the city, it is easily accessible during the construction and operation phase (or when the housing complex is occupied by the recipient citizens).

The subproject site is neither within nor located adjacent any ecologically critical areas, and subproject development interventions will not have any significant impact on the physical, biological and social environment. This IEE has been conducted to evaluate any potential environmental impacts of the subproject and propose measures to mitigate these impacts, including monitoring.

**Assessment of Environmental Impacts.** Potential environmental impacts were identified on the basis of review and analysis of the primary and secondary data or information and stakeholder consultations, and field visits to the site. Impacts were identified in relation to the different phases of project implementation — pre-construction, construction, and operation of the built infrastructure. Evaluation of the likely degree of impacts has been done on each of identified potential impacts. Based on this evaluation, mitigation measures have been developed to reduce all negative impacts to acceptable levels. These were discussed with specialists and experts responsible for the engineering and environmental aspects.

In order to ensure that the assessment of impact is robust, a biodiversity assessment has been undertaken relative to the subproject location. The Integrated Biodiversity Assessment Tool (IBAT) was used to screen and assess potential risks on the protected areas or critical habitat

that may exist around the project site (default area of analysis of 50 km radius). Screening results show there is no protected area or key biodiversity area within 1 km from the subproject site. There are 36 IUCN Red List species of concern that were identified and potentially found within 50km of the area of interest. These species were assessed to determine the likelihood of them being found at the subproject site. Since the subproject site is already in township development area of Phuentsholing, the probability of these species being found at the site is very low. Nevertheless, the assessment included necessary written confirmation from the Department of Forest, which confirmed that none of the terrestrial species are found or sighted at the subproject site. Accordingly, these species are found or dwell in the denser forest further in the higher elevations of the district.

The Amochhu river is the nearest body of water which is about 175m from the subproject site. This river has a number of aquatic species, including the Mahseer (*Tor putitora*) that is considered an endangered species per IUCN Red List species of concern. However, the assessment showed that the subproject will not impact any species in this river considering the distance from the subproject site. Further, the nature of the subproject (i.e., housing development) has all the construction activities constrained within the site boundaries. In addition, the Amochhu river and the subproject site are separated by a township area being developed by the government.

**Environmental Management Plan.** From the results of assessment of impacts and mitigation measures, an environmental management plan (EMP) has been developed and included as part of this IEE, which outlines the following: (i) mitigation measures for environmental impacts during implementation; and (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting.

In order to ensure sound environmental management and safety during various phases of the implementation, the Contractor will be required to prepare a site-specific environmental management plan (SEMP) based on the EMP of this IEE. Contractor will submit its SEMP for approval to the project implementation unit (PIU) or project management unit (PMU). This will cover the following areas of impact which are potentially significant but can be mitigated by the adoption of good practice: (i) impedance of traffic, (ii) noise pollution and vibration, (iii) waste generation (iv) release of silt from excavations, (v) water pollution, (vi) air and dust pollution, (vii) community health and safety risks, and (viii) occupational health and safety.

The EMP and SEMP will (i) ensure that the activities are undertaken in a responsible non-detrimental manner; (ii) provide a pro-active, feasible, and practical working tool to enable the measurement and monitoring of environmental performance on site; (iii) guide and control the implementation of findings and recommendations of the environmental assessment conducted for the subproject; (iv) detail specific actions deemed necessary to assist in mitigating the environmental impact of the subproject; and (v) ensure that safety recommendations are complied with. Copies of the EMP and SEMP shall be kept on-site during the construction phase. The Contractor will be responsible for the organization, direction, and execution of environmental management related activities during construction of the proposed subproject. The Contractor will also undertake all activities in accordance with the relevant environmental requirements, including consent documentation and other regulatory and/or statutory and contractual requirements.

**Grievance Redress Mechanism.** The project will adopt a grievance redress mechanism (GRM) that shall be set up to register grievances of the people regarding technical, social and environmental aspects. The process will be designed to be transparent, gender responsive, culturally appropriate and commensurate to the risks and adverse impacts of the project, as well as readily accessible to all segments of the affected people. The project GRM will not supersede



any legal government grievance procedures. Affected people are to be informed about the mechanism through media and public outlets. This participatory process shall ensure that all views of the people are adequately reviewed and suitably incorporated in the design and implementation process.

**Implementation Arrangement.** The executing is the Ministry of Finance and the implementing agency is the National Housing Development Corporation Limited (NHDCL) of the Government of Bhutan. NHDCL will establish a project management unit (PMU) comprising officials including an Environmental Safeguard Officer who is a permanent employee of NHDCL. The PMU will be strengthened with external experts or consultants in environmental and social safeguards, including experts on finance, procurement, technical areas, and contract management. Project Implementation Units (PIUs) will be established at the local level or municipalities where the subprojects under the project are located. For this subproject, NHDCL Phuentsholing will serve as the PIU. The PMU and PIUs will have responsibility for overseeing subproject management, including overseeing EMP implementation. The PMU will also have the responsibility for obtaining environmental clearance of the subproject from the relevant competent authority in compliance with RECOP.

The Contractor will be required to (i) obtain all other statutory clearances prior to commencement of civil works; (ii) establish an operational system for managing environmental impacts; (iii) prepare a SEMP based on the EMP of this IEE, and submit to PIU or PMU for approval; (iv) carry out all of the monitoring and mitigation measures set forth in the approved SEMP; and (v) implement any corrective or preventative actions set out in safeguards monitoring reports that the PMU will prepare from time to time to monitor implementation of this IEE, EMP, and SEMP. The Contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

**Information Disclosure and Consultation.** The project has undertaken meaningful consultations<sup>1</sup> during the project preparatory stage. The objectives of the consultations are to ensure that project information is accurately and properly disseminated to all stakeholders and engage them in the environmental assessment process, ensure all issues from the stakeholders about the project are considered in the environmental management planning and ultimately addressed in the EMP of the IEE. Meaningful consultations also provide valuable guidance and direction to safeguard the interests of the stakeholders, developers and the environment. Stakeholder engagement will be a continuing activity of the PMU throughout project implementation.

Written information and documents shall be disclosed at a location in which they can be easily accessed by stakeholders. This includes making draft environmental safeguards reports available for the public and providing a mechanism for the receipt of comments and making such documents available more widely by disclosing them on ADB and project websites. NHDCL

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<sup>1</sup> Per ADB SPS, meaningful consultation means a process that (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle; (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people; (iii) is undertaken in an atmosphere free of intimidation or coercion; (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

through the PMU will submit to ADB the following documents for disclosure on ADB's website:<sup>2</sup> (i) the final IEE report; (ii) new or updated IEE reports and corrective action plan prepared during project implementation, if any; and (iii) semi-annual environmental monitoring reports.

PMU will provide relevant environmental information, including information from the relevant documents in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. For the benefit of the communities affected, the executive summary of the IEE will be translated in the local language and made available at the offices of PMU and Contractor, including satellite office of Contractor at the subproject site. Hard copies of the IEE will be available in the PMU, and accessible to citizens as a means of disclosing the document and at the same time creating wider public awareness. On demand, the person seeking information can obtain a hard copy of the complete IEE document at the cost of photocopy from the office of the PMU.

**Monitoring and Reporting.** EMP compliance monitoring will be undertaken by the PMU, with support of external experts or consultants. Contractors will submit monthly reports to PMU. Consistent with reporting requirements set out in the Project Administration Manual, PMU will prepare and submit reports to ADB on a semi-annual basis. The submission of semi-annual environmental monitoring reports to ADB will continue until ADB issues a project completion report for the project.

**Conclusion.** The overall finding of this IEE is that the subproject will result in significant environmental benefits because of improved living condition of selected recipient citizens of Phuentsholing. The subproject is unlikely to cause significant adverse impacts because: (i) most of the subproject components involve straightforward construction, so impacts will be mainly localized; (ii) in most cases, the predicted impacts are likely to be associated with the construction process and are produced because of excavation, obstruction at specific construction locations, and earth movements; and (iii) being located mainly along roads and built-up area will not cause direct impact on terrestrial biodiversity values. The potential adverse impacts that are associated with construction can be mitigated to standard levels without difficulty through proper engineering practice and the incorporation or application of recommended mitigation measures and procedures in the EMP and SEMP. Consequently, the potential adverse impacts that are associated with the operation phase (i.e., the period when the housing facility is occupied by beneficiary citizens) can already be mitigated upfront through incorporation of environmental requirements in the detailed engineering design.

As such, no further environmental assessment is therefore required and the classification of Category B per ADB SPS is confirmed.

This IEE has been prepared based on preliminary designs of the subproject. If the design is revised or modified, the PMU shall update this draft IEE based on final detailed design and submit to ADB for review and disclosure. In compliance with the requirements of the RECOP, PMU shall obtain the necessary environmental clearance for the subproject from the relevant competent authority. No contract under the subproject shall be awarded until an environmental clearance covering said subproject is issued.

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<sup>2</sup> Per ADB SPS, 2009, prior to disclosure on ADB website, ADB reviews the "borrower's/client's social and environmental assessment and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1-4."

The approved updated IEE shall be treated as the final IEE and shall be attached in the bid and contract documents. No works can commence until (i) the final IEE approved by ADB is provided to the Contractor, and (ii) the SEMP prepared by the Contractor is approved by PIU or PMU. In the event of any design change during subproject implementation period, the IEE shall be updated to include assessment of impacts due to the design change, any corrective actions, associated cost and revised schedule.

## I. INTRODUCTION

### A. Background

1. Currently one third of the Bhutanese population lives in urban centers and by 2037 this is expected to reach 50.4%. Urban areas also have higher number of urban poor who struggle to secure adequate housing at reasonable costs. An estimated 10% of Thimphu city's population lives in informal settlements. About a quarter of households (41,039) lack access to improved sanitation and waste management is a concern as it does not reach every corner of the city. Most of the urban contract workers (cleaners, waste collectors, and semi-skilled workers) reside in informal squatter settlements in Thimphu and Phuentsholing as they are unable to afford decent housing elsewhere.<sup>3</sup>

2. Affordable housing is provided by the National Housing Development Corporation Limited (NHDCL), an agency that was delinked from the Ministry of Works and Human Settlements (MOWHS). Per the directive of the government, NHDCL plans, designs and provides affordable housing. However, due to increasing demand, there are still many challenges of not being able to cater to the housing needs of the clients.

3. The proposed Bhutan Green and Resilient Affordable Housing Sector Project (GRAHSP) will deliver affordable housing in selected settlements in Bhutan. Improved livability, safety, and sustainability of human settlements through access to adequate affordable housing are a national priority.<sup>4</sup> The project will also strengthen policies, institutions, and regulatory framework of the housing sector in Bhutan.

4. **Affordable housing needs.** Currently, there is poor availability of affordable housing in Bhutan, particularly in urban areas where demographic trends are increasingly putting pressure on the residential land and housing stock. About 63.5% of urban households rent and only 19% of households own houses in urban areas.<sup>5</sup> As demand for serviced land and housing increases and the supply is unable to keep up, house prices and rents are also rising, making housing unaffordable for low-income households. Low-income civil servants who fall in income brackets ranging from Nu900 (\$12) to Nu 3,500 (\$50) per month are faced with rental stress, as they need to spend an estimated 40%–60% of their income on housing costs.<sup>6</sup> Likewise, majority of the urban poor including low-income contract workers (non-civil servants) are currently forced to live in informal settlements as there is a lack of affordable formal housing supply that is accessible to them. As of 2017, there was an estimated shortfall of 21,156 units nationwide.<sup>7</sup> Currently, many low-income households have no option but self-build housing in peri-urban areas or overcrowd in the existing housing (to share costs) and overload infrastructure services, finding accommodation in substandard housing in poorly located and under-served areas (informal settlements),<sup>8</sup> or live

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<sup>3</sup> Ministry of Works and Human Settlement. 2016. National Report, The 3rd UN Conference on Housing and Sustainable Urban Development. Thimphu.

<sup>4</sup> Government of Bhutan, Gross National Happiness Commission. 2019. [Twelfth Five-Year Plan, 2018–2023: Just, Harmonious and Sustainable Society through Enhanced Decentralization](#). Thimphu. Affordable housing is defined as the ability for households to meet housing costs within 30% of gross monthly income.

<sup>5</sup> Government of Bhutan, NSB. 2017. [Bhutan Living Standards Survey Report 2017](#). Thimphu.

<sup>6</sup> Government of Bhutan, NSB. 2017. [Bhutan Poverty Analysis Report 2017](#). Thimphu. Civil servants are provided with rental housing allowance.

<sup>7</sup> ADB. 2017. *Housing Finance Feasibility Study*. Consultant's report. Manila (SC107332); and ADB. 2018. *Housing Finance Feasibility Study*. Consultant's report. Manila (SC 107332).

<sup>8</sup> Government of Bhutan, Ministry of Works and Human Settlement (MOWHS). 2016. [National Report: The 3rd UN Conference on Housing and Sustainable Development](#). Thimphu.

in adjacent countries (footnote 3).<sup>9</sup> Women are continuing to bear a disproportionate share of the burden and are vulnerable to housing insecurity exacerbated by overcrowding, which raises social pressures (e.g., domestic violence).

5. **ADB's intervention in the sector.** ADB has adopted a holistic approach in addressing the long-term housing sector needs in Bhutan. ADB provided assistance through a policy-based loan (PBL) under a programmatic approach to enable continuous reforms reflecting developments in the sector.<sup>10</sup> The PBL subprogram 1, approved in 2019 for the financial market development program, supported the revision of the National Housing Policy (NHP).<sup>11</sup> In October 2020, PBL subprogram 2 was approved for developing a long-term strategy for public housing including fiscal measures and access to finance to women. The subprogram 3 under the PBL is planned for approval in 2021 and will support conducting a nationwide housing survey and implementing financing schemes using the survey results. The PBLs will strengthen financial sector institutions' capacity and develop nonfinancial institutions to deliver housing finance solutions. The proposed project, complemented by the PBL reforms, will support the government to (i) reduce the shortage of affordable housing which needs an urgent intervention; and (ii) create a robust medium- to long-term road map to achieve the policy objectives of the sector.

6. **Government policy.** Bhutan's Twelfth Five-Year Plan, 2018–2023 prioritizes the government's strategic thrust for economic stability, economic diversification, and poverty reduction, which includes a medium-term outlook for affordable housing provision. Recently, the government approved the NHP and the Strategy for Housing (2020) promoting a vision for universal access to safe and affordable housing.<sup>12</sup> The NHP includes five core objectives, of which the following three stand out, namely to: (i) provide safe, affordable, and adequate rental housing for all; (ii) promote home ownership; and (iii) encourage partnership and cooperation among private and government entities in the provision of affordable housing. The policy's focus is on a multi-pronged approach to catalyze new investment including the release of land for housing infrastructure, making housing finance readily available to support economic development, and improve planning and policy coordination. Integrating these elements requires high levels of coordination and collaboration at the central government level, and among real estate developers, banks, and beneficiaries.

## **B. Developmental Impact, Outcome and Outputs of the Project**

7. The project is aligned with the following impact: livability, safety, and sustainability of human settlements ensured (footnote 4). The project will have the following outcome: access to green and resilient affordable housing for low-income households improved.

8. **Output 1. Climate- and disaster-resilient, energy-efficient, and affordable housing units and public facilities for low-income households constructed.**<sup>13</sup> Output 1 will support the NHDCL in building about 1,000 rental units, three integrated community service centers, and two recycled waste stations connected to services, in support of SDG 1. The government selected

<sup>9</sup> At least 26% of urban households live in shared accommodation with basic infrastructure services (footnote 3).

<sup>10</sup> ADB. 2019. [Report and Recommendation of the President to the Board of Directors: Proposed Programmatic Approach and Policy-Based Loan for Subprogram 1 and Technical Assistance Grant to the Kingdom of Bhutan for Financial Market Development Program](#). Manila; and ADB. 2020. [Report and Recommendation of the President to the Board of Directors: Proposed Programmatic Approach and Policy-Based Loan for Subprogram 2 and Technical Assistance Grant to the Kingdom of Bhutan for Financial Market Development Program](#). Manila.

<sup>11</sup> Government of Bhutan, MOWHS. 2020. [National Housing Policy](#). Thimphu.

<sup>12</sup> Government of Bhutan, MOWHS. 2020. [Long Term Strategy for Housing](#). Thimphu.

<sup>13</sup> Resilient housing design incorporates climate change and disaster risk-reduction measures to avoid, minimize, and/or recover from a disaster in a timely and efficient manner.

high-priority investments as subprojects.<sup>14</sup> The increase in the supply of affordable rental housing is expected to immediately relieve the housing shortage and benefit lower-income civil servants (about 10%) and non-civil servants (about 90%), including marginalized municipal waste workers. The NHDCL will select beneficiaries most in need by applying beneficiary eligibility and selection criteria, with gender equality considered as part of the eligibility criteria as defined in the project administration manual (PAM). The building designs incorporate gender-inclusive features; enhanced safety against earthquake and fire hazards; and resource efficiency, making greater use of locally available materials.<sup>15</sup> The building structures will employ reinforced-concrete frames and innovative pre-engineered structures. The project design has identified and incorporated climate and disaster resilience features, considering multiple hazards. The project will support green building certification through the International Finance Corporation’s Excellence in Design for Greater Efficiencies (EDGE) certification program.<sup>16</sup> The housing designs reflect local cultural heritage values and traditional architecture.<sup>17</sup> Additional subprojects will be selected during project implementation in line with the NHP using the eligibility criteria set out in the PAM.

9. **Output 2. Institutional capacities, policy, and regulatory framework of the housing sector strengthened.** This output will (i) strengthen the NHDCL’s housing design, construction, and management capacity—informed by climate and disaster risks and affordability considerations; (ii) review the building code and regulations; (iii) develop climate- and disaster-resilient building designs and related solutions to improve safety, resource efficiency, and gender and disability inclusiveness; (iv) conduct awareness training and a capacity building program for key project stakeholders on climate- and disaster-resilient design and the building code; (v) enhance the NHDCL’s business model, strengthening its O&M capacity, and developing partnerships with the private sector; (vi) strengthen the housing management information system of the MOWHS by expanding it to include tenancy data and better understand and prepare evidence-informed policy updates to address demand and supply-side bottlenecks in the sector; (vii) develop a gender and socially inclusive national homeownership strategy, including a rent-to-own mechanism; and (viii) provide project implementation support, including supervision, and set up a safeguard unit in the NHDCL.

10. Due to the large demand of housing units in the country, NHDCL plans to carry out the construction in a phased manner with the project considered as “Phase 1” comprising of about 1,026 – 1,062 housing units spread over 9 subprojects in six dzongkhags (districts) and sub-districts. These are prioritized in terms of pressing demand and availability of land and funds. Table 1 below shows a summary of the subprojects. Based on experiences under the project, subsequent phases may be planned by the government in the future.

**Table 1: Proposed Housing Structures**

S. No	Location	District	Area (Acres)	Typology	# Blocks	# Units	With SC*?
1	Tading	Samtse	9.00	G+2	37/34	444/408	No
2	Amochhu (Bangay)	Phuentsholing	0.98	G+5	5	120	No

<sup>14</sup> Priority subprojects are located in Nganglam; Phuentsholing (Amochu, Rinchending and Drungpa’s Residence); Samtse (Tading); Samdrup Jongkhar (Dradulthang and Toed); Thimphu (Semtoka); and Trashiyangtse.

<sup>15</sup> The gender-inclusive considerations include a preference for households headed by women and tenancy agreements signed by both spouses. In addition, the service centers will include childcare facilities, shelter for women, and offers employment opportunities. The green features include insulated walls, improved windows, use of timber and stone, water-efficient faucets.

<sup>16</sup> [EDGE](#).

<sup>17</sup> Government of Bhutan, MOWHS. 2014. [Bhutanese Architectural Guidelines](#). Thimphu.

3	Rinchending	Phuentsholing	5	G+2	18	108	Yes
4	Drungpa Residence Area	Phuentsholing	0.85	G+5	4	96	No
5	Dradulthang	SamdrupJongkhar	0.8	G+3	4	32	No
6	Samdrup Jongkhar Toed	SamdrupJongkhar	2	G+3	11	88	Yes
7	Nganglam	Pema Gatshel	2.82	G+1	8	32	No
8	Semtokha	Thimphu	1.93	G+4	8	110	Yes
9	Trashi Yangtse	Trashi Yangtse	2.48	G+1	8	32	No
	Total		<b>23.05</b>		<b>88</b>	<b>1062/1026</b>	

\*Service Center

### C. Purpose of the IEE

11. The purpose of this IEE is to describe the assessment of environmental impacts due to the proposed housing subproject based on the detailed design produced under the project, and to specify measures to address impacts. This IEE is based on engineering design information, field visits, and primary and secondary data to characterize the environment. It contains the results of interviews and consultations with stakeholders. This IEE includes an environmental management plan (EMP) outlining mitigation measures and monitoring requirements, and environmental specifications to be appended to contract documents.

12. Screening using ADB's rapid environmental assessment checklist for urban development (Appendix 1) was initially conducted together with an accomplished No Mitigation Measures Scenario Checklist (Appendix 2), and results show that the subproject is unlikely to cause any significant adverse impacts, and therefore classified under Category B per ADB Safeguard Policy Statement (SPS), 2009. Thus, this initial environmental examination (IEE) has been prepared in accordance with ADB SPS2009 requirements for environment category B projects.

13. The subproject is consistent with the EARF of the project, which provides the selection criteria for future subprojects.

### D. Methodology

14. The methodology used for the preparation of IEE is presented as follows:

- (i) Review of project-related documents and literature relevant to the subproject;
- (ii) Site visits to the subproject site to review the existing environmental conditions and develop baseline information for the subproject area;
- (iii) Consultation with NHDCL to discuss subproject components, benefits, and impacts;
- (iv) Analysis of typical environmental impacts of subproject components and identification of suitable measures to mitigate potential impacts; and
- (v) Review and develop institutional arrangements and capacity building needs for implementation of environmental management and monitoring.

### E. Structure of the Report

15. The IEE is presented in twelve chapters, including the executive summary, as follows:

- (i) Executive Summary. This chapter provides an overview and summary of the outcome of the IEE;
- (ii) Chapter 1. Introduction, which includes the Background, Developmental Impact, Outcome and Outputs of the Project, Purpose of the IEE, Methodology and Structure of the Report;
- (iii) Chapter 2. Policy Legal and Administrative Framework, which includes ADB Safeguard Policy Statement, Environment Legislation Framework, National Environmental Act and Legislation, Legislation relating to Occupational Health and Safety, Relevant International Conventions and Treaties, Gaps in Legal and Guiding Instruments, Permits and Clearances and Applicable Environmental Standards;
- (iv) Chapter 3. Description of the Project, which focuses primarily on subproject location and area, subproject rationale, subproject alternatives, subproject development plan and subproject components, subproject phase, and schedule and resource utilization;
- (v) Chapter 4. Description of the Environment, which includes a description of the baseline information, subproject influence area, land environment, water environment, air environment, noise environment, ecological environment, socio-economic environment, and physical and cultural resources;
- (vi) Chapter 5. Anticipated Environmental Impact and Mitigation Measures, which includes introduction, impact assessment, anticipated impacts and mitigation measures during pre-construction, construction and operation phases, cumulative impacts and mitigation, environmental benefits and enhancement measures, and a summary of impacts and mitigation;
- (vii) Chapter 6. Analysis of Alternatives, which discusses how the alternatives were assessed in terms of site location, design and technology, environmental implications of alternatives, including implication of No-Project alternative
- (viii) Chapter 7. Information, Disclosure, Consultation and Participation, which details the process and the approach and methodology for preliminary consultations, and discusses future consultations during detailed design stage and information disclosure;
- (ix) Chapter 8. Grievance Redress Mechanism for the project;
- (x) Chapter 9. Environmental Management Plan, which includes the institutional arrangement, roles and responsibilities of stakeholders including contractors and environmental performance criteria;
- (xi) Chapter 10. Monitoring and Reporting, which includes capacity building, cost and other reporting obligations;
- (xii) Chapter 11. Conclusion, which provides overall analysis, conclusion and recommendations of the IEE.

## **II. POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK**

### **A. ADB Safeguard Policy statement**

16. ADB's Safeguard Policy Statement (SPS) governs the environment and social safeguards of ADB's operations. The goal of the SPS is to promote the environmental and social sustainability of ADB supported projects by protecting people and their environment from potential adverse impacts and enhancing the benefits provided. The SPS requirements for environmental safeguards support the integration of environmental considerations into the project decision-making process. These requirements are triggered if a proposed project is likely to have



environmental impacts and risks to the physical, biological, socioeconomic, and/or physical cultural resources in the project's area of influence.<sup>18</sup> Project screening and categorization using the sector-based rapid environmental assessment (REA) checklists determines the categorization of the project based on the significance of the project's potential environmental impacts and risks.

17. **Categorization.** ADB assigns one of the following environmental categories to the proposed project:

- (i) **Category A.** The project is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. Impacts may affect an area larger than the sites or facilities subject to physical works. A full-scale environmental impact assessment (EIA), including an environmental management plan (EMP), has to be prepared by the borrower/client.
- (ii) **Category B.** The project's potential environmental impacts are less adverse and fewer in number than those in category A. Impacts are site-specific, few of which, if any, are irreversible. Impacts can be readily addressed through mitigation measures. An initial environmental examination (IEE), including an EMP, has to be prepared by the borrower/client.
- (iii) **Category C.** The project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, but ADB will conduct a desk review of the project's environmental implications.
- (iv) **Category FI.** The project involves the investment of ADB funds to or through a financial intermediary

18. Initial screening using the REA checklist indicates that the subproject will not cause any significant negative environmental impacts and that most impacts are site specific, temporary and therefore the subproject is classified as Category B for Environment per ADB SPS.

19. For Category B project, ADB SPS also requires the conduct of initial environmental examination (IEE); preparation of corresponding IEE report, which includes an environmental management plan (EMP), consultation and disclosure requirements, establishment of a grievance redress mechanism (GRM), compliance monitoring and reporting, updating of the IEE in the event of unanticipated impacts, applying pollution prevention and control technologies and practices consistent with international good practices, ensuring that workers are provided with a safe and healthy working environment, and other elements as indicated in the suggested outline of IEE report in the SPS.

20. The subproject must also identify and assess the risks to, and potential impacts on, the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, avoid significant damage to physical cultural resources and the institutional responsibilities of all key parties involved in EMP implementation and project environmental management must be clearly designated. The work must not be initiated or contract awarded unless the subproject is approved by ADB and the EMP is included in the contract documents.

21. Mitigation measures and Environmental Management Plan. Once potential impacts and risks are identified, mitigation measures are required to be developed for each impact and risk. As a general rule, a mitigation hierarchy is followed, starting with avoidance, minimization, mitigation, and lastly, compensatory measures to offset significant residual impacts. Key environmental considerations can also be incorporated upfront into the subproject design.

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<sup>18</sup> ADB. 2009. *Safeguard Policy Statement*. Manila.

22. **Meaningful Consultation.** ADB SPS, 2009 requires meaningful consultation with affected people that:

- (i) begins early in the project preparation stage and is carried out on an ongoing basis throughout the project cycle;
- (ii) provides timely disclosure of relevant and adequate information that is understandable and readily accessible to affected people;
- (iii) is undertaken in an atmosphere free of intimidation or coercion;
- (iv) is gender inclusive and responsive, and tailored to the needs of disadvantaged and vulnerable groups; and
- (v) enables the incorporation of all relevant views of affected people and other stakeholders into decision making, such as project design, mitigation measures, the sharing of development benefits and opportunities, and implementation issues.

23. As a minimum, stakeholders of each subproject will be consulted regarding the scope of the environmental study and will then be informed during environmental assessment about the likely impacts of the subproject and proposed mitigation measures. The report will record the views of stakeholders and indicate how these have been taken into account in project development. A variety of approaches for consultations include public meetings, focus group discussions, workshops, and public information campaigns. Public consultations may include newspaper advertisement in the local and national newspapers well before the consultations giving brief project description, location, and specific contact data (including telephone numbers). In the meetings, presentations will be provided about the subproject's potential environmental and social impacts. Consultation sessions must have attendance sheets prepared and included as part of the documentation. See Table 2 below for the template.

**Table 2: Template of Attendance Sheet for Consultation Meetings**

S.N.	Name of Attendees	Gender (M/F)	Age	Affiliation and Position	Signature

24. Public consultation and involvement will be given highest priority in the implementation of mitigation measures. Public consultation will take place, and on the basis of decision of the consultation meeting, implementation of mitigation measures will be prioritized and will be carried out with the involvement of the local people.

25. **Information Disclosure.** Information will be disclosed through public consultation and more formally by making documents and other materials available in a form and at a location in which stakeholders can easily access. This will involve making reports available at public locations within the vicinity of the sites, and providing a mechanism for the receipt of comments and making documents available more widely by lodging them on the ADB and NHDCL websites.

26. Subject to approval by NHDCL and clearance by ADB, PMU will disclose the following documents on the project website, and endorse these same documents to ADB for disclosure on ADB website:

- (i) environmental assessment and review framework;
- (ii) the final IEE report for each subproject (per location);

- (iii) new or updated IEE reports and corrective action plan prepared during project implementation, if any; and
- (iv) semi-annual environmental monitoring reports.

27. PMU will provide relevant environmental information, including information from the relevant documents in a timely manner, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. For illiterate people, other suitable communication methods will be used. For the benefit of the community, the summary of the IEE will be translated in the local language (Dzongkha) and made available at: (i) offices of PMU; and (ii) offices of the supervising/implementing unit or office.

28. Hard copies of the IEE will be available in the PMU and local supervising/implementing units, and accessible to citizens as a means to disclose the document and at the same time creating wider public awareness. On demand, the person seeking information can obtain a hard copy of the complete IEE document at the cost of photocopy from these offices. Electronic version of the IEE reports will be placed in the project website after approval of the documents by the government and clearance from ADB. PMU will issue notification on the disclosure mechanism in local or national newspapers, ahead of the initiation of implementation of the project, providing information on the project, as well as the start dates, etc. This will create awareness of the project implementation among the public. PMU will consider other additional means of information disclosure depending on practicability, such as the distribution of posters to community billboards within the vicinity of the subproject sites to mass campaign the basic tenets of the IEE.

29. **Grievance Redress Mechanism (GRM).** A GRM must be established to allow affected people a trusted way to voice and resolve project-related concerns, and to enable the project to effectively address affected people's concerns. The GRM can be used to cover the environmental, involuntary resettlement and/or Indigenous Peoples safeguard requirements.

30. **Occupational Health and Safety.** The PMU must ensure safe and healthy worker conditions and prevent accidents, injuries, and disease. This includes identifying and minimizing, the causes of potential hazards to workers; providing preventive and protective measures, worker training and awareness and other measures to minimize risks and hazards at the workplace, ensuring emergency response and compensation for work related injuries and fatalities.

31. **Community Health and Safety.** The PMU must identify and assess the risks to, and potential impacts on the safety of affected communities during the design, construction, operation, and decommissioning of the subproject, and establish preventive measures and plans to address them in a manner commensurate with the identified risks and impacts.

32. **Pollution prevention and control techniques.** The PMU must apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines, during the design, construction, and operation of the project.

33. **Unanticipated Environmental Impacts.** The PMU must update the environmental assessment and EMP or prepare a new environmental assessment and EMP to assess the potential impacts, evaluate the alternatives, and outline mitigation measures and resources to address any unanticipated impacts.

34. **Physical Cultural Resources (PCR).** The PMU must identify and avoid significant damage to any PCRs by the project. Chance finds procedure must be used by contractors in the event that such PCR is discovered during project implementation.

35. **Bidding and Contract Documents.** The EMP must be verified by the PMU and included in bidding and contract documents and along with any specific provisions requiring contractors to comply with all other conditions required by ADB or provisions of the loan agreement.

**B. National Environmental Assessment Act, and Related National and Local Legislations**

**Table 3: Summary of National Environmental Assessment Act, and Related National and Local Legislations**

<b>Regulation</b>	<b>Brief Description</b>	<b>Applicable Consent / Permit Requirement</b>	<b>Governing Agency</b>	<b>Remarks / Relevance to Subproject</b>	<b>Implementation Phase</b>	<b>Responsibility</b>
<b>Environmental assessment</b>						
Environmental Assessment Act 2000	Establishes procedures for the assessment of potential environmental impacts and aims to determine the measures to avoid, mitigate, reduce the adverse impacts, and promote environmental benefits of projects, plans, and policies.	Environment Clearance	National Environment Commission	Subproject is subject to this Act as construction of buildings will bring about environmental impacts.	Design Phase / Pre-construction Phase	PMU
Regulation for The Environmental Clearance of Projects (RECOP) 2016	Describes the responsibilities and procedures for the implementation of Environmental Assessment Act 2000 in relation to the issuance and enforcement of environmental clearances at the project level. It defines specific activities of projects where competent authorities can issue an environmental clearance (EC) and those requiring NEC			The housing subproject is covered by this regulation. Project is categorized as Blue category requiring an IEE.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	evaluation and approval of EC.					
National Environment Protection Act 2007	Provides an effective system of conserving and protecting the environment and established the NEC and other designated Competent Authorities and advisory committees responsible for independently regulating and promoting sustainable development.			Under this Act, the IEE of the subproject will be reviewed by NEC. The provisions of the EMP will be followed during subproject implementation to ensure compliance with this Act.		
Bhutan Environmental Standards 2010, and Drinking Water Quality Standards 2016	Sets minimum standards for i) ambient water quality, ii) industrial effluent discharge standards, iii) standard for sewerage effluents, iv) ambient air quality, v) industrial emission standards, vi) workplace emission standards, vii) vehicle emission standards and, viii) noise level limits.			The subproject is expected to emit pollutants during construction and operation phases and will be required to comply with applicable standards. Applicable environmental standards for the subproject are ambient air, noise level limits, and drinking water quality. PMU will ensure compliance of		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
				Contractor(s) to applicable environmental standards during construction.		
<b>Waste Management</b>						
Waste Prevention and Management Act of Bhutan 2009	Institutional framework on waste management to reduce generation at source, promotes segregation, reuse, and recycling, storage, transportation, environmentally-sound treatment and disposal of waste, and monitoring procedures and coordination at every organizational level	Waste disposal permit	Phuentsholing Thromde	The subproject is a potential generator of solid wastes during construction and operation phases. The subproject will comply with this Act and ensure waste segregation, collection, storage and disposal as per Thromde requirements.	Design Phase / Pre-construction Phase / Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL
Waste Prevention and Management Regulation 2012 (amended 2016)	This regulation establishes procedures and requirements to implement the Waste Prevention and Management Act 2009.					
<b>Water</b>						
Water Act of Bhutan 2011	Ensures that water resources are protected, conserved, and/or managed in an economically efficient, socially	No specific permit required, but any development project needs to comply with the provisions of this	National Environment Commission	The subproject is about 175m from the Amochhu river and 70m from a stream and needs to	Design Phase / Pre-construction Phase / Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

<b>Regulation</b>	<b>Brief Description</b>	<b>Applicable Consent / Permit Requirement</b>	<b>Governing Agency</b>	<b>Remarks / Relevance to Subproject</b>	<b>Implementation Phase</b>	<b>Responsibility</b>
	equitable, and environmentally sustainable manner.	Act and regulation.		comply with this Act. The subproject will ensure that the site is located at least 30m away from any river or stream.		
Water Regulation of Bhutan 2014	Promulgated to enforce the objectives and purposes of the Water Act 2011, effectively implement and enforce the Water Act by the Competent Authorities; and identify roles and responsibilities of designated Competent Authorities and other relevant organizations.			The subproject is expected to generate wastewater that could potentially impact the environment during construction and operation phases. PMU will ensure compliance with the requirements of this Act.		
<b>Forestry and Biodiversity</b>						
Forest and Nature Conservation Rules 2000 (revised 2006, 2017)	Provides rules for project activities that involve clearing and felling of trees, blasting, etc. It also define activities that are prohibited in forested areas, outlines procedures for sourcing sand and gravel, peat, stone,	Tree felling permit, if applicable to the site.	Phuentsholing Thromde, Environment Division/Forest Range Office	The subproject will not impact any protected areas, critical habitats or endangered species. No trees will be cut at the site.	Design Phase / Pre-construction Phase	PMU, Contractor, PIU,



<b>Regulation</b>	<b>Brief Description</b>	<b>Applicable Consent / Permit Requirement</b>	<b>Governing Agency</b>	<b>Remarks / Relevance to Subproject</b>	<b>Implementation Phase</b>	<b>Responsibility</b>
	and surface soil from forested areas.					
Forest and Nature Conservation Act 1995	Allows community stewardship of forests and aims to provide protection and sustainable use of forests, wildlife, and related natural resources. Describes activities that require special permits from the Department of Forests and Park Services as well as other activities such as forest clearing and cutting of trees, hunting and polluting which are not allowed in Government Reserved Forests. All wild animals whether enlisted under Schedule I (totally protected species) or not, cannot be killed, injured, captured or collected unless under special conditions of self-protection and other genuine reasons.					
Biodiversity Act 2003	Sets forth national sovereignty over genetic resources; ensures conservation	No specific permit required, but any development project needs to	National Environment Commission	Subproject is not located in ecologically sensitive areas.	Design Phase / Pre-construction Phase	PMU

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	and sustainable use of biochemical and genetic resources; promotes equitable sharing of benefits derived from genetic resources; promotes technology transfer and capacity building; recognizes and protects traditional knowledge, innovation, and practices of local communities associated with biodiversity; regulates the collection of genetic resources and prevents illegal access; recognizes and protects farmers' and breeders' rights; and regulates plant variety and property rights and use.	comply with the provisions of this Act.		However, the subproject will need to continuously monitor the implementation of the subproject to ensure no protected species (especially the wandering or migratory kinds), if ever found at the site or vicinity in the future, will be affected.		
<b>Occupational Health and Safety</b>						
Bhutan Constitution 2008	The following are relevant provisions on protection of workers: <ul style="list-style-type: none"> <li>Article 5 (2.d) ensures a safe and healthy environment.</li> </ul>	No specific permit required, but any development project needs to comply with the relevant provisions of the constitution.	N/A	The subproject will involve workers. These provisions of the constitution on workers' occupational health and safety	Design Phase / Pre-construction Phase / Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	<ul style="list-style-type: none"> <li>• Article 9 (12) endeavors to ensure the right to work, vocational guidance and training and just and favorable conditions of work.</li> <li>• Article 9 (13) endeavors to ensure the right to rest and leisure, including reasonable limitation of working hours and periodic holidays with pay.</li> <li>• Article 9 (14) ensures the right to fair and reasonable remuneration for one's work.</li> <li>• Article 9 (17) takes appropriate measures to eliminate all forms of discrimination and exploitation against women including trafficking, prostitution, abuse, violence, harassment and</li> </ul>			will be complied by the subproject.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	<p>intimidation at work in both public and private spheres.</p> <ul style="list-style-type: none"> <li>• Article 9 (18) takes appropriate measures to ensure that children are protected against all forms of discrimination and exploitation including trafficking, prostitution, abuse, violence, degrading treatment and economic exploitation.</li> <li>• Article 9 (22) provides security in the event of sickness and disability or lack of adequate means of livelihood beyond one's means of control.</li> </ul>					
Labour and Employment Act (LEA) 2007	Provides for the regulation of employment and working conditions, including occupational health and safety, labor	Foreign worker permit	Ministry of Labor and Human Resources	The subproject will involve contractors and workers. PMU will ensure that Contractor(s) comply with the	Design Phase / Pre-construction Phase / Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	<p>protection and relations as well as setting of occupational standards and certification.</p> <p>The Act aims to improve employees' work environment and working conditions to safeguard and keep work ability, prevent occupational accidents, diseases, and other physical or mental problems related to work.</p>			relevant provisions of this Act		
<p>Regulations on Occupational Health, Safety and Welfare, March 2012 (supersedes the General Rules and Regulations on Occupational Health and Safety in Construction, Manufacturing, Mining and Service Industries 2006)</p>	<p>Prescribes standards and procedures on occupational health, safety and welfare for workplaces, instruments, vessels, appliances, apparatuses, tools, devices, electrical safety and other hazardous conditions. It aims to ensure safety, health and welfare for employees as well as other persons at workplaces from work-related risks to</p>	<p>No specific permit required, but any development project needs to comply with the provisions of this regulation.</p>	<p>Ministry of Labor and Human Resources</p>	<p>The subproject will involve workers. The PMU will monitor compliance of the Contractor(s) in providing for safe and healthy working conditions during construction of the buildings.</p>	<p>Construction Phase / Operation Phase</p>	<p>PMU, Contractor, NHDCL, PIU,</p>

<b>Regulation</b>	<b>Brief Description</b>	<b>Applicable Consent / Permit Requirement</b>	<b>Governing Agency</b>	<b>Remarks / Relevance to Subproject</b>	<b>Implementation Phase</b>	<b>Responsibility</b>
	their health, safety and wellbeing					
Regulations on Working Conditions 2012 (first edition in 2009)	Under the MOLHR, these are 15 regulations which provide for the employment conditions required to implement the provisions of the LEA 2007 effectively. The 15 Regulations cover issues such as recruitment and management of foreign workers, child labor, hours of work, grievance procedure, sexual harassment, workers' compensation, etc.	No specific permit required, but any development project needs to comply with the provisions of this regulation.	Ministry of Labor and Human Resources	The subproject will involve workers. Contractors will be required to strictly comply with the relevant provisions identified in the regulations. The PMU will monitor compliance.	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL
Regulations on Occupational Health and Safety for Construction Industry 2012 (supersedes 2009)	These regulations set the occupational health and safety standards, and procedures on construction safety. It aims to ensure safety and health for employees, as well as other persons at the construction sites, from work related risks to their health, safety, and wellbeing. It also prescribes the roles and	No specific permit required, but any development project needs to comply with the provisions of this regulation.	Ministry of Labor and Human Resources	The subproject will involve workers. Contractor(s) will be required to provide workers with safe and healthy working conditions during construction. Workers will be provided with safety and protection equipment, where needed. PMU	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL

<b>Regulation</b>	<b>Brief Description</b>	<b>Applicable Consent / Permit Requirement</b>	<b>Governing Agency</b>	<b>Remarks / Relevance to Subproject</b>	<b>Implementation Phase</b>	<b>Responsibility</b>
	responsibilities of the workers and employers in ensuring health and safety at the site.			will monitor compliance of the Contractor(s).		
Road Safety and Transport Act 1999	Provides for safe and efficient use of road systems and to ensure an efficient and a safe public transport system. Describes the duties of the drivers related to traffic safety signs and safety procedures to prevent and minimize transport accidents.	No specific permit required, but any development project needs to comply with the provisions of this Act.	Road Safety and Transport Authority	The subproject site is adjacent to main roads. Contractor(s) will be required to comply with the relevant provisions of this Act to prevent accidents in the construction sites. PMU will monitor compliance.	Construction Phase	Contractor / Trasporter
Disaster Management Act of Bhutan 2013	Establishes and strengthens institutional capacity for disaster management in institutions, mainstreaming of disaster risks reductions in policies and plans, and integrates and coordinates disaster management activities and how to respond to emergencies.	No specific permit required, but any development project needs to comply with the provisions of this Act.	Phuentsholing Thromde	The subproject is a housing project requiring designs to ensure disaster resiliency. Provisions for disaster resilience will be included in the infrastructure designs.	Construction Phase / Operation Phase	PMU, PIU, Contractor, NHDCL
<b>Others</b>						
Bhutan Building Regulation 2018	This regulation defines the set of		Phuentsholing Thromde	The subproject involves building		PMU

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	<p>rules that specify the minimum acceptable level of safety for building infrastructures in Bhutan. It has various specific objectives, which include, among others the following:</p> <ul style="list-style-type: none"> <li>(i) prescribe standards for the construction and demolition of buildings,</li> <li>(ii) prescribe requirements for the design and siting of single dwellings and associated buildings,</li> <li>(iii) prescribe standards and matters relating to the maintenance of fire safety and safety measures,</li> <li>(iv) provide for matters relating to the accreditation of building products, construction methods, designs, components and systems connected with building work,</li> <li>and (v) prescribe qualifications and</li> </ul>	Building construction approval / permit		<p>construction. The subproject will need to strictly comply with this set of rules and will be adhered to during design phase.</p>	Design Phase / Pre-construction Phase	



Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	provide for other matters relating to registration of building practitioners.					
Building Code of Bhutan 2018	This Building Code has been issued as part of and to ensure the effective implementation of the Bhutan Building Regulation 2018. It sets out the technical requirements, standards and design considerations which shall apply to construction of buildings in Bhutan. The Code ensures safety of buildings, protect public health and general welfare related to building constructions and its occupancy.			The subproject involves building construction. The subproject will need to strictly comply with this set of rules and will be adhered to during design phase.		
Bhutan Green Building Guidelines, 2013	This Guidelines was issued by the Ministry of Works and Human Settlements to introduce for the basic concepts, sustainable green principles and approaches that will be practical for consideration in the design and			The subproject involves building construction. Although not mandatory, the subproject may use this set of guidelines as reference during design phase.		

Regulation	Brief Description	Applicable Consent / Permit Requirement	Governing Agency	Remarks / Relevance to Subproject	Implementation Phase	Responsibility
	<p>construction of future buildings in Bhutan. It aims to inspire positive change in the built environment of Bhutan; motivate policies, regulations, standards, and projects that will minimize negative impacts of the built environment on the natural environment of the country while enhancing the positive impacts of sustainable building design and construction practices for the present and future generations.</p>					
<p>Bhutanese Architecture Guidelines 2014</p>	<p>The Guidelines was issued by the Ministry of Works and Human Settlements to be used as a reference to understand the various elements of Bhutanese architecture and its values while providing a guide to what could be appropriate for new design and construction in</p>			<p>The subproject involves building construction. Although not mandatory, the subproject may use this set of guidelines as reference during design phase.</p>		

<b>Regulation</b>	<b>Brief Description</b>	<b>Applicable Consent / Permit Requirement</b>	<b>Governing Agency</b>	<b>Remarks / Relevance to Subproject</b>	<b>Implementation Phase</b>	<b>Responsibility</b>
	Bhutan according to the values found in traditional architecture of Bhutan.					

### C. COVID-19 Pandemic Measures and Protocols

36. In Bhutan, the first patient tested positive for COVID 19 was in March 2020. A year after the pandemic, less than 1,000 positive cases were reported (921 as of April 12, 2021), of which there are 45 active imported cases. So far one death is linked to the virus. Since the detection of the first COVID-19 positive case, several measures have been undertaken. At the national level, there is a National COVID-19 Task Force (NC19TF) chaired by the Prime Minister. This is the highest decision-making body in the country on all policy matters related to COVID-19 management. There are three multi-sectoral Regional COVID-19 Task Force and district and sub-district COVID-19 Task Force in each district. There is also a Health Emergency Management Committee (HEMC) tasked with decision-making regarding the matters related to health emergency management including the surveillance, quarantine and testing based on the scientific evidence.

37. The government, through the Ministry of Health (MOH), has a Media and Risk Communication team responsible for communication and information dissemination to the general public.<sup>19</sup> Measures have been undertaken to prevent the import, transmission, contain and manage the disease are summarized below.

- (i) Creation of COVID-19 Taskforce and zonation in municipalities and districts;
- (ii) Mandatory 21-day quarantine for all in-coming travels arriving in the country from abroad under a designated quarantine facility, and 7-day quarantine for travelers to the border districts;
- (iii) 2 nationwide lockdowns to prevent community transmission, and restrictions on movement after 9PM;
- (iv) Installation and use of Druk Trace App or registry in all public places including public transport, hand wash stations and mandatory use of mask and regular advocacy and dissemination for social distancing through print, broadcast and social media. Protocols for shops, schools and offices;
- (v) Temporary closure of schools and introduction of online classes;
- (vi) Compulsory pre-registration online for all inter-district travel on the Check Post Management System, and quarantine for travelers; and
- (vii) First vaccination of all eligible persons in April 2021.

38. The government also has its COVID 19 Strategies and Protocols (e.g. for import and export of goods, protocols for testing, lockdown, movement with pass, containment of outbreak, containment, decontamination and disinfection, management of dead bodies). Specific standard operating procedures (SOPs) or guidelines are included in the following issuances that can be found on the MOH website, which are being updated from time to time depending on COVID-19 situation in the country.<sup>20</sup> These SOPs or guidelines are applicable to the project.

- (i) MOH, 2020a. SOP for decontamination and disinfection of COVID-19 contaminated area. March 2020;
- (ii) MOH, 2020b. SOP for Safe and Dignified Management of Dead body of Suspected or Confirmed COVID-19, March 2020;

<sup>19</sup> WHO, 2020. Bhutan Decision making for social and movement measures in the context of COVID-19 SNAPSHOT AS OF NOVEMBER 2020. Retrieved from [https://www.who.int/docs/default-source/hgf/bhutan.pdf?sfvrsn=ce5445da\\_9](https://www.who.int/docs/default-source/hgf/bhutan.pdf?sfvrsn=ce5445da_9)

<sup>20</sup> <http://www.moh.gov.bt/covid-19-strategies-protocols-and-guidance/>

- (iii) MOH, 2020c. Containment of COVID-19 outbreak in Cluster Surveillance 2nd-Sept-2020;
- (iv) MOH, 2020d. Additional Measures to prevent and contain local transmission in high-risk areas. May 2020;
- (v) MOH, 2020e. Strategy for Engaging High-Risk Communities for COVID Prevention & Control, April 2020; and
- (vi) MOH, 2020f. National COVID 19 Testing Protocols, December 2020.

39. A contractor has to apply online for foreign workers, after which a limited number may be approved, and there are mandatory protocols and costs to be borne by the contractor. The contractor will be required to have a COVID-19 Standard Operating Protocol (SOP) and plan for its project sites. See Appendix 3.

#### D. Relevant International Conventions and Treaties

40. Bhutan is a party to several multilateral environmental agreements. Of the conventions that are listed, the most relevant to the subproject are in Table 4. There are no elements of the subproject that contravene the direction and intentions of these conventions.

**Table 4: International Environmental Agreements**

	<b>International Environmental Agreement</b>	<b>Ratified</b>	<b>Relevance</b>	<b>Remarks</b>
1	Convention on Biological Diversity (1992)	23 November 1995	Integrate conservation and sustainable use of biological diversity into relevant sectoral plans Identify components of biological diversity important for its conservation and sustainable use.	The IEE process takes into consideration compliance with this agreement.
2	Convention on International Trade in Endangered Species of Wild Fauna and Flora (Washington 1973) – also known as CITES	15 August 2002	Requires Parties to the Convention not to trade in listed species other than in accordance with the Convention	The subproject does not involve any trade in wildlife or plant species.
3	Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)	22 October 2001	Parties are responsible for not undertaking deliberate measures which might damage directly or indirectly the cultural and natural heritage	The IEE process takes into consideration compliance with this agreement. The project's site selection criteria has put a condition that the site must not cause damage to Physical Cultural Resources and follow chance finds procedure

	<b>International Environmental Agreement</b>	<b>Ratified</b>	<b>Relevance</b>	<b>Remarks</b>
				in case of chance finds.
4	Vienna Convention for the Protection of the Ozone Layer	23 August 2004	Phasing out the chemicals that deplete the ozone	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject follows NEC requirements, including prohibition on the use of ozone-depleting substances.
5	UN Framework Convention on Climate Change	25 August 1995	Bhutan has committed to remain carbon neutral, and to keep greenhouse gas (GHG) emissions less than the sequestration capacity of its forests for all times	The IEE process takes into consideration compliance with this agreement. The subproject will ensure to implement measures to reduce emission of greenhouse gases as much as possible.
6	Basel Convention on the Control of Trans boundary Movements of Hazardous Wastes and their Disposal	26 August 2002 (accession)	Management hazardous waste in an environmentally sound manner and to follow a system for trans boundary waste movement	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject follows NEC requirements, including management of hazardous wastes.
7	Montreal Protocol on Substances that Deplete the Ozone Layer	April 2004	Protection of the Earth's ozone layer by phasing out the chemicals that deplete it	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject follows NEC requirements, including

	International Environmental Agreement	Ratified	Relevance	Remarks
				prohibition on the use of ozone-depleting substances.
8	International Plant Protection Convention	June 1994	Prevent and control the introduction and spread of pests and invasive species	The IEE process takes into consideration compliance with this agreement, ensuring that the subproject avoids planting invasive and non-native species.

### E. Gaps in Legal and Guiding Instruments

41. The ADB SPS and national environmental laws are aligned with screening to determine the potential impact of a project on the environment, followed by appropriate environmental assessment, preparation of environmental management plans to avoid, mitigate, minimize and offset environmental impacts. While minor gaps are identified in terms of the other more specific ADB SPS requirements vis-à-vis the national environmental laws, gap-filling measures are available and can be readily complied with by the government through NHDCL as implementing agency. See Table 5.

42. The national procedures are comprehensive enough to ensure that any developmental activity/enterprise in sensitive and critical habitats/ecosystems, and affected rare or endangered species, or extraction of resources in large quantities are avoided from the screening stage. This includes significant impacts on religious and cultural sites as well.

43. Once a project is approved, it requires the proponent to comply to the terms and conditions of the approved Environmental Clearance with compliance monitoring and reporting during implementation of the EMP by the proponent. The project may also be independently monitored by the competent authority or NEC.

**Table 5: Comparison of national regulations and ADB safeguard requirements**

	<b>ADB SPS Principles</b>	<b>National requirements</b>	<b>Extent of Equivalence or Gaps</b>	<b>Gap-filling Measures</b>
1	Conduct screening to determine the extent and type of required environmental assessment	Projects are screened into Green, Blue and Red categories that determine whether the level of environmental assessment  If the development is within the E-1 (environmental conservation), E-2 (forest environments) precincts, the application has to be accompanied by a no objection certificate from the National Environment Commission (NEC).	No gaps	None required
2	Conduct environmental assessment	Green project – No environmental assessment Blue project- initial environmental examination (IEE) is required Red project- environmental impact assessment (EIA) is required	No gaps	None required
3	Examination of project alternatives	Under RECOP, Annex 3, Sections 6 and 8, the project must provide a detailed analysis of the negative and positive impacts of the proposed project and its alternatives including the “alternative of not undertaking the project”.	No gaps	None required
4	EMP preparation is part of IEE and EIA Process	The Environmental Assessment Act (EAA) provides for the formulation of environmental management plans (EMPs). The EMPs must identify environmental risks and address means of avoiding or minimizing adverse impacts (including direct, indirect and cumulative effects) and enhancing positive impacts. Applicants must also set out a monitoring program (both baseline and compliance monitoring) and are responsible for all project monitoring. Project monitoring is undertaken by the Competent Authority (CA) or NEC.  The RECOP provides that: (i) “the CA shall be responsible for monitoring compliance” for projects requiring development consent and environmental clearance (EC), and (ii) the Secretariat [of NEC] shall monitor projects “that do not require development consent”.	No gaps	None required
5	Conduct meaningful consultation with affected people	Public consultation is mandatory for any IEE/EIA. Under the EAA, applicants have a duty to inform and consult with “concerned people” and organizations before submitting the environmental assessment documents to the CA where the project is classified	No gaps	None required



	<b>ADB SPS Principles</b>	<b>National requirements</b>	<b>Extent of Equivalence or Gaps</b>	<b>Gap-filling Measures</b>
		as a “significant project”. NEC or the CA is authorized to “ensure that concerned people are given adequate opportunity to express their views on the project and that their views are adequately taken into account.”		
6	EMP implementation and monitoring (with corrective actions, when needed)	<p>The EAA mentions that Applicants must [also] set out a monitoring program (both baseline and compliance monitoring) and are responsible for all project monitoring (project monitoring is undertaken by CA or NEC).</p> <p>The RECOP requires that EMPs include the proposed mitigation measures, the need to budget mitigation measures, supervision, monitoring and evaluation requirements for the construction, operation and maintenance phases of the project cycle.</p> <p>The RECOP provides that: (i) “the CA shall be responsible for monitoring compliance” for projects requiring development consent and EC, and (ii) the Secretariat [of NEC] shall monitor projects “that do not require development consent”.</p> <p>The Environmental Assessment Act states that “compliance monitoring of projects” is undertaken by the Secretariat [of NEC on becoming aware of non-compliance with the terms or other activities related to a project that may be dangerous to the environment.”</p>	No outstanding gaps in terms of policy. However, EMPs are not normally included in Contractor’s contracts to ensure implementation of EMPs.	Include EMP into Contracts and ensure compliance monitoring and submission of environmental monitoring reports.
7	Establish Grievance Redress Mechanism (GRM)	Different agencies have different GRMs.	Partial gap due to lack of specific guidelines that can be followed by projects.	To ensure equivalence, the project needs to establish a GRM process that could be adopted from the site level to the agency level, including option for access to country’s legal system independently

	<b>ADB SPS Principles</b>	<b>National requirements</b>	<b>Extent of Equivalence or Gaps</b>	<b>Gap-filling Measures</b>
				and regardless of the outcome of the project GRM process.
8	Appropriate public disclosure of EIA/IEE and EMP	Not mandatory to disclose, but documents are available in relevant government agencies.	Partial gap due to lack of specific directives or guidelines requiring mandatory disclosure of environmental assessment documents.	To ensure equivalence, the project needs to disclose the IEE through any means that could reach the general public.
9	Do not implement project activities in areas of critical habitats.	<p>Forest and Nature Conservation Act, 1995; Forest and nature Conservation Rules, Sections 62, 70 and EAA and RECOP relate to this issue.</p> <p>Under Bhutan's laws and regulations, it is prohibited to undertake any human activities within the core zone of a protected area unless determined necessary by forest/ protected area officials to achieve nature conservation objectives. Outside the core area, no construction is allowed except with a written permit or authorization from the MoAF, acting as CA under the EAA. A permit for land clearance may be granted in private lands under strict conditions but not to alter protected area status, water catchment areas and areas containing high forest.</p>	No gaps	None required
10	Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's Environmental, Health and Safety Guidelines. Adopt cleaner production	<p>The NEC sets the permissible emission standards for a) ambient water quality, Industrial Effluent Discharge Standard, Sewage Treatment Plant (STP) Discharge Standards, Ambient Air Quality, Workplace Emission Standards, Vehicular Emission and Noise Limit Standards, Noise Level Limits but this is monitoring is not mandatory for construction</p> <p>The Vehicle fitness test must be done annually by the vehicle owner. The agency responsible for this is The Road Safety and Transport Authority (RSTA)</p>	No gaps in terms of availability of standards in the country. However, the implementation of regulations pertaining to these standards is an issue. Further, the values of the national standards are less strict than the	To ensure equivalence, the project should: (i) comply with the stricter internationally recognized standards or provide justification if the option under the project is to use the national standards; and

	<b>ADB SPS Principles</b>	<b>National requirements</b>	<b>Extent of Equivalence or Gaps</b>	<b>Gap-filling Measures</b>
	processes and good energy efficiency practices.		internationally recognized standard values.  Partial gap in terms of the legislation having no explicit requirement for adopting cleaner processes and good energy efficiency practices, although it might be considered implicit in the legislation	(ii) require the adoption of cleaner technologies and energy efficiency measures.
11	Safe working conditions	The Labor and Employment Act, 2007 governs employment and Occupational health and safety (OHS), including physical or mental health problems related to work.  The Regulation on Occupational Health and Safety for Construction Industry, 2012 and the Regulation on Occupational Health, Safety and Welfare, 2016 have detailed requirements for contractors to follow to ensure the safety, health and welfare for employees and other persons at workplaces.	No gaps	None required
12	Conserve physical cultural resources Provide for the use of “chance find” procedures.	Any development activity within a heritage precinct requires a No objection certificate from the National Commission for Cultural Affairs (MH&CA)  Any valuable cultural property discovered must be immediately reported to the Department of Culture, Ministry of Home and Culture through the concerned Dzongkhag.	Partial gap due to the absence of legislation or regulations to protect “chance finds”.	To ensure equivalence, the project should include chance finds procedure that will be used during the implementation.

## F. Other Statutory Requirements

44. **Application to the Bhutan Power Corporation (BPC).** The subproject will apply to BPC for allocation/installation of meter boxes and electricity connection at the subproject site, and for billing purposes during construction.

## G. Applicable Environmental Standards

45. **Bhutan Environmental Standards 2010 (revised 2020).** The Bhutan Environmental Standards sets the minimum standards for (i) ambient water quality, (ii) industrial effluent discharge, (iii) sewerage effluents, (iv) ambient air quality, (v) industrial emission, (vi) workplace emission, (vii) vehicle emission, and (viii) noise level limits.

46. The Water Act of Bhutan, 2011 and the Water Regulation of Bhutan 2014 apply to all issues relating to water resources and their management. Based on these, there are water quality standards and guidelines, and effluent discharge standards into water resources. For example, the Drinking Water Quality Standards, 2016 ensures safe drinking water. It protects consumer health by describing the quality parameters for drinking water and the maximum permissible limit for each parameter. The Effluent Discharge Standard requires effluents to be treated using best available technology before discharging directly or indirectly to any water resource.

47. Following requirements of ADB SPS, the project shall apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in EHS Guidelines. When the government regulations differ from these levels and measures, the executing agency shall achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the executing agency will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009. In view of this, Table 6, Table 7, Table 8 and Table 9 show the ambient air quality standards, noise level standards, effluent standards and drinking water quality standards to be followed by the project. Other applicable standards are also provided in Table 10, Table 11, and Table 12.

**Table 6: Ambient Air Quality Standards**

Parameter	Averaging Period*	Bhutan's Ambient Air Quality Standard, 2010**(µg/m <sup>3</sup> )			WHO Air Quality Guidelines (µg/m <sup>3</sup> )	
					Global Update <sup>^</sup> 2005	Second Edition <sup>^^</sup> 2000
		Industrial Area	Mixed Area***	Sensitive Area****		
TSP	Annual	360	140	70	-	-
	24-hour	500	200	100	-	-
PM <sub>10</sub>	Annual	120	60	50	20	-
	24-hour	200	100	75	50	-
PM <sub>2.5</sub>	1-year	-	-	-	10	-
	24-hour	-	-	-	25	-
SO <sub>2</sub>	Annual	80	60	15	-	-
	24-hour	120	80	30	20	-
	10-minute	-	-	-	500	-
NO <sub>2</sub>	Annual	80	60	15	40	-
	24-hour	120	80	30	-	-
	1-hour	-	-	-	200	-

Parameter	Averaging Period*	Bhutan's Ambient Air Quality Standard, 2010**(µg/m <sup>3</sup> )			WHO Air Quality Guidelines (µg/m <sup>3</sup> )	
					Global Update <sup>^</sup> 2005	Second Edition <sup>^^</sup> 2000
CO	8-hour	5,000	2,000	1,000	-	10,000
	1-hour	10,000	4,000	2,000	-	-
	15-minute	-	-	-	-	100,000

\* Due to short term duration of civil works, the shortest period will be more practical to use.

\*\* Taken from Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.

\*\*\* 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.

<sup>^</sup> Source: Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.

<sup>^^</sup> Source: Air Quality Guidelines for Europe, Second Edition, 2000; WHO Regional Office for Europe, Copenhagen

**Table 7: Noise Level Standards**

Receptor/ Source	National Noise Standard Guidelines, 2012* (dB)		WHO Guidelines Value For Noise Levels Measured Out of Doors** (One Hour LA <sub>q</sub> in dBA)	
	Day***	Night****	07:00 – 22:00	22:00 – 07:00
Industrial area	75	65	70	70
Mixed area	65	55		
Sensitive area	55	45	55	45

\* Taken from Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.

\*\* Guidelines for Community Noise, WHO, 1999. Source: Environmental, Health and Safety General Guidelines, 2007. International Finance Corporation, World Bank Group.

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

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

**Table 8: Effluent Standards**

Parameters	Unit	NEC Standards, mg/l <sup>a</sup>
Biochemical Oxygen Demand	mg/l	30.0
Total Suspended Solids	mg/l	100
Fecal Coliform	CFU/100ml	1,000
pH	pH scale	6.5 – 9.0
Chemical Oxygen Demand	mg/l	125

Source: Environmental Standards, NEC 2020

<sup>a</sup> Standards for Sewage Treatment Plant Effluent

48. Table 8 provides the standards for effluent for sewage treatment plant which may be the one applicable standards for any potential discharges (overflows) from septic systems (septic tanks and soak pits) of the housing subprojects. In addition, the septic system should comply with the recommendations of World Bank's Environmental, Health, and Safety (EHS) Guidelines, as follows:

- (i) Properly designed and installed in accordance with local regulations and guidance to prevent any hazard to public health or contamination of land, surface or groundwater;
- (ii) Well maintained to allow effective operation;

- (iii) Installed in areas with sufficient soil percolation for the design wastewater loading rate; and
- (iv) Installed in areas of stable soils that are nearly level, well drained, and permeable, with enough separation between the drain field and the groundwater table or other receiving waters.

**Table 9: National Drinking Water Quality Standards, 2016**

Group	National Drinking Water Quality Standards, 2016* (for Urban Drinking Water Supply)			WHO Guidelines for Drinking- Water Quality, 4 <sup>th</sup> Edition, 2011**
	Parameter	Unit	Max. Concentration Limits	
Physical	Turbidity	NTU	5	-
	pH		6.5 – 8.5	none
	Color (TCU)	Hazen Unit	15	none
	Taste and Odor		Non- objectionable	-
Chemical	Iron	mg/l	0.3	-
	Manganese	mg/l	0.4	-
	Arsenic	mg/l	0.01	0.01
	Fluoride <sup>^</sup>	mg/l	1.5	1.5
	Lead	mg/l	0.01	0.01
	Nitrate	mg/l	50	50
	Calcium	mg/l	75	-
	Mercury	mg/l	0.006	0.006
	Residual Chlorine	mg/l	0.2 - 0.5	5 <sup>^^</sup>
Sulphate	mg/l	250	-	
Microbiological	E-coli	CFU/100ml	0	Must not be detectable in any 100 ml sample

\* Taken from Bhutan Drinking Water Quality Standard, 2016, National Environment Commission, Royal Government of Bhutan, 8 March 2016.

\*\* Health-based guideline values

<sup>^</sup> To be tested for ground and spring water only.

<sup>^^</sup> From WHO (2003) Chlorine in Drinking-water, which states that this value is conservative.

**Table 10: Workplace emissions standards**

Parameter	Period	Unit of measure	Standard
Total suspended particulate matter TSPM	8-hour average	mg/m <sup>3</sup>	10
Respirable suspended particulate matter RSPM (PM <sub>10</sub> )	8-hour average	mg/m <sup>3</sup>	5
PM <sub>2.5</sub> <sup>*</sup>	24-hour average	mg/m <sup>3</sup>	25
	1 Year average	mg/m <sup>3</sup>	10
Sulfur dioxide (SO <sub>2</sub> )	8-hour average	mg/m <sup>3</sup>	1
Nitrogen Oxide (NO <sub>x</sub> )	8-hour average	mg/m <sup>3</sup>	1
Carbon monoxide (CO)	1 hour average	mg/m <sup>3</sup>	5
Pb 17 <sup>**</sup>	1 hour average	mg/m <sup>3</sup>	0.0005
Ozone <sup>***</sup>	8-hour average	mg/m <sup>3</sup>	0.08

Source: Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.

PM 2.5<sup>\*</sup> - Gravimetric/light-scattering/beta attenuation-based instruments

<sup>\*\*</sup>National Institute of Occupational Safety and Health (NIOSH) Method 7303

<sup>\*\*\*</sup>UV Photometric/Chemiluminescence/Chemical Method

**Table 11: Motor vehicle emission standards**

Fuel Type	Vehicle registered prior to Jan 1, 2005	Vehicle registered after Jan 1, 2005	Vehicle registered prior to Jan 1, 2021	Vehicle registered after Jan 1, 2021 (Approval type: Euro 6/BS VI)
Petrol (%CO)	4.5%	4.0%	4.0%	0.5%
Diesel (%HSU)	75%	70%	70%	50%

Source: Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.

**Table 12: Vehicular noise level limits**

Sl. #	Type of Vehicle	Noise level limits dB(A)
	Two-Wheeler	
1.1	Displacement up to 80cc	75
1.2	Displacement more than 80cc but up to 175cc	77
1.3	Displacement more than 175cc	80
2	Vehicles used for carriage of passengers and capable of having not more than nine seats including the driver's seat	74
3	Vehicles used for carriage of passengers and capable of having more than nine seats, including the driver's seat and a maximum gross vehicle weight (GVW) of more than 3.5 tonnes	
3.1	With engine power less than 150 KW	78
3.2	With engine power more than 150 KW	80
4	Vehicles used for carriage of passengers and capable of having more than nine seats, including the driver's seat: vehicles used for carriage goods	
4.1	With maximum GVW not exceeding 2 tonnes	76
4.2	With maximum GVW greater than 3 tonnes but not exceeding 3.5 tonnes	77
	Vehicles used for carriage of transport of goods with a maximum GVW exceeding 3.5 tonnes	
5.1	With engine power less than 75 KW	77
5.2	With engine power more than 75 KW or above but not less than 150 kv.	78

Source: Environmental Standards, National Environment Commission, Royal Government of Bhutan, November 2010.

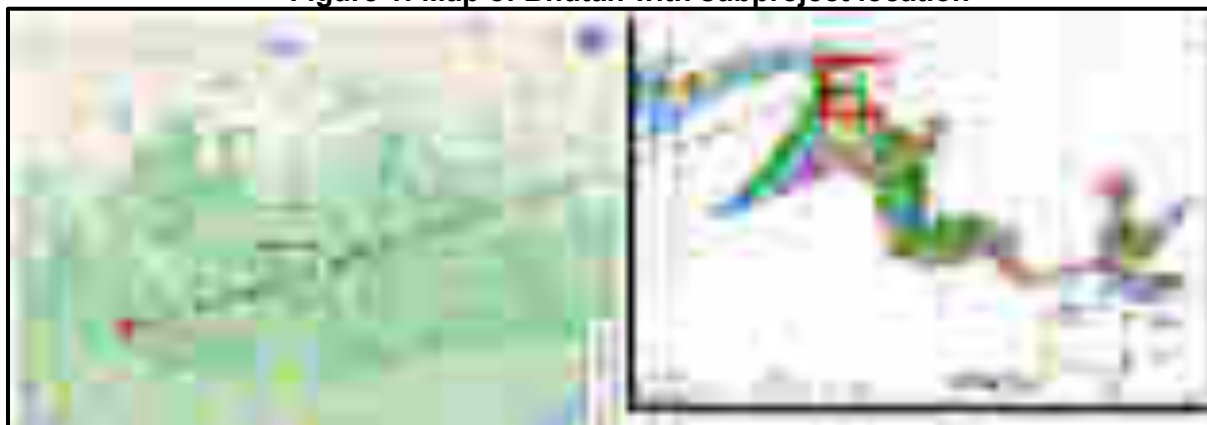
### III. DESCRIPTION OF THE SUBPROJECT

#### A. Subproject Location and Area

49. The proposed site is located at Bangay, about 3 km the center of Phuentsholing Thromde (26°53'13" N 89°22'35" E) at an elevation of 246m. The proposed site is adjacent to the existing NHDCL housing complex. It is in UV-1 precinct, adjacent to the Phuentsholing -Samtse Highway and accessible from this highway. The total site area allocated for the infrastructure work is 2.27 acres and the Land user certificate (Plot number PGT-4034) has been issued to the NHDCL by the National land Commission (Appendix 4)



**Figure 1: Map of Bhutan with subproject location**



Source: NHDCL

**Figure 2: Aerial View and Ground Level View of Subproject Site**





**Figure 3: Another Ground Level Photo of Subproject Site**





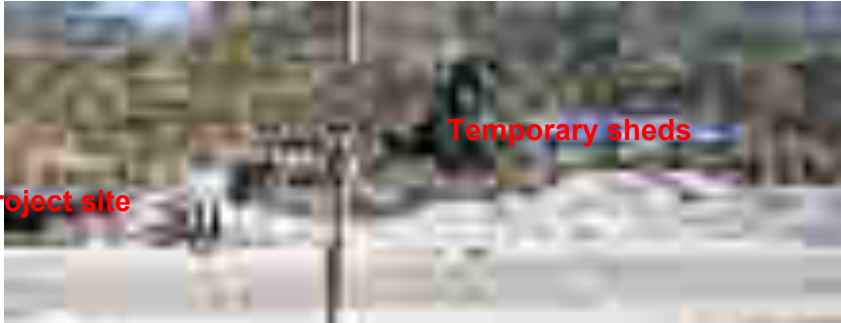

**Figure 4: Map Rendering Showing Subproject Site and Vicinity**










50. Figure 4 above show the various features and notable receptors around the subproject site. Table 13 below provides the ground level photos of these receptors.



**Table 13: Photos of Notable Receptors around the Project Site**

<b>Features / Receptors</b>	<b>Photos of Reference</b>
NHDCL housing Colony – Adjacent to the site	


Features / Receptors	Photos of Reference
	 <p data-bbox="581 411 943 443">NHDCL residential colony</p> <p data-bbox="740 485 899 516">Project site</p>
Residential buildings- 200m Southeast	 <p data-bbox="764 785 1062 816">Residential buildings</p> <p data-bbox="824 1016 984 1047">Project site</p>
Temporary sheds- adjacent to the site (East)	 <p data-bbox="948 1272 1192 1304">Temporary sheds</p> <p data-bbox="477 1346 636 1377">Project site</p>
Residential houses- North (140m) across the drainage site	

Features / Receptors	Photos of Reference
Government reserve forest-50m	
Government Reserve Forest- 50m	
Amochhuriver-175m west	
Phuentsholing-Samtse highway- adjacent to the site and the primary access to the site	
Phuentsholing-Samtse highway-	

Features / Receptors	Photos of Reference
<p>adjacent to the site and the primary access to the site</p>	
<p>PCR location &gt;2km from subproject site (South</p>	
<p>Township subproject ongoing &lt;20m from the site (Southern view from the site)</p>	

Features / Receptors	Photos of Reference
<p>Phuentsholing -Samtse highway and township subproject ongoing &lt;20m from the site (View of the north from the site)</p>	 <p>The highway</p> <p>Project site</p>
<p>Landslide area North of subproject site- 70m</p>	 <p>Drainage and Landslide area</p>



Features / Receptors	Photos of Reference
	

## B. Project Rationale

51. Over the past decades, the growth in urban population due to increasing rural-urban migration and increasing development in urban areas has exerted great pressure on existing services. Phuentsholing has the second highest population (27,658) living within its municipal boundaries. Due to high cost of private rental accommodation, an increasing number of the low-income earners have opted to live in Jaigaon, the border Indian town, coming into Bhutan to work each day. The Drungkhag (Sub-district) collected the details on the families in need of housing in 2017 and 2018 for the distribution of NHDCL housing colonies but only 506 Bhutanese families were allotted the housing facilities in Phuentsholing. It was estimated that more than 2,000 people were living across the border.<sup>21</sup> Since the COVID 19 pandemic surfaced in Bhutan, the government urged Bhutanese to shift to Phuentsholing, or to return to their villages. Over 5,000 Bhutanese were evacuated from Jaigaon and the majority of these were given accommodation in the temporary houses that were built for them at Amochhu. This housing was constructed to provide temporary housing for only two years.

52. Under the 12<sup>th</sup> Five-Year Plan (FYP), the Government has a designated National Key Result Area (NKRA) that aims to improve livability, safety and sustainability of human settlements through access to adequate affordable housing, efficient and effective municipal services, and clean and green public spaces for social engagement. An integral part of this NKRA 15, is the provision of affordable housing, which is the primary objective of this subproject.

53. There are three proposed sites in Phuentsholing, namely: Amochhu, Dungpa's Residence and Rinchending. This IEE report covers the Amochhu site.

## C. Project Alternatives and Site Selection

54. Within the municipality, this site has been chosen in addition to two other sites, which together combined is still inadequate to sufficiently provide affordable housing for the target beneficiaries. Because of the shortage of housing in the municipality, the no-project alternative is not an option. The government has placed great emphasis on improving livability and reducing

<sup>21</sup> Rai, Rajesh. 'Bhutanese residing in Jaigaon starts moving to Phuentsholing', Kuensel, March 17, 2020.

disparities in access to affordable housing for low-income groups, and this subproject is part of the government's effort to reduce housing shortage.

55. Overall, while the housing development is intended for the low-income groups, the site selection has considered several factors that will ensure avoidance of or minimal environmental impacts, and will safeguard the welfare and well-being of the future occupants, such as, but not limited to, the following:

- (i) Complies with all requirements of relevant national, state and local laws, rules and regulations;
- (ii) Complies with all requirements of ADB SPS, 2009;
- (iii) Does not involve components, processes and technologies that pose significant threat to public health and the environment, such as incinerators, etc.;
- (iv) Does not involve works within or near environmentally sensitive locations (must be at minimum distance of 500m), including sites with national or international designation for nature conservation, cultural heritage, or any other purposes;<sup>22</sup>
- (v) Does not result in destruction of or encroachment onto physical cultural resources such as archaeological monuments; heritage sites; and movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance;
- (vi) Does not lead to degradation of cultural properties, and loss of cultural heritage values and tourism revenues;
- (vii) Not located in flood zones and/or adjacent to natural water courses (must not be within 30 meters from the edge of major streams, and/or within 15 meters from the edge of small streams);
- (viii) Does not lead to alteration of surface water hydrology of streams/waterways through diversion of flow or reclamation;
- (ix) Not located in areas that can cause adverse impact on human health, such as but not limited to the following:
  - Municipal solid waste dumps (must be at least 1 km away),
  - Sewage Treatment Plants (STPs) (must be at least 500 m away),
  - Industrial area with polluting industries (must be at least 500 m away or at a distance wherein pollutants will not affect the ambient air quality at the site, whichever is more strict), and
  - High-tension cables (distance must be in compliance with the guidelines of the Bhutan Power Corporation and Bhutan Electricity Authority to avoid long term exposure to high electromagnetic fields [EMF]). The distance from high tension cable should ensure that the EMF is reduced to safe exposure level;<sup>23</sup>
- (x) Area that has sufficient space for all allied infrastructures. If there is no centralized septage management in the town, the area shall have sufficient space for septic tanks/chambers designed to accommodate target number of occupants;
- (xi) Avoids area with risk of landslides, unstable lands, etc. based on historical data, including geotechnical studies, if possible;

<sup>22</sup> If corresponding development control regulations similar to Thimphu's DCR-2016 is promulgated by Phuentsholing in the future, the subproject shall comply with these local regulations particularly on sanctions pertaining to allowed locations for housing developments.

<sup>23</sup> US EPA: Questions and Answers About Electric and Magnetic Fields (EMFs).

- (xii) Avoids removal of trees where possible. When mature trees must be removed, new trees must be planted following the compensatory replacement required by the government;
- (xiii) Area that is included in territorial jurisdiction of the municipality/town/city (Phuentsholing municipality for this subproject), compliant with land use regulations, and any urban development plans or master plans of the national or local government;
- (xiv) Area where access to basic services can be practically built or established. These basic services include water supply, sewerage system, electricity, telecommunication, sanitation/solid waste management, etc.;
- (xv) If area is outside the periphery of the urban center, the area should be accessible via public transport and/or has road infrastructures leading to civic centers, markets, institutions such as hospitals, schools, etc.;
- (xvi) Does not adversely affect the existing community resources/ facilities, such as roads, sanitation services, water supply, solid waste management, power supply, parking spaces, etc.; and
- (xvii) Ensures that the subproject design will not lead to depletion of water supply and degradation of groundwater and surface water in the area. The following should be considered:
  - Conservation measures integrated into the design;
  - Water supply is sufficient during the operation phase. Liaising with water supply provider should be part of the consultation and assessment; and
  - Not to overburden the sewerage system and other infrastructures in the area.

#### D. Subproject Components and Design

56. The subproject is one of nine subprojects designed by the NHDCL that will provide affordable housing in six dzongkhags (districts), bringing the above benefits (and others) to about 1,026 – 1,062 urban households - mostly low-income civil servants, corporate employees and wage workers. For the Amochhu Subproject, it involves construction of five six-storey (G+5 floors) residential buildings with total of 120 units. These buildings will be built on 2.27 acres of land and will cover about 23.6% of the land area, complemented with internal access road and parking. Table 14 shows the size of the various components of the subproject.

**Table 14: Details of the Housing Complex**

Sl. No.	Building Type	Number of Buildings	Total Number of Units	Remarks
1	Category III (Type 2)	1	24 (1 building x 6 floors per building x 4 unites per floor)	Plinth Area(1 <sup>st</sup> Floor): 389.9 m <sup>2</sup> (4,195.32 ft <sup>2</sup> )  Unit Area: 97.48 m <sup>2</sup> (1,048.83 ft <sup>2</sup> )
2	Category IV (Type 2)	3	72 (3 buildings x 6 floors per building x 4 units per floor)	Plinth Area(1 <sup>st</sup> Floor): 308.64 m <sup>2</sup> (3,320.97 ft <sup>2</sup> )  Unit Area: 77.16 m <sup>2</sup> (830.24 ft <sup>2</sup> )



Sl. No.	Building Type	Number of Buildings	Total Number of Units	Remarks
3	1 BHK (1 Bedroom, hall, kitchen)	1	24 (1 building x 6 floors per building x 4 unites per floor)	Plinth Area(1 <sup>st</sup> Floor): 220.7 m <sup>2</sup> (2,374.73 ft <sup>2</sup> )  Unit Area: 55.19 m <sup>2</sup> (593.844 ft <sup>2</sup> ) (Including balcony)
Total		5	120	
Facilities				
4	Internal road and parking	To fit 48light vehicles and 25 two-wheelers (cumulative area of 1,363.95 m <sup>2</sup> )		
5	Other facilities <ul style="list-style-type: none"> <li>• Drinking water storage tanks</li> <li>• Rain water harvesting tank</li> <li>• Pedestrian footpath</li> <li>• Recreational area/Green space</li> </ul>			

**Figure 5: Site Layout of the Housing Complex**



### 1. Building Design<sup>24</sup>

<sup>24</sup> The building designs presented in this IEE report are preliminary, which may be updated accordingly. NHDCL will comply with all relevant regulations such as the Bhutan Building Code 2018, Bhutan Building Regulations 2018, etc., including the requirement for emergency or fire exits as may be required.

57. The buildings are designed keeping in mind the location within the Local Area Plan, Building Regulation, 2018 and the Bhutan Building Code, 2018. These set out the requirements which apply to the construction of buildings. These regulations and codes prescribe the building dimensions, circulation space requirements, design standards, detailing of structures, light and ventilation requirements, water supply and sanitary control, electrical requirements and standards, fire safety, access, parking and provisions for disabled persons.

58. The structural design is in line with the following Special Publications and Indian Standards:

- (i) IS 13920\_2016 (Ductile Design of Reinforced Concrete Structures);
- (ii) SP16 (Design Aids for Reinforced Concrete to IS 456);
- (iii) IS 1893 Part 1 - 2016 (Criteria for Earthquake Resistant Design of Structures);
- (iv) IS 4326-2013 (Earthquake Resistant Design and Construction of Buildings);
- (v) IS 800 (Code of Practice for General Construction in Steel);
- (vi) IS 875\_1 (Code of Practice for Design Loads-Dead Loads);
- (vii) IS 875\_2 (Code of Practice for Design Loads- Live Loads);
- (viii) IS 875\_3 (Code of Practice for Design loads- Wind loads); and
- (ix) SP 34 (Handbook on Concrete Reinforcement and Detailing).

59. The designs also comply with the Bhutan Green Building Guidelines, 2013, Bhutanese Architecture Guidelines, 2014, Bhutan Building Color Code, 2014 and the Design Guidelines for Differently Abled Friendly Construction, 2011.

60. The **Category III (Type II) building** will include 1 Living room, 2 Bedrooms, 2 Toilets, 1 Kitchen and 1 Balcony. Each unit area is 97.48 square meter (m<sup>2</sup>) (1048.83 sq. ft) and the Plinth Area (1Floor) will total 389.9 m<sup>2</sup> (4195. 32 sq.ft). The building will also have a lift and a fire exit

61. The **Category IV (Type II) building** will include 1 Living room, 2 Bedrooms, 2 Toilets, 1 Kitchen, 1 Balcony. Each Unit area is 77.16 m<sup>2</sup> (830.24 sq. ft) and the Plinth Area (1Floor) is 308.64 m<sup>2</sup> (3320.97 sq. ft). The building will also have a lift and a fire exit

62. The **One Bedroom apartment building** will include 1 Living room, 1 Bedrooms, 1 Toilet, 1 Kitchen and 1 Balcony. The building will also have a lift and a fire exit. Each Unit area is 55.19 m<sup>2</sup> (593.844 Sq. ft) (including balcony) and the Plinth Area (1Floor) is 220.7 m<sup>2</sup> (2374.73 Sq.ft)

**Table 15: Overview of External Façade or Building Sections<sup>25</sup>**

<b>Category</b>	<b>External Façade/Building Section</b>
Category III (Type II) building	
Category IV (Type II) building	
One bedroom apartment	

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<sup>25</sup> See footnote 32.

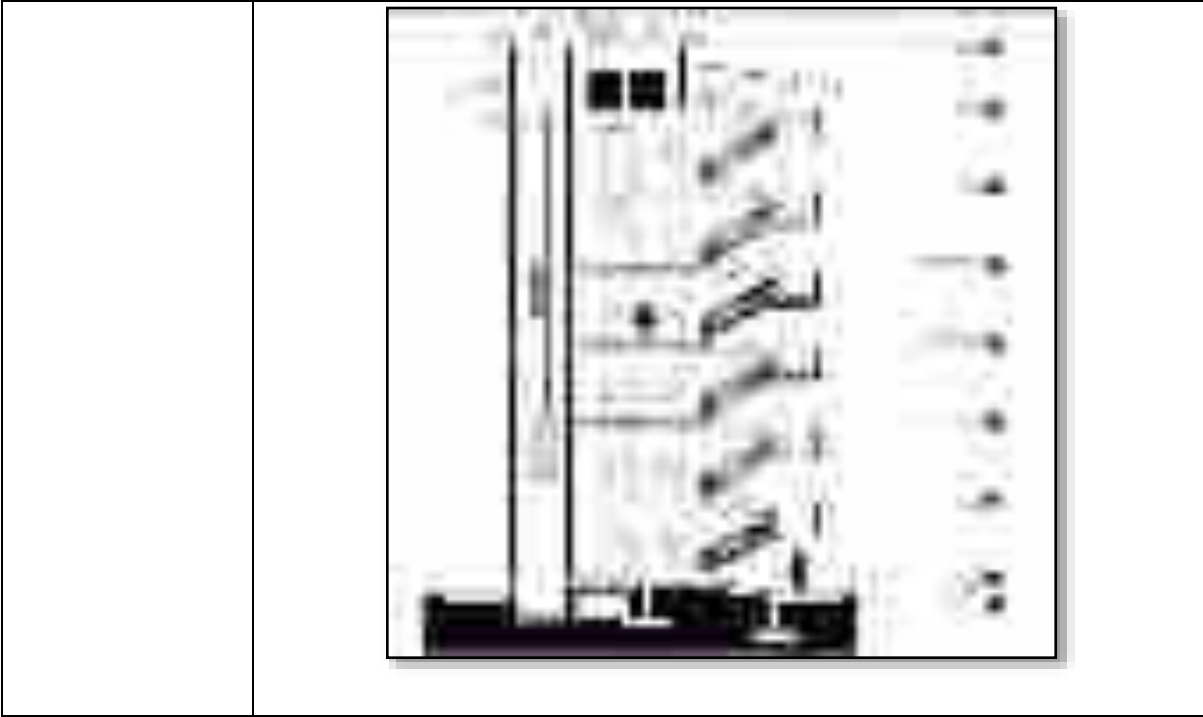
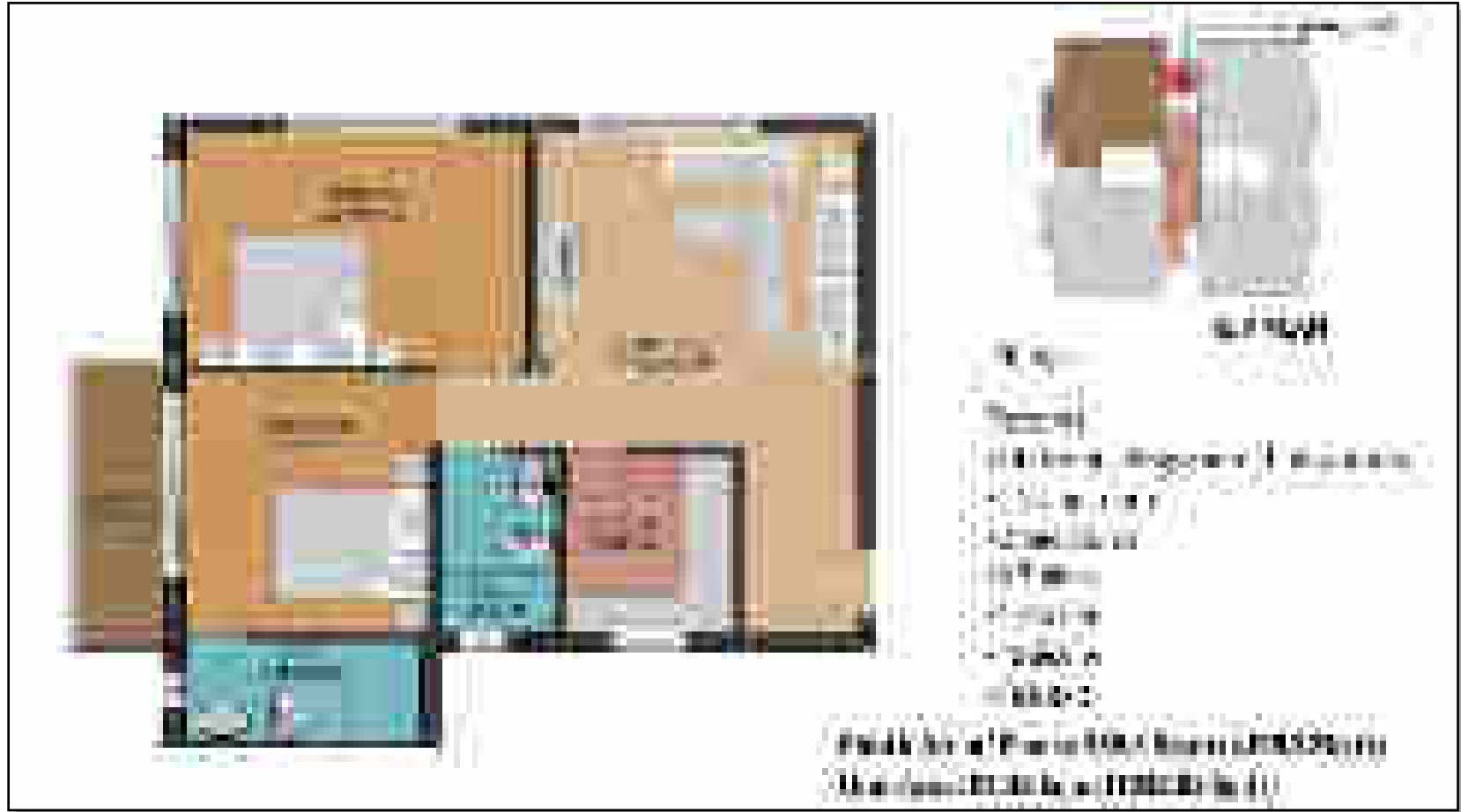


Figure 6: Layout Plan for Category III (Type 2)<sup>26</sup>



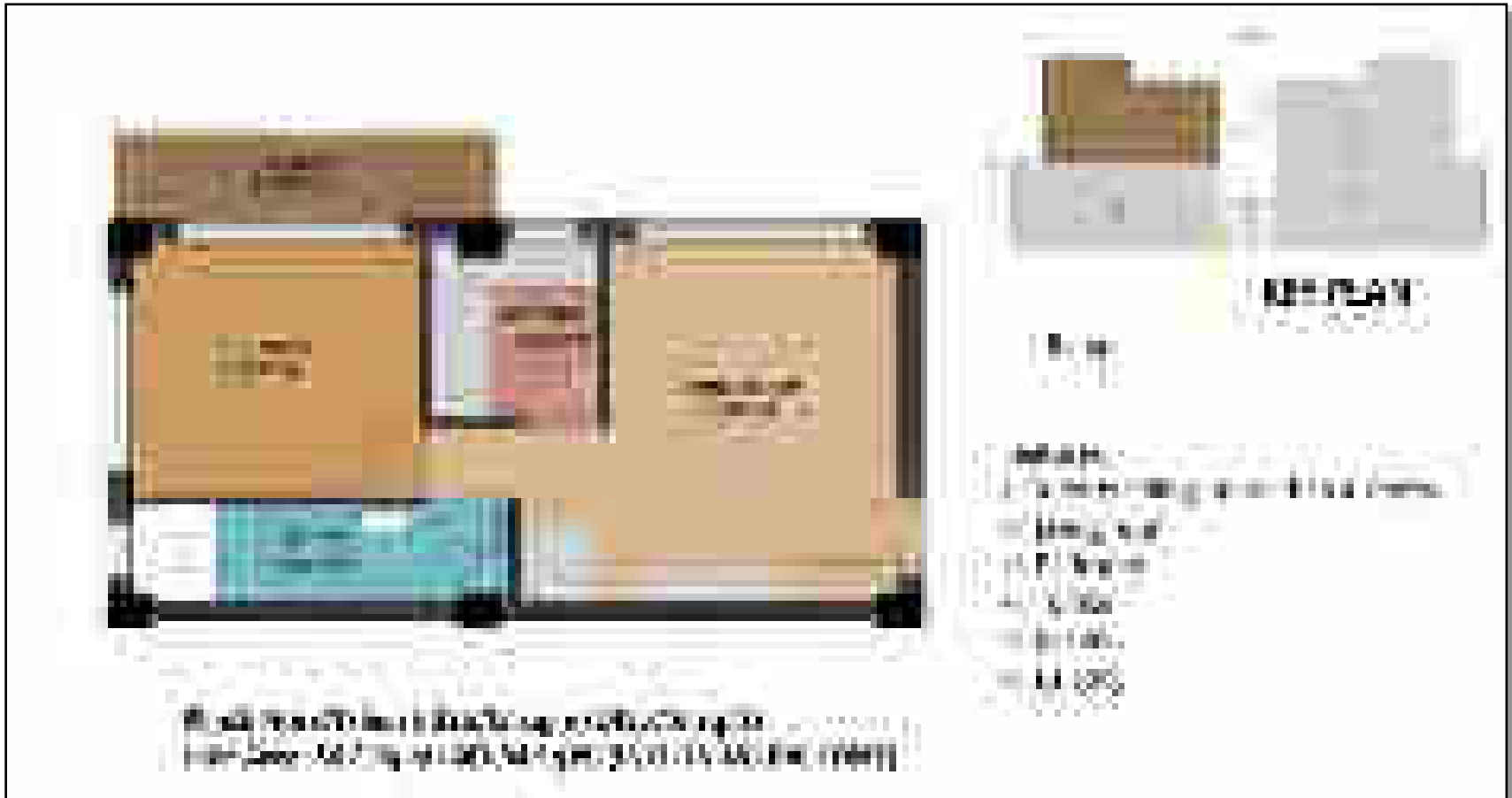
<sup>26</sup> See footnote 32.

Figure 7: Layout Plan for Category IV (Type 2)<sup>27</sup>



<sup>27</sup> See footnote 32.

Figure 8: Layout Plan for One bedroom apartment<sup>28</sup>



<sup>28</sup> See footnote 32.

63. **Site preparation works.** This will include site clearance and site development works which will be carried out six months before the actual construction work, during which the site will be prepared for installation of the prefabricated structures.

64. **Design Capacity.** For this housing development, the design assumes five persons to reside in each unit in the larger category apartments, and three to reside in the single bedroom apartment, which translates to about 552 total residents in this housing complex. As such, the amenities and facilities are designed according to this target number of residents, such that the capacity of drinking water storage tanks, rainwater harvesting tanks and septic tanks are sufficient.

65. **Water supply details.** The municipality is responsible for ensuring regular supply of water to all residential establishments in its jurisdiction. There are three water supply schemes in Phuentsholing and the subproject site will be provided with water from the north treatment plant that has a capacity of 2,000 m<sup>3</sup>. Augmentation of water supply is also envisaged in the future through a separate ADB-funded Water Flagship Program, wherein Phuentsholing Thromde has proposed to construct intake structures, transmission line, reservoir, river training works and Water Treatment Plant (3 MLD) at Amochhu.<sup>29</sup>

66. Each building will be provided with four 2,500-liter overhead water tanks. Thus, the total storage capacity in the residential buildings is 5000 liters. On average each person will consume about 100 liters of water per day.

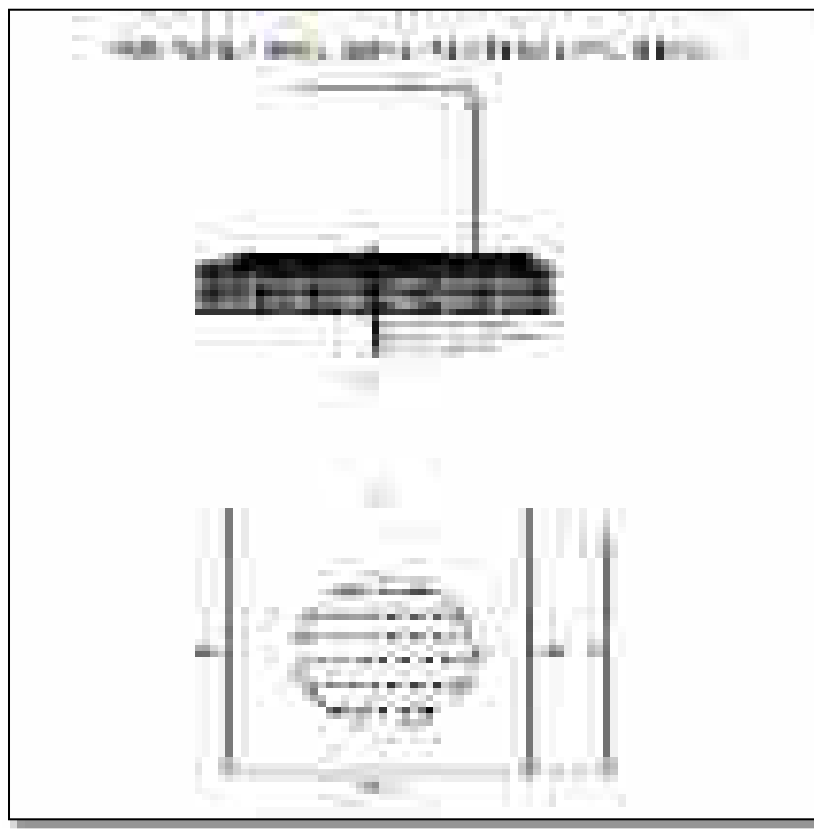
**Table 16: Daily Water Requirement Calculation**

Building	Total Number of Units	Number of Persons	Water Consumption
Category III (Type-II)	24 units	24 x 5 persons = 120 persons	120 persons x 100 liters/person = 12,000 liters
Category IV (Type – II)	72 units	72 x 5 persons = 360 persons	360 persons x 100 liters/person = 36,000 liters
1BHK Building	24 units	24 x 3 persons = 72 persons	72 persons x 100 liters/person = 7,200 liters
Total for Residential Buildings			55,200 liters

67. **Rainwater harvesting.** To further supplement the water storage tanks, a 2,500-liter capacity rainwater storage tank will also be installed on the upper slopes near the water tanks. Figure below shows the rain water harvesting tank details.

<sup>29</sup> Department of Engineering Services, MOWHS. 2020. Water Flagship Program. Access to 24x7 safe drinking water with irrigation.



**Figure 9: Rainwater Harvesting Tank details**

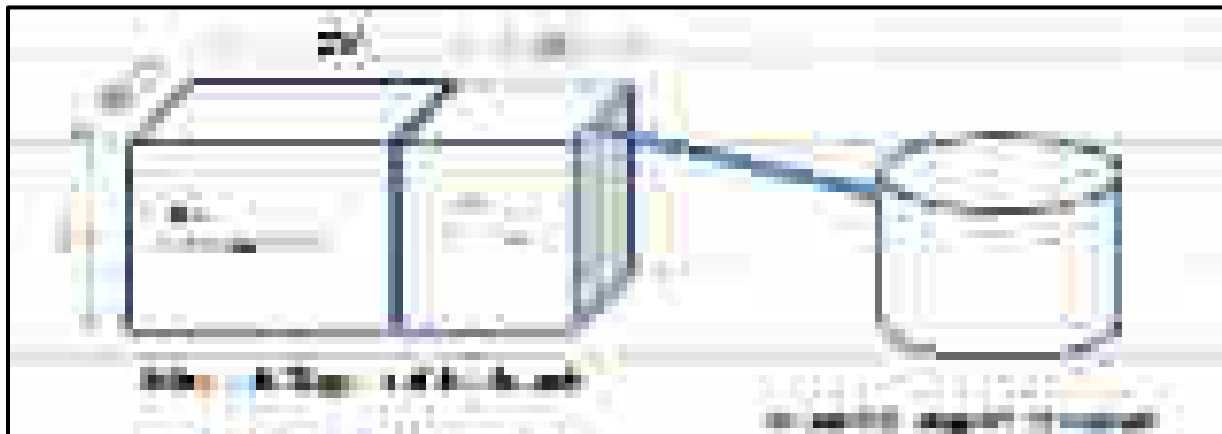
68. **Septic tank and soak pits.** The septic tank will receive both water closet (WC) waste and sullage from the buildings. In this housing complex there is one proposed septic tank and soak pit. Based on the number of buildings connecting to the septic tank the standard dimensions of septic tank including wall is 12.6 m x 4.2 m. The tank will have 4 soak pits (2 m diameter) and the septic tank will have two sections; Settling chamber 1 (8.4 m x 4.2 m) and Settling chamber 2 (4.2m x 4.2m). The water will seep from the soak pit into the ground.

**Table 17: Calculation for Septic Tank Sizes**

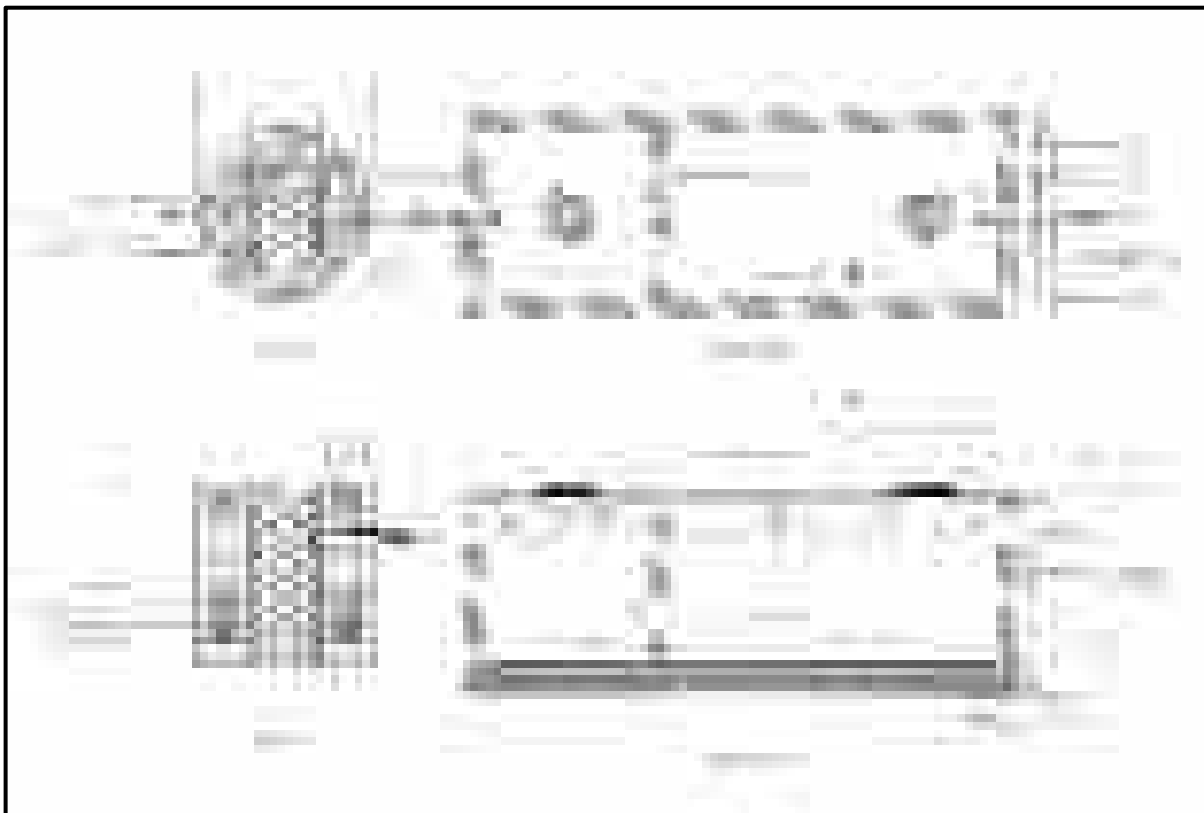
Design Data / Parameters	Remarks
Average number of persons per unit	5 for 2 bedroom, 3 for 1 bedroom
Total number of septic tanks	1
Total number of persons	552
Septic tank will receive both WC waste and sullage	Yes
Volume of sewage entering the tank daily	51,030 liters
Ambient temperature in Winter	20 degrees Centigrade
Retention period for the wastewater in the septic tank	24 hours
Period between desludging	2 years
Depth of tank	1.7m
Gap between water level and underside of cover slab	0.3m
Length to breadth ration of tank	3
<b>Calculation</b>	
Sewage flow	121.5 liters
Sizing factor	1.15

Design Data / Parameters	Remarks
Sludge and scum accumulation rate/person/year	40 liters
Volume of sludge and scum	38,640 liters
Required tank volume	89,670
Plan area of tank	52.75 m <sup>2</sup>

**Figure 10: Schematic Diagram of Septic Tank and Soak Pit (3-D)**



**Figure 11: Schematic Diagram of Septic Tank and Soak Pit (Top View / Cross Section)**



**Figure 12: Schematic Diagram of Interception Pit and Manhole Chamber**



**Figure 13: Storm Water Canal/Drainage Adjacent the Site**



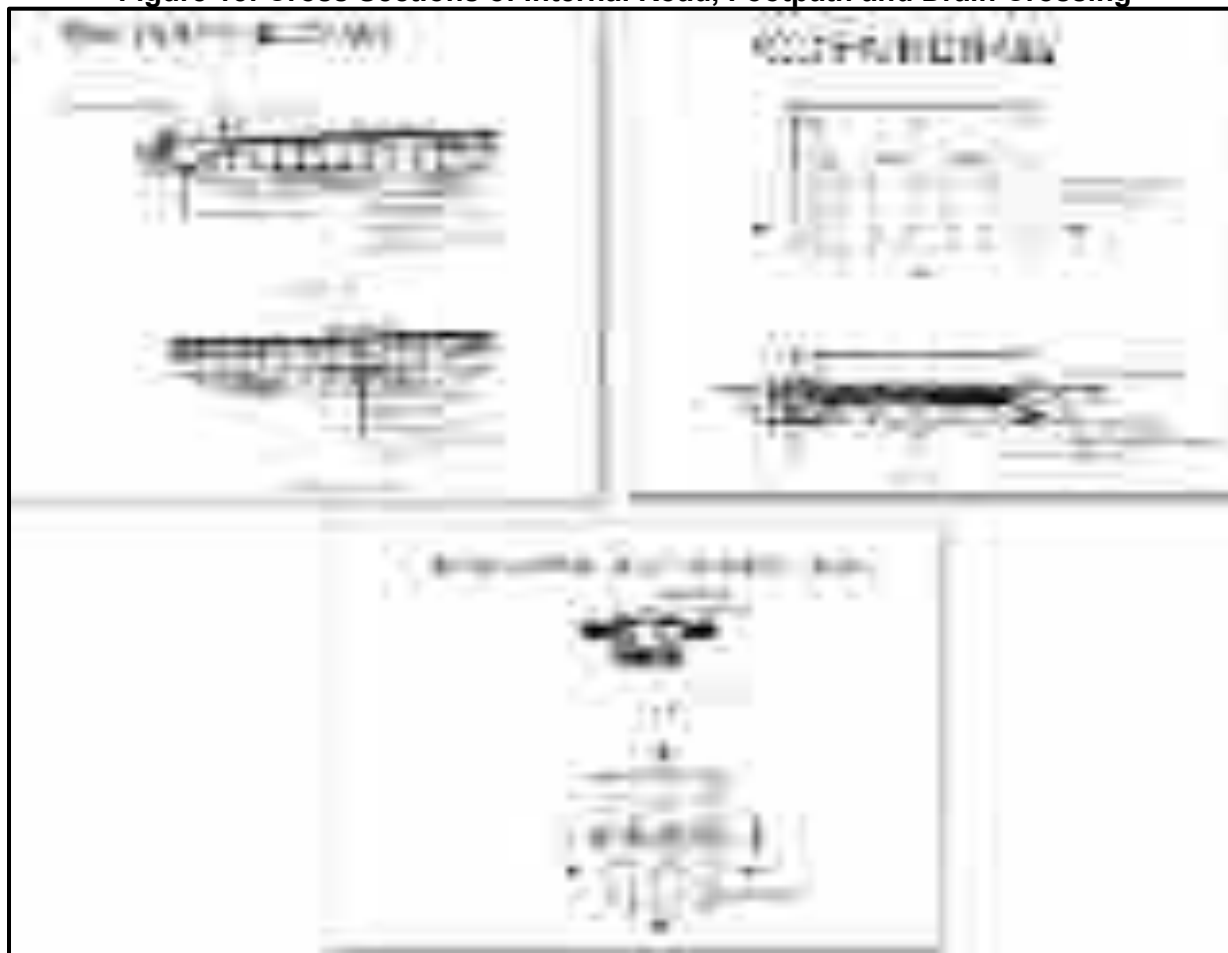
69. **Plumbing and Sanitation.** The plumbing and sanitation design are in compliance with applicable plumbing codes of practice. The designs include details on kitchen, bathroom and WC outlets; the location of the septic tank and soak-pit, including manhole, layout plan of the internal plumbing system of each floor, with details of pipe sizes and material. Water meters will be provided for each dwelling unit; the building drains will be connected to the secondary storm water drain of 450mm wide and the secondary storm water drain will be connected to main storm water drain.

70. **Site accessibility, entry, exit and internal roads.** The proposed main access to the site is from the Phuentsholing-Samtse highway. There will be only one entry and exit for the site. In the site the parking is designed to accommodate 48 light vehicles and 25 two-wheelers. The following figure shows the access road and parking details. From the main parking, internal roads to connect each building will also be accessible through the pedestrian staircase from the Parking. The housing complex will have a boundary wall with chain link fencing. The black road towards the back of the site is the Local Area Road that is proposed for the future.<sup>30</sup>

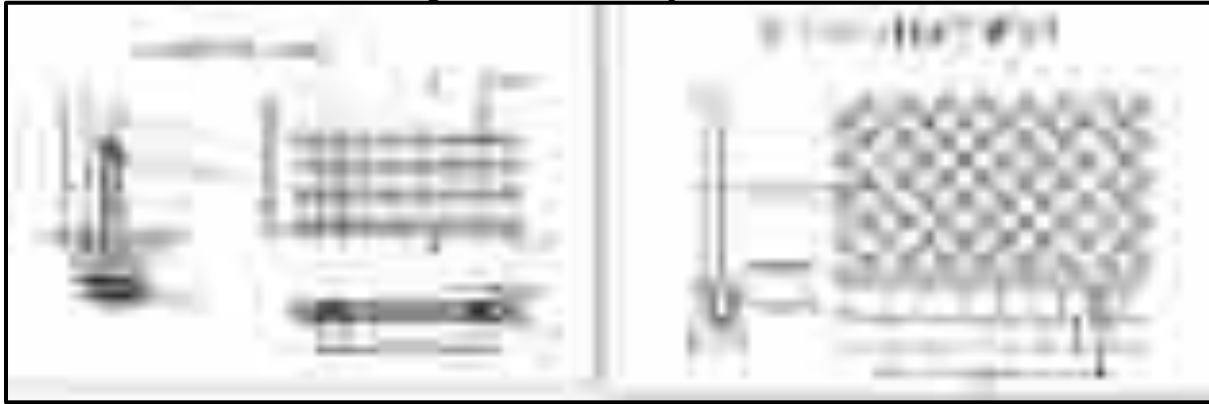
**Figure 14: Access Road and Parking**



**Figure 15: Cross Sections of Internal Road, Footpath and Drain Crossing**



<sup>30</sup> As per NHDCL design team

**Figure 16: Boundary Wall Details**

71. **Building construction materials.** This includes reinforced concrete cement (RCC) for footing, steel sections for columns, beams and floor joist. Random rubble masonry (RRM) wall for foundation, hard stones for stone filling; cement, sand, graded crushed rock for concrete works. Thin RCC slab, aerated autoclaved concrete blocks (AAC) for walls, fiber-reinforced plastic (FRP) for window frames and cornices. Wood plastic composite (WPC) for door frames. Tiles for flooring, unplasticized polyvinyl chloride (UPVC) for windows. PVC for ceiling. Mild steel for railings, steel tubular truss, pre-painted galvanized iron (PPGI) sheet roofing. For toilets and drainage, chlorinated polyvinyl chloride (CPVC) pipes, (high density polyethylene (HDPE) Pipe, Indian-type vitreous water closet squatting pan and European-type vitreous water closet pedestal for plumbing and sanitary works. Materials codes, Indian Standards (IS) and specifications are as follows:

- (i) Steel: IS 800:2007, SP6:1972 (Part 1-6), IS 1161:1998 (Tubular Sections), IS 808:1989;
- (ii) Concrete: IS-456\_2000 ( Plain \_ Reinforced Concrete Code of Practice);
- (iii) Masonry (manufactured): IS 2185:2005 (Part 1);
- (iv) Wood: IS 3629:1986, IS 883:1994; and
- (v) Earth and stone: IS 2185:2005 (Part 1).

72. Specific to major construction earth-based materials such as aggregate, sand and stone, these will be sourced from local authorized suppliers from Phuentsholing. Other materials such as plywood, tiles and bathroom fixtures will be purchased from local suppliers or directly from India.

73. **Construction Technology.** The buildings will be made of prefabricated material. The contractor will engage earth moving equipment, excavators, tower cranes if available, prefabrication of doors and windows off site, use of construction management software to manage, monitor and ensure timely delivery of projects.

74. **Disaster and emergencies.** The buildings are designed for seismic performance (IS 1893:2016, Zone V,  $Z=0.36$ ,  $I=1.37$ ,  $R=5$ , Damping=5%). A Retaining wall along the perimeter is proposed at the boundary of the NHDCL site. Other climate proofing considerations are integrated into the design to ensure the infrastructures can withstand natural disasters such as earthquakes and floods.

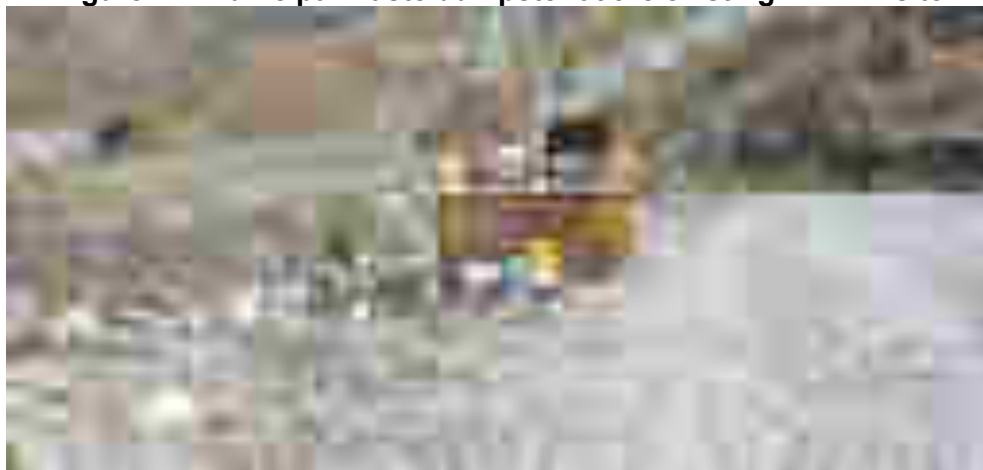
75. **Fire safety.** In terms of fire safety, the building designs are in compliance with the Bhutan Building Standard (BTS)-014 and Part 6 of the Building Code 2018. According to the Code, Exits

must be located so that the travel distance to the exit on each floor does not exceed the distances set out in the table at the foot of this clause. For Residential Building the travel distance is 22.5m.

76. Each building will be provided with a fire dry hydrant that will be utilized when the fire engines are mobilized from the Thromde during a fire emergency. A hose pipe will be stored in the staircase landing area of the selected building.

77. **Solid Waste Management.** At the existing NHDCL site, there is a communal waste dumpster wherein waste is dumped by the residents and picked up by the waste collectors once a week. Currently there are at least two private waste dealers who buy recyclable waste. Both are located within 700m of the subproject site so residents can segregate their waste and sell these to the private dealers.

**Figure 17: Municipal waste dumpster at the existing NHDCL site**



**Figure 18: Individual pet bottle buyer (left photo) and waste dealer at Amochhu**



78. **Green area and landscaping.** 20.86% of the land will be left as green area. The green area is located towards the extreme left where the and easily accessible to all buildings through pedestrian footpaths. Once the construction is over, the green area as well as periphery of the site will be planted with local species. Although the plan for the green area is still under process, much of this area will be left as open space with a few benches and tables.

**Figure 19: Location of Proposed Green Area**

79. **Aesthetics.** The Architectural drawings will comply with the Bhutanese Architecture Guidelines 2014 and the external façade of the buildings will be compatible with existing buildings and structures in the local area. Wherever possible, local building materials will be used.

#### **E. Subproject Implementation Schedule**

80. The preliminary design works have already begun and once the final approvals have been obtained, the contract works will be advertised. Site works are expected to begin as soon as contractors are selected. Pre-site development works to prepare the site for installation of the prefabricated buildings is expected to take 3 months. The construction work will be completed in 24 months, after which post construction activities will be undertaken (6 months).

**Table 18: Work Schedule**

	Activity	Months Period				
		1-2	3-4	4-6	6-32	33-39
1	Approval of architectural drawings					
2	Preparation of BOQ					
3	Advertisement, selection and contract award					
4	Establishment of PIU and supervision team					
5	Site development works (3 months)					
6	Construction (24 months)					
7	Post development works (6 months)					



## F. Resource Utilization

81. The construction of the buildings will require a significant number of resources. With the design process still ongoing, the total required amount of each resource is yet to be quantified. In general however, the major construction materials required include stones, aggregates, sand, cement, AAC blocks, Glassfibre reinforced concrete (GRC), glass, steel and timber. Most of the materials will be sourced from authorized local suppliers within Phuentsholing and Thimphu.

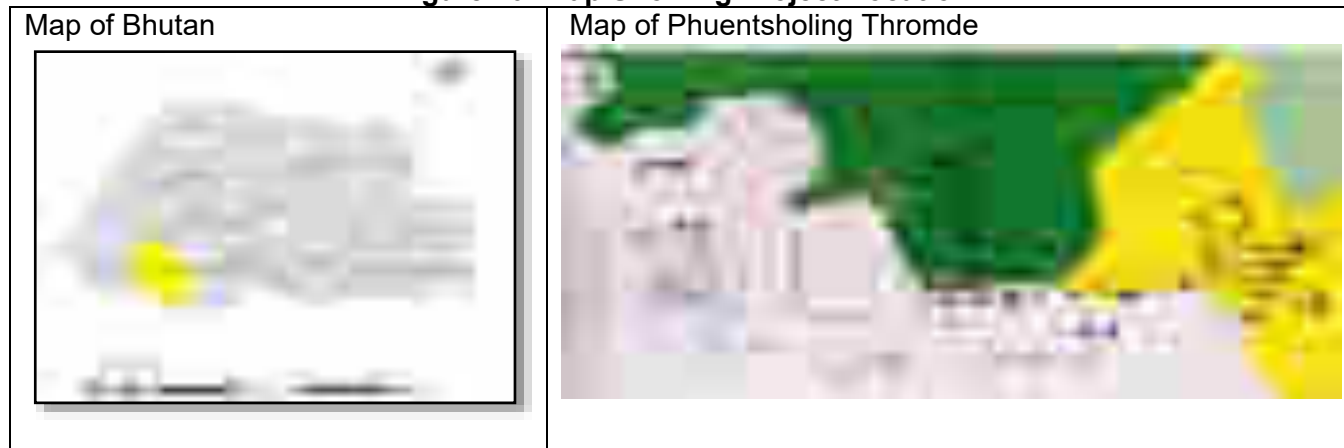
82. Approved construction materials approved will be sourced from local Bhutanese manufacturers (TMT rods, bricks, cement) but others such as tiles, paints, lights, plumbing and interior fixtures will most probably be imported from India (or otherwise as determined by NHDCL) as Bhutan does not manufacture these items.

## IV. DESCRIPTION OF THE ENVIRONMENT

### A. Baseline information

83. The Thromde lies within Phuentsholing Dungkha (Sub divisional district), which is administratively part of the 1882.38 square kilometer (km<sup>2</sup>) Chukha Dzongkhag.<sup>31</sup> Phuentsholing Thromde is strategically located at the border and is the western point of entry by road from India into Bhutan and is the primary gateway to Bhutan. It also serves as the western commercial and industrial hub. It was established by the Parliament in 2010 as a Class A Thromde with an area of 15.6 sq km.<sup>32</sup>

**Figure 20: Map Showing Project Location**



Source: MOWHS, 2019<sup>33</sup> and 2010.

<sup>31</sup><http://www.chukha.gov.bt/index.php/about-district>

<sup>32</sup> MOWHS, 2010. Approved Thromdes and Boundaries

<sup>33</sup> MOWHS, 2019. Flood hazard assessment for Chukha Dzongkhag. Flood Engineering and Management Division. Department of Engineering Services  
MOWHS, 2016. Compliance-and-Development-Review-of-Phuentsholing-Throm. Department of Human Settlement, MOWHS



**Figure 21: Project Site Location**

Source. Phuentsholing Thromde)

84. Phuentsholing has been classified as a Class A Thromde<sup>34</sup> and extends from Amochhu to Pasakha along the southwestern foothills. It comprises of six constituencies (Demkhongs), each represented by an elected people's representative (Tshogpa). It has 11 Local Area Plans, all of which are under implementation except for Pasakha and Allay.

### **B. Project Influence Area**

85. The major environmental impacts during both construction and operational phases (e.g., drainage congestion, noise/air pollution, water/environmental pollution, traffic congestion) are unlikely to affect areas beyond 200m from the subproject site. Thus, the 200m from the subproject boundaries are considered as the subproject influence area.

<sup>34</sup> Criteria for designating Thromdes (Thromde Act of Bhutan 2007 and Thromde Rules 2011- classifies a Class A Thromde as one with a resident population of more than 10,000 irrespective of their census; a population density of 1000 persons or more per square kilometers; an area of not less than 5 square kilometers.

**Figure 22: Distances of Nearest Receptors Around the Subproject Site**



### **C. Land Environment**

86. **Topography, Geology and Soil.** Bhutan has very rugged terrain with elevations ranging from 160 to more than 7,000 meters above sea level (masl).<sup>35</sup> Phuentsholing Thromde occupies an area of 15.6 km<sup>2</sup>. or 1,560 hectares. It lies within the wet sub-tropical agro ecological zone at elevations between 160 – 600 masl.

87. The subproject site is located within the floodplains of the Amochhu valley on flat land. The site itself is on flat land, with very little slope cutting only (a few meters) in the center. However, as can be seen from the figure below, just 50 m behind (Northeast of the site), the terrain changes drastically, with the hills rising, with increasing altitude.

<sup>35</sup> NSB. 2020. Statistical yearbook of Bhutan 2020. National Statistical Bureau

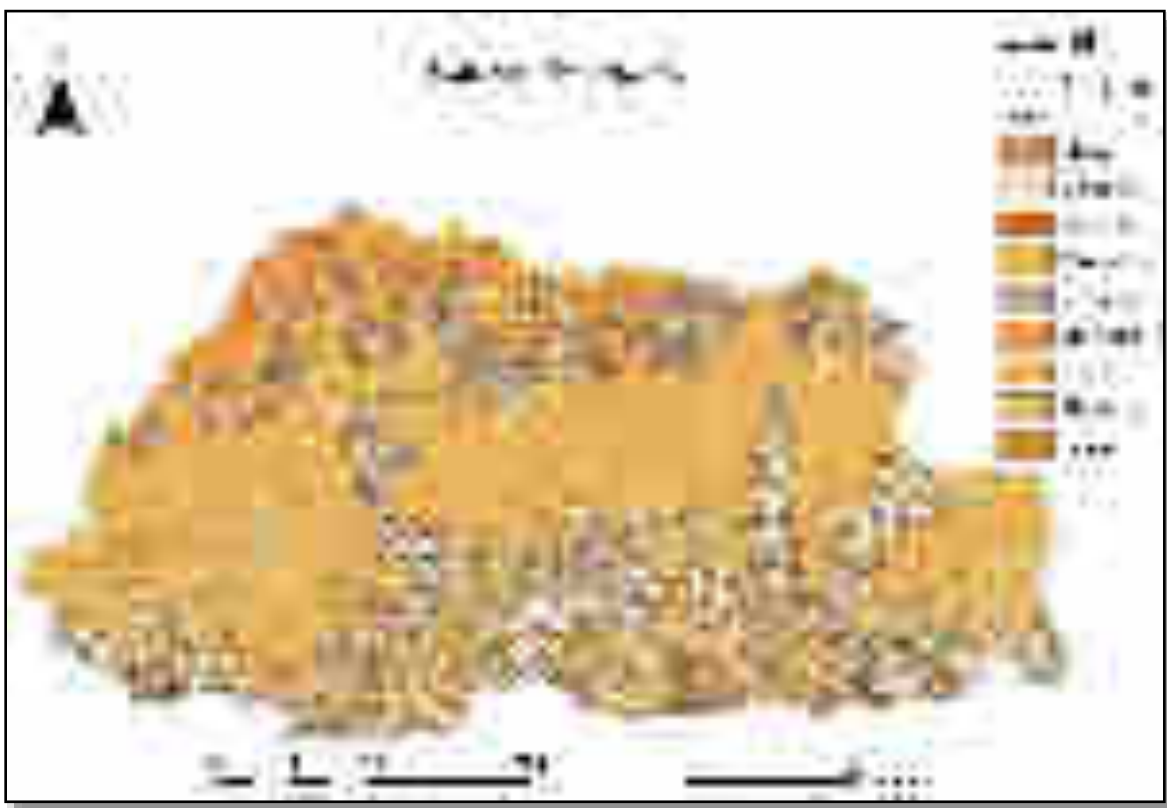
**Figure 23: Contour Map Showing Elevations at the Subproject Site**



88. Bhutan has three geological zones and Phuentsholing lies in the Frontal Belt that makes up the foothills and parts of the Lesser or Lower Himalaya. This Frontal Belt consists of recent deposits of sand, gravel, and boulders in the foothill terraces. The geology in Phuentsholing area, called the Phuentsholing Formation of Baxa Group of rocks, consists of variegated phyllite (which is highly weathered, fractured and at places decomposed to residual soil. It also comprises of talcose phyllite with thin bands of grayish white quartzite, limonitic quartzite, dolomite bands and

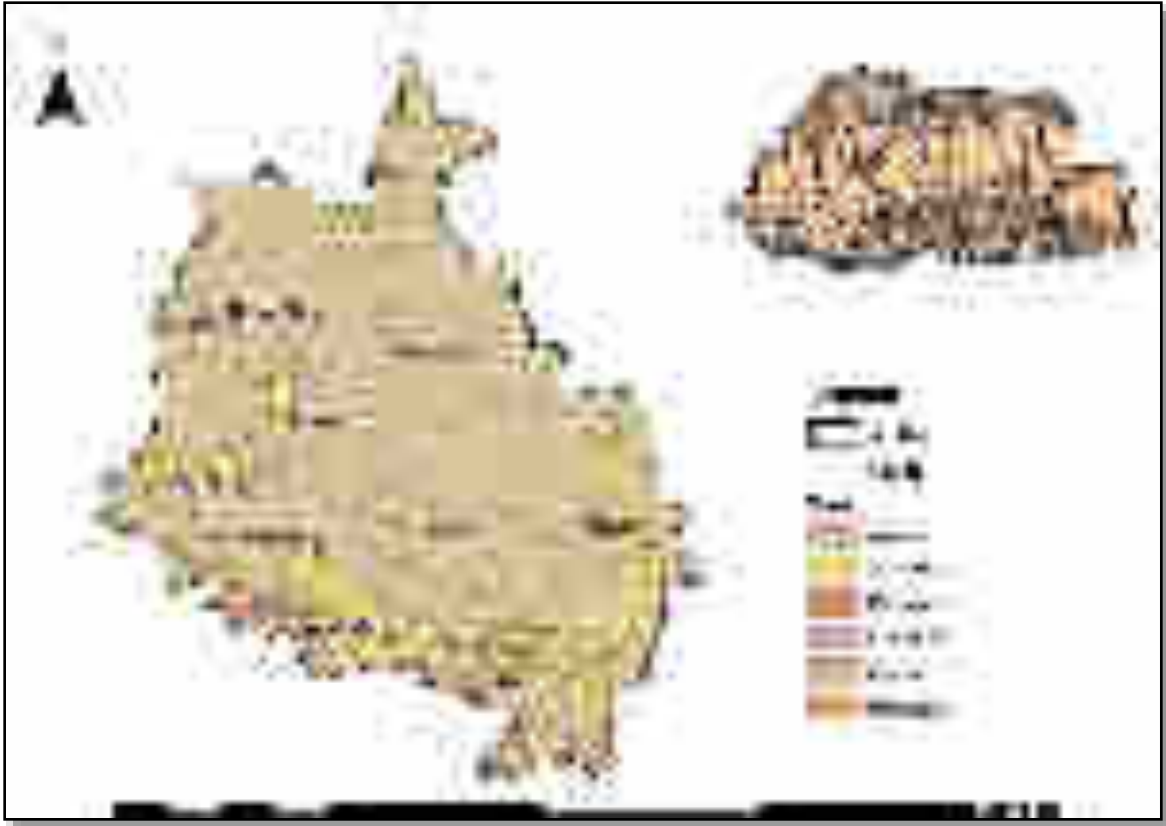
basic rocks. Major tectonic and neo-tectonic activities have resulted in landslides at different structural levels along the slopes in Phuentsholing.<sup>36</sup>

89. The soil map of the world prepared by FAO and ISRIC is used to extract the soil information for Bhutan. The scale of the latest available soil map is of 250 meters grid; therefore, it is the best available data to extract the soil information for the project areas. The figure below shows the types of soil and their coverage.<sup>37</sup>



<sup>36</sup> UNDP/GEF. 2014. Addressing the risk of climate induced disasters through enhanced National and Local capacity for effective actions.

<sup>37</sup> FAO and ISRIC (International Soil Reference and Information Centre)

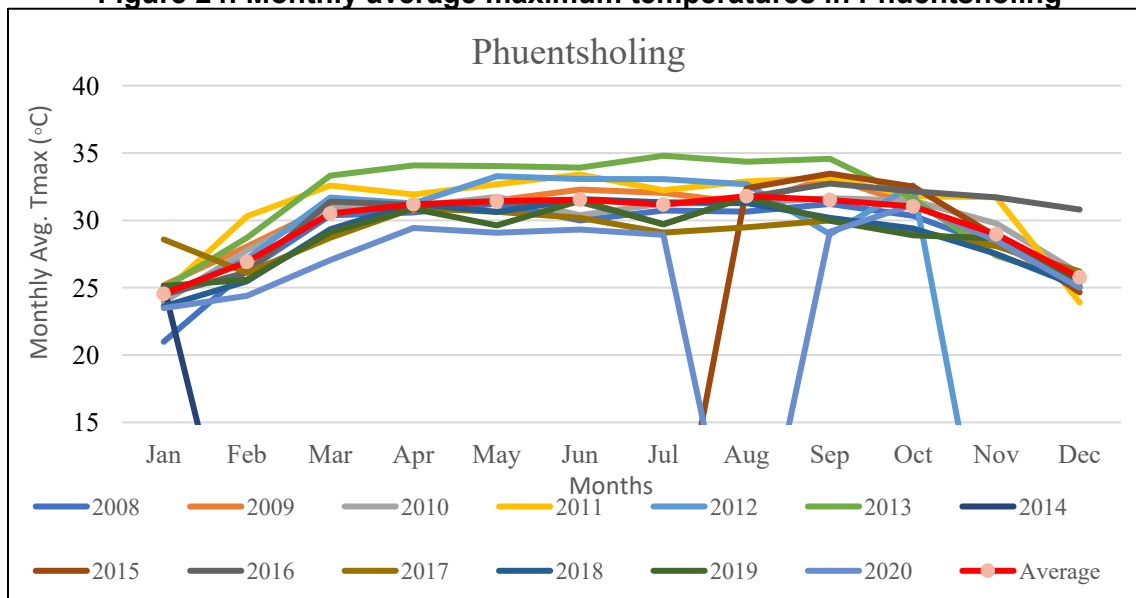


#### D. Air Environment

90. **Temperature.** The month of May, June, July and August experiences the maximum monthly average temperature and the monthly average temperature slightly declines from September.

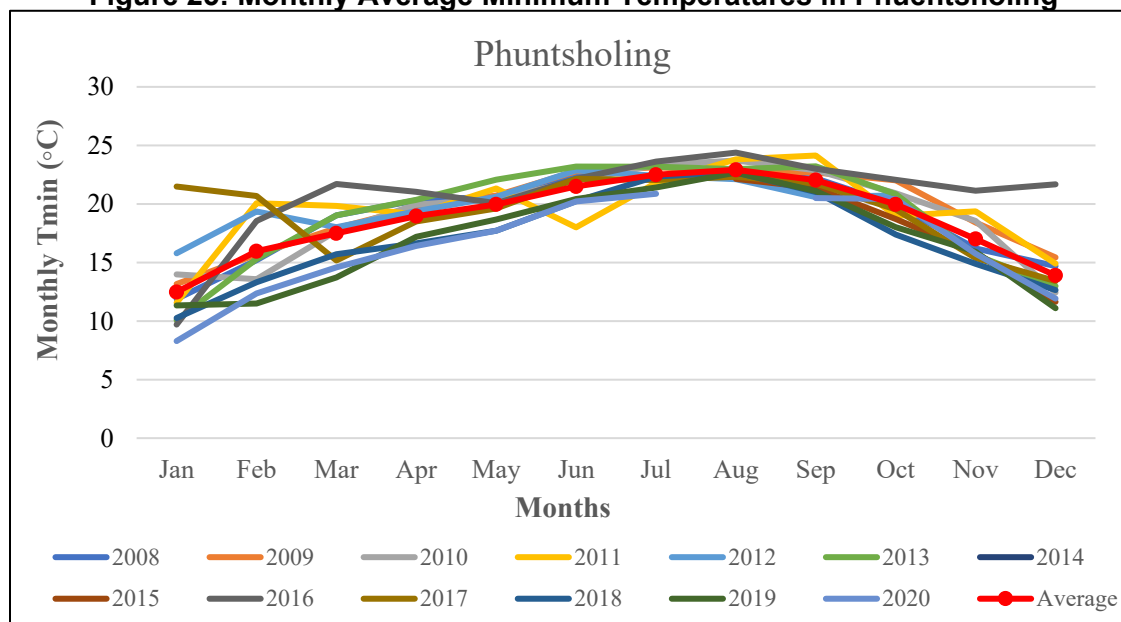
91. The highest monthly average temperature from the year 2008 to 2020 was noted in July 2013 (34.8°C) while the lowest monthly average maximum temperature was noted in January 2008 (21°C).

**Figure 24: Monthly average maximum temperatures in Phuentsholing**



92. The monthly average minimum temperature from the year 2008 to 2020 in Phuentsholing is shown in Figure 25. The monthly average minimum temperature was in January 2020 (8.29 °C) while the highest average minimum temperature was in September, 2015 (10.1°C).

**Figure 25: Monthly Average Minimum Temperatures in Phuentsholing**



93. Table 19 shows the monthly long term average maximum and minimum temperature of Phuentsholing. The highest monthly average maximum temperature in Phuentsholing was recorded in August (31.8 °C) while the lowest was recorded in January (12.5°C).

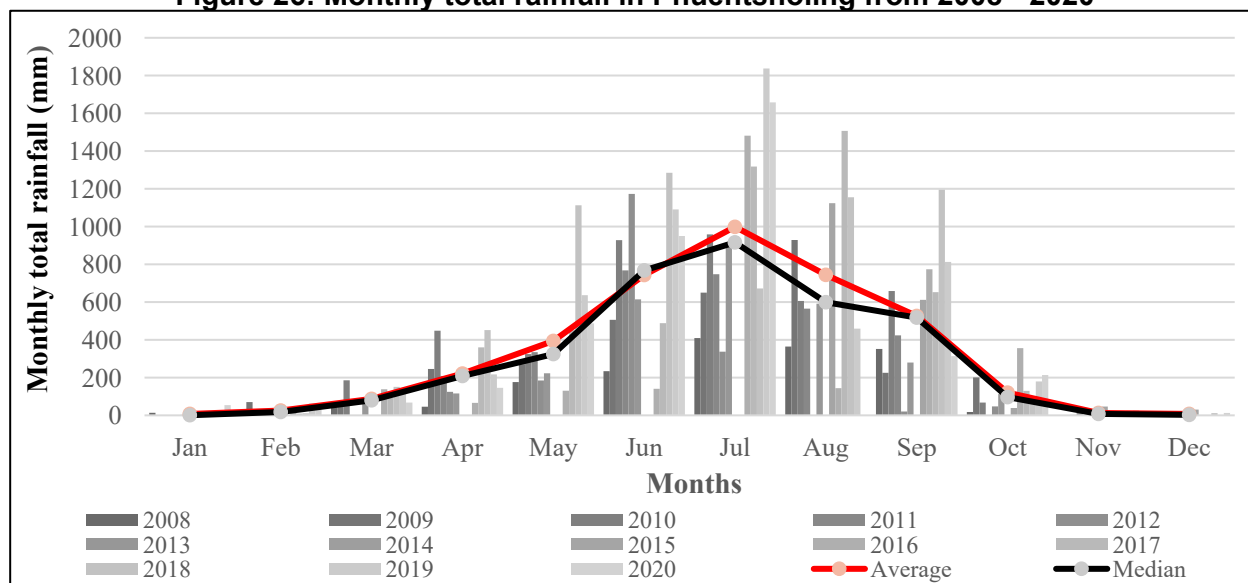
**Table 19: Long term monthly average temperature of Phuentsholing (2008 - 2020)**

Temperature	Months
-------------	--------

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>Avg. Tmax (°C)</b>	24.5	26.9	30.5	31.2	31.4	31.5	31.2	31.8	31.5	31.0	29.0	25.8
<b>Avg. Tmin (°C)</b>	12.5	16.0	17.5	19.0	20.0	21.5	22.5	22.9	22.0	20.0	17.0	13.9

94. **Rainfall.** The monthly total rainfall along with the long term monthly average total rainfall from the year 2008 to 2020 is shown in Figure 26. The month of July received the highest monthly average rainfall (998.78 mm) while the month of January received the least rainfall (7.42 mm) in Phuentsholing.

**Figure 26: Monthly total rainfall in Phuentsholing from 2008 - 2020**



95. **Ambient Air Quality.** The ambient air quality of Amochhu area was measured in six locations for two seasons during the EIA of the Amochhu Land Development and Township Project. The data from site (NHDCL Colony) has been compiled from this EIA and relevant monitoring reports. The ambient air quality of Amochhu area has deteriorated significantly since 2015/2016 when the EIA was carried out. The latest measurements as reported in the Semi-annual Report (July–December 2020) for the South Asia Subregional Economic Cooperation Transport, Trade Facilitation and Logistics Project indicate that PM<sub>2.5</sub> levels are 2.5 times higher than standard permissible levels, while PM<sub>10</sub> levels almost double the standard permissible levels. Table below summarizes the latest available data on air quality at the site.

**Table 20: Air Quality trends in Amochhu**

Parameter		Levels µg/m <sup>3</sup>	Levels µg/m <sup>3</sup>	Levels µg/m <sup>3</sup>	Levels µg/m <sup>3</sup>	Maximum permissible limit
		Dec 2015 <sup>a</sup>	Spring 2016 <sup>b</sup>	Jan- June 2019 <sup>c</sup>	Feb 2021 <sup>d</sup>	Mixed area*
Total suspended particulates (TSP)	24-hour average	247	184	131.53	463.51	200
Particulate matter 2.5 micrometers or less in diameter (PM <sub>2.5</sub> )	24-hour average	33	34	39.47	184.14	60



Parameter		Levels $\mu\text{g}/\text{m}^3$	Levels $\mu\text{g}/\text{m}^3$	Levels $\mu\text{g}/\text{m}^3$	Levels $\mu\text{g}/\text{m}^3$	Maximum permissible limit
		Dec 2015 <sup>a</sup>	Spring 2016 <sup>b</sup>	Jan- June 2019 <sup>c</sup>	Feb 2021 <sup>d</sup>	Mixed area*
Particulate matter 10 micrometers or less in diameter (PM10)	24-hour average	98	74	61.68	198.69	100
Sulfur dioxide (SO <sub>2</sub> )	24-hour average				BDL	80
Nitrogen oxides (NO <sub>x</sub> )	24-hour average				BDL	80
Carbon monoxide (CO)	8-hour average				BDL	2,000
Ozone	8-hour average					

<sup>a</sup> ADB, 2017. EIA for Amochhu Land Development and Township Project.

<sup>b</sup> ADB, 2017. EIA for Amochhu Land Development and Township Project.

<sup>c</sup> ADB, 2019. Environmental Monitoring Report. Amochhu Land Development and Township Project.

<sup>d</sup> ADB, 2020. Semiannual Report (July–December 2020). Bhutan: South Asia Sub regional Economic Cooperation Transport, Trade Facilitation and Logistics Project. Phuentsholing–Chamkuna 4- Lane Road Construction & Construction of Chamkuna–Amochhu Bridge Road

96. Observations from site visits reveal that the reasons for the high levels of air pollution in Amochhu area are (i) the infrastructure development activities due to the Amochhu Land Development Project, (ii) heavy traffic flow to and from Samtse through the area, (iii) boulder collection for export from the Amochhu river bed, (iv) increasing number of vehicles due to the new settlement in the area (kidu colony), and (v) increase in other business activities.

97. Amochhu has unpaved road conditions, heavy truck traffic and open storage of raw materials adding to fugitive emission during material transportation and storage.

**Figure 27: Daily Traffic Scene at Amochhu Through Unpaved Highway**





98. Due to its location along the border, the ambient air quality is also affected due to transboundary air pollution from the Indo-Gangetic plains, especially during winter months.<sup>38</sup> This could be one of the reasons for the very high PM<sub>10</sub> data on certain days from November – March.

99. More recent site-specific ambient air quality will be obtained by the contractor prior to construction phase to provide a baseline data for reference during the monitoring activities.

## E. Water Environment

100. Bhutan has an extensive river system that is generally distinguished by main rivers flowing north to south, with tributaries flowing in an east-westerly direction. The main rivers are Amochhu, Wangchhu, Punatsangchhu and Manas. The Amochhu river system has its origin in the People's Republic of China (PRC) and flows through the western Bhutan districts of Ha and Samtse before finally draining via Chukha district onto the plains of India. The upper catchment is at a high elevation with steep slopes. Its source is Mount Pauhunri (7,128 meters above mean sea level [AMSL]) on the border with India and PRC. The catchment area down to Phuentsholing is approximately 3,785 square kilometers (km<sup>2</sup>).<sup>39</sup>

**Figure 28: River Basins in Bhutan**



Source. National Integrated Water Resources Management (IWRM) Plan 2016. NEC

<sup>38</sup>NEC, 2016. Bhutan State of the Environment

<sup>39</sup> Phuentsholing Township Development Project

**Figure 29: Aerial View Showing Subproject Site and Nearest Rivers**



101. The subproject site is located about 175m from the Amochhu river and about 730m from a perennial stream that drains into the Amochhu. It is more than 3 km away from the Omchhu/Dhoti Khola that flows through Phuentsholing town.

102. The Amochhu River supports 91 species of fish including the Golden Mahseer (*Tor putitora*) which is protected under schedule I of Forest and Nature Conservation Act of Bhutan, 1995 and listed as endangered by the IUCN.

103. A total of 28 species were found to exist in Amochhu River according to a report by the National Research Centre for Riverine and Lake Fisheries.<sup>40</sup> Golden Mahseer (*Tor tor*), is protected under Schedule I of Forest and Nature Conservation Act (FNCA) 1995 and listed endangered in IUCN red list. *Neolissochilus hexagonolepis* and *Neolissochilus hexastictus* are listed as Near Threatened by IUCN by its status in Bhutan is not known. *Neolissochilus hexastictus* has been reported from other rivers such as Doti Khola (Omchhu) Dagachhu, Punatsangchhu, Kamechhu and Basochhu while *Neolissochilus hexastictus* has been reported from Dagachhu and Punatsangchhu.<sup>41</sup>

**Table 21: Fish species reported from the Amochhu**

	Scientific Name	Common name	Status	Source
1	<i>Aborichthys sp.</i>	Gongthongnga	LC	NCRLF 1
2	<i>Amblycepserinum</i>		LC	NCRLF 1
3	<i>Amblycepserinum arunachalensis</i>		LC	NCRLF 1
4	<i>Aspidopariajaya</i>		LC	NCRLF 1
5	<i>Banganadero</i>	Bhanga	LC	NCRLF 1
6	<i>Bariliusbarna</i>	Barnabaril/titer kanefaketa	LC	NCRLF 1
7	<i>Barilius bendelisis</i>	Hamilton's barila, fageta	LC	NCRLF 1
8	<i>Barilius vagra</i>	Vagrabaril, fageta	LC	NCRLF 1
9	<i>Chagunius chagunio</i>	Chaguni	LC	NCRLF 1

<sup>40</sup> Field Guide to Fishes of Western Bhutan, 2017. National Research Centre for Riverine and lake fisheries, Department of Livestock and

<sup>41</sup> NCRLF2- National Research Centre for Riverine and lake fisheries. <http://www.ncrlf.gov.bt/>

	Scientific Name	Common name	Status	Source
10	<i>Channa sp.</i>		LC	NCRLF 1
11	<i>Clariasgariepinus</i>	walking catfish	introduced	NCRLF 1
12	<i>Clariasmagur</i>	catfish	introduced	NCRLF 1
13	<i>Ctenopharyngodonidella</i>		introduced	NCRLF 2
14	<i>Cyprinus carpio</i>		LC	NCRLF 2
15	<i>Danio rerio</i>	bhitti	LC	NCRLF 1
16	<i>Devario aequipinnatus</i>	Bhitti	LC	NCRLF 1
17	<i>Devario assamensis</i>	Bhitti	LC	NCRLF 1
18	<i>Garragotyla</i>	Gotyla	LC	NCRLF 1
19	<i>Lepidocephalichthysguntea</i>	Guntea loach	LC	NCRLF 1
20	<i>Neoeucirrhichthysmaydelli</i>	Goalpara loach	LC	NCRLF 1
21	<i>Neolissochilusdukai</i>	Katle	Data deficient	NCRLF 1
22	<i>Neolissochilushexagonolepis</i>	Kheynga, copper mahseer, katli	Near Threatened (IUCN), status in Bhutan not known	NCRLF 1
23	<i>Neolissochilushexasticus</i>			NCRLF 2
24	<i>Pethia sp.</i>		LC	NCRLF 1
25	<i>Pethiaticto</i>	Ticto barb	LC	NCRLF 1
26	<i>Raiamas bola</i>	Indian trout	LC	NCRLF 1
27	<i>Schizothoraxprogastus</i>	Chucheyasala	LC	NCRLF 1
28	<i>Tor putitora</i>	Golden Mahseer	EN	NCRLF 1

104. The subproject site is buffered from the Amochhu river by the township development project. The EIA<sup>42</sup> has included mitigation measures to minimize any risk to vulnerable and endangered species and proposed a Biodiversity Monitoring and Bench Marking Study (BMBMS) to be carried out jointly with the terrestrial survey of Zone C for a period of 3 years, to further monitor the potential impact of the subproject on aquatic fauna. If the study finds any indication of population reduction of aquatic fauna, then a joint program will be developed with the National Research Centre for Riverine and Lake Fisheries, Haa (Department of Livestock) to replenish the species.

## F. Noise Environment

105. Information on noise levels is taken from noise level sampling that was carried out using the SL-1352 sound level meter at Toorsa tar village. The average noise level recorded was 51.6 dB(A) during the day.<sup>43</sup> There is no information on noise levels in other areas of Phuentsholing.

## G. Ecological Environment

### 1. Forest cover and biodiversity

106. Broadly speaking, the country can be divided into three distinct Eco floristic zones (alpine zone, temperate zone and subtropical zone). According to the Department of Forest and Park Services, 81%<sup>44</sup> of Chukha district is covered with forest. The primary forest types are broadleaf forest, mixed conifer with blue pine and fir at higher altitudes. Much of the Phuentsholing falls

<sup>42</sup> ADB, 2017. Bhutan: Amochhu Land Development and Township Project. Project Number: 50165-002 May 2017

<sup>43</sup> DOR.2020. Initial Environmental Examination Report, 2020. BHU: South Asia Subregional Economic Cooperation Transport, Trade Facilitation and Logistics Project. Prepared by Department of Roads

<sup>44</sup> DOFPS, 2019. Forest Facts and Figures 2019.

under the subtropical zone that comprises broadleaf forest. Species types vary with the level of rainfall and soil type- from deciduous on exposed dry slopes to almost evergreen in the moist valleys. In general, the forests are multi- storied and have high species diversity. Floristic composition consists of tropical species like *Shorea robusta*, *Terminalia myriocarpa*, *Bombax ceiba*, *Daubanga grandifolia*, *Sterculia villosa*, *Acacia catechu*, and *Terminalia nudiflora*.<sup>45</sup>

107. Within the 15.6 km<sup>2</sup> area of the previously demarcated Thromde area, only 28% is classified as green areas. This includes forest, parks and open areas in the EI –E4 and G1-G2 Land use areas. The slopes along the Amochhu are interspersed with forest, agriculture land and private dry land. The common tree species found in the subproject area are *Ficus elastica*, *Michelia champaca*, *Phoebe golparaensis*, *Dillenia pentagyna*, *Sapium baccatum*, *Putrangiba assamica*, *Cannarium sikkimensis*, *Mangifera sylvesteris*, *Careya arborea*, *Diplocknema butyraceae*, *Vitex heterophylla*, *Phoenix humilis*, *Trachycarpus martianus* and *Caryotaurens*. Common shrubs found are *Piper mulesua*, *Crotolaria sp.* *Flemingia sp.*, *Todalía asiatica*, *Citrus lemon*, *Cipadessabaccifera* and *Tithonia diversifolia*.<sup>46</sup>

108. The construction site lies in a highly disturbed area because the ADB Amochhu land development project and the Chamkuna highway projects are both ongoing at Bangay. Also, the Phuentsholing-Samtse highway passes through the area so traffic is quite high especially due to closure of the Phuentsholing gate due to COVID-19.

109. While the common trees upslope (and away from the site) are *Bombax ceiba*, *Rhus chinensis*, *Ailanthus integrifolia*, *Tetrameles nudiflora*, *Albizia* species, and *Duabanga grandiflora*, there are no trees to be cut within the site. The site is largely undeveloped apart from the temporary storage shed, the makeshift restaurant and piles of sand and aggregate and a small vegetable garden. The vegetation comprises mostly weedy species such as *Artemisia vulgaris*, *Ageratum conyzoides*, *Eupatorium adenophorum*, *Thysonalena maxima*, *Dioscorea sp.* and *Lantana Camara*.

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<sup>45</sup> NBC. 2014. National Biodiversity Strategies and Action Plan of Bhutan, 2014. National Biodiversity Centre, Ministry of Agriculture and Forests, Royal Government of Bhutan

<sup>46</sup> DOR, 2020. Initial Environmental Examination. BHU: South Asia Subregional Economic Cooperation Transport, Trade Facilitation and Logistics Project

**Figure 30: Photos of Subproject Site Showing Present Vegetations**



## **2. Protected Areas and Critical Habitats**

110. There are no legally protected areas, buffer zones or critical habitat areas in the vicinity of any of the sites. The closest protected area is Phibsoo wildlife sanctuary which is more than 80km away and separated by the Sunkosh River. There are also no wetlands within the subproject area of influence.

**Figure 31: Protected Area Map of Bhutan**



Source: MOWHS, 2018<sup>47</sup>

111. **Critical Habitats.** The Integrated Biodiversity Assessment Tool (IBAT) was used to screen and assess potential risks on the protected areas or critical habitat that may exist around the subproject site (default area of analysis of 50 km radius). Screening results show there is no protected area or key biodiversity areas within 1 km from the subproject site. See Appendix 5 for the results of IBAT Screening.

112. IUCN Red List species of concern were assessed to determine the likelihood of them being found at the subproject site. The Amochhu River supports many species of fish including the Golden Mahseer (*Tor putitora*) which is protected under schedule I of Forest and Nature Conservation Act of Bhutan, 1995 and listed as endangered by the IUCN. The Department of Forest, through its Divisional Forest Office verified that there are no endangered or vulnerable species within 1km of the subproject site.

<sup>47</sup> MOWHS, 2018. Report-on-Nganglam-Regional-Hub-Development-Plan-1

**Table 22: Assessed Presence of Species of Concern at the Subproject Site**

	Species Name	Common Name	Taxonomic Group	IUCN Category	Presence
1	<i>Indotestudo elongata</i>	Elongated Tortoise	REPTILIA	Critically endangered	Absent
2	<i>Batagurdhon goka</i>	Three-striped Roofed Turtle	REPTILIA	Critically endangered	Absent
3	<i>Manis pentadactyla</i>	Chinese Pangolin	MAMMALIA	Critically endangered	Absent
4	<i>Aythya baeri</i>	Baer's Pochard	AVES	Critically endangered	Absent
5	<i>Houbaropsis bengalensis</i>	Bengal Florican	AVES	Critically endangered	Absent
6	<i>Gyps bengalensis</i>	White-rumped Vulture	AVES	Critically endangered	Absent
7	<i>Sarcogyps calvus</i>	Red-headed Vulture	AVES	Critically endangered	Absent
8	<i>Ardea insignis</i>	White-bellied Heron	AVES	Critically endangered	Absent
9	<i>Emberiza aureola</i>	Yellow-breasted Bunting	AVES	Critically endangered	Absent
10	<i>Gyps tenuirostris</i>	Slender-billed Vulture	AVES	Critically endangered	Absent
11	<i>Bulbophyllum leopardinum</i> var. <i>tuberculatum</i>		LILIOPSIDA	Critically endangered	Absent
12	<i>Ailurus fulgens</i>	Red Panda	MAMMALIA	Endangered	Absent
13	<i>Caprolagus hispidus</i>	Hispid Hare	MAMMALIA	Endangered	Absent
14	<i>Cuon alpinus</i>	Dhole	MAMMALIA	Endangered	Absent
15	<i>Cuora amboinensis</i>	Southeast Asian Box Turtle	REPTILIA	Endangered	Absent
16	<i>Elephas maximus</i>	Asian Elephant	MAMMALIA	Endangered	Absent
17	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	REPTILIA	Endangered	Absent
18	<i>Manis crassicaudata</i>	Indian Pangolin	MAMMALIA	Endangered	Absent
19	<i>Melanochely stricarinata</i>	Tricarinate Hill Turtle	REPTILIA	Endangered	Absent
20	<i>Moschus chrysogaster</i>	Alpine musk deer	MAMMALIA	Endangered	Absent
21	<i>Moschus leucogaster</i>	Himalayan musk deer	MAMMALIA	Endangered	Absent
22	<i>Panthera tigris</i>	Tiger	MAMMALIA	Endangered	Absent
23	<i>Axis porcinus</i>	Hog Deer	MAMMALIA	Endangered	Absent
24	<i>Amblyceps arunchalensis</i>		ACTINOPTERY GII	Endangered	Absent
25	<i>Perdicula manipurensis</i>	Manipur Bush-quail	AVES	Endangered	Absent
26	<i>Sterna acuticauda</i>	Black-bellied Tern	AVES	Endangered	Absent
27	<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	AVES	Endangered	Absent
28	<i>Neophron percnopterus</i>	Egyptian Vulture	AVES	Endangered	Absent

	Species Name	Common Name	Taxonomic Group	IUCN Category	Presence
29	<i>Aquila nipalensis</i>	Steppe Eagle	AVES	Endangered	Absent
30	<i>Falco cherrug</i>	Saker Falcon	AVES	Endangered	Absent
31	<i>Leptoptilos dubius</i>	Greater Adjutant	AVES	Endangered	Absent
32	<i>Laticilla cinerascens</i>	Swamp Grass-babbler	AVES	Endangered	Absent
33	<i>Ceropegia bhutanica</i>		MAGNOLIOPSI DA	Endangered	Absent
34	<i>Hoya bhutanica</i>		MAGNOLIOPSI DA	Endangered	Absent
35	<i>Strobilanthes accrescens subsp. accrescens</i>		MAGNOLIOPSI DA	Endangered	Absent
36	<i>Tor putitora</i>		ACTINOPTERY GIIE	Endangered	Amochhu river
37	<i>Rhinoceros unicornis</i>	Greater one-horned Rhino	MAMMALIA	Vulnerable	Absent
38	<i>Chrysomma altirostre</i>	Jerdons Babbler	AVES	Vulnerable	Absent
39	<i>Chatarrhaea longirostris</i>	Slender-billed Babbler	AVES	Vulnerable	Absent
40	<i>Kaloula assamensis</i>	Assamese Balloon Frog	AMPHIBIA	Least Concern	Absent
41	<i>Trochalopteron imbricatum</i>	Bhutan Laughing Thrush	AVES	Least Concern	Absent
42	<i>Zootherasalimalii</i>	Himalayan Forest Thrush	AVES	Least Concern	Absent
43	<i>Minervarya chilapata</i>	Chilapata rain-pool Frog	AMPHIBIA	Data deficient	Absent

## H. Socio-economic Environment

113. **Demography.** The total population in Chukha Dzongkha as of 2017 was 68,966 persons (36,041 male and 32,925 female). The total population of Phuentsholing Thromde was 27,658 of which 15,052 were male and 12,606 were female (NSB, 2017) but the MOWHS estimates the population to be closer to 30,000 including floating population.<sup>48</sup> In total, there are 6,817 households within 15.6 km<sup>2</sup>.<sup>49</sup> There is no population estimate just for Amochhu.

114. **Educational and health facilities.** Within the Thromde, there are 4 private early childhood care and development (ECCD) centers, 1 Lower Secondary School, 1 Middle Secondary School, 3 Higher Secondary Schools (2 are privately owned) and 3 autonomous schools (Primary, Middle and Secondary schools). In all these educational institutions, there is 4,749 students (2,359 Male, 2,390 Female). The closest school from the subproject site is at 2.4km away.

115. There is only one general hospital in the area, which is serviced by 12 doctors, 39 nurses and 7 health assistants. This hospital is 2.5km from the subproject site.

<sup>48</sup> MOWHS, 2019. Annual information bulletin

<sup>49</sup> GNHC, 2017. 12th-FYP\_Vol-III\_Phuentsholing-Thromde



116. **Municipal Services and Amenities.** In total, 1,410 buildings/houses have access to safe and 24/7 drinking water. There are 3 functional water supply schemes with three treatment plants (South treatment plan – 2,000m<sup>3</sup>; North treatment plant – 2,000m<sup>3</sup> and Kharbandi treatment plan – 500m<sup>3</sup>). 1,190 households have pour-flush (PF) toilet. Water supply and sewerage is the responsibility of the Thromde. So far, the 8 LAP have designated reservoir tanks for each Local Area Plan. For the Amochhu area, there are 2 bore wells, 1 pump house and one reservoir tank with a capacity of 300 m<sup>3</sup> located near the Youth Building.

117. Water supply and electricity is available through the municipal water supply and local electrical system of the Bhutan Power Corporation, respectively. Almost half of the households (3,311 of 6,817 households)<sup>50</sup> are not yet connected to the sewerage network.

118. The total length of road within the Thromde (including all types of roads) is 57.15 km.<sup>51</sup> There are two bus stops, 1 bus terminal and 2 city bus stops. A new multilevel car parking has been recently constructed in the city center. For recreational purposes, the Thromde has one archery ground, 5 open gyms, one multipurpose hall, 4 football grounds and 7 basketball courts.

119. **Development activities around the subproject site.** The Amochhu subproject site is part of Zone A of the Amochhu Land Development and Township Project (ALDTP). The master plan for the Township project aims to expand and improve Phuentsholing city, promote economic growth and employment, and protect the township from flooding. Under this plan, riparian land on both sides of the river is being developed to provide protection from floods and erosion to the existing township area, and to construct smart urban infrastructure to allow phased urban expansion over an estimated 464 hectares of reclaimed land area. The area has been divided into five zones with a time schedule of fifteen years for completion of the master plan.<sup>52</sup> Currently, work for Zone A is ongoing with support from ADB. Zone A is the area abutting the Phuentsholing Local Area Plan (LAP) and adjacent to the Phuentsholing Town within the floodplain on the eastern bank of Amochhu.

120. Currently the area has mixed land use: residential houses/buildings, commercial (shops, tea shops, restaurants, scrap dealers, industries, access roads, and storage depots. In the future, neighborhood parks, gardens and green industries are proposed.

121. The figure below shows the Kidu Colony, where over a thousand temporary shelters were constructed and house approximately 5000 people who were evacuated from neighboring Indian town of Jaigaon, at the start of the COVID 19 Pandemic. Some of the persons living in the shelters will be the future residents/beneficiaries of this subproject.

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<sup>50</sup>GNHC, 2017. 12th-FYP\_Vol-III\_Phuentsholing-Thromde

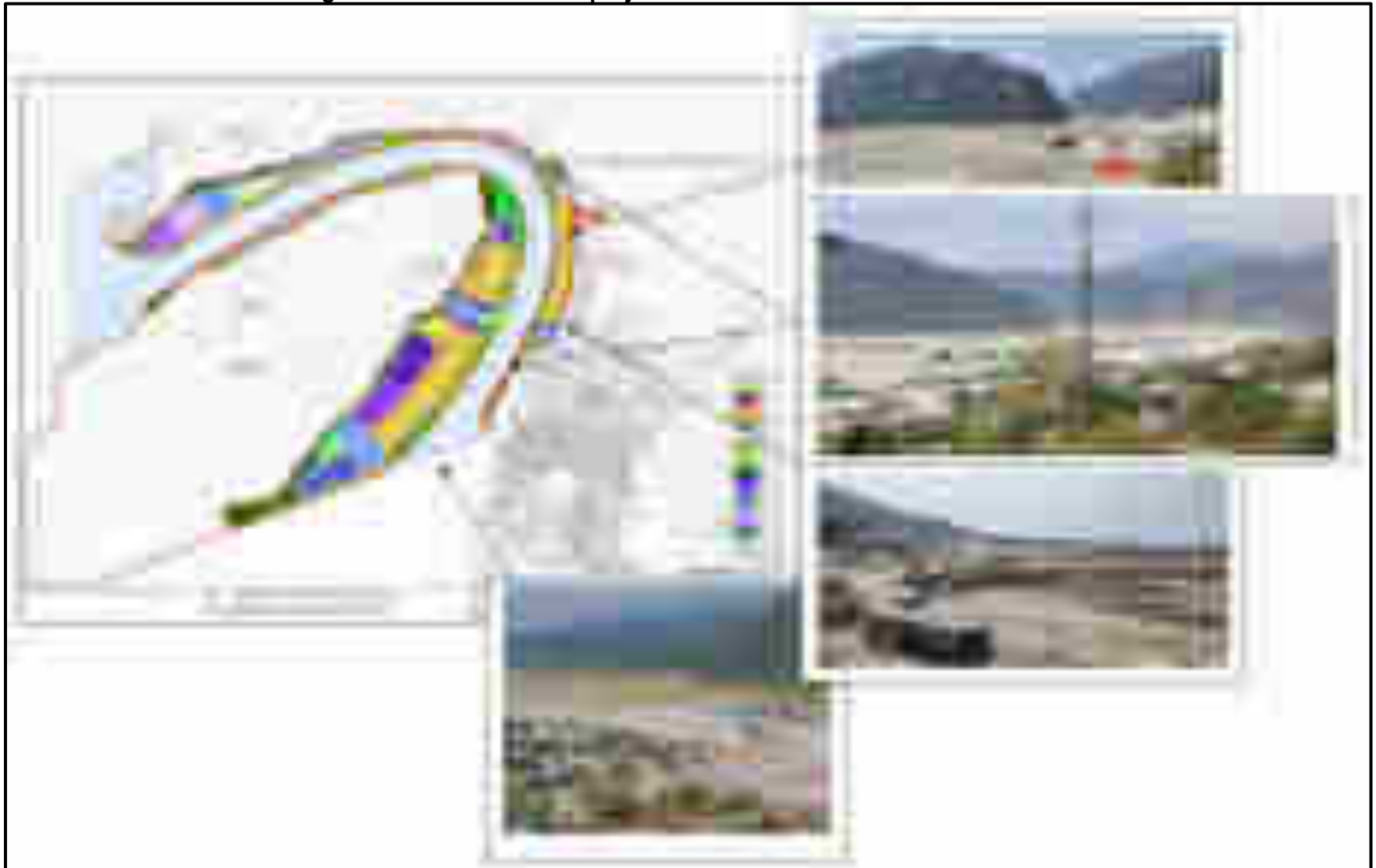
<sup>51</sup>Phuentsholing Thromde, 2017. Annual performance reporting for the year 2017.

<sup>52</sup> CDCL. EIA for Amochhu land development and township project.

**Figure 32: The Kidu Colony in Amochhu**



**Figure 33: Location of Subproject Site Relative to the Local Area Plan**



122. Waste is collected by a registered private waste collector from 4360 of 6000 individual households and transported to the landfill site, which is located at Toribari. The landfill site was commissioned in 2015. From an area of 3025 acres (including access road) less than 2 acres is under use. Within the city, water collection is carried out twice a day, but the frequency decreases towards the periphery to once a week, due to inadequate waste collection vehicles. On an average 8-9 tonnes of waste is collected from the Thromde per day.<sup>53</sup> The waste disposal site is more than 10km from the subproject site.

**Figure 34: Location of Municipal Waste Disposal Site at Toribari (W), Phuentsholing**



123. Phuentsholing is not a tourist destination for international travelers. However, it is both a transit route and for weekend visits of Indian tourists, especially during vacation time or holiday in India. In 2018 and 2019, there were 202,290 and 243,400 regional arrivals of which 95% were from India. More than half (55%) of these arrivals travelled by road entering Bhutan through Phuentsholing. In terms of tourist accommodation, Chukha (including Phuentsholing) has 12 three-star hotels and many other smaller ones but no four- or five-star hotels as compared to other tourist destinations like Thimphu, Paro or Punakha.<sup>54</sup>

### **G. Physical and Cultural Resources**

124. There are three Government-owned Temples/Lhakhang's in Phuentsholing. These are the PaldenTashiCholingShedra (monastic school), which is more than 1.7km away from the subproject site; the ZangtoPelri in the center of the town, which is more than 3km away from the subproject site; and the crematorium located in Amochhu, which is more than 2 km away from the subproject site.

<sup>53</sup> MOWHS 2019, Annual information bulletin -material source -Phuentsholing Thromde

<sup>54</sup> Tourism Council of Bhutan, 2018, 2019. Bhutan Tourism Monitor, 2018, 2019

**Figure 35: Physical Cultural Resource near the Subproject Site**



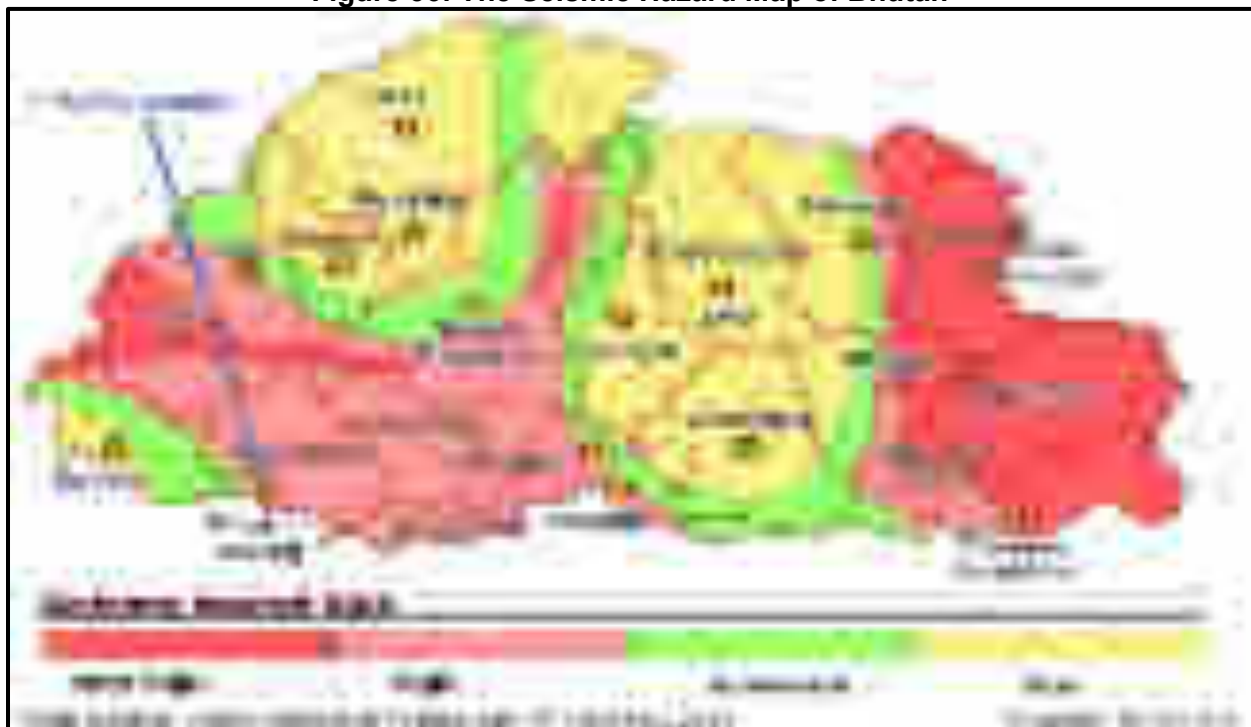
## H. Natural hazards

125. **Seismic hazards.** Geo-physically, Bhutan is located in the young Himalayan Mountains and considered to be one of most seismically active zones in the world, along the boundary between the Indian and the Eurasian tectonic plates. there is no detailed and comprehensive seismic micro zonation of Bhutan, it is assumed that the continent-to-continent collision resulting in a stress build-up in the Himalayan region places the country either in Zone IV or V due to its contiguity and proximity to the north-eastern part of India, which falls under the same seismic zonation according to the Bureau of Indian Standards. Based on the seismic hazard map of Bhutan, Phunetsholing lies in the boundary of high hazard zone (rated in a 4-point scale of low to very high). See **Figure 36** below.

126. The most significant earthquakes that occurred in the district were in 2009 (affecting most Dzongkhags including Chukha, damaging rural households, schools, Lhakhang's and other

government infrastructures<sup>55</sup>), September 2011 during the Sikkim earthquake (causing widespread damage to rural homes and government infrastructure) and in 2015.<sup>56</sup>

**Figure 36: The Seismic Hazard Map of Bhutan**



Source: Indian Institute of Technology. Roorkee, India

127. **Flood and landslide risks.** The flood depends on the distance of the site from the nearest river. Amochhu (Toorsa) and Om Chu are the two main rivers passing through the settlements in Phuentsholing Municipality.

128. Floods occurred in the Dhoti Khola in 1990, 1991 and 2000 and in the Amochhu in 2005, 2008, 2015 and 2016 as shown in the following table.

**Table 23: Flood events in Dhoti Khola and Amochhu river since 1968<sup>57</sup>**

Year	Date	River/basin	Impact
1990	2 June	Dhoti Khola	Damaged fields, houses, water lines, 1 bridge, two shacks and the wall of the fuel depot and washed away the gabion wall
1991	2,3,5 July	Dhoti Khola	The water supply pipes and small huts around the colony were all swept away
2000	August	Dhoti Khola	17 huts were washed away in the vegetable market. The BOD fuel station, a private sawmill, the city corporation water supply office were submerged, automobile workshop and the city corporation's staff quarters were severely damaged

<sup>55</sup>Chukha Dzongkhag 2018. Disaster Management and Contingency Plan 2018

<sup>56</sup>Phuentsholing Thromde 2018. Thromde Disaster Management and Contingency Plan 2018

<sup>57</sup>National Centre for Hydrology and Meteorology. The Compendium of climate and hydrological extremes in Bhutan since 1968



2005	May	Amochhu	A dozen makeshift shops and dry land were damaged
2008	September	Amochhu	Part of the Gabion wall was washed away
2015	30 June	Amochhu	7 families lost their makeshift homes and shop in Bangay. A brick factory and workshop was flooded and 2 excavators and 3 school buses were submerged
2016	23 July	Amochhu	Workshops and warehouses flooded along the river banks

129. The flood hazard assessment for Chukha Dzongkhag reported that these rivers deposit lots of sediment during monsoon within the city leading to change in the flow path of the river. The primary flood risk is due to the reduction in elevational difference between the river bed level and the settlements along Amochhu river. On the other hand, the Omchhu (Dotikhola) is critical because it poses threat to lower part of the Phuentsholing town. In 2000-2001, 2km of retaining walls and embankment walls along the Omchhu were constructed along the length of the Phuentsholing town through ADB funding.

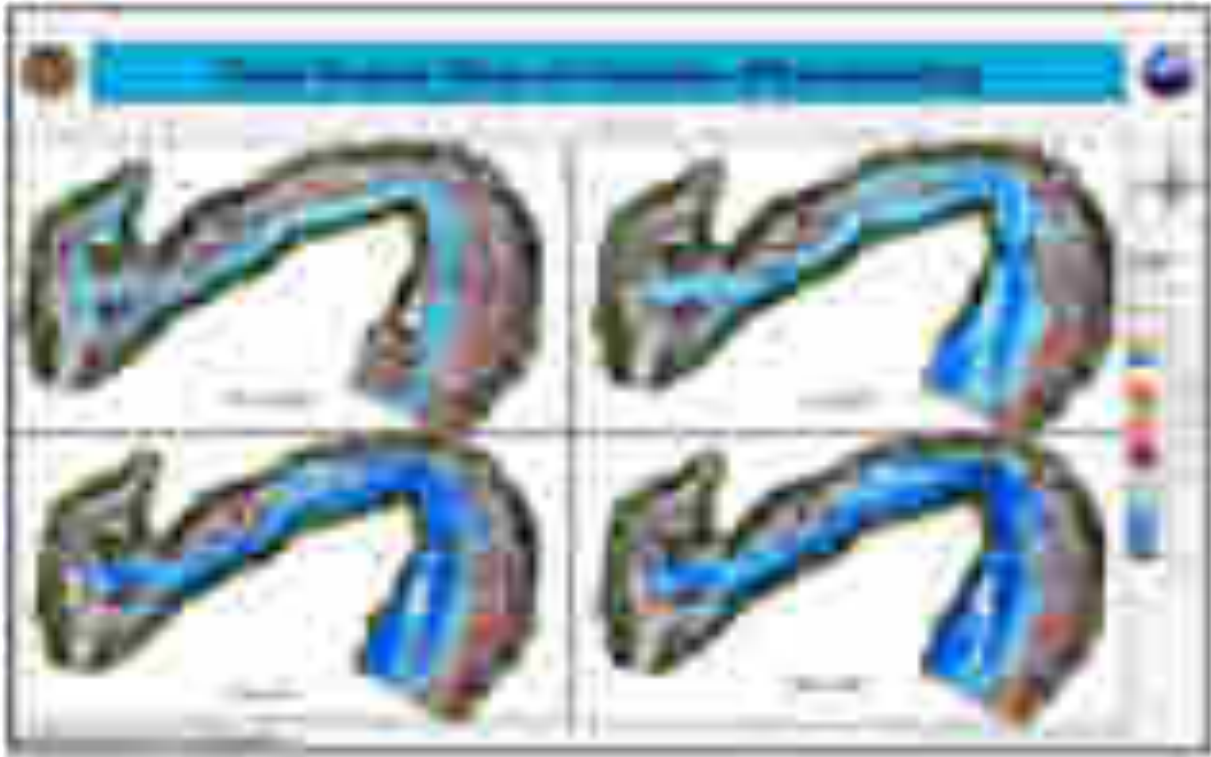
130. In terms of location, the subproject site has High flood risk due to its location within 100m of Amochhu river embankment and about 70m from a perennial stream that drains into the Amochhu. In Phuentsholing the major causes of landslide are a) monsoon rainfall, b) geology and c) anthropogenic activities. Along the slopes above the site, there are landslides, caused by the heavy rains in summer, which makes the downstream areas more vulnerable.

131. The National Centre for Hydrology and Meteorology conducted detailed hydrological survey, modeling and hazard mapping in April 2020, based on which the early warning system was installed along with Standard Operating Procedures for Amochhu.<sup>58</sup>

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<sup>58</sup>National Centre for Hydrology and Meteorology, 2020. Report on Installation of Community Based Flood Early Warning System at Amochhu, Phuentsholing. National Centre for Hydrology and Meteorology

**Figure 37: Flood hazard map of Amochhu (NCHM, 2020)**



**Figure 38: Landslide Area North of the Subproject Site**





**Figure 39: Ongoing cross drainage works in Amochhu**



132. Ongoing mitigation measures. The Land Development and Township Project funded by ADB<sup>59</sup> is developing 460 hectares of riparian land along the Amochhu - with activities ranging from river protection from floods and erosion to smart urban infrastructure to allow phased urban expansion. The subproject design has taken into consideration the velocity, maximum flood level, scour depth for 100 years Probable Maximum Flood (PMF). A reinforced concrete (RCC) diaphragm wall is being built for riverbed protection which will extend below the normal river scour depth and will be supported using “dead man anchors” and “anchor slab” techniques. Backfilling will be carried out to create the reclaimed land using selected fill materials that will be spread in layers not exceeding 300mm followed by compaction. The retaining wall constructed along the river reduces the risk due to flood to the site.

133. Through the ADB funded South Asia Sub regional Economic Cooperation Transport, Trade Facilitation and Logistics Project, for the 3km, 4 lane Phuentsholing-Chamkuna Road (PCR), 3 sets of erosion and flood control systems were integrated in the design. This included armoring and properly founding the embankment road, river training to maintain safe distance separation of the main Amochhu channel from the embankment road, manage the surface runoff laden with sediment and boulders from the hill side east of the embankment road and provide adequate conveyance structure across the road to allow safe passage water towards the Amochhu River.<sup>60</sup>

134. The site hazard assessment is rated as High for Flood and Earthquake and Medium for Landslide and Windstorm

<sup>59</sup>ADB. 2017. Environmental Impact Assessment. Amochhu Land Development and Township Project. Project Number: 50165-002

<sup>60</sup>ADB, Initial Environment Examination Report. BHU: South Asia Sub regional Economic Cooperation Transport, Trade Facilitation and Logistics Project. April 2020

ADB.2017. Environmental Impact Assessment. Amochhu Land Development and Township Project. Project Number: 50165-002

## V. ANTICIPATED ENVIRONMENTAL IMPACT AND MITIGATION MEASURES

135. ADB SPS requires that all project activities need to be carefully assessed and considered to avoid and/or minimize negative social, religious, and cultural, and environmental impacts.

### A. Impacts Rating System

136. The approach for the environmental assessment of this subproject involved the following steps:

- (i) Review of baseline information on the subproject area and site location;
- (ii) Initial environmental screening using ADB's Rapid Environmental Assessment (REA) checklist (Appendix 1) and No Mitigation scenario scoping checklist (Appendix 2);
- (iii) Consultation with the design team on the proposed infrastructure design and plan;
- (iv) Site visit and consultation with subproject staff; and
- (v) Discussions between NHDCL, Thromde and current residents.

137. Several criteria were used for assessment. These include:

- (i) Type/nature of activities proposed;
- (ii) Project footprint/spatial scale of the proposed infrastructure work/magnitude of impact;
- (iii) Likelihood of the impacts from occurrence;
- (iv) Existing baseline conditions at the subproject site and within the subproject zone of influence, which in this case is up to 200m;
- (v) Duration of the proposed activities and period of impact (short, medium, or long term); and
- (vi) Requirements for compliance with national acts, rules and regulations and compliance with ADB policies.

**Table 20: Likelihood of Impacts from Occurrence**

Likelihood	Definition
Certain	Occurs under typical operating or construction conditions.
Likely	Occurs under worst case (negative impact) or best case (positive impact) operating conditions.
Occasional	Occurs under abnormal, exceptional or emergency conditions.
Unlikely	Unlikely to occur.

**Table 21: Parameters for Determining Magnitude**

Parameter	Major	Medium/ Moderate	Minor	Negligible
Duration of potential impact	Long term (more than 35 years)	Medium Term Lifespan of the project (5 to 15 years)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of potential impact	Widespread far beyond project boundaries	Beyond immediate Project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable

Parameter	Major	Medium/ Moderate	Minor	Negligible
				potential impact
Reversibility of potential impact	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Baseline requires a year or so with some interventions to return to baseline	Baseline returns naturally or with limited intervention within a few months	Baseline remains constant
Legal requirements	Breaches national standards and or international guidelines/obligations	Complies with limits given in national standards but breaches international lender guidelines in one or more parameters	Meets minimum national standard limits or international guidelines	Not applicable
Likelihood of potential impacts occurring	Certain	Likely	Occasional	Unlikely

138. **Sensitivity of Receptor.** The sensitivity of a receptor has been determined based on review of the population (including proximity/numbers/vulnerability) and presence of features on the site or the surrounding area. Each detailed assessment has defined sensitivity in relation to the topic. Criteria for determining receptor sensitivity of the subproject's potential impacts are outlined in the following table.

**Table 22: Parameters for Determining Significance**

Sensitivity Determination	Definition
Very severe	Vulnerable receptor with little or no capacity to absorb proposed changes
Severe	Vulnerable receptor with little or no capacity to absorb proposed changes or limited opportunities for mitigation
Mild	Vulnerable receptor with some capacity to absorb proposed changes or moderate opportunities for mitigation
Low	Vulnerable receptor with good capacity to absorb proposed changes or/and good opportunities for mitigation

139. **Assigning Significance.** Following the determination of impact magnitude and sensitivity of the receiving environment or potential receptors, the significance of each potential impact has been established using the impact significance matrix shown below in the table.

**Table 23: Significance of Impact Criteria**

Magnitude of Potential Impact	Sensitivity of Receptors			
	Very severe	Severe	Mild	Low
Major	Critical	High	Moderate	Negligible
Medium	High	High	Moderate	Negligible
Minor	Moderate	Moderate	Low	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

**B. Summary of Impacts Rating for the Subproject**

140. The subproject's potential impacts on the key environmental parameters have been assessed and their significance determined using the methodology described above. A summary of the potential impacts of the subproject on the key environmental parameters and significance of these impacts are presented in the following table.

**Table 24: Summary of Rating of Potential Impacts**

<b>Activity/ Impact</b>	<b>Duration of Impact</b>	<b>Spatial Extent</b>	<b>Reversible or not</b>	<b>Likelihood</b>	<b>Magnitude</b>	<b>Sensitivity</b>	<b>Significance Prior to Mitigation</b>	<b>Significance after Mitigation</b>
<b>Design and Pre-Construction phase</b>								
Land Acquisition – Change in land use	Long term	Local	Yes	Unlikely	Minor	Mild	Low	Negligible
Consents, Permits and Clearances	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Natural Hazards and Disasters (floods, earthquake)	Long term	Local	Yes	Likely <sup>a</sup>	Medium	Mild	Moderate	Low
Community Awareness	Short term	Local	Yes	Certain	Negligible	Mild	Low	Negligible
<b>Construction Phase</b>								
Worker recruitment -Occupational Health and Safety	Short term	Local	Yes	Certain	Medium <sup>61</sup>	Mild	Moderate	Negligible
Construction of site office, worker camps and storage sheds, stockpile areas	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Demolition of temporary sheds	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Excavation	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Water supply	Will be provided through municipal water supply							
Electrical connections	Substation will be installed by BPC							
Mobilization of construction equipment and material transportation-traffic and congestion	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Air pollution	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Dust generation	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Noise Pollution	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Soil erosion and Sediment mobilization	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible

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<sup>61</sup> 24-30 months

<b>Activity/ Impact</b>	<b>Duration of Impact</b>	<b>Spatial Extent</b>	<b>Reversible or not</b>	<b>Likelihood</b>	<b>Magnitude</b>	<b>Sensitivity</b>	<b>Significance Prior to Mitigation</b>	<b>Significance after Mitigation</b>
Ground water quality	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Drainage congestion	Short term	Local	Yes	Certain	Medium	Mild	Moderate	Negligible
Impact on critical habitat	Short term	Local	No	Unlikely	Minor	Mild	Low	Negligible
Impact on endangered species	Short term	Local	No	Unlikely	Minor	Mild	Low	Negligible
Impact on Physical Cultural Resources	Short term	Local	No	Unlikely	Minor	Mild	Low	Negligible
Socio-economic status/livelihood	Short term	Local	Yes	Certain	Minor	Mild	Positive	Positive
Community Health and Safety	Short term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Aesthetic impacts	Short term	Local	Yes	Unlikely	Minor	Mild	Low	Negligible
<b>Operation Phase</b>								
Maintenance and operation of the housing complex	Long term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Disaster and natural hazards	Long term	Local	Yes	Likely <sup>a</sup>	Minor	Mild	Low	Negligible
Resident health and safety	Long term	Local	Yes	Certain	Minor	Mild	Low	Negligible
Socio-economic status/livelihood	Short term	Local	Yes	Certain	Moderate	Mild	Positive	Low

<sup>a</sup> Natural hazards/extreme events are likely to occur, but not predictable as to when these will occur.

141. The potential environmental impacts expected during the construction phase are mostly due to the nature of the activity (construction of buildings) and subproject location.

### **C. Anticipated Impacts and Mitigation Measures during Pre-construction Phase**

142. Potential environmental impacts expected during the pre-construction phase are mostly due to the design and location and are discussed as follows:

#### **1. Impacts Due to Subproject Location**

##### **(i) Protected areas, critical habitats and endangered species**

143. **Impact.** The site is located within Phuentsholing Thromde boundary. There are no legally protected areas or other environmentally sensitive areas in the vicinity of the subproject site. The closest protected area is Phibsoo wildlife sanctuary which is more than 80km away. There are also no wetlands within the subproject area of influence.

144. In Chapter IV of this IEE, initial screening and assessment indicate that one species listed in the IUCN Red List species of concern is found in the Amochhu river that is 175m away from the site. During construction phase, it is unlikely that the subproject activities will impact this particular species due to the distance of the subproject site to the river as well as the nature of subproject works (building construction) whose impacts are localized or temporary. During operation phase, the subproject may pose impact to the Amochhu river due to potential discharges of wastewater or effluent from the housing complex.

145. **Mitigation.** To mitigate any potential impacts during operation phase, the subproject will ensure that the housing complex design includes appropriate facilities to keep any wastewater or effluent from flowing into the Amochhu river, such as well-designed and maintained septic tanks and soak pits.

##### **(ii) Physical Cultural Resources**

146. **Impact.** There are no Physical Cultural Resources (PCRs) within 500m of the site. The closest PCR is the Palden Tashicholing Shedra (monastic school), which is more than 1km away from the site and too far to be affected by subproject activities.

147. **Mitigation.** No mitigation required. The upfront site selection criteria used under the subproject also ensured that planned development for the site will not result in destruction of or encroachment onto physical cultural resources such as archaeological monuments; heritage sites; and movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural significance.

##### **(iii) Risk of natural hazards such as earthquakes, floods and climate change considerations**

148. **Impact.** The subproject site was assessed in terms of earthquake, flooding and landslide risks. Due to its location as discussed in (proximity to the north-eastern parts of India, which are in the 'most active' seismic Zone V), the subproject site is at High risk of earthquakes. It is also High risk for floods due to its location within the Amochhu riverbank.

149. The main associated risks and impacts in the design phase are insufficient building design and non-compliance to the plans, regulations and building codes which could result in limitations and inappropriate design without adequate consideration for seismicity, floods and other natural hazards including climate change.

150. **Mitigation for earthquakes.** The design process has taken into consideration the requirements of Bhutan Building Rules (BBR) 2017<sup>62</sup> and other relevant rules or regulation as discussed in Chapter II of this IEE. The buildings are designed for seismic performance (IS 1893:2016, Zone V, Z=0.36, I=1.37, R=5, Damping=5%).

151. The proposed subproject will be guided by the Phuentsholing Urban Development Plan 2002-2017 and Phuentsholing Structure Plan 2013-2028. Compliance to these rules, regulations and plans implies that the structural design will have considered and incorporated measures to minimize the risks of earthquakes.

152. **Mitigation for flood.** For this site, the riverbank protection works under the Township development project are expected to be resilient enough to protect Phuentsholing from flooding and erosion. The project is also supporting the establishment and operationalization of a flood early warning system and flood management plan in consultation with the community.<sup>63</sup> Under the Phuentsholing-Chamkuna Road cross drainage works is being carried out as well. The stormwater drains from the new site will be connected to these cross drains. These measures along with the early warning system installed by the NCHM are adequate enough to protect the site from flooding and erosion.

153. Climate considerations will also be taken care of through choice of building materials, which must be suitable for monsoon rains. The approval process therefore ensures that natural hazards, climatic conditions, and local areas plans are duly considered. Any changes to approved plans will be resubmitted to the Development Control Division, Thromde Office.

154. The NHDCL has accumulated much experience in planning, designing and executing the construction of Affordable Projects around the country. In 2017, 41 buildings were contracted out to 7 large contractors of which 21 buildings were completed in December 2018, 20 buildings in early 2019. Of these, 506 units were completed and allotted to the tenants successfully in Phuentsholing.<sup>64</sup>

## 2. Impacts of Consents, Permits and Clearances Requirements

155. All development within the area is controlled by the municipality, which is responsible for ensuring that developmental activities are aligned with the local area plan for Phuentsholing. There is gradual elevation towards the existing housing colony with the lower level of the site on flat ground. Given that the current highway and township project is still ongoing, the required ground level or elevation must be confirmed. Without approval of the subproject plan by the Phuentsholing municipality, subproject implementation may not be able to proceed.

156. **Mitigation.** Site surveys and preliminary designs have been completed and the detailed design is under process. The construction approval process is standard. The land ownership certificate, official site plan along with the structural, electrical, sewerage, water supply and

<sup>62</sup> Bhutan Building Rules 2017 (Replaces the Bhutan Building Rules 2002 and Rural Construction Rules 2013), [www.mowhs.gov.bt/wp-content/uploads/2017/05/Bhutan-Building-Rules.pptx](http://www.mowhs.gov.bt/wp-content/uploads/2017/05/Bhutan-Building-Rules.pptx)

<sup>63</sup> ADB. Bhutan: Phuentsholing Township Development Project

<sup>64</sup> NHDCL, 2019. Annual Report, 8<sup>th</sup> Issue.



plumbing drawings certified by the PMU design team will be submitted to the Development Control Division (DCD) of the Thromde. If the designs and drawings meet all the requisite requirements as per the rules, standards and guidelines, construction approval will be granted. If there are any reservations from the DCD, Thromde, this will be communicated back to the PMU, through the design team, for rectification and revision of drawings.

157. The PMU will consult with the Thromde to confirm the level of the highway as planned in the LAP, to keep the ground level of the site in line with the designed level of the new township.

158. Environmental clearance approval will be sought from the NEC based on the IEE.

### **3. Impacts on Construction Schedule, Cost Estimation and Bidding Process**

159. **Impact.** There is a general lack of awareness by most contractors on ADB SPS and EMP requirements, and this is the reason why mitigation measures are not normally budgeted in the contract cost. Due to COVID 19 restrictions, there is also a huge shortage of skilled national workers.

160. **Mitigation.** The procurement unit will incorporate the cost of OHS and the EMP as well as specific provisions requiring contractors to comply with all other conditions required by ADB into the bidding and contract document. Once the contractor is selected, the PIU will arrange to conduct awareness for contractors on their responsibilities in EMP implementation, in compliance with ADB and RGOB requirements, self -monitoring and reporting procedures.

161. The construction schedule must consider the current shortage of skilled manpower and constraints in importing foreign workers due to the COVID 19 pandemic so that the construction is completed on time.

162. The Bhutan Schedule of Rates - 2020 includes a Guideline for Occupational Health and Safety Cost to be used by procuring agencies for estimating the Bill of Quantities for each contract.<sup>65</sup> Inclusion of the Cost of OHS is the minimal mandatory requirements for a construction site. In addition to this, the Contract must specify that the minimum age of employment shall be 18 years and the contractor is liable for the cost of providing accident compensation for all the employees in case of work-related injury or accidents.

163. Due to the high demand for waste disposal in Phuentsholing and the uncertainty in terms of the waste disposal location for excavated soil, the cost of transportation of waste from the construction sites must be incorporated into BOQ to avoid additional claims or improper disposal of waste.

### **4. Risk on Compliance with Relevant ADB Loan Agreement and Safeguard Policy Statement Requirements**

164. **Risk.** There is the risk that EMP may be incorporated into the bidding documents without prior approval from ADB and that relevant environmental and social safeguard provisions/conditions of the loan agreement are not included either. Also, although the level of awareness on ADB safeguard policies and national regulations relevant for the subproject has been substantially enhanced due to interactions between subproject design and planning team, ADB staff and consultants.

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<sup>65</sup>Department of Engineering Services, MoWHS, 2020. The Bhutan Schedule of Rates - 2020 includes a Guideline for Occupational Health and Safety Costs

165. **Mitigation.** The EMP, GRM and EMOP and relevant provisions of the loan agreement must be incorporated into bidding documents only after prior approval of the IEE report from ADB. Further briefings are required if new staff are appointed or transferred to the PMU/PIU and engaged in supervision tasks during the construction process. Trainings must include topics on applicable national legislation, the EMP including OHS and COVID protocols, GRM, and environmental monitoring and reporting requirements as per ADB SPS.

## 5. Project Disclosure and Community Awareness

166. **Community awareness and project disclosure.** The neighboring community must be informed of the subproject activities and schedule so that they are well informed and aware of the subproject activities in advance. The first round of consultation with project affected families and current residents have already been carried out. The project must disseminate information on the objectives of the proposed project, the preliminary design of proposed project components; potential environmental and social impacts (positive and negative) of the project, and proposed mitigation measures for the perceived negative impacts; and the Grievance Redress Mechanism and contact details of the project. Project signboards must be designed and constructed according to the design standards and specifications of the Thromde. The signboards must disclose project contact information for easy contact for any issues or clarification.

### D. Anticipated Impacts and Mitigation Measures during Construction Phase

#### 1. Impacts on socio-economic conditions

167. **Impact.** The project will generate employment and business opportunities for local suppliers of construction materials as well as material transporters and machine operators. The socio-economic benefits of obtaining temporary employment in construction workforces, can be significant for low-income people within and outside Phuentsholing

#### 2. Impacts of Site Preparation and Construction of Site Office, Worker Camps and Material Storage Sheds

168. **Impact.** Once the contract is awarded, the site will be handed over to the Contractor by the PIU. There is ample space at the site for construction of workers camps and material storage, but the Contractor may also choose to arrange off-site accommodation for its workers, especially if it prefers to use the available space more effectively for site office and material storage.

169. **Mitigation.** If additional space is required to park machinery, build storage sheds or for other purposes, the PIU will assist the Contractor (if required) to lease land, but the responsibility of finalization of land agreement and payments to the landowner or to the Thromde will lie with the Contractor. The Contractor must set aside a secure enclosure/shed for the storage of cement, lubricants, solvents, paint, electrical and other breakable material. Fuel and other petroleum products must be stored at storage areas away from water drainage and protected by impermeable lining and banded 110% by volume.

#### 3. Impacts of Recruitment of Workers

170. **Impact.** The COVID 19 safeguard restrictions on recruitment of foreign workers will require the contractor to hire national workers. This will significantly and positively benefit the current economic and unemployment scenario by providing local employment and benefit sharing.

However, it is generally still necessary to import foreign skilled workers because it is very difficult to find skilled national workers.

171. The presence of workers will increase the demand for services like temporary housing, drinking water and sanitation. There is also the risk of gender discrimination and potential health and safety impacts for female employees due to unclean sanitary facilities. A mix of local and foreign construction workers may cause social conflict and the sudden influx and large number of workers living together in one location may also cause disturbance to the neighborhood. The operation of construction camps will generate sewage and other waste from workers.

172. **Mitigation.** The Contractor will be required to follow the rules and regulations for foreign and local worker recruitment, such as the “Handbook on Recruitment and Employment of Foreign Workers in Bhutan”<sup>66</sup> and avoid recruiting workers below the age of 18. The Contractor will strive to be gender sensitive by ensuring equal pay for equal work for female worker, brief workers on gender discrimination and sexual harassment. All foreign workers will be screened at their point of entry for the more virulent and contagious diseases, including HIV/AIDS, TB, Malaria, Dengue and COVID 19. The prevailing requirements of the Ministry of Health and the COVID Taskforce, which include mandatory quarantine requirement, and payments for quarantine, isolation and testing.

173. The Contractor will be required to provide workers with good quality temporary accommodation, with ample and safe drinking water, electricity and sanitation facilities with separate toilets for females. Worker camps will be self-contained, regularly cleaned and properly organized to handle waste issues according to the succeeding section on waste management. For good reference, the contractor will follow the standards for workers accommodation per guidance note by the International Finance Corporation and European Bank for Reconstruction and Development entitled “*Workers’ accommodation: processes and standards: A guidance note by IFC and the EBRD*”.

174. The contractor will be responsible for briefing all workers on required social behavior and imposing sanctions for inappropriate conduct. The number of complaints received from neighboring residents will be recorded with action taken.

175. The contractor with more than 12 workers must submit a Notification of Construction Work (in writing and as per the information required) within 7 days after the commencement of the work, to the Chief Labor Administrator, and also repeat the same within 7 days of completion of the work.

#### **4. Impacts on Occupational Health and Safety**

176. **Impact.** The construction industry entails working at height, excavation, use of machinery and constant exposure to noise, dust, and equipment. Construction noise such as welding, use of excavators will cause more disruption to the machine operators or workers in close proximity to the machine. There is also the risk of workplace injury due to (i) lack of personal protective equipment (PPE), (ii) unsafe acts/carelessness or ignorance by workers, (iii) use of unskilled workers, (iv) working long hours with inadequate facilities, and (v) lack of dedicated personnel to ensure worker health and safety and lack of general safety awareness.

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<sup>66</sup>RGOB. Regulations on Working Conditions, 2012

177. **Mitigation.** To ensure the health and safety of worker, the contractor will be required to abide by the international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities;<sup>67</sup> and by Regulation on Occupational Health, Safety and Welfare, 2012, and nominate a Health and Safety Focal Person (or equivalent) who will have the overall responsibility to ensure safe working conditions and environment for all workers. The contractor will provide required and appropriate PPE (e.g. safety boots, helmets, gloves, protective clothes, dust mask, goggles, and ear plugs), at no cost to the workers, maintain a PPE issue register, and enforce its use with sanctions for non-compliance. Contractor will institute protocols to deal with accidents (including evacuation of injured person to the nearest hospital), emergencies and grievances at the worksite and communicate this to all workers. Briefings and awareness on health and safety and required social behavior will carry out during toolbox talks. To prevent accidents during electrical installation, only trained and competent electrical workers must be hired. The site will be provisioned with first aid kits and safety signage at critical and risky/precarious areas. Records of all accidents will be maintained including measures taken and workers will be compensated for work injuries and fatalities. The subproject site is located about 2-3km from the hospital, so easy access to health facilities is not a concern but the contractor must provide transportation during emergencies for workers.

178. The contractor will be required to institute minimum COVID 19 measures such as hand washing facilities, installation of the Druk Scan App for movement of visitors and workers, mandatory use of masks, social distancing norms and any other protocols as per the prevailing requirements of the Ministry of Health and the COVID 19 Taskforce.

## 5. Demolition of existing structures

179. **Impact.** There are two temporary structures at the site will need to be dismantled to construct the new buildings.

**Figure 40: Temporary Storage Shed and Makeshift Restaurant at the Subproject Site**



180. **Mitigation.** As these are single storey temporary structures, there is no need to seek approval for demolition from the Thromde. Subject to compliance with involuntary resettlement or compensation requirements, if any, based on relevant social safeguard report (e.g, resettlement plan), NHDCL could either remove these structures before award of contract (to avoid cost of dismantling the structures) or leave it on site for the contractor to use as storage shed. Reusable construction materials will be segregated and reused wherever possible.

## 6. Excavation Work

<sup>67</sup>IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning.](#)

181. **Impact.** Excavation work will be carried out for the footing of all the buildings. This will result in loose soil requiring space for storage and creating dust piles during windy days adding to the already dusty conditions due to the various ongoing development activities in the area.

182. **Mitigation.** Most of the excavated material will be reused for filling in the building foundation. The remaining soil, if any, will can be used within the project area as filling material so there is no need to transport this. The newly excavated area will be sprinkled with water to minimize dust at least twice a day on dry windy days.

## 7. Material Sourcing and Storage

183. **Impact.** The buildings will require a number of construction materials such as steel for footing, columns, beams and slab; random rubble masonry wall for foundation, hard stones for stone filling; cement, sand, graded crushed rock for concrete works, aerated autoclaved concrete blocks for walls, fiber-reinforced plastic for window frames and cornices, wood plastic composite for door frames, tiles for flooring, unplasticized polyvinyl chloride for windows, mild steel for railings, steel tubular truss, and pre-painted galvanized iron sheet roofing. For toilets and drainage, construction materials include chlorinated polyvinyl chloride pipes, high density polyethylene pipe, water closet squatting pan and water closet pedestal. All these materials will come from different suppliers and locations. Storage of all these materials will also be an issue at the subproject site. Without proper planning on sourcing and materials may lead to implementation delays and loss of materials.

184. **Mitigation.** The quantity of material required will be estimated based on the final detail design and preparation of Bill of Quantities. Most raw materials will be imported but wherever possible, locally available building materials will be used.

185. Aggregate, sand and stone will be sourced from local authorized suppliers from Phuentsholing and Thimphu. Other materials such as plywood, tiles and fixtures will be purchased from local suppliers or directly from India as per the decision of the Contractor. To minimize wastage and to avoid storage issues, the Contractor will prepare and plan material requirement and delivery as required during each phase of the construction. The NHDCL will use pre-engineered material for the construction of the buildings structure. Pre-engineered material will be imported from India.

186. In terms of storage, the Contractor will schedule material procurement to prevent both shortage and storage issues, construct material storage shed, maintain inventory, and keep valuable items locked. He could appoint security guard to minimize the risk of losing construction material.

## 8. Water Requirements

187. **Impact.** Much of the water for Phuentsholing is pumped from the ground and treated and stored in water reservoirs. There are three water treatment plants in Phuentsholing located in the South, North and Kharbandi with capacities of 2,000 m<sup>3</sup>, 2,000 m<sup>3</sup>, and 500 m<sup>3</sup>; respectively. Three additional water treatment plants will be completed, of which one is the Omchhu treatment plant with a capacity of 8 MLD. The construction work and the influx of a large number of workers is expected to create an additional demand for water for drinking, cooking, washing as well as construction and its associated activities (sprinkling/spraying and cleaning).

188. **Mitigation.** The Contractor will be required to ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purpose. The existing water supply line to the existing NHDCL housing colony which is adjacent to the site will be utilized for this subproject during construction and operation phases, so there is no need to install new water pipelines or seek water sources. However, to ensure adequate water supply during the operation phase, the PMU and PIU will ensure to include the estimated volume of water requirement of the entire housing complex in its application for water service connection from the municipality.

189. In case of shortage of water during construction phase, the Contractor will arrange water tankers to bring water from the Amochhu river to the site and install adequate water tanks to store water. All water supply pipes will be checked, repaired and maintained to prevent leakages or blockages.

## 9. Electrical Requirements

190. **Impact.** Electricity for the construction will be required for lighting and cooking in the worker camps, site office and use of construction tools, equipment and machinery. Without electrical power supply will delay project implementation at the site.

191. **Mitigation.** Within the municipality, the Thromde is responsible for providing electrical services. Currently, all the existing buildings are already connected to the electrical supply network provided by the Bhutan Power Corporation (BPC). Therefore, there is no need to apply for new electrical connections and existing meters can be utilized, with payment for usage by the Contractor. However, the Contractor would need to request from BPC for service on the handling of existing electricity lines before, during and after the demolition works as temporary dismantling and reinstallation of electrical lines will be necessary.

192. The construction of a substation with adequate electrical supply to cater to the additional residential units at the site will be outsourced to BPC, thereby ensuring reliable electrical supply to all the buildings once they operate or occupied in the future.

## 10. Sewerage

193. **Impact.** Without any adequate sewerage system at the site, discharge of greywater and blackwater from the site and workers' camp could pollute the receiving bodies of water in the area.

194. **Mitigation.** Any workers' camp to be temporarily built at the site and other temporary sanitation facilities at construction site will be connected to septic tanks which will be used until the end of the construction period, after which these will be decommissioned, cleared out and filled in with soil. If there is any available authorized provider in the city, movable portable toilets with septic tanks can be rented by the Contractor as an option, which can be desludged or emptied on a regular basis by the service provider.

## 11. Mobilization of Construction Equipment

195. **Impact.** The operation of vehicles and mobile construction equipment at the construction site are risky if adequate precautions are not followed. These hazards include risk of being struck or crushed by moving equipment or its load when being lifted or moved or due to mechanical failure or when machines tip over.

196. **Mitigation.** To minimize the risk to workers working nearby, the machine operators must be trained and competent and use the horn when backing, be assigned a signal person to guide him when reversing and workers must be restricted from working in close proximity during these period, unless it is essential for assisting the use of the machine or for the intended work. In such cases, a supervisor should alert the worker of potential risks.

## 12. Risk of Erosion and Landslide

197. **Impact.** The monsoon months between June and September are the periods of heavy rainfall. From 2008 to 2020,<sup>68</sup> the average annual rainfall was 5700mm. Of this, 52% occurred from June- September. If excavation work is carried out during the summer months, the heavy downpour will wash away the exposed parts of the site. There is a landslide area 70m north of the site. The existing housing complex lies between the site and the landslide area.

198. **Mitigation.** The slope of slide area is deemed at a distance that it will not pose significant threat to the subproject site. As much as possible, excavation works will be completed before the onset of the heavy monsoons.

199. The site drainage will be planned to ensure that rainwater from excavated areas, worker camps and material storage areas do not cause erosion and sedimentation. For the new buildings, the infrastructure design will incorporate efficient drainage system that will connect with the existing drains that are being constructed under the Amochhu Land Development Project.

## 13. Air Quality

200. **Impact.** The air quality in Phuentsholing is poorer in winter compared to summer months as shown in chapter IV because of the dry season. The infrastructure works will further deteriorate the air quality due to the cumulative increase in air emissions from operation of machinery and vehicles that will contribute to the air pollutant load (primarily particulate matter (PM), NO<sub>x</sub>, S<sub>ox</sub>, CO, etc.). However, much of the impacts on air quality will occur during the construction period only.

201. **Mitigation.** The Contractor will ensure that construction equipment and vehicles are maintained in good condition and have passed the RSTA emission test. Vehicles transporting soil, sand and other construction materials and waste will be covered with tarpaulin sheets to reduce the release of dust along transport routes. Stockpiles of soil, sand and other construction materials will be covered to prevent it from being carried off on windy days.

202. **Worker Camps.** The Contractor will provide alternative fuel (electricity or LPG) at worker camps and restrict use of firewood for cooking. Burning of waste will be restricted and enforced strictly.

## 14. Dust Generation

203. **Impact.** Dust will be generated during excavation, transportation and unloading of sand and other construction materials as well as during material storage. The issue of dust will impact workers and tenants who will be exposed to the dust until the Township Development Project and the Phuentsholing-Chamkuna Highway project are completed.

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<sup>68</sup>There was no data for 2014-2015.

204. **Mitigation.** To prevent too much dust during demolition and excavation works, the area will be enclosed/cordoned with construction fabric. Water will be sprayed over bare or newly excavated areas especially on windy days. The excess excavated soil will be removed from the site within 2 weeks of excavation at disposed at the approved disposal site. Material transporters will be instructed to cover dust generating materials to prevent dust and spillage along transport routes. With respect to exposure to dust emanating from the development activities beyond the site, workers will be required to wear personal protective equipment such as masks.

## 15. Noise and Disturbance to the Neighboring Community

205. **Impact.** The construction site is surrounded by residential buildings and offices in the city center. During the construction period, the main sources of noise will be from construction activities such as use of welding machines, sawing of wood, concrete mixing, batching plant operation, excavators and movement of vehicles and trucks. The impacts from construction work will be most disturbing if these activities are carried on during early morning hours or late into the night.

206. Another source of disturbance especially in the evenings is from the workers camps when workers play loud music, engage in brawls or drunken behavior. All these impacts are centered on work sites and camps, and last until the end of the construction period.

207. **Mitigation.** Measures to minimize disturbance to the community include restricting construction work between 9PM -8AM,<sup>69</sup> briefing workers on their obligations regarding proper management of work and behavior with sanctions for inappropriate behavior or repeated complaints from the residents. The vehicle owners will be encouraged to develop and implement a preventive maintenance schedule for all heavy construction equipment and machinery to minimize noise and vibration. The use of prefabricated materials and AAC blocks will also reduce the duration of the construction period.

## 16. Waste Generation and Management

208. **Impact.** The major source of the waste will be from the site offices, worker camps and construction sites. The wastes will includes mostly polyethylene terephthalate (PET) bottles, paper, plastics, glass, organic food and construction waste. Improper disposal of waste will cause land contamination, encourage rodents and impacting local community with the foul odor and unhygienic conditions.

209. **Mitigation.** According to the Waste Prevention and Management Act 2009, any person polluting the environment or causing ecological harm shall be responsible for the costs of mitigation and restoration. Every business entity is required to provide appropriate bins for waste storage and safe collection, segregate hazardous wastes within the premises, maintain cleanliness of the respective premises or surroundings.

210. The contractor will ensure that workers are briefed on proper waste management and good housekeeping at worker camps enforced. Separate bins for “bio-degradable” and “non-biodegradable” for staff quarters and worker camps, and a separate bin for hazardous waste. Waste storage areas will be identified until these are collected by the municipal trucks. Hazardous waste will be stored separately and disposed with the guidance of Thromde. Demolition waste will be removed from the site daily at designated sites.

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<sup>69</sup>As per Development Control Regulations 2016.



211. If required by the Thromde, the demolition and construction waste will be transported along the designated route, and during specific times if specified in waste disposal permit without any spillage along the route (and the route will be cleaned if spillage occurs). Again, if required by Thromde, the waste dumped will be leveled and compacted, and the Thromde Officer updated on quantities disposed.

### 17. Community Health and Safety

212. **Impact.** The main risks to public health is if the construction workers (both foreign and nationals) are sick and transmit these by mingling with the public and local community. The public may also be at risk or if they walk into the site when work is ongoing or from materials falling from the building site.

213. **Mitigation.** Measures to minimize risks to community health and safety include cordoning the construction site to exclude public from the site, controlling access to the site, installing signboards to notify passers-by of ongoing work, installing warning signs near access road and entry points, restrict spilling or storing of construction material along access road, on top of drains and footpaths.

### 18. Congestion and Traffic Management

214. **Impact.** The risks to human safety are the risk of accidents during material transportation especially during peak traffic hours, if drivers are not careful and if construction material is stored along the access road.

215. **Mitigation.** The material transporters will be briefed to adhere to speed limit to reduce the risk of accidents. To reduce congestion, the contractor will coordinate with material transporters to schedule materials drop times and avoid peak traffic hours (e.g., 8.30-9.30AM and 4-6PM).

### 19. Aesthetic Impacts

216. **Impact.** The housing project will be located within 2.27 acres of property allocated to NHDCL, specifically for housing. If not properly designed, the buildings can have negative aesthetic impacts.

217. **Mitigation.** The design team will consider requisite development controls (such as building height, ground coverage and minimum setbacks from roads and adjacent plots), as per the allowable local area plan. The major part of the land will be retained as parking with the building coverage at 23.6%. 20.86% of the area will be allocated as green space. The building designs will also utilize the Bhutanese Architecture Guidelines<sup>70</sup> as a reference to ensure that the buildings blend in with the surrounding while maintaining certain elements of traditional Bhutanese architectural designs.

### 20. Chance Finds

218. **Impact.** Given that the locations and areas, where earthmoving works will be required are known, chance finds may be remote. Nevertheless, there is still a remote possibility that a PCR may be discovered at the site, requiring precautionary measures and procedures to be followed.

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<sup>70</sup> MOWHS, 2014. The Bhutanese Architecture Guidelines

219. **Mitigation.** The Contractor will be briefed during orientation on chance find procedures. In case a PCR is encountered during excavation, construction activities including within a 30-meter radius in the area will be stopped immediately by the site engineer or their representative to the PIU. In particular, the following chance finds procedure should be strictly observed:

- (i) In case of suspected chance finds, the Contractor shall immediately stop all works;
- (ii) Contractor to report immediately within the same day to the PMU or PIU regarding the suspected chance finds;
- (iii) PMU or PIU to advise Contractor to strictly follow the full stoppage of works;
- (iv) PMU to report the potential chance finds to the Department of Culture, Ministry of Home and Cultural Affairs, and the latter to investigate; and
- (v) No works shall resume until clearance is provided by the Department of Culture, Ministry of Home and Cultural Affairs.

## 21. Natural Hazards and Accidents

220. **Impact.** The risk of earthquakes and flood is high in general and requires mitigation measures for such disasters. Also, there is always the risk of structural fires requiring emergency mitigation measures.

221. **Mitigation.** Mitigation measures for earthquakes have been incorporated in the building design and choice of materials. There is no need for additional measures for flood mitigation as the site falls under the Amochhu township project and there is also an early warning system installed along with Standard Operating Procedures for Amochhu.<sup>71</sup>

222. In terms of mitigation measures during the actual disaster/natural hazard, the PMU and the Contractor will follow the guidance of the Phuentsholing Thromde Disaster Management Committee (DMC). Also, measures are outlined in this IEE report under the discussions on occupational health and safety, such as meeting points, provision of emergency transportation to the hospital for injured workers. At the site, fire extinguishers or water storage tanks with hoses will be readily available and the emergency numbers (Fire, Police and Hospital) will be posted at a visible location.

## 22. Completion of construction work

223. **Impact.** The housing complex cannot be complete and ready for its tenants until the infrastructure works are inspected for completion, the site is cleaned of construction debris and damages repaired. However, there is a risk that site could be abandoned and left with unmanaged wastes, debris and other temporary structures used during the construction phase.

224. **Mitigation.** Once the construction is over, the contractor will be responsible for ensuring decommissioning of all temporary worker camps. All temporary structures will be dismantled/demolished, temporary septic tanks and soak pits covered with an adequate amount of soil. All construction materials and debris will be removed before handing the site to the PIU. Any damaged property (government or private) will be repaired and/compensated before final leaving the site. The site will then be replanted with appropriate species during landscaping and creation of green spaces.

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<sup>71</sup> National Centre for Hydrology and Meteorology, 2020. Report on Installation of Community Based Flood Early Warning System at Amochhu, Phuentsholing. National Centre for Hydrology and Meteorology

225. For more specific actions on the decommissioning activities, the Contractor shall follow international best practices such as those in World Bank Environmental Health and Safety (EHS) Guidelines on Construction and Decommissioning Activities.<sup>72</sup>

## **E. Anticipated Impacts and Mitigation Measures During Operation Phase**

### **1. Impacts**

226. At this stage, potential impacts are mostly beneficial as the new tenants will get to live in the newly constructed housing complex, which is affordable, suited to the climatic conditions and more resilient to disasters. The only concerns during the operation phase is the wear and tear on the building, breakdown of electrical and plumbing fixtures/systems, and risk of natural hazards and fire.

227. Over the long term, generation of liquid and solid wastes will also generate impacts to the environment if not managed well.

### **2. Mitigation Measures**

228. **Maintenance and delivery of services.** The NHDCL has a Real Estate Management Services Division (REMSD) that is responsible for managing and carrying out maintenance work on its buildings. It also has a pool of trained and certified electricians, plumbers and masons in case repairs are urgently required.

229. **Fire and Natural Hazards.** NHDCL must ensure that the focal resident person or caretaker is trained in using fire extinguishers and that these are regularly checked and maintained. The emergency numbers of Fire, Police must be posted near the fire extinguisher or at a visible location. NHDCL must also ensure for the conduct of periodic fire drills, posting of emergency exit plans, designating evacuation areas, dissemination of other emergency plan information, and all other activities that will raise awareness among residents on how to behave and respond in times of fire or natural disasters.

230. REMSD will follow instructions from the Thromde Disaster Management Committee (DMC) on procedures to follow in cCase of emergencies

231. **Water shortage.** The infrastructure design has incorporated rainwater harvesting, which will reduce the demand for water during the operation phase, and adequate water tanks to ensure enough storage capacity for water supply.

232. **Solid waste generation.** This is not a significant concern as the site is serviced by the municipal waste disposal service providers. NHDCL will promote waste segregation, storage and disposal as per the collection requirements and procedures and ensure that garbage is not allowed to accumulate on the premises.

233. **Liquid waste (effluent) generation.** The sewerage system in Phuentsholing is the lagoon system. It was constructed in 1994-1996 and only serves 90% of the core urban area. The housing complex will require the sewerage connectivity to the proposed Amochhu township sewerage system in the future but until such as time, septic tanks and soak pits will be required. The official

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<sup>72</sup> IFC World Bank Group. 2007. [\*Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning.\*](#)

site plan and building design will indicate the water supply, plumbing and sewerage (septic tanks and soak pit) provisions, which meet all requisite requirements as per the rules, standards and guidelines. When the sewerage system under the Township project is completed, the buildings will be connected to this system.

#### **F. Cumulative Impacts and Mitigation**

234. Due to its strategic location as a border town between Bhutan and India, Phuentsholing has over the last few decades evolved from a small town to a bustling commercial center, encompassing a mini dry port and industrial estate, apart from being the easternmost gateway to India, Phuentsholing provides a vital link to Samtse Dzongkhag, a mining center. As the gateway to Bhutan, Phuentsholing experiences daily traffic of 10,000 vehicles between Phuentsholing and Jaigaon and 47,000 vehicle passengers and pedestrians.<sup>73</sup> The traffic between Phuentsholing to Samtse has increased substantially due to the current border lockdown and with all vehicles to Samtse driving through Amochhu.

235. Due to geographical limitations, the municipal area stretches over 15.6 km<sup>2</sup>. There is little room for expansion due to the steep slopes and fragile geology. Within this limited Thromde area, there are 6817 Households with a population of 27,658.<sup>74</sup> Almost half of these are not connected to the sewerage network.

236. **Ongoing development projects in the project area.** In Amochhu, with the assistance of the ADB, Phuentsholing is aggressively pursuing the Amochhu Land Development and Township Project, covering 462 hectares of land. There is also an ADB-financed 4-lane Phuentsholing-Chamkuna Road Project from Phuentsholing to Samtse under the South Asia Sub-regional Economic Cooperation Transport, Trade Facilitation and Logistics Project.

237. With the core area the Thromde has completed the construction of a multi-level car parking (MLCP) to fit 200 vehicles. The Thromde has initiated the implementation of 3 new LAPs, in addition to its 8 existing ones- creating alternative routes, widening existing ones, parking spaces, expanding the sewerage network, sanitation and drinking water supply facilities.

238. In terms of private and government building constructions, the Thromde approved 60 new building constructions in 2019.<sup>75</sup>

239. The housing project will add to the ongoing infrastructure development and Local Area Plan that are already ongoing in the Thromde. The housing subproject will add to the cumulative pollution and impact the ambient air quality. If there is no mitigation, the health of the resident and workers will be negatively impacted, with health and economic consequences. Also, it will require resources such as water, timber, construction material and extension of existing municipal services such as waste management.

240. The construction impacts will be visible and have social and environmental impacts during the construction period of 24 months. By this time, the other infrastructural development works of the ADB will also be mostly completed. Most of the construction activities are limited to the project site. It is unlikely that any of the project impacts will go beyond 200m around each site.

#### **G. Environmental Benefits and Enhancement Measures**

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<sup>73</sup> IEE 47284-002-iee-en

<sup>74</sup> GNH, 201

<sup>75</sup> MOWHS 2019.

241. Despite the transient negative environmental and social impacts, the project will generate substantial environmental benefits and enhancements measures. After Thimphu, Phuentsholing is the most populous urban centers with the highest unemployment rates—6.3% for females and 3.1% for males in Phuentsholing. Most of the urban contract workers (cleaners, waste collectors, and semi-skilled workers) reside in informal squatter settlements in Phuentsholing as they are unable to afford decent housing elsewhere.

242. Overall, the project will provide 764 families decent affordable accommodation for low-income Bhutanese people living in Jaigaon, the Indian town across the border from Phuentsholing, who were evacuated recently due to the COVID 19 pandemic, as well as low-income wage earners working in various government agencies.

243. The housing complex will include internal access with ample parking, pedestrian footpath, recreational area/green space, service Block (2 sites). Rainwater harvesting and water storage tanks will be provided that will ensure that residents do not have to face water shortage constraints. Distantly located sites such as Pasakha will also be provided with waste storage and an Eco sewer treatment plant

244. Considering the city's vulnerability due to its terrain and climatic conditions and its location making it prone to natural hazards, the project will promote the development of disaster and climate resilient infrastructure.

245. The project will enhance the capacity of NHDCL to design and build disaster resilient infrastructure, adapted to disasters and natural hazards such as earthquakes, windstorms and floods and to select construction materials, taking into consideration the potential increase in temperatures, rainfall and extreme weather conditions in the future. It will create awareness of both NHDCL and the private contractors/sector on safe construction practices.

246. The project will also enhance the capacity of local contractors through constant supervision and guidance on safe construction practices.

## **H. Summary of Impacts and Mitigation Measures**

247. This subproject involves the construction of four six-storey (G+5 floors) residential buildings with 96 units on 0.85 acres of land. The footprint of these buildings will occupy 28.8% of this land. The parking will fit 36 light vehicles and 36 2-wheelers.

### **1. Design and Pre-construction**

248. Given that the entire site is located within the core area and within a designated Local Area Plan, the project activities will have no impact on any protected area, other environmentally sensitive areas, or endangered, rare or vulnerable species.

249. There are no trees to be removed from the site and no PCRs will be impacted by the subproject.

250. The risk of earthquakes and floods have been taken into consideration during building design, through choice of construction material and ongoing mitigation measures of the township project.

251. The site is easily accessible from the Phuentsholing-Samtse highway so there is no need to construct an approach road. Also, drinking water supply schemes and electricity is already

available at the area, which will be utilized during construction. For the buildings, the construction of a substation and provision of electrical supply will be outsourced to the Bhutan Power Corporation.

## **2. Construction Phase**

252. In general, the implementation of construction work is not expected to cause major negative impacts spatially or temporally because the site is within the designated urban areas and has been specifically allocated by the Thromde for construction of housing units.

253. Construction impacts (mostly for noise and air and dust pollution) will be limited to the immediate area and its surrounding, and mitigation measures are included in the EMP. Both demolition and excavation work will be confined to the existing structure and building footprint and will not last for more than two months.

254. Excavation works will be planned so that it can be carried out and all excess soil removed from the site before the onset of the monsoons, if possible.

255. The choice of prefabricated construction materials means less assemblage time, waste and disturbance to the neighboring community.

256. NHDCL will ensure that contractor (s) selected have adequate experience in such infrastructure works. The construction work will be contracted out as per prevailing government procedures wherein the contractor will be accountable for managing the construction sites responsibly and delivering quality structures within the stipulated period.

257. As part of their responsibility to prevent unwanted/unsafe development, the Thromde will monitor all building construction through regular site visits during various stages of the construction process (foundation, completion of each floor, and roofing). Upon completion of the project, the issuance of an occupancy certificate is based on compliance to the approved construction approval and site inspections. This check and balance system ensures that appropriate design and structural considerations are adhered to.

258. The construction team will comprise of small teams about 80-100 workers in one building at any given time. Also, work will 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.).

259. Potential environmental and social impacts before, during and post construction have been identified along with appropriate mitigation measures that are included in the Environmental Management Plan which be included in the bid document.

260. The PIU will conduct an orientation for both its staff as well as selected contractor(s) on ADB safeguard policies, national regulations and EMP requirements, and COVID 19 safeguard requirements and procedures.

261. The construction will be monitored by the supervision staff and the PIU, and accordingly corrective actions will be undertaken and reported to the PMU and to ADB.

**3. Post-construction / Operation Phase**

262. The necessary areas of concern during the operation phase are natural hazards, building wear and tear, water shortage and waste management. Again, mitigation measures for these are incorporated in the EMP to be implemented by the NHDCL, who will ensure regular repair and maintenance of its newly constructed structure so that its residents can enjoy the benefits of the new housing colony.

263. On the social front, the Grievance Redress Mechanism will be instituted and required processes followed to ensure that there are no outstanding grievances due to the project. Any public or private property that is damaged during construction will be promptly repaired and reported. Semi-annual Environmental Monitoring Reports will be submitted to the PMU and ADB on the status of the work and compliance to ADB safeguards, National Regulations and the EMP.

**VI. ANALYSIS OF ALTERNATIVES**

**A. Alternatives relating to Site Location**

264. There is an acute shortage of government land within Phuentsholing Thromde, and yet there is an urgent need to meet the immediate housing demand. This leaves very little room for alternatives. For the Phuentsholing area, initially four sites had been selected, but due to concerns of long-term exposure to industrial pollution at Pasakha, only three sites have been chosen for implementation and the Amochhu is one of the three sites.

265. Since the project is geared for urban low-income staff and wage workers, the site location is idea as it reduces transportation cost as most of the government offices, schools and businesses are located within a radius of 1km from the site.

**B. Alternatives relating to Design and Technology**

266. The project has departed from the convention housing design by incorporating universal designs features, disaster resilience, fire safety and rain water harvesting considerations.

**C. Environmental Implications of Alternatives**

267. There are many positive implications of the selected alternative. Firstly, the building footprint utilizes only 29% of the 0.85 acres. 11.5% will be maintained as green space while the majority of the area will be retained as parking.

**D. Implication of No-Project Alternative**

268. Both the “no project” and “with project” options have been studied and a comparison of ‘No Project’ and ‘with Project’ options are presented in the Table below.

**Table 25: Comparison of “with project” and “no project” options.**

<b>Description</b>	<b>No Project</b>	<b>With Project</b>
Social impacts	Maintain status quo	The Project will assist the Royal Government of Bhutan (RGOB) establish housing infrastructures for 96 families including those living in the temporary Kidu colony in Amochhu

Description	No Project	With Project
Physical impacts	None	The planned housing complex will be designed based on what is allowable within the local area plan. Five buildings will be constructed at the site, with internal access road and parking.
Potential impacts due to seismic risks, environmental friendly and climate resilience	The land is undeveloped with two temporary structures.	Design of buildings are as per Bhutan Building Regulations 2018, Bhutan Building Code of Bhutan 2018, Bhutanese Architectural Guidelines, 2014 and the Bhutan Green Building Guidelines, 2013; Development Control Regulation 2016; Bhutan building color code- 2014; Design guidelines for differently abled friendly construction-2011. The project will integrate innovative approaches to enhance resilience to geophysical events with suitable materials. The design includes parking, rain water harvesting and installation of storage tanks. 20.86.% will be left as green space.
Environmental impacts Potential impacts to ecologically sensitive areas, critical habitats, biodiversity and physical cultural structures	No impact as the site is located within city boundaries	Same as 'no project' scenario
Social impacts Potential impacts to indigenous people	There are no indigenous communities at or near the project site	Same as 'no project' scenario
Disruption to local residents during construction	None	There will be some disturbance to local residents living in close proximity to the construction site during the construction period especially due to construction noise There is a potential for traffic congestion to occur with increase in material transporting vehicles
Employment opportunities for locals	None	The project will provide employment opportunities for able, skilled and non- skilled workers (both foreign and local)

269. **“No Project” option:** The No project option means that the existing housing crunch, a chronic issue being faced at the Kidu Colony and by low-income government and corporate employees in Phuentsholing will continue. The lack of affordable housing further aggravates already existing urbanization woes such as increasing illegal settlements and temporary huts, overcrowding, waste generation, and inadequate sanitation resulting in unhealthy living conditions. The unaffordable housing also undermines a wage earners ability to save money further widening the gap between the rich and the poor. This situation particularly impacts the low income and vulnerable population the most, as they continue to reside in housing complexes ill-suited to withstand the seismic risks and natural hazards.

270. **“With Project” option:** The new project will provide affordable housing and relief for 96 families. The new housing complex will be designed to suit the topography and surrounding land



use. It will incorporate universal design features (ramps, sufficient parking, pedestrian footpaths and efficient drainage systems). It will be designed for disaster resilience and fitted with fire extinguishers. Environmentally friendly/green features such as use of locally produced materials, improved window designs, waste management units, provision of adequate water storage tanks, open green spaces and parking. Above all, it will provide opportunities for low-income families to save money while live in a healthy, spacious environment, in close proximity to all amenities. The project will also generate employment opportunities for both skilled and non-skilled workers during the construction phase.

## **VII. INFORMATION, DISCLOSURE, CONSULTATION AND PARTICIPATION**

### **A. Consultation and Participation**

271. Consultation, participation, and disclosure constitute an integrated process in the project design preparation and implementation. As required by ADB SPS, NHDCL will disseminate information to affected persons and consult with them in a manner that is commensurate with the anticipated project impacts on the affected communities. NHDCL will inform and consult with the affected persons on resettlement and compensation options and provide them with project-related information during resettlement planning and implementation. Disclosing information will precede consultation.

### **B. Approach and Methodology**

272. Key stakeholders were identified and consulted during the project planning process as follows:

- (i) Forest Range Office;
- (ii) Executive Secretary, Phuentsholing Thromde and Solid Waste Section Head, Thromde office, 12 March 2021;
- (iii) Current residents/neighbors around the site, 10 -13 March 2021;
- (iv) Future potential residents who are currently residing at the Kidu Colony including representatives and women's groups, 10 March 2021; and
- (v) Waste collectors/technicians working with the Thromde, 12 March 2021.

273. **Consultations during COVID-19 Pandemic.** Meaningful consultations will continue even as the COVID-19 pandemic prevails. Consultations will be undertaken through a combination of online, virtual and in-face consultations. Field consultations will be undertaken only when necessary, but following safety guidelines to ensure project team members and participants are not put at high risk of contracting COVID-19. A set of guidelines has been developed for the project to ensure that the conduct of consultations will be a safe activity for the organizers and participants (see Appendix 6). This set of guidelines may be adopted wholly or adjusted depending on the prevailing local and national guidelines on COVID-19.

### **C. Preliminary and Follow up Consultations**

#### **1. Consultation and project disclosure with relevant stakeholders**

274. NHDCL has informed and sought clarification from the Forest Range Office on the results of IBAT screening for the subproject site. There are 36 IUCN Red List species of concern that were identified and potentially found within 50km of the area of interest. These species were assessed to determine the likelihood of them being found at the subproject site. During the

consultation, the Forest Range Office confirmed that none of the terrestrial species are found or sighted at the subproject site. Accordingly, these species are found or dwell in the denser forest further in the higher elevations of the district.

275. The Forest Range Office also confirmed that the Amochhu river has a number of aquatic species, including the Mahseer (*Tor putitora*) that is considered an endangered species per result of the IBAT screening. However, it was assessed that the subproject will not impact any species in this river considering the distance from the subproject site. Further, the nature of the subproject (i.e., housing development) has all the construction activities constrained within the site boundaries. In addition, the Amochhu river and the subproject site are separated by a township area being developed by the government.

276. Consultation was also carried out with Executive Secretary, Phuentsholing Thromde to discuss related social (affected persons, compensation requirements) and environmental concerns (water supply, waste and disaster risks) for the subproject site.

277. Table 26 shows a summary of the public consultations done with other stakeholders of the subproject. Copies of minutes of meetings are in Appendix 7.

**Table 26: Public Consultations for the Phuentsholing subproject**

<b>Date</b>	<b>Target audience</b>	<b>Number of Participants</b>
March 9, 2021	NHDCL and Government staff (those currently living in NHDCL housing and those who are not but have applied)	16 (10M, 6F)
March 10, 2021	Employed and Unemployed (Kidu Colony)	18 (7M, 11F)
March 12, 2021	Waste workers	7
March 10, 2021	Women's group	9F +, 3M (organizers)

## **2. Summary of key queries and clarifications regarding the Phuentsholing Subproject**

278. The objective of the consultation was to inform project affected people about the plan for development of the affordable housing in Phuentsholing through ADB support; to make participants aware of the safeguard requirements, to agree on a plan to vacate the identified sites ahead of the project approval and implementation phase; and discuss any forms of assistance that NHDCL could provide to ease the process of vacating and relocation of affected people.

279. During each meeting, the Liaison Officer presented the floor plans and designs of the housing units planned in Phuentsholing as well as the location identified. He also informed that the lowest rent would be Nu. 4,400 for a two-bedroom apartment and Nu. 3,000 for a one-room apartment.

280. All apartments are handed over with inventories to new tenants which is the basis for verification when the apartment is vacated. Tenants are responsible for paying their bills directly to the service provider and rent can be deposited by electronic transfer or cheque or cash to NHDCL's account. Each NHDCL colony and buildings has a Representative for maintenance and to coordinate waste management. From experience in existing NHDCL housing facilities, the challenges faced by the Representative is the lack of incentive and the low compliance by the tenants to notices and requests to participate or collaborate in events such as cleaning campaigns. It is with trust that this issue will be remedied by the recent Zero Waste Hour Policy of the Government, which requires all offices/residential complexes to carry out cleaning on the

second day of every month. NHDCL will provide cleaning implements and accessories such as gloves and plastic bags to efficiently collect wastes. If found necessary, NHDCL will hire cleaners to clean the premises.

281. For maintenance purposes, all tenants are required to fill and submit a form to the NHDCL through their representative. Based on this a technician is deputed to assess and carry out routine maintenance. Minor repairs are also carried out by the tenants themselves

### **3. Meeting with the residents of the Kidu Colony/Resettlers**

282. Much of the discussion with the members from the Kidu Colony, at Amochhu was on the differences between living in Bhutan and Jaigaon, India. The key advantages of living in Jaigaon are cheap rent, easy availability of goods. The disadvantages outweigh the advantages and include high electricity charges, common toilets, safety risks, easy access to drugs, and difficulty in seeking timely and quality health treatment during emergencies. Moreover, tenants are at the mercy of landlords.

283. The residents are currently residing in the Kidu housing colony and apart from problems with cockroach infestations and unfiltered tap water, there are no major issues. They are anxious about whether they can find affordable housing once they are required to vacate the colony. They feel that the two-bedroom apartments proposed by NHDCL are suitable and affordable.

284. Regarding the location, some participants prefer living closer to core city area due to higher bus fares and easier access to educational, health facilities and proximity to Jaigaon.

### **4. Women's group meeting**

285. Most of the women attending the meeting were working or doing home-based income generating activities like weaving and hawking edible snacks. Only one woman was unemployed as she had to stay at home to look after the children. In general, divorced or single mothers having to care for children struggled more than other married women. The women found the kidu colony safe with the only constraint being limited space for larger families. Apart from ration/food supplies from the Office of the His Majesty's Secretariat, they have not received any assistance from any other agency.

### **5. Focus Group Discussions with NHDCL and Government staff (those currently living in NHDCL housing and those who are not but have applied)**

286. Most participants prefer the two-bedroom apartment and found the rent for this affordable. Currently, some residents are living in small, congested spaces in need of repair (which they carry out themselves) and face water shortage.

287. Some of the preferences for the new housing colonies are (i) sliding windows reinforced with grills especially on the ground floor; (ii) grills in the open space along the stairway for security reasons; and (iii) net screens on doors and windows. It was recommended that NHDCL fix the rent based on location and distance from the city center. The participants found the idea of ownership schemes for housing units very good in principle but realize it might be difficult practically due to frequent transfer of civil servants.

288. Other recommendations were to provide individual water meters; install good quality electrical and plumbing fixtures and fittings that are locally available so that tenants can easily purchase these if damaged.

#### **D. Future Consultations during detailed design stage**

289. Once the detailed design of the housing complex is finalized, NHDCL through PMU, will prepare a brief and disclose the same through the conduct of meaningful consultations with the stakeholders, including those identified during the reconnaissance visits but were not included in previous consultations. Follow up consultations will also be undertaken prior to construction activities, and will continue throughout the subproject implementation. Formal disclosure of completed project reports will also be made by making copies available at the NHDCL site and head office, informing the public of their availability, and providing a mechanism through which comments can be made.

#### **E. Information Disclosure**

290. NHDCL will disclose relevant information regarding the project on the website, and in print form, which will be available to interested parties at the PIU. The project contact details will also be posted on the signboard installed at the construction site, so that any person can call the PIU for project related information.

291. This IEE, which includes the EMP and all other safeguard documents, will also be disclosed on the ADB website for information. If any changes are made to the project design or location, this IEE will be updated, and likewise disclosed accordingly.

### **VIII. GRIEVANCE REDRESS MECHANISM**

292. The project will adopt a three-tier Grievance Redress Mechanism (GRM) in implementing the project. The GRM will receive, evaluate, and facilitate the resolution of social, environmental or any other project related grievances. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project. The GRM described below has been developed in consultation with stakeholders. Public awareness campaign will be conducted to ensure that awareness on the project and its grievance redress procedures is generated and shared with affected persons and other stakeholders. The campaign will ensure that the poor, vulnerable and others are made aware of the need for and process in availing the GRM.

293. The GRM provides an accessible, inclusive, gender-sensitive and culturally appropriate platform for receiving and facilitating resolution of affected persons' grievances related to the project. A sample grievance redress form is in Appendix 8. The three-tier GRM for the project is outlined below, each tier having time-bound schedules and with responsible persons identified to facilitate and address grievances at each stage, as required. Public awareness campaigns will ensure that awareness on grievance redress procedures is generated through the campaign. The Environmental and Social Safeguard Officer of PMU will have the overall responsibility for timely grievance redress on environmental and social safeguards issues.

294. **Who can file a complaint:** A complaint may be registered by stakeholders who may be, directly or indirectly affected by the project. A representative can register a complaint on behalf of

the affected person or group, provided that the representative is identified by the affected person or group and submits evidence of the authority to act on their behalf.

295. **What type of grievance/complaint:** Any comments, complaints, queries and suggestions pertaining to safeguard compliance - environment, involuntary resettlement, and indigenous people, design related issues, compensation, service delivery or any other issues or concerns related to the project can be registered. The complaint must indicate the name, date, address/contact details of the complainant, location of the problem area, along with the problem.

296. **Where and how to file a complaint:** The contractor's site office will be the primary point for receiving and lodging any complaint. Apart from that, grievances/suggestions/queries from affected persons can be dropped into suggestion boxes or conveyed through phone or e-mails. Affected persons or any complainant will also be able to register grievances on social, environmental or other related issues, personally to the Complaint Cell at PIU level.

297. **Process and Timeframe:** The grievance redress process and timeframe involved in the GRM is described below:

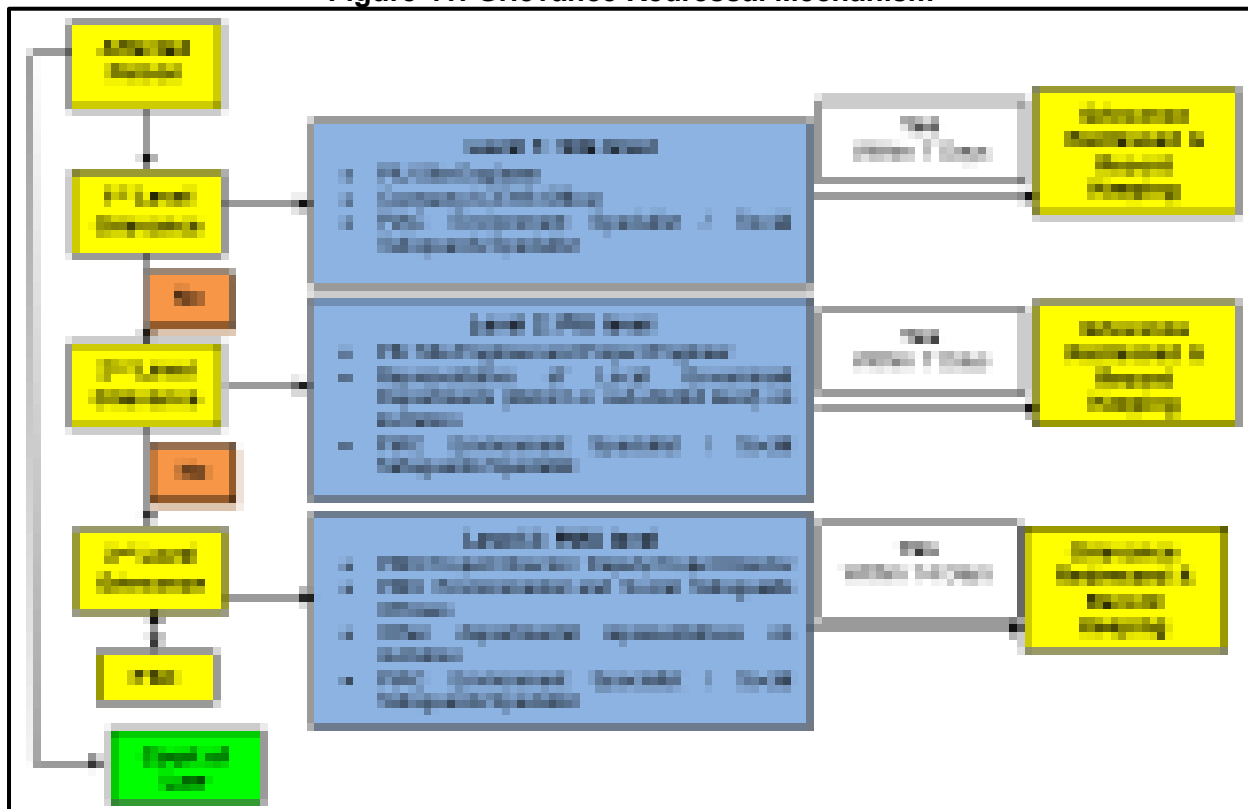
- (i) **1st Level Grievance (Field Level):** In case of grievances that are immediate and urgent in the perception of the complainant, concerned officer of PIU will direct the contractor to resolve the complaint and ensure that it is resolved. If the grievance is not under the contractor's scope, the Project Implementation Assistance Consultant (PIAC) will resolve this issue with the support of respective PIU. Efforts will be made to resolve all grievances within two days from the date of receipt of a complaint / grievance. Relevant government representatives from the respective districts and sub-districts, where the subproject will be implemented, can be consulted as and when required.
- (ii) **2nd Level Grievance (PIU):** Grievances that cannot be redressed at first level within two days will be brought to the notice of the Complaint Cell at PIU level. The Project Engineer will try to resolve the grievance/ complaint within a timeframe of 14 days of receiving the complaint from the first level. The PIU may consult/seek the assistance of the Environment and Social Safeguard Officers at the PMU level. Government representatives from the respective districts and sub-districts where the subproject will be implemented can be consulted as and when required. Any unresolved complaint at the second level will be taken up to the third level.
- (iii) **3rd Level Grievance (PMU):** All the grievances that are not addressed at 2nd level by PIU will be brought to the third level. The third level will meet once a month and determine the merit of each grievance/s brought to the committee. The third level grievance redress committee will resolve the grievance within 14 days of receiving the complaint from the second level. The Environmental Safeguards Officer or Social Safeguards Officer, PMU will provide feedback to the complainant. Any critical or unresolved matter may be taken to the Project Steering Committee (PSC) for solution.

298. MOF will chair the PSC which will comprise government officials from the Ministry of Works and Human Settlement (MOWHS), National Land Commission (NLC), the Gross Happiness Commission (GHNC), the National Commission for Women and Children (NCWC), the NHDCL, and representatives of selected subproject districts. The PSC will be established to oversee the project implementation and provide strategic and policy guidance and will meet at least biannually and as required.

299. The GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage, such as Thromde or court of law in the respective district. This can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

300. The process of the project GRM is given in Figure **41**.

Figure 41: Grievance Redressal Mechanism



EHS = environmental health and safety, NHDCL=National Housing Development Corporation Limited, PIAC = project implementation assistance consultant, PIU= project implementation unit, PMU =project management unit, PSC= project steering committee

301. The timeframes within which to resolve the issues may be adjusted accordingly during extraordinary circumstances, such as lockdowns or travel restrictions imposed by local or national governments due to the ongoing COVID-19 pandemic. The adjustment will depend on the period of interruption during these events and will be decided upon by the PMU.

302. **Information Dissemination Methods about GRM.** Periodic community meetings will be held by PIUs, and PIAC with affected communities to understand their concerns and help them through the process of grievance redress (including translation from local dialect/language, recording and registering grievances of non-literate affected persons and explaining the process of grievance redress) if required. The above Grievance Redress Process will be discussed with the different stakeholders during stakeholder consultation meetings. These meetings will be held with affected persons and community members (beneficiaries) and the concerned local government representatives where civil works are proposed. The process and timelines for grievance redress and contact details of the persons responsible for grievance redress will be shared in the stakeholder meetings. Action taken in respect of all complaints will be communicated to the complainant by letter, over phone or e-mail or text messaging.

303. **Consultation Arrangements for GRM.** This will include group meetings and discussions with affected persons, to be announced in advance and conducted at the time of day agreed on with affected persons and conducted to address general/common grievances; and if required with the Environment/Social Specialist of PMU/PIU for one-on-one consultations. Non-literate affected persons/vulnerable affected persons will be assisted to understand the grievance redress

process, at the site office of the contractor and at PIU level, the official appointed to receive grievances will assist the non-literate affected persons to register complaints and follow-up with actions at different stages in the process.

304. **Record Keeping.** Records of all grievances received, including contact details of complainant, date of receiving complaint/grievance, nature of grievance, agreed actions and measures, the date these were affected, and outcome will be kept by PIU. The number of grievances recorded and resolved, and the outcomes will be displayed/disclosed in the PIU office, and on the website of PMU, as well as reported in the semiannual social and environmental monitoring reports to be submitted to ADB. The Environmental Officer and the Social Safeguard Officer will be responsible for maintaining the grievance record. Suggested template for record-keeping of grievances is in Appendix 9.

305. **Periodic Review and Documentation of Lessons Learned.** The PMU, and PIUs, supported by the PIAC specialist will periodically review the functioning of the GRM and record information on the effectiveness of the mechanism, especially on the PIU's ability to prevent and address grievances.

306. **Costs.** All costs involved in resolving the complaints (meetings, consultations, communication, and reporting/information dissemination) will be borne by the PMU.

307. **ADB Accountability Mechanism.** If the established GRM is not able to resolve the issue, the affected person can use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB headquarters. Before submitting a complaint to the Accountability Mechanism, it is recommended that affected people make effort in good faith effort to resolve their problems by working with the concerned ADB operations department (in this case, the Bhutan Resident Mission (BHRM)). Only after doing that, and if they are still dissatisfied, they could approach the Accountability Mechanism. The ADB Accountability Mechanism information will be included in the project-relevant information to be distributed to the affected communities, as part of the project GRM.

## IX. ENVIRONMENTAL MANAGEMENT PLAN

### A. Institutional Arrangement

308. **Overall Project Institutional Arrangement.** The Ministry of Finance (MOF) is the executing agency and the National Housing Development Corporation Limited (NHDCL) is the implementing agency of all outputs of the proposed Bhutan Green and Resilient Affordable Housing Sector Project. MOF and NHDCL will engage relevant government agencies<sup>76</sup> and NGOs in designing and operationalizing the project. International and national consultants will be recruited to provide expert assistance. A central project steering committee (PSC) set up under the project will facilitate and ensure adequate coordination among relevant stakeholders and provide guidance for PMU and PIUs for this proposed project. In particular, the PSC will: (i) meet at least semi-annually or more frequently if required; (ii) provide guidance for and ensure the implementation of government and ADB policies for the proposed Project; (iii) assist in resolving any interagency implementation problems; (iv) review relevant reports and audit statements from PMU and PIUs, as and when required; and (v) ensure that conditions of the Loan Agreement with ADB are met.

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<sup>76</sup>Department of Disaster Management (Ministry of Home and Cultural Affairs); Department of Engineering Services; Department of Geology and Mines; etc.



309. NHDCL being the implementing agency for the project, will be responsible for management, coordination and execution of all activities funded under the loan. A PMU at NHDCL will be created, which will be responsible for implementing the project. The PMU will be headed by a Project Director and supported by PIUs at the district and/or sub-district levels.

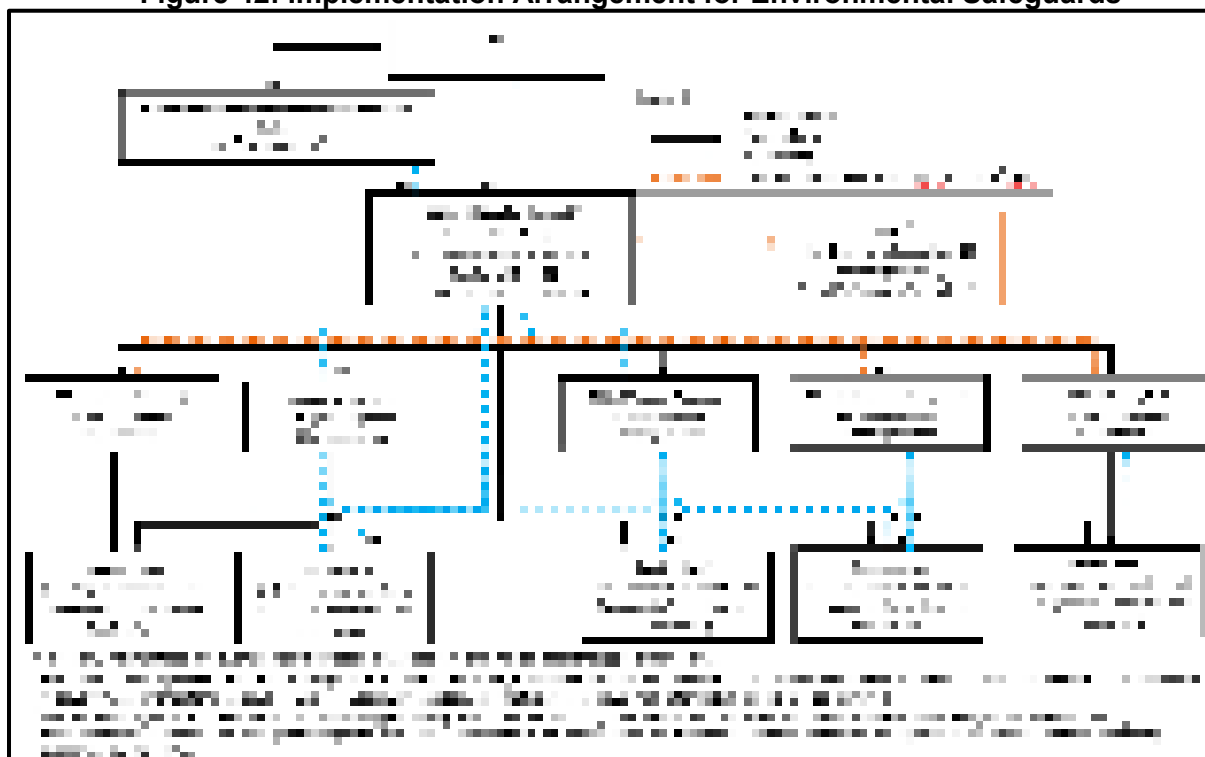
310. The PMU and PIUs will be further supported by a Project Implementation Assistance Consultant (PIAC) in project management and implementation. Figure below details the responsibilities for the project preparation, construction and operation.

**Figure 42: Overall Project Implementation Arrangement**



311. **Specific Institutional Arrangement for Environmental Safeguards.** Figure below depicts the implementation arrangement for environmental safeguards.

**Figure 42: Implementation Arrangement for Environmental Safeguards**



ADB = Asian Development Bank, EHS = environmental, health and safety, PIAC = project implementation assistance consultant, PIU = project implementation unit, PMU = project management unit.

312. **Project Management Unit.** The PMU will work closely with the PIUs in implementing the environmental safeguards requirements of the project. The PMU will be staffed with at least one (1) environmental safeguards officer who will lead the efficient overall implementation of environmental safeguards. With support from the PIUs and PIAC, the PMU will have the following responsibilities:

- (i) Ensure subprojects comply with the national and local statutory and legal environmental requirements, ADB SPS 2009, EARF and environmental safeguards provisions of the ADB loan covenant;
- (ii) Ensure subprojects conform to exclusion criteria and subproject selection guidelines as stipulated in the EARF;
- (iii) Review and approve the environmental categorization of future subprojects;
- (iv) Review and approve subproject IEE reports, including EMPs, and ensure that subproject IEEs and EMPs are updated based on final detailed designs and submit to ADB for clearance;
- (v) Ensure that no civil works commence until updated IEE based on final detailed design is cleared by ADB;
- (vi) Ensure that the IEEs including EMPs are updated in case of changes in detailed design that may occur during implementation phase;
- (vii) Ensure that IEEs with EMPs are included in bidding documents and civil works contracts;
- (viii) Ensure that the requirement for contractors to prepare their respective Health and Safety (H&S) Plans including COVID-19 H&S Plans is included in bidding documents and civil works contracts;
- (ix) Review and approve site-specific EMPs (SEMPs) of contractors;

- (x) Provide oversight on environmental management aspects of the project, and ensure EMPs and SEMP are implemented by contractors;
- (xi) Establish a system to monitor environmental safeguards of the project including monitoring the indicators set out in the monitoring plan of the IEE;
- (xii) Facilitate timely and ensure overall compliance with all national and local government rules and regulations regarding site and environmental permits/clearances/approvals as well as any other environmental requirements as relevant;
- (xiii) Review, monitor and evaluate effectiveness with which the EMPS, SEMPs, and Health and Safety Plans are implemented, and recommend necessary corrective actions to be taken;
- (xiv) With support from PAIC, consolidate quarterly monitoring reports from the PIU and submit semi-annual environmental monitoring reports (SEMRs) to ADB;
- (xv) Ensure availability of budget for safeguards activities;
- (xvi) Ensure adequate awareness campaigns, information disclosure among affected communities and timely disclosure of final IEEs/EMPs and SEMRs, including corrective action plans, if any, in project website and in a form accessible to the public;
- (xvii) Address any grievances brought through the grievance redress mechanism (GRM) described in this IEE report in a timely manner;
- (xviii) Undertake regular review of safeguards-related loan covenants, and the compliance during project implementation; and
- (xix) Organize periodic capacity building and training programs on safeguards for stakeholders, PMU, PIUs and contractors.

313. **Project Implementation Unit (PIU).** The PIU will be responsible for the day-to-day activities of project implementation in the field and will have direct supervision to the contractors at subproject sites. The PIU will be headed by a Project Engineer who will oversee the overall implementation of the project including safeguards. The PIU will also appoint a Site Engineer who will oversee and monitor the day-to-day progress and implementation of the environmental provisions in the EMP. With support from PIAC, the Site Engineer will:

- (i) Ensure compliance with government and ADB requirements on environmental safeguards;
- (ii) Conduct regular site visits, including spot checks, to ensure the EMPs and/or SEMPs are properly implemented;
- (iii) Review monthly reports from contractors;
- (iv) Prepare quarterly reports on all aspects concerning environmental assessment, management, and monitoring;
- (v) Obtain approval of the quarterly reports from the Project Engineer, and submit approved reports to PMU;
- (vi) Address any grievances brought about through the GRM described in the EARF in a timely manner; and
- (vii) Support all other environmental safeguards-related activities and tasks of the PMU as may be needed.

314. **Environment Specialist Consultant.** The PIAC shall have an Environment Specialist Consultant who will assist and train PMU and PIUs in implementing the EMPs of subprojects, including the review and updating of all necessary environmental safeguard documentation as required by ADB SPS and national laws, regulations, policies and guidelines applicable to each subproject. The Environment Specialist Consultant will also train PMU and PIU on how to monitor

safeguards compliance during O&M phase. Other specific tasks of the consultant are to assist PMU and PIUs to:

- (i) Conduct consultations/discussions with environmental regulatory agencies and other stakeholders;
- (ii) Identify all applicable and relevant national laws, regulations, policies and guidelines and preparing environmental assessment;
- (iii) Undertake environmental categorization for the proposed future subprojects;
- (iv) Carry out IEE for the proposed future subprojects and formulating environmental management plans (EMPs) for the different components of the civil works in line with ADB and national requirements;
- (v) Undertake assessment of existing safeguards system under the project, identifying areas for improvement, and development of appropriate safeguards implementation arrangement. This assessment will form part of the IEE, and results will be included in the IEE report;
- (vi) Carry out (a) environmental baseline data collection, (b) assessment of project hazards and risks that may be posed to the environment and people, (c) EMP development or formulation, (d) meaningful consultations with project-affected people; and (e) other preparatory activities necessary for finalizing the subprojects' environment safeguard documents;
- (vii) Prepare IEE report, environmental management plans (EMPs) as required by country's environmental legal frameworks and ADB SPS;
- (viii) Ensure that the relevant provisions of EMPs, including costs of implementing the EMPs, are fully included in bid and contract documents, particularly in the bill of quantities (BOQ) and cost line items;
- (ix) Review designs, bidding documents, BOQ, and safeguard documents to ensure health and safety considerations including issues related to COVID 19 pandemic, are adequately covered and costed;
- (x) Calculate and provide the indicative cost estimate to implement EMPs, environmental monitoring programs, awareness programs, etc.;
- (xi) Assist with any capacity building activities for stakeholders;
- (xii) Ensure quality and format of IEE reports, and other environmental safeguard documents following ADB Handbook of Styles and Usage;
- (xiii) Comply with disclosure requirements per ADB SPS;
- (xiv) Implement proposed environmental mitigation measures and ensure the implementation of EMPs during construction phase;
- (xv) Monitor implementation of SEMP;
- (xvi) Monitor required environmental parameters and preparing semi-annual environmental monitoring report (SEMR) per the requirement of ADB; and
- (xvii) Prepare all necessary environmental reports per requirement during implementation of the civil works contracts.

**315. Civil Works Contract and Contractor.** The IEE with EMP will form part of bidding and contract documents and verified by PMU. The Contractor will be required to designate an environment, health and safety officer (or equivalent) to ensure implementation of EMP during civil works. Contractor is to carry out all environmental mitigation and monitoring measures outlined in their contract. The Contractor will be required to submit to PMU, for review and approval, a SEMP including (i) proposed sites/locations for construction work camps, storage areas, hauling roads, lay down areas, disposal areas for solid and hazardous wastes; (ii) specific mitigation measures following the approved EMP; (iii) monitoring program per EMP; and (iv)

budget for SEMP and EMP implementation. No works can commence until SEMP is approved by PMU.

316. Specifically, the Contractor will have the following responsibilities, among others that will be included in the bid and contract documents:

- (i) Ensure that the infrastructure development works are carried out in an environmentally friendly manner, minimizing environmental impacts while ensuring the health and safety of all its workers and the minimizing disturbance to the surrounding environment and communities;
- (ii) Consideration of ADB SPS, national regulations and the EMP during bid preparation and cost estimation;
- (iii) Hire or designate a full time Environment, Health and Safety Officer (or equivalent) responsible for compliance to ADB SPS requirements, national regulations and the EMP. The officer/staff must have a clear terms of reference and responsibilities to ensure that all environmental and social concerns are properly managed;
- (iv) Ensure regular reporting to the PIU on work progress and alert management on any potential issues or delays;
- (v) Strictly follow National COVID 19 protocols and instructions issued by the Ministry of Health and the COVID Task Force, and immediately report to the PIU upon detection of COVID positive cases at the project site;
- (vi) Obtain the necessary permits and clearances as required to implement the project;
- (vii) Ensure that all worker recruitment and OHS requirements are complied;
- (viii) Take necessary corrective action to rectify any non-conformance, including actions related to grievances;
- (ix) Institute an emergency plan for natural calamities/disasters and accidents at the site; and
- (x) Follow chance finds procedures to discovery of any physical cultural artifact.

317. A copy of the EMP/approved SEMP will be kept on-site during the construction period at all times. Non-compliance with, or any deviation from, the conditions set out in the EMP/SEMP constitutes a failure in compliance and will require corrective actions.

318. PMU will ensure that bidding and contract documents include specific provisions requiring contractors to comply with: (i) all applicable labor laws and core labor standards on (a) prohibition of child labor as defined in national legislation for construction and maintenance activities; (b) equal pay for equal work of equal value regardless of gender, ethnicity, or caste; and (c) elimination of forced labor; and with (ii) the requirement to disseminate information on sexually transmitted diseases, including HIV/AIDS, to employees and local communities surrounding the proposed project infrastructure sites.

**Table 27: Environmental Safeguards Roles and Responsibilities**

<b>Project Management Unit</b>	<b>Environment Specialist Consultant</b>	<b>ADB</b>
<b>Pre-construction stage</b>		
Environmental officer of the PMU, with assistance from the environment specialist consultant, to conduct Rapid Environmental Assessment (REA) for each site of proposed subprojects using checklist available from ADB. Based on the REA,	Environment Specialist Consultant will assist PMU and conduct IEE (or update existing IEE) for all subprojects, which will include an EMP. The environmental expert and other consultants will work	ADB to review the REA checklists and reconfirm the categorization.

<b>Project Management Unit</b>	<b>Environment Specialist Consultant</b>	<b>ADB</b>
categorize the project based on ADB SPS. Submit all categorization forms to ADB.	with the design team to ensure all relevant environmental considerations are included in the design. The PMU consultants (environment and social) will assist PMU in the conduct of public consultations during IEE process and incorporate consultation findings into project designs and IEE.	
Based on its review, PMU will approve the IEE and send to ADB for review and clearance before contract award. The IEE also made available on request. Ensure IEE with the corresponding EMP is part of contract documents for category B subprojects. If the proposed infrastructure is classified as category C, the PMU to provide generic mitigation measures, if any, to be implemented. For Category C, no IEE/EIA is required, and only a review of the environmental implications is necessary.	After the approval of IEE by PMU and clearance by ADB, the Environment Specialist Consultant will assist PMU in disseminating the IEE to public for information as required by ADB SPS.	ADB will review and provide clearance of IEE/EMPs before award of contracts. ADB will disclose cleared and government endorsed IEEs on its website.
Environmental officer of PMU to provide guidance to the PMU consultant team to ensure compliance of all undertakings with regulatory requirements with regard to environment. This shall include guidance in preparation of the documents as required for the issuance of environmental clearance and other necessary clearances such as for example forest clearances if required, submission of application forms, and liaising with agencies towards obtaining these clearances from relevant government agencies. Environmental officer of PMU shall notify the ADB on obtaining of these clearances, including the conditions specified if any in the clearances, and integration of these into the contracts/EMP.	The Environment Specialist Consultant shall support the PMU environmental safeguards officer in compiling the necessary information required for submission of application forms for clearances, obtaining NOC from local authorities, etc., including coordinating with the NEC/MOWHS on a regular basis and provide necessary documentation and clarifications as required until the environmental clearance is issued.	ADB to ensure that the clearance requirements are included in the contract provisions/EMP.
Environmental officer of PMU to ensure that the IEE containing the EMP of each subproject is included in the bid and contract documents. At the same time, the Environmental officer of PMU to ensure that the total budget for implementing the EMP is included in the bid and contract documents.	The Environment Specialist Consultant will support the PMU environmental safeguards officer in ensuring that each Contractor: (i) prepares its SEMP based on the EMP in the IEE, and (ii) has budget allocated for the implementation of the SEMP.	
<b>Construction Stage</b>		
PMU to review the monthly monitoring reports from the environment specialist consultant to ensure that all mitigation measures are implemented. PMU to consolidate the monthly reports and submit semi-annual reports to ADB for review.	Contractor to conduct environmental monitoring and implement SEMP/EMPs. The Environment Specialist Consultant will assist the PMU environmental officer in (i) review and approval of	ADB to review the reports and provide necessary advice/guidance needed to the PMU.

<b>Project Management Unit</b>	<b>Environment Specialist Consultant</b>	<b>ADB</b>
Corrective actions to be undertaken if needed.	contractor's implementation plans such as EMPs/SEMPs, and (ii) monitor the implementation of mitigation measures in the EMPs/SEMPs by contractors. The Environment Specialist Consultant will also prepare monthly progress reports including a section on implementation of the mitigation measures and submit to PMU for review.	
<b>Operation Stage</b>		
PMU to conduct monitoring, as specified in the environmental monitoring plan of EMP. NHDCL to monitor the performance, if required and as specified in monitoring plan of EMP.		ADB to review semi-annual environmental monitoring report and disclose on its website.
PMU to continue submission of semi-annual environmental monitoring report to ADB until ADB issues a Project Completion Report.		ADB to prepare Project Completion Report

ADB = Asian Development Bank, EIA = environmental impact assessment, EMP = environmental management plan, IEE = initial environmental examination, NHDCL = National Housing Development Corporation Limited, NOC = no objection certificate, PMU = project management unit, REA = rapid environmental assessment, SEMP = site-specific environmental management plan, SPS = safeguards policy statement.

## **B. Environmental Management Plan Matrices**

319. Table below summarizes the potential impacts and mitigation and management measures to be taken during pre-construction, construction and operation phases to avoid, reduce, mitigate, or compensate for adverse environmental impacts.

320. It is a commitment by NHDCL to implement the proposed management measure and therefore must be incorporated into the bidding documents, project construction contracts and also monitored during operation and maintenance

**Table 28: Environmental Management Plan**

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
Design / Pre- construction phase					
Subproject Location	Impact on protected area, and other environmentally sensitive areas.	The subproject site is located within the city limit, at a distance of more than 80km from the nearest protected area (Phibsoo wildlife sanctuary). No mitigation measure is required with regard to impact on protected area or other environmentally sensitive areas.  The designated land use is for housing and there is already one residential complex adjacent the site	NA	PIU	PMU
	Impact on endangered species [Mahseer (Tor putitora)] potentially found in the Amochhu river.	Ensure that the housing complex design includes appropriate facilities to keep any wastewater or effluent from flowing into the Amochhu river, such as well-designed and maintained septic tanks and soak pits.	NA	PMU Design Team	PMU
	Impact on Physical cultural Resources (PCR)	No mitigation required as the project site is not located at a distance that could impact a PCR. The nearest PCR is the Palden Tashicholing Shedra (monastic school), which is more than 1km away.			
	Risk of natural hazards such as earthquakes and climate change considerations	<ul style="list-style-type: none"> <li>Design of buildings in line with Bhutan Building Rules, 2017, Bhutan Building Regulations 2018, Bhutan Building Code of Bhutan 2018, Bhutanese Architectural Guidelines, 2014 and the Bhutan Green Building Guidelines, 2013.</li> <li>Choice of construction materials must be based on climatic conditions and suitable for monsoon rains and winter snow conditions.</li> </ul>	Included in Subproject design cost	PIU	PMU
Consents, permits and clearances	Failure to comply with national regulation and procedures can delay project progress	<ul style="list-style-type: none"> <li>Seek approval for building design and construction approval from the Development Control Division of the Thromde.</li> </ul>	PMU Operating cost	PIU	PMU



Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<ul style="list-style-type: none"> <li>Consult with the Thromde to confirm the level of the highway as planned in the LAP, to keep the ground level of the site in line with the designed level of the new township.</li> <li>Seek approval for environmental clearance from NEC.</li> </ul>			
Aesthetics	Change in aesthetics at the site due to new infrastructures that could obstruct views.	<ul style="list-style-type: none"> <li>Consider requisite development controls (such as building height, ground coverage and minimum setbacks from roads and adjacent plots), as per the allowable local area plan.</li> <li>Comply with the Bhutanese Architecture Guidelines<sup>77</sup> as a reference to ensure that the buildings blend in with the surrounding while maintaining certain elements of traditional Bhutanese architectural designs.</li> <li>Undertake landscaping and revegetation will further improve site conditions once activities are completed.</li> </ul>	PMU Operating cost	PIU	PMU
Compliance with ADB Loan Agreement and SPS	Lack of technical capacity on environmental safeguards	Conduct briefing/orientation for designated staff to be aware of ADB safeguard policies and RGOB regulations relevant for the project, including EMP, and compliance monitoring and reporting requirements.	PMU Operating cost	PIU / PMU	PMU
	Lack of awareness by the Contractor on ADB environmental safeguard policies and EMP requirements and therefore mitigation measures not budgeted	<ul style="list-style-type: none"> <li>Incorporate the cost of OHS and the EMP as well as any specific provisions into the bidding documents requiring contractors to comply with all other conditions required by ADB into the bidding and contract documents</li> <li>Conduct pre-bid meeting to inform contractors of the need to strictly</li> </ul>	PMU Operating cost	PIU / PMU	PMU

<sup>77</sup> MOWHS, 2014. The Bhutanese Architecture Guidelines.

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<p>incorporate OHS and EMP into the contract cost</p> <ul style="list-style-type: none"> <li>Once contract is selected, conduct awareness for contractors on their responsibilities in EMP implementation, compliance with ADB and RGOB requirements, self-monitoring and reporting procedures.</li> </ul>			
Project disclosure and Community awareness	Lack of awareness by the Public and Community on project activities or GRM	<ul style="list-style-type: none"> <li>Disclose project information/brief on NHDCL website, along with GRM mechanism and contact numbers, and one available at the site office</li> <li>Design and install project signboards as per design standards and specifications of the District and include relevant contact numbers for GRM</li> </ul>	PMU Operating cost	PIU / PMU	PMU
<b>Construction phase</b>					
Award of Construction work	Positive multiplier effect for goods and services	<ul style="list-style-type: none"> <li>The project will generate employment and business opportunities for local suppliers of construction materials as well as material transporters and machine operators.</li> </ul>	PMU Operating cost	PIU / PMU	PMU
Site preparation and Construction of site office, worker camps and material storage sheds	Encroachment on government or private land due to lack of space for accommodating worker camps and storage	<ul style="list-style-type: none"> <li>If required, land will be leased from government or private landowners to set up worker camps, material storage and to park machinery.</li> <li>Set aside a secure enclosure/shed for the storage of cement, lubricants, solvents, paint, electrical and other breakable material. Fuel and other petroleum products must be stored at storage areas away from water drainage and protected by impermeable lining and bunded 110%.</li> </ul>	Contractor's cost	Contractor	PIU
Recruitment and management of workers	Non-compliance with National recruitment regulations and risk of	<ul style="list-style-type: none"> <li>Strictly follow the "Handbook on Recruitment and Employment of Foreign Workers in Bhutan"<sup>78</sup> with respect to</li> </ul>	Contractor's cost	Contractor	PIU

<sup>78</sup>RGOB. Regulations on Working Conditions, 2012

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	employing underage children.	<p>screening recruitment, worker permits, road passes, management, and repatriation</p> <ul style="list-style-type: none"> <li>• Process for worker permits and entry as per prevailing health restrictions and screening requirements.</li> <li>• Follow restriction on employment of children below 18 years.</li> <li>• Employ trained and skilled national workers wherever possible.</li> <li>• If Contractor has more than 12 workers, it must submit a Notification of Construction Work (in writing and as per the information required) within 7 days after the commencement of the work, to the Chief Labour Administrator, and also repeat the same within 7 days of completion of the work.</li> </ul>			
	Risk of conflict and disturbance with neighboring community	<ul style="list-style-type: none"> <li>• Brief all workers on required social behavior and impose sanctions for inappropriate conduct.</li> <li>• Record number of complaints received from neighboring residents</li> </ul>	Contractor's cost	Contractor	PIU
	Requirement for housing and resources (drinking water and electricity and sanitation facilities	<ul style="list-style-type: none"> <li>• Provide workers with temporary accommodation, drinking water and sanitation facilities, with separate toilets for males and females.</li> <li>• Maintain cleanliness of the residential areas.</li> <li>• Ensure adequate water is available for sanitation and require workers to maintain toilets.</li> <li>• Follow the standards for workers accommodation per guidance note by the International Finance Corporation and European Bank for Reconstruction and Development entitled "Workers'</li> </ul>	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		accommodation: processes and standards: A guidance note by IFC and the EBRD".			
Occupational health and safety	Health and safety risks for construction workers	<ul style="list-style-type: none"> <li>• Prepare site-specific health and safety management plan including COVID 19 H&amp;S measures.</li> <li>• Nominate a Health and Safety Officer with specific responsibilities to ensure the OHS of all workers, report on accidents and to follow national health protocols.</li> <li>• Abide by the international best practices on occupational health and safety such as those in Section 4.2 of World Bank EHS Guidelines on Construction and Decommissioning Activities;<sup>79</sup></li> <li>• Screen workers at their point of origin for both virulent and contagious diseases, including COVID-19.</li> <li>• Follow COVID 19 protocols as per the prevailing requirements of the Ministry of Health and the COVID Taskforce.</li> <li>• Identification of workplace and process hazards (with machines, vehicles, excavation, and construction activities including electrical work) and outline procedures and responsibilities for preventing, eliminating, and minimizing the effects of identified work hazards and risk.</li> <li>• Install adequate support structures for temporary structures.</li> <li>• Prepare emergency management procedures.</li> <li>• Determine types of trainings/ orientations/ briefings required for each group of workers and who will give the required briefings.</li> </ul>	Contractor's cost	Contractor	PIU

<sup>79</sup> IFC World Bank Group. 2007. [Environmental, Health, and Safety \(EHS\) Guidelines – General EHS Guidelines: Construction and Decommissioning](#).

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<ul style="list-style-type: none"> <li>• Institute protocols to deal with accidents and emergencies including compensation for treatment and recovery, loss of ability to work, and loss of life</li> <li>• Provide medical assistance for cases of workplace related injury.</li> <li>• Provide adequate payment and facilities (lighting) for overtime work.</li> <li>• Post/Display emergency contact numbers of the staff as well as Police/Hospital/Fire at a visible location.</li> <li>• Provide workers with Personal Protective Equipment (PPE) such as safety helmets, gloves, glasses, and boots (as required) and enforce their use at the workplace.</li> <li>• Brief workers on work risks during toolbox talks.</li> <li>• Restrict drinking or consumption of intoxicants at the work site.</li> <li>• Post warning signs at risky/hazardous areas in the Dzongkha and English languages.</li> <li>• Maintain accident register with incidents and actions taken.</li> <li>• Maintain First aid box at site for minor injuries.</li> <li>• Install fire extinguishers, with instruction and training of staff on how to use these. If fire extinguishers are not available, ensure alternative means of firefighting are available (adequate water, sand buckets, hose and pipes)</li> <li>• Provide a safe means of access and egress to and from every workplace</li> <li>• If gas cylinders are used, then store these in an upright position, protected against heat and cover the control valves with</li> </ul>			

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		protective caps screwed to proper positions.			
Excavation work	Mismanaged spoils from loose excavated soils.	<ul style="list-style-type: none"> <li>Reuse excavated soil for filling in the building foundations and for levelling the parking and recreational areas</li> <li>Remove excess excavated soil within 2 weeks of excavation and dispose at designated site.</li> <li>Seek approval/permit for disposal of soil/spoil from District Regulatory Officer/Municipal, and remove unwanted soil from the site within 2 weeks of excavation at pre-approved site. (At least 50% of the soil will be reused for building foundation, road works or levelling works)</li> </ul>	Contractor's cost	Contractor	PIU
	Dust generation on windy days	<ul style="list-style-type: none"> <li>Enclose excavated areas to contain dust.</li> <li>Spray water over loose soil piles especially on windy days.</li> </ul>	Contractor's cost	Contractor	PIU
Raw materials sourcing and storage	Haphazard and inefficient material purchase and sourcing	<ul style="list-style-type: none"> <li>Prepare and plan material requirement and delivery as required during each phase of construction depending on what is available locally</li> <li>Outsource manufacture of doors and windows</li> </ul>	Contractor's cost	Contractor	PIU
	Lack of storage space and Loss of materials	<ul style="list-style-type: none"> <li>Schedule material procurement to prevent both shortage and storage issues.</li> <li>Construct material storage shed, maintain inventory, and keep valuable items locked.</li> <li>Appoint security guard if necessary</li> <li>Stacked material in a safe and orderly manner</li> </ul>	Contractor's cost	Contractor	PIU
Water Requirements	Water supply shortage due to additional demand for drinking, cooking, washing as well as construction and its	<ul style="list-style-type: none"> <li>Ensure adequate water for domestic (drinking, cooking, washing and sanitation) and construction purpose.</li> <li>Install adequate water tanks or mobilize water tankers during periods of shortage.</li> </ul>	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	associated activities (sprinkling/spraying and cleaning).	<ul style="list-style-type: none"> <li>To conserve water, all water supply pipes will be checked, repaired and maintained regularly to prevent leakages or blockages.</li> </ul>			
Electrical requirements	Delay in project implementation at the site due to lack of electrical power supply.	<ul style="list-style-type: none"> <li>Request from Bhutan Power Corporation for service on the handling of electricity connection before, during and after the construction works.</li> </ul>	Contractor's cost	Contractor	PIU
Sewerage requirement	Without any adequate sewerage system at the site, discharge of greywater and blackwater from the site and workers' camp could pollute the receiving bodies of water in the area.	<ul style="list-style-type: none"> <li>The workers' camp will be connected to septic tanks which will be used until the end of the construction period, after which these will be decommissioned, cleared out and filled in with soil.</li> </ul>	Contractor's cost	Contractor	PIU
Mobilization and operation of construction equipment	Risk of accidents and injuries to workers	<ul style="list-style-type: none"> <li>Train machine operators</li> <li>Ensure machine operators to use the horn when backing, be assigned a signal person to guide him when reversing</li> <li>Workers must be restricted from working in close proximity of equipment in operation, unless it is essential for assisting the use of the machine or for the intended work. In such cases, a supervisor should alert the worker of potential risks.</li> </ul>	Contractor's cost	Contractor	PIU
Erosion and sedimentation	Siltation of receiving body of water and canals in the area, resulting to clogging of these canals.	<ul style="list-style-type: none"> <li>Complete all excavation works before the onset of the monsoon season to reduce the runoff.</li> <li>Construct drains to divert clean stormwater away from areas where soil is exposed by constructing drains with silt traps that is connected to this main stormwater drain.</li> </ul>	Contractor's cost	Contractor	PIU
Ambient Air Quality	The use of fuelwood for heating in winter will result in air pollution from fires.	<ul style="list-style-type: none"> <li>Provide alternative fuel (electricity or LPG) at workers' camp and restrict use of firewood for cooking (but may be allowed for heating as this is permitted in the city).</li> <li>Restrict open burning of wastes.</li> </ul>	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	<p>Exhaust emission from operation of machinery and vehicles will contribute to the air pollutant load (primarily particulate matter (PM), NOx, SOx, CO etc.) in the ambient air</p> <p>Dust from excavation, and other construction activities.</p>	<ul style="list-style-type: none"> <li>• Ensure that construction equipment and vehicles are maintained in good condition and have passed the RSTA emission test.</li> <li>• Provide tarpaulin covers to vehicles transporting soil, sand and other construction materials and waste.</li> <li>• Provide cover to stockpiles of soil, sand and other construction materials, especially during windy days.</li> <li>• Spray water over bare or newly excavated areas especially on windy days and wherever possible excavated soil will be reused for leveling the site and for green belt development.</li> <li>• Remove excess excavated soil from the site within 2 weeks of excavation and dispose at the designated disposal site.</li> </ul>			
Noise and disturbance to the neighboring community	Construction activities will result to high level of noise that could impact the workers and communities around the site.	<ul style="list-style-type: none"> <li>• Restrict construction work between 9PM - 8AM.</li> <li>• Brief workers on their obligations regarding proper management of work and behavior with sanctions for inappropriate behavior or repeated complaints from the residents.</li> <li>• Implement a preventive maintenance schedule for all heavy construction equipment and machinery to minimize noise and vibration.</li> <li>• Do not allow woodworks such as the use of sawing machines at the site. Doors and windows must be fabricated offsite or outsourced.</li> </ul>	Contractor's cost	Contractor	PIU
Solid waste generation and management	Improper disposal of solid wastes could lead to contamination of lands, proliferation of vectors of diseases, foul odor and	<ul style="list-style-type: none"> <li>• Provide appropriate bins for waste storage and safe collection, segregate hazardous wastes within the site.</li> <li>• Maintain cleanliness of the site premises or surroundings.</li> </ul>	Contractor's cost	Contractor	PIU



Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
	other nuisance to nearby communities.	<ul style="list-style-type: none"> <li>• Ensure that workers are briefed on proper waste management and good housekeeping at worker camps.</li> <li>• Allocate waste storage areas where wastes can be stored and then collected by the municipal trucks.</li> <li>• Ensure to remove solid wastes and bring to designated disposal sites.</li> </ul>			
Community health and safety	<p>Safety risk to public safety during transport of materials.</p> <p>Safety risk to pedestrians.</p>	<ul style="list-style-type: none"> <li>• Provide cordon or barricades around the construction site to restrict public from the site and controlling access to the site.</li> <li>• Install signboards to notify passers-by of ongoing work, install warning signs near access road and entry points.</li> <li>• Restrict unloading or storing of construction material along access road, on top of drains and footpaths.</li> <li>• Designate personnel to warn passers-by and guide trucks during material delivery.</li> <li>• Schedule materials delivery times to avoid peak traffic hours.</li> <li>• Impose speed limits for trucks near the construction site.</li> </ul>	Contractor's cost	Contractor	PIU
	Air pollution due to emissions and dust	<ul style="list-style-type: none"> <li>• Provide alternative fuel (electricity or LPG) at workers' camp and restrict use of firewood for cooking (but may be allowed for heating as this is permitted in the city).</li> <li>• Restrict open burning of wastes.</li> <li>• Ensure that construction equipment and vehicles are maintained in good condition and have passed the RSTA emission test.</li> <li>• Provide tarpaulin covers to vehicles transporting soil, sand and other construction materials and waste.</li> <li>• Provide cover to stockpiles of soil, sand and other construction materials, especially during windy days.</li> </ul>	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<ul style="list-style-type: none"> <li>Spray water over bare or newly excavated areas especially on windy days and wherever possible excavated soil will be reused for leveling the site and for green belt development.</li> <li>Remove excess excavated soil from the site within 2 weeks of excavation and dispose at the designated disposal site.</li> </ul>			
	Congestion and blockages/obstructions	<ul style="list-style-type: none"> <li>Restrict material drop off by trucks during peak traffic hours (8-9.30Am and 4-6PM)</li> <li>Brief drivers on restriction of spillage or storing of construction material along access road, on top of drains and footpaths blocking access.</li> </ul>	Contractor's cost	Contractor	PIU
Chance finds	Potential chance finds	<p>Follow chance finds procedure:</p> <ul style="list-style-type: none"> <li>In case of suspected chance finds, the Contractor shall immediately stop all works</li> <li>Contractor to report immediately within the same day to the PMU or PIU regarding the suspected chance finds.</li> <li>PMU or PIU to advise Contractor to strictly follow the full stoppage of works.</li> <li>PMU to report the potential chance finds to the Department of Culture, Ministry of Home and Cultural Affairs, and the latter to investigate.</li> <li>No works shall resume until clearance is provided by the Department of Culture, Ministry of Home and Cultural Affairs.</li> </ul>	Contractor's cost	Contractor	PIU
Emergencies such as earthquakes, Fire hazards	Risk of injury and losing lives due to natural hazards and fire	<ul style="list-style-type: none"> <li>Develop an emergency action plan to handle emergencies such as earthquakes, fires, breakdown in machinery, collapse of structures, electrical mishaps. These are as follow:</li> <li>Identify procedures to follow during emergencies.</li> </ul>	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<ul style="list-style-type: none"> <li>• Display and maintain suitable warning signs at conspicuous places in Dzongkha and English.</li> <li>• Identify a meeting point for all workers in case of earthquakes.</li> <li>• Brief workers on protocols to follow during earthquakes.</li> <li>• Provide transportation to the nearest hospital in case of accidents and emergencies.</li> <li>• Install fire extinguishers or ensure adequate storage of water supply, water hoses and pipes</li> <li>• Train staff to operate the fire extinguishing equipment.</li> <li>• Conduct quarterly checks on fire extinguishers.</li> </ul> <p><b>Collapse of structures.</b></p> <ul style="list-style-type: none"> <li>• Stabilize all temporary structures to prevent them from collapse.</li> <li>• Electrical mishaps.</li> <li>• Hire only certified electricians.</li> <li>• Provide all temporary electrical installations with earth-leakage circuit breakers.</li> <li>• Require workers to check safety of electrical wiring before commencement of work</li> <li>• Operation of machines</li> <li>• Restrict operation of machines to trained and competent operators, or under the supervision of one</li> </ul>			
Post construction – camp closure	<ul style="list-style-type: none"> <li>• Positive impact resulting to restoration of pleasant aesthetics at site.</li> </ul>	<p>Implement camp and site closure plan that includes the following</p> <ul style="list-style-type: none"> <li>• Dismantle all worker camps, fill in sanitation areas/temporary toilets with soil</li> </ul>	Contractor's cost	Contractor	PIU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<ul style="list-style-type: none"> <li>Remove all machines, equipment and debris from construction site and worker camps</li> <li>Restore any damage to government or private properties</li> <li>Hand over site back to PMU</li> <li>Carry out repair and maintenance during liability period as per contract</li> <li>Ensure that foreign workers exit the country (expatriation) on completion of work</li> <li>Plan and undertake revegetation and landscape development</li> </ul>			
Post-construction – greening and landscaping	<ul style="list-style-type: none"> <li>Positive impact resulting to enhancement of surrounding environment.</li> </ul>	<ul style="list-style-type: none"> <li>Improve aesthetic view by landscaping</li> <li>Development of green belt around the housing complex</li> </ul>	Contractor's cost	Contractor	PIU
<b>Operation phase</b>					
Building occupancy and utilization	Wear and tear of buildings	<ul style="list-style-type: none"> <li>Follow NHDCL maintenance processes to address complaints by tenants</li> <li>Undertake regular inspections to assess the risks, hazards or defects with the buildings and rectify these</li> </ul>	Housing Management Cost	Housing Management	PIU / PMU
	Fire safety	<ul style="list-style-type: none"> <li>Train the focal resident person on use of fire extinguishers and its maintenance</li> <li>Regularly check and maintain the fire extinguisher</li> <li>Post emergency numbers of Fire, Police near the fire extinguisher or at a visible location.</li> </ul>	Housing Management Cost	PIU	PIU / PMU
	Accidents and emergencies and natural disaster	<ul style="list-style-type: none"> <li>Follow instructions from the Dzongkhag Disaster Management Committee (DMC) on procedures to follow in case of emergencies.</li> </ul>	Housing Management Cost	PIU	PIU / PMU

Subproject Activities / Field	Potential Environmental Impacts	Mitigation Measures	Cost	Implementation	Supervision
		<ul style="list-style-type: none"> <li>• Post emergency numbers for Police, Ambulance and Fire should be prominently posted at a visible spot.</li> <li>• Maintain emergency lighting system in the premises.</li> <li>• Conduct of periodic fire drills.</li> <li>• Posting of emergency exit plans, designating evacuation areas, dissemination of other emergency plan information.</li> <li>• Other training to raise awareness on how to properly behave and respond in times of fires or natural disasters.</li> </ul>			
	Buildup of sewage that could impact surface water and groundwater	<ul style="list-style-type: none"> <li>• Coordinate with District Regulatory Officer for desludging and vacuum cleaning of septic tank annually</li> </ul>	Housing Management Cost	PIU	PIU / PMU
	Solid waste generation that could impact the environment	<ul style="list-style-type: none"> <li>• Follow District waste management guidelines and garbage collection and disposal times and ensure that garbage is not allowed to accumulate on the premises.</li> </ul>	Housing Management Cost	PIU	PIU / PMU

### **C. Environmental Performance**

321. The Environmental Monitoring Plan is linked to the Environmental Management Plan. Therefore, the environmental performance of the project will be measured against the following criteria:

- (i) Air emission and dust- number of fires being lit, number of electrical appliances being use and measures to contain dust during construction;
- (ii) Water supply –The provision of facilities to ensure adequate water supply for construction as well as domestic needs of staff and workers;
- (iii) Waste disposal- Receipt of waste disposal permit and the number of truckloads of excavated materials and waste segregated, reused, recycled and disposed;
- (iv) Traffic congestion – Number of accidents due to material transportation and drop off;
- (v) Worker Health and Safety- The number of accidents and emergencies must be recorded with actions taken to prevent repeat of the same mistakes in the future; and
- (vi) Community health and safety- The number of grievances and complaints received by the community during project construction and operation.

### **X. MONITORING AND REPORTING**

322. Environmental monitoring is an obligatory aspect of project implementation. The ADB SPS requires that the borrower/client monitor and measure the progress of implementation of the EMP. The extent of monitoring activities will be commensurate with the project's risks and impacts. In addition to recording information to track performance, the borrower/client will undertake inspections to verify compliance with the EMP and progress toward the expected outcomes.

323. More specifically, environmental monitoring during project implementation is required to:

- (i) assess project performance against agreed criteria;
- (ii) identify any environmental harm and non-compliance issues;
- (iii) provide data to support compliance;
- (iv) prepare corrective action plans is required; and
- (v) meet government approval/ permit conditions and ADB requirements.

324. The PMU with support from PIU, will monitor the progress of EMP implementation and compliance with ADB SPS requirements and national rules and regulations/guidelines. The PMU will coordinate and monitor project activities with PIU and contractor to ensure timely implementation of project activities.

325. The contractor will submit monthly reports to the PIU with jurisdiction over the subproject. The monthly reports will include compilation of copies of monitoring sheets accomplished and duly signed by the contractor's EHS supervisor (or equivalent) on a daily basis. A sample daily monitoring sheet which can be used by the contractor is in Appendix 10. This monitoring sheet is indicative which can be further enhanced depending on the actual situations at subproject construction site.

326. The PIU will submit quarterly environmental monitoring reports to PMU, which will include summary of daily monitoring activities of contractor and results of any independent monitoring or inspection activities of the PIU. A sample inspection checklist is in Appendix 11. This checklist is

indicative which can be further enhanced depending on the actual situations at subproject construction site.

327. PMU shall consolidate quarterly reports from the PIUs, which include reports from the PIU for this subproject, and results of its independent monitoring or inspection activities. PMU shall accomplish semi-annual environmental monitoring report (SEMRs), which shall be submitted to ADB for review and disclosure on ADB website. Submission of SEMR will continue until ADB issues a project completion report. The template for the SEMR is attached as Appendix 12.

328. 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. The environmental reporting will cover developments that have taken place in relation to the loan recipient project during the reporting period, report any changes in the design or procedures, management or site-specific situations.

**Table 29: Environmental Monitoring Plan**

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
<b>Pre-Construction</b>					
1	Land use approval	<ul style="list-style-type: none"> <li>Land Use certificate received from National Land Commission</li> </ul>	PMU	PMU	PMU
2	Project design and approvals	<ul style="list-style-type: none"> <li>Infrastructure design and construction approval,</li> <li>Demolition approval</li> </ul>	One time	NHDCL	PMU
3	Roles and responsibilities and awareness of project site supervision team	<ul style="list-style-type: none"> <li>Office order</li> <li>TOR for Site supervision team</li> <li>Training materials</li> <li>Participant list</li> </ul>	One time	NHDCL	PMU
4	Awareness and training of contractor	<ul style="list-style-type: none"> <li>Pre-bid meeting to inform contractors</li> <li>No. of trainings and dates</li> <li>Contractor's attendance sheet</li> </ul>	One time	NHDCL	PMU
5	Incorporating of EMP into bid documents	<ul style="list-style-type: none"> <li>EMP included in bid document</li> </ul>	One time	NHDCL	PMU
6	Incorporating of OHS requirements into contract	<ul style="list-style-type: none"> <li>OHS component included in Contract</li> </ul>	One time	NHDCL	PMU
7	Project disclosure and information	<ul style="list-style-type: none"> <li>Project information/brief on NHDCL website,</li> <li>Project contact number on signboards</li> <li>Minutes of Meeting/Consultation with Affected people and community</li> </ul>	One time	NHDCL	PMU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
8	Removal of existing structures/demolition	<ul style="list-style-type: none"> <li>No. of structures removed.</li> <li>Report on removal/demolition of structures</li> </ul>	One time	NHDCL	PMU
<b>Construction phase</b>					
9	Consents and Permits	<ul style="list-style-type: none"> <li>Tree removal</li> <li>Waste disposal</li> </ul>	One time	Contractor	PIU
10	Recruitment of workers	<ul style="list-style-type: none"> <li>No. of workers (nationals/foreign- by gender)</li> <li>No. of skilled and unskilled workers</li> <li>No. of workers below age 18</li> </ul>	During recruitment	Contractor	PIU
11	Workers welfare (health and safety)	<ul style="list-style-type: none"> <li>No. of worker camps</li> <li>Availability of safe drinking water, electricity and sanitation facilities (with separate toilets for males and females)</li> <li>PPE distribution list/records</li> <li>Ocular inspection of the cleanliness of worker camps</li> <li>safety structure installed</li> <li>Overtime facilities provided</li> <li>Emergency Contact numbers displayed</li> <li>Assembly points identified</li> <li>Emergency protocols</li> <li>First aid kit</li> <li>Warning signs at risky/hazardous areas</li> <li>Records in accident register with incidents and actions taken.</li> <li>Number of fire extinguishers installed at site</li> <li>Type and no. of trainings (training record)</li> </ul>	Monthly	Contractor	PIU
12	Temporary land requirement for worker camps and storage	<ul style="list-style-type: none"> <li>Land lease agreement between contractor and land owner/government</li> </ul>	One time	Contractor	PIU
13	Air pollution	<ul style="list-style-type: none"> <li>Use of electrical appliances</li> <li>Ocular observation of vehicles and site conditions</li> <li>Use of reconditioned machines and vehicles.</li> <li>Maintenance of machines</li> </ul>	Monthly	Contractor	PIU



No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
14	Dust pollution/minimization	<ul style="list-style-type: none"> <li>Ocular observation of dust and dust suppression measures undertaken as per EMP</li> </ul>	Monthly	Contractor	PIU
15	Water supply and conservation	<ul style="list-style-type: none"> <li>No. of water storage tanks.</li> <li>Measures taken during periods of shortage.</li> <li>No. of water supply repair and maintenance works</li> </ul>	Monthly	Contractor	PIU
16	Waste management of worker camps, construction sites	<ul style="list-style-type: none"> <li>No. and types of waste bins installed</li> <li>No. of truckloads of construction waste disposed</li> <li>Types of demolition waste segregated and reused</li> <li>Ocular inspection of camps and construction site</li> <li>Segregation, storage of hazardous waste</li> </ul>	Monthly	Contractor	PIU
17	Generation of excavated soil	<ul style="list-style-type: none"> <li>% soil reused for construction</li> <li>% soil disposed</li> <li>Ocular observation of soil pileup at site</li> </ul>	One time	Contractor	PIU
18	Site drainage	<ul style="list-style-type: none"> <li>Site drainage</li> <li>Connection to storm water drainage</li> <li>Repair and maintenance of drains</li> <li>Ocular observation of site drainage</li> </ul>	Monthly	Contractor	PIU
19	Noise pollution and disturbance	<ul style="list-style-type: none"> <li>No. of complaints received from neighboring residents/community</li> </ul>	One time	Contractor	PIU
20	Congestion and blockages/obstructions	<ul style="list-style-type: none"> <li>No. of complaints on congestion caused by Construction traffic</li> <li>Ocular observation of road conditions (spillage of construction material along access road, blockage of drains and footpaths)</li> </ul>	Monthly	Contractor	PIU
21	Material storage	<ul style="list-style-type: none"> <li>No. of material storage sheds</li> <li>Ocular observation on material storage at site</li> <li>Material inventory</li> </ul>	Monthly	Contractor	PIU
22	Community health and safety	<ul style="list-style-type: none"> <li>Consultation with community (minutes of meeting, participant list)</li> </ul>	Monthly	Contractor	PIU

No.	Activity	Method of Measurement/Indicators	Frequency	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> <li>No. of safety signs</li> <li>Installation of barricades</li> <li>Obstruction of access routes/paths</li> <li>No. of accidents occurred</li> <li>No. of complaints received</li> </ul>			
23	Camp closure	<ul style="list-style-type: none"> <li>Ocular observation of site conditions and compliance to EMP</li> </ul>	One time	Contractor	PIU
<b>Operation phase</b>					
24	Operation phase	<ul style="list-style-type: none"> <li>Maintenance records</li> </ul>	Every quarter	NHDCL estate management	PMU
25	Fire hazard	<ul style="list-style-type: none"> <li>No. of fire extinguishers, and maintenance record</li> </ul>	Once a year	NHDCL estate management	PMU
26	Sewage and sanitation	<ul style="list-style-type: none"> <li>Maintenance record</li> </ul>	Once a year	NHDCL estate management	PMU
27	Waste management	<ul style="list-style-type: none"> <li>Maintenance record</li> </ul>	Monthly	NHDCL estate management	PMU

329. ADB will carry out the following monitoring actions to supervise implementation of the overall project:

- (i) On a need basis, conduct site visits for subprojects with potential adverse environmental or social impact;
- (ii) Conduct supervision missions with detailed review by ADB's environment/social safeguard specialists and/or officers and/or consultants for subprojects with adverse environmental and social impacts;
- (iii) Review the SEMRs submitted by PMU to ensure that adverse impacts and risks are mitigated as planned in the EMP;
- (iv) Work with NHDCL to rectify to the extent possible any failures to comply with its environmental safeguard commitments, as covenanted in the loan agreement and elaborated in all environmental safeguard documents; and formulate and implement a corrective action plan to re-establish compliance as appropriate; and
- (v) Prepare a project completion report that assesses whether the objective and desired outcomes of the safeguard plans have been achieved, taking into account the baseline conditions and the results of monitoring.

330. ADB's monitoring and supervision activities must be carried out on an on-going basis until the project completion report is issued. ADB normally issues a project completion report within 1-2 years after the project is physically completed and in operation.

#### **A. Capacity Building**

331. The implementing agency, NHDCL, does not have any prior experience of implementing any ADB-funded projects. Understandably, NHDCL needs a capacity building exercise in order to implement ADB SPS requirements for the project. Therefore, capacity building interventions are recommended for NHDCL, PMU, PIU and the Contractors.

332. When the PMU and PIU staff are assigned, it will be vital to train all these relevant personnel who will implement and monitor environment and social safeguards measures developed under the project. A consultant support (e.g., an Environment Specialist Consultant) will be provided to the PMU who will assist in conducting capacity building and training for the implementing stakeholders, including contractors. The capacity building and training program shall include, among others, the following:

- (i) Training on ADB SPS requirements, EARF, IEE with EMP, and other national government laws, rules and regulations on environmental safeguards, including identification of roles and responsibilities for each stakeholder in the project;
- (ii) Project compliance monitoring, and preparation and submission of environmental monitoring reports; and
- (iii) Preparation of Corrective Action Plan, if required.

333. Specific to environmental safeguards, the Environment Specialist Consultant of the PMU will provide targeted basic training required for environmental awareness followed by specific aspects of infrastructure improvement projects along with environmental implications for projects. Specific modules customized for the available skill set will be devised after assessing the capabilities of the members of the Training Program and the requirements of the project. The entire training would cover basic principles of environmental assessment and management mitigation plans and programs, implementation techniques, monitoring methods and tools. The proposed indicative training program along with the frequency of sessions is presented in the following table.

**Table 30: Training Modules for Environmental Management**

<b>Module</b>	<b>Frequency of Sessions</b>	<b>Target participants</b>	<b>Conducting Personnel</b>
1. Introduction and Sensitization to Environmental Issues (One-day workshop): <ul style="list-style-type: none"> <li>• ADB Safeguards Policy Statement;</li> <li>• Government of Bhutan applicable safeguard laws, regulations and policies including but not limited to core labor standards, OHS, etc.;</li> <li>• Sensitization on environmental concerns, environmental impacts of urban infrastructure improvement projects.</li> </ul>	Once during Pre-construction	NHDCL engineers / management team, officials responsible for implementing the Project, PMU staff, PIU staff, contractor/s.	Environmental Specialist Consultant
2. Project training on hazards, health, safety and environmental issues pertaining to the project (two-day workshop and site visits): <ul style="list-style-type: none"> <li>• EMP mitigation and monitoring measures;</li> <li>• Roles and responsibilities;</li> <li>• Public relations,</li> <li>• Consultations;</li> <li>• Grievance redress;</li> <li>• Monitoring and corrective action planning;</li> <li>• Reporting and disclosure;</li> </ul>	Once before and during construction	NHDCL engineers and management professionals, to be involved in on-site execution and operation of the proposed facilities, PMU staff, PIU staff, contractor/s	Environmental Specialist Consultant

Module	Frequency of Sessions	Target participants	Conducting Personnel
<ul style="list-style-type: none"> <li>• Construction site standard operating procedures (SOP);</li> <li>• Chance finds (archaeological) protocol;</li> <li>• Health and safety plan;</li> <li>• Traffic management plan;</li> <li>• Waste management plan;</li> <li>• Site clean-up and restoration.</li> </ul>			
<p>3. EMP implementation (Two-day session and site visit):</p> <ul style="list-style-type: none"> <li>• Implementation of EMP</li> <li>• Identification of environment impacts</li> <li>• Monitoring and reporting for EMP</li> <li>• Public interactions and consultations</li> <li>• Coordination for consents with various departments</li> <li>• Monitoring formats filling and review of impacts.</li> </ul>	Once during construction stage	NHDCL Engineers, Officials responsible for implementing the Project, PMU staff, PIU staff, contractor/s.	Environmental Specialist Consultant

## XI. RECOMMENDATION AND CONCLUSION

334. The IEE process described in this document has assessed the environmental impacts of all elements of the infrastructure proposed under the Bhutan Affordable Housing Project. Potential negative impacts were identified in relation to design, construction and operation of the proposed infrastructure and it is anticipated that the subproject will not have any significant negative impacts due to the project design or location.

335. The NHDCL will construct 5 residential buildings on 2.27 acres of land in Zone A in Amochhu, which is located along the Amochhu river valley, 3km from the city center. There is no need for land acquisition and compensation and resettlement measures have been prepared under the social diligence studies.

336. There are no impacts on ecological habitats and wildlife species and the site is more than 175m from the Amochhu river, and there are no activities that will directly impact the river or the aquatic life. The project design will take into consideration required building design regulations and guidelines to ensure earthquake resilience, climatic conditions and Bhutanese architectural designs.

337. All necessary approvals and permits required have been identified and will be processed with the relevant authorities. Most of the impacts will occur during the construction period for which mitigation measures have been developed and incorporated in the EMP. To ensure that all anticipated environmental impacts are addressed, NHDCL must ensure that all mitigation measures in the EMP proposed are implemented in full, as described in this document. Regular reporting by the contractor to the PIU and PMU must be adhered to so that the Environmental Monitoring Reports can accurately reflect work progress and site conditions as well as compliance to the conditions of the loan agreement, ADB safeguard policies, National regulations and the EMP.

338. Based on the findings of the IEE, most impacts identified have been found to be predictable, manageable and temporary. The overall conclusion of this process is that providing the mitigation, compensation and enhancement measures are implemented in full, there should be no significant negative environmental or social impacts as a result of location, design, construction or operation of the subproject. No further special study or detailed EIA needs to be undertaken to comply with ADB SPS (2009) or national regulations.

339. There should in fact be major benefits in terms of major improvements in quality of life for the residents of the Kidu Colony and lower income support staff and their families once the construction is completed.

## 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 (SDSS) for endorsement by the Director, SDSS 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:

Proposed Affordable Housing Developing Project

Sector Division:

Urban Development

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area			
Densely populated?	✓		Yes, the site is located within the city core. The density of Phuentsholing is 48 persons per km <sup>2</sup> . <sup>80</sup> The limited Thromde area has a population 27,658 <sup>81</sup>
Heavy with development activities?	✓		Yes, Phuentsholing Thromde is the second largest Thromde in the country. The site is in the city core where there are two ongoing ADB projects (Amochhu Land Development Project and the Phuentsholing- Chamkuna Highway Development Project)
Adjacent to or within any environmentally sensitive areas?			
Cultural heritage site		✓	The closest heritage site is more than 1km away
Protected Area		✓	The closest Protected area is more than 80km away
Wetland		✓	
Mangrove		✓	
Estuarine		✓	
Buffer zone of protected area		✓	
Special area for protecting biodiversity		✓	
Bay		✓	
B. Potential Environmental Impacts Will the Project cause...			

<sup>80</sup> ADB, Phuentsholing Township Development Project

<sup>81</sup> NSB, Statistical Yearbook of Bhutan, 2020.

Screening Questions	Yes	No	Remarks
impacts on the sustainability of associated sanitation and solid waste disposal systems and their interactions with other urban services.	✓		The subproject involves construction of 5 residential buildings comprising of 120 units. Once built, the housing subproject will require additional Thromde resources to expand the coverage of the existing sanitation and sewerage infrastructures and waste disposal management systems so as to reach the subproject area.
deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?		✓	The activity is within the permissible development activity and the local area plan so it the mandate of the Municipality to plan for such developments
degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		✓	
dislocation or involuntary resettlement of people?		✓	There are two temporary stores and one family that will be dislocated. These will be compensated with adequate measures under the Resettlement plan. The restaurant owner will be provided livelihood and transactional assistance.
disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable group?		✓	Not anticipated as per Social report
degradation of cultural property, and loss of cultural heritage and tourism revenues?		✓	No, there are no cultural site or tourist destinations in the area
occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to pollutive industries?		✓	No
water resource problems (e.g. depletion/degradation of available water supply, deterioration for surface and ground water quality , and pollution of receiving waters)?		✓	The site is already connected by the municipal water supply line to the existing house
air pollution due to urban emissions?	✓		The primary sources of air pollution are due to the use of heavy machinery and trucks transporting materials to the site. It is mandatory for all vehicles to undergo emission tests annually in compliance with the Road Safety Transport Authority
risks and vulnerabilities related to occupational health and safety due to physical, chemical and biological hazards during project construction and operation?	✓		Occupational health and safety hazards from construction works are anticipated but these will be mitigated through the OHS measures many of which is mandatory by regulation
road blocking and temporary flooding due to land excavation during rainy season?		✓	Excavation works are limited to foundation works with the site boundary so it is not expected to cause any road block. Site drainage will connect to the municipal drains.

Screening Questions	Yes	No	Remarks
noise and dust from construction activities?	✓		Yes, anticipated but will be temporary during construction phase and limited to the project site. The site is already very noisy and dusty due to the ongoing developmental works
traffic disturbances due to construction material transport and wastes?	✓		Yes, because the site is adjacent to the Phuentsholing-Chamkuna highway which already has heavy local traffic as well as many vehicles plying between Samtse and Phuentsholing
temporary silt runoff due to construction?	✓		This is anticipated if excavation works are undertaken during the rainy season
hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?		✓	Not anticipated as the construction work includes use of prefabricated materials. Workers will be provided with electricity for cooking. Phuentsholing has warm climate so there is no need for heating (so no need for household pollution from burning of fuel wood).
water depletion and/or degradation?		✓	There will be an increase in demand for water use for construction activities as well as for domestic purposes but this will be temporary during construction phase only. Once the project is in operation, there should be no issue with water supply as rainwater harvesting and adequate water tanks are included in the design
overpaying of ground water, leading to land subsidence, lowered ground water table, and salinization?		✓	
contamination of surface and ground waters due to improper waste disposal?		✓	Not anticipated as the site is within the municipality that is responsible for ensuring adequate and timely waste collection facilities
pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?		✓	
large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	✓		The project will recruit both foreign (if COVID restrictions are lifted) and local workers but it is not anticipated that this will burden the infrastructure as the water supply storage tanks and sanitation will be provided by the contractor
social conflicts if workers from other regions or countries are hired?	✓		This could happen due to differences between workers but the issue is only during the construction period and appropriate measures will be undertaken to minimize social conflicts
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 operation and construction?		✓	Not anticipated because there is no requirement for explosives or fuel storage required at the site



Screening Questions	Yes	No	Remarks
community safety risks due to both accidental and natural hazards, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?	✓		Not anticipated because mitigation measures will be put in place to restrict access to the public and inform and warn the public of ongoing works.

### A Checklist for Preliminary Climate Risk Screening

**Country/ Project Title** : Green and Resilient Affordable Housing Sector Project  
(Site: Amochhu, Phuentsholing)  
**Sector** : Water and Other Urban Infrastructure and Services  
**Subsector** : Urban Housing  
**Division/Department** : SAUW

Screening Questions		Score	Remarks <sup>82</sup>
<b>Location and Design of project</b>	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?	2	The site <sup>83</sup> is located on the bank of the Torsa river (or Amochhu river) and prone erosion. The banks of the river get frequent flooding. In recent memory, destructive floods have been observed in 1996, 2000, 2009, 2015, and 2016. Additionally, a severe landslide site is located within 100 m of the proposed housing compound.
	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)?	2	Since the site is located on the bank of the Torsa river (or Amochhu river) and a landslide site is located nearby, erosion protection measures should be in place. Additionally, Ground floor of the building may leave vacant to drain out flood water in extreme condition.
<b>Materials and Maintenance</b>	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)?	1	Being located on the bank of a river, the humidity will be higher in the site than inner part of the country.
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	1	Moderate level of maintenance cost will be involved to protect the location from erosion and landslide.
<b>Performance of project outputs</b>	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g.	0	Nothing envisaged at the moment

<sup>82</sup> 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.

<sup>83</sup><https://www.google.com/maps/place/26%C2%B053'03.7%22N+89%C2%B022'37.8%22E/@26.8739223,89.3770338,272a,35y,355.95h,78.8t/data=!3m1!1e3!4m9!1m3!11m2!2sLV4IZUe43MeUSvdEtHryOks8K9hqbW!3e3!3m4!1s0x0:0x0!8m2!3d26.8843649!4d89.3771723>

Screening Questions	Score	Remarks <sup>82</sup>
hydro-power generation facilities) throughout their design life time?		
<b>Cumulative score</b>	<b>6</b>	

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): High**

**Other Comments:** Amochu site is exposed to river bank erosion, flood and landslide. Torsa river becomes mighty during monsoon season. Overflow in the river imposes potential risk to the proposed housing site. Erosion and flood protection measures are required for site development of the subproject. Furthermore, a giant landslide site is located within 100 m of the site. Landslide protection measures should also be in place.

**Prepared by:**  
**NHDCL**

## Appendix 2: No Mitigation Measures Scenario Checklist

### SAUW No Mitigation Scenario (Scoping Checklist)

**Instructions:** Answer the questions based on subproject/package information. Discuss/consult design engineers, social safeguards team and other technical experts to ensure most recent information is used. The answers will be used in the preparation of EIA/IEE and EMP. If subproject/package will involve rehabilitation/expansion of existing facility, specify in the checklist (audit is required as part of the EIA/IEE).

#### PART 1: Project Characteristics

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
<b>1. Will construction, operation or decommissioning of the Project involves actions which will cause physical changes in the locality (topography, land use, changes in water bodies, etc)?</b>				
1.1	Permanent or temporary change in land use, land cover or topography including increases in intensity of land use?	Yes	Land cover and aesthetics; due to new residential structures at the site. This will increase the carrying capacity in the area.	Not significant because the effect will not be unusual in the area which is already within the designated Urban Village High Density UV-2 (HD) Area. It is anticipated the surrounding land use will also be converted to offices, residences, shops etc. in the future
1.2	Clearance of existing land, vegetation and buildings?	N/A		There are no trees to be cut except for shrubs
1.3	Creation of new land uses?	No		The site is in Urban Village High Density UV-2 (HD) area
1.4	Pre-construction investigations e.g. boreholes, soil testing?	Yes	Noise, due to potential drilling.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
1.5	Construction works?	Yes	Ambient air quality and noise level due to impacts of construction works.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures. (5 buildings will be constructed on 2.27 acres)
1.6	Demolition works?	Yes	Ambient air quality and noise level, and aesthetics; due to potential dust	Not significant because there are only 2 temporary shacks to be dismantled. The activity is temporary

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
			generation, elevated noise level and indiscriminate disposal around the site.	and any impacts are short term and can be readily mitigated through standard measures.
1.7	Temporary sites used for construction works or housing of construction workers?	No		There is ample land within and adjacent to the project site, and if additional land is required for temporary housing, this will be leased from Thomde or a private party.
1.8	Above ground buildings, structures or earthworks including linear structures, cut and fill or excavations?	Yes	Ambient air quality and noise level due to potential dust generation and elevated noise level during demolition works.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.  Excavation work will be carried out to construct five numbers of five storied buildings. Much of the excavated soil will be reused for filling and leveling works for internal access road and parking
1.9	Underground works including mining or tunneling?	N/A		
1.10	Reclamation works?	N/A		
1.11	Dredging?	N/A		
1.12	Coastal structures e.g., seawalls, piers?	N/A		
1.13	Offshore structures?	N/A		
1.14	Production and manufacturing processes?	N/A		
1.15	Facilities for storage of goods or materials?	Yes	None.	Not significant. Construction materials that will be used are to be delivered to the site on programmed and scheduled basis. Materials that are needed day-to-day during construction period will be stored at a dedicated storage area at site. This storage will have a small footprint.

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
1.16	Facilities for treatment or disposal of solid wastes or liquid effluents?	Yes	Aesthetics, odor and surface water quality; due to potential release of untreated effluents and indiscriminate disposal of solid wastes	Not significant because the impact can be mitigated through efficient functioning of the facilities as per design.
1.17	Facilities for long term housing of operational workers?	N/A		
1.18	New road, rail or sea traffic during construction or operation?	No		The project site is already adjacent an existing main road.
1.19	New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, ports, airports etc?	No		The project site is already adjacent an existing main road.
1.20	Closure or diversion of existing transport routes or infrastructure leading to changes in traffic movements?	No		The construction phase of the project is not expected to cause any closure or diversion of routes on the adjacent road. The site is wide enough to accommodate all construction activities, equipment, etc. without disturbing the traffic flow.
1.21	New or diverted transmission lines or pipelines?	No		
1.22	Impoundment, damming, culverting, realignment or other changes to the hydrology of watercourses or aquifers?	No		
1.23	Stream crossings?	No		The project activities will not impact any streams
1.24	Abstraction or transfers of water from ground or surface waters?	No		The municipal is responsible for ensuring regular supply of water to all buildings within the city. The site is already connected to the local municipal water supply.
1.25	Changes in water bodies or the land surface affecting drainage or run-off?	Yes	Surface water quality, due to siltation	Not significant because measures are readily available to mitigate the impact.

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
1.26	Transport of personnel or materials for construction, operation or decommissioning?	Yes	Noise, due to potential elevated noise during delivery of construction materials at the site.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
1.27	Long term dismantling or decommissioning or restoration works?	N/A		
1.28	Ongoing activity during decommissioning which could have an impact on the environment?	N/A		
1.29	Influx of people to an area in either temporarily or permanently?	Yes	Noise, Surface water quality; due to workforce at the site during construction phase.	Not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
1.30	Introduction of alien species?	No		Landscaping will be carried out with local species
1.31	Loss of native species or genetic diversity?	No		The vegetation is mostly weedy species (Lantana Camara, Eupatorium species)
1.32	Any other actions?	No		
<b>2. Will construction or operation of the Project use natural resources such as land, water, materials or energy, especially any resources which are non-renewable or in short supply?</b>				
2.1	Land especially undeveloped or agricultural land?	Yes		The subproject will be carried out on 2.27 acres of vacant undeveloped land
2.2	Water?	Yes	Water supply availability, due to additional users.	Not significant because the water users for the housing facility are already existing users in Phuentsholing.
2.3	Minerals?	Yes	Land cover and stability, due to potential quarrying or mining activities relative to the production of raw materials to be used for construction.	Not significant. Although minerals such as fuel and other earth-based resources (sand, stones, marble) will be required during construction, the amount will not be high to cause significant impact to natural resources.
2.4	Aggregates?	Yes	Land cover and stability, due to	Not significant. Will be required for construction

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
			potential quarrying or mining activities relative to the production of raw materials to be used for construction.	purposes, but the amount will not be high to cause significant impact to natural resources.
2.5	Forests and timber?	Yes	Forest cover, due to potential cutting of trees.	Not significant. Timber will be required for making doors and windows and other woodworks , but the amount will not be high to cause significant impact to natural resources.
2.6	Energy including electricity and fuels?	Yes	Climate, due to potential additional power generation from fossil fuel.	Not significant. The increase in power demand brought about by the new housing facility is marginal/negligible as compared with the demand of the entire locality. Future occupants of the housing facility are already existing electricity users in Phuentsholing.
2.7	Any other resources?	No		
<b>3. Will the Project involve use, storage, transport, handling or production of substances or materials which could be harmful to human health or the environment or raise concerns about actual or perceived risks to human health?</b>				
3.1	Will the project involve use of substances or materials which are hazardous or toxic to human health or the environment (flora, fauna, and water supplies)?	Yes	Human health, surface water quality; groundwater quality; Ambient air quality, including odor. Releases of these substances can potentially pollute the different environmental media.	Solvents, primers, adhesives, paint will be utilized. However, not significant because the activity is temporary and any impacts are short term and can be readily mitigated through standard measures.
3.2	Will the project result in changes in occurrence of disease or affect disease vectors (e.g. insect or water borne diseases)?	Yes	Human health, Surface water quality; groundwater quality; Ambient air quality, including odor. Sanitation quality at the site (including Contractor's camp) could affect the quality of surface water due to	Not significant because standard measures are available to mitigate the impacts.



No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
			wastewater releases, and hygiene due to solid waste generation. These are potential sources of disease vectors.	
3.3	Will the project affect the welfare of people e.g. by changing living conditions?	Yes	Better welfare of the housing beneficiaries, due to improved facilities.	Significant but on positive aspect. The project will significantly improve the living conditions of the new tenants/beneficiaries.
3.4	Are there especially vulnerable groups of people who could be affected by the project e.g. hospital patients, the elderly?	No		
3.5	Any other causes?	No		
<b>4. Will the Project produce solid wastes during construction or operation or decommissioning?</b>				
4.1	Spoil, overburden or mine wastes?	Yes	Aesthetic, Surface water quality, Ambient air quality, due to potential indiscriminate handling or disposal of spoils that could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.2	Municipal waste (household and or commercial wastes)?	Yes	Aesthetic, Surface water quality, Odor; due to potential dumping and mismanagement of solid wastes that could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.3	Hazardous or toxic wastes (including radioactive wastes)?	Yes	Surface water quality; Ambient air quality, including Odor; due to potential releases that could pollute the environment.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.4	Other industrial process wastes?	N/A		
4.5	Surplus product?	N/A		
4.6	Sewage sludge or other sludge from effluent treatment?	Yes	Surface water quality, groundwater quality, odor due to potential release of untreated effluents the could	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
			pollute the environment.	
4.7	Construction or demolition wastes?	Yes	Aesthetics, community safety, due to potential unmanaged bulky construction and demolition wastes.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
4.8	Redundant machinery or equipment?	No		
4.9	Contaminated soils or other material?	No		
4.10	Agricultural wastes?	No		
4.11	Any other solid wastes?	No		
<b>5. Will the Project release pollutants or any hazardous, toxic or noxious substances to air?</b>				
5.1	Emissions from combustion of fossil fuels from stationary or mobile sources (vehicles and/or heavy equipment)?	Yes	Ambient air quality, due to emissions from heavy equipment, service vehicles, generator sets, and other vehicles, such as those transporting materials at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.2	Emissions from production processes?	N/A		
5.3	Emissions from materials handling including storage or transport?	Yes	Ambient air quality, due to emissions from stored materials at site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.4	Emissions from construction activities including plant and equipment?	Yes	Ambient air quality, due to emissions from heavy equipment, service vehicles, generator sets, and other vehicles, such as those transporting materials at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.5	Dust or odors from handling of materials including construction materials, sewage and waste?	Yes	Ambient air quality, due to emissions from unmanaged liquid and solid wastes at construction sites.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
5.6	Emissions from incineration of waste?	N/A		

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
5.7	Emissions from burning of waste in open air (e.g. slash material, construction debris)?	No		
5.8	Emissions from any other sources?	No		
<b>6. Will the Project cause noise and vibration or release of light, heat energy or electromagnetic radiation?</b>				
6.1	From operation of equipment e.g. engines, ventilation plant, crushers?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction activities at the site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
6.2	From industrial or similar processes?	N/A		
6.3	From construction or demolition?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction activities at the site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
6.4	From blasting or piling?	N/A		
6.5	From construction or operational traffic?	Yes	Noise level, due to noisy operation of heavy equipment (including drills, concrete mixers, tile cutters, chain saw during tree cutting), excavation work, and other construction activities at the site. Additional noise can also be generated due to increase in vehicular movement for material drop off to the site.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
6.6	From lighting or cooling systems?	N/A		

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
6.7	From sources of electromagnetic radiation (consider effects on nearby sensitive equipment as well as people)?	N/A		
6.8	From any other sources?	No		
<b>7. Will the Project lead to risks of contamination of land or water from releases of pollutants onto the ground or into sewers, surface waters, groundwater, coastal waters or the sea?</b>				
7.1	From handling, storage, use or spillage of hazardous or toxic materials?	Yes	Surface water quality and ground water quality, due to potential unwanted release of fuels, solvents, primers, adhesives, paint.	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
7.2	From discharge of sewage or other effluents (whether treated or untreated) to water or the land?	Yes	Surface water quality and ground water quality, due to potential unwanted release of untreated wastewater	Not significant because the impacts are short term and localized. Standard measures are available to mitigate the impacts.
7.3	By deposition of pollutants emitted to air, onto the land or into water?	Yes.	Land quality and surface water quality, due to deposition of emissions from heavy equipment and other machines used during construction activities.	Not significant. The deposition, if any, is very negligible to affect the quality of surface water or land/soil in the area.
7.4	From any other sources?	No		
7.5	Is there a risk of long term build-up of pollutants in the environment from these sources?	No		
<b>8. Will there be any risk of accidents during construction or operation of the Project which could affect human health or the environment?</b>				
8.1	From explosions, spillages, fires etc from storage, handling, use or production of hazardous or toxic substances?	Yes	Humans/people, due to potential release of these substances that could affect the workers at site and nearby human receptors (residential areas, institutions)	Not significant because the impacts are short term and localized. Standard community and occupational health and safety measures are available to mitigate the impacts.
8.2	From events beyond the limits of normal environmental protection e.g. failure of pollution controls systems?	N/A		

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
8.3	From any other causes?	No		
8.4	Could the project be affected by natural disasters causing environmental damage (e.g. floods, earthquakes, landslip, etc)?	Yes	Humans/people, due to risk of natural disasters that could lead to injuries or death.	Not significant because there are designs available that could mitigate the impacts. The sites lie in High Seismic zone and are within 100m of the Amochhu so it could be affected by floods and earthquakes. The Buildings are designed for seismic performance (IS 1893:2016, Zone V, Z=0.36, I=1.37, R=5, Damping=5%). The site is however within the Amochhu township development project wherein flood mitigation measures are being
<b>9. Will the Project result in social changes, for example, in demography, traditional lifestyles, employment?</b>				
9.1	Changes in population size, age, structure, social groups etc?	Yes	Humans/people, due to change in lifestyles of future occupants of the housing facility.	Positively significant during operation phase due to improved living conditions.  Not significant in terms of demography. The project will not increase the local population because residents or occupants of the housing facility will come from existing residents of Phuentsholing (e.g. Kidu Colony).
9.2	By resettlement of people or demolition of homes or communities or community facilities e.g. schools, hospitals, social facilities?	Yes		The resettlement plan will ensure that the two families are compensated as per resettlement plan
9.3	Through in-migration of new residents or creation of new communities?	Yes	Humans/people, due to new communities that will be created at the location of housing facility resulting to new dynamics within the community.	Not significant. A new community will be created at the site. However, no in-migration is expected since residents of the housing units will be the residents of Phuentsholing, who will move out of their existing

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
				settlements in the locality (e.g. Kidu Colony).
9.4	By placing increased demands on local facilities or services e.g. housing, education, health?	Yes	Humans/people, due to increased demand for these services in the locality resulting to stress on availability to accommodate such demand.	Not significant. There will be an increased demand for health facilities because of the influx of workers. Temporary housing will be constructed by the contractor for the workers with adequate drinking water and sanitation facilities. The increase in local facilities such as education or health is not anticipated as the new tenants will mostly be from the same municipality
9.5	By creating jobs during construction or operation or causing the loss of jobs with effects on unemployment and the economy?	Yes	Humans/people, due to creation of employment opportunities.	Positive significant impact. The project will generate employment for foreign workers and nationals during construction phase.
9.6	Any other causes?			
<b>10. Are there any other factors which should be considered such as consequential development which could lead to environmental effects or the potential for cumulative impacts with other existing or planned activities in the locality?</b>				
10.1	Will the project lead to pressure for consequential development which could have significant impact on the environment e.g. more housing, new roads, new supporting industries or utilities, etc?	Yes		The increase in the number of residential units in the proposed site will drastically increase the demand for water and electricity. Additional storage tanks, rainwater harvesting and substation will be constructed to cater to the increased demand. The Site is part of the planned township development plan
10.2	Will the project lead to development of supporting facilities, ancillary development or development stimulated by the project which could have impact on the environment e.g. supporting infrastructure (roads, power supply, waste	Yes		Yes, but any development requires the approval of the municipality.

No.	Questions to be considered in Scoping	Yes No n/a Not Sure	Which Characteristics of the Project Environment could be affected and how?	Is the effect likely to be significant? Why? (See last page for Questions to Guide Assessing Significance of Impacts)
	or waste water treatment, etc) housing development extractive industries supply industries other?			
10.3	Will the project lead to after-use of the site which could have an impact on the environment?	No		Government regulations require that all camps have to be cleared out on completion of work so no new communities will be created The project will be required to ensure post construction closure of the temporary sites
10.4	Will the project set a precedent for later developments?	Yes		Yes, if carried out well, NHDCL housing could be an example for future housing projects in the future
10.5	Will the project have cumulative effects due to proximity to other existing or planned projects with similar effects?	No		

## Part 2 - Characteristics of the Project Environment (Environmental Sensitivity)

Question	Remarks
<p><b>Are there features of the local environment on or around the Project location which could be affected by the Project?</b></p> <ul style="list-style-type: none"> <li>• Areas which are protected under international or national or local legislation for their ecological, landscape, cultural or other value, which could be affected by the project?</li> <li>• Other areas which are important or sensitive for reasons of their ecology e.g. <ul style="list-style-type: none"> <li>○ Wetlands,</li> <li>○ Watercourses or other water bodies,</li> <li>○ the coastal zone,</li> <li>○ mountains,</li> <li>○ forests or woodlands</li> </ul> </li> <li>• Areas used by protected, important or sensitive species of fauna or flora e.g. for breeding, nesting, foraging, resting, overwintering, migration, which could be affected by the project?</li> <li>• Inland, coastal, marine or underground waters?</li> <li>• Areas or features of high landscape or scenic value?</li> <li>• Routes or facilities used by the public for access to</li> </ul>	<p>There are no protected areas or critical habitats within 50km of the project site The closest water river is the Amochhu, at a distance of 100 away and separated from the site by the Phuentsholing-Chamkuna Highway and other development infrastructure under construction</p> <p>The area is within the Urban Village High Density UV-2 (HD), where the existing land use is residential housing.</p> <p>There are no critical habitats that could be affected by the project.</p>

Question	Remarks
recreation or other facilities? <ul style="list-style-type: none"> <li>• Transport routes which are susceptible to congestion or which cause environmental problems?</li> <li>• Areas or features of historic or cultural importance?</li> </ul>	
<b>Is the Project in a location where it is likely to be highly visible to many people?</b>	Yes, the project will only be visible to all traveling along the Highway as it is adjacent to it.
<b>Is the Project located in a previously undeveloped area where there will be loss of greenfield land?</b>	No, the site has been specifically allocated for housing
<b>Are there existing land uses on or around the Project location which could be affected by the Project? For example:</b> <ul style="list-style-type: none"> <li>• homes, gardens, other private property,</li> <li>• industry,</li> <li>• commerce,</li> <li>• recreation,</li> <li>• public open space,</li> <li>• community facilities,</li> <li>• agriculture,</li> <li>• forestry,</li> <li>• tourism,</li> <li>• mining or quarrying</li> </ul>	No.
<b>Are there any plans for future land uses on or around the location which could be affected by the Project?</b>	No
<b>Are there any areas on or around the location which are densely populated or built-up, which could be affected by the Project?</b>	The entire Amochhu area is under development as a new township (extension of the municipality)
<b>Are there any areas on or around the location which are occupied by sensitive land uses which could be affected by the Project?</b> <ul style="list-style-type: none"> <li>• hospitals,</li> <li>• schools,</li> <li>• places of worship,</li> <li>• community facilities</li> </ul>	No. The closest religious and historic site and the hospital is more than 1km from the site.
<b>Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the Project? For example:</b> <ul style="list-style-type: none"> <li>• groundwater resources,</li> <li>• surface waters,</li> <li>• forestry,</li> <li>• agriculture,</li> <li>• fisheries,</li> <li>• tourism,</li> <li>• minerals.</li> </ul>	No
<b>Are there any areas on or around the location of the Project which are already subject to pollution or environmental damage? For example:</b> <ul style="list-style-type: none"> <li>• where existing legal environmental standards are exceeded, which could be affected by the Project</li> </ul>	No
<b>Is the Project location susceptible to earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions? For example:</b> <ul style="list-style-type: none"> <li>• temperature inversions, fogs, severe winds, which could cause the Project to present environmental problems?</li> </ul>	Yes, the project and the town in general fall in High earthquake hazard zone. It is also susceptible to floods.
<b>Is the Project likely to affect the physical condition of any environmental media?</b> <ul style="list-style-type: none"> <li>• The atmospheric environment including microclimate and local and larger scale climatic</li> </ul>	No



Question	Remarks
conditions? <ul style="list-style-type: none"> <li>• Water – e.g. quantities, flows or levels of rivers, lakes, groundwater. Estuaries, coastal waters or the sea?</li> <li>• Soils – e.g. quantities, depths, humidity, stability or erodibility of soils?</li> <li>• Geological and ground conditions?</li> </ul>	
<p><b>Are releases from the Project likely to have effects on the <u>quality</u> of any environmental media?</b></p> <ul style="list-style-type: none"> <li>• local air quality</li> <li>• global air quality including climate change and ozone depletion</li> <li>• water quality – rivers, lakes, groundwater. estuaries, coastal waters or the sea</li> <li>• nutrient status and eutrophication of waters</li> <li>• acidification of soils or waters</li> <li>• soils</li> <li>• noise</li> <li>• temperature, light or electromagnetic radiation including electrical interference</li> <li>• productivity of natural or agricultural systems</li> </ul>	Yes, Increase in dust levels during excavation and air emissions from use of heavy machines. Effects will be temporary and restricted to the construction period
<p><b>Is the Project likely to affect the availability or scarcity of any resources either locally or globally?</b></p> <ul style="list-style-type: none"> <li>• fossil fuels</li> <li>• water</li> <li>• minerals and aggregates</li> <li>• timber</li> <li>• other non-renewable resources</li> <li>• infrastructure capacity in the locality - water, sewerage, power generation and transmission, telecommunications</li> <li>• waste disposal roads, rail</li> </ul>	Water is becoming more scarce in the City due to increasing demand from construction activities and increasing urban population. However measures will be undertaken for rainwater harvesting and water storage
<p><b>Is the Project likely to affect human or community health or welfare?</b></p> <ul style="list-style-type: none"> <li>• The quality or toxicity of air, water, foodstuffs and other products consumed by humans?</li> <li>• Morbidity or mortality of individuals, communities or populations by exposure to pollution?</li> <li>• Occurrence or distribution of disease vectors including insects?</li> <li>• Vulnerability of individuals, communities or populations to disease?</li> <li>• Individuals' sense of personal security?</li> <li>• Community cohesion and identity?</li> <li>• Cultural identity and associations?</li> <li>• Minority rights?</li> <li>• Housing conditions?</li> <li>• Employment and quality of employment?</li> <li>• Economic conditions?</li> <li>• Social institutions?</li> </ul>	No. The project will not affect human or community health. It is in fact expected to provide relief to the residents of the temporary kidu colony which was planned for two years only.

#### Questions to Guide Significance of Impacts

1. Will there be a large change in environmental conditions?
2. Will new features be out-of-scale with the existing environment?
3. Will the effect be unusual in the area or particularly complex?
4. Will the effect extend over a large area?
5. Will there be any potential for trans boundary impact?
6. Will many people be affected?
7. Will many receptors of other types (fauna and flora, businesses, facilities) be affected?

8. Will valuable or scarce features or resources be affected?
9. Is there a risk that environmental standards will be breached?
10. Is there a risk that protected sites, areas, and features will be affected?
11. Is there a high probability of the effect occurring?
12. Will the effect continue for a long time?
13. Will the effect be permanent rather than temporary?
14. Will the impact be continuous rather than intermittent?
15. If it is intermittent will it be frequent rather than rare?
16. Will the impact be irreversible?
17. Will it be difficult to avoid, or reduce or repair or compensate for the effect?

**Appendix 3: General COVID-19 Health and Safety Guidance for Contractor**

**CONTRACTOR GUIDELINES ON RESPONDING TO THREAT OF CORONA VIRUS DISEASE (COVID-19)**

1. This set of guidelines has been formulated based on common practices in many countries worldwide on the fight against COVID-19, and in consonance with WHO guidance on COVID-19,<sup>84</sup> the ILO Workplace Response to the Coronavirus Disease outbreak,<sup>85</sup> and the IFC-WB Environmental, Health, and Safety (EHS) General Guidelines (April 2007). It aims to assist Contractors during construction works in response to the COVID-19 pandemic.
2. The Contractor will be required to comply with the requirements and recommendations from the national policies and guidelines on COVID-19, which may change from time to time.
3. The Contractor will employ an EHS Engineer/Officer who shall oversee compliance to the occupational health and safety (OHS) requirements particularly on prevention of COVID-19 transmission in the workplace. This shall include but not limited to the following:
  - (i) Orientation of workers on OHS, disaster and emergency response procedures, and COVID-19;
  - (ii) Provision and use of personal protective equipment (PPE), fire suppression system and appropriate medical emergency response logistics;
  - (iii) Placement of safety signs, posters (e.g., WHO posters on COVID-19), information and warning signs within the worksite and adjacent areas;
  - (iv) Implementation and maintenance of good housekeeping;
  - (v) Monitoring of occupational health and environmental controls (e.g., airborne contaminants, noise, illumination, ventilation, temperature and humidity); and
  - (vi) Conduct of regular safety inspection and incident reporting/ recording.
4. The Contractor will provide all subcontractors, if any, with compulsory site induction on COVID-19 response prior to start of any works. The EHS Officer will keep a record of the contact details of all workers and staff: mobile telephone number, alternate telephone, email, and address where they are staying.
5. The Contractor will maintain regular housekeeping practices, including routine cleaning and disinfecting of surfaces, equipment, and other elements of the work environment. Make sure workplaces are clean and hygienic. Surfaces (e.g., desks and tables) and objects (e.g., telephones, keyboards) need to be wiped with disinfectant regularly.
6. The Contractor will ensure that all persons reporting to work are healthy and in a fit state. Any person showing signs of cough and colds will not be allowed to enter the work sites and will be advised to stay at home, or follow the isolation procedure, if any, by the government.
7. The Contractor will ensure that staff, subcontractors (if any), and workers have access to places where they can wash their hands with soap and water. Wash stations at strategic locations within

<sup>84</sup> WHO. Coronavirus disease (COVID-19) technical guidance: Guidance for schools, workplaces & institutions. 19 March 2020. <https://www.who.int/docs/default-source/coronaviruse/advice-for-workplace-clean-19-03-2020.pdf>

<sup>85</sup> ILO. ILO Standards and COVID-19 (coronavirus) 23 March 2020 - Version 1.2 [https://www.ilo.org/global/topics/safety-and-health-at-work/areasofwork/occupational-health/WCMS\\_738178/lang--en/index.htm](https://www.ilo.org/global/topics/safety-and-health-at-work/areasofwork/occupational-health/WCMS_738178/lang--en/index.htm).

the work areas that are equipped with adequate soap and water will be provided for workers to wash their hands. Put sanitizing hand rub dispensers in prominent places around the workplace. Make sure these dispensers are regularly refilled. All workers will be required to practice basic hygiene such as hand washing before eating, drinking, and after using the toilet.

8. The Contractor will display posters promoting hand-washing, and social distancing – ask local public health authority for these or consult [www.WHO.int](http://www.WHO.int). Combine posters with other communication measures like offering guidance from EHS Officer, briefings at meetings, and information on intranet sites to promote handwashing.

9. The Contractor will not allow any person on medication for a specific medical condition that will impair their performance to work at the sites.

10. The Contractor and all subcontractors, if any, will provide the appropriate PPE for all its workers. All tools and PPE must be in good condition, fit for purpose, and receive all the mandatory and statutory inspections, checks and calibrations, as and when required. Proof that they are in good condition may be required, if needed. Workers will be responsible to wear PPE appropriately, take good care of equipment and report any defects. Have surgical masks and disposable gloves available to provide anyone who develops respiratory symptoms. All tools and equipment must be sanitized after every use.

11. The Contractor will actively monitor where COVID-19 infection is high. In the event COVID-19 is known in the community, the Contractor will brief and/or orient workers, staff and subcontractors, if any, that anyone with mild cough or low-grade fever (37.3°C or more) will stay at home. A work from home arrangement for office workers, if possible, can be arranged.

12. The Contractor will keep promoting the message that people need to stay at home even if they have only mild symptoms of COVID-19 by displaying posters with this message in the workplace, combined with other channels of communications commonly used in the workplace.

13. The Contractor will develop a preparedness and response plan to prevent COVID-19 infection in the workplace. The preparedness plan will be submitted to PMU for approval.

### Appendix 4: Land User Certificate



**Appendix 5: Result of IBAT Screening (page 1)**



**Result of IBAT Screening (page 2)**



### Result of IBAT Screening

IBAT Screening Result	IBAT Screening Result
	
	
	



The table is oriented vertically and contains multiple columns and rows of data. It includes several rows with colored headers (red, green, blue) and contains a mix of text and numerical data. The content is highly blurred and difficult to read, but it appears to be a detailed data table or report.

### Assessed Presence of Species of Concern at the Subproject Site

	Species Name	Common Name	Taxonomic Group	IUCN Category	Presence
1	<i>Indotestudo elongata</i>	Elongated Tortoise	REPTILIA	Critically endangered	Absent
2	<i>Batagur dhongoka</i>	Three-striped Roofed Turtle	REPTILIA	Critically endangered	Absent
3	<i>Manis pentadactyla</i>	Chinese Pangolin	MAMMALIA	Critically endangered	Absent
4	<i>Aythya baeri</i>	Baer's Pochard	AVES	Critically endangered	Absent
5	<i>Houbaropsis bengalensis</i>	Bengal Florican	AVES	Critically endangered	Absent
6	<i>Gyps bengalensis</i>	White- rumped Vulture	AVES	Critically endangered	Absent
7	<i>Sarcogyps calvus</i>	Red-headed Vulture	AVES	Critically endangered	Absent
8	<i>Ardea insignis</i>	White-bellied Heron	AVES	Critically endangered	Absent
9	<i>Emberiza aureola</i>	Yellow- breasted Bunting	AVES	Critically endangered	Absent
10	<i>Gyps tenuirostris</i>	Slender- billed Vulture	AVES	Critically endangered	Absent
11	<i>Bulbophyllum leopardinum var. tuberculatum</i>		LILIOPSIDA	Critically endangered	Absent
12	<i>Ailurus fulgens</i>	Red Panda	MAMMALIA	Endangered	Absent
13	<i>Caprolagus hispidus</i>	Hispid Hare	MAMMALIA	Endangered	Absent
14	<i>Cuonalpinus</i>	Dhole	MAMMALIA	Endangered	Absent
15	<i>Cuora amboinensis</i>	Southeast Asian Box Turtle	REPTILIA	Endangered	Absent
16	<i>Elephas maximus</i>	Asian Elephant	MAMMALIA	Endangered	Absent
17	<i>Geoclemys hamiltonii</i>	Spotted Pond Turtle	REPTILIA	Endangered	Absent
18	<i>Manis crassicaudata</i>	Indian Pangolin	MAMMALIA	Endangered	Absent
19	<i>Melanochelys tricarinata</i>	Tricarinate Hill Turtle	REPTILIA	Endangered	Absent
20	<i>Moschus chrysogaster</i>	Alpine musk deer	MAMMALIA	Endangered	Absent
21	<i>Moschus leucogaster</i>	Himalayan musk deer	MAMMALIA	Endangered	Absent
22	<i>Panthera tigris</i>	Tiger	MAMMALIA	Endangered	Absent
23	<i>Axis porcinus</i>	Hog Deer	MAMMALIA	Endangered	Absent
24	<i>Amblyceps arunchalensis</i>		ACTINOPTERY GII	Endangered	Absent
25	<i>Perdicula manipurensis</i>	Manipur Bush-quail	AVES	Endangered	Absent
26	<i>Sterna acuticauda</i>	Black-bellied Tern	AVES	Endangered	Absent
27	<i>Haliaeetus leucoryphus</i>	Pallas's Fish- eagle	AVES	Endangered	Absent

28	<i>Neophron percnopterus</i>	Egyptian Vulture	AVES	Endangered	Absent
29	<i>Aquila nipalensis</i>	Steppe Eagle	AVES	Endangered	Absent
30	<i>Falco cherrug</i>	Saker Falcon	AVES	Endangered	Absent
31	<i>Leptoptilos dubius</i>	Greater Adjutant	AVES	Endangered	Absent
32	<i>Laticilla cinerascens</i>	Swamp Grass-babbler	AVES	Endangered	Absent
33	<i>Ceropegia bhutanica</i>		MAGNOLIOPSI DA	Endangered	Absent
34	<i>Hoya bhutanica</i>		MAGNOLIOPSI DA	Endangered	Absent
35	<i>Strobilanthes accrescens subsp. accrescens</i>		MAGNOLIOPSI DA	Endangered	Absent
36	<i>Tor putitora</i>		ACTINOPTERY GIIE	Endangered	Amochhu river
37	<i>Bos gaurus</i>	Gaur	MAMMALIA	Vulnerable	Absent
38	<i>Crocodylus palustris</i>	Mugger	REPTILIA	Vulnerable	Absent
39	<i>Lutrogaleperspicillata</i>	Smooth -coated otter	MAMMALIA	Vulnerable	Absent
40	<i>Melursus ursinus</i>	Sloth bear	MAMMALIA	Vulnerable	Absent
41	<i>Myotis sicarius</i>	Mandelli's Mouse-eared Myotis	MAMMALIA	Vulnerable	Absent
42	<i>Neofelisnebulosa</i>	Clouded Leopard	MAMMALIA	Vulnerable	Absent
43	<i>Panthera pardus</i>	Leopard	MAMMALIA	Vulnerable	Absent
44	<i>Prionailurusviverrinus</i>	Fishing Cat	MAMMALIA	Vulnerable	Absent
45	<i>Rhinoceros unicornis</i>	Greater One-horned Rhino	MAMMALIA	Vulnerable	Absent
46	<i>Ursus thibetanus</i>	Asiatic Black Bear	MAMMALIA	Vulnerable	Absent
47	<i>Arctictis binturong</i>	Binturong	MAMMALIA	Vulnerable	Absent
48	<i>Rusa unicolor</i>	Sambar	MAMMALIA	Vulnerable	Absent
49	<i>Aonyx cinereus</i>	Asian Smallclawed Otter	MAMMALIA	Vulnerable	Absent
50	<i>Ingerana borealis</i>	Rotung Oriental Frog	AMPHIBIA	Vulnerable	Absent
51	<i>Wallago attu</i>		ACTINOPTERY GII	Vulnerable	Absent
52	<i>Bagariusyarrelli</i>		ACTINOPTERY GII	Vulnerable	Absent
53	<i>Oligodonjuglandifer</i>	Walnut Kukri Snake	REPTILIA	Vulnerable	Absent
54	<i>Ophiophagus hannah</i>	King Cobra	REPTILIA	Vulnerable	Absent
55	<i>Python bivittatus</i>	Burmese Python	REPTILIA	Vulnerable	Absent
56	<i>Anacyclus pyrethrum</i>	Atlas Daisy	MAGNOLIOPSI DA	Vulnerable	Absent
57	<i>Francolinusgularis</i>	Swamp Francolin	AVES	Vulnerable	Absent
58	<i>Arborophilamandellii</i>	Chestnut-breasted Partridge	AVES	Vulnerable	Absent
59	<i>Aythya ferina</i>	Common Pochard	AVES	Vulnerable	Absent
60	<i>Mulleripicuspulverulentus</i>	Great slaty Woodpecker	AVES	Vulnerable	Absent

61	<i>Bucerosbicornis</i>	Great Hornbill	AVES	Vulnerable	Absent
62	<i>Acerosnipalensis</i>	Rufous-necked hornbill	AVES	Vulnerable	Absent
63	<i>Grus antigone</i>	Sarus Crane	AVES	Vulnerable	Absent
64	<i>Gallinagonemorica</i>	Wood snipe	AVES	Vulnerable	Absent
65	<i>Sterna aurantia</i>	River tern	AVES	Vulnerable	Absent
66	<i>Clangaclanga</i>	Greater Spotted Eagle	AVES	Vulnerable	Absent
67	<i>Aquila heliaca</i>	Eastern Imperial Eagle	AVES	Vulnerable	Absent
68	<i>Leptoptilosjavanicus</i>	Lesser Adjutant	AVES	Vulnerable	Absent
69	<i>Turdus feae</i>	Grey-sided Thrush	AVES	Vulnerable	Absent
70	<i>Saxicola insignis</i>	White-throated Bushchat	AVES	Vulnerable	Absent
71	<i>Sittaformosa</i>	Beautiful Nuthatch	AVES	Vulnerable	Absent
72	<i>Chaetornis striata</i>	Bristled Grassbird	AVES	Vulnerable	Absent
73	<i>Chrysommaaltirostre</i>	Jerdon's Babbler	AVES	Vulnerable	Absent
74	<i>Chatarrahaealongirostris</i>	Slender-billed Babbler	AVES	Vulnerable	Absent
75	<i>Ploceusmegarhynchus</i>	Finn's Weaver	AVES	Vulnerable	Absent
76	<i>Clangahastata</i>	Indian Spotted Eagle	AVES	Vulnerable	Absent
77	<i>Ophiocordyceps sinensis</i>	Chinese Caterpillar Fungus	SORDARIOMY CETES	Vulnerable	Absent
78	<i>Drepanostachyumannulatum</i>		LILIOPSIDA	Vulnerable	Absent
79	<i>Corallodiscuscooperi</i>		MAGNOLIOPSIDA	Vulnerable	Absent
80	<i>Oryza malampuzhaensis</i>		LILIOPSIDA	Vulnerable	Absent
81	<i>Cinnamomum impressinervium</i>		MAGNOLIOPSIDA	Vulnerable	Absent
82	<i>Capricornissumatraensis</i>		MAMMALIA	Vulnerable	Absent
83	<i>Paris polyphylla</i>	Love apple	LILIOPSIDA	Vulnerable	Absent
84	<i>Chrysommaaltirostre</i>	Jerdon's Babbler	AVES	Vulnerable	Absent
85	<i>Chatarrahaealongirostris</i>	Slender-billed Babbler	AVES	Vulnerable	Absent
86	<i>Kaloulaassamensis</i>	Assamese Balloon Frog	AMPHIBIA	Least Concern	Absent
87	<i>Trochalopteronimbricatum</i>	Bhutan Laughingthrush	AVES	Least Concern	Absent
88	<i>Zootherasalimalii</i>	Himalayan Forest Thrush	AVES	Least Concern	Absent
89	<i>Minervaryachilapata</i>	Chilapata rain- pool Frog	AMPHIBIA	Data deficient	Absent

Fish species reported from the Amochhu<sup>86</sup>

	Scientific Name	Common name	Status	Source
1	<i>Aborichthys sp.</i>	Gongthongnga	LC	NCRLF 1
2	<i>Amblycepscerinum</i>		LC	NCRLF 1
3	<i>Amblycepsef.arunachalensis</i>		LC	NCRLF 1
4	<i>Aspidopariajaya</i>		LC	NCRLF 1
5	<i>Banganadero</i>	Bhanga	LC	NCRLF 1
6	<i>Bariliusbarna</i>	Barnabaril/titer kanefaketa	LC	NCRLF 1
7	<i>Bariliusbendelisis</i>	Hamilton's barila, fageta	LC	NCRLF 1
8	<i>Bariliusvagra</i>	Vagrabaril, fageta	LC	NCRLF 1
9	<i>Chaguniuschagunio</i>	Chaguni	LC	NCRLF 1
10	<i>Channa sp.</i>		LC	NCRLF 1
11	<i>Clariasgaripepinus</i>	walking catfish	introduced	NCRLF 1
12	<i>Clariasmagur</i>	catfish	introduced	NCRLF 1
13	<i>Ctenopharyngodonidella</i>		introduced	NCRLF 2
14	<i>Cyprinus carpio</i>		LC	NCRLF 2
15	<i>Danio rerio</i>	bhitti	LC	NCRLF 1
16	<i>Devarioaequipinnatus</i>	Bhitti	LC	NCRLF 1
17	<i>Devarioassamensis</i>	Bhitti	LC	NCRLF 1
18	<i>Garragotyla</i>	Gotyla	LC	NCRLF 1
19	<i>Lepidocephalichthysguntea</i>	Guntea loach	LC	NCRLF 1
20	<i>Neoeucirrhichthysmaydelli</i>	Goalpara loach	LC	NCRLF 1
21	<i>Neolissochilusdukai</i>	Katle	Data deficient	NCRLF 1
22	<i>Neolissochilushexagonolepis</i>	Kheynga, copper mahseer, katli	Near Threatened (IUCN), status in Bhutan not known	NCRLF 1
23	<i>Neolissochilushexasticus</i>			NCRLF 2
24	<i>Pethia sp.</i>		LC	NCRLF 1
25	<i>Pethiaticto</i>	Ticto barb	LC	NCRLF 1
26	<i>Raiamas bola</i>	Indian trout	LC	NCRLF 1
27	<i>Schizothoraxprogastus</i>	chucheyasala	LC	NCRLF 1
28	<i>Tor putitora</i>	Golden Mahseer	EN	NCRLF 1

<sup>86</sup> Field Guide to Fishes of Western Bhutan, 2017. National Research Centre for Riverine and lake fisheries, Department of Livestock and  
NCRLF2- National Research Centre for Riverine and lake fisheries <http://www.nrclf.gov.bt/>

## Appendix 6: COVID-19 Safety Guidelines for Field-Based Consultation Activities

### A. Introduction

1. The Green and Resilient Affordable Housing Sector Project (GRAHSP) will assist the Royal Government of Bhutan (RGOB) establish infrastructures (i.e., shelters and recycled waste livelihood facilities) and provide services [i.e., business development, child care centers (crèches), integrated services for survivors of gender based violence (GBV)] for vulnerable women (victims/survivors of violence, poor working mothers caring for children and marginalized informal sector workers) in Thimphu and Phuentsholing municipalities (*thromde*) while also adopting climate adaptation and disaster risk reduction in housing projects. The Project is in line with ADB's Strategy 2030, the Country Partnership Strategy (2019-2023) and the 12th Five-Year Plan's national key result area (NKRA) of gender equality and sustainable human settlements. NKRA aims to remove barriers (including GBV) that limit the opportunities and potentials of women and girls by creating enabling policies and providing adequate support services.<sup>87</sup> The Project is also aligned with the Disaster Management Act (2013) and supports a systematic approach to disaster risk management.

2. As an integral part of administering this project and to comply with ADB Safeguard Policy Statement, continuing meaningful consultations will be undertaken with stakeholders. This activity may be undertaken through a combination of online, virtual and in-face consultations. However, as COVID-19 still prevails, travel to sites for in-face consultations shall need to be undertaken with due regard to compliance with appropriate safety protocol as discussed in detail in this document.

### B. About the Corona Virus Disease

3. Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness. The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Precautions can be implemented to prevent and slow down the transmission of the virus<sup>88</sup>.

### C. Common Symptoms of Corona Virus Disease<sup>89</sup>

4. COVID-19 affects different people in different ways. Most infected people will develop mild to moderate illness and recover without hospitalization.

Most common symptoms:

- fever.
- dry cough.
- tiredness.

Less common symptoms:

- aches and pains.

<sup>87</sup> Gross National Happiness Commission. 2019. Twelfth Five-Year plan. 2018-2023. Thimphu.

<sup>88</sup> World Health Organization. [https://www.who.int/health-topics/coronavirus#tab=tab\\_1](https://www.who.int/health-topics/coronavirus#tab=tab_1)

<sup>89</sup> World Health Organization. [https://www.who.int/health-topics/coronavirus#tab=tab\\_3](https://www.who.int/health-topics/coronavirus#tab=tab_3)

- sore throat.
- diarrhea
- conjunctivitis.
- headache.
- loss of taste or smell.
- a rash on the skin, or discoloration of fingers or toes.

Serious symptoms:

- difficulty breathing or shortness of breath.
- chest pain or pressure.
- loss of speech or movement.

#### **D. Personal Protective Equipment that should be worn by field team**

5. While in the field, all the members of the consultation team shall use or wear proper personal protective equipment (PPE) at all times. These PPEs may be removed on certain circumstances only, such as, but not limited to, eating, drinking, and any other task or activity that the PPE may inhibit the action. However, during these times, strict observance of social distancing is required.

6. The most common type of PPEs that should be worn by the field team are the following:
- Reusable mask or surgical mask. Reusable masks should be maintained clean per the manufacturer's instruction. Surgical masks should not be reused.
  - Face shield. This PPE is especially useful for the field workers when talking to various people in a relatively confined space or indoors.
  - Gloves. This is especially useful in situations in the field where items are being passed around from one hand to another, and no available hand sanitizers, or water and soap for handwashing after the activity.

#### **E. Safety Protocol for Field Work**

##### **▪ Field Team Composition**

7. Strictly comply and observe with the condition that field team composition, including assistants, drivers, helpers, etc., should be pre-identified. These team members should only be the ones going to the field.

##### **▪ The field team should ensure the following:**

8. Before undertaking the field visits, ensure that the local/district administration of a target site for consultation has been informed about the visit. Obtain necessary permits, if required.
9. Never carry out activities in areas under lockdown, if any, and undertake consultations in such areas after restrictions are lifted and necessary approvals are obtained for field activity.
10. Maintain adequate stock of face masks and hand sanitiser for field team; including single-use surgical masks for participants.
11. The team should have handheld contactless temperature scanner and pulse oximeter (minimum 2-sets).

- a) Test all members of the field team every morning before starting of field visit or activity to ensure no member is having a fever (above 100 F or 38 C) and ensure oxygen saturation level is normal (above 95).
  - b) Once in the field or venue of consultations, the team should test the temperature of every participant.
    - i. The temperature of a participant should likewise be below 100 F or 38 C.
    - ii. If the temperature is high, advise such participant to immediately go home, take a rest and consult a doctor.
12. Community consultation should be held only if allowed by local or district administration and if situation permits. Otherwise, avoid consultations.
- a) If consultations are conducted, ensure it is held in the open and that participants are seated at least 1-meter apart (or as per local rules on social distancing).
  - b) Ensure there is no handshaking or any physical contact among the team members and participants.
13. Check daily the latest information on areas where COVID-19 is spreading and ensure no field activity is undertaken in any area declared under lockdown.
14. Ensure that no member of the field team belongs to the high-risk category, or those with medical conditions such as diabetes, heart disease, lung disease, etc.
15. Mobile phones of the field team, laptop, etc need to be wiped with disinfectant daily on return from the field.
16. If a big group of participants or a wide venue is expected for a consultation activity, ensure to bring portable microphones and audio system to avoid shouting or avoid drawing participants close to the speaker or discussant.
- **Each field team member should strictly adhere to the following safety measures:**
17. Use facemasks with reliable and known quality in every field consultation activity. At the end of each day of consultation activity and upon reaching home/place of stay, cut the mask into two pieces (to prevent recycling) and safely dispose following local or national guidelines. Wash hands with soap afterwards.
18. Use a shoulder bag for carrying hand sanitiser, single-use surgical masks, hand towel, identity card, water bottle, etc.
19. Wear mask before setting out to the field location and the mask should be worn throughout the day until return to place of stay or residence, unless in special or unavoidable circumstances as discussed in the use of PPE above.
- a) Before putting on the mask, clean hands with alcohol-based hand sanitise or soap and water.
  - b) Cover mouth and nose with mask and make sure there are no gaps between the face and the mask.



- c) Avoid touching the mask while using it; if it is touched, clean hands with alcohol-based hand sanitise immediately after touching the mask.
  - d) To handle a reusable mask: remove it from behind (do not touch the front of the mask); clean hands with alcohol-based hand rub or soap and water; and wash the mask with washing soap and dry it in sunlight.
20. When multiple small group consultations are undertaken, ensure to clean hands thoroughly with an alcohol-based hand sanitiser at every end of each consultation.
- a) Avoid touching eyes, mouth, and nose after using the hand sanitiser. Spare a few minutes for the hands to dry up. The hand sanitizer can cause irritation.
  - b) Store the hand sanitizers in safe places and out of reach of children. Hand sanitizers can be poisonous when swallowed.
  - c) Recommended hand sanitizers are alcohol-based. Ensure to handle them with care as these can be flammable.
21. Carry a freshly washed hand towel every day to dry your hands after washing.
22. Maintain at least 1 meter distance (or as per local rules on social distancing) the participants and any others during the consultation activities.
- a) If the place of consultation is deemed congested and may be difficult to maintain the minimum distance, ensure that the participants wear masks throughout the discussion.
  - b) Ensure that single-use surgical masks are available for participants who do not have their own.
  - c) Request participants to maintain distance and avoid congregating too close when the discussion is in progress.
23. As much as possible, avoid touching eyes, nose, and mouth until reaching home. Once at home or place of stay, take a bath immediately and observe all necessary actions to protect members of the household from possible COVID-19 infection.
- a) Use shampoo and wash hair thoroughly.
  - b) Wash clothes and dry them in sunlight.
  - c) All gadgets and materials used during field work should be disinfected, put in one bag and keep away from any family member.
  - d) Dispose of used face masks properly as described above. Face shields should be properly washed or disinfected as well.
24. Avoid public transport for local travel, if possible, and use dedicated vehicle/motorcycle (owned or rented by the project) to reach project sites.
- a) Where possible, the team shall only use dedicated vehicles to and from the sites.
  - b) If motorcycle or taxi is used, ensure to abide by the passenger limit imposed by the local or national government on the use of these transportations.
25. When feeling or suffering from any minor symptoms such as cough, headache, mild fever, stay at home and do not participate in the consultation activity.
- a) At home, be isolated from others.

- b) Call the nearest government COVID-19 health care contact person and give details of symptoms. Provide any other relevant information as may be needed by the health care contact person.

**F. Important**

26. The project will facilitate testing of the team members for COVID-19 prior to deployment. Only members with negative results will participate in consultation activities. If a team member is tested positive, then such team member should immediately contact the appropriate local authority and follow all local/national guidelines governing patients of COVID-19.

## **Appendix 7: Copies of Minutes of Consultation Meetings**

### **MINUTES OF FOCUS GROUP DISCUSSIONS AT PHUNTS HOLING (PTDP / BAHP) Employed and Unemployed (Kidu Colony)**

There is a difference in living in Jaigaon as compared to Phuntsholing. The advantages are that all goods are available at cheap price at the doorstep in Jaigaon. Rents are cheaper in Jaigaon. The disadvantages are that toilets are shared, and electricity charges are very high. The environment is not safe for children, especially daughters. Moreover, youth can get easily influenced to drugs and gangs. Besides, it is difficult to get timely and quality treatment during emergencies, and the tenants are at the mercy of the landlord. If they cannot pay rent, they are told to vacate.

In terms of the current housing colony at the Kidu Colony, Amochu, they are living in, there are no issues with water supply and other services. However, they do face problems with cockroach infestations and unfiltered water from the taps. They feel that after the termination of the two-year period of stay in the current Kidu Colony, they would have a difficult time to find housing in Phuntsholing because of their inability to afford high rents.

They accept that the two-bedroom apartments proposed by NHDCL are more suitable and they may just be able to afford the rental. Currently, in Jaigaon they pay Nu.2,500 for two rooms but then the toilet is outside and not integrated with the rooms. In Jaigaon, the nearer is the dwelling to the Bhutan gate, the higher is the rent.

Some suggestions that participants have are: if the government could regulate the rents in Phuntsholing in order that they can also afford to pay the rent and stay in Phuntsholing. Besides, when asked, people are more in favor of living within the Phuntsholing core city area rather than the peripheral areas such as Pasakha and Toribari. There are bus services currently provided to these areas. While the bus fare to Pasakha is Nu. 25/trip from Phuntsholing, the bus fare to Toribari is Nu. 15/trip. Another reason for preferring living accommodations in Phuntsholing is the easy access to educational, health and short distance to Jaigaon.

**Table 6.1**  
**Summary of the results of the regression analysis**

Variable	Parameter estimate	Standard error	t-statistic	Probability >  t	95% CI of parameter estimate
Intercept	1.23	0.05	24.6	<.0001	1.13 to 1.33
Age	0.02	0.01	1.8	.076	0.00 to 0.04
Gender	0.15	0.08	1.8	.076	0.00 to 0.30
Education	0.05	0.02	2.5	.012	0.01 to 0.09
Income	0.01	0.00	2.8	.006	0.00 to 0.02
Health	0.03	0.01	3.2	.001	0.01 to 0.05
Marital status	0.02	0.01	2.1	.035	0.00 to 0.04
Employment	0.01	0.00	2.5	.012	0.00 to 0.02
Living alone	0.01	0.00	2.8	.006	0.00 to 0.02
Living with family	0.01	0.00	2.8	.006	0.00 to 0.02
Living with friends	0.01	0.00	2.8	.006	0.00 to 0.02
Living with partner	0.01	0.00	2.8	.006	0.00 to 0.02
Living with spouse	0.01	0.00	2.8	.006	0.00 to 0.02
Living with children	0.01	0.00	2.8	.006	0.00 to 0.02
Living with grandchildren	0.01	0.00	2.8	.006	0.00 to 0.02
Living with other relatives	0.01	0.00	2.8	.006	0.00 to 0.02
Living with non-relatives	0.01	0.00	2.8	.006	0.00 to 0.02
Living with pets	0.01	0.00	2.8	.006	0.00 to 0.02
Living with other animals	0.01	0.00	2.8	.006	0.00 to 0.02
Living with plants	0.01	0.00	2.8	.006	0.00 to 0.02
Living with other things	0.01	0.00	2.8	.006	0.00 to 0.02
Living with nothing	0.01	0.00	2.8	.006	0.00 to 0.02



**MINUTES OF FOCUS GROUP DISCUSSIONS AT PHUNTSHOLING  
(PTDP / BAHP)  
Employed and Unemployed (Kidu Colony)**

There is a difference in living in Jaigaon as compared to Phuentsholing. The advantages are that all goods are available at cheap price at the doorstep in Jaigaon. Rents are cheaper in Jaigaon. The disadvantages are that toilets are shared, and electricity charges are very high. The environment is not safe for children, especially daughters. Moreover, youth can get easily influenced to drugs and gangs. Besides, it is difficult to get timely and quality treatment during emergencies, and the tenants are at the mercy of the landlord. If they cannot pay rent, they are told to vacate.

In terms of the current housing colony at the Kidu Colony, Amochhu, they are living in, there are no issues with water supply and other services. However, they do face problems with cockroach infestations and unfiltered water from the taps. They feel that after the termination of the two-year period of stay in the current Kidu Colony, they would have a difficult time to find housing in Phuentsholing because of their inability to afford high rents.

They accept that the two-bedroom apartments proposed by NHDCL are more suitable and they may just be able to afford the rental. Currently, in Jaigaon they pay Nu.2,500 for two rooms but then the toilet is outside and not integrated with the rooms. In Jaigaon, the nearer is the dwelling to the Bhutan gate, the higher is the rent.

Some suggestions that participants have are: if the government could regulate the rents in Phuentsholing in order that they can also afford to pay the rent and stay in Phuentsholing. Besides, when asked, people are more in favor of living within the Phuentsholing core city area rather than the peripheral areas such as Pasakha and Toribari. There are bus services currently provided to these areas. While the bus fare to Pasakha is Nu. 25/trip from Phuentsholing, the bus fare to Toribari is Nu. 15/trip. Another reason for preferring living accommodations in Phuentsholing is the easy access to educational, health and short distance to Jaigaon.

**Table 6.1** *Handwritten title*

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## **MINUTES OF FOCUS GROUP DISCUSSIONS AT PHUNTSHOLING (PTDP / BAHP)**

### **FGD with NHDCL and Government staff (those currently living in NHDCL housing and those who are not but have applied)**

The NHDCL Liaison Officer presented the floor plans and designs of the housing units planned in Phuentsholing as well as the location identified. He also informed that the lowest rent would be Nu. 4,400 for a two-bedroom apartment and Nu. 3,000 for a one-room apartment.

Most participants were in favor of a two-bedroom apartment justifying that they needed more space for their goods and other belongings as well as for guests and moreover the rent seemed affordable. The present living conditions are characterized by small, congested spaces, water shortages, dilapidated conditions of the housing units entailing frequent repairs which are not undertaken regularly and even when there are urgent repairs to be done addressing the damages is dependent on budget availability and workmen to repair the damages so often tenants land up taking up the repairs themselves at their own cost.

However, in the new housing they preferred sliding windows reinforced with grills especially on the ground floor. Some stated that grills were also required in the open space along the stairway which if kept open would encourage easy entry of robbers to balconies of the people living on the first floor and above. They also felt that as Phuentsholing is a hot area and prone to dengue, if net screens could be provided in doors and windows, this would help tenants keeping internal areas cool but also prevent dengue mosquitoes.

An additional request is that if NHDC could fix the rent as per location as they felt for the same space, they should have different rents depending on distance from the city center. For example, for a two-bedroom apartment it is justified to have lower rent in Pasakha than in Phuentsholing because of the distance from the center, as with private housing, where one can find cheaper housing the further from the Centre one goes.

On the idea of ownership schemes for housing units, the participants are of the opinion that though in principle the idea is very good; but in practice, it will be difficult to implement because civil servants are usually posted to a location for 3-5 years and after that as per rules they must be transferred to another place. This will be inconvenient in terms of occupancy of the unit they have opted to own.

Each NHDCL colony and buildings have a Representative who coordinates waste management and cleanliness in the colony, coordinates maintenance when there is a need expressed by residents through an application form, parking control and ensures regular delivery of services. The challenges that Representatives face is that there are no incentives especially when they spend their own funds (for mobile vouchers) for calling up people. Further, they face the challenge of people not adhering to their notices and requests to participate or collaborate in common events for e.g., cleaning campaigns.

The process of availing maintenance services is that tenants fill out a form and submit to NHDCL through their representatives. The NHDCL deutes its technicians to make an assessment. If its routine maintenance like buying sockets and bulbs etc. tenants buy these themselves and technicians help in fixing the installations if they cannot manage. For other maintenance beyond their capacity, NHDCL technicians carry these out. All apartments are handed over with inventories to new tenants and on exit the inventory is again referred to ascertain that all that was

provided is available at the end of the tenure. Payments of bills are made by tenants themselves to the service providers. Rental can be deposited by electronic transfer or cheque or cash to NHDCL's account.

Participants feel that it is better to have individual water meters because some families use a lot more if they have more family members but pay the same as everyone else – even those with few members who consume less water than others. They also suggest that at the beginning itself if NHDCL should install good quality electrical and plumbing fixtures and fittings to deter repeated damage and repairs due to inferior quality. Also, these brands should be locally available (for example ROMA) so that people can purchase these locally and repair/replace the damaged ones immediately.





**Appendix 8: SAMPLE GRIEVANCE REGISTRATION FORM**  
(To be available in the local language)

The \_\_\_\_\_ Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing **\*(CONFIDENTIAL)\*** above your name. Thank you.

<b>Date</b>		<b>Place of registration</b>			
<b>Contact Information/Personal Details</b>					
<b>Name</b>		<b>Gender</b>	<ul style="list-style-type: none"> <li>• Male</li> <li>• Female</li> </ul>	<b>Age</b>	
<b>Home Address</b>					
<b>Village / Town</b>					
<b>District</b>					
<b>Phone no.</b>					
<b>E-mail</b>					
<b>Complaint/Suggestion/Comment/Question</b> Please provide the details (who, what, where and how) of your grievance below: If included as attachment/note/letter, please tick here:					
<b>How do you want us to reach you for feedback or update on your comment/grievance?</b>					

**FOR OFFICIAL USE ONLY**

<b>Registered by:</b> (Name of Official registering grievance)	
<b>Mode of communication:</b> <ul style="list-style-type: none"> <li>• Note/Letter</li> <li>• E-mail</li> <li>• Verbal/Telephonic</li> </ul>	
<b>Reviewed by:</b> (Names/Positions of Official(s) reviewing grievance)	
<b>Action Taken:</b>	
<b>Whether Action Taken Disclosed:</b>	<ul style="list-style-type: none"> <li>• Yes</li> <li>• No</li> </ul>
<b>Means of Disclosure:</b>	



**Appendix 10: Sample Environmental Site Inspection Checklist for Contractors**

**DAILY MONITORING SHEET FOR CONTRACTORS**

GREEN AND RESILIENT AFFORDABLE HOUSING SECTOR PROJECT  
Contractor Monitoring Sheet

Name of Subproject: \_\_\_\_\_  
 Location of Subproject: \_\_\_\_\_  
 Chainage covered (for linear works): \_\_\_\_\_  
 Supervising PIU: \_\_\_\_\_  
 Contractor: \_\_\_\_\_  
 Contractor EHS Supervisor (or equivalent): \_\_\_\_\_  
 Date of monitoring: \_\_\_\_\_

**Summary of Findings**

Monitoring Item	Status	Remarks
<b>1. Compliance with Local Permit Requirements</b>	<b>(Secured / Application Submitted / Not Applicable)</b>	
<i>Location/zoning permits</i>		
<i>Permit to construct</i>		
<i>Building permit</i>		
<i>Transport / hauling permits</i>		
<b>2. Compliance with IEE Requirements</b>	<b>(Approved / Under Preparation / Submitted to PIU for Approval)</b>	
<i>Site-specific EMP (SEMP)</i>		
<i>Corrective Action Plan, if any</i>		
<b>3. Compliance with SEMP</b>		
<b>Construction Site</b>	<b>(Satisfactory / Needs Improvement / Not Implemented)</b>	
- Conduct of toolbox talk		
- Use of PPE		
- Rest areas for male and female workers		
- Toilets for male and female workers		
- Medical kits		
- Drinking water supply		
- Dust control		
- Noise control		
- Solid waste management		
- Wastewater management		
- Chemicals storage (fuel, oil, etc.)		
- Siltation or erosion control		
- Heavy equipment staging / parking area		
- Barricades around excavation sites		
- Access to residential houses/shops/businesses		
- Traffic routing signages		
- Lightings at night		
- Trench shoring / landslide protection		

<b>Monitoring Item</b>	<b>Status</b>	<b>Remarks</b>
<b>Construction Workers' Camp Site</b>	<b>(Available / Needs Improvement / Not Available)</b>	
- Quarters for male and female workers		
- Sleeping utilities (e.g. beds, pillows, blankets, mosquito nets, etc.)		
- Power/Electricity supply		
- Drinking water supply		
- Toilets for male and female workers		
- General purpose water supply (cooking, washing, bathing)		
- Cooking facilities and areas		
- Solid waste management		
- Wastewater management		
- Pest control		
<b>4. Implementation of GRM</b>	<b>(Yes / No or None / Under Resolution)</b>	
<i>Complaints</i>		
<i>Complaints resolution</i>		
<b>5. Environmental Quality Measurement</b>	<b>(Passed / Failed / Not Applicable)</b>	
<i>Ambient air quality sampling</i>		
<i>Noise level measurement</i>		
<i>Receiving water quality sampling</i>		

**Other Issues:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Attachments:**

1. Copies of permits obtained, if any.
2. Photos taken at worksites, if any.  
(photos attached in previous monitoring sheets should not be used again).
3. Laboratory results of environmental quality measurements, if any.

**Prepared by:** \_\_\_\_\_  
 Name, Designation and Signature



**Appendix 11: Sample Environmental Site Inspection Checklist for PMU/PIU**

**INSPECTION CHECKLIST FOR PMU AND PIUs**

**GREEN AND RESILIENT AFFORDABLE HOUSING SECTOR PROJECT  
SITE INSPECTION CHECKLIST**

Subproject: \_\_\_\_\_

Date: \_\_\_\_\_

Location: \_\_\_\_\_

Chainage (for linear works): \_\_\_\_\_

Monitoring/Inspection Questions		Findings			Comments / Clarifications
1.	Supervision and Management Onsite	Yes	No	NA	
	a. Is an EHS supervisor available?				
	b. Is a copy of the SEMP available?				
	c. Are daily toolbox talks conducted on site?				
2.	The Facilities	Yes	No	NA	
	a. Are there a medical and first aid kits on site?				
	b. Are emergency contact details available on-site?				
	c. Are there PPEs available? What are they?				
	d. Are the PPEs in good condition?				
	e. Are there firefighting equipment on site?				
	f. Are there separate sanitary facilities for male and female workers?				
	g. Is drinking water supply available for workers?				
	h. Is there a rest area for workers?				
	i. Are storage areas for chemicals available and with protection? in safe locations?				
3.	Occupational Health and Safety	Yes	No	NA	
	a. Are the PPEs being used by workers?				
	b. Are excavation trenches provided with shores or protection from landslide?				
	c. Is breaktime for workers provided?				
	d. How many for each type of collection vehicle is in current use?				
4.	Community Safety	Yes	No	NA	
	a) Are excavation areas provided with barricades around them?				
	b) Are safety signages posted around the sites?				
	c) Are temporary and safe walkways for pedestrians available near work sites?				
	d) Is there a record of treated wastewater quality testing/measurement?				
5.	Solid Waste Management	Yes	No	NA	
	a. Are excavated materials placed sufficiently away from water courses?				
	b. Is solid waste segregation and management in place?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
	c. Is there a regular collection for solid wastes from work sites?				
6.	<b>Wastewater Management</b>	Yes	No	NA	
	a) Are there separate sanitary facilities for various types of use (septic tanks, urination, washing, etc.)?				
	b) Is any wastewater discharged to storm drains?				
	c) Is any wastewater being treated prior to discharge?				
	d) Are measures in place to avoid siltation of nearby drainage or receiving bodies of water?				
	e) Are silt traps or sedimentation ponds installed for surface runoff regularly cleaned and freed of silts or sediments?				
7.	<b>Dust Control</b>	Yes	No	NA	
	a. Is the construction site watered to minimize generation of dust?				
	b. Are roads within and around the construction sites sprayed with water on regular intervals?				
	c. Is there a speed control for vehicles at construction sites?				
	d. Are stockpiles of sand, cement and other construction materials covered to avoid being airborne?				
	e. Are construction vehicles carrying soils and other spoils covered?				
	f. Are generators provided with air pollution control devices?				
	g. Are all vehicles regularly maintained to minimize emission of black smoke? Do they have valid permits?				
8.	<b>Noise Control</b>	Yes	No	NA	
	a) Is the work only taking place between 7 am and 7 pm, week days?				
	b) Do generators operate with doors closed or provided with sound barrier around them?				
	c) Is idle equipment turned off or throttled down?				
	d) Are there noise mitigation measures adopted at construction sites?				
	e) Are neighboring residents notified in advance of any noisy activities expected at construction sites?				
9.	<b>Traffic Management</b>	Yes	No	NA	
	a) Are traffic signages available around the construction sites and nearby roads?				
	b) Are re-routing signages sufficient to guide motorists?				
	c) Are the excavation sites along roads provided with barricades with reflectors?				

Monitoring/Inspection Questions		Findings			Comments / Clarifications
	d) Are the excavation sites provided with sufficient lighting at night?				
10.	Recording System	Yes	No	NA	
	a) Do the contractors have recording system for SEMP implementation?				
	b) Are the daily monitoring sheets accomplished by the contractor EHS supervisor (or equivalent) properly compiled?				
	c) Are laboratory results of environmental sampling conducted since the commencement of construction activities properly compiled?				
	d) Are these records readily available at the site and to the inspection team?				

**Other Issues:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Prepared by:** \_\_\_\_\_  
 Name, Designation and Signature

## Appendix 12: Semi-Annual Environmental Monitoring Template

### I. INTRODUCTION

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. PIUs				
3. Consultants				

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) <sup>90</sup>	If On-going Construction	
				%Physical Progress	Expected Completion Date

<sup>90</sup> If on-going construction, include %physical progress and expected date of completion

**II. COMPLIANCE STATUS WITH NATIONAL / STATE / LOCAL STATUTORY ENVIRONMENTAL REQUIREMENTS<sup>91</sup>**

Package No.	Subproject Name	Statutory Environmental Requirements <sup>92</sup>	Status of Compliance <sup>93</sup>	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish <sup>94</sup>

**III. COMPLIANCE STATUS WITH ENVIRONMENTAL LOAN COVENANTS**

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

**IV. COMPLIANCE STATUS WITH THE ENVIRONMENTAL MANAGEMENT PLAN (REFER TO EMP TABLES IN APPROVED IEE/S)**

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

**Package-wise IEE Documentation Status**

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
	Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

<sup>91</sup> All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the “remarks” column.

<sup>92</sup> Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

<sup>93</sup> Specify if obtained, submitted and awaiting approval, application not yet submitted

<sup>94</sup> Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

**Package-wise Contractor/s' Nodal Persons for Environmental Safeguards**

Package Name	Contractor	Nodal Person	Email Address	Contact Number

- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

**Summary of Environmental Monitoring Activities (for the Reporting Period)<sup>95</sup>**

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>Design Phase</b>						
<b>Pre-Construction Phase</b>						
<b>Construction Phase</b>						
<b>Operational Phase</b>						

<sup>95</sup> Attach Laboratory Results and Sampling Map/Locations

**Overall Compliance with CEMP/ EMP**

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

**V. APPROACH AND METHODOLOGY FOR ENVIRONMENTAL MONITORING OF THE PROJECT**

- Briefly describe the approach and methodology used for environmental monitoring of each sub-project.

**VI. MONITORING OF ENVIRONMENTAL IMPACTS ON PROJECT SURROUNDINGS (AMBIENT AIR, WATER QUALITY AND NOISE LEVELS)**

- Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:
  - Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
  - Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
  - Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain;
  - Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
  - Confirm spill kits on site and site procedure for handling emergencies.
  - Identify any chemical stored on site and provide information on storage condition. Attach photograph.
  - Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
  - Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
  - Provide information on barricades, signages, and on-site boards. Provide photographs in the Appendix.
  - Indicate if there are any activities being under taken out of working hours and how that is being managed.
- Briefly discuss the basis for environmental parameters monitoring.
- Indicate type of environmental parameters to be monitored and identify the location.
- Indicate the method of monitoring and equipment used.
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements.

As a minimum the results should be presented as per the tables below.

### Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m <sup>3</sup>	SO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m <sup>3</sup>	SO <sub>2</sub> µg/m <sup>3</sup>	NO <sub>2</sub> µg/m <sup>3</sup>

### Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

### Noise Quality Results

Site No.	Date of Testing	Site Location	LA <sub>eq</sub> (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA <sub>eq</sub> (dBA) (Monitoring Results)	
			Day Time	Night Time

## VII. GRIEVANCE REDRESS MECHANISM

- Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).



### **VIII. COMPLAINTS RECEIVED DURING THE REPORTING PERIOD**

- Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

### **IX. SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS**

- Summary of follow up time-bound actions to be taken within a set timeframe.

### **X. APPENDIXES**

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- All supporting documents including **signed** monthly environmental site inspection reports prepared by consultants and/or contractors
- Others

### SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT

Project Name \_\_\_\_\_  
 Contract Number \_\_\_\_\_

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_  
 TITLE: \_\_\_\_\_ DMA: \_\_\_\_\_  
 LOCATION: \_\_\_\_\_ GROUP: \_\_\_\_\_

WEATHER CONDITION: \_\_\_\_\_

INITIAL SITE CONDITION: \_\_\_\_\_

CONCLUDING SITE CONDITION:  
 Satisfactory \_\_\_\_\_ Unsatisfactory \_\_\_\_\_ Incident \_\_\_\_\_ Resolved \_\_\_\_\_ Unresolved \_\_\_\_\_

INCIDENT:  
 Nature of incident: \_\_\_\_\_

Intervention Steps: \_\_\_\_\_

Incident Issues

Resolution	Project Activity Stage	Survey	
		Design	
		Implementation	
		Pre-Commissioning	
		Guarantee Period	

#### Inspection

Emissions	Waste Minimization
Air Quality	Reuse and Recycling
Noise pollution	Dust and Litter Control
Hazardous Substances	Trees and Vegetation

Site Restored to Original Condition      Yes       No

Signature \_\_\_\_\_

**Sign off**

\_\_\_\_\_  
**Name**  
**Position**

\_\_\_\_\_  
**Name**  
**Position**